

Enlightening the dark zone

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ENLIGHTENING THE DARK ZONE

UNESCO, Science and the Technocratic
Reordering of the World in the Global South,
1937-1959

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ENLIGHTENING THE DARK ZONE

UNESCO Science and the Technocratic Reordering of the World in the Global South 1937-1959

DISSERTATION

To obtain the degree of Doctor at Maastricht University, on the authority of the Rector Magnificus, Prof. dr. Rianne M. Letschert in accordance with the decision of the Board of Deans, to be defended in public on Wednesday 19th of December 2018 at 12:00

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What an adventure. I embarked on this project seven years ago. It all started on a gloomy December day when I decided to jot down some ideas to concretize a long-held aspiration of mine to become a researcher one day. Back then, I did not imagine that my ideas to investigate the creation of an international laboratory in the heart of the Amazon would be deemed worthy to explore. Nor did I believe they could occupy me daily for so long, take me around the globe and eventually make me a historian. Along the way, I was fortunate enough to receive the support of many caring, encouraging and competent people who guided me when in the dark, helped me when in doubt and inspired me to bring this project to fruition. I would like to express my gratitude to them.

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Chapter **1**

REORDERING THE WORLD
WITH SCIENCE

In 1943, in Chongqing, the British biochemist and historian of science Joseph Needham voiced his concern regarding the situation of his colleagues in war-torn China. In three memoranda addressed to the world's leading scientists he deplored that their situation remained ignored. In what he called the *Dark Zone* they struggled in the shadow of the thriving scientific communities of Europe and North America – that is, the *Bright Zone*. For Needham, the existence of this *Dark Zone* was a problem. It was a problem if the Allies wanted to defeat the Japanese. But, and more importantly to him, it was a problem for science as well. In China, Needham “realised the deadening, and sometimes demoralizing effect produced by the isolation in which scientists [in the *Dark Zone*] have to live”.¹ Excluded from scientific exchange, most non-Western scientists were unable to benefit from and, more problematically for Needham, to contribute to the advancement of science. Needham was alarmed to see how the contributions of his Asian colleagues were simply ignored or nipped in the bud due to a chronic lack of support from their colleagues in the *Bright Zone*. Ignoring the *Dark Zone* scientists was not just detrimental to science but also to humanity as a whole for Needham. With adequate moral and material support to the *Dark Zone*, he believed that scientists from both zones could contribute together to solve the challenges to peace posed by postwar reconstruction.²

In China, Needham grew convinced of the international origins of modern science. Although, like his contemporaries, Needham placed the birth of modern science in Europe, he believed it to be tributary to intense intellectual exchanges between Western and Eastern scholars. Needham discovered out of his queries into China's ancient knowledge traditions that many of the discoveries that were thought to be of European origins and that had been associated to the rise of European modernity – i.e., Capitalism and modern science – had actually been made by China long before. On the basis of these findings, Needham pictured modern science as an ecumenical product rather than a strictly European invention. Plunging into modern science's oriental origins, Needham envisioned a golden age, in which the exchanges between the intellectual and technical traditions of the West and the East prepared the ground for the unprecedented leap of

¹ ‘UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the first meeting held at Unesco house, 19, Avenue Kléber, Paris, 16e, on Saturday, November 20th 1946, at 10:30 a.m.’, 11 March 1947, UNESCO Archives, Paris (subsequently UA), UNESCO/C/Prog.Com./S.C.Nat.Sci./V.R.1, p.4.

² Joseph Needham, ‘First memorandum on an international science cooperation service (Chungking, July, 1944)’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Cooperation Office*, London: The Pilot Press LTD, 1948, pp.274-282; Joseph Needham, ‘Memorandum addressed to the Parliamentary and Scientific Committee. Measures for the organization of international cooperation in science in the postwar period’, 1944, Needham Papers, Cambridge University Library, Cambridge (subsequently NP), Folder D.6; Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14.

progress for mankind that the Scientific Revolution made possible. Some half a millennium later, Needham regrettably saw in the isolation of the Chinese scientists he visited how this golden era that birthed modern science had been long gone.³

Although Needham deplored how the present day community of science of which he was a prominent member had shrunk to the bounds of Europe and North America, he, in the midst of World War II, grew confident that the golden era of the past could and should be re-instated. If ecumenical exchanges between Eastern and Western scientific traditions had spawned modern science, Needham trusted that “assisting particularly the scientists and technologists in the far regions of the world outside the bright zone” would bring about its future advancement as well.⁴ With this conviction at heart, Needham eventually toured China, Europe and North America, before he found in the emerging United Nations Educational, Scientific and Cultural Organisation (UNESCO) a favorable platform to carry out the reconstruction of science as a world community. In the torment of war, but with its end in sight, Needham stated that a truly international science that included the scientists of the peripheral *Dark Zone* would be the “forecast of the world of tomorrow, as well as the inheritance of scientists the world over.”⁵

Following the success of his international campaign to include science at UNESCO, Needham joined the newly created specialized agency in 1946 as director of the Natural Science (NS) division. With the NS division, Needham sought to mobilize scientists from North and South to recreate the extinct ecumenical community of science he had glimpsed at through his historical investigations on the scientific traditions of Ancient China. Needham postulated that once re-united, the scientists from the *Bright* and the *Dark Zones* would be UNESCO’s best agent for the promotion of world peace. In his view scientific ecumenism enabled the full expression of science’s peace-making qualities. Needham argued that scientists possessed from their trade a universal and peace-loving attitude. Based on this conviction, he coupled the progress of international science to the regress of nationalism and believed that the ecumenical reunification of scientists constituted a model of international solidarity that could undermine the peace-threatening proliferation of nationalism. Ecumenism also impelled the development of science, which he conceived as mankind’s most powerful engine of progress. As a socialist, Needham granted socio-political functions to science which ecumenism could stimulate.

³ Thomas Mougey, ‘Needham at the crossroads: history, politics and international science in wartime China (1942-1946)’, *British Journal for the History of Science* (2017) 50, pp.83-109, p.99-108.

⁴ Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14, p.3.

⁵ Joseph Needham, ‘Science and society by a Chinese student reporter’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Cooperation Office*, London: The Pilot Press LTD, 1948, pp.120-121, p.121.

By working together, scientists from North and South would extend the capacities of science to strengthen human welfare and thus reduce the socio-economic causes of war.⁶

Needham staffed his new NS division with an international team of scientists from the United States, Britain but also the British Commonwealth, Brazil, China and India. Together they came up with a program to build several international laboratories and field cooperation offices scattered throughout the so-called *Dark Zone*, from China to Amazonia. Between 1946 and 1948, this ambition received a high priority within UNESCO's peace-building policy. Even though Needham had his eyes on China, the political instability resulting from the Chinese Communist Revolution combined with the stirring influence of the coalesced South American delegations on UNESCO affairs led the NS division to establish its first laboratory and field cooperation office in Latin America rather than China. In Rio de Janeiro, Needham and his team planned the creation of a Field Science Cooperation Office (FSCO) to enhance North-South scientific exchanges and an International Institute for the Hylean Amazon (IIHA) to foster international research in the heart of the Amazon.⁷

First proposed by the Brazilian chemist and UNESCO delegate Paulo de Berredo Carneiro in 1946, the IIHA was to become a major centre of science outside Europe and North America. The proposed institute was to be located in the heart of the Hylean Amazon, the vast wooded region of the Amazon River basin that then covered some seven million square kilometres in area.⁸ Carneiro and Needham's NS division aimed to make the IIHA the world's leading platform for tropical research. UNESCO aimed to make the IIHA into a space for scientists from all over the world, North and South alike, to meet and work together to advance scientific knowledge on the tropics and lay down practical solutions to the challenge of life and civilization in harsh but rich tropical environments. Despite its laudable intentions and an initial enthusiastic welcoming from local scientists, the IIHA was quickly resisted, re-negotiated, remodelled and eventually undone in 1952

⁶ Needham, *op. cit.* (2), p.274; Joseph Needham, 'The place of science and international scientific cooperation in postwar world organization, Memorandum III', 28 April 1945, NP, Folder D14, p.2-3; Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.5-12; Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70; For an overview of Needham's internationalism, see: Brigitte Schroeder-Gudenus, *Les Scientifiques et la Paix: La Communauté Scientifique Internationale au cours des Années 20*, Montréal: Les Presses Universitaires de Montréal, 1978, p.16-17, p.32-33.

⁷ *Science and UNESCO - International Scientific Cooperation - Tasks and Functions of the Secretariat's Division of Natural Sciences*, London: Pilot Press, nd, UA, UNESCO/Prep.Com./Nat.Sci.Com./12; Patrick Petitjean, 'Le département des sciences naturelles de l'UNESCO et les scientifiques latino-américains à la fin des années 1940', *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2009) 4, pp.437-452, p.438-440.

⁸ 'International Institute of the Hylean Amazon', *Nature* (1949) 163, p.15.

by the interventions of Latin American actors and events. The IIHA spurred a spree of positive and not so positive reactions from the local and international intelligentsia. Support came first from the directly concerned scientific communities of the Amazon and some eager Indian and British imperial scientists and experts who Needham and UNESCO actively sought to include. Then, in 1947, the Latin American scientists involved in the institute's making coalesced around Carneiro to redefine the proposed IIHA from a global to a regional institute. They feared that Needham's proposal would not help emancipate the Amazon but rather re-instate old colonial patterns that would renew the subjection of the *Dark Zone* and the Amazon to the benefit of the North. The renegotiation of the shape and purpose of the IIHA was however abruptly terminated when the Brazilian parliament, backed by the country's technocratic elite decided in 1952 to reject the creation of the proposed institute on its Amazonian soil. On the wreck of Needham's proposals and Carneiro's counter-proposals, the Brazilian technocratic elites led by the historian Arthur César Ferreira Reis and the Vice Admiral and scientist of explosives Álvaro Alberto da Mota e Silva eventually built the national twin to the IIHA, the National Institute for Amazonian Research (INPA) and the Superintendence for the Planning of the Economic Valorisation of the Amazon (SPVEA) in 1954. Together the two agencies served the same development purposes as the IIHA with the exception that its action remained within the bounds of the Brazilian Amazon and under the sole control of the Brazilian state was its sole master.⁹

BEYOND THE AMAZON JUNGLE: THE IIHA AND THE AGE OF TECHNOCRACY

Regardless of its dramatic rejection, the IIHA offers a transnational perspective on how scientists, their trade and ideology – i.e., modern science – shaped the national and global modes of governance of the immediate post-war era. The (un)making of the IIHA epitomizes the rise of scientists as a significant political force of the postwar era. Building upon their decisive involvement in the war, scientists had come to occupy authoritative functions in the governance of the postwar era both at the national and international level. While scientists and science-minded intellectuals and administrators like Vannevar Bush in the US contributed to make science a strategic concern for most Western powers, others

⁹ Marcos Chor Maio, 'A UNESCO e o projeto de criação de um laboratório científico internacional na Amazônia', *Estudos Avançados* (2005) 19, pp.115-130; Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50; Marcos Chor Maio and Magali Romero Sá, 'Ciência na periferia: a UNESCO, a proposta de criação do Instituto Internacional da Hiléia Amazônica e as origens do INPA', *História, Ciências, Saúde – Manguinhos* (2000) 4, pp.975-1017.

took up influential positions in the emerging agencies of the United Nations (UN). The British biologists Julian Huxley and John Boyd Orr, for instance, became the first general-directors of UNESCO and the Food and Agriculture Organisation (FAO). Together with scientists like Needham and the French physiologist Henri Laugier, Huxley established the development of science for peace as a program priority for several UN agencies like UNESCO and the Economic and Social Council (ECOSOC).¹⁰

The aims of this dissertation are threefold. My first question concerns the scientists, and more specifically their activism and the claim to a political role they pursued in the 1930s and 1940s. I seek to understand how scientists from North and South managed to take up an increasingly visible role in the international political arena. My second question emphasizes the worldviews of these scientists and the political aspirations associated to their claim to political authority. I intend to unravel what exact roles they assigned to science and how these different conceptualizations of science competed in the reordering of postwar society. Lastly, the third question of this dissertation zooms in on the effects and legacy of these scientific worldviews on the reconstruction process. I examine how conceptions of science and their practical enactment at the end of the 1940s shaped the postwar world. I will particularly highlight how the scientific reordering of the postwar world proposed by scientists produced new conceptions of postwar modernity as well as alternative forms of world order.

I intend to answer these questions by following the conflicts and controversies that punctuated the IIHA's making and unmaking. This journey takes us from China, where Needham challenged the existing international organization of science and successfully conducted a worldwide campaign in favor of science at UNESCO, to Paris, where he and scientists from North and South quarrelled about the nature and purpose of UNESCO's scientific program. From Paris, where UNESCO scientists devised a plan to create the IIHA, we will travel to the heart of the Amazon to reconstruct the project's disputed making and witness its demise. Focusing on local voices, this query into the IIHA's unsuccessful establishment does not just show different models of what the IIHA was to be but sheds light on competing visions of world order, science and modernity in the tropics.

My research focuses on the period stretching between 1937 and 1959 because this periodization corresponds to the lead-up to and immediate afterlife of the IIHA. 1937

¹⁰ John Toye and Richard Toye, 'One world, two cultures? Alfred Zimmern, Julian Huxley and the ideological origins of UNESCO', *History* (2010) 95, pp.308-331, p.318-326; Patrick Petitjean, 'Giving science for peace a chance: the post-war international laboratory projects', in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty Years of Science at UNESCO*, Paris: UNESCO publishing, 2006, p.52-57; Amy Staples, 'To win the peace: the Food and Agriculture Organization, Sir John Boyd Orr, and the World Food Board Proposals', *Peace and Change* (2003) 28, pp.495-523, p.498-501.

was a turning point for two of the program's main protagonists. In this year, Needham experienced his first contacts with China. His collaboration with a group of visiting biochemical students from China awakened a life-long curiosity for Chinese science and his concern for the problematic condition of *Dark Zone* scientists.¹¹ In the same year, Carneiro fled to France after two years in the Brazilian state of Pernambuco where he had experimented with scientific modernization. His Pernambucan experience combined with his return to research at the Pasteur Institute in Paris transpired later in his commitment at UNESCO.¹² 1959, then, concluded the first *First Five-year Valorisation Plan* that the SPVEA and the INPA had launched in 1955. The end of the Valorisation Plan marked the overall end of the IIHA sequence. After 1959, the SPVEA and the INPA vegetated as Amazonia returned to the status of a secondary concern for the government of Juscelino Kubitschek before the military coup of 1964 profoundly transformed the two institutions that had been modelled on the IIHA.¹³

The period between 1937 and 1959 also corresponds more generally to the crucial period when scientists defined the political and social functions of science and put science on the national and international agenda as a mode of reordering a world troubled by WWII. The 1930s, 1940s and 1950s have been commonly associated to what historians have named the age of modernity or high modernity (1890-1970). Ulrich Herbert but also Stefan Couperus, Liesbeth van de Grift and Vincent Lagendijk have defined high modernity as a moment of accelerated social, economic and cultural changes in which the actors were aware of their capacity to perfect society through scientific interventions.¹⁴ Paul Forman further pointed out that the period marked the cultural primacy of science in powering intellectual and material progress in the Western world while Richard Olson, in a similar vein, showed how, through the course of the twentieth century, scientific management became a shared feature of industrial and public management worldwide.¹⁵

¹¹ Mougey, op. cit (3), p.91-93, p.103-108.

¹² Marcos Jungmann Bhering and Marcos Chor Maio, 'Entre ciência e política: o positivismo de Paulo Carneiro na Secretaria de Agricultura, Indústria e Comércio de Pernambuco (1935)', *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.435-451, p.443-449; Paulo de Góes Filho and Francisco Barreto Araújo, 'Noções de ciência nacional e internacional: as trajetórias de Paulo Carneiro e Carlos Chagas Filho' in Marcos Chor Maio, (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.169-193, p.182-184.

¹³ José Raimundo Barreto Trindade (ed.), *Seis décadas de intervenção estatal na Amazônia. A SPVEA, Auge e crise do ciclo ideológico do desenvolvimentismo Brasileiro*. Belém: Editora Paka-Tatu, 2014; Gilberto Marques, 'SPVEA: O Estado na crise do desenvolvimento regional Amazonico (1953-1966)', *Revista da Sociedade Brasileira de Economia Política* (2013) 34, pp.163-198, p.179-181.

¹⁴ Stefan Couperus, Liesbeth van de Grift and Vincent Lagendijk, 'Experimental spaces: a decentred approach to planning in high modernity. Introduction', *Journal of Modern European History* (2015) 13, pp.476-480, p.476; Ulrich Herbert, 'Europe in high modernity. Reflections on a theory of the 20th century', *Journal of Modern European History* (2007) 5, pp.5-21.

¹⁵ Paul Forman, 'The primacy of science in modernity, of technology in postmodernity, and of ideology

Such broad categorization however overlooks the specificities of the period investigated in this dissertation. The 1940s and 1950s marked a turning point in this process. While, over the first half of the twentieth century, science obtained a growing cultural authority among the intellectual elite, it remained largely ignored by the political elite as a reliable resource of governance. Following WWII, science was no longer seen as belonging to the cultural realm and became politically ubiquitous. As John Krige and Kai-Henrik Barth argued, WWII “irreversibly embedded science at the heart of the political process”.¹⁶ Political historians and historians of science have shown that, throughout the 1940s and 1950s, science did not merely expand with new fields of research and countless contributions to the war effort, but it became, by 1945, a coveted and strategic asset for governments to advance national interests. The post-war era was a time of optimism about science. National elites from around the world enrolled science and scientists to promote political stability, improve socio-economic prospects, refashion identity and advance national interests in the unstable geopolitics of the immediate post-war.¹⁷ Science did not only become a practical instrument of governance and state in the 1940s. Mark Mazower drew attention to the fact that science, expertise and technical knowledge also arose as a significant ideological resource to imagine a durable and peaceful post-war order. In the 1940s and early 1950s, science became an alternative universalizing ideology to the so far dominant universalist thinking centred around human rights and international law.¹⁸ The period 1937-1959 was therefore characterized by the rise of scientific expertise as a state resource and the increased ideological value and centrality of science in the conduct of national and international affairs. Focusing on the years 1937-1959 thus enables to scrutinize the specific processes that marked the global dawn of technocracy during and after WWII.

Technocracy generally designates the rule of expert and reflects a belief in the inevitability and desirability of such rule in industrial societies. Although the concept has a long history dating back to Plato, its modern usage stemmed from the Industrial Revolution and refers namely to attempts to use modern scientific principles and technological means to rationalize management, optimize production and heighten labor productivity. Through the Scientific Management movement of the early twentieth

in the history of technology’, *History and Technology* (2007) 23, pp.1-152; Richard Olson, *Scientism and Technocracy in the Twentieth Century: The Legacy of Scientific Management*, Lanham: Lexington Books, 2016.

¹⁶ John Krige and Kai-Henrik Barth, ‘Science, technology and international affairs’, *Osiris* (2006) 21, pp.1-21, p.2.

¹⁷ John Krige and Jessica Wang, ‘Science, technology and nation-building, post-1945’, *History and Technology* (2015) 31, pp.171-179.

¹⁸ Mark Mazower, ‘Reconstruction: the historiographical issues’, *Past and Present* (2011) 210 suppl_6, pp.17-28, p.23.

century, engineering progressivism and the American Technocrat movement of the 1930s, social engineers and technicians spread the idea of technocracy and technocratic organization beyond the workspace of the industrial factory to guide the organization and rationalization of other spheres of society.¹⁹ Proponents of technocratic rule were to be found across the industrialized world, from one of its birthplace, the United States through Europe and the Soviet Union.²⁰ According to Beverly Burris, technocrats legitimized their claim to power based on three main ideas. First, the increasingly technical character of industrial societies called for technical experts to organize them adequately. Second, the resulting prominence of technical considerations rendered political considerations obsolete and made technical solutions inevitable in the governance of modern industrial societies. Third, technocrats were technological determinists, if not optimists, as they generally believed in technological fixes and the capacity of the expert to identify the one best fix to solve an issue or accomplish a task.²¹

Historians have investigated technocracy as an organizational practice and traced the effects of technocratic practices on various spheres of society from labor organization to social order and politics. Early studies focused on the birth of technocracy in the burgeoning American industry of the late nineteenth century, while subsequent research has considered its deployment and development in other sphere of society.²² Burris studied the effect of technocracy as organizational control over labor place and markets, while others like Frank Fischer investigated the role of expertise on decision-making and Claudio Radaelli looked into the political effects of the rule of experts on the political process within the institutions of the European Union.²³ The rule of expert was however more than an instrument to optimize production and structure policy-making. It was also a politically and culturally significant ideology that formed the basis to various political imaginaries throughout the twentieth century. As Charles Maier argued, engineers and technicians but also politicians, intellectuals and businessman looked up to technocracy as a way to create new societal orders.²⁴ Recently, Johan Schot and Vincent Lagendijk

¹⁹ On the Technocrat Movement, see: William Akin, *Technocracy and the American Dream. The Technocrat Movement, 1900-1941*, Berkeley: University of California Press, 1977 and Henry Elsner Jr. *The Technocrats: Prophets of Automation*, Syracuse: Syracuse University Press, 1967.

²⁰ On Taylorism and scientific management in the US, see: Hugh Aitken, *Scientific Management in Action: Taylorism at Watertown Arsenal, 1908-1915*, Princeton: Princeton University Press, 1985; on the development of scientific management in the Soviet Union, see: Mark Beissinger, *Scientific Management, Socialist Discipline and Soviet Power*, Cambridge: Harvard University Press, 1988.

²¹ Beverly Burris, *Technocracy at Work*, Albany: State University of New York Press, 1993.

²² Akin, op. cit. (19); Aitken, op. cit. (20).

²³ Frank Fischer, *Technocracy and the Politics of Expertise*, Newbury Park: Sage Publications, 1990; Claudio Radaelli, *Technocracy in the European Union*, London: Routledge, 1999.

²⁴ Charles Maier, 'Between Taylorism and technocracy: European Ideologies and the Vision of Industrial Productivity in the 1920s', *Journal of Contemporary History* (1970) 5, pp.27-61.

pointed out how technocratic ideas in the construction of Europe's transport and energy networks sustained internationalist aspirations and notably the peaceful imbrication of Europe.²⁵ Although, as Maier showed, technocratic ideas influenced fascist, liberal as well as socialist and communist ideologies and permeated international organizations like the League of Nations, ideologies of technocracy remain relatively understudied according to Schot and Lagendijk.²⁶

In this dissertation, I proposed to continue this inquiry into technocracy as a political ideology. My contribution to this burgeoning literature is threefold. First, I will show how technocratic ideologies permeated the mid-twentieth century and spread beyond the industrial West to flourish across the globe. We will see that during and following WWII, technocratic worldviews were deployed at the international level, in the case of UNESCO's peace-building mission, and at the regional and national level, in the case of Amazonia's development and Brazil's modernization. Second, I will examine these competing technocratic imaginaries as they were articulated and implemented in concrete projects, namely UNESCO's IIHA and Brazil's SPVEA, CNPq and INPA. After recollecting their interwar origins, I will examine the ways by which these ideals informed international reconstruction, the kind of recomposition of social and international order they entailed, or not, and the discussions and controversies they provoked. Finally, I will focus on the scientists and the way they mobilized science rather than technology to conceive such technocratic rule.

I study the formation of post-war technocracy as a global process in which the Global South figured prominently. As I briefly pointed at already, a variety of sites and actors stemming from outside Europe and North America participated actively in shaping the IIHA and the making of post-war technocracy. As we will see, scientists and intellectuals from China, the British Empire and Latin America engaged in the making of the IIHA. Throughout this dissertation I refer to this eclectic constellation of places and actors using the notion of Global South. This notion arose in the late 1960s, within postcolonial history, to designate the underdeveloped reality of decolonized countries and became widely used in the late 2000s and 2010s to refer to non-Western countries which share cultural difference, geopolitical relations and a similar process of development.²⁷ I use

²⁵ Johan Schot and Vincent Lagendijk, 'Technocratic Internationalism in the Interwar Years: Building Europe on Motorways and Electricity Networks', *Journal of Modern European History* (2008) 6, pp.196-217.

²⁶ Maier, op. cit. (24), p.28-29; Schot and Lagendijk, op. cit. (25), p.197-200; On technocratic ideas and practices at the League of Nations, see: Patricia Clavin, *Securing the World Economy. The Reinvention of the League of Nations, 1920-1946*, Oxford: Oxford University Press, 2013; Jo-Anne Pemberton, 'New Worlds for Old: the League of Nations in the Age of Electricity', *Review of International Studies* (2002) 28, pp.311-336.

²⁷ Diana Mitlin and Diana Satterlhwite, *Urban Poverty in the Global South: Scale and Nature*, New York:

Global South as opposed to the West to highlight the involvement and agency of actors outside Europe and the United States in the shaping of post-war technocracy and contest by extension their absence in the existing accounts of this very shift. The notion is not entirely unproblematic however. It does not allow for a distinction between colonial and postcolonial realities (i.e., the British Empire and Latin America) and it overshadows the cases of territories that are standing north of the equator (i.e., China). For lack of a better terminology, I will try to limit the totalizing and anachronic implications of the notion of Global South by adding, when required, some additional geographical concepts specifying places such as Eastern and Latin American or political realities like Empires or the tropics.

Technocracy, UN internationalism and the challenge of postwar reconstruction – A review

With its focus on science, UNESCO, internationalism and international politics, my dissertation draws on a rich body of scholarship, crosscutting several disciplines. My approach brings imperial, international and post-war political history, the history of the UN, the history of science, the history of development and the history of planning and reconstruction together to examine the interplay between science, the idea of progress and (international) politics in the dawn of technocracy.

Until recently, historians have regarded the 1940s and, more specifically, the reconstruction effort in the years 1945-1949 as what Mazower described as “a kind of prehistory of the Iron Curtain”.²⁸ The end of the Cold War opened up new perspectives on the origins of the post-war order.²⁹ Historians have questioned the usefulness of the Cold War binary to interrogate this period and turned to the reconstruction effort to unravel the diverse and contingent experiences, challenges and solutions that made up the reconfiguration of the world order after 1945. Reconstruction scholars postulate that the destruction (and creations) of WWII – material as much as moral and symbolic – and the challenge of reconstruction opened a window of opportunity for a variety of actors to

Routledge, 2013, p.13; Heike Pagel, Karen Ranke, Fabian Hempel and Jonas Köhler, ‘The use of the concept of “global south” in social science and humanities,’ presented at the symposium “Globaler Süden / Global South: Kritische Perspektiven”, Institut für Asien- & Afrikawissenschaften, Humboldt-Universität zu Berlin, 11th July, 2014.

²⁸ Mazower, op. cit. (18), p.17.

²⁹ Tony Judt’s conference series on the theme of “Rethinking Postwar Europe” and Eric Hobsbawm’s Balzan workshops “Reconstruction of the Immediate Aftermath of War: A Comparative Study of Europe, 1945-1950” paved the way to this renewed interest for the question of reconstruction, see: István Deák, Jan Gross and Tony Judt, *The Politics of Retribution in Europe: World War II and its Aftermath*, Princeton: Princeton University Press, 2000; Tony Judt, *Postwar: A history of Europe Since 1945*, New York: Penguin Press, 2005; see also the special issue edited by Jessica Reinish, ‘Relief in the aftermath of war,’ *Journal of Contemporary History* (2008) 43, which grew out of the Balzan conference.

imagine new futures and reinvent the present. The reconstruction era was a period in which the political, social, economic and international norms of the interwar past such as the liberal and the colonial rule were questioned, reinvented and/or replaced. Reconstruction studies consist of several bodies of literature that look into WWII and the 1940s to deal with objects such as the reconfiguration of internationalism, the consolidation of the welfare state, the remodeling of Empire and the construction of Europe.³⁰ This dissertation draws further on two related historiographies of reconstruction, the history of the UN and UNESCO and contemporary history of science.

As a product of reconstruction, the UN has recently been the object of renewed historical interest from the burgeoning field of transnational history. For the past decade, historians have critically revisited the narratives associated to the formation of the UN and moved beyond the realist-idealist binary inherited from the Cold War to examine its actions.³¹ The history of international organizations and the UN in particular has been traditionally dominated by realist accounts from international relations.³² Postulating the primacy of states and their conflicts as the formative force shaping world politics, realist scholars have portrayed the UN as either irrelevant to understand postwar world politics

³⁰ The supplement 6 of the journal *Past and Present* (2011) titled 'Post-war reconstruction in Europe: international perspectives, 1945-1949' and edited by Mark Mazower, Jessica Reinisch and David Feldman and, to some extent, the supplement 8 of the same journal (2013) titled 'Transnationalism and contemporary history' and edited by Matthew Hilton and Rana Mitter as well as the special issue 'Relief in aftermath of war' (2008) in the *Journal of Contemporary History* provide an interesting overview of the historiographical breadth offered by reconstruction studies. See on the reconfiguration of internationalism: Waqar Zaidi, "A blessing in disguise": reconstructing international relations through atomic energy, 1945-1948', *Past and Present* (2011) 210 suppl_6, pp.309-331; Sunil Amrith and Patricia Clavin, 'Feeding the world: connecting Europe and Asia, 1930-1945', *Past and Present* (2013) 218 suppl_8, pp.29-50; On the recomposition of the nation state, see: David Edgerton, 'War, reconstruction, and the nationalization of Britain, 1939-1951', *Past and Present* (2011) 210 suppl_6, pp.29-46; On the reconfiguration of Empire, see: Frederick Cooper, 'Reconstructing Empire in British and French Africa', *Past and Present* (2011) 210 suppl_6, pp.196-210.

³¹ For an overview of the new directions and historiographical challenges that the history of the UN has taken in the past decade, see: Glenda Sluga, 'Editorial – the transnational history of international institutions', *Journal of Global History* (2011) 6, pp.219-222; Sunil Amrith and Glenda Sluga, 'New histories of the United Nations', *Journal of World History* (2008) 19, pp.251-274; Sandrine Kott, 'Les organisations internationales, terrains d'étude de la globalisation. Jalons pour une approche socio-historique', *Critique Internationale* (2011) 3, pp.9-16.

³² Kott, op. cit. (31), p.10; On the realist approach of international organisations, see : Robert Jervis, 'Realism in the study of world politics', *International Organization* (1998) 52, pp.971-991 ; John Gerard Ruggie, *Constructing the World Polity : Essays on International Institutionalization*, New York: Routledge, 1998 ; John Ikenberry, *Liberal Leviathan : the Origins, Crisis and Transformation of the American World Order*, Princeton: Princeton University Press, 2011; For an account of the origins of realism and how its rise was intimately related to a critique of the emerging UN in the 1940s and 1950s see, Mark Mazower, *Governing the World: the History of an Idea*, London: The Penguin Press, 2012, p.235-240; see also Nicolas Guilhot (ed.), *The Invention of International Relations Theory: Realism, the Rockefeller Foundation, and the 1954 Conference on Theory*, New York: Columbia University Press, 2011.

or as another arena for nations to compete.³³ Post-realist inquiries have contributed to rediscover the political origins of the UN system as well as to re-evaluate the distinct political and intellectual significance of the UN's many specialized agencies for twentieth century politics. Scholars like Mark Mazower and Glenda Sluga have shown the UN to be a complex product of the changes brought about by WWII and the liberal as well as imperial practices inherited from the interwar period.³⁴ Jean-Jacques Renoliet has explored the strong continuities that tied UNESCO with the League of Nations, while others like Peder Anker and Joseph Hodge showed how the UN system cultivated imperial thinking by embracing the British Empire's intellectual traditions and enrolling its colonial experts.³⁵

Building upon recent re-evaluations of the legacy of the League of Nations, this expanding historiography is also starting to investigate the actions, practices and ideas of the UN.³⁶ Historians start to highlight how the UN challenged the hegemony of nationalism and later Cold War politics by promoting East-West dialogue and by fostering alternative ideologies such as cosmopolitanism, scientific humanism, Third-Worldism and environmentalism.³⁷ In the 1950s and 1960s, UNESCO, FAO and WHO modelled

³³ Particular attention has been paid to the role of the US in the shaping of the UN, see for instance: Elizabeth Borgwardt, *A New Deal for the World: America's Vision for Human Rights*, Cambridge: Harvard University Press, 2005; Stephen Schlesinger, *Act of Creation: The Founding of the United Nations*, Boulder: Westview Press, 2003; Mary Ann Glendon, *A World Made New: Eleanor Roosevelt and the Universal Declaration of Human Rights*, New York: Random House, 2001; Townsend Hoopes and Douglas Brinkley, *FDR and the Creation of the UN*, New Haven: Yale University Press, 1997.

³⁴ Mark Mazower, *No Enchanted Palace: The End of Empire and the Ideological Origins of the United Nations*, New Jersey: Princeton University Press, 2009; Mazower, op. cit. (32); Glenda Sluga, *Internationalism in the Age of Nationalism*, Philadelphia: University of Pennsylvania Press, 2013; See also the special issue 'International organizations during the Second World War' edited by Sandrine Kott in the *Journal of Modern European History* (2014) 3 and in particular Sandrine Kott, 'International organizations during the Second World War. Introduction', *Modern European History* (2014) 3, pp.317-322.

³⁵ Jean-Jacques Renoliet, *L'UNESCO oubliée: La Société des Nations et la Coopération Intellectuelle (1919-1946)*, Paris: Publications de la Sorbonne, 1999; Clavin, op. cit. (26); Peder Anker, *Imperial Ecology. Environmental Order in the British Empire, 1895-1945*, Cambridge: Harvard University Press, 2001; Staples, op. cit. (10); Joseph Morgan Hodge, 'British colonial expertise, post-colonial careering and the early history of international development', *Journal of Modern European History* (2010) 8, pp.24-46; Anthony Kirk-Greene, 'Decolonization: the ultimate diaspora', *Journal of Contemporary History* (2001) 36, pp.133-151.

³⁶ Poul Duedahl's latest edited volume on UNESCO illustrates this shift of attention, see: Poul Duedahl (ed.) *A History of UNESCO. Global Actions and Impacts*, London: Palgrave Macmillan UK, 2016; For an overview of the new approaches on the League of Nations, see: Susan Pedersen, 'Back to the League of Nations', *The American Historical Review* (2007) 112, pp.1091-1117.

³⁷ On environmentalism, see: Thomas Jundt, 'Dueling visions for the postwar world: The UN and UNESCO 1949 Conferences on Resources and Nature, and the origins of environmentalism', *The Journal of American History* (2014) 101, pp.44-70, Anna-Katharina Wöbse, "'The world after all was one": the international environmental network of UNESCO and IUPN, 1945-1950', *Contemporary European History* (2011) 20, pp.331-348; Simone Schleper, *Life on Earth. Controversies on the Science and Politics of global Nature Conservation, 1960-1980*, Dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2017; Hans Schouwenburg, *Strategies to Save the Earth. Nature Conservation Experts and Sustainable Development, 1980-2000*, Dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2017; On cosmopolitanism, see: Glenda Sluga and Julia Horne, 'Cosmopolitanism:

alternative planning practices that suited the non-alignment politics of the emerging Third World.³⁸ Although the role of science in developing these planning practices is starting to receive attention, especially via a growing interest among historians for technical and development aid, the bulk of UN studies still focuses on international law, human rights and cultural cooperation as the core business of the UN. Similarly, if international history recognizes the relative independence of the UN from Great Power and Cold War politics, research into the way this autonomy materialized in practice and what effects it produced still remains limited.³⁹

Another important feature of the 1940s that historians are currently highlighting is the increasingly important political role that science played in the conduct of war and in the task of post-war reconstruction. Historians like David Edgerton have showed how science became enrolled in the world conflict and highlighted the many ramifications of such enrolment on the conduct of war and reconstruction once the war over.⁴⁰ John Krige and Kai-Henrik Barth claimed that with WWII science became a new strategic resource for leading powers to imagine and organize the future post-war world order.⁴¹ The post-war era was the age of Big Science in which states began to sponsor large-scale scientific research and enrolled its transformative power to advance their interests in the international arena.⁴² Several authors showed in the case of the United States how science came to be seen as a privileged instrument for the state to reinforce its military capacities,

its pasts and practices', *Journal of World History* (2010) 21, pp.369-373; Tom Allbeson, 'Photographic diplomacy in the post-war world: UNESCO and the conception of photography as a universal language, 1946-1956', *Modern Intellectual History* (2015) 12, pp.383-415; On scientific humanism, see: Mougey, op. cit. (3); Toye and Toye, op. cit. (10); Glenda Sluga, 'UNESCO and the (one) world of Julian Huxley', *Journal of World History* (2010) 21, pp.393-418. On Third Worldism and decolonization, see: Mazower, op. cit. (34), p.149-189; Mazower, op. cit. (32), p.244-272.

³⁸ Interest for UN technical agencies is however growing, see: Amy Staples, *The Birth of Development: How the World Bank, Food and Agriculture Organization, and World Health Organization Changed the World, 1945-1965*, Kent: The Kent State University Press, 2006; Marc Frey, Sönke Kunkel, and Corinna Unger, *International Organizations and Development, 1945-1990*, Basingstoke: Palgrave Macmillan, 2014; Jacob Darwin Hamblin, 'Let there be light ... and bread: the United Nations, the developing world, and atomic energy's Green Revolution', *History and Technology* (2009) 25, pp.25-48.

³⁹ For our concern (i.e., UNESCO), Poul Duedahl's recent volume on UNESCO is a noteworthy exception, see: Duedahl, op. cit. (36).

⁴⁰ David Edgerton, *Britain's War Machine: Weapons, Resources and Experts in the Second World War*, London: Allen Lane, 2011; David Edgerton, *Warfare State, Britain 1920-1970*, Cambridge: Cambridge University Press, 2005; Allan Needell, 'From military research to big science: Lloyd Berkner and science-statemanship in the post-war era', in Peter Galison and Bruce Hevly (eds.) *Big Science: The Growth of Large-Scale Research*, Stanford: Stanford University Press, 1992, pp.290-311; See also: Guy Hartcup, *The Effect of Science on the Second World War*, Houndmills, Basingstoke, Hampshire; New York: Palgrave Macmillan, 2000; William McGucken, *Scientists, Society, and State: The Social Relations of Science Movement in Great Britain, 1931-1947*, Columbus: Ohio State University Press, 1984.

⁴¹ Krige and Barth, op. cit. (16).

⁴² On Big Science, see: Daniel Kevles, *The Physicists: The History of a Scientific Community in Modern America*, New York: Vintage Books, 1979; Galison and Hevly, op. cit. (40).

promote world peace and a communist-free international order and foster development in the growingly decolonized world.⁴³ As Krige, Stuart Leslie and Robert Kargon showed, the rise of Big Science in America was not neutral. American Big Science also became an important platform to advance the US administration's political and ideological agendas overseas. By reconstructing Europe's scientific infrastructure and assisting the development of science and technology in emerging Third World countries like Iran and India, the US technocratic elite made scientific cooperation a powerful instrument of America's anti-communist politics.⁴⁴ Some authors have described how similar processes took place within Europe's remaining Empires. The ruling elite of the French, British and Dutch Empires indeed looked to science to reinvent colonial rule during and after the war.⁴⁵

That science became the dominant problem-solver of the post-war era consecrated the rule of experts. Historians of planning and technocracy demonstrated the power of technocratic imaginaries regarding the problems of economic depression, social conflict and instability and to create a harmonious societal order. They showed planning and technocracy to have diverse shapes. They ranged from a working method to an ideological resource and produced a variety of interventions from micro-level initiatives such as reconstruction planning in war-torn European cities to largescale regional and internationalist enterprises like the unification of Europe through electricity and motorway networks.⁴⁶ Historians have furthermore studied technocracy in action, the

⁴³ John Krige, 'Atoms for Peace, scientific internationalism, and scientific intelligence', *Osiris* (2006) 21, pp.161-181.

⁴⁴ Stuart Leslie and Robert Kargon, 'Exporting MIT: science, technology and nation-building in India and Iran', *Osiris* (2006) 21, pp.110-130; John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, Cambridge: the MIT Press, 2006; Clark Miller, "An effective instrument of peace": scientific cooperation as an instrument of US foreign policy, 1938-1950, *Osiris* (2006) 21, pp.133-160.

⁴⁵ On the British Empire, see: Brett Bennett and Joseph Morgan Hodge (eds.), *Science and Empire: Knowledge and Networks of Science in the British Empire, 1800-1970*, Basingstoke: Palgrave MacMillan, 2011; Joseph Morgan Hodge, *Triumph of the Expert: Agrarian Doctrines of Development and the Legacies of British Colonialism*, Athens: Ohio University Press, 2007; Helen Tilley, *Africa as a Living Laboratory. Empire, Development and the Problem of Scientific Knowledge, 1870-1950*, Chicago: University of Chicago Press, 2011; Sabine Clarke, 'A technocratic imperial state? The Colonial Office and scientific research, 1940-1960', *Twentieth Century British History* (2007) 18, pp.453-480; On the Dutch Empire, see: Peter Boomgaard, 'The making and unmaking of tropical science. Dutch research on Indonesia, 1600-2000', *Bijdragen tot de Taal-, Land- en Volkenkunde / Journal of the Humanities and Social Sciences of Southeast Asia* (2006) 162, pp.191-217; Andrew Goss, *The Floracrats: State-Sponsored Science and the Failure of the Enlightenment in Indonesia*, Madison: University of Wisconsin Press, 2011; Andrew Goss, 'Decent colonialism? pure science and colonial ideology in the Netherlands East Indies, 1910-1929', *Journal of Southeast Asian Studies* (2009) 40, pp.187-214; On the French Empire, see: Christophe Bonneuil, 'Des savants pour l'Empire. Les origines de l'ORSTOM', *Cahiers pour l'Histoire du CNRS, 1939-1989* (1990) 10, pp.83-102; Patrick Petitjean, *Les Sciences Coloniales. Figures et Institutions*, Paris: Orstom Edition, 1996; Cooper, op. cit. (30).

⁴⁶ Stefan Couperus, 'Experimental planning after the Blitz. Non-governmental planning initiatives and post-war reconstruction in Coventry and Rotterdam, 1940-1955', *Journal of Modern European History*

nature of the expertise enrolled and its socio-political implications.⁴⁷ Some also showed the relevance of seeing technocracy as a global phenomenon with practices of technocratic internationalism mushrooming in North America and Europe but also throughout colonial Empires and within the League of Nations.⁴⁸ Historians of technocracy finally pointed out how scientific planning became widely appropriated from liberal democratic to authoritarian contexts before and after WWII and across the East-West divide during the Cold War.⁴⁹

Although a popular trope among the political elite of the second half of the twentieth century, technocracy and the rule of expert had been originally advocated by the experts themselves, the scientists, since the late nineteenth century. A branch of the history of science has looked into the development of science as a political ideology and the political attitudes and activism of the scientific community in the period. This scholarship examined the porous boundary separating science and politics by showing how scientists and science-minded actors cultivated the political virtues that they thought naturally stemmed from the scientific method and mindset. Several authors analysed how scientists granted political functions to features of science such as neutrality, universality and internationality. Some like Brigitte Schroeder-Gudehus and Rebecka Lettevall, Geert Somsen and Sven Widmalm looked at how scientists claimed a role in international affairs in virtue of science's alleged internationalist and neutral nature.⁵⁰ Others like Garry Werskey and Fabian de Kloe demonstrated how scientists explored alternative forms of social and political organisation, such as the establishment of a scientific form of Socialism or the creation of a scientifically generated international language.⁵¹ These

(2015) 13, pp.516-533; Liesbeth van de Grift, 'On new Land a new society: internal colonization in the Netherlands, 1918-1940', *Contemporary European History* (2013) 22, pp.609-626; Schot and Lagendijk, op. cit. (25).

⁴⁷ Couperus, van de Grift and Lagendijk, op. cit. (14).

⁴⁸ Valeska Huber, 'Social planning in late colonial and postcolonial societies (1920s-1960s), conference report', *German Historical Institute London Bulletin* (2013) 35, pp.173-176; Schot and Lagendijk, op. cit. (25); Pemberton, op. cit. (26).

⁴⁹ Vincent Lagendijk, 'Divided development: post-war ideas on river utilisation and their influence on the development of the Danube', *The International History Review* (2015) 37, pp.80-98.

⁵⁰ Brigitte Schroeder-Gudehus, *Les Scientifiques et la Paix: La Communauté Scientifique Internationale au cours des Années 20*, Montréal: Les Presses Universitaires de Montréal, 1978; Aant Elzinga and Catharina Landström (eds.) *Internationalism and Science*, London: Taylor Graham, 1996; Geert Somsen, 'A history of universalism: conceptions of the internationality of science from the Enlightenment to the Cold War', *Minerva* (2008) 46, pp.361-379; Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012.

⁵¹ Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s*, London: Free Association Books, 1988; Fabian de Kloe, *Constructing Worlds with Words. Science and International Language in the Early Twentieth Century*, Dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2014.

science-driven political ideologies permeated the international sphere and resulted in an explosion of international conferences, collaborations and institutions.⁵² Despite claims of universality and unity, historians have showed that political differences often divided the scientists themselves. Paul Forman, Daniel Kevles and Schroeder-Gudehus described how the First World War and exacerbated patriotism tore the scientific community apart and maintained German scientists in a state of isolation for most of the interwar period.⁵³ Others showed that these divisions were also conducive of competing visions of scientific internationalism and urged historians to unpack scientific ideologies as heterogeneous and historically located discourses.⁵⁴ This scholarship has focused particularly on the first half of the twentieth century. It has, however, paid little regard to the life of these scientific ideologies and the political activism of scientists after WWII, even though a handful of studies indicate a continued relevance of scientific internationalism in the science-friendly era of reconstruction.⁵⁵

Decentring technocracy

Despite the rich scholarship related to post-war reconstruction, historians have generally underestimated the place of science in shaping the period. As such they have not paid enough attention to the scientists, their political engagement in the reconstruction process, their scientific approaches and their role in the formation of new international

⁵² For an overview of the process and the literature on the matter, see: 'Chapter 4: Science the unifier' in Mazower, op. cit. (32), p.94-115; See for instance the work of Waqar Zaidi on the internationalisation of aviation and the control of atomic energy: Waqar Zaidi, 'Liberal internationalist approaches to science and technology in interwar Britain and the United States' in Daniel Laqua (ed.) *Internationalism Reconfigured: Transnational Ideas and Movements between the World Wars*, London and New York: I.B. Tauris; Palgrave Macmillan, 2011, pp.17-43; Waqar Zaidi, "Aviation Will Either Destroy or Save Our Civilization": Proposals for the International Control of Aviation, 1920-45', *Journal of Contemporary History* (2011) 46, pp.150-178; Waqar Zaidi, *Technology and the Reconstruction of International Relations: Liberal Internationalist Proposals for the Internationalisation of Aviation and the International Control of Atomic Energy in Britain, USA and France, 1920-1950*, Dissertation submitted to University of London (Imperial College), 2008;

⁵³ Paul Forman, 'Scientific internationalism and the Weimar physicists: the ideology and its manipulation in Germany after World War I', *Isis* (1973) 64, pp.150-180; Daniel Kevles, "Into hostile political camps": the reorganization of international science in World War I', *Isis* (1971) 62, pp.47-60; Brigitte Schroeder-Gudehus, 'Probing the master narrative of scientific internationalism. Nationals and neutrals in the 1920s' in Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012, pp.19-42; see also: Elisabeth Crawford, *Nationalism and Internationalism in Science, 1880-1939. Four Studies of the Nobel Population*, Cambridge: Cambridge University Press, 1992.

⁵⁴ Rebecka Lettevall, Geert Somsen and Sven Widmalm, 'Introduction', in Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012, pp.1-15.

⁵⁵ In the case of the scientist Sir John Boyd Orr, see: Staples, op. cit. (10); In the case of Julian Huxley, see: Sluga, op. cit. (37); In the case of Joseph Needham, see: Mougey, op. cit. (3).

frameworks, institutional structures and expert-based policy practices. The main contribution of my dissertation, then, lies in bringing science and the scientists centre stage as resource and architects of the reconstruction process. I study the formation of the post-war international political order as the product of the entanglement of scientific and political controversies regarding its shape. Bridging the fields of science and international politics, that so far have been studied in relative isolation, my research on the activism of scientists between 1937 and 1959, contributes to a better understanding of the dawn of post-war technocracy as well as of its legacy in the age of development.

The sequence of the IIHA, from its ideological origins to its demise and replacement by the Brazilian INPA, offers an opportunity to scrutinize, in practice, this process by which scientists promoted science as the engine of post-war modernity at the international as well as the local level. The making of the IIHA, as it moves back and forth across the North-South divide, also offers an opportunity to show the dawn of technocracy as a global process and, in turn, to decentre the recent narratives on post-war international and reconstruction history. The tumultuous history of the IIHA, I argue, reveals how much the advent of post-war technocracy in the 1940s and 1950s was construed beyond the nation state, across the globe and with the involvement of scientists from North and South at every stage of the process. I will explore how, in the case of the IIHA, scientists, and especially Southern ones, engaged in the political reorganization of the world and how they mobilized science as the main engine of this transformative process in the period between 1937 and 1959 when Empires crumbled, liberal nation-states dwindled and the League of Nations collapsed. In particular, I seek to examine three issues.

To start off, I am interested in the making and unmaking of the IIHA. I look at how the IIHA was planned, negotiated, contested and eventually undone by the intervention of competing groups of scientists. I will explore its trajectory from its ideological origins in the 1930s and its modelling at UNESCO in the 1940s to finally address its demise and replacement in the Amazon by the Brazilian INPA in the 1950s. By retracing the IIHA's (un)making, I shed light on the political activism of scientists and their claim to political authority regarding the political and international reordering induced by WWII. I particularly question how scientists came together during the war and framed themselves as the post-war world's authoritative peacemaker. Focusing on UNESCO, I demonstrate how the insertion of science in UNESCO resulted from a global campaign in favor of scientific cooperation and how this addition resulted in the redefinition of the terms of intellectual cooperation. Moving beyond a success-failure perspective, I will also reflect on the crash of the IIHA project and its implications for our understanding of the action of international organizations like UNESCO. Building on this first issue, I then ask how scientists determined what the advancement of science was to entail politically

and internationally and examine what notions of science competed in the IIHA's making. These conceptions of science carried with them sets of political ideals and imaginaries that either reinforced or challenged the existing world order. Finally, I look at what worlds the scientists involved with the IIHA intended to build through their definition of the socio-political role of science. I reconstruct these diverse imaginaries by examining how their promoters tried to implement them in practice. This investigation focuses on both successful realizations such as the insertion of science in UNESCO and Brazil's developmental agencies and the unsuccessful ones such as the IIHA. I will ultimately show how, in the period between 1937 and 1959, science came to catalyse world imaginaries that either questioned or reinforced the existing socio-political order at the national, regional and international level.

I will explore these issues by looking at the various groups of Southern scientists and science-minded actors who were involved in all stages of the IIHA's making and unmaking. I will therefore demonstrate, in the specific case of the IIHA, how the attempts to scientifically reorder the post-war world did not merely involve actors from Europe, North America and the USSR but also a wide range of often overlooked Southern ones from what Needham called the *Dark Zone*.

EXPLORING THE DARK ZONE

Why did I choose to entitle this dissertation, *In the Dark Zone*, after Needham's concept? As described above, Needham formulated the concept to denounce the limited means with which non-Western scientists struggled to practice their trade and the physical and moral barriers that impeded their participation in the international scientific debates. With the concept of *Dark Zone*, Needham critiqued the fallacy of scientific universalism and denounced the incomplete and segregating nature of the Western-centric organization of modern science. For him, the *Dark Zone* was a problem for Southern and Western scientists alike. It was a problem that he conceptualized together with a solution embodied in what he called the *Periphery Principle*. Via the *Periphery Principle*, he hoped to reinstate science's ecumenical traditions, liberate its growth and release the full breadth of its power to reorder the post-war world in a peaceful fashion. The *Periphery Principle* consisted in organizing the means to establish strong North-South scientific exchanges, develop scientific research capacities outside Europe and North America and grant a place in international science for Southern scientific contributions. The *Periphery Principle* permeated UNESCO's first scientific program and the IIHA with which Needham sought to stimulate the engagement of the leading scientists from the North in developing science in the peripheral South.

The concept of the *Dark Zone* was also turned against Needham by those he intended to speak for and help. It became a sort of rallying call for the Latin American scientists involved in the IHA's making to denounce the colonial attitudes that pervaded UNESCO's international science program. For them the *Dark Zone* epitomized the patronizing attitude of the West. It reflected the Western scientists' tendency to deny the assumedly immature voices of Southern scientists in the development of science and to impose on them a model of science that was at best foreign and, at worst, contradictory with their aspirations. By rising against UNESCO's colonially charged idea of the *Dark Zone*, Paulo Carneiro defended Latin America's scientific excellence and reclaimed the right for Latin American scientists to determine science's purpose, form and ideology in accordance with their local context.

In this dissertation, I reflect, symmetrically and relationally, on the two parties involved with the *Dark Zone*: I analyse both Needham's UNESCO scientists and their concern for and solution to the Global South's marginality, *and* the Latin American scientists who not only expressed their discontent with Needham's vision and its alleged 'old-boy imperialism' but also proposed alternatives to UNESCO's IHA plan. Seeing the *Dark Zone* symmetrically and relationally, I show the scientific reordering of the post-war to be a global process with solutions that stemmed from both sides and that were shaped through their disputes regarding the role and function of international science.

The *Dark Zone* is an interesting concept for this dissertation for a third reason. The *Dark Zone* epitomizes the still significant absence of the South in our understanding of WWII, its aftermath and the process of reconstruction that ensued. Despite the abandonment of centre-periphery paradigms and the advent of international and transnational history, few are the works that investigate Southern contexts as sites of global significance. Fewer are those that consider Southern actors as agents of post-war reconstruction equally significant as their Western counterparts to whom the architecture of these processes is usually attributed. Like Needham's Chinese scientists, the South remains largely peripheral and invisible in the different historiographical streams I have delineated above and on which this dissertation builds.

Most of the existing post-war reconstruction scholarship still focuses on North America and Europe and their responses to the moral, material and political challenges posed by the war's destructions. Reconstruction thus remains construed as a Western iteration. Recent studies are however showing that the Global South was a significant agent in the process of reconstruction as well. The New Imperial History has revealed how new rational approaches to colonial development that arose in the colonies, had important repercussions not just on the colonies themselves but on the metropolis as

well.⁵⁶ Imperial historians have shown how, for the case of the British Empire, concepts of colonial modernization such as ecology partly inspired Britain's wartime and post-war planning policies. Sabine Clarke has for instance pointed out that colonial modernization had important consequences on the growth and modernization of Britain's scientific organization in the 1940s.⁵⁷ Joseph Hodge and Christophe Bonneuil traced down the legacy of these science-based approaches to colonial development and showed how these approaches continued to inform state-building and development after decolonization.⁵⁸ A growing community of postcolonial historians of science has started to demonstrate the importance of science and technocracy in the nation-building processes that formerly colonized countries like India, China but also older nations of Latin America pursued after WWII.⁵⁹ Historians like Jahnvi Phalkey and Zuoyue Wang described how independent India and revolutionary China enrolled science to strengthen their independence from former colonizers and invent alternative civilizational orders.⁶⁰

⁵⁶ While I deal here with the case of the British Empire, similar processes have been observed for Europe's other colonial Empires. For an overview of the existing literature on the technocratic reform of European empires, see footnote 45.

⁵⁷ Sabine Clarke, 'The research council system and the politics of medical and agricultural research for the British colonial Empire, 1940–52', *Medical History* (2013) 57, pp.338-358; Sabine Clarke, "'The chances to send their first class men out to the colonies": the making of the colonial research service', in Brett Bennett and Joseph Morgan Hodge, *Science and Empire: Knowledge and Networks of Science across the British Empire, 1800-1970*, Basingstoke: Palgrave MacMillan, 2011, pp.187-208; Charlotte Lydia Riley, *Monstrous predatory Vampires and Beneficent Fairy-Godmothers: British Post-war colonial Development in Africa*, Dissertation submitted to University College London, 2013. On the entanglement between colonial development and Britain's modernization, see the work of Peder Anker on imperial ecology, Anker, op. cit. (35).

⁵⁸ Joseph Morgan Hodge, 'Writing the history of development (Part 2: longer, deeper, wider)', *Humanity: An International Journal of Human Rights, Humanitarianism and Development* (2016) 7, pp.125-174; Hodge, op. cit. (45), p.254-276; Christophe Bonneuil, 'Development as experiment: science and state building in late colonial and post-colonial Africa, 1930-1970', *Osiris* (2000) 15, p.258-281; David Webster, 'Development advisors in a time of Cold War and decolonization: The United Nations Technical Assistance Administration, 1950-1959', *Journal of Global History* (2011) 6, pp.249-272.

⁵⁹ See the special issue 'Nation, knowledge, and imagined futures: science, technology and nation-building, post-1945', *History and Technology* (2015) 31, and particularly the introduction by the editors Krige and Wang, op. cit (17); On the case of Latin and Central America and the specificities of its modernization process, see: Gabriela Soto Laveaga, *Jungle Laboratories: Mexican Peasants, National Projects and the Making of the Pill*, Durham: Duke University Press, 2009; Diana Obregon, 'The state, physicians and leprosy in Modern Colombia', in Diego Armus (ed.) *Disease in the History of Modern Latin America: From Malaria to AIDS*, Durham: Duke University Press, 2003, pp.130-157; Antoine Acker, *Volkswagen in the Amazon: the Tragedy of Global Development in Modern Brazil*, Cambridge: Cambridge University Press, 2017; Christian Brannstrom, 'Polluted soil, polluted souls: the Rockefeller hookworm eradication campaign in São Paulo, Brazil, 1917-1926', *Historical Geography* (1997) 25, pp.25-45.

⁶⁰ Jahnvi Phalkey, *Atomic State. Big Science in Twentieth Century India*. Delhi: Permanent Black, 2013; Zuoyue Wang, 'The Chinese developmental state during the Cold War: the making of the 1956 twelve-year science and technology plan', *History and Technology* (2015) 31, pp.180-205; Jahnvi Phaley and Zuoyue Wang, 'Planning for science and technology in China and India', *British Journal for the History of Science: Themes* (2016) 1, pp.82-112; For more on India, see the focus section of *Isis* (2013) Volume 104 and in particular Jahnvi Phaley, 'Introduction', pp.330-336; Robert Anderson, *Nucleus and Nation. Scientists, Inter-*

The New History of the UN displays a *Dark Zone* bias similar to the one observed in reconstruction history. Although the UN emerged as a cultural and political meeting point for the nations of the world, Amrith and Sluga noted that the historiography on the UN system – old and new – tends to remain narrowly centred on the Great Powers of the North.⁶¹ Despite a new understanding of its origins and practices, the UN system continues to be portrayed as a Western construct, shaped by and in the service of Europe and mostly the United States.⁶² When the Global South appears, it is often as the recipient or the object of UN action and less as actors and operators of UN interventionism. As Sluga argued, both the League of Nations (LoN) and the UN were populated by a variety of diplomats, intellectuals and civil servants from the Global South whose actions and roles only start to be addressed and researched.⁶³ Corinne Pernet and others have showed for instance that Latin Americans played an important role both at the LoN – especially at the International Institute of Intellectual Cooperation (IIIC) – as well as in the early years of the UN when Latin American member-states participated in the UN's creation to chart their own independent course.⁶⁴

This dissertation thus explores these vast *Dark Zones* – i.e., geographic, institutional but also symbolic spaces and the actors that populate and create them – whose absences questions the completeness, relevance and accuracy of our understanding of the reconstruction period and its aftermath. The *Dark Zones* that I explore in this dissertation, include geographical areas such as China, the British Empire and the Amazon Basin and imagined entities such as the zonal unification of the world or the construction of tropical modernity in the Amazon. Accordingly, opening up the *Dark Zone* does not merely consist in questioning the marginality of the Southern scientists but it also implies to conceive their agency as something more than a linear and diffusionist process in which they, as

national Networks and Power in India, Chicago: University of Chicago Press, 2010. For more on China, see the focus section of *Isis* (2007) Volume 98 and especially Benjamin Elman, 'New directions in the history of modern science in China: global science and comparative history', pp.517-523; see also: Zuoyue Wang, 'Science and the state in Modern China', *Isis* (2007) 98, pp.558-570 Jahnvi Phalkey and Tong Lam, 'Science of giants: China and India in the twentieth century', *British Journal for the History of Science: Themes* (2016) 1, pp.1-11; Zuoyue Wang, 'The Cold War and the reshaping of transnational science in China', in Naomi Oreskes and John Krige (eds.), *Science and Technology in the Global Cold War*, Cambridge, MA: MIT Press, 2014, pp. 343-370.

⁶¹ Amrith and Sluga, op. cit. (31).

⁶² See for instance the works of Schlesinger, op. cit (33); Hoopes and Brinkley, op. cit. (33).

⁶³ Sluga, op. cit. (34).

⁶⁴ Corinne Pernet, 'Shifting position to the global south: Latin America's initiatives in the early years at the United Nations' in Claude Auroi and Aline Helg, *Latin America 1810-2010: Dreams and Legacies*, London: Imperial College Press, 2012, pp.83-100; See also: Alan McPherson and Yannick Wehrli, *Beyond Geopolitics: New Histories of Latin America at the League of Nations*, Albuquerque: University of New Mexico Press, 2015; Others showed how the Third World movement invested the UN to advance their political autonomy, see, for instance, Mazower, op. cit. (34), pp.149-189.

peripheral actors, perpetually try to catch up with the North as the unique standard-setting centre.

Opening up the *Dark Zone* thus consists in listening when Southern scientists talk back. This dissertation aims to analyse the claims to an alternative scientific and political path that scientists like Carneiro opposed to UNESCO's world plans. The South was not a mere canvas for change. I show that it was also a prolific source of alternate visions of science and society. Investigating the *Dark Zone's* new worlds, I intend to retrieve the imaginaries and processes that Southern scientists crafted, defended and eventually implemented to challenge or reinforce existing political orders. Looking at the global and transnational geography of reconstruction and more specifically at its peripheral ends like Amazonia shows the building of postwar technocracy as a polyphonic, dialogical and disputed process involving Western and Southern scientists alike. Eventually, by investigating the *Dark Zone's* new world I aim to bury the notion of *Dark Zone*, its twin, the *Bright Zone*, and the implicit division of the world it entails. *In the Dark Zone, A New World* is to show, how the re-composition of the world order that took place in the period directly preceding and following WWII unfolded as a global process. Both the advent of science as a political ideology and instrument of change, and the replacement of the League's IIC by UNESCO operated within a geography that exceeded the narrow bounds of the North.

HISTORY IN ACTION: CONCEPTUAL FRAMEWORK AND METHOD

In my analysis, I will trace the IIHA from its ideological origins in the 1930s to its collapse and replacement by the INPA in the mid-1950s. In order to analyse the IIHA and the construction of the scientific rule as a global endeavor, I will employ a conceptual and analytical framework that draws inspiration from Science and Technology Studies (STS), global history of science and transnational history.

Beyond postpositivism and post-colonialism: Localism and circulation

Since the 1980s, a variety of scholars from STS and the history of Western science have assailed the widely held empiricist view of science as an inherently universal system of free-floating ideas. Both grappled with the question of "where" science is practiced. Scrutinizing the many places of scientific production historians of Western science questioned diffusionist narratives of international science by demonstrating that the universality of science is above all constitutively local.⁶⁵ STS scholars have generally

⁶⁵ Adi Ophir and Steven Shapin, 'The place of knowledge. A methodological survey', *Science in Context*

defined the local context as a relational space where the stable interactions between a wide range of actors bestowed meaning, robustness and mobility upon the constituted claim. Ultimately, for STS, the ability of a claim to travel wide and far is a matter of sturdily extending an existing local network rather than an innate feature of science.⁶⁶ The localist turn in STS and history of science has disclosed a whole range of unsuspected places – be it the laboratory or the hospital – where science was actively shaped, mediated and translated. Revealing the creative role of alleged peripheries, STS has been instrumental in re-establishing an epistemological balance between centre and periphery and paved the way to treat both ends symmetrically.⁶⁷

Drawing from these insights, postcolonial historians of science depicted the globalization of science as a polyphonic historical process in which contributions from metropolis and colonies were intertwined.⁶⁸ Postcolonial historians of science, however, remained dissatisfied with the tendency within STS and the history of science to assume the West to be the site of origin of modern science. In their view, STS did not merely obliterate the colonial origins of international science but inadvertently reproduced the asymmetrical power relations that structured the making of science as an instrument of Empire.⁶⁹ For postcolonial historians of science, science originated as much from the colonial peripheries as it did from the imperial centres. They argued that the globalization

(1991) 4, pp.3-21; Steven Shapin, 'Here and everywhere: sociology of scientific knowledge', *Annual Review of Sociology* (1995) 21, pp.289-321; David Livingstone, *Putting Science in its Place. Geographies of Scientific Knowledge*, Chicago: University of Chicago Press, 2003.

⁶⁶ John Law, 'On the methods of long distance control: vessels, navigation and the Portuguese route to India', *The Sociological Review* (1984) 32, pp.234-263; Bruno Latour, *Science in Action. How to Follow Scientists and Engineers through Society*, Cambridge: Harvard University Press, 1987; Marianne de Laet and Annemarie Mol, 'The Zimbabwe bush pump: mechanics of a fluid technology', *Social Studies of Science* (2000) 30, pp.225-263.

⁶⁷ Initiatives like *Science and Technology in the European Periphery* (STEP) resulted from this localist turn spearheaded by STS and the history of science in the 1990s. On STEP, see: Kostas Gavroglu, Faidra Papanelopoulou, Ana Simões, Ana Carneiro, Maria Paula Diogo, José Ramón Bertomeu Sánchez, Antonio García Belmar and Agustí Nieto-Galan, 'Science and technology in the European periphery: some historiographical reflections', *History of Science* (2008) 46, pp.153-175.

⁶⁸ David Wade Chambers, 'Period and process in colonial and national science', in Nathan Reingold and Marc Rothenberg (eds.) *Scientific Colonialism: A Cross-Cultural Comparison*, Washington: Smithsonian Institution Press, 1987, pp.297-321; Roy McLeod, 'On visiting the "moving metropolis": reflections on the architecture of imperial science', in Nathan Reingold and Marc Rothenberg (eds.) *Scientific Colonialism: A Cross-Cultural Comparison*, Washington: Smithsonian Institution Press, 1987, pp.217-249; Roy MacLeod, 'Introduction', *Osiris* (2000) 15 *Nature and Empire: Science and the Colonial Enterprise*, pp.1-13; Paolo Palladino and Michael Worboys, 'Science and imperialism', *Isis* (1993) 84, pp.91-102; Warwick Anderson, 'Introduction: postcolonial technoscience', *Social Studies of Science* (2002) 35, pp.643-658.

⁶⁹ David Wade Chambers and Richard Gillespie, 'Locality in the history of science: colonial science, technoscience and indigenous knowledge', *Osiris* (2000) 15, pp.221-240; Warwick Anderson and Vincanne Adams, 'Pramoedyas chickens: postcolonial studies of technoscience', in Edward Hackett, Olga Amsterdamska, Michael Lynch and Judy Wajcman, (eds.) *The Handbook of Science and Technology Studies*, Cambridge: MIT press, 2008, pp.181-204.

of science resulted from a to-and-fro process of appropriation between the metropolis and the colonial periphery. To the postcolonial scholars, science is therefore constantly altered, modified and enriched as it is brought in contact with a variety of localities through its internationalization.⁷⁰

In spite of a greater attention to the geographical and historical contexts of knowledge making, STS and postcolonial scholars still reproduce some fundamental diffusionist notions in their approach to the global workings of science. Global historians of science like Kapil Raj argue that both traditions continue to believe in the Western origins of science and the centre-periphery model to understand the spread of modern science. If postcolonial historians had indeed succeeded in banishing diffusionism as the frame to understand the spread of modern science, Raj claims that they left the problem of the origins of science unquestioned. In his eyes, the postcolonial critique failed to challenge the idea of modern science as a western emanation as postcolonial historians continued to base their approach on the assumption that there is something essential, unified and hegemonic called modern science that originated in Western Europe.⁷¹

In his investigations on the construction of modern science in South Asia and Europe, Raj proposes to overcome these pitfalls by approaching the global workings of science in terms of circulation and encounters. Raj defines circulation as “the processes of encounter, power and resistance, negotiation and reconfiguration that occur in cross-cultural interaction”.⁷² Circulation is not the communication and reproduction of existing notions and practices of science. It is a transformative process that implies a double movement. As things, men and notions circulate, Raj argues, they transform themselves through interaction with mutations coming back to the point of origin as well. Although the circulatory approach confers agency on all involved in the knowledge building process, it also accounts for power relationships as they play out through asymmetries in the negotiation process between the different actors involved. For Raj, circulation, and more precisely the encounters that it produces, are privileged sites to observe how knowledge and the actors, notions, practices and structures of science are geographically and historically co-produced through the interactions between the heterogenous groups of actors involved. In that regard, the circulatory perspective offers an alternative to the linearity and unidirectionality entailed by the centre-periphery trope by showing science’s development as a global, multi-sited and contingent process of co-constitution.

⁷⁰ Palladino and Worboys, op. cit. (68); Gavroglu *et al.*, op. cit. (67).

⁷¹ Kapil Raj, ‘Beyond postcolonialism... and postpositivism. Circulation and the global history of science’, *Isis* (2013) 104, pp.337-347; Kapil Raj, *Relocating Modern Science. Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900*, Basingstoke: Palgrave Macmillan, 2007.

⁷² Raj, op. cit (71), p.343.

Hence, following Raj's circulation approach, I propose to reconstruct the IIHA as the product of multiple local encounters between a variety of actors and ideas from across the globe.⁷³ The narrative of this dissertation revolves particularly around four key encounters through which the IIHA was made and eventually unmade. The first encounter corresponds to the process by which scientists from Britain, France, China and the Commonwealth obtained the insertion of the S in UNESCO during the London-based Conference of Allied Ministers of Education (CAME) (1942-1945). I look at how scientists used ideas of science's internationalist nature and transformative power to contest the existing notion of intellectual cooperation that former IIIC-ICIC intellectuals defended at the CAME. The second encounter concerns the way UNESCO's first international science program and the IIHA were formulated and designed in Paris during the preparatory commission of UNESCO. I pay particular attention to the differences of perspective between Needham's NS division and some of its Latin American partners regarding the meaning of international science and the shape and purposes of the IIHA. The third and the fourth encounters correspond to the implementation and rejection process of the IIHA in Latin America. I first analyse how the conflict in Paris matured and continued in Belém and Manaus, where UNESCO's proposals to create the IIHA for the world's tropics was critiqued by local scientists who framed the future institute as a developmental and Latin American institute instead. Finally, I scrutinize how the respective proposals of UNESCO and the Latin Americans were absorbed and terminated by the emerging Brazilian technocratic elite who built the INPA-SPVEA as a replacement to the IIHA.

The four encounters constitutive of the IIHA were moments of controversy where questions such as how the IIHA should be organized, what tropical research was to entail, who ought to participate and what socio-political functions of the institute were to be were the subjects of disagreement and negotiation. To analyse these controversies and retrieve the competing visions of science and society at play, my approach will be completed by a discourse and counter-discourse analysis. Here I do not intend to pursue a discourse analysis in the strict sense.⁷⁴ Rather, I look at discourses and counter-discourses of science and society based on Maarten Hajer's broad definition of discourse as "the ensemble of ideas, concepts and categories through which meaning is given to social and physical

⁷³ I utilize the circulatory approach to investigate a different object than Raj's. When Raj designed and used circulation to look at science as it was practiced, I mobilize the circulatory perspective to look at science as it was imagined or planned.

⁷⁴ By discourse analysis, I do not refer to the study of the rhetorical and argumentative structures of discourses on science and society and the way these discourses operate at the level of language. I am more interested in studying the meanings associated to concepts like science, nature and modernity, the narratives or discourses that tie these concepts together and the broader historical and institutional context that withstood their formation and operation.

phenomenon”.⁷⁵ By examining the competing conceptions of the IIHA I bring to light the different ways in which science’s transformative power was imagined, negotiated and mobilized to tackle the political and international challenges that arose with and after WWII.

Follow the IIHA! Histoire croisée and actor-centred research in practice

Methodologically, transnational circulation has proven to be a challenging subject to study. *Histoire croisée* offers an interesting approach to operationalize transnational and circulatory history and to therefore investigate the IIHA as an entangled and multisited object. Werner and Zimmermann proposed *histoire croisée* to overcome the main methodological shortcomings of comparative history and transfer studies.⁷⁶ In their view, these shortcomings can be summarized as a methodological incapacity to encompass the dynamic and multidirectional nature of transnational phenomena.

Histoire croisée is based on two important conceptual principles that resonate with the abovementioned circulation approach. First, it conceives transnationality as a multidirectional – rather than linear – process of mutual exchanges between several entities. Second, the object-entity relationship is seen as interactional reciprocal: the involved entities shape the transnational which shapes them back as the result of their coming into contact. As the upshot of their mutual exchanges, these entities do not remain intact; they change over time. To investigate a transnational object, Werner and Zimmermann devised the method of *pragmatic induction* as a way to co-define the object of study and its relevant contexts in the richest way. Applied to the IIHA, it consists of letting the protagonists such as the Brazilian scientists, the staff of the NS division, Needham and Carneiro define what the IIHA was. The scales, categories and contexts each of them mobilized in turn constitute the relevant referents I use to comprehend the IIHA’s fate. Rather than fixed and predefined by me, “the relevant scales, frames [and contexts] are these that are constructed or brought into play in the very situations under study”.⁷⁷ Through pragmatic induction both the empirical object and the frame of analysis are actively co-designed and sensibly historicized.

Practically, I show that, from its ideological origins with Needham and Carneiro to its undoing by the Brazilian technocrats, the IIHA was the product of a non-linear chain of

⁷⁵ Maarten Hajer, *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*, Oxford: Clarendon Press, 1995.

⁷⁶ Michael Werner and Benedicte Zimmermann, ‘Beyond comparison: *histoire croisée* and the challenge of reflexivity’, *History and Theory* (2006) 45, pp.30-50; Michael Werner and Benedicte Zimmermann (eds.) *De la Comparaison à l’Histoire Croisée*, Paris: Seuil, 2004.

⁷⁷ Werner and Zimmermann, op. cit. (76), p.44.

locally defined controversies – involving alliances and disputes alike – between a variety of scientists from across the globe. Each of the four controversies I investigate occurred when these different groups entered in contact as they either shared common or conflicting interests with respect to the organization of the IIHA. Accordingly, my dissertation is organized chronologically as I follow the IIHA, its making and unmaking, as it moves from one controversy to the next.

The controversy constitutes a localized site where competing actors, views, discourses and interest contend.⁷⁸ Each of the constitutive controversies of the IIHA works as an observation post from which the groups involved and the nature of their interactions can be recomposed, the competing visions of the IIHA and their underlying scientific and political discourses retrieved, and the relevant context and the associated power distribution recovered. As the IIHA and its makers travel from one controversy to the next, its shape but also the context of its production – i.e., the relevant actors, their interactions and their discourses – change.

For each encounter, I recount the actors' prior local and international movements as their mobility and their dislocation matter in the shaping of the IIHA. As we will see, Needham's travels to China, Carneiro's stays in France and Alvaro Alberto's visit to the UN in New York were dislocations that were decisive in shaping their views of science and in amalgamating a coalition to advance them through or against the IIHA. These displacements matter as well. They may weaken one group and strengthen another. For instance, when the UNESCO representative for Latin America E.J.H. Corner brought the IIHA to the Amazon, the zonal plan he defended was weakened as it was separated from its supportive network back in Paris and relocated in a tropical context much different than the colonial African tropicity it had been modelled on.

Each encounter, through the relocations it entails and controversies it may trigger, thus works as a site of co-production where both the IIHA and the context of its production are being made, re-made or eventually un-made by the actors involved. Controversies are therefore transformative and can redefine both the object (i.e., IIHA), the subjects (i.e., the actors making it) and their contexts in unsuspected ways. These unintended consequences might be the creation of new alliances, the appearance of new discursive elements, social

⁷⁸ Dorothy Nelkin, 'Science controversies: the dynamics of public disputes in the United States' and Brian Martin and Evelleen Richards, 'Scientific knowledge, controversy, and public decision making' in Sheila Jasanoff, Gerald Markle, James Petersen, and Trevor Pinch (eds.) *Handbook of Science and Technology Studies*, Thousand Oaks, London, New Delhi: Sage Publications, 1995, revised edition, pp.444-456, pp.506-526; Sheila Jasanoff, 'Genealogies of STS', *Social Studies of Science* (2002) 42, p.435-441, p.339-340; Sergio Sismondo, 'Science and technology studies and an engaged program', Edward Hackett, Olga Amsterdamska, Michael Lynch and Judy Wajcman, (eds.) *The Handbook of Science and Technology Studies*, Cambridge: MIT press, 2008, pp.13-32, p.14-15.

groups, contexts as well as possible new resistances and controversies through which the IIHA is either maintained, transformed or eventually undone.

The third encounter in which UNESCO presented its proposal to the local Amazonian scientists in Belém illustrates well the idea of unintended consequences. There, UNESCO sought to gather local support around its zonal proposal. But it was displaced, operating in a context different from Paris, within which the power relations were altered in favor of the local groups and in which other conceptions of the tropics and science prevailed. The encounter produced resistance and led to the redefinition of the IIHA into a regional project. As I will show, this remodeling entailed important changes in objects and actors. The object, the Amazon, was revised under the impulse of Carneiro's coalition. It was not merely a naturalistic space and the embodiment of the world's tropics anymore but a locally defined socio-political reality that bound Latin America as one. Consequently, local voices were reinforced while the colonial scientists who UNESCO consecrated as the IIHA's operator were sidelined. The nations of the Amazon became key players, replacing the colonial Empires, and undermining UNESCO in organizing the IIHA. Interestingly, the encounter between UNESCO and the local groups of Latin American scientists and the changes that it produced had also unintended effects. As we will see, the IIHA disputes revived Amazonia's nation-building value for the Brazilian technocratic nationalists. Although, their interventions in the IIHA process eventually terminated the project, it also brought them to produce a national alternative to the IIHA in the form of the INPA. As shown in this example, approaching the IIHA from a circulatory perspective enables to understand the IIHA beyond stories of success and failure. Indeed, if the IIHA ended because of interference by the Brazilians, the fallen institute participated to produce unforeseen effects such as reviving Brazil's interest for the Amazon and inspiring the creation of an entirely new institutional set up in the Brazilian Amazon.

Archives and sources

To reconstruct the IIHA's making and unmaking and disentangle the different controversies on the role of science to reorder the world between 1930 and 1960, I have consulted a wide array of primary sources. The first body of studied material concerned the archives of UNESCO and several Brazilian institutions. The UNESCO archives in Paris have preserved reports of expert meetings and a large array of grey literature ranging from working documents, draft versions of action plans, progress reports and official and confidential correspondences regarding the making of the IIHA. These documents provided the necessary details to reconstruct the fate of the IIHA, determine the decisive encounters of its making and unmaking and identify the key actors and groups involved

in the process. I have also consulted the online archives of the Brazilian Congress, the archives of the Ministry of Foreign Affairs (Itamaraty), Rio de Janeiro, as well as the collections on the Brazilian National Research Council (CNPq) and the INPA which are both held by the Museu de Astronomia e Ciências Afins, Rio de Janeiro. These sources, similar in type as those obtained at UNESCO, enabled me to track the unmaking of the IIHA and the creation of the SPVEA, CNPq and INPA as a national alternative to UNESCO's project. The second corpus of primary sources I have collected consists of the personal papers of several key figures of the (un)making of the IIHA. I spent the most time with the papers of Joseph Needham at Cambridge University Library, Cambridge, as well as the papers of Paulo Carneiro at the Fundação Oswaldo Cruz (Fiocruz), Rio de Janeiro. In Rio de Janeiro, I also looked at the papers of Heloisa Alberto Torres at the Museu Nacional, and the papers of Carlos Chagas Filho, Fiocruz. These collections included private and professional correspondence but also a variety of writings. These documents provided details about the controversies surrounding the IIHA's creation. It also enabled me to address and reconstruct their worldviews and their conception of politics, science and society, which undergirded their conceptualization of the IIHA.

THE CHAPTERS

This book portrays the (un)making of the IIHA across its entire lifespan and highlights the rise of post-war technocracy and its competing shapes therein. The chapters trace the IIHA chronologically from its ideological origins in the politicized fringes of science in the 1930s to its implementation at UNESCO and reinvention as the INPA in Brazil between the 1940s and the 1950s. Each chapter retrieves the various scientists, the controversies and the competing conceptualization of the international and political functions of science that fed the feud around UNESCO's international laboratory project. At the same time, reconstructing the different stages of the IIHA's creation will also shed light on how post-war technocracy arose in the period between 1937-1959, what the scientization of politics meant to the actors who introduced and implemented it at UNESCO and what it implied regarding the shape of the post-war political and international order.

Chapter 2 *The S in UNESCO: International Science from its Fringes* examines the international campaign that Needham orchestrated from China during WWII in order to obtain the creation of a scientific mandate for UNESCO. This investigation draws attention to the emergence of scientists on the international political stage. It sheds light on the profuse wartime debates that animated the scientific community worldwide on the shape of international science and its political function in the post-war reconstruction process. Needham's global campaign for the S in UNESCO illustrates the political activism

of scientists during the war, their claims to political authority and the strategies they deployed to obtain a significant role in conducting UNESCO's peace-building mission. The success of Needham had important implications regarding the shape of intellectual cooperation. Needham and his coalition pioneered a scientized conception of intellectual cooperation that contested the rule of the literary-humanist tradition that dominated the cultural construction of international peace during the interwar period. The complicated story of UNESCO science also decentres the narratives of its creation by illuminating its Far Eastern and Southern origins. Rather than being the mere product of the global politics of Western powers, UNESCO was made to a large extent outside the formal constitutional process held in London in places like Chongqing where the Chinese and imperial scientists garnered around Needham claimed a place in the emerging UN apparatus and shaped a role for science to solve the challenges of post-war peace.

The chapter 3, *Scientific Internationalism(s) in Tension*, reconstructs and compares the scientific and political trajectory of Needham and Carneiro, two of the IIHA's leading architects and advocates. Each defended a distinctive discourse of science, society and international cooperation, which reflected to a large extent the trajectories that took them across the alleged North-South border and led them from Cambridge and Rio de Janeiro to Paris. Their conceptions of the international function of science inaugurated quite different visions of international order and peace-building. While Needham postulated that welding all of mankind's scientific traditions into a single ecumenical endeavor would contest the hegemony of nation-states and facilitate the dawn of a peaceful international society instead. In contrast with Needham, Carneiro relied on the nation-state. He defended an utilitarian scientific internationalism that would strengthen the capacity of marginalized nations like Brazil and regions like the Amazon to participate in the progress of mankind. The distinct internationalist imaginaries of Needham and Carneiro reveal scientific internationalism as a diverse and disputed political ideology. It also exposes the complex ideological heterogeneity that pervaded at UNESCO's NS Division. These discrepancies between Carneiro and Needham fed disputes at UNESCO where Carneiro and his compatriot Miguel Ozorio de Almeida criticized Needham's Dark Zone concept. These differences nourished significant controversies in Paris regarding the goals of North-South scientific cooperation and the modelling of the IIHA, which prefigured deeper clashes in the field.

The following three chapters will closely analyse the implementation of the IIHA in the heart of the Amazon Basin and scrutinize the controversies that led to its demise and replacement by the INPA in Brazil. I identified three groups of scientists, the zonal ecumenists led by Needham, the Latin-American positivists gathered around Carneiro and the technocratic nationalists headed by Reis. These three groups competed in the

making of the IIHA, each of which advanced a different conception of the institute as well as a distinct vision for the post-war world. The introduction to the second part of this dissertation, *Worldmaking in the Jungle*, introduces the notion of worldmaking that I use to underscore how the three groups of scientists involved intended to remake the world based on competing scientific conceptions of the social and natural world. In the last three chapters of this dissertation, I will explore the main controversies that led to the IIHA's remodeling, downfall and reinvention in the form of the Brazilian INPA. Each chapter will be dedicated to one controversial sequence of the IIHA's (un)making and will successively follow Needham, Carneiro, Reis and their coalitions of scientists to retrieve the worldmaking visions they sought to enact via the IIHA.

To start off, Chapter 4 *UNESCO's Ecological World Order: Building Tropical Ecumenism in the Amazon* focuses on Needham and his staff at the NS division. In Paris, they designed the IIHA into a leading laboratory in human ecology dedicated to the study of the tropics as a unified zone. They established the IIHA at the centre of a wide network of field stations scattered throughout the world's tropical hotspots such as Indonesia and tropical Africa. The ecumenists believed that the IIHA's zonal research could contribute to 'make' the tropics into a single ecumenical community unified through research and zonal exchanges. Although zonal ecumenism provided a foundation for new international solidarity, it reduced the tropics to a uniform environmental reality predominantly defined by primordial nature rather than by culture. Importantly, zonal ecumenism also rehabilitated in the process the British Empire and its scientists as the authoritative architect of tropical progress. To accomplish the bio-social unification of the world's tropical zones, Needham and the NS division ignored local communities and relied instead on the involvement of the British Empire. By appropriating imperial ecology and by planning close cooperation between the IIHA and the Empire's scientific workforce and field stations, Needham and his team rehabilitated the Empire as a credible actor of the post-war international order. In 1947, Needham and his colleagues aimed to reproduce this zonal ecumenism from the tropical zone to the arid zone with the creation of an International Institute for the Arid Zone (IIZA). The idea was actually carried out by Needham's successor, Pierre Auger, who orchestrated between 1949 and 1951 the setup of a variant of the IIHA, the Advisory Committee on Arid Zone Research. The Committee eventually launched and coordinated the decade-long Arid Zone Research Program (1951-1964).⁷⁹

⁷⁹ The work of the IIZA officially begun with the first meeting of the Advisory Committee on Arid Zone Research in Algiers in April 1951 and was terminated nearly fifteen years later in 1964. According to one of its director, Michel Batisse, the program elucidated several problems of the arid lands such as hydrology and energy and highlighted their economic, social and ecological implications. It functioned as a catalyser in the creation of new institutions such as the Desert Institute in Cairo and the Central Arid Research Institute in Jodphur. The program left a significant legacy with the launch of the International Hydrolog-

At the first IIHA conference in 1947 in Belém, Needham's ecumenical plan quickly received fierce resistance from Carneiro's Latin-American coalition. Carneiro and his colleagues were positivists, which meant that, following a local interpretation of Comtean positivism, they believed in the power of applied science to reform and advance a modern Latin American civilization. Chapter 5 *Latin America's Mare Nostrum: Positivist science and the Rise of a Pan-Amazonian Civilization* follows this dissenting group of Latin American positivists who, based on a belief in Amazonia's exceptionalism developed a regional alternative to UNESCO's ecumenism. At the second IIHA conference in 1948 in Iquitos they challenged the ecumenists by pushing forward a conception of the IIHA as a regional and positivist laboratory. Although both groups relied on human ecology, the positivists mobilized human ecology to highlight rather than do away with Amazonia's social, cultural and natural singularities. Carneiro's Amazonian coalition re-modelled the IIHA to serve an ambitious civilizational transformation of the Amazon. The scientific work of the IIHA entailed research into the biotic specificities of the Amazon, anthropological surveys on both native occupation and modern colonization and technoscientific interventions in activities like forestry and agriculture to enhance human utilization of the Amazon's environment. Based on a socio-political rather than natural conception of the Amazon, the positivists shaped the IIHA to serve what I name Pan-Amazonian positivism or the modernization, unification and cultural awakening of this peripheral area of Latin America by science. Ultimately, the positivists entrusted the future institute with regional and continental functions. With the 'making' of a scientific civilization in the Amazon, they aimed to overcome Latin America's divisions, strengthen its cultural singularity and enable the continent to contribute to the progress of humanity.

Although positivists and ecumenists disputed the shape and purpose of the IIHA, both groups were committed to facilitate its creation, which depended on the willingness of Brazil – Amazonia's largest nation – to support it. Brazil eventually refused to endorse the IIHA but the project catalysed interests for the development of the Amazon among the country's technocratic elite and led them to create the INPA, Brazil's very own IIHA. Chapter 6 *Technocratic Developmentalism: Brazil's Pursuit of Modernity in the Amazon* looks at what the rejection of the IIHA meant for Brazil's approach to science and the Amazon. It follows Reis, Alvaro Alberto and their coalition of nationalist technocrats

ical Decade (1965-1974) and the subsequent International Hydrological Program. See, Malcolm Hadley 'Nature to the fore. The early years of UNESCO's environmental program, 1945-1965' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty Years of Science at UNESCO*, Paris: UNESCO publishing, 2006, pp.201-232, p.209-214; Michel Batisse, 'A long look at the world's arid lands', *UNESCO Courier* (1994) January issue, pp.34-39 and Michel Batisse, *The UNESCO Water Adventure: From Desert to Water... From the 'Arid Zone Program' to the 'International Hydrological Decade', 1948-1974*, Paris: UNESCO edition, 2005.

who responded to the national challenges posed by the IIHA's failure by creating an unprecedented institutional trinity to reconquer the Amazon. With these three scientific agencies, the SPVEA, the CNPq and the INPA, the Brazilian technocrats placed the co-advancement of science and Amazonia's development at the centre of Brazil's national project. These agencies formalized what I called Brazilian technocratic developmentalism or the unification of Brazil through state-led science-driven modernization. If science respectively made the rise of zonal and continental entities possible for Needham and Carneiro, its development served to reinforce the Brazilian nation for Reis and Alvaro Alberto. The Brazilian technocrats mobilized modern science to respond to a variety of local socio-economic imperatives as well as broader political needs to invent a distinct, non-European identity and break the cycle of dependency with the West. The chapter ends with a comparison between the three worldmaking visions competing in the making of the IIHA and the way each distinctly co-constructed science and the postwar political order.

Chapter 7 *In the Dark Zone, A New World Order* finally concludes by synthesizing the insights from the empirical chapters to discuss the global rise of technocracy between 1937 and 1959. Through the (un)making of the IIHA, I point out how scientists produced scientific and technocratic cultures that established science as the engine of post-war modernity and examine what challenges these new political/technocratic imaginaries posed to the existing political and international order. These insights entail three historiographical suggestions. First, tracing the IIHA showed that the politization of science and the scientization of politics was not a Western iteration but a process that took place in both hemispheres. Second, the rise of post-war technocracy calls for a revision of our perception of the mid-twentieth century. Finally, my dissertation urges to consider the UN seriously as both a significant agent of post-war reconstruction and a valuable object of study to retrieve the global nature of the political and international shifts of the post-war era.

Part **1**

SCIENTIFIC IDEALS OF WORLD ORDER:
SCIENTIFIC INTERNATIONALISM AND
TECHNOCRATIC RULE FOR PEACE

Many were the scientists who took part in the making of UNESCO and who participated in the elaboration of the program that the first General Conference granted to the new agency in fall 1946.¹ Not only did they have things to say about the future of the post-war world and claimed that science had a role to play in its reconstruction but they also spoke as authoritative figures within the UN. Julian Huxley, who the Canadian delegate, the educationalist Victor Doré, considered as “the driving spirit of UNESCO” was installed amid applause of the delegates of the first General Conference as the first Director-General of the new specialized agency.² Together with Joseph Needham, who on that same occasion was given the reins of the NS Division, and many other delegate-scientists like the French physicist Pierre Auger and the Brazilian chemist Paulo Carneiro, Huxley played a key role in developing the general principles of the future UNESCO and making science one of the pillars of its peace-making mission.

In the pamphlet *UNESCO: Its Purpose and Philosophy*, Huxley advocated that because “the application of science provide most of the material basis for human culture” and the universality of its claims permeate all aspects of human activities, science should stand as the core guiding principle of the new agency.³ As opposed to religious faiths, political and economic doctrines, philosophical principles and the rule of nation-states, that he sought too particular or exclusive to encompass the wholeness of human experience, he proposed to instate what he called “world scientific humanism” as UNESCO’s philosophy since it provided a unitary, evolutionary and all-encompassing philosophical basis to UNESCO’s mission to “unify the world mind”.⁴ Meanwhile, Needham, who was said to have been “fruitful and necessary for the future development” of UNESCO, elaborated at the NS division his idea of scientific ecumenism with which he sought to bring the knowledge traditions of the world back in a constructive dialogue in order to harness science’s unifying power for the advancement of world peace.⁵ What was true of UNESCO

¹ For an overview of the role of science and the presence of scientists at UNESCO in its early years, see: Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac, and Gail Archibald, eds., *Sixty Years of Science at UNESCO, 1945-2005*, Paris, 2006, p.27-65, p.71-75

² UNESCO, ‘General Conference, First Session, held at UNESCO House, Paris, from 20 November to 10 December 1946’, 1947, UA, UNESCO/C/30, p.52, p.74

³ Julian Huxley *UNESCO. Its Purpose and Philosophy (English and French texts)*, facsimile edition, London: Euston Grove Press, 2010 (first published 1946), p.7

⁴ Huxley, op. cit. (3), p.61. For an analysis of Huxley’s vision for UNESCO, see: Glenda Sluga, ‘UNESCO and the (one) world of Julian Huxley’, *Journal of World History* (2010) 21, pp.393-418 and Vassiliki Betty Smocovitis ‘The unifying vision: Julian Huxley, evolutionary humanism and the evolutionary synthesis’ in Geert Somsen and Harmke Kamminga (eds.) *Pursuing the Unity of Science: Ideology and Scientific Practice between the Great War and the Cold War*, Abingdon and New York: Routledge, Taylor & Francis Group, 2016, pp.30-49.

⁵ UNESCO, ‘General Conference, First Session, held at UNESCO House, Paris, from 20 November to 10 December 1946’, 1947, UA, UNESCO/C/30, p.22; Thomas Mougey, ‘Needham at the crossroads: history, politics and international science in wartime China (1942-1946)’, *British Journal for the History of Science*

was true of many other agencies of the emerging UN system. When Huxley was instated as DG of UNESCO, his friend John Boyd Orr was appointed director of WHO, and Henri Laugier worked as deputy secretary-general of ECOSOC.⁶

Some thirty years earlier, however, natural scientists did not stroll the corridors of the Versailles Palace where the Paris Peace Conference was held in 1919 and where the League of Nations was created.⁷ Unlike at UNESCO, scientists were not convened to partake in the building of world peace. In fact, over the twenty-year-long interwar period, few were the scientists who had worked at the League, a place where none occupied functions as authoritative as those obtained by Huxley, Orr and Laugier at the UN. The cultural leaders and experts of the League were political scientists, economists, unionists and intellectuals who actively participated in imagining, organizing and arbitrating the interwar world order. While the British classicists Alfred Zimmern, Gilbert Murray and David Mitrany drafted the blueprint of the League of Nations and pioneered international intellectual cooperation with the IIIC, the so-called soul of the League, the French unionist Albert Thomas, the British economist Arthur Salter and the Dutch jurist Joost Van Hamel organized the economic, social, health and communication services of the League of Nations.⁸ Some scientists were nevertheless involved in the works of the League. The famous physicists Albert Einstein and Marie Curie were prominent figures of the CICI-IIIC while medical experts ran the League's Health Organization.⁹ However, Einstein and Marie Curie participated less as scientists than thanks to their pacifist engagements while the role of the sanitarians and doctors of the Health Organisation was restricted to solve

(2017) 50, pp.83-109, p.21-26

⁶ On John Boyd Orr, see: Amy Staples, 'To win the peace: the Food and Agriculture Organization, Sir John Boyd Orr, and the World Food Board Proposals', *Peace and Change* (2003) 28, pp.495-523; On Henri Laugier, see Patrick Petitjean, 'Giving science for peace a chance: the post-war international laboratory projects', in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty Years of Science at UNESCO*, Paris: UNESCO publishing, 2006, p.52-57.

⁷ Although scientists came together at the end of the war to create the International Research Council (IRC) in 1919 in order to re-construct international scientific cooperation, this initiative was taken independently from the Versailles Conference process. On the IRC, see: Brigitte Schroeder-Gudehus, *Les Scientifiques et la Paix: La Communauté Scientifique Internationale au cours des Années 20*, Montréal: Les Presses Universitaires de Montréal, 1978, p.116-123; Daniel Kevles, "Into hostile political camps": the reorganization of international science in World War I', *Isis* (1971) 62, pp.47-60, p.57-60.

⁸ On the role of Zimmern and other British classicists in the creation of the League of Nations, see: Mark Mazower, *No Enchanted Palace: the End of Empire and the Ideological Origins of the United Nations*, Princeton: Princeton University Press, 2009, p.66-103. For an overview of the League's technical services and the growing body of literature on it, see: Susan Pedersen, 'Back to the League of Nations', *American Historical Review* (2007) 112, pp.1091-1117, p.1108-1112.

⁹ According to Brigitte Schroeder-Gudehus, the CICI considered science to be important. Its members saw science as a model and sought to stimulate international scientific cooperation by collaborating with the IRC. Yet, Schroeder-Gudehus noted that despite its interest for science, the CICI did eventually very little to involve scientists in its activities or to stimulate international relations in the sciences. Schroeder-Gudehus, op. cit. (7), p.185-191.

specific human and technical problems. While intellectual figures, social activists and social scientists like Zimmern and Thomas were the authoritative peace-builders of the League, the scientists remained largely on the backseat of post-WWI international politics.

SCIENTISTS AND WORLD ORDER

The twenty-five years that separated the creation of the League from the creation of the UN and UNESCO, staged a political and cultural ascent for the scientists. This ascent was however not accidental but the outcome of the politization of science and of the scientists themselves over the first half of the twentieth century. Although most like Needham and Huxley were relatively new to the world of international diplomacy when they joined UNESCO, all were already well versed in political matters. Throughout the 1930s, Needham became a leading figure of the Scientific Left in Britain with which he partook in pacifist and antifascist campaigns before playing a substantial role in the British war effort.¹⁰ Huxley advocated the marvels of scientific planning to reform Britain and participated in the technocratic reform of the British Empire in the late 1930s and early 1940s.¹¹ Meanwhile, in Brazil, Carneiro used his scientific expertise and his positivist outlook to serve the federal state's modernization efforts. He deployed his chemical expertise within the technical agencies of the federal state as part of an effort to valorize the coffee production of Brazil. He also advocated for scientifically guided social reforms, which he eventually put to practice in 1935 as secretary of state in the State of Pernambuco.¹²

The existing historiography has established since the 1970s that scientists have always maintained close ties with politics, whether by rejecting it or by embracing it like Needham and Huxley did. In the 1970s, Brigitte Schroeder-Gudehus, Daniel Kevles and Paul Forman showed how after WWI the international scientific community broke down, shattered by national divisions inherited from WWI. Allied nations organized the exclusion of German and Austrian scientists from post-war organizations of science while

¹⁰ On the Scientific Left: Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s*, London: Free Association Books, 1988; William McGucken, *Scientists, Society, and State: The Social Relations of Science Movement in Great Britain 1931-1947*, Columbus, Ohio: Ohio State University Press, 1984. On Needham's wartime activities, see: Mougey, op. cit (5).

¹¹ Peder Anker, *Imperial Ecology. Environmental Order in the British Empire, 1895-1945*, Cambridge: Harvard University Press, 2001.

¹² Marcos Jungmann Bhering and Marcos Chor Maio, 'Entre ciência e política: o positivismo de Paulo Carneiro na Secretaria de Agricultura, Indústria e Comércio de Pernambuco (1935)', *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.435-451, p.440; Marcos Chor Maio (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004.

allied scientists actively impeded the German scientists to participate in international science at all.¹³ Scientists were not just collateral victims of the divisions and tensions produced by WWI. As Anne Rasmussen recently showed, scientists played an active role in the war itself by producing war propaganda as well as using their scientific know-how to contribute to the war effort.¹⁴ Nationalism was also potent in peacetime. Elizabeth Crawford showed how national interests guided prize politics in science and explained how the Nobel Prize worked as a platform to advance national interests.¹⁵ Geert Somsen went on to argue that early twentieth century scientific internationalism was not working in opposition with nationality but operated in reality as its very expression, which he designated as Olympic internationalism.¹⁶

In these times of conflict, scientists also tried to make science a form of politics that challenged or reinforced the established international and political order. Holding the idea that science was international and neutral, scientists engaged for the promotion of international cooperation and peace and pursued various interests that did not necessarily served ideals of internationalism.¹⁷ Somsen showed how Dutch scientists claimed neutrality to end the boycott of German scientists at the International Research Council to gain power within the scientific community.¹⁸ Vidar Ennebakk looked at how the involvement of scientists in determining an objective foundation to the Nobel Prize ended in them proposing a science of peace based on science's alleged neutrality and internationality.¹⁹ Others mobilized science to pursue more radical agendas ranging from both ends of the political spectrum. For leftist scientists in Britain, in France and in the US, science and socialism were the basis of a scientific society through which the

¹³ Schroeder-Gudehus, op. cit. (7), p.116-123; Kevles, op. cit. (7), p.57-60; Paul Forman, 'Scientific internationalism and the Weimar physicists: the ideology and its manipulation in Germany after World War I', *Isis* (1973) 64, pp.150-180.

¹⁴ Anne Rasmussen, 'Science and Technology' in John Horne (ed.) *A companion to World War I*, Malden: Blackwell Publishing, 2012, pp.307-323; Anne Rasmussen, *Au Nom de la Patrie: Les Intellectuels et la Première Guerre Mondiale (1910-1919)*, Paris: Editions La Decouverte, 1996.

¹⁵ Elisabeth Crawford, *Nationalism and Internationalism in Science, 1880-1939. Four Studies of the Nobel Population*, Cambridge: Cambridge University Press, 1992.

¹⁶ Geert Somsen, 'A history of universalism: conceptions of the internationality of science from the Enlightenment to the Cold War', *Minerva* (2008) 46, pp.361-379.

¹⁷ Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012.

¹⁸ Geert Somsen, "'Holland's calling": Dutch scientists' self-fashioning as international mediators' in Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012, p.45-65.

¹⁹ Vidar Enebakk, 'Nobel science of peace: Norwegian neutrality, internationalism, and the Nobel Peace Prize' in Rebecka Lettevall, Geert Somsen, and Sven Widmalm, *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, London: Routledge, Taylor and Francis Group, 2012, p.295-315.

turmoil of nationalism and capitalism could be overcome. Meanwhile in Italy, on the other side of the political scope, science-minded fascists mobilized science to promote a fascist conception of world order.²⁰ Altogether, the existing historiography showed how, by the end of WWII, scientists had produced science as a political culture. Based on differing understanding of science whether as a transformative power, an outlook or a set of moral values, scientists produced new political imaginaries, discourses and forms of activism. Throughout the interwar period, they mobilized these political repertoires and framed themselves as legitimate actors to intervene in any political area, from revolutionary politics to international affairs.

REVISITING SCIENTIFIC INTERNATIONALISM

This rich body of literature has however two important chronological and geographical limits. First, the main body of literature on the matter has predominantly focused on the period stretching from the late nineteenth century to WWII. The political discourses, programs and activism deployed by scientists during the interwar has been hardly followed up during and after WWII, although as John Krige and Kai-Hendrik Barth claimed, this scientific political culture formed a powerful repertoire that profoundly shaped the post-war reorganization of international affairs.²¹ Second, the politicization of science and scientific internationalism has mostly been scrutinized as a western, if not European, phenomenon. Although contact between North-South contacts were numerous, as for instance the rich literature on the scientific exchanges between Europe and Brazil shows, little has been written on the political, scientific and internationalist visions of non-western scientists and their activism.²² In recent years, a small numbers of historians have

²⁰ Patrick Petitjean, 'Sur quelques aspects des sociabilités scientifiques entre Cambridge et Paris dans les années 1930' in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'Exemple de Cambridge*, Paris: Magnat-Vuibert, 2009, pp.139-174; Werskey, op. cit. (10); Peter Kuznick, *Beyond the Laboratory: Scientists as political activists in 1930s America*, Chicago: University of Chicago Press, 1987; Geert Somsen, 'Science, Fascism, and Foreign Policy: the Exhibition "Scienza Universale" at the 1942 Rome World's Fair', *Isis* (2017) 108, p.769-781; Geert Somsen, *Science and World Order. Scientific Universalism and International Politics, 1898-1950*, in preparation.

²¹ John Krige and Kai-Hendrik Barth, 'Science, technology and international affairs', *Osiris* (2006) 21, pp.1-21.

²² See for instance Magali Romero Sá and Larissa Moreira Viana, 'La science médicale entre la France et le Brésil: stratégies d'échange scientifique dans l'entre-deux-guerres', *Cahiers des Amériques Latines* (2010) 65, pp.125-144; Patrick Petitjean, 'Entre a ciência e a diplomacia: a organização da influência científica Francesa na América Latina, 1900-1940', in Amélia Hamburger and Patrick Petitjean (eds.) *A Ciência nas relações Brasil-França, 1850-1950*, São Paulo: Editora da Universidade de São Paulo, 1996, pp.89-120. On the internationalism of Brazilian scientists, see the work of Letícia Pumar on the Brazilian physiologist Miguel Ozório de Almeida: Letícia Pumar Alves de Souza, 'Between national and international, science and education: Miguel Ozório de Almeida and the League of Nations' Intellectual Cooperation Project' in Alan McPherson and Yannick Wehrli, *Beyond geopolitics: New Histories of Latin America at the League of*

begun to scrutinize non-western scientific activism and tend to point to how non-western scientists contributed to the politicization of science as well as to the shaping interwar international affairs.

Building upon the existing literature, and addressing its limits, the first part of this dissertation will revisit the interwar period as the background to understand how scientists formulated, advocated and eventually succeeded in transforming science and the question of its development into a politically significant matter for the reordering of the post-WWII world. Focusing on the case of UNESCO, I will retrace how scientists campaigned for the inclusion of science in the new UN agencies and analyse what such scientific mandate was to entail politically and internationally. I will particularly emphasize on the trajectory of Needham and Carneiro, the leading figures of UNESCO's early International Science Program as well as of the IIHA. More broadly, this inquiry will contribute to reconstruct the background to the rise of technocracy observed after WWII. By unravelling the wartime discussions on the role of science in the postwar era, recollecting the political, international and social functions that SRS activists, imperial scientists and Brazilian positivists granted to science in the 1930s, the following two chapters will explore how scientists conceived science as the engine of modernity and framed themselves as carriers of progress. The politicization of science was however not a monolithic nor an undisputed process as several imaginaries of a scientific world order competed. As we will see in the next two chapters, these competing imaginaries and the tensions they triggered infused the postwar reconstruction process, the creation of new technocratic institutions and the attempts of scientists to create conditions of peace and progress via science in particular. By following the actors and the controversies they engaged in from the late 1920s to the end of WWII, I will finally show that the postwar rise of technocracy and the politicization of science was a global process from its onset.

Nations, Albuquerque: University of New Mexico Press, 2015, pp.169-184.

Chapter 2

TRACING THE FAR EASTERN ORIGINS OF THE S IN UNESCO

The origins of UNESCO have fascinated and polarized historians since its inception in 1945. Until the late 1990s, the foundational moment that the beginning of UNESCO was catalysed a politicized historiography that reflected the historians' hopes and scepticism in the new UN body. The creation of UNESCO in November 1945 was for its observers the germination of a century long movement. The political scientist and former UNESCO delegate (1947-1950) Walter Laves, noted that after the bombing of Hiroshima "government delegates met in an atmosphere of bitter memories but of renewed hope", realizing that "civilization could survive only if a climate of mutual understanding and mutual trust were created".¹ It was, for Laves, "the universal longing for a better world" that brought UNESCO into being and turned the promotion of cultural, educational and scientific cooperation into the basis of a durable world peace.² Laves' statements epitomized the optimism of the early historiography that idealized the birth of UNESCO. The new institution was portrayed as rising above the vacuity of the League of Nations (LoN) and as the product of a coherent, goal driven and well ordained process fuelled by a collectively felt need for durable peace. Often written by former delegates such as Czechoslovakian Jan Opocensky or American Walter Laves, the early narratives celebrated UNESCO's establishment as the necessary and natural solution to an unequivocal fear of a third world war.³ These accounts conveyed a vision of the UN system and of UNESCO as powerful international agent endowed with the political agency/capacity to build and maintain a stable international order.

With the beginning of Cold War bloc politics in the 1950s, optimism in the UN faded giving way to more critical if not pessimistic realist appraisal of the long constitutional process of UNESCO. Krill De Capello showed that the delegates of the CAME, the conference that prefigured UNESCO's creation, did not intend to create UNESCO at first and were, for the longest part of the conference, concerned with finding practical solutions to cultural reconstruction in Europe. The creation of UNESCO and its framing as a replacement of the League's IIC was a by-product of the CAME negotiations rather than its red-thread.⁴ To the fact that the creation of new international cultural organisation seemed undesired by the CAME delegates, James Sewell added that the making of UNESCO was not the cosmopolitan and collective achievements than assumed

¹ Walter Laves and Charles Thompson, *UNESCO – Purpose, Progress, Prospects*, Bloomington: Indian University Press, 1957, p.3.

² Laves and Thompson, op. cit. (1), p.3.

³ Jan Opocensky, *The Beginnings of UNESCO 1942-1948: Vol I & II*, Paris: UNESCO, 1949; Laves and Thompson, op. cit. (1).

⁴ Krill De Capello, "The creation of the United Nations Educational, Scientific and Cultural Organization", *International Organization* (1970) 24, pp.1-30

by Opocensky and Laves. He pointed out that the process rather revolved around great power negotiations between the United States, Britain and France.⁵

While early accounts emphasized UNESCO's political agency and autonomy in the task of peace-building, the later Cold War realist historiography undermined UNESCO's political agency by arguing that the new agency was a mere product and agent of great power interests. With the Cold War gelling international relations and the UN system slipped in the background of international affairs, the scholar's skepticism about UNESCO gave way to plain disregard. As Maurel noted from the archivists at UNESCO, researchers deserted the UNESCO archives throughout the 1960s and the 1980s.⁶ This disregard worried some historians like Sewell, who found it critical that hardly any academic work had been produced on the UN agency over a large section of its existence.⁷

Since the mid-1990s, the historiography on UNESCO found a new lease of life by moving beyond the idealist-realist binary that so far structured our understanding of UNESCO and its origins. Cultural and political historians such as Jean-Jacques Renoliet and Chloé Maurel have offered a timely reappraisal of our understanding of the creation of UNESCO. In *L'UNESCO oubliée*, Renoliet convincingly questioned the idea of a rupture with the interwar period by unveiling the philosophical continuities between UNESCO and its predecessor the ICIC and the IIIC.⁸ Following Renoliet, Maurel has re-explored UNESCO's beginning beyond the constitutional room and further unearthed its diverse intellectual and conceptual origins.⁹ Their publications contributed to reveal UNESCO as a relatively autonomous and hybrid agent that condensed a variety of old and new cosmopolitan ideals.

Interestingly, this recent historiography has only meagrely considered the role of the sciences within UNESCO's project and focused instead on its engagements as a cultural and educational institution. Yet, I argue that without the natural sciences one cannot fully understand UNESCO at all. Back in 1945, many were the delegates who introduced science as the lynchpin of the new organization's peace building mission. By choosing the biologist Julian Huxley over the classicist Alfred Zimmern as first general-director and later making the creation of the International Institute for the Hylean Amazon (IIHA)

⁵ James Sewell, *UNESCO and World Politics. Engaging in International Relations*, Princeton: Princeton University Press, 1975.

⁶ Chloé Maurel, *L'UNESCO de 1945 à 1974 (Thèse de Doctorat d'Histoire Contemporaine)*, Dissertation submitted to École Doctorale d'Histoire de Paris I, 2005, p.15-16.

⁷ Sewell, op. cit. (5), p.357.

⁸ Jean-Jacques Renoliet, *L'UNESCO Oubliée: La Société des Nations et la Coopération Intellectuelle (1919-1946)*, Paris: Presse de la Sorbonne, 1999.

⁹ Chloé Maurel, 'Le rêve d'un gouvernement mondial des années 1920 aux années 1950. L'exemple de l'UNESCO', *Histoire@Politique* (2010) 10, pp.2-20; Chloé Maurel, 'L'UNESCO: une plate-forme pour les circulations transnationales de savoirs et d'idées (1945-1980)', *Histoire@Politique* (2011) 15, pp.42-59;

one of UNESCO's four priorities for 1947, delegates believed science was also a solid basis for a peaceful and prosperous world, one that counted as much as cultural preservation and education. If science had enabled the Allied forces to win the war, UNESCO's makers had high hopes that it was one of their best instrument to win the peace as well. Though short-lived, this scientific optimism permeated the first five years of the organization. Interestingly, the inclusion of science in the program of UNESCO, unlike education and culture, was a hard-gained and fiercely debated achievement for British biochemist Joseph Needham who spearheaded the campaign to raise science from a sterile problem of reconstruction to a world-peace priority for UNESCO.

This chapter proposes to rediscover UNESCO's origins from an investigation of Needham's scientific activism. Following him in his peregrinations from China, where he was based at the time as head of the Sino-British Scientific Cooperation Office (SBSCO), to Paris where UNESCO was finally erected, this chapter will first retrieve the forgotten non-Western origins of UNESCO. By adding the S to UNESCO, we will see in a second part that Needham and Julian Huxley purported a redefinition of the established order of intellectual cooperation in which science should prevail. Defending a conception of science endowed with political and international functions, Needham's coalition wished to replace intellectual cooperation, which had so far been commonly understood as a cultural and educational matter, by a diplomacy of scientific experts in which scientists prevailed over writers, artists and educationalists.

Within the history of science, the difficult insertion of science in UNESCO has received already some attention. Following the pioneering work of Aant Elzinga who investigated the place of science at UNESCO in its first decades, this scholarship contributed to a renewal of our understanding of UNESCO's making.¹⁰ Historians of science like Patrick Petitjean, Vidar Ennebakk and development economists John and Richard Toye have highlighted the crucial role played by scientists and their organizations in the birth of UNESCO. While earlier historiography reduced the insertion of science to the individual activism of exceptional men such as Julian Huxley and Joseph Needham, these authors widened the scope to retrieve the collective and ideological roots of early UNESCO science.¹¹ All three traced down the origins of UNESCO science to the 1930s and a constellation of radical leftist scientists commonly known as the Social Relation of

¹⁰ Aant Elzinga, 'UNESCO and the politics of international cooperation in the realm of science', in Patrick Petitjean, *Les Sciences Coloniales - Figures et Institutions*, Paris: Orstom Edition, 1996, pp.163-202; see also: David Nofre, 'Managing the technological edge: the UNESCO International Computation Centre and the limits to the transfer of computer technology, 1946-61', *Annals of science* (2013) 71, pp.410-431.

¹¹ On Julian Huxley and Joseph Needham, see: John Baker and Jens-Peter Green, *Julian Huxley. Scientist and world citizen 1887-1975*, Paris: UNESCO, 1978; Maurice Goldsmith, *Joseph Needham. Twentieth Century Renaissance Man*, Paris: UNESCO publishing, 1995.

Science Movement (SRSM). Toye and Toye unearthed the multilevel strategy deployed by the British SRSM to win the support of the British political and scientific establishment to defeat the proponents of a strictly educational and cultural United Nations Educational and Cultural Organization (UNESCO).¹² Looking beyond Britain, Petitjean and Diane Dosso showed how French-British SRSM networks facilitated the diffusion of Needham's scientific proposals for UNESCO and left a mark on the early reorganisation of postwar international science with the creation of the World Federation of Scientific Workers (WFSwW).¹³ While Toye and Toye and Petitjean and Dosso thoroughly retraced the complex insertion process, Enebak argued that UNESCO science reflected the important concept of social responsibility of science and of science's political function that Britain's scientific left popularized at the end of the 1930s and during the war.¹⁴

Despite their novelty, however, these accounts tend to reproduce the kind of triumphalism that pervaded the older general UNESCO historiography discussed above. It described the insertion of the S as an unproblematic and undisputed addition to UNESCO's fields of action and uncritically reproduced the well-rooted assumption that UNESCO was above all a Western achievement by limiting their attention to the European activism of SRSM scientists. This Eurocentric delineation, however, is problematic. So far, historians have failed to recognize the non-Western scientists from China and the British Empire who decisively contributed to the successful insertion of the S in UNESCO, and only a few, like Toye and Toye, have shown that the scientification of UNESCO was initially also *resisted* in the West namely by former members of the League's International Committee on Intellectual Commission (ICIC) and the IIIC. In fact, Needham obtained a scientific mandate for UNESCO thanks to the strong ties he established with Chinese and imperial scientists who agreed with him on the possible role of science for international peace and campaigned by his side. Finally, Needham and his internationalist supporters reached their goal by competing against former IIIC members to redefine the nature of intellectual cooperation as a primarily scientific peace-building instrument. This far-eastern activism and the contention with IIIC enthusiasts raise some important questions

¹² Richard Toye and John Toye, 'One world, two cultures? Alfred Zimmern, Julian Huxley and the ideological origins of UNESCO', *History* (2010) 95, pp.308-331.

¹³ Patrick Petitjean, Stéphane Schmidt and Cathérine Jami, *Science, Histoire et Politique. L'Exemple de Cambridge*, Paris: Magnard-Vuibert, 2009; Patrick Petitjean, 'The joint establishment of the World Federation of Scientific Worker and UNESCO after World War II', *Minerva* (2008) 46, pp.247-270; Patrick Petitjean, 'Needham, Anglo-French civilities and ecumenical science' in Irfan Habib and Dhruv Raina, (eds.) *Situating the History of Science: Dialogues with Joseph Needham*, New Delhi: Oxford University Press, 1998, pp.152-197. Diane Dosso, 'La construction de la coopération scientifique Franco-Britannique (des années 1920 à la Seconde Guerre Mondiale)', in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'exemple de Cambridge*, Paris: Magnart-Vuibert, 2009, pp.117-138.

¹⁴ Vidar Enebak, *The S in UNESCO – Post-War Visions of Science and Democracy*, at the Third Conference on Knowledge and Politics, Bergen University, 18-20 May, 2005

regarding UNESCO's making: Could UNESCO and its philosophy be more than a Western construct? But also, how did Needham's technocratic diplomacy challenge the model of intellectual cooperation inherited from the League's ICIC-IIIC?

This chapter intends in a first section to retrieve the non-Western roots of UNESCO by decentring and globalizing the narrative of the insertion of its scientific mandate. Following Needham and reconstructing his activism for UNESCO science, I will show the significance of non-Western contexts in enabling and modelling science's role at UNESCO. This transnational investigation will reveal how, for instance, Chinese and imperial scientists became significant (yet forgotten) advocates for the insertion of Science at UNESCO. Here I will demonstrate that the introduction of science at UNESCO was neither self-evident nor the achievement of Joseph Needham alone. We will see that it stemmed from a heterogeneous coalition assembled by Needham and aggregating non-Western and Western scientists around a common set of concerns and aspirations for the postwar order of international science. In revisiting UNESCO's origins through its science, this chapter will bring together diverse histories that had so far been kept in separation to propose a new outlook on the wartime and early postwar construction of peace.

In a second section, we will see that Needham's coalition put forward a conception of science endowed with social, political and international functions. Petitjean and Enebakk demonstrated that early UNESCO science strongly resonated with some important SRS conceptions of science such as the notion of social responsibility of science. I will, however, show that other scientific concerns and practices such as the wartime experiences in international scientific cooperation, the advancement of East-West scientific cooperation and Needham's ecumenical and unitary conception of science were also essential underpinnings of UNESCO science. Finally, I will show that the scientific mandate Needham proposed for UNESCO induced a conflict with the paradigm of intellectual cooperation inherited from the interwar IIIC. Indeed, the negotiations to include the S in UNESCO staged a shift from the League's intellectualist internationalism to the forthcoming technocratic internationalism of the UN, from the idea of a *Société des Esprits* as conceived by the French poet and philosopher Paul Valéry to Needham's scientific plan for a *technocratic diplomacy*. I will therefore investigate the creation of UNESCO as an early stage of the transition from the old figure of the literary intellectual to the technical expert as legitimate international peace builder.

THE INSERTION OF SCIENCE AT UNESCO

On November sixteenth 1942, the president of the British Board of Education, Richard Austen Butler, and the Chairman of the British Council, sir Malcolm Robertson, convened

Britain's allies to the first meeting of the Conference of Allied Ministers of Education (CAME) in order to collaborate on the "educational questions affecting the allied countries of Europe and the UK during and after the war".¹⁵ To assist the conference, several sub-commissions were appointed in 1943 among which the Science Commission whose goal was to "report on the problems involved in the supply of scientific equipment to the occupied countries when they had been freed".¹⁶ However, the CAME's mission quickly expanded beyond educational reconstruction. In April 1944, following the US delegate's Greyson Kefauver's "proposals for a United Nations organization to deal with educational and cultural problems in the period of reconstruction", the CAME officially became the antechamber of the future UNESCO.¹⁷ This reorientation broadened up the CAME's prerogatives allowing for new concerns to appear in the negotiations such as the French proposal to revive the IIIC and the role of intellectual cooperation in the post-war world.

Within this frame, the Science Commission started to consider science more broadly and some members, like the Greek physicist Alexander Photiades "raised the question of the inclusion of scientific research in the scope of the proposed UN educational Organization".¹⁸ The first discussions on science's inclusion in the new organization only formally took place a year later when, in April 1945, the Science Commission discussed Needham's memorandum entitled *The place of Science and International Scientific Cooperation in Postwar World Organization*.¹⁹ The Commission welcomed Needham's suggestions and agreed to "recommend [to the plenary] that the new organization should be called UNESCO" and that "the list of scientific activities outlined [by Needham] should be incorporated into the constitution of the future body".²⁰ The Conference for the Establishment of UNESCO eventually approved Needham's recommendations in November 1945 to grant the new organization with a scientific mandate. A year later, in 1946, his memorandum greatly inspired the design of UNESCO's first scientific program, which Needham, furthermore, was designated to carry out. In view of Needham's seclusion in China at the time, the fact that his memorandum made it to the Science Commission's working table, met with unanimous enthusiasm and became the founding philosophy of

¹⁵ 'Draft report of a conference held at the Board of Education on Monday 16th November, 1942, at 3 p.m.', UA, CAME Plenary meetings Vol.I, p.1

¹⁶ 'CAME, Commission on Scientific and Laboratory Equipment, 'draft minutes of the 1st meeting held at the British Council, 25, Savile Row, W.1, on Tuesday 19 October 1943 at 3 p.m.', UA, file AME/D/1, p.1.

¹⁷ Grayson Kefauver, 'Memo on international action needed in the educational and cultural field by Grayson N. Kefauver, USA delegate to CAME, London', nd, NP, Folder D.8

¹⁸ CAME, Commission on Scientific and Laboratory Equipment, 'draft minutes of the 9th meeting held at the British Council, 25, Savile Row, W.1, on Tuesday 2nd May 1944 at 2.30 p.m.', UA, file AME/D/75, p.2.

¹⁹ Joseph Needham, 'The place of science and international scientific cooperation in postwar world organization, Memorandum III, 28 April 1945, NP, Folder D.14.

²⁰ CAME, Science Commission, 'draft minutes of 19th meeting, held at the British Council, 43, Portland Place, W.1, on April 10th, 1945, at 2.30 p.m.', UA, file AME/D/1B, p.3.

UNESCO's early science, raises some basic questions: Where did Needham's memorandum come from? What was the nature of his proposal that enthused the Science Commission and convinced UNESCO's delegations? How did it reach the Science Commission and appear on the future organization's agenda?

Although, between 1944 and 1945, Needham managed to communicate his memorandas to the Science Commission via his friend the scientific journalist and CAME member James Gerald Crowther, the Science Commission remain nonetheless a marginal and rather insignificant episode of Needham's campaign to turn UNECO into UNESCO. Although the Science Commission endorsed the memorandum, the issue of international scientific cooperation remained a secondary concern for its members. The Science Commission levelled up to Needham's expectation rather late, in the summer of 1945, when its members began a timid promotion of Needham's plan to the rest of the conference. Rather than relying on internal support, Needham built the basis for his success outside the CAME. To publicize his cause, Needham did not only solicit his peers, but interpellated political authorities as well, such as the White House, on the necessity to reorganize international science.²¹ Over the two years of his campaign, Needham therefore composed a heterogeneous coalition of scientific as well as governmental, parliamentary and state supporters from around the globe. Before delving into Needham's scientific activism, however, I will first detail how he envisioned the postwar reorganization of international science.

A view from China: Needham on the reorganization of international science

Needham articulated his vision for postwar international science in a series of three memoranda that he prepared between the summer of 1944 and spring 1945. It was in Chongqing, where Needham was stationed as director of the SBSCO to organize Sino-British scientific cooperation to contain Japan's imperial expansion in continental Asia that he first imagined and formulated his plan for international science. As he recalled later, it all started in December 1943 through a meeting with Soong Tse-Ven, who is known in English as T.V. Soong, the then Chinese minister of Foreign Affairs.²² Needham recalled that he came to realize from his correspondence with Soong, that "the time has gone when enough can be done by scientists working as individuals". Needham wrote him that "science and technology are now playing and will increasingly play, so predominant

²¹ Needham even wrote to Roosevelt at the White House, see: Luachlin Currie to Needham, 7 September 1944, NP, Folder D.4.

²² Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.5.

a part in all future human civilization, that some means whereby science can effectually transcend national boundaries is urgently needed”.²³ Based on these exchanges, Needham and Soong wrote together three memoranda on “an International Science Cooperation Service”, which nourished an eighteen-month long campaign in favor of a UN-mediated reorganization of international science.²⁴

In the *First Memorandum on an International Co-operation Service* written in the summer of 1944, Needham and Soong set the goals of a reorganization of international science outside Europe and the United States.²⁵ For Needham, even though science had an internationalist propensity by nature, it was illusory to believe in its enactment without

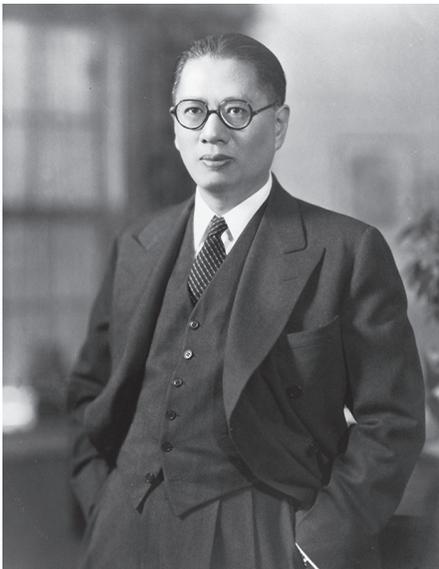


Figure 1 – Chiang Kai-Shek’s Minister of Foreign Affairs (1942-1945) Soong Tse-Ven (1894-1971)

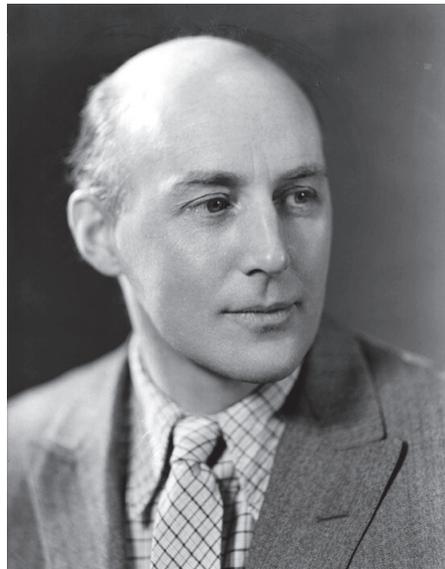


Figure 2 – British pioneer of scientific journalism, popularizer of science and Marxist activist James Gerald Crowther (1899-1983)

voluntarily undertaking its material realization. Witnessing the isolation and hardship of his Chinese colleagues during his mission at the SBSCO, Needham rejected what he called the “laissez faire organization of science” as a fallacy.²⁶ For Needham, the real

²³ Joseph Needham to T.V. Sung, 29 December 1943, NP, Folder D.1.

²⁴ Joseph Needham, ‘Science and international relations’, fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.5.

²⁵ Joseph Needham, ‘First memorandum on an international science cooperation service (Chungking, July, 1944)’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Cooperation Office*, London: The Pilot Press LTD, 1948, pp.274-282.

²⁶ Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14, p.3.

challenge laid in the durable construction of Eastern science and East-West scientific contacts rather than in the “Bright Zone [...] where all the sciences are very advanced and industrialisation is highly developed”.²⁷ Needham formalized this challenge of developing science in the Dark Zone with the concept of *periphery principle*. The *periphery principle* consisted in “assisting particularly the scientists and technologists in the far regions of the world outside the bright zone who needed the helping hand of international science” without “interfering too much within the ‘bright zone’”.²⁸ The establishment of what he called an International Science Cooperation Service (ISCS) could achieve the goals associated with the *periphery principle*. As Needham put it, the ISCS should foster to “the conveyance of the most advanced applied and pure science from the highly industrialized Western countries to the less highly industrialized eastern ones, though this is not to say that there would be no scope for westbound traffic too”.²⁹

Needham modelled the ISCS after the British imperial scientific machinery that emerged with WWII and that the Washington-based British Commonwealth Scientific Office (BCSO) and Needham’s own SBCO exemplified.³⁰ These liaison offices facilitated contacts and cooperation between the Empire’s many scientific communities. Needham viewed liaison offices, also called Scientific Liaison Offices (SLOs), as a vital complement to the existing peacetime organizations of science such as international congresses and international unions. In his second memorandum, he suggested that the ISCS could “combine the methods which the world of science has spontaneously worked out for itself in periods of peace with those which the nations have had to work out under the stress of war”.³¹ In this respect, Needham insisted that “the ISCS may be regarded as a natural

²⁷ Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14, p.3.

²⁸ Joseph Needham, ‘The place of science and international scientific cooperation in post-war world organization, Memorandum III’, 28 April 1945, NP, Folder D.14, p.3.

²⁹ Needham, op. cit (25), p.275.

³⁰ Although Alexander King’s office was named after the British Commonwealth, I designate in this chapter all the scientific activities of the late British Empire under the broad category of imperial. Just as the subdivisions of Dominions and Colonies, the distinction between Empire and Commonwealth hold little significance for the purpose of understanding late imperial science. Indeed, the notion of Commonwealth of Nations, first used by General Smuts, referred to the same territorial and political organization than the notion of British Empire. It however, as Lawrence James put it, “banished from the self-governing dominions [i.e., Canada, South Africa, Australia and New Zealand] that stigma of inferiority and subservience conveyed by membership of an Empire”. Commonwealth referred to an idea of a “free community of equals with shared interests who worked together for the good of all”. Yet, as James further clarify, the transformation from Empire to Commonwealth was “made on Britain’s terms, and on the assumption that Britain was legally entitled to give or withhold political rights to its subjects everywhere”. Lawrence James, *The Rise and Fall of the British Empire*, London: Abacus, 1998, p.385.

³¹ Joseph Needham, ‘Memorandum addressed to the Parliamentary and Scientific Committee. Measures for the organization of international cooperation in science in the postwar period’, 1944, NP, Folder D.6, p.4.

growth from the international unions on the one hand and the science cooperation offices on the other”.³² In Needham’s vision, the ICSC would crown a new scientific order based on peace and wartime scientific organizations. As a true international body, the ICSC could enable a supranational loyalty in science as opposed to any of the existing methods impeded by “a fundamentally national emphasis and an inevitable national loyalty”.³³ Aspiring to overcome the narrowness of the national logic, Needham contemplated the emerging UN framework as a fertile ground to endorse his plans.

The need for the reinforcement of science in the UN system became evident for Needham during the winter 1945. If Needham’s engagement started in China, it snowballed from his 6-week visit to the US a year later, in February 1945, where “the Question of the due weight to be given to science in the projected international organization was fully gone into, not only with the late Dr. Grayson Kefauver, and others then working at the State Department, but also with many representatives of American scientists”.³⁴ Upon his return, Needham indeed unequivocally pleaded for “UNESCO to become UNESCO” and further contended that “so important is the place of science in world affairs [...] that science might come into the main organization at a higher level – i.e., that there should be established, parallel to the Economic and Social Commissions of the Economic and Social Council [i.e., ECOSOC], one further commission to be known as the Scientific Commission”.³⁵ Needham legitimized this ambitious addition because he saw the reorganization of international science as a means to foster peace and humankind’s welfare. Needham saw the insertion of science at UNESCO and at the UN’s highest level as a means to prolong the valuable services science offered in the war. He believed that these wartime services like the provision of technical advice to governments, the transfer of science and technology to aid underdeveloped and devastated countries to industrialize and the facilitation of movement of scientists across national boundaries could contribute to solve the social and political challenges of peace.³⁶ “The vast mass of human suffering throughout the world”, Needham asserted, “needed the scientist’s help just as much as the military survival of democratic nations”.³⁷

³² Joseph Needham, ‘Memorandum addressed to the Parliamentary and Scientific Committee. Measures for the organization of international cooperation in science in the postwar period’, 1944, NP, Folder D.6, p.4.

³³ Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14, p.2.

³⁴ Joseph Needham, ‘Science and international relations’, fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.5-6.

³⁵ Joseph Needham, ‘Summary of memorandum: the place of science and international scientific cooperation in post-war world organisation’, nd, NP, Folder D.22, p.2.

³⁶ Needham, op. cit (25), p.277-278, p.281-282.

³⁷ Joseph Needham, ‘The place of science and international scientific cooperation in postwar world organization, Memorandum III’, 28 April 1945, NP, Folder D14, p.25.

In Chongqing, Needham did not formulate his proposals as a Western hermit secluded from the agitated discussions on postwar reconstruction. Against the status quo, and as a true agitator, he sensitized and debated, corresponded and met with scientists and political officials from China to America, Britain to Australia to advance his plans. Needham deployed a great deal of energy and a fine sense of manoeuvring in creating the necessary coalition that ultimately paved him, and his ideas, the way to UNESCO. He was also greatly helped by his British leftist comrades like Crowther who promoted his memoranda at the British Council where he headed the Science Committee and at the CAME's Science Commission where he represented the British Council. Needham also relied on freshly found supporters such as the young physicist and BCSO director Alexander King who distributed Needham's memoranda throughout the British Empire to the imperial scientists he represented in Washington.³⁸ In his campaign, however, Needham had to compete with a sea of suggestions for the postwar future of science. Between 1940 and 1946, the question of the place of science after the war stimulated the imagination of many individual scientists like Needham and alimeted vivid debates across the scientific community at the occasion of large conferences especially convened to deal with this issue. Some sought to reinforce and protect the creative capacities of science. the medical doctor Jacques Métadier proposed for instance to protect science from society and create new organizational patterns to stimulate the growth of science while the imperial scientists gathered in 1946 at the *Royal Society Empire Scientific Conference* (RSESC) discussed ways to reinforce trans-imperial scientific cooperation and stimulate scientific research in the colonies. Others however intended to develop the socio-political functions of science. The Czechoslovakian pathologist Józef Skládál called for the establishment an IIIC-inspired International Academy where science would be erected as a moral and humanitarian compass for humanity. His companions at the *Science and World Conference* organized in 1941 by the British Association for the Advancement of Science (BAAS) coupled scientific expertise and leftist politics to the advancement of a planned welfare state and social democracy against fascist ideologies.³⁹

³⁸ On James Gerald Crowther, see: Ralph John Desmarais, *Science, Scientific Intellectuals and British Culture in the Early Atomic Age, 1945-1956: A Case Study of Georges Orwell, Jacob Bronowski, J.G. Crowther and P.M.S. Blackett*, Dissertation submitted to Imperial College London, 2010, pp.89-108; Petitjean, op. cit. (13), p.255-256; Christopher Chilvers, 'The dilemmas of seditious men: The Crowther-Hessen correspondence in the 1930s', *The British Journal for the History of Science* (2003) 36, pp.417-435, p.417-422; On Alexander King, see: Roy MacLeod, 'The Royal Society and the Commonwealth: old friendships, new frontiers', *Notes and Records of the Royal Society* (2010) 64, pp.137-149, p.140; Alexander King, 'Commonwealth scientific cooperation during World War II', *Science and Public Policy*, (1987) 14, pp.151-154.

³⁹ Jacques Métadier, 'Proposed creation of an international society for scientific research', 1942, NP, Folder D.1; Dr. Józef Skládál, 'Proposal for an international academy', 1942, NP, Folder J.22.

Needham engaged in these discussions and modelled his memoranda accordingly. His plans crystallized around two dominant notions of science: First, Needham rejected what he called the *laissez-faire* idea that science was universal *per se* in favor of a materialist conception of science's universality. The *laissez faire* idea designated a common belief among Western scientists that the universality of a scientific claim and the capacity of a scientist to recognize it implied that knowledge was universally available and scientific contact seamless across the globe. Although Needham believed in the inherent universality of a scientific fact, he argued that the international diffusion of scientific knowledge was not naturally occurring and depended on specific material and institutional conditions. He argued that a whole institutional machinery of scientific exchange was required to make scientific knowledge travel worldwide and enable scientists from around the world to interact. Second, he believed that once adequately reorganized, science could fulfil decisive social and international functions in the service of a harmonious and peaceful international society. I will show in this section how these two major conceptual tenets, can be linked back to Needham's participation in war science as well as in the lively debates on science and international politics that especially animated Chinese and imperial scientists and officials. We will see for each notion how he tinkered the fundamental ideas of his proposals and pieced together the coalition he needed to eventually successfully promote his plan for a scientific mandate for UNESCO. Hence, uncovering the non-Western nature of Needham's scientific activism will shed light on the so far overlooked part a variety of non-Western actors and contexts took in decisively modelling UNESCO's science.

Building universality: the peacetime future of wartime scientific liaison

In 1945, Needham rejected the idealist conception of science's universalism, explaining in his third memorandum that "this parochial theory [...] that in science everyone knows everyone else, and can, therefore, easily get in touch when any problem arises which calls for it".⁴⁰ He satisfyingly noticed, however, that "there are today several distinct conceptions of the form in which international intercourse in science and technology may embody itself [differently] after the war".⁴¹ He considered furthermore that, despite their past services, reviving international science should not be confined to the prewar peacetime organizations. Needham argued that International Congresses

⁴⁰ Joseph Needham, 'The place of science and international scientific cooperation in postwar world organization, Memorandum III', 28 April 1945, NP, Folder D14, p.3

⁴¹ Joseph Needham, 'Memorandum addressed to the Parliamentary and Scientific Committee. Measures for the organization of international cooperation in science in the postwar period', 1944, NP, Folder D.6, p.1.

and Unions limited contact to personal exchanges within tight disciplinary bounds and could therefore not appropriately deal with the challenges of international science. “To represent all the sciences, pure and applied” and “implement the social function of science in the international sphere”, which Needham believed to be a widespread aspiration of his community, international science should be modelled on the cooperative experiences of war science.⁴²

Needham had indeed witnessed the limits of science’s universality first-hand through his wartime activities. In Cambridge, he had participated in the reorganization of Britain’s biological sciences for the war effort as a member of the Biology War Committee (BWC) between 1938 and 1942, before he undertook, as director of the SBSCO, the promotion of Sino-British scientific cooperation until 1946. By 1940, a wide scientific front ranging from the prestigious Royal Society to the radical British Association of Scientific Workers (BAScW) assembled to turn the country’s disorganized scientific apparatus into an aid in the war effort. This front in which Needham took part defended the idea that the government should establish “central co-ordination to ensure the most efficient use of the available personnel, equipment and laboratory resources”.⁴³ Like many, Needham decided to experiment with the rationalization of science himself. He started first in 1938, when he participated in the reorganization of his Cavendish Laboratory, before, launching in 1941 a nationwide effort to ‘militarize’ biochemical research via the BWC. The committee essentially worked as “clearing-house through which ideas or knowledge relating to war-time biological problems could be exchanged between biologists and the Government [and his technical committees]” such as the Joint Committee of the Department of Scientific and Industrial Research.⁴⁴ Inspired by these committees, Needham then basically created the SBSCO as a sort of international clearing house. His goal was to establish and sustain high levels of cooperation and coordination between Britain’s scientific centers and China’s atomized scientific communities to enhance the Chinese resistance against the Japanese invader. From these experiences, he discovered international contact, liaison and cooperation in science to be complex organizational challenges rather than the natural outcomes that seamlessly unfolded from the practice of science. He witnessed that even though scientists could be naturally inclined to cooperate they were so far not aided by the adequate material and organizational conditions to do so. For him it became evident

⁴² Joseph Needham, ‘Memorandum addressed to the Parliamentary and Scientific Committee. measures for the organization of international cooperation in science in the postwar period’, 1944, NP, Folder D.6, p.4.

⁴³ ‘The A.S.W. (Association of Scientific Workers) and the War’, 1938, NP, Folder B.237, p.1.

⁴⁴ ‘The Biology War Committee’, *Nature*, 154, n°3918, 2 December 1944, pp.693-694, p.693.

that a scientific claim could only transcend the local on the condition that contact among scientists and diffusion of knowledge was pro-actively and materially organized.

With the war, a variety of new means of international scientific cooperation mushroomed to enhance the Allies' war effort. Among others, the SLOs such as Needham's SBCSO and the BCSO effectively stimulated exchange of staff and scientific information between Allied nations. Covering the whole range of sciences, these liaison units enhanced transmission of information, assisted scientists in obtaining equipment, facilitated and maintained scientific contact between distant communities as well as between diplomatic and governmental organizations. These offices were facilitators, and their core business, Needham argued, "was not to know but to know who probably knows"⁴⁵. Needham did not only recognize the wartime value of these agencies. He believed that their liaison activities had a peacetime value and could overcome the limits of the laissez faire organization of science and lay the foundations of a world community of science. He considered "this piece of machinery too precious to be allowed to disappear after war", and eventually modelled UNESCO's Field Science Cooperation Offices (FSCOs) after these wartime SLOs.⁴⁶

That Needham referred extensively to the British Empire's efforts to enhance scientific contact between Britain and the rest of the Empire as well as to strengthen war cooperation between the British Empire and the United States was not without significance. Through Chongqing, Needham cooperated with the BCSO and shared with its director, King, the same concern for the absence of effective channels of scientific exchanges beyond the integrated scientific networks of North America and Western Europe. Based on their experience at BCSO and SBSCO, they shared a similar belief in the power of international scientific interchange and foresaw in the Empire's wartime scheme of SLOs a model of effective contact to extend on an international scale. King was an important advocate for a reorganization of scientific cooperation in the Empire during and after the war.⁴⁷ Early on, he took part in Britain's efforts to organize scientific cooperation within the English-speaking world as part of a mission to Canada and the USA in September 1940. King mainly worked together with the Dominion missions through the British Commonwealth Science Committee (BCSC) established in 1941 to facilitate exchanges of information and staff within the Empire. His appointment as head of the Washington-based BCSO in 1944 intensified cooperation between the scientists of the different entities composing the

⁴⁵ Joseph Needham, 'Memorandum addressed to the Parliamentary and Scientific Committee. Measures for the organization of international cooperation in science in the postwar period', 1944, NP, Folder D.6, p.3.

⁴⁶ Needham, op. cit (25), p.274.

⁴⁷ Roy MacLeod, "All for each and each for all": reflections on Anglo-American and Commonwealth scientific cooperation, 1940-1945", *Albion: A Quarterly Journal Concerned with British Studies* (1994) 26, pp.79-112, p.85-86.

British Empire and between them and their American colleagues to deepen war-related cooperation.⁴⁸ At the BCSO, King became a catalyst for greater scientific cooperation within the British Empire. Not unlike Needham's SBCO, the BCSO accelerated the flow of scientific information between the Empire's various scientific communities and broke their relative isolation from one another by becoming a major meeting point for imperial scientists. Altogether, as King recalled, they recognized that "the kind of relationships established for the exigencies of war [...] had potentially great importance for a peacetime world" which King strived to reinforce.⁴⁹ Under King's leadership, the BCSO grew into a major center where imperial scientists discussed future arrangements for peacetime cooperation. At the end of the war, The BCSO obtained from the Royal Society the organization of the first *Royal Society Empire Scientific Conference* in 1946 to address the problems related to the organization of science within the Empire.⁵⁰

With his paper, titled *International Relations in Science*, King fed into the conference's discussions with a plan for a network of scientific offices modelled on the wartime SLOs. With his plan, King sought to extend the network of interchange established with the wartime BCSO and SLOs. However, unlike these agencies which intensified contact between London, India and the Dominions – i.e., the semi-independent polities of the British Empire⁵¹ – and contact between the Empire and the United States, King's scientific service aimed at introducing trans-imperial and inter-continental exchange. One of King's goal was to emulate lateral ties between the Dominions and empower them to also interact with other communities outside the bounds of Empire. The service comprised a central office, the BCSO based in London, and seven Commonwealth Scientific Centres scattered over the five continents such as in Delhi, Melbourne but also Moscow or Rio de Janeiro. These regional centers were meant to facilitate exchanges between the Empire's scientists and relevant scientific communities outside the British Empire. The London Office would centralize the effort to co-ordinate interchange of staff, the circulation of scientific knowledge throughout the Empire via the regional centers and the provision of technical expertise to local authorities. For King, this institutional web could reinforce the proximity between scientists and maximize the potentialities of science for human welfare. Like Needham, King was persuaded that continued contacts and cooperation

⁴⁸ Alexander King, the head of the BCSO, later explained in an article published in *Science and Public Policy*, that the BCSO was originally called the British Central Scientific Office before it was transformed into the British Commonwealth Scientific Office, which did not concern Britain alone anymore but involved also the other members of the British Commonwealth, see: King, op. cit. (38), p.153.

⁴⁹ King, op. cit. (38), p.153.

⁵⁰ MacLeod, op. cit. (47), p.106; MacLeod, op. cit. (38).

⁵¹ The Dominions designate Australia, Canada, Newfoundland, New Zealand, South Africa and the Irish Free State. India was not a Dominion, but ruled its internal affair in relative autonomy under the British Raj.

would eventually “provide a truly scientific atmosphere” as well as “lead to a greater understanding of one another’s problems and a broader appreciation of the necessity for a common scientific approach.” While he believed his proposed service would strengthen the Empire, he also suggested, linking his proposals to Needham’s ISCS, that it “should be considered with regard to its possible extension on an international scale”.⁵²

King was not alone to value the SLOs. Many imperial scientists foresaw the advancement of science in the Empire through the development of a web of interconnected SLOs. The chemist Sir Shanti Bhatnagar and the geologist Darashaw Noshawan Wadia of the Indian delegation contended that the SLOs “should be the normal channels for all measures of scientific coordination and cooperation within the Commonwealth”.⁵³ Many agreed on the relevance of this machinery to “tackle the difficulties experienced by scientific workers in the colonies, where they are often completely isolated from discussion with colleagues”.⁵⁴ But for King and his colleagues, the peacetime development of the SLOs held a greater promise than scientific facilitations. It announced social and political advancement for the Empire and mankind as a whole. King for instance predicted that closer scientific cooperation between scientists of the world would accrue international understanding as well as extend the great potentialities of science for human welfare.⁵⁵ By stimulating scientific cooperation, King and the imperial scientists and delegates participating in the conference aspired to prevent war and create greater harmony and human welfare within but also beyond the British Empire. In that respect the conference contemplated cooperation with UN and Needham’s plans for a UNESCO which delegates like Bhatnagar saw as a necessary central body to safeguard the principle of freedom of science.⁵⁶

Interest was mutual and contacts regular between King and Needham. From the fall of 1944 onward, the architects of postwar imperial science and UNESCO science initiated a rich correspondence, which they maintained throughout the remainder of the war. Both shared similar views on postwar science and found inspiration in each other’s work at

⁵² Alexander King, ‘International relations in science’, *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.116-136, p.122, p.125.

⁵³ Sir Shanti Bhatnagar and Darashaw Noshawan Wadia, ‘Empire cooperation in the scientific field with existing and projected international organizations’, in *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.99-102, p.101.

⁵⁴ ‘Discussion of methods of improving the interchange of scientists throughout the Empire including a discussion on the future of the scientific liaison offices that have been established during the war’, in *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.7-11, p.10

⁵⁵ King, op. cit. (52), p.123-124.

⁵⁶ Bhatnagar and Wadia, op. cit. (53); ‘Discussion of Empire cooperation in the scientific field with existing and projected international organizations’, *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.93-98.

BCSO and SBCO.⁵⁷ They recognized the difficulties of peripheral scientific communities, appreciated the potentialities of the wartime SLOs but also valued the power of enhanced scientific cooperation for science's and mankind's advancement. Both extensively discussed the future of science in the emerging UN system, agreeing for instance on the need to introduce a scientific secretariat to the general secretariat or to the benefits of a network of regional scientific offices.⁵⁸ These interactions extended beyond a mere exchange of ideas and King went as far as distributing Needham's memoranda in Washington as well as throughout the Empire.⁵⁹ Importantly, both saw their respective plans as complementary and used each other's project to advance their respective agendas. The historian Roy MacLeod showed for instance that Needham's proposals to use the existing SLOs within the emerging UN framework ultimately helped King to convince the sceptical scientific missions of the British Empire to back up his plan to create an Empire-wide network of SLOs.⁶⁰ In turn, King's project constituted a formidable opportunity for Needham to reach out to and gather the isolated scientists scattered throughout the British Empire behind his ICSC proposal.

Once the S had been inserted into UNESCO, Needham, supported by his friend the biologist, imperial ecologist and freshly appointed first Director-General of UNESCO Julian Huxley, continued to look up to the sciences of the British Empire. Both Needham and Huxley aspired to establish a close partnership between UNESCO and the scientific institutions of the British Empire. Huxley, who had been an influential imperial expert and reformer of the British Empire since the early 1930s, was invited to present Needham's plan at the penultimate session of the Royal Society Empire Scientific Conference.⁶¹ In front of a large audience of scientists and delegates from the four corners of the British Empire, Huxley discussed the role of UNESCO science, but also suggested the creation of a British Commonwealth Scientific Service (BCSS) similar to King's plan. Huxley ultimately intended to highlight the possible synergies that could arise from cooperation between a BCSS and Needham's ICSC. Huxley pleaded that "if the BCSS were to set up offices [e.g., within the African region, Malaya, and the East Indies], they could clearly be of great service to UNESCO and it would almost certainly be desirable for the scientific section of UNESCO to have whole- or part-time representatives in them".⁶² Supportive of

⁵⁷ In a letter to Frederic Joliot-Curie, Needham shared his enthusiasm for King's work referring to the BCSO "qu'il a construit d'une façon tout à fait genial", in Joseph Needham to Frederic Joliot-Curie, 1 March 1945, NP, Folder D.9.

⁵⁸ Alexander King to Joseph Needham, 17 January 1946, NP, Folder D.25; Alexander King to Joseph Needham, circa August – December 1944, NP, Folder D.4.

⁵⁹ Joseph Needham to Alexander King, 15 March 1945, NP, Folder D.9.

⁶⁰ MacLeod, *op. cit.* (47), p.105.

⁶¹ On Huxley's colonial affiliations, see in particular Anker, *op. cit.* (11), p.76, p.128-129.

⁶² Julian Huxley, 'Empire cooperation in the scientific field with UNESCO and other UN organizations',

Needham's plans to insert a S in UNESCO as early as spring 1945, imperial scientists such as Frederick John Marrian Stratton and Shanti Bhatnagar, recommended shortly after Huxley's talk to undertake close cooperation with UNESCO.⁶³

Building universalism: The periphery principle

The ISCS that Needham proposed to establish at UNESCO was not only inspired by the British Empire's wartime scientific machinery. The novelty of the ISCS resided mainly in the *periphery principle* which he conceptualized during his time in China between 1942 and 1946. In Chongqing, Needham modelled his concept based on the intense exchanges he nurtured with scientists from China and the British Empire on the problematic organization of international science.

China was where it all started and, as he admitted during his Boyle Lecture in 1948, his "approach to the subject [of international scientific cooperation] was brought about by his experiences in [Chongqing]".⁶⁴ Shortly after his arrival in Chongqing, Needham modelled the SBSCO into China's main scientific post office, through which he stimulated contact between Chinese and Western scientists and organized material assistance to local scientists. Relying on RAF carriers operating between Calcutta and Chongqing, and aided by a handful of young Chinese scientists, Needham monitored the needs of local scientific communities and quickly organized the provision of books, tools, apparatus and chemical reagents to enable local scientists "to carry on their work, whether in pure science or in science applied to the war effort as the case may be".⁶⁵ During the four years of his mission at the SBSCO, Needham also visited many of these communities and undertook multiple journeys throughout Free China, from the front line in the neighborhood of Kunming to the north-western towns of Lanzhou and Dunhuang on the border with the Soviet Union. On these journeys, Needham saw countless universities, industrial plants, research laboratories and arsenals, and talked extensively with scientists about their activities and problems.

in *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.106-115, p.114.

⁶³ 'Discussion of Empire cooperation in the scientific field with existing and projected international organizations', in *Report of the Royal Society Empire Scientific Conference*, 1948, Vol.II, London: Morrison and Gibb Ltd., pp.93-98.

⁶⁴ Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.5.

⁶⁵ Joseph Needham, 'Article I: science in south-west China. (1) The physico-chemical sciences (1943)', Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Cooperation Office*, London: The Pilot Press LTD, 1948, pp. 80-81; Joseph Needham, 'Report I: the first year's working of the Sino-British Science Cooperation Bureau, February 1944', in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Cooperation Office*, London: The Pilot Press LTD, 1948, pp. 16-26, 17.



Figure 3 – Joseph Needham and the staff of the Sino-British Scientific Cooperation Office (SBSCO) (Chongqing, China, 1946)



Figure 4 – View of the SBSCO headquarters in Chongqing, China (c. 1944-1946)



Figure 5 – One of the two trucks Needham used to travelled more than 25,000 km to visit the universities, laboratories and industrial plants of Free China between 1942 and 1946

Travelling through China, Needham was struck by its state of disarray, by its “grinding poverty” and by his local colleagues’ distress at the chronic lack of facilities since the Japanese invasion.⁶⁶ And yet, despite their difficulties, Needham found “an extraordinary resourcefulness” in these scientists who “pertinacious beyond belief, continued to carry on research and operate industrial plants under a lack of facilities which would surely daunt those of any other people”.⁶⁷ If the war contributed to accentuate the difficulty of doing science in China, it only magnified a greater problem. Needham and his Chinese colleagues came to the conclusion that if science in China was “in a starved condition, [it was from] having been isolated so severely from the main currents of world scientific thought for so long”.⁶⁸ In that respect, as Hsing-Tsung remembered, Needham “gave of himself tirelessly in lectures, discussions and personal contacts to lessen their sense of isolation from the latest developments in science and technology in the West”.⁶⁹ But while

⁶⁶ Needham, *op. cit.* (65), p.48; Joseph Needham, ‘British Council policy in China. Recommendation complementary to those of P.M. Roxby (head of the British Council mission in China)’, 7 November 1945, NP, Folder C.95, p.36.

⁶⁷ Joseph Needham, ‘Science and life in wartime China’ in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948, pp.50-55, p.54, p.55.

⁶⁸ Joseph Needham ‘International science cooperation in war and peace address to the annual conference of Chinese Scientific Societies, Beipei, Szechuan, July 1943’, NP, Folder C.72, p.2.

⁶⁹ Huang Hsing-Tsung, ‘Peregrinations with Joseph Needham in China, 1943-1944’ in Guohao Li, Zhang

the SBSCO's achievements "rendered a real contribution to keeping the flame of science burning during the dreadful war years in Free China", Needham came to realize that the solution to the problem of isolation and the key to China's scientific revival might reside in structural efforts to inaugurate new patterns of international scientific cooperation that could reach out to the isolated scientists standing outside Europe and North America.⁷⁰

Thanks to his work at the SBSCO, Needham was well introduced in the intellectual and political life of Free China. While the SBSCO was associated with the Council for the Promotion of Science in the National Defence from 1943 and had several liaison officers within the principal Chinese ministries, Needham was himself elected corresponding member of both China's highest scientific organizations, the National Academies and the *Academia Sinica*.⁷¹ That Needham identified international scientific cooperation as a possible solution to China's scientific underdevelopment reflected this involvement and came in good part from his Chinese colleagues.

The idea of enhancing international scientific cooperation between China and the West permeated the lively discussions on China's scientific revival that animated the scientific community of Free China before and during the war.⁷² As an important promoter of international cooperation via the SBSCO, Needham participated in and more importantly drew significantly from these discussions and the solutions proposed by local scholars. Needham had, furthermore, already engaged in such debates prior to his departure for Chongqing. As member of several of Anglo-Chinese cultural organisations such as the Anglo-Chinese Intellectual Cooperation Committee and the Sino-British Cultural Association, Needham profusely exchanged with prominent Chinese scholars such as Chung-Shu Lo and campaigned for the establishment of greater Sino-British cooperation.⁷³ Within these heated debates, the proposals put forward by Chung-Su Lo during his 1940 tour in Britain stood out. Through a series of lectures in a dozen British

Mengwen and Cao Tianqin (eds.), *Explorations in the History of Science and Technology in China*, Shanghai: Shanghai Chinese Classics Publishing House, 1982, pp.39-76, p.73

⁷⁰ Joseph Needham, 'Report II. The second and third year's working of the Sino-British Science Cooperation Bureau, February 1946', in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948, pp.56-75, p.58

⁷¹ The government of Chang Kai Chek also appointed Needham as adviser to the ministry of education and the ministry of economic affairs, see: Needham, 'Report I...', op. cit. (65), p.20; Needham, op. cit. (70), p.68.

⁷² More broadly on the debates and discussions on the role of science in Republican China, see: E-Tu Zen Sun, 'The growth of the academic community, 1912-1949', in John Fairbank and Albert Feuerwerker (eds.), *The Cambridge History of China, volume 13: Republican China 1912-1913, Part 2*, Cambridge: Cambridge University Press, 2008, pp.381-382; Zuoyue Wang, 'Saving China through science: the Science Society of China, scientific nationalism, and civil society in republican China', *Osiris* (2002) 17, pp.310-319.

⁷³ Ernest Richard Hughes-Joseph Needham correspondence, NP, Folder C.5.

universities, including both Oxford and Cambridge, Lo introduced his British audience to the crippled state of science and education in China and exposed the benefits that an East-West cooperation program would bring to China's social and scientific development.⁷⁴ Lo's lectures left a strong impression on Needham. The two scholars subsequently established a rich correspondence on the matter of international cooperation throughout the war, which showed its influence on the type of scientific cooperation Needham ultimately envisioned, first between Britain and China with the SBSCO, and later at UNESCO with his *periphery principle*.⁷⁵

During his visit to the United Kingdoms, Lo aimed to convey the immense fascination that Western science exerted upon his colleagues back home. He particularly insisted on their unequivocal faith in the power of Western applied sciences, with which they hoped to alleviate most of the existing hardship in China. Lo ardently believed that greater cooperation with the West would help "to rejuvenate the nation" and "raise the general standard of living".⁷⁶ He regarded international scientific cooperation as China's best means to overcome the Japanese occupation, elicit societal progress, and revive its scientific tradition. Lo also foresaw in these multifarious contacts between East and West the roots of a peace-loving ecumenism. In his view, the advancement of world peace depended on the existence of genuine mutual exchanges between Eastern and Western science. Lo explained that scientific cooperation should be a two way street, a channel through which East and West would benefit from each other's views and ways "as the common heritage of mankind".⁷⁷ Lo concluded that "if we can get scholars from Cambridge to come to China to promote the study of pure science and other branches of studies, the time will come that from China there will be great scientists and scientific thinkers who can make original contribution to the world of thought".

In China, like almost everyone involved in the utilization of science for the war effort, the Chinese biologist Sidney Hsiao and the chemist and politician Jen Hung-Chun (aka H.C. Zen) also contemplated the power of scientific cooperation as the driving force of scientific progress. In a letter to Needham, Hsiao stated that cooperation "could bring

⁷⁴ Chung-Shu Lo, 'Cultural cooperation between China and Britain', 1939, NP, Folder C.3; Chung-Shu Lo, 'Some ideas for cooperation', 15 November 1939; Chung-Shu Lo, 'The past and present of Chinese university education', 4 August 1939; Chung-Shu Lo, 'Chinese university education and British universities: a plea for cooperation', nd, NP, Folder C.2.

⁷⁵ Needham redacted a collective statement by Cambridge scholars in plea for Anglo-Chinese university cooperation, see: 'A statement by a group of university teachers in Cambridge addressed to university teachers and other scholars in China concerned with cooperation between British and Chinese universities', January 1940, NP, Folder C.4; on SBSCO: Joseph Needham – Chung-Shu Lo correspondence, December 1939, NP, Folder C.3.

⁷⁶ Chung-Shu Lo, 'A suggestion of cultural cooperation between Cambridge and Chinese university', 8 December 1939, NP, Folder C.2, p.2.

⁷⁷ Chung-Shu Lo, 'Some ideas for cooperation', 15 November 1939, NP, Folder C.2, p.2.



Figure 6 – Chinese philosopher Chung-Shu Lo in Chengdu, China (May 1943)



Figure 7 – Joseph Needham with Chung-Shu Lo to his right in Chengdu, China (May 1943)

enormous moral support for an isolated worker” and approval of a project by an outside body could contribute to advancing the state of science locally by removing local obstacles and enlarging the views of local authorities.⁷⁸ Cooperation was not only morally important. For Rjen extending scientific cooperation to include remote communities like the Chinese was essential to the progress of science.⁷⁹ He noted, however, that since science’s “sane and swift progress” depended on the cooperation of scientists of different nationalities, it required the involvement of as many scientists as possible, which the existing organization of science did not permit.⁸⁰

Besides the necessary institutionalization of international contacts, the main problem of international cooperation in science lay for Rjen in the fact that large sections of world science “were not in a position worthy of other’s cooperation”.⁸¹ He contended that for international cooperation to work, countries like China needed to reach scientific maturity to generate “sufficient contributions of their own to be able to cooperate successfully with others”.⁸² If Rjen recognized the need for more international organizations such as the liaison offices, he postulated that bringing countries like China to scientific maturity would be the necessary condition for mutually beneficial discussions and exchanges of information. In that regard, Rjen and Hsiao, believed that by tackling the problem of isolation and underdevelopment that crippled Chinese science would not merely benefit to China and its scientists but to science as a whole. Allowing Chinese science to flourish would extend the realm of scientific cooperation, which both identified as science’s vital source of progress. For them, like Lo prophesized four years earlier, building West-East cooperation would and should pave the way to a future eastward traffic of knowledge essential for the future advancement of science. Needham was well-acquainted with the views of his Chinese colleagues on scientific cooperation as he took part in a multitude of debates and conferences on the future of science in China during his mission at the SBSCO.⁸³

From China, Needham was also made aware that the problems of scientific isolation did not only affect Chinese scholars but also the diverse scientific communities of the

⁷⁸ Sidney Hsiao to Joseph Needham, 8 September 1945, NP, Folder D.20.

⁷⁹ H.C. Rjen, ‘Problems of international cooperation in science’, 27 January 1944, NP, Folder D.19.

⁸⁰ H.C. Rjen, ‘Problems of international cooperation in science’, 27 January 1944, NP, Folder D.19, pp.1.

⁸¹ H.C. Rjen, ‘Problems of international cooperation in science’, 27 January 1944, NP, Folder D.19, pp.3.

⁸² H.C. Rjen, ‘Problems of international cooperation in science’, 27 January 1944, NP, Folder D.19, pp.3.

⁸³ Joseph Needham, ‘Science and agriculture in China and the West (Chungking, 1944)’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948 pp.252-258; Joseph Needham, ‘International science cooperation in war and peace (Beipei, 1943)’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948, pp.266-273.

British Empire, in spite of the European origins of many of them. As part of his wartime mission in China, Needham actively collaborated with allied scientists on the far eastern front such as Indians as well as Australians and stayed in close contact with other national delegations in China. As we have seen above, many in the Empire suffered from the distance to London and the inadequacy of the imperial scientific policy to bridge the gap.⁸⁴ In a letter to Needham, the chemist Norman McKenna of the Indian Ordnance Advisory Office, who drafted a proposal for an Indian Central Scientific Office, recognized the need for West-East cooperation. Supportive of Needham's ISCS proposal, he however warned Needham that "something more than this is needed, particularly for countries which are relatively backward like India and China" since he believed that "the danger [... is that purely scientific liaison will of itself be sterile".⁸⁵ For McKenna, scientific cooperation should entail more than the exchanges of scientific information. In his letter, he contemplated more practical patterns of collaboration between scientists on specific socio-economically relevant problems. For him, international scientific cooperation should, for instance, make it possible to enable "the work [...] carried out in the Middle East on Soil Stabilisation for road construction to be] extended by suitable planned research and trial [...] on a vast scale in India and Australia" where the same challenge to road construction were found.⁸⁶ Boyer and Veall of the Canadian Association of Scientific Workers, claimed that greater cooperation "will only be possible through an ISCS [which] will be necessary for this country [Canada and others, that they believed stood outside the Bright zone] to make the fullest use of the scientific information available form other countries [and] make up for the inadequate policies of the past [such as "the purely academic IIIC"] and the damage they have done to Canada's scientific resources".⁸⁷ Like the Chinese, imperial scientists unflinchingly argued that more eastbound exchanges were needed and that these should be more than just intellectual but also material in order to alleviate the scientific and economic backwardness of the many communities standing outside Europe and North America.

Working, helping and debating with a variety of isolated scholars in China and throughout the British Empire profoundly marked Needham and modified his understanding of science's workings. Upon his return to Britain, He explained in his book *Science Outpost* that these meetings did not just crystallize "the thinking which was going on in China from 1943 onwards about international scientific and technological

⁸⁴ Greater liaison with the metropolis started from the onset of the Royal Society but especially flourished from the 1890s, see: MacLeod, op. cit (38), p.139-141.

⁸⁵ Norman McKenna to Joseph Needham, November 1944, NP, Folder D.7, p.1

⁸⁶ Norman McKenna to Joseph Needham, November 1944, NP, Folder D.7, p.2

⁸⁷ Raymond Boyer and Norman Veall, 'Canadian Association of Scientific Worker. Memorandum', 16 October 1945, Montreal, NP, Folder D.21.

cooperation” but that the claims and proposals that Lo, Rjen, Hsiao and many others in and out of China formulated sensibly contributed to the formation of Needham’s ISCS and his concept of *periphery principle*.⁸⁸

In China, on the far eastern fringe of modern science, Needham encapsulated in his *periphery principle* the concerns of his peripheral colleagues as well as the solutions – e.g. scientific assistance and globally inclusive patterns of scientific cooperation – they envisioned to elevate science’s internationality to a world scale. The *periphery principle* was as much a critique of as it was an alternative to what Needham called the laissez-faire organization of science. While in China, Needham observed how the laissez-faire organization of science excluded large, mostly non-Western sections of the world’s scientific community from international debates. Needham argued in his third memorandum that:

“Laissez faire dons who look at the scene too exclusively from the Euro-American point of view, [and who] think of oscillating between Paris, Brussels, London, New York... They do not realize that the picture of world science looks very different when seen from Romania, Peru, Java, Siam or China.”⁸⁹

Needham believed laissez-faire historically led to an unequal organization of science with a highly integrated Western core, which he called the Bright Zone, and neglected non-Western fringe communities in a state of chronic isolation. The mission of the ISCS was to inaugurate an organization based on the *periphery principle*. Needham believed that the ISCS would emulate exchanges that would benefit both ends, the ‘Bright Zone’ as well as what came to be called the ‘Dark Zone’. While Needham confessed “the immediate aims of such an International Service would be the conveyance of the most advanced applied and pure science from the highly industrialized Western countries to the less highly industrialized eastern ones” he also assured “that this was not to say that there would be no scope for Westbound traffic too”.⁹⁰ Through the ISCS, Needham wished to inaugurate a new, truly global scientific order that would finally instate the adequate degree of global interconnectedness that was expected of a universal endeavor like the natural sciences.

Working at the SBSCO profoundly shaped Needham’s views, and set his proposals for an ISCS and the *periphery principle* apart in the wider, more euro-centric, discussions on the post-war reconstruction of international science. Well received among Chinese and imperial scientists, his memoranda, simultaneously, enabled Needham to constitute

⁸⁸ Needham, op. cit (83), p.266.

⁸⁹ Joseph Needham, ‘The place of science and international scientific cooperation in post-war world organization, Memorandum III’, 28 April 1945, NP, Folder D.14, p.3.

⁹⁰ Needham, op. cit (25), p.275.

a powerful coalition of supporters whose role in the run up to the insertion of science in UNESCO, in 1945, proved decisive, as we will see in the following section.

The last sprint and the S of UNESCO as far eastern legacy

While in China, Needham also travelled in and out of the country to promote the ISCS and the *periphery principle*. Following his tour in the USA in winter 1945, Needham decided to target the future UNECO as the frame to implement his ISCS. As he revealed in a letter to Henry Dale, his exchanges with local scientists, from the United States and Canada, convinced him of the feasibility and appropriateness of his plan.⁹¹ Though Needham and his third memo received wide acceptance within the scientific community in the period leading up to UNESCO's Establishment Conference of November 1945, his proposal had still only been marginally considered by CAME delegates. The draft proposal that the CAME submitted to the Establishment Conference enshrined an overall disregard for science. Despite the pressure of the Science Commission to grant it more space, delegates confined science to a subordinate function of the future organization's broader goal of educational and cultural cooperation.⁹² As the conference closed in, however, agitation levelled up at the CAME. The consensus around the CAME's draft proposal breached when the French delegates proposed a reinforcement of the role of intellectual and scientific cooperation in the future organization following their failure to have the plenary revive the IIIC as part of the future UNECO.⁹³ When the Establishment Conference opened in London on November first, 1945, the inclusion of the French counterproposal to the agenda forced the forty-four delegations and eight international organizations present to renegotiate the nature and breadth of the future organization's means to promote world peace. Thanks to the French, Science at UNESCO became both a distant dream and yet a reasonable prospect for Needham; a dream as he did not have personal access to the conference to promote his plan and still a realistic goal as science was finally on the agenda.

What eventually made it happen, however, were Needham's relentless efforts to gather the world's scientific communities and authorities behind his proposals to include science in the future institution. The last months of his campaign were decisive to inscribe his proposals and the need for science at UNESCO at the forefront of the conference's discussion. His international campaign gained the necessary momentum following the

⁹¹ Joseph Needham to Sir Henry Dale, 1 March 1945 and 15 March 1945, NP, Folder D.9.

⁹² 'Draft proposals for an Educational and Cultural Organisation of the United Nations, November 1945', reproduced in Jan Opocensky, *The Beginnings of UNESCO 1942-1948: Vol. I & II*, Paris: UNESCO, 1949, p.285-296.

⁹³ 'Proposals for the Constitution of the United Nations Organization of Intellectual Cooperation', reproduced in Opocensky, op. cit. (92) p.297-308.

distribution of his third memorandum in late winter 1945. This final memorandum became the instrument that tied around Needham and his ISCS a heterogeneous coalition of socially minded scientists and scientifically minded officials, from London to Chongqing. Needham did not only distribute his memorandum widely from Australia to Canada and Britain to the United States.⁹⁴ While in Washington, he also actively lobbied Kefauver, the head of US delegation, to grant more importance to science in his twenty-four aims memorandum on International Action for UNESCO, before soliciting the Soviet Union and its scientists when he flew to Moscow to defend his ISCS at the 220th anniversary of the Russian Academy of Science in June 1945.⁹⁵

In this worldwide campaign, Needham was not alone. Early on, he had benefited from his SRSM connections back in Britain and France to promote his proposals in Europe as well as within the CAME process.⁹⁶ Toye and Toye have shown how Crowther, then secretary of the Science Commission of the CAME, Sir Richard Gregory, former editor of *Nature* and Julian Huxley helped Needham to mobilize the British scientific establishment behind his ISCS proposals.⁹⁷ Several issues of *Nature* were ultimately dedicated to Needham's ISCS before the publication of a special volume titled 'UNESCO' in which Needham himself and several important figures of the SRSM such as John Desmond Bernal, Huxley, and Crowther defended the insertion of science in UNESCO.⁹⁸ Support, however, extended far beyond Europe with for instance the Canadian ASCW lobbying their CAME delegation to "support the changing of the name of the organization from UNECO to UNESCO".⁹⁹ Unsurprisingly, the bulk of China's scientific community, including the *Academia Sinica* backed up Needham's ISCS. Together, Needham and his local colleagues networked energetically to enrol China's highest authorities in the promotion of the ISCS on the burgeoning UN stage. Benefiting from his position at SBCSO, Needham managed to obtain support from the ministry of economic affairs and the ministry of education for instance.¹⁰⁰ He eventually addressed the Generallissimo Chiang Kai-Shek

⁹⁴ Joseph Needham to James Gerald Crowther, 25 July 1944 and 5 August 1945, NP, Folder D.1 and D.19.

⁹⁵ Joseph Needham, 'Response to Kefauver's items and activities suggested for UNECO', 4 March 1945, NP, Folder D8; Joseph Needham, 'Speeches @ Moscow June 1945', NP, Folder H.52; On Needham and the US position to UNESCO, see: Toye and Toye, op. cit. (12), p.320-321.

⁹⁶ Joseph Needham to Frédéric Joliot-Curie, 1 March 1945, NP, Folder D.9.

⁹⁷ Toye and Toye, op. cit. (12), p.320.

⁹⁸ 'An international science cooperation service', *Nature*, 6 October 1945, 156, n°3962, NP, Folder D.21, pp.401-405; 'A United Nation Educational and Cultural Organization', Reprinted from *Nature*, 10 November 1945, 156, NP, Folder D.22, pp.553-561.

⁹⁹ Raymond Boyer and Norman Veall, 'Canadian Association of Scientific Worker. Memorandum', 16 October 1945, Montreal, NP, Folder D.21, pp.3.

¹⁰⁰ Han Lih Wu to Joseph Needham, 3 August 1944, NP, Folder D.4; Wong Wen Hao (Academia Sinica) to Joseph Needham, 7 August 1944, NP, Folder D.4; Chu Chia Hua (Vice President of the Academia Sinica) to Joseph Needham, 24 October 1945, NP, Folder D.21; Chen Li Fu (Minister of Education) to Joseph Needham, 10 August 1944, NP, Folder D.4; Local scientists also showed great support to Needham's plan,

– Free China’s prime minister – to request “China to continue her policy of demanding a UN Cultural Organization capable of fulfilling the functions of an ISCS”.¹⁰¹ China’s diplomacy had however already accessed Needham’s request. The Chinese delegation to the UN energetically campaigned in favor of Needham’s ISCS at the 1945 United Nations Conference on International Organisation in San Francisco, at the CAME as well as at the Establishment Conference six months later.¹⁰²

On the eve of the Establishment Conference, Needham’s international activism eventually paid off as delegates of the constituent conference quickly recognized and endorsed his call for UNESCO science. From the first day of the conference, the significance of science was recognized when Ellen Wilkinson, the acting president of the conference, announced that, “the British delegation will put forward a proposal that it be included, so that the title would run ‘Educational, Scientific, and Cultural Organization’”.¹⁰³ Delegates unanimously supported Wilkinson’s call to include science in the organization’s title and constitution. The French delegate and former Prime Minister Léon Blum followed in lockstep with Wilkinson when he asserted that “the advance of all branches of science, was essential to the betterment of human welfare, and to the maintenance of peace” before the US delegate, Archibald MacLeish officially submitted a proposal that the Organization be called UNESCO and the Chinese eagerly seconded it.¹⁰⁴ At the conference, delegates did not only change the name from UNECO to UNESCO and recognized the importance of science, which they had notably overlooked throughout the CAME process. They also recognized the value of Needham’s own proposals for a non-eurocentric reorganization of international science. The Preparatory Commission of UNESCO – the instrument summoned by the Establishment Conference to discuss and define UNESCO’s mandate and program in 1946 – appointed Needham as head of the Committee on Natural Sciences and modelled the tasks of UNESCO’s NS division after his third memorandum.¹⁰⁵

By following Needham through his international campaign, I highlighted a complex imbrication of peripheral contexts and actors that played a key role in the making of UNESCO. The voices, concerns, and aspirations of numerous non-Western scientific

see for instance: Hu Chien Shan ‘Hu’s comments on the memo, III’, 10 November 1945, NP, Folder D.22.

¹⁰¹ ‘Report to his Excellency President and Generalissimo Chinag Kai-Shek on the position and prospects of science and technology in China’ by Joseph Needham, winter 1945, Chungking, NP, Folder C.100, p.2.

¹⁰² Chu Chia Hua to Joseph Needham, 24 October 1945, NP, Folder D.21.

¹⁰³ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.24.

¹⁰⁴ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.26-29 and p.99.

¹⁰⁵ *Science and UNESCO - International Scientific Cooperation - Tasks and Functions of the Secretariat’s Division of Natural Sciences*, London: Pilot Press, nd, UA, UNESCO/Prep.Com./Nat.Sci.Com./12.

communities resonated at the Institute of Civil Engineers, London, in November 1945 when delegates discussed Needham's memoranda and agreed to turn UNECO into UNESCO. In a letter to Needham from June 1945, the Indian biochemist Biresch Chandra Guha prophetically acknowledged Needham's crucial role. Speaking for his colleagues from the British Empire, Guha expressed his gratitude to Needham for "making exceedingly able use of his time and opportunities [as] one of their scientific ambassadors".¹⁰⁶ What Guha noted for imperial scientists was true of Chinese scholars as well. Bearing Needham's mark, the introduction of science at UNESCO reflected the needs and concerns of these scattered and isolated scientific communities. As we have seen, Needham's experience as head of SBSCO was the experiential foundation of his proposals for a reorganization of international science. In his memoranda, Needham recorded the problems he witnessed while working in China and articulated into his proposed ISCS the solutions that Chinese and imperial scientists contemplated to reinforce their place in international science. In his memoranda, Needham therefore connected different social groups with relatively similar objectives. Throughout his campaign, Needham did not only operate as a prestigious spokesperson for science but also particularly for science's inaudible peripheral voices. By reflecting their aspirations and imposing his proposals as the frame of action for his own UNESCO's NS division, Needham eventually altered the Western-centered conception of scientific and cultural cooperation that had thus far been contemplated during UNESCO's creation. While, as we will see in chapter 4, the NS division launched the IIHA to inscribe Latin America as a new major center on the scientific world map, Huxley and Needham modelled UNESCO's own FSCOs after King's BCSO following a meeting with Alexander King on April 24th, 1946.¹⁰⁷

Needham, however, did not only campaign to tackle the asymmetric structure of international science and organize the greater inclusion of its non-Western parts. He pursued a vision of a scientized world order as well, in which science could and should perform a greater role in mediating international relations and organizing a durable postwar peace. As we will see in the final section of this chapter, UNESCO science entailed a critique of the interwar order of cultural cooperation to which Needham but also Huxley and a large group of leftist scientists opposed a technocratic form of diplomacy.

¹⁰⁶ Chandra Guha to Joseph Needham, 14 June 1945, NP, Folder D.17.

¹⁰⁷ Edred John Henri Corner, 'British Commonwealth Scientific Organisation, Washington. Memo of a Talk with Dr. Alexander King, Sec. B.C.S.O., 16.4.46', 24 April 1946 UA, F/1/3 in preparatory commission box 12.

DEFINING UNESCO SCIENCE: SHAKESPEARE VS. TRACTORS

Between 1945 and 1946, the experts and diplomats involved in the creation of UNESCO conceived the new agency as the replacement of the League of Nations' Intellectual Cooperation Organization (ICO) and the consciousness of the emerging UN system. In November 1945, the president of UNESCO's Establishment Conference, Ellen Wilkinson made this very clear. Seconded by one of the founding fathers of the League of Nations (LoN), Alfred Zimmern, she set the humanist frame in which the UNESCO's purposes were to be debated. In her speech, Wilkinson declared that:

“We live in a machine age and the world has worshipped at the shrine of the practical man and of technological achievement. But we know that progress as machine users can lead only to disaster unless we also have progress as human beings. Behind the machine, and vastly more important, is man and the mind of man. It is in the mind of man – the right-mindedness of man – which alone can prevent the misuse of the new powers always coming to his hand. Civilization, it has been said, represents the conquest of nature. But surely, it must also depend on the development of all that is best in human nature”¹⁰⁸

At a time when the UN and its special agency ECOSOC emphasized on the construction of peace through diplomatic and economic cooperation, Wilkinson and the UNESCO delegates warned against material progress alone and insisted on the promotion of cultural, educational cooperation to achieve the building of peace. They postulated that durable peace could only be secured if spiritual and intellectual progress matched and more importantly harnessed material and technological progress.

Rather than turning a blind eye on its ancestor like the UN makers did in San Francisco, the architects of UNESCO cultivated and revived the spirit of the League of Nations and its intellectual agency the CICI-IIIC. In the footsteps of Wilkinson, Blum postulated to the assembly of the Establishment Conference that “the spirit of peace in the world” could only be durably instilled “by an organization for intellectual and spiritual cooperation” oriented towards the promotion of “mutual knowledge and understanding”.¹⁰⁹ For that purpose, the Conference elevated the intellectual worker into the fundamental architect

¹⁰⁸ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.23.

¹⁰⁹ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.27-28.

of peace. Prolonging the peace-loving spirit of the ICIC-IIIC, the future organization was to become, in the words of Wilkinson, “a world-wide brain workers’ parliament”.¹¹⁰ Science was therefore just another tool in UNESCO’s panoply. Educational and cultural progress still prevailed to construct a durable peace that was essentially conceived in terms of spiritual betterment, mutual understanding and the construction of the better man. Many, like the Peruvian delegate, wanted “the organization – UNESCO – to direct its efforts to the fruitful task of educating humanity to a new spirit in the relations among States, to achieve consciousness of the essential unity of the human race”.¹¹¹ The interwar internationalism inaugurated at the LoN was thereby promised to have a bright future at UNESCO.

If the speeches of delegates are anything to go by, UNESCO opened in relative continuity with its predecessor. And even though the assembly rejected the institutional and financial flaws of the League, it acclaimed its spirit and worldview. Yet, the breakthrough of science at UNESCO came with an imaginary of intellectual cooperation quite different from Valéry’s “noble *Société des Esprits*” that some like the Chilean Delegate, and former IIIC member, Francisco Walker Linares contemplated as a blueprint for the new organization.¹¹² With his idea of a *Société des Esprits*, Valéry imagined a republic of lettered men where leading philosophers, writers and poets would cultivate through intellectual exchanges the fundamental moral and cultural standards necessary to the furtherance of humanity’s civilizational advancement and concord.¹¹³ With UNESCO science, Needham and Huxley augured a significant break away from the kind of liberal-humanist model of intellectual cooperation that Valéry had theorized and which had been enshrined at the LoN’s ICIC-IIIC since 1922. Proclaiming the reign of the scientist, they proposed an alternative definition of the goals, means and agents of intellectual cooperation. Needham the biochemist and Huxley the biologist aspired to replace the figure of the literary intellectual as the legitimate peacebuilder of tomorrow’s increasingly scientized world. In this final section, I will analyze how Needham and Huxley initiated a shift from intellectual cooperation to a technocratic diplomacy driven by scientists and I will show

¹¹⁰ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.23-24.

¹¹¹ ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.55.

¹¹² ‘Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945’, UA, Eco/Conf./29, p.57.

¹¹³ Paul Valéry and Henri Focillon, *Introduction to Correspondance 1. Pour une Société des Esprits*, Paris: Institut International de Coopération Intellectuelle, 1933.

how this shift could be seen as an early stage of the advent of the technical expert and the heavily scientized developmental era a decade later.

In his seminal work *L'UNESCO Oubliée*, Renoliet and more recently Pemberton have investigated the connections between the IIIC and UNESCO. Interestingly, both have used intellectual cooperation to speak indistinctively of the strategies for peace issued by the IIIC and by UNESCO. Pemberton investigated in particular how the notion of intellectual cooperation travelled from the IIIC to UNESCO.¹¹⁴ She noted that, for instance, the issue of diversity in unity introduced by Henri Bergson and Paul Valery at the IIIC remained an important theme for UNESCO's first DG, Julian Huxley. Pemberton, however, acknowledged some differences of emphasis, such as the rise of the natural sciences in UNESCO's mandatory premises. Yet the thrust of these differences remained invisible as Pemberton kept a definition of intellectual cooperation based on its interwar meaning to investigate both the IIIC and UNESCO. As a result, Pemberton tended to magnify similarities and overlooked the differing conceptions operating at the IIIC and at UNESCO.

Applied to UNESCO, the term intellectual cooperation is problematic when one considers the non-scientific, if not anti-scientific background of its formulation at the ICIC-IIIC. As Mazower recently showed, the LoN reflected British Commonwealth conceptions of international and social order rooted in a liberal humanism. Anna-K. Mayer, however, pinpointed that the tenants of this liberal-humanist worldview denied science any peace-building functions for its lack of moral and civilizational value.¹¹⁵ For Toye and Toye, the appointment of Huxley as the first DG of UNESCO in 1945 broke the cultural marginality of the natural sciences. In a recent article, they showed that the position of DG was bitterly disputed between Zimmern – the Hellenist – and Huxley – the natural scientists. For them, this dispute constitutes a premise of the two-culture debate sparked by Charles Percy Snow in 1959.¹¹⁶ The early days of UNESCO was thus in their view a significant episode in the battle for cultural leadership between literary intellectuals and scientists since it consecrated for the first time a scientist as the head of the largest international cultural organisation of the postwar era. Unlike Toye and Toye, however, I argue that the nomination of Huxley – and the appointment of Needham at the NS division – was not just a symbolic conquest of leadership. Huxley, Needham and Zimmern defended competing models of intellectual cooperation. I will show that the

¹¹⁴ Jo-Anne Pemberton, 'The changing shape of intellectual cooperation: from the League of Nations to UNESCO', *Australian Journal of Politics and History* (2012) 58, pp.34-50.

¹¹⁵ Anna-K. Mayer, "A combative sense of duty": Englishness and the scientists' in Anna-K. Mayer and Christopher Lawrence, *Regenerating England: Science, Medicine, and Culture in Inter-War Britain*, Amsterdam: Rodopi Edition, 2000, pp.67-106.

¹¹⁶ Toye and Toye, op. cit. (12).

success of Huxley and Needham against Zimmern brought about significant political shifts regarding the meaning and practice of intellectual cooperation. Finally, I will retrieve the non-western components that participated in this feud between Zimmern and Huxley, which Toye and Toye and Pemberton have limited to the bounds of Europe. To start with, we will therefore first turn to the LoN-IIIC model that Zimmern contributed to elaborate following WWI and came to defend twenty-five years later at CAME, before zooming in on the scientific diplomacy defended by Needham and Huxley.¹¹⁷

The League of Nations' model of intellectual cooperation: education, culture and the rule of the humanist intellectual

At the Preparatory Commission, convened in London and Paris between December 1945 and December 1946 by the Establishment Conference to shape UNESCO's peace mission, delegates had as much to imagine its future program as to deal with the ghost of the LoN and the relics of interwar internationalism. Invited to participate in the process following the insertion of science in UNESCO, Needham and Huxley rubbed elbows with figures of the former League such as its architect Alfred Zimmern, and a handful of IIIC members like Jean-Jacques Mayoux, Walker Linares and Gilbert Murray who were eager to resume the activities of the League's ICO that had been thwarted by the war. Unlike Needham and Huxley, these former intellectual figures of the League contemplated the revival of intellectual cooperation as practiced at the ICIC-IIIC. None had abandoned their hopes in building up a *Société des Esprits*, and all foresaw in UNESCO a better fitted – financially and politically – organization to carry on the OIC's mission.

All were important actors in the creation of UNESCO. Involved in the CAME as well as the Preparatory Commission, they kept the OIC's legacy alive in the negotiations on the future form intellectual cooperation would take at UNESCO. Zimmern was a case in point. Appointed by Wilkinson as executive secretary general of the Preparatory Commission, Zimmern set the tone in his inaugural draft plan for the general structure of UNESCO: "It is not enough for UNESCO to have framed a constitution and to hold an

¹¹⁷ Yet Needham and Huxley did not throw the baby with the bathwater. Huxley embraced humanistic considerations in line with those defended at IIIC in his proposed philosophy for UNESCO, see: Huxley, op. cit. (3); On Huxley and IIIC-UNESCO continuity see: Vassiliki Betty Smocovitis 'The unifying vision: Julian Huxley, evolutionary humanism and the evolutionary synthesis' in Geert Somsen and Harmke Kamminga (eds.) *Pursuing the Unity of Science: Ideology and Scientific Practice between the Great War and the Cold War*, Abingdon and New York: Routledge, Taylor & Francis Group, 2016, pp.30-49; Pemberton, op. cit. (114); Glenda Sluga, 'UNESCO and the (one) world of Julian Huxley', *Journal of World History* (2010) 21, pp.393-418.



Figure 8 – British zoologist, ecologist, bird-watcher and popularizer of science Julian Huxley (1887-1975)



Figure 9 – British classicist and former deputy-director of the IIC Sir Alfred Eckhard Zimmern (1879-1957), October 1944.

annual conference: If it is to be launched upon a course of creative evolution, it must be endowed with *élan vital* which Bergson revealed to us that surely is the true meaning of [...] of international intellectual cooperation”.¹¹⁸ Delving into considerations over education and inter-cultural exchanges while ignoring science, Zimmern inscribed the spirit and therefore the future of UNESCO in continuity with the conceptual and spiritual foundations of its predecessor the ICIC-IIIC. In the corridors of Belgrave Palace, Zimmern, Mayoux, Murray and others former IIIC delegates intended to salvage the ICIC-IIIC’s model of intellectual cooperation and temper if not defeat, the science-based approach Needham and Huxley intended to imprint on UNESCO.

To understand what the attempts by Zimmern and Mayoux to revive the ICIC-IIIC as part of the emerging UNESCO entailed, let us first go back in time to the Versailles Peace Conference of 1919 and the actual creation of the ICIC-IIIC. In Versailles, the victors of WWI defined the peace terms for the defeated Central Powers and set the foundations of the LoN. The principal mission of the LoN was to maintain world peace via various means such as disarmament, arbitration and intellectual cooperation which came as a late adjunction. The five major powers – France, Britain, the United States, Italy and Japan – behind the LoN only recognized the peace-making value of intellectual cooperation some years later when they agreed to create the ICIC in January 1922 and the French funded IIIC in 1926. Zimmern and Murray were already there in Versailles to plan the League and in Paris to launch the IIIC. Alongside Henri Bergson, whom Zimmern would later invoke in his plan for UNESCO, they spearheaded the mobilization of Europe’s intellectual elite in favor of a formal role for cultural and intellectual cooperation within the League’s apparatus.¹¹⁹ They instilled a conception of peace based on the advancement of both legal and civilizational standards inspired by nineteenth century liberal internationalism and British liberal imperialism.¹²⁰ In this regard they did not trust legal regulation of interstate relations to be sufficient to achieve peace. They believed instead that durable peace could be secured by crafting new higher moral and cultural standards, which should augur the creation of what Zimmern called ‘an international mind’.

While the League pursued peace through military disarmament, the ICIC-IIIC strengthened mutual understanding through mental disarmament and the moral uplifting of mankind. As Henri Bergson, ICIC’s first president, had put it, moral disarmament

¹¹⁸ ‘UNESCO - Preparatory Commission - Report on the Framework of the Organization’, 1 February 1946, UA, UNESCO/Prep.Com./16, p.2.

¹¹⁹ Renoliet, *op. cit.* (8), p.12-13.

¹²⁰ Paul Rich, ‘Reinventing peace: David Davies, Alfred Zimmern and liberal internationalism in interwar Britain’, *International Relations* (2002) 16, pp.117-133; See also on Zimmern: Jeanne Morefield, *Covenants without Swords: Liberal Internationalism and the Spirit of Empire*, Princeton: Princeton University Press, 2004.

consisted in realizing through intellectual exchanges “the grand ideal of fraternity, of solidarity and of agreement amongst men”.¹²¹ From the mid-1920s, the ICO’s mission would be associated to Valéry’s idea of constructing a *Société des Esprits*. Intellectual cooperation and cultural exchanges between civilizations were pivotal in erecting Valéry’s ideal. The goal was to build a world consciousness and international commonwealth through civilizational dialogues - i.e., cultural and intellectual exchanges - operating at the level of the mind.¹²²

In spite of its limitations, the OIC epitomized the interwar conception of intellectual cooperation that its makers imagined in the early 1920s to safeguard the peace achieved in Versailles. Under Zimmermann’s direction, the IIIC contributed, via the Centre d’Information Scolaire created in 1927, to the diffusion of the League’s ideals of world peace and solidarity among young generations through educative films and youth literature.¹²³ Zimmermann believed education could heal from war-binding feelings and sponsored the organization of summer schools and international school exchanges.¹²⁴ Furthermore, the IIIC sought to facilitate the international diffusion of the literary heritage of each nation by creating, for instance, an international translation index, the *Index Translationum*.¹²⁵ Another important aspect of the OIC’s mission was to facilitate cooperation between intellectual workers through the rationalization and standardization of intellectual work.¹²⁶ The landmark of the League’s intellectual cooperation remained the IIIC’s roundtable discussions, the famous *Entretiens*. Between 1931 and 1938, the ICIC-IIIC’s Permanent Committee on Arts and Letters stimulated an international dialogue between prestigious intellectuals from around the world like Sigmund Freud, Albert Einstein, Aldous Huxley or Salvador de Madariaga. These roundtable discussions and correspondences epitomized how the OIC defined the shape of intellectual cooperation for peace. On nine occasions, intellectuals from around the world were convened to define the moral and cultural foundations of a universal humanism as well as to strengthen the peace-building role of culture in stimulating mutual understanding. The IIIC published these famous *Entretiens* and *Correspondence*

¹²¹ Henri Bergson, ‘Discours de clôture du président’, 5 August 1922, UA, Folder C.711.M.423.1922.XII, pp.36-37.

¹²² Daniel Laqua, ‘Transnational intellectual cooperation, the League of Nations and the problem of order’, *Journal of Global History* (2011) 6, pp.223-247.

¹²³ Renoliet, op. cit. (8), p.303

¹²⁴ Paul Rich, ‘Alfred Zimmermann’s cautious idealism: the League of Nations, international education and the Commonwealth’, in David Long and Peter Wilson (eds.), *Thinkers of the Twenty Years’ Crisis. Interwar Idealism Reassessed*, Oxford: Clarendon Press, 1995, pp.79-99, p.85-86.

¹²⁵ Jean Renoliet, op. cit. (8), p.304.

¹²⁶ Laqua, op. cit. (122), p.243-244.

such as *Pour une Société des Esprits* and *Why War?* with the aim of educating a new form of international belonging to the masses.¹²⁷

These activities, undertaken in the 1930s, grounded the pursuit of peace in educational and cultural interchange. The sciences, and the natural sciences in particular, were on the contrary underrepresented in this pursuit of peace. Around the ICIC's table, few had been the scientists to rub shoulders with novelists such as Julien Luchaire, composers like Bela Bartok or philosophers and classical scholars such as Henri Bergson, Paul Valéry and Gilbert Murray. Even if, Albert Einstein, Marie Curie and the physicist Robert Andrews Millikan took part in the ICIC, it was less in their quality of natural scientist than for their engagement for peace to which they dedicated their later life. As Pemberton demonstrated, IIC dons did not esteem the natural sciences very much. Even though they looked up to the organisational structure of the natural sciences and valued the degree of international exchange it permitted, none deemed the scientists to be intellectually and morally fit for

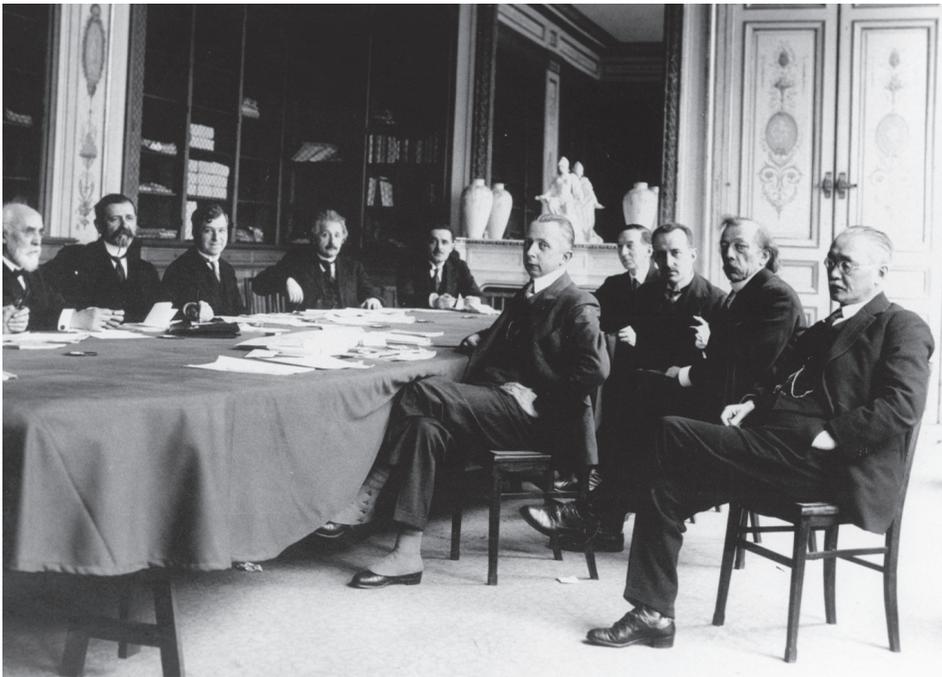


Figure 10 – Plenary session of the International Committee on Intellectual Cooperation in the Palais Wilson, Geneva, Switzerland (c. 1924-1927)

¹²⁷ Renoliet, *op. cit.* (8), p.297-322; Henri Focillon, Gilbert Murray, Alfonso Reyes and Paul Valéry, *Pour une Société des Esprits*, Paris: Institut International de Coopération Intellectuelle, Société des Nations, 1933; Albert Einstein and Sigmund Freud, *Why War?* Paris: Institut International de Coopération Intellectuelle, Société des Nations, 1933.

the purpose of furthering intellectual and cultural harmony.¹²⁸ Scientists were seen as too divided by a multitude of specializations to generate the kind of harmony and unity needed to tackle the chaotic and riotous world of the 1930s. Because of their fragmentation as a community, scientists appeared unfit to the task of drawing the spiritual and moral truths required to install peace, harmony and unity in the world.

While science was plain and simply ignored by some, others, like Zimmern openly charged and condemned science's irresponsibility. For the purpose of peace and the moral uplifting of human existence, he claimed, science proved itself helpless and scientists irresponsible.¹²⁹ The disregard for science of IIC members like Zimmern, reflected a general tendency among literary intellectuals to look down on science. In that regard, Mayer demonstrated how the British literary intellectual elite crafted their moral authority and public role against the scientists whose moral and spiritual narrowness they despised.¹³⁰ Many among the interwar literary and humanist intelligentsia nurtured a profound antipathy and suspicion against the rule of experts. If some, like the Oxford classicist and educationalist Richard Livingstone and the philosopher Alfred North Whitehead, merely distrusted the scientist's judgment, others, more extreme skeptics like the French critique of rationalism Bergson and the Anglican bishop Edward Arthur Burroughs, accused science to be the mother of all evils, from the horrors of WWI to the authoritarian danger of a scientifically organized society.¹³¹ Although scientists could unveil the mysteries of nature, they lacked the philosophical wisdom and moral anchorage needed to orient mankind on the treacherous path of progress. During the interwar period, the IIC-ICIC thus consecrated at the League the rule of the liberal-humanist intellectual as the arbitrator and proponent of cultural internationalism from which the natural scientist and technologist were excluded.

¹²⁸ Pemberton, op. cit. (114), p.40-41.

¹²⁹ Despite his reservations regarding science, Zimmern was not fundamentally anti-science as Toye and Toye implied. Geert Somsen pointed out that Zimmern considered science as peaceful by nature and valued the scientific expert as well and granted him a place in the machinery of international progress. However, unlike Needham and Huxley, who elevate the scientist as the main architect of world progress, Zimmern did not promote science as a model. He confined the scientific expert to a subsidiary role to the intellectual who remained in his view the authoritative figure that could secure humankind's moral progress. See, Alfred Zimmern, *Learning and Leadership: A Study of the Needs and Possibilities of International Intellectual Cooperation*, Oxford: Oxford University Press, London: Humphrey Milford, 1928, p.14-15, p.39, p.61-62, p.79; Toye and Toye, op. cit. (12), p.317; See also, Geert Somsen, 'The engine of internationalization. Conceptions of science in the foundation of UNESCO', at *The Engine of Modernity. Construing Science as the Driving Force of History in the Twentieth Century* organized by Marwa Elshakry and Geert Somsen, 2-3 May 2017, Heyman Centre, Columbia University.

¹³⁰ Mayer, op. cit. (115).

¹³¹ Mayer, op. cit. (115), p.70-73, p.83.

The Cuban Refuge and the revival of the International Institute of Intellectual Cooperation

Although the outbreak of World War II precipitated the ICIC-IIIC into a state of dormancy, their supporters did not relinquish their faith in intellectual cooperation. Just as Needham worked out his memoranda to grant a role for science in the restoration of peace, IIIC members ventured, from the closing of the IIIC's doors in June 1940 till its reopening in February 1945, to prepare intellectual cooperation to face the challenges of the postwar world. The return of the ICIC-IIIC was mainly contemplated from two places: in La Havana, where the IIIC's National Committees of Intellectual Cooperation (NCIC) planned the creation of a Center of Intellectual Cooperation and at the CAME where Bonnet and Mayoux tried to revive the IIIC under UNESCO oversight.

The French Debacle and the unwillingness of the German occupant to keep the IIIC open precipitated the departure of its director Henri Bonnet on June nineteenth, 1940. Unable to interest the Americans to shelter the IIIC, Bonnet found support amidst the Latin American intellectual elite. Latin Americans had grown increasingly interested in the IIIC throughout the 1930s and Bonnet entertained a close working relation with its different representatives. As Pernet showed, Latin American intellectuals and delegates like the Brazilian Ozorio de Almeida and the Cuban Mariano Brull as well as Inter-American organizations such as the Pan-American Union valued the IIIC for several reasons. Not only the IIIC allowed them to escape from US hegemony and attends to their cultural needs such as the protection of archeological patrimony but it also enabled them to establish close ties with European culture, which they valued as a model to organize intellectual life back home.¹³² During his directorship Bonnet strove to further open the doors of the IIIC to this important contingent of non-European enthusiasts.¹³³ He notably initiated several measures, such as the 1938 International Act, to decentralize the ICO's activities and, facilitate the inclusion of Latin American intellectuals in particular.¹³⁴

¹³² Corinne Pernet, 'Twists, turns and dead alleys: the League of Nations and intellectual cooperation in times of war', *Journal of Modern European History* (2014) 12, pp.342-357, p.346-347; Corinne Pernet, "For the genuine culture of the Americas": musical folklore, popular arts and the cultural politics of pan Americanism, 1933-1950' in Jessica Gienow-Hecht (ed.), *Decentering America*, New York: Berghahn Books, 2007, pp.132-168; Corinne Pernet, 'Culture as Policy: Cultural Exchanges between Europe and Latin America in the Interwar Period', *Puente@Europa* (2007) 5, pp.121-126; For a more specific case study, see Brazil's ties with the IIIC in: Juliette Dumont, *L'Institut International de Cooperation Intellectuelle et le Brésil 1924-1946: le Pari de la Diplomatie Culturelle*, Paris: Edition de l'IHEAL, 2008, pp.107-119.

¹³³ According to Renoliet, 19 Latin American countries had a delegate, representing almost half of the IIIC delegates, Renoliet, op. cit. (8), p.258.

¹³⁴ Renoliet, op. cit. (8), p.259-262.

Facing America's scepticism to his request to have the IIIC transferred to the US, Bonnet could fortunately count on his Latin American colleagues. Shortly after his arrival in the United States, they responded to his transfer call during the Second Pan-American Conference on Intellectual and Cultural Cooperation organized in La Havana in 1941, which he attended. The Havana conference convened the NCICs of nineteen Latin American countries, and the United States, to intensify intellectual cooperation at the regional level. However, former members of the ICIC-IIIC, among which Miguel Ozorio de Almeida, Francisco Walker-Linares and Cosme de la Torriente seized the opportunity to submit a resolution in favor of the IIIC. As the secretary of the American NCIC Edith Ware noted, they requested the establishment of "the institution of intellectual cooperation of Paris in one of the American countries for the duration of the war".¹³⁵ While the proposal "constituted a praiseworthy gesture of loyalty to the institute and its director" as Ware argued to explain Ozorio's resolution, it also illustrated their faith in the universalizing and peace-building power of intellectual cooperation.¹³⁶ By setting the IIIC in La Havana they wanted to pick up the torch of intellectual cooperation, to make the Western hemisphere, and more specifically Latin America, "the custodian of world culture" and combat totalitarianism as well as promote and prepare peace once the war was over.¹³⁷

The delegates of the Havana conference, such as Walker-Linares, the secretary of the Chilean national committee of intellectual cooperation, reaffirmed in 1941 his trust in intellectual cooperation, that "Society of the Spirit, that creates a propitious moral climate in the neutral field of intelligence, in order to create real brotherhood among men" before paying his gratitude to France and the League for enabling the work of the ICIC-IIIC.¹³⁸ In furthering inter-American exchange, the Havana conference was also a space to safeguard and cultivate the ICIC-IIIC's heritage. The conference modelled its program on the ICIC-IIIC's experience and sought to perpetuate several of its educational and cultural initiatives. The planned activities, which ranged from organizing exhibitions, opening libraries, promoting the interchange of writers, artists, students and fostering education of the younger generations to pacifist and brotherly feelings, were, for Linares, "very useful for the future reconstruction of a better world, in which spiritual liberty and intellectual

¹³⁵ Edith Ware, *Second American Conference of National Committees on Intellectual Cooperation, Havana, Cuba, 15-22 November, 1942*, New York: National Committee of the United States of America on International Intellectual Cooperation, 1942, p.24, retrieved on 19 June 2017 at: <http://babel.hathitrust.org/cgi/pt?id=mdp.39015063713021;view=1up;seq=16>

¹³⁶ Ware, op. cit. (135), p.24.

¹³⁷ John Harvey Furbay, 'Proposed Shangri-La of the Occident', *The Journal of Higher Education* (1942) 13, pp.376-378, p.377.

¹³⁸ Ware, op. cit. (135), p.14.

rapprochement may succeed in imposing durable peace and brotherhood among men”¹³⁹ The intellectuals at La Havana also perpetuated one landmark of the League’s intellectual cooperation, the IIIC’s roundtable discussions, the famous “Entretiens”. Indeed, the conference closed on a *Platica*, or *Entretiens*, where intellectuals had been invited to discuss America in face of the crisis created by the war and reflect on the “Responsibility of the Intellectual in the Present Situation Toward the Spiritual Unity of America”¹⁴⁰. Just as with the IIIC’s roundtables, the Havana’s *Platica* appointed a few scientists on the basis of their literary and cultural credentials. The Brazilian physiologist Miguel Ozorio de Almeida, for instance, earned his seat at the discussion table once appointed at the Brazilian Academy of Letter. His appointment coincided with his involvement in several ICIC’s *Entretiens*, his designation as head of the Brazilian national committee of intellectual cooperation and his participation in the Havana negotiations.¹⁴¹

Despite an ambitious plan, the reopening of the IIIC in Havana never saw the light of day. US scepticism, a severe lack of funds and the liberation of Paris in August 1944 killed the initiative.¹⁴² IIIC’s supporters eventually turned their attention back to Paris where the IIIC officially reopened in February 1945 and London, where the CAME undertook the creation of a future educational and cultural organization within the emerging UN frame. At the CAME, ICIC-IIIC actors campaigned to keep intellectual cooperation alive. While, as Pernet recently showed, Gilbert Murray, CICI president, and Bonnet, the IIIC director, succeeded with their influential report, *Education and the United Nations* to convince the CAME to elaborate plans for a permanent organization promoting cultural and educational interchange, Mayoux and the French delegation intended to revive the IIIC.¹⁴³ Supported by the Latin Americans amongst whom Walker Linares and Mayoux, the successor of Bonnet, went to the CAME to defend the IIIC’s place in the future UN framework.¹⁴⁴ Reopened in February 1945, the IIIC tried to regain its authority over the

¹³⁹ Ware, op. cit. (135), p.14.

¹⁴⁰ Ware, op. cit. (135), p.36; see also: Comisión Cubana de Cooperación Intelectual, *Segunda Conferencia Americana de Comisiones Nacionales de Cooperación Intelectual (15-22 de Noviembre de 1941). Creación del Centro de Cooperación Intelectual En America*, La Habana: Ucar García y Cia, 1943.

¹⁴¹ On Miguel Ozorio de Almeida, see: Leticia Pumar Alves de Souza, ‘Between national and international science and education: Miguel Ozorio de Almeida and the League of Nations’ Intellectual Cooperation Project’ in Alan McPherson and Yannick Wehrli, *Beyond geopolitics: New Histories of Latin America at the League of Nations*, Albuquerque: University of New Mexico Press, 2015, pp.169-184, p.179-180; Juliette Dumont, *L’Institut International de Coopération Intellectuelle et le Brésil, 1924-1946: Le Pari de la Diplomatie Culturelle*, Paris: Editions de l’IHEAL, 2008, p.141-143

¹⁴² Pernet, op. cit. (132), p.352-353.

¹⁴³ *Education and the United Nations: A Report of the Joint Commission of the Council for Education in World Citizenship and the London International Assembly*, Washington: American Council on Public Affairs, 1943; Corine Pernet, ‘Twists, turns and dead alleys: the League of Nations and intellectual cooperation in times of war’, *Journal of Modern European History* (2014) 12, pp.342-357, p.354-355.

¹⁴⁴ Pernet, op. cit. (132), p.353.

cultural, intellectual and spiritual construction of postWWII peace that was projected at the CAME.¹⁴⁵ Despite their optimism, the French counterproposal however failed at UNESCO's Establishment Conference and a revival of the IIIC as it was left in 1940 quickly appeared illusory to Mayoux who ultimately agreed with Huxley that UNESCO would organize the liquidation of the IIIC.¹⁴⁶

Even though cultural and educational cooperation did not disappear with the IIIC-ICIC in 1946 and found a new lease of life under the brand new banner of UNESCO, the cultural and educational organization of the UN did not consecrate the sole hegemony of the literary intellectual in shaping post-war intellectual cooperation. Needham's successful insertion of science at UNESCO punctuated the scientist's claim to cultural leadership that had started in the early 1930s with a symbolic success. As we will see in the following section, Needham and Huxley introduced with UNESCO science a substantially different conception of intellectual cooperation in which the *international society* could be both scientifically and materially built by the international concert of socially responsible scientists.

A claim to leadership: The Social Responsibility of Science Movement and the rule of science

Huxley and Needham opposed Zimmern with a scientific vision of the *international society* that was largely inspired by the SRS movement of the 1930s and more specifically by the idea that science had a political function. The SRS movement is chiefly remembered for its conception of the advancement of science and Socialism as two blades of the same sword.¹⁴⁷ Yet and despite its social and political power, SRS scientists considered science as a frail enterprise whose thriving depended on its social entanglements. In the tumult of the 1930s, they came to believe that science could as much perish either under the agonizing state of British Capitalism as it could be corrupted to destructive ends by the Fascist frenzy spreading over continental Europe. Science was therefore conceived as both a powerful and yet alarmingly fragile entity whose advancement was no longer seen as self-motivated and eternal but intricately tied to society's destiny. Under such circumstances, doing good science did not suffice to ensure its survival, which impelled scientists to politically engage in favor of scientifically sound social reforms. In response

¹⁴⁵ Renoliet, op. cit. (8), p.163.

¹⁴⁶ 'Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945', UA, Eco/Conf./29, p.5-9.

¹⁴⁷ Werskey, op. cit. (10); William McGucken, *Scientists, Society, and State: The Social Relations of Science Movement in Great Britain 1931-1947*, Columbus, Ohio: Ohio State University Press, 1984.

to science's frailty, Needham, John Desmond Bernal and others SRS partisans bolstered an aggressive call for the reorganisation of science through the BAScW. Once the war broke out, the need to organize science for society's progress remained a vividly discussed issue among socially minded scientists.

These discussions illustrated the scientist's rebellion against his marginal position in the public debate. During the war, the BAScW, the ICSU-CSSR and the BAAS' Division for the Social and International Relations of Science (DSIRS) constituted spaces in which a new model of intellectual cooperation that consecrated the scientist as the ultimate peacebuilder were imagined.¹⁴⁸ As we will see below, Needham's UNESCO plan thus echoed the questions and aspirations of a considerable section of the scientific community who, like the future UN Deputy Secretary-General Guy Gresford openly wondered whether scientists "will cope with the equally urgent [and] more difficult problems of peace".¹⁴⁹ Scientists came to grips with these questions on several occasions such as at the BAAS' conference *Science and World Order* in 1941 and at the BAScW's conferences *Planning of Science in War and Peace* in 1943 and *Science and the Welfare of Mankind* in 1946.

The Conference *Science and World Order* was particularly astonishing because it brought for the first time scientists and statesmen from over twenty different countries together to discuss and imagine the place and role of science in organizing postwar peace and relief.¹⁵⁰ Two months before the IIIC conference in Havana, scientists gathered to shape a somewhat different picture of the problem of peace. As Bernal put it, it was time for change since, with the war, "science has got a far wider and more thorough going application to governmental affairs than had previously been accepted or even imagined".¹⁵¹ Throughout the three days of the conference, scientists, among which future UNESCO dons, Needham and Huxley, as well as leading SRS figures such as Bernal, envisioned the challenge of peace as a predominantly socio-economic issue. If the participants identified science and technology as the best suited solution to meet the problems of reconstruction, they also acknowledged that the rise of socially minded scientists could prevent the disasters of war. Witnessing "what war, made terrible by the abuse of science, meant", the men of science

¹⁴⁸ Patrick Petitjean, 'The joint establishment of the World Federation of Scientific Worker and UNESCO after World War II', *Minerva* (2008) 46, pp.247-270; Patrick Petitjean, 'Sur quelques aspects des sociabilités scientifiques entre Cambridge et Paris dans les années 1930' in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'Exemple de Cambridge*, Paris: Magnat-Vuibert, 2009, pp.139-174.

¹⁴⁹ Guy Gresford became the Deputy Secretary-General of the UN Conference on Science and Technology for Development (UNCSTD) in 1979. Guy Gresford, 'The scientist and the economic and social council', September 1945, NP, Folder D.21, p.1.

¹⁵⁰ James Gerald Crowther, Osbert John Radcliffe Howarth and Dennis Parker Riley, *Science and World Order*, Harmondsworth: Penguin Books, 1942.

¹⁵¹ Crowther, Howarth and Riley, op. cit. (150), p.31.

“who had stood aside too long, disowning the stupid world and disclaiming the perversion of their discoveries, had realized that science has a social function.”¹⁵² As Crowther, Howarth and Riley recorded in their account of the conference, scientists proclaimed on the occasion “that from now on, more determined efforts should be made to ensure that the gifts of science be used for human betterment and advancement, for promoting the welfare of all peoples, irrespective of nationalities, race, colour or creed.”¹⁵³ After all, as the British Liberal Herbert Louis Samuel claimed, scientists were not “merely technicians nor yet abstract theorists, but citizens, bearing special responsibilities on account of special qualifications to take part in the ordering of human affairs.”¹⁵⁴

Throughout the conference’s six sessions, scientists thus displayed, as Huxley postulated four years ahead of his UNESCO appointment, how “in the winning of the peace as in the winning of the war, men of science were key men.”¹⁵⁵ They indeed considered how the spirit, outlook, and expertise fostered by science were essential to build peace. The concerns science could address in their view were rather down to earth. For them, uprooting war could be carried out by science in fields as diverse as the management of natural resources, the promotion of health and better nutrition as well as in the planning of war relief. Technological advances and scientific planning could for instance enable fairer and more efficient use of natural resources and sustain the craving for energy for reconstruction after the war. The science of nutrition could also contribute to meet mankind’s nutritional needs with abundant and qualitative food essential to prevent the lurking postwar risks of epidemics, dearth and famines. However, all agreed that science’s social function could be best implemented once the spirit of science and scientific planning would permeate society, from the average citizen to its political leaders and decision makers. The US river engineering experience and emblem of President Roosevelt’s New Deal, the Tennessee Valley Authority, and the five year plans of the Soviet Union had, for Archibald Vivian Hill, testified of the way scientific planning “could make many of our troubles unnecessary” and “render to the peace-time welfare of our people.”¹⁵⁶ As Bernal argued, science’s social function could only be fully empowered when the “scientist come more and more to interest himself in all human problems” and “the citizen learns a wider and deeper application of science.”¹⁵⁷ However, most envisioned technoscientific possibilities called “for a large measure of international cooperation.”¹⁵⁸

¹⁵² Crowther, Howarth and Riley, op. cit. (150), p.10.

¹⁵³ Crowther, Howarth and Riley, op. cit. (150), p.13.

¹⁵⁴ Crowther, Howarth and Riley, op. cit. (150), p.28.

¹⁵⁵ Crowther, Howarth and Riley, op. cit. (150), p.15

¹⁵⁶ Crowther, Howarth and Riley, op. cit. (150), p.30.

¹⁵⁷ Crowther, Howarth and Riley, op. cit. (150), p.37.

¹⁵⁸ Crowther, Howarth and Riley, op. cit. (150), p.69.

Although UN plans were not thought of yet, scientists of the *Science and World Order* conference contemplated the international sphere as an appropriate space for scientific peacebuilding. All agreed, that the intensification of scientific cooperation was needed as well as the creation of international scientific organizations which “would represent an immense stride forward towards the right utilization of the benefits of science, and what is more the avoidance of the misuse of science and its application.”¹⁵⁹

With the Inter-American meeting in La Havana and the *Science and World Order* conference in London, fall 1941 turned out to be an interesting moment for the future of intellectual cooperation. As we have seen, the two meetings devised divergent models of intellectual cooperation, which ultimately competed for primacy at UNESCO four years later. The existing literature on intellectual cooperation has however failed to recognize that in the version of Needham in London and in the version of Ozorio de Almeida in La Havana, the same concept of intellectual cooperation meant quite different things. Although both meetings contemplated intellectual cooperation as an essential channel for the promotion of peace, each circle defended sharply different notions of what the problem of peace was, what the means of its promotion were and who should legitimately undertake this enterprise. When the delegates of the Havana conference understood the problem of peace as an inherently spiritual and cultural issue, the SRS scientists of the *Science and World Order* conference envisioned world peace as a technoscientific challenge. For the IIIC supporters, peace could only be durably achieved through the spiritual uplifting of individual citizens and the advent of the international society, which they defined as a set of core moral values common to mankind. To build the international society, delegates privileged the promotion of a humanist education and the pursuit of cultural interchanges between nations. All consecrated the literary intellectual as the legitimate architect to orchestrate the erection of such moral edifice. On the eastern end of the Atlantic Ocean, in London, the scientists of the *Science and World Order* conference endorsed a more pragmatic model. They reconstructed intellectual cooperation as a science-centered endeavor in which the united, cooperative and socially responsible scientists should rule. Through the advancement of science and the scientific planning of society, the pure and applied scientists could solve mankind’s social and material needs, which had so far fed war and hindered peace. While the Havana delegates defended a paradigm that flourished through the ICIC-IIIC during the interwar period, delegates at the *Science and World Order* conference pre-empted its replacement by the reign of technoscientific cooperation. Following the meeting, SRS scientists endorsed this scientific approach to intellectual cooperation in the reconstruction of the postwar international order. At the time Needham

¹⁵⁹ Crowther, Howarth and Riley, op. cit. (150), p.72.

and Huxley inserted science in UNESCO, Frédéric Joliot-Curie and Bernal created the World Federation of Scientific Workers (WFSaW), and Patrick Blackett campaigned for the control of nuclear power to organize science for peace.¹⁶⁰ This scientization of intellectual cooperation imagined at the *Science and World Order* Conference was what Needham and Huxley implemented at UNESCO.

UNESCO's technocratic diplomacy

At a time when the IIC heirs struggled to keep intellectual cooperation alive, the outbreak of WWII enabled scientists to successfully claim greater political implication in public affairs. Scientists had become crucial agents in the allied war machine and the defence of science a central discursive element of the Allied pro-democracy discourse.¹⁶¹ If the war did not initiate the inclusion of scientists in Britain's political elite, it certainly reinforced it and contributed to put the advancement of science at the heart of the discussions on the shape of the post-war world, at both the national and international level.¹⁶² Yet it came at a price. If the war strengthened the public and political legitimacy of scientists in the reconstruction process, the shock of the atomic bomb that scientists enabled engendered public fear of science's potential destructive power as well and forced them to face responsibility for their doings. Dealing with science's involvement in the war became both a moral obligation as well as a political opportunity for scientists. Wilkinson made clear in her opening address that "in these days when we are all wondering, perhaps apprehensively, what scientists will do to us next, it is important that they should feel that they have a responsibility to mankind for the results of their labours".¹⁶³ Despite the public pressure, scientists were confident in science's social and political relevance. The American neurophysiologist and ISCS supporter Ralph W. Gerard confided to Needham "the bomb has created an awareness of these problems (i.e., science's place in postwar world) to an extent we could hardly have hoped for, and now is the time for scientists to strongly push

¹⁶⁰ Petitjean, op. cit. (13).

¹⁶¹ David Edgerton, 'British scientific intellectuals and the relations of science, technology and war', in Paul Formal and José Sanchez-Ron (eds.), *National Military Establishments and the Advancement of Science and Technology. Studies in twentieth Century History*, Dordrecht: Kluwer Academic Publishers, 1996, pp.1-35, p.3-5; David Edgerton, *Warfare State. Britain, 1920-1970*, Cambridge: Cambridge University Press, 2005, pp.108-190; Geert Somsen, 'Truth from Britain: science and democracy in Second World War propaganda', workshop 'Science and its Citizens', Open University, April 2009.

¹⁶² John Krige and Kai-Hendrik Barth, 'Science, technology and international affairs', *Osiris* (2006) 21, pp.1-21.

¹⁶³ 'Conference for the Establishment of the United Nations Educational, Scientific and Cultural Organisation, held at the Institute of Civil Engineers, London from the 1st to the 16th November 1945', UA, Eco/Conf./29, p.24.

their claims for expert service”¹⁶⁴ Gerard’s confidence was widespread. As the Dutch physicist Johannes Martinus Burgers and the Belgian biochemist Marcel Florkin of the Commission on Science and its Social Relations (CSSR) of the International Council of Scientific Unions (ICSU) revealed from their unprecedented survey on the relation of science and scientific cooperation to peace, scientists generally believed that they bore a special function and responsibility in the promotion of peace.¹⁶⁵

At UNESCO, the consecration of science was concomitant with the decline of interwar intellectual cooperation. The successful integration of a scientific mandate at UNESCO and the rise of Huxley and Needham corresponded to the IIIC’s termination and the fall of the intellectual Zimmern. Secretary-General of the Establishment Conference in 1945 and nominated provisional executive Secretary of the Preparatory Commission in 1946, Zimmern was predestined to take on a high responsibility at UNESCO. Yet, Zimmern, on a sick leave shortly after his nomination, paid for the insertion of science in UNESCO and was replaced by Huxley who became UNESCO’s first Director-General. Embittered



Figure 11 – Huxley as Director-General at the tribune of the First General Conference of UNESCO, Paris, France (November 1946)

¹⁶⁴ Ralph Gerrard to Joseph Needham, 10 October 1945, NP, Folder D.21.

¹⁶⁵ Johannes Martinus Burgers and Marcel Florkin, ‘Commission pour la Science et ses Relations Sociales (CSSR) du Conseil International des Unions Scientifiques (ICSU)’, 11 November 1948, Delft/Liege, NP, Folder J.120.

Zimmern campaigned against Huxley and was ultimately removed from UNESCO's final negotiation for his demeaning critiques against the latter.¹⁶⁶ This episode concluded his personal demise and the relative marginalization of the kind of intellectual cooperation he defended while it empowered Huxley and Needham to establish scientific cooperation as the cornerstone of postwar peace. In his report, Huxley and his secretariat laid UNESCO's success in the hands of science when declaring that "the more UNESCO can stimulate the unification of science and learning and the speeding-up of their rate of advance, as a single global enterprise, the better it will be performing its task, and the better will the welfare of mankind be served".¹⁶⁷ As head of the Natural Science Section, Needham was quick to join Huxley on the same idea when he postulated to the Committee on Natural Sciences that there is "no distinction between help to the scientific world and help to the peoples of the world, because only by helping the scientists is it possible to help the peoples".¹⁶⁸

With these declarations, Needham and Huxley conveyed an alternative vision of what intellectual cooperation should be. One in which science was no longer subordinated to culture and the scientists were endowed with a new responsibility to foster the application of scientific knowledge to human welfare. This down to earth expert diplomacy was built in opposition to the interwar order of intellectual and cultural cooperation, which Needham had repeatedly criticized when promoting his ISCS. Following a stop over in Teheran on his way to the 220th anniversary of the Russian Academy of Science in Moscow, Needham criticized the British Council's cultural policies in Iran and Iraq. In regard to the essential material needs of Iran, Needham found it "extraordinary that all the Council can bring itself to do in Iran is to arrange performances of Shakespeare plays in admittedly beautiful gardens, and to give large numbers of classes in English language [...] when the great mass of the people have not enough to eat, and lack good clothes and shoes to wear, and have no modern means of transport".¹⁶⁹ The British Council elitist cultural and educational emphasis was not in tune with the actual socio-economic and material needs of the people, which Needham thought essential to solve in order to foster human progress. Needham was as critical of UNESCO's predecessor as he was of the cultural policies of the British Council. In his third memorandum Needham criticized the highbrow style and approach of the IIC's cultural and scientific policies, which "gave the impression of

¹⁶⁶ Toye and Toye, op. cit. (12), p.323-324.

¹⁶⁷ 'United Nations Educational, Scientific and Cultural Organisation, preparatory commission, progress report on the program of the United Nations Educational, Scientific and Cultural Organisation (Item 6 of the Provisional Agenda of the fifth Session, 5th July, 1946)', 3 July 1946, UA, UNESCO/prep.com./51, p.3.

¹⁶⁸ 'UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I', UA, Box 20 file 6/3/78 - minutes, p.8.

¹⁶⁹ Joseph Needham to Richard Seymour (British Council), 2 July 1945, NP, Folder C.30.

mandarinism in all its activities".¹⁷⁰ For him, "the formulation of its aims was too vague, academic and contemplative, insufficiently executive and practical and [...] inadequate to the obvious immediate needs of today".¹⁷¹ Needham reproached the IIIC to over-emphasize universities and the humanities whose "activities in these fields tend more easily than in those of a scientific character towards degeneration into high-sounding phrase-making with no tangible results." "They lacked", he believed, "the innumerable links with practical life through the technologies on which all modern civilization depends".¹⁷² For Needham, the miseries of modern times that were sickness, malnutrition and poverty called for a different solution which "one thing alone could remove, applied science in the service of man".¹⁷³

As the entitled architect of science for peace at UNESCO, Needham claimed at the first meeting of the Committee on Natural Sciences of the Preparatory Commission that it was the scientist's responsibility to "work for humanity as a whole, because it is only through the natural sciences that the standard of life of the human population of the world can be raised".¹⁷⁴ However, the current organization of science was in his view a major hindrance to the pursuit of science's inherent social and international peace function. "Spreading the network of science much more evenly over the world", as he proposed with the ISCS and the *periphery principle*, was for him a condition to liberate science's pacifist power.¹⁷⁵ In the periphery, Needham argued, "you have scientific men who are struggling to do the best they can under extreme difficulties of isolation. We cannot make any distinction between helping them and helping the peoples as a whole, since it is only by helping them that the natural sciences can play their essential part in raising the standard of life of the human population of the world".¹⁷⁶ The creation of several international laboratories, like the Brazilian proposals for an International Institute for the Hylean Amazon (IIHA), exemplified this cooperation-based approach. Regarding the Brazilian

¹⁷⁰ Joseph Needham, 'The place of science and international scientific cooperation in post-war world organization, Memorandum III', 28 April 1945, NP, Folder D.14, p.22.

¹⁷¹ Joseph Needham, 'The place of science and international scientific cooperation in post-war world organization, Memorandum III', 28 April 1945, NP, Folder D.14, p.24.

¹⁷² Joseph Needham, 'The place of science and international scientific cooperation in post-war world organization, Memorandum III', 28 April 1945, NP, Folder D.14, p.24.

¹⁷³ Joseph Needham, 'British Council policy in China. Recommendation complementary to those of P.M. Roxby (head of the British Council mission in China)', 7 November 1945, NP, Folder C.95, p.2.

¹⁷⁴ 'UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I', UA, Box 20 file 6/3/78 – minutes, p.6.

¹⁷⁵ 'UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I', UA, Box 20 file 6/3/78, p.6.

¹⁷⁶ 'UNESCO Preparatory Commission, Committee on Natural Sciences, 31st May, 1st June, 1946, introductory remarks by the senior counsellor', 20 June 1946, UA, UNESCO/Prep.Com./Nat.Sci.Com./7, p.3.

proposals, Needham and most members of the Committee including the institute's promoter, Carneiro, believed that only an integrated international effort like the Amazon project could generate "the botanical, zoological, chemical, geological, meteorological, anthropological, nutritional and medical research with a view to the exploitation of this enormous natural" and to raise the standard of life for its inhabitant.¹⁷⁷ As the director of the Natural Science Section, Needham therefore strove to stimulate science's social and peacebuilding function by increasing international scientific exchanges via the proposed ISCS and a network of international laboratories. Interestingly, Needham's UNESCO plan finally realized a conception of science and politics that the SRSM had contemplated from the early 1930s. This vision of a new political and international order dominated by science eventually heralded the techno-centered age of developmentalism of the late 1950s and 1960s, and the relative relegation of cultural cooperation in the pursuit of peace.

CONCLUSION

That on March 12, 1947, Needham, Carneiro, Corner and Dr. Martinez Baez of the Natural Science Section could meet to officially launch the creation of the IIHA as one of UNESCO's main project was not a given. It marked the successful ending of a long and winding campaign that saw science shift from a non-issue at the CAME in 1942 to one of UNESCO's most prominent instrument for the promotion of peace four years later.¹⁷⁸ That this informal meeting, as a direct outcome of this campaign, could take place thus shakes up our representations of the origins of UNESCO. More broadly, that science found its place at the heart of UNESCO's peace mandate also questions our understanding of the way in which interwar internationalism was mediated during and right after WWII.

Tracing the complicated story of UNESCO science challenges the prevailing understanding of UNESCO's making. As this chapter has shown, UNESCO was shaped to a large extent outside the formal constitutional process that we commonly associate to the CAME, the Establishment Conference of 1945 and the Preparatory Commission of 1946. Places like Chongqing, events like the *Science and World Order Conference* and institutions such as Needham's SBSCO and King's BCSO were decisive for scientists to claim a position in the emerging UN apparatus and shape a role for science in solving the challenges of postwar peace. Importantly, most of these places, institutions and actors that mobilized around Needham and proved essential in the shaping and success of his ISCS

¹⁷⁷ 'UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 3 p.m., Session II, UA, Box 20 file 6/3/78 - minutes, p.15.

¹⁷⁸ 'Hylean Amazon discussion', 12 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

plans at UNESCO belonged to remote places that were politically neglected back then and are still historiographically overlooked today. Reconstructing Needham's campaign decenters the narrative of UNESCO's constitution and shed light on the significant Far Eastern and Southern roots of UNESCO.

The story of UNESCO science also shows UNESCO as anything but a self-evident construct whose shape, mission, function and action rose out of an alleged collective realization of the war's terrifying destructiveness. Nor does it sustain the idea that it was the product of Western powers' global politics. On the contrary, the new institution was the fragile and contingent outcome of complex negotiations entailing diplomatic but also intellectual and philosophical contentions between a wide range of non-diplomats. The primacy of science was as unplanned by the delegates of the 1945 Establishment Conference as the marginalisation of the literary-humanist tradition of intellectual cooperation was to the intellectuals dominating the CAME. The campaign led by Needham outside the bounds of UNESCO's constitutional process profoundly transformed the terms of the proposed institution and contributed to make UNESCO into a flagship of technocratic diplomacy in the UN system.

Needham's success also sheds light on the complex mediation of past practices. The architects of UNESCO established an agency that entailed less than a sharp break but also more than a mere continuity with the interwar period. The model of science that Needham and his coalition of 'Dark Zone' scientists defended at UNESCO pioneered a scienticized conception of intellectual cooperation. Although conceived by Needham himself as a break from the canons of cultural cooperation that prevailed at the League's ICIC-IIIC, the S in UNESCO amplified another interwar heritage, the radical-leftist conceptions of science theorized by the SRS movement of the 1930s. While Needham's plan sought to break the long-standing isolation of non-Western scientists, it relied on a model of scientific organization inherited from the British Empire. By modelling the ISCS and later UNESCO's own FSCOs on the British Empire's LSOs and by contemplating future collaboration between UNESCO and imperial science, Needham and Huxley also participated in maintaining the Empire as a valuable political organization and actor of the postwar order at a time when growing anti-colonial unrest seriously threatened the continuity of colonial rule in the French, British and Dutch Empire.

What is more, the creation of UNESCO science and the vibrant debates on international science that took place between 1940-1945 display the Second World War as already a decisive stage for the thinking about the postwar world order. From London to Chongqing, Paris to Havana, discussions between scientists proliferated and tensions multiplied with intellectuals on the shape of the international arena, the challenges of reconstruction and the role of science in it. The literature on international science has largely focused on

the immediate postwar to understand the shaping of science's international functions by taking the Hiroshima bombing as the trigger that prompted the insertion of science in international politics. The exploration of Needham's activism offers a counterpoint to this narrative as it showed that concerns but also hopes about the societal functions of science's transformative power proliferated during the wartime years and found resonance in the emerging UN system years before the end of WWII. More than the Hiroshima bombings which catalyzed rather than initiated discussions on the intertwinment of science and political affairs, it was the processes of the type that took place around UNESCO science and the diplomacy of experts that shed the political and cultural foundations of the development age and the hegemonic rule of experts in the 1950s.

Moreover and unlike what the existing literature has tended to assume, the state was not the sole and prime actor of science's politicization in the 1940s, nor were the scientists fully subordinated to the state's will during and after the war. Scientists, through their engagement in the war effort and, as shown in this chapter via their scientific agency and political activism, participated actively during the war in scientizing the problems, solutions and institutions of the postwar era on their terms. Needham and the many Western and Southern scientists that joined his campaign mobilized their scientific and political networks to put the issue of science's uneven development on the international agenda. Although united to combat science's uneven development and claim a political and international role for science, the scientists held diverging views on what form, functions and goals this role should take. In the next chapter I turn to these contentious views by examining in greater details the distinct scientific and political aspirations that the main figures of UNESCO's international science program, Needham and Carneiro, held, the conflicts that arose from these differences and the consequences it had in the shaping of the IIHA..

Chapter 3

SCIENTIFIC INTERNATIONALISM(S)
IN TENSION

Released from his obligations as director of the SBSCO in Chongqing, Needham moved to Paris where he was appointed in May 1946 as special counsellor to the Natural Science Committee of the Preparatory Commission to “define more clearly in terms of a concrete work program” the broad and all-inclusive term “scientific” he succeeded to insert in UNESCO’s title six months earlier.¹ From being science’s decisive promoter, Needham moved to become its head architect when Huxley hired him as head of the future Natural Science Section of UNESCO.² Needham dominated the talks with his memoranda ideas, which the Committee reproduced in the mandate proposals it addressed to UNESCO’s First General Conference in November 1946.³ The committee stood by Needham’s *periphery principle* and against the *laissez-faire* organization of science. In its final report, it suggested to the General Conference that UNESCO should “assist the free flow of essential research apparatus [...] the free flow of scientific books and literature [...] the free flow of scientists coming and going across national boundaries” as well as “throw a network of regional science cooperation stations round the world” and help the scientific unions.⁴

In his opening of the Committee’s first session, Needham added to his original suggestions the proposal “to originate quite new forms of international scientific cooperation (international observatories and laboratories)”⁵ This additional proposition came in reaction to a growing interest among UN-involved scientists for the constitution of a network of UN-sponsored international laboratories.⁶ Between 1946 and 1947,

¹ ‘UNESCO Preparatory Commission, work program and committee structure of the Preparatory Commission of UNESCO’, 29 January, 1946, UA, UNESCO/Prep.Com./12, p.1.

² Needham enrolled Dr. Yeh Chu Pei of China, Prof. Guha of India as scientific advisers, Dr. Shukova of the USSR as assistant and planned to hire three other assistants, two from Britain and one from the United States. More details on Needham’s first steps as head of UNESCO’s NS division, see ‘UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I’, UA, Box 20 file 6/3/78 - minutes, p.5.

³ ‘UNESCO Preparatory Commission, Natural Sciences Committee, document prepared for the Natural Sciences Committee of the UNESCO National delegates, 31 May – 1 June, 1946’, UA, UNESCO/Prep.Com./Nat.Sci.Com./2.

⁴ ‘United Nations Educational, Scientific and Cultural Organisation, preparatory commission, progress report on the program of the United Nations Educational, Scientific and Cultural Organisation (Item 6 of the Provisional Agenda of the fifth Session, 5th July, 1946)’, 3 July 1946, UA, UNESCO/Prep.Com./51, pp.III B.1 and pp.III B.2; ‘United Nations Educational, Scientific and Cultural Organisation, preparatory commission, revised progress report on the program of the United Nations Educational, Scientific and Cultural Organisation, chapter V. Natural sciences’, 11 September 1946, UA, UNESCO C/2, Chapter V, p.4.

⁵ ‘UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I’, UA, Box 20 file 6/3/78 - minutes, p.10.

⁶ UNESCO was not alone to enrol science to pursue its goals. Besides agencies like FAO and WHO that made agricultural and health sciences a cornerstone of their action, other bodies like ECOSOC but also the Security Council via the UN Atomic Energy Commission sought to enrol science and impinged upon UNESCO’s mandatory primacy over the sciences. On this inter-institutional competition over science at the UN, see: David Nofre, ‘Managing the technological edge. The UNESCO International Computational Centre and the limits to the transfer of computer technology, 1946-61’, *Annals of Science* (2013) 71,

the French physiologist and assistant secretary general of ECOSOC Henri Laugier and Needham worked together to issue such a worldwide network. Laugier sought to create a Conseil International de la Recherche which he modelled after the French Centre National de la Recherche Scientifique to stimulate scientific research internationally.⁷ Meanwhile, Needham collected several proposals at UNESCO to create an “International Astronomical Observatory”, “one or more International Nutrition Laboratories” and “an International Mathematical Laboratory”⁸ As Laugier and Needham did not find a common ground to carry out the international laboratory initiative together, the NS division proceeded to establish UNESCO’s own laboratories.

Among the four proposals submitted by Needham to the Committee, the project to create an International Institute of the Hylean Amazon (IIHA) by the Brazilian biochemist Paulo Carneiro won the committee and especially Needham’s favor. Unlike his rivals, Carneiro defended the creation of a research institute outside the so-called Bright Zone, in the heart of Amazonia.⁹ Despite Amazonia’s scientific and economic value, Carneiro shared with the committee his regrets that “this remote world of plant, animal and human life is still little known” and that Amazonian countries like Brazil had so far been materially and scientifically incapable to substantially explore this immense territory.¹⁰ Since Carneiro believed researching and utilizing the Amazon basin’s natural resources “was essentially an international task [...] of concern to the whole world”, he suggested that this international effort could be operated on the basis of a network of UNESCO-sponsored research stations scattered throughout this immense territory.¹¹ Following

pp.410-431; Patrick Petitjean, ‘Giving science for peace a chance: the post-war international laboratory projects’, in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty Years of Science at UNESCO*, Paris: UNESCO publishing, 2006, p.52-57; Aant Elzinga, ‘UNESCO and the politics of international cooperation in the realm of science’, in Patrick Petitjean, *Les Sciences Coloniales – Figures et Institutions*, Paris: Orstom edition, 1996, p.179.

⁷ ‘United Nations Economic and Social Council, draft resolution submitted to the economic and social council by the French delegation on the establishment of united nations research laboratories, UA, box 32 (11/2/348-17/2/384) – scientific research – establishment of UN research laboratories and of an international research council, E/147/Rev.1, p.2-4; ‘United Nations Educational, Scientific and Cultural Organization, committee of experts on the establishment of an International Computation Centre, working paper no.1, background’, 21 May 1951, UA, UNESCO/NS/ICC/8, WS/041.110, p.1-3; see also: Nancy MacLennan, ‘Science program prepared by U.N.’, 19 June 1946, *New York Times*.

⁸ ‘UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 10 a.m., Session I’, UA, Box 20 file 6/3/78 - minutes, p.10.

⁹ ‘UNESCO Preparatory Commission. Natural Sciences Committee. Suggestions for the scientific program of UNESCO. Creation of an “International Institute of the Hylean Amazon” submitted by Professor Paulo de Berredo Carneiro’, UA, UNESCO/Prep.Com./Nat.Sci.Com./4.

¹⁰ ‘UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 3 p.m., Session II’, UA, Box 20 file 6/3/78 - minutes, p.15.

¹¹ ‘UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at

Carneiro's speech, Needham expressed his unequivocal support and enthusiasm for the project to the Committee. He found in Carneiro's proposal a valuable complement to his own international science plan. He announced to the Committee that he and his staff had thought of similar peripheral areas that would deserve international attention. Since he agreed that "these parts of the world [like the Amazonian forest] have certainly very many surprises and things of great importance which no one has yet discovered", he suggested that UNESCO might help these peripheral countries which "are unable themselves to finance the investigations of their natural products".¹²

Six months later, the First General Conference of UNESCO held in Paris in November 1946 approved of Needham's and Carneiro's proposed program and consecrated both of them as the new organization's authority figures for the natural sciences. In many ways each complemented and reinforced the other. While Needham's program offered an opportunity for Carneiro to implement his research project in the Amazon region, Carneiro strengthened Needham's non-Eurocentric program with a concrete plan of action oriented towards the Dark Zone. Both, with their respective plans, proposed a kind of scientific internationalism in which the Southern scientist was granted a more active role in UNESCO's mission to build a durable post-war peace. Yet, if, following Needham's categorizations, the 'Bright Zone' scientist Needham and his 'Dark Zone' counterpart Carneiro seemed to speak in unison at the Preparatory Commission, I will show that each defended a distinctive discourse on science, society and international cooperation. Needham's scientific ecumenism and Carneiro's internationalist positivism reflected to a large extent the trajectories that had led them respectively from Cambridge and Rio to Paris. Needham postulated that the unification of all of mankind's scientific traditions would transcend the state order and announce a peaceful international society. In contrast, Carneiro foresaw in international scientific cooperation an instrument to strengthen nations like Brazil, and regions like the Amazon area in accelerating the progress of mankind. These two discourses undermined the IIHA before its foundations were laid. Needham's and Carneiro's conceptions composed the project's discursive opposites. These competing visions installed the project's making into a continuous tension, which, I believe, has been a significant source of frictions between the different stakeholders later involved in the creation of the IIHA.

47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 3 p.m., Session II, UA, Box 20 file 6/3/78 - minutes, p.15.

¹² UNESCO Preparatory Commission, minutes of proceedings of the Committee on Natural Sciences at 47, Belgrave Square, London, S.W.1 on Friday, 31st May, 1946 at 3 p.m., Session II, UA, Box 20 file 6/3/78 - minutes, p.16.

This chapter will unearth Needham's and Carneiro's distinct internationalist imaginaries, which undergirded the international science program of UNESCO and the implementation of the IIHA. Whereas I highlighted in Chapter 2 the greater implication of Southern actors in UNESCO's creation and reconstructed the shifting landscape of intellectual cooperation announced by the insertion of science at UNESCO, I will here zoom in on Carneiro and Needham to expose the complex intellectual and ideological heterogeneity permeating UNESCO's NS division and its impact on the IIHA's project. This ideological archaeology is essential to understand the philosophical and political diversity reigning over the novel institution in its early days and its implications on the tragic fate of its first major project, the IIHA.

Through this investigation, I first intend to contribute to the recent scholarship on the ideological origins of UN internationalism.¹³ If political historians have recently re-explored political internationalism in context and unveiled its ideological diversity, they however continue to see scientific internationalism as an ideologically homogenous technical enterprise. In this chapter, I will highlight scientific internationalism as a diverse political discourse by retracing and contrasting the formation of Needham's ecumenical worldview and Carneiro's positivist outlook.¹⁴ To this end, I build on the work of historians of science like Lettevall, Somsen and Widmalm who recently demonstrated that the appeal to science to mediate political and cultural tensions internationally constituted a rich set of plural and contextually defined discourses.¹⁵ I will reveal that Needham and Carneiro's strains of internationalism did not only reflect distinct political and scientific trajectories. Each rhetorically and politically appealed to science's international function to inaugurate quite different peaceful international orders. If Needham believed that greater international scientific cooperation would condemn the nation states to obsolescence, Carneiro envisioned an opportunity for Latin America in general and Brazil in particular to claim a bigger role on the world's scientific and political stage. Discovering, with the case of Carneiro, how the international function of science was conceived from the Global South will also broaden our understanding of twentieth century scientific internationalism

¹³ See for instance: Mark Mazower, *No Enchanted Palace: the End of Empire and the Ideological Origins of the United Nations*, New Jersey: Princeton University Press, 2009; Glenda Sluga, *Internationalism in the Age of Nationalism*, Philadelphia: University of Pennsylvania Press, 2013; Jean-Jacques Renoliet, *L'UNESCO Oubliée: la Société des Nations et la Coopération Intellectuelle (1919-1946)*, Paris: Publications de la Sorbonne, 1999.

¹⁴ See in particular, 'Chapter 4: Science the unifier' in Mark Mazower, *Governing the World: The History of an Idea*, London: Penguin Group, 2012, p.94-115.

¹⁵ Rebecka Lettevall, Geert Somsen and Sven Wildmalm (eds.), *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, New York, London: Routledge, Taylor and Francis Group, 2012.

that the current historiography had so far limited to Europe's bounds.¹⁶ Overall, this chapter both continues and expands these novel approaches on scientific internationalism by looking beyond the Western world and by bringing the history of science and the transnational history of the UN in dialogue.¹⁷

Symmetrical interest in Needham and Carneiro's worldview will not only unearth the ideological tensions underlying the IIHA's creation and further debunk the idea that UNESCO is a strictly Western product. It will also show the actual irrelevance of fixed center-periphery narratives. Even though anti-diffusionist historians of science, who thoroughly opposed center-periphery perspectives, yielded new understandings of the development of modern science, most of these scholars have tended to reproduce the very analytical divide they initially aimed to bring down.¹⁸ This was particularly true of earlier works on IIHA. Authors like Heloisa Maria Bertol Domingues and Patrick Petitjean placed *a priori* Carneiro and Needham, UNESCO and Latin America along a predefined center-periphery divide and interpreted the IIHA's failure as the outcome of the unsuccessful move of the project from UNESCO as the center to its peripheral recipient Brazil.¹⁹ Instead, as claimed in Chapter 1, I will reconstruct the IIHA from the actors' perspectives. I will show in this chapter that Needham and Carneiro envisioned the project within different ideological imaginaries each of which reflected how they respectively mediated several discourses, purposes, and constraints arising from their trajectory and mobility across the

¹⁶ From the field's classics to its later additions, all have focused on investigating the diverse forms of scientific internationalism developed by Western scientists and institutions, see: Paul Forman, 'Scientific internationalism and the Weimar physicists: the ideology and its manipulation in Germany after World War I', *Isis* (1973) 64, pp.150-180; Brigitte Schroeder-Gudehus, *Les Scientifiques et la Paix: La Communauté Scientifique Internationale au cours des Années 20*, Montréal: Les Presses Universitaires de Montréal, 1978; Geert Somsen, 'A history of universalism: conceptions of the internationality of science from the Enlightenment to the Cold war', *Minerva* (2008) 46, pp.361-379; Lettevall, Somsen and Wildmalm, op. cit. (15).

¹⁷ On internationalism and the global south, see especially: Sluga, op cit. (13).

¹⁸ For a critique of the pervasiveness of centre-periphery approaches in the history of science, see: Kapil Raj, 'Beyond postcolonialism ... and postpositivism. Circulation and the global history of science', *Isis* (2013) 104, pp.337-347; For a post-center/periphery approach to the global history of science, see: Kapil Raj, *Relocating Modern Science. Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900*, Basingstoke: Palgrave Macmillan, 2007.

¹⁹ Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50; Patrick Petitjean and Heloisa Maria Bertol Domingues, 'A redescoberta da Amazônia num projeto da UNESCO: o Instituto Internacional da Hiléia Amazonica', *Estudos Históricos* (2000) 14, pp.265-292, p.282-288; Patrick Petitjean, 'Introducing the symposium "Refounding the International Scientific Relations in the Post-war Period. The Exact and Natural Sciences Division of UNESCO in its first Years"', *Twenty-First International Congress for the History of Science and Technology*, Mexico, 2005; Patrick Petitjean, 'Visions and revisions. Defining UNESCO's scientific culture, 1945-1965' and 'Blazing the trail. Needham and UNESCO: perspectives and realizations' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty years of science at UNESCO*, Paris: UNESCO publishing, 2006, pp.29-34, pp.43-47.

alleged North-South border. If Needham built his ecumenical outlook from his experience in Chongqing and Carneiro nurtured his positivist internationalism from his time in France, none could be said to be unequivocally Western or non-Western. Accordingly, rather than seeing the IIHA as either a Western enterprise or a victim of a Latin-American nationalisms, I will study it as a contextually defined and multi-layered project, starting with disentangling the different worldviews Needham and Carneiro projected on it in May 1946.

This investigation into Needham and Carneiro's complex and multi-contextual identities will finally contribute to a recent interest in the issue of identity among the staff of international organizations.²⁰ In a recent study, Rangil investigated this problem of identity and its impact on the work and shape of UNESCO's Social Science division in its first decade.²¹ She argued that a lack of intellectual and political harmony reigned over the organization, which, as she showed, left top-ranking staff members free to mediate their previous intellectual, cultural, political and national identifications. She argued that the multiplicity of overlapping and sometimes contradicting identities impeded the section's functioning as well as the undertaking of large projects similar to the IIHA. Inspired by her findings, my investigation of the ideological underpinnings of the IIHA will shed light on the different identities and worldviews co-existing in the Natural Science Section in its formative years. I will point out how Needham's and Carneiro's differing identities and allegiances both shaped and weakened the proposed IIHA as early as its design phase.

This chapter will consist of two biographical accounts of Needham and Carneiro's trajectory over the first half of the twentieth century. I will reconstruct and compare, first what their conception of science, society and their relations were, to later move on to retrieve their experience of international science (and cooperation) and to finally reconstruct their respective notions of scientific internationalism. While the first two sections will illuminate Needham's and Carneiro's scientific and political life before UNESCO, the last section will focus on the Natural Science Section and the ideological tensions dividing Carneiro and Needham regarding the design of the IIHA.

²⁰ On Colonial experts and the UN, see: Joseph Morgan Hodge, 'British colonial expertise, post-colonial career and the early history of international development', *Journal of Modern European History* (2010) 8, pp.24-46; On League of Nations' staff, and their transfer to the UN, see: Susan Perdersen, 'Back to the League of Nations', *The American Historical Review* (2007) 11, pp.1091-1117, p.1112-1115; Sunil Amrith and Glenda Sluga, 'New histories of the United Nations', *Journal of World History* (2008) 19, pp.251-274, p.271-272.

²¹ Teresa Tomas Rangil, 'Citizen, academic, expert, or international worker? Juggling with identities at UNESCO's social science department, 1946-1955', *Science in Context* (2013) 26, pp.61-91.

SCIENCE AND SOCIETY

Needham sealed his appointment as head of the NS division mostly thanks to his wartime activities in China and his UNESCO activism. To fashion himself into an expert of international scientific cooperation, Needham also relied on a decade of leftist activism within the so-called Social Relation of Science Movement (SRSM) and a successful scientific career as a biochemist. Unlike Needham, Carneiro entered UNESCO after more than a decade of civil and diplomatic service to the Brazilian state that he ran parallel to a discontinuous scientific career as an industrial chemist first in Brazil and then in France. I will demonstrate that Carneiro's and Needham's distinct form of scientific internationalism were intimately shaped by their experiences of being a scientist on the boundary of science and politics, and their mobility across the divide between the North and the South. But before reconstructing the tenets of their respective worldviews, I will first turn to their scientific and political background.

Types of science: Cambridge exceptionalism and Brazilian positivism

Born in 1900, Needham embraced science and an unshakable faith in its power from his early youth.²² Under the aegis of his father, a science-minded physicist, Needham entered Cambridge and went on to pursue a brilliant career in biochemistry under the guidance of his mentor, the Nobel Prize winning biochemist Frederick Gowland Hopkins. At the turn of the 1930s, he had grown into an outstanding product of Cambridge science. He became one of its most promising representatives following the acclaimed publication of his *Chemical Embryology* and his appointment of the Sir William Dunn Readership in Biochemistry at the age of only thirty-two. Fed on science fiction, notably the novels of Herbert George Wells, and shaped by Cambridge's scientific culture, Needham thrived on a sense of historical exceptionality and a blatant belief in his leading civilizational role as a scientist. Like his young colleagues, the crystallographer John Desmond Bernal in *The World, the Flesh and the Devil* and the biologist John Burdon Sanderson Haldane in *Daedalus*, Needham displayed the breadth of his scientific idealism in the *Great Amphibium* in which he praised biology's transformative and spiritual power at length.²³

²² For a detailed account of Needham's youth at Cambridge in the 1920s, see: Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s* London: Free Association Books, 1988, p.67-76.

²³ John Burdon Sanderson Haldane, *Daedalus or Science and the Future*, London: Kegan Paul, Trench, Trubner & co., 1923; John Desmond Bernal, *The World, the Flesh, and the Devil: An Inquiry into the Future of the Three Enemies of the Rational Soul*, New York: Verso Book, 2017 (first published 1929); Joseph Needham, *The Great Amphibium. Four Lectures on the Position of Religion in A World Dominated by Sci-*



Figure 12 – British biochemist Joseph Needham in the Dunn Biochemistry Institute, Cambridge University, United Kingdom, 1937.

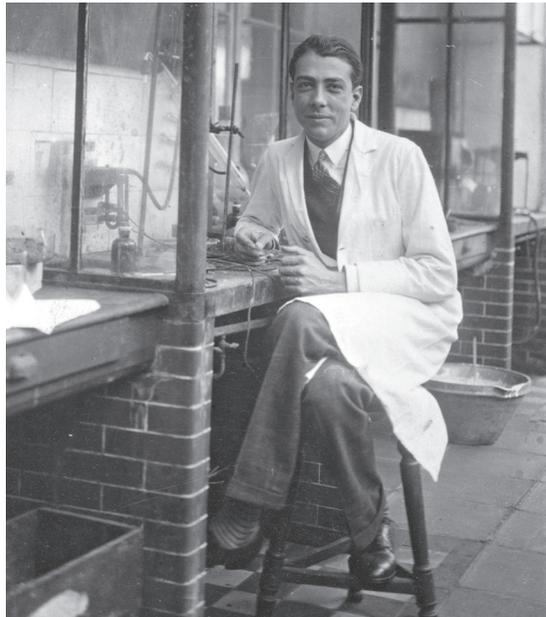


Figure 13 – Paulo Carneiro at the Pasteur Institute, Paris, France, c.1930

ence, London: Student Christian Movement Press, 1932.

Yet, at the turn of the 1930s what science could do for society's advancement and mankind's progress still remained a fuzzy hobbyhorse for the young and ambitious student who strove to become a leading Cambridge biochemist.

Carneiro was born a year later than Needham, in Rio de Janeiro, some 9000 kilometers away from Cambridge in a prestigious positivist family. His father, Mario Barbosa Carneiro, was a major statesman and a well-known figure of Brazil's Comtean reformist movement, which overthrew Emperor Dom Pedro II in 1889 and established in its place the First Republic.²⁴

From the mid-nineteenth century, the European positivist philosophies of the French Auguste Comte and the British John Stuart Mill and Herbert Spencer swept through Latin America.²⁵ While in Europe positivism remained a philosophy, in Latin America it took the form of a political movement and a long-lasting political ideology claimed by the rising bourgeois and state elite. At the time the ideas of Comte, Mill and Spencer were already losing traction in Europe, it fuelled political renovation throughout the continent from the late 1870s through the first half of the twentieth century. European positivism offered the continent's emerging bourgeoisie a set of ideas and principles – such as the ideas of progress and a scientific legitimization of orderly change – to legitimize their aspiration to overcome the stranglehold of colonial conservatism and scholasticism inherited from the colonial period.²⁶ The positivist ideologies that blossomed in Latin America took various forms. In Brazil and Mexico, the positivists organized in well-structured movements and political parties and followed the philosophy of Comte while in countries like Argentina

²⁴ Marcos Chor Maio and José Augusto Drummond, 'Depoimento: Paulo Estevas de Berredo Carneiro, cientista brasileiro, cidadão do mundo' (interview edited by Marcos Chor Maio and José Augusto Drummond) in Marcos Chor Maio (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.269-305, p.269; Marcos Chor Maio, 'Bibliografia: trajetória e produção intelectual de Paulo Carneiro' in Marcos Chor Maio (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.309-321, p.309; Priscila Fraiz, 'O acervo da família Carneiro: fonte para o estudo do pensamento e da prática filosófica, política e científica brasileira nos séculos XIX e XX', *Historia, Ciências, Saúde – Mangueiras* (2000) 6, pp.1125-1133, p.1125-26.

²⁵ Gregory Gilson and Irving Levinson, 'Introduction' in Gregory Gilson and Irving Levinson (eds.) *Latin American Positivism. New Historical and Philosophical Essays*, Lanham, Boulder, New York, Toronto, Plymouth: Lexington Books, 2012, pp.vii-viii; On European Positivism, see: Leszek Kolankowski, *The Alienation of Reason: A History of Positivist Thought*, Garden City, NY: Anchor Books, Double-day, 1969; Walter Simon, *European Positivism in the Nineteenth Century: An Essay in Intellectual History*, Ithaca: Cornell University Press, 1963.

²⁶ Arturo Ardao, 'Assimilation and Transformation of Positivism in Latin America', *Journal of the History of Ideas* (1963) 24, pp.515-522, p.516-517; Meri Clark, 'The Emergence and Transformation of Positivism', in Susana Nuccetelli, Ofelia Schutte and Otavio Bueno (eds.) *A Companion to Latin American Philosophy*, Chichester: Wiley-Blackwell Publishing Ltd., 2010, pp.53-67, p.54-55; Oscar Marti, 'Early critics of positivism', in Susana Nuccetelli, Ofelia Schutte and Otavio Bueno (eds.) *A Companion to Latin American Philosophy*, Chichester: Wiley-Blackwell Publishing Ltd., 2010, pp.68-81, p.69-70.

and Uruguay positivism was less structured, individual and in line with the precepts of British positivism.

In Brazil, positivism was a reflection of Comtean positivism and was less an orthodox doctrine than a point of departure to envision Brazil's modernization.²⁷ The movement was multifaceted and spread through the ranks of the army, the law schools and attracted the emerging Brazilian bourgeois middle class more generally.²⁸ The positivists made up the most powerful republican movement of the late nineteenth century and their influence as diverse and heterogeneous as it was went on throughout the first half of the twentieth century. It started with the Positivist Society of Rio de Janeiro (1876) led by Benjamin Constant who built the First Republic, served in the highest levels of government and ran about half of the country's states between 1889 and 1915.²⁹ The founding figures of Brazilian positivism that were Benjamin Constant, Candido Rondon, Teixeira Mendes and Carneiro's father were later followed by the generation of Paulo Carneiro who followed Comte's precepts in a less dogmatic approach than their forefathers and sought to develop his ideas to meet Brazilian needs. They embraced Comte's idealization of the scientific method and attempted to implement his views on education, politics, and religion.³⁰

Brazilian Comtean positivism was thus less a philosophy and a doctrine than a political method to instate orderly change and conservative modernity in post-monarchy Brazil. Although the first republic remained controlled by the rural oligarchies, the positivists left a considerable mark on the emerging republican regime where they had power. Besides turning positivist ideals into republican and national symbols – i.e., the national flag carrying Comte's motto 'Order and Progress' – the positivists fought to erect a republican dictatorship as defined by Comte, which they eventually successfully applied only in Rio Grande do Sul. The positivists strived to put Comte's principles to work. While they put in place an educational system that was essentially Comtean, wherein scientific education

²⁷ Robert Nachman, 'Positivism, modernization and the Middle Class in Brazil', *The Hispanic American Historical Review* (1977) 57, pp.1-23; For a thorough study of positivism in Brazil, see: Ivan Lins, *História do Positivismo no Brasil*, São Paulo: Companhia Editora Nacional, 1964

²⁸ Nachman, op. cit. (27), p.1-2; On the relationship between Brazilian scientists and engineers and positivism, see: Simone Petraglia-Kropf, 'O saber para prever, a fim de prover – A engenharia de um Brasil moderno', in Micael Herschman and Carlos Alberto Pereira. *A Invenção do Brasil Moderno Medicina Educação e Engenharia nos Anos 20-30*, Rio de Janeiro: Rocco, 1994, pp.202-223; On the rise of Comtean Positivism in the Brazilian armed force between the late nineteenth century and the late twentieth century, see: Robert Sterling Rose, 'Brazil's military Positivists: another myth in need of explosion?' in Gregory Gilson and Irving Levinson (eds.) *Latin American Positivism. New Historical and Philosophical Essays*, Lanham, Boulder, New York, Toronto, Plymouth: Lexington Books, 2012, pp.133-152.

²⁹ Nachman, op. cit. (27), p.12-13; Angela Alonso, 'De positivismo e de positivistas: Interpretações do positivismo Brasileiro', *Revista Brasileira de Informação Bibliográfica em Ciências Sociais* (1996) 42, pp.109-134, p.112-117, Ardao, op. cit. (26), p.519.

³⁰ Nachman, op. cit. (27), p.12-22.



Figure 14 – French philosopher and founding father of positivism Auguste Comte (1798-1857)



Figure 15 – Brazilian Republican leader and political thinker Benjamin Constant de Botelho de Magalhães (1836-1891)



Figure 16 – Brazilian military man and sertanista Marshall Cândido Mariano da Silva Rondon (1865-1958)

and educational secularism predominated, they also criticized institutionalized religion and established a strict separation of the church and the state. While many turn atheists or agnostics, some went into constructive religious actions by propagating as in no other countries in the world, the Religion of Humanity founded by Comte, which became a popular movement that still lives on today.³¹ Following Comte's rejection of colonialism and imperialism and his opposition to laissez faire economics, the positivists turned a wide range of positivist concepts into economic policies that merged economic nationalism, with strong state interventions and protectionist measures. In order to promote order and social harmony, they intended to integrate the proletariat into society via progressive labor policy aiming at reducing working hours, establishing minimum wage and better working conditions.³²

Brazilian positivism was not only elitist and nationalist but intrinsically scientific as well. The positivists mobilized Comte's counsel to consolidate the Brazilian nation and resolve the social disorder inherited from the monarchy. Like Comte, they conceived science as the most reliable instrument to decode, control and modernize society in an orderly fashion. They enrolled science symbolically and practically to unravel the laws operating the Brazilian society and design public and private interventions in all spheres of society to bring Brazil towards what Comte defined as the higher positive stage of progress. Believing in the civilizing power of science, the positivists needed a technocratic elite scientifically trained to carry out modernization and thus played a significant role in forming Brazil's scientific culture.³³ As a result of the positivist's utilitarian and pragmatic attitude to science, applied science and engineering grew substantially at the turn of the century via military schools but also through the multiplication of research stations, engineering schools and technical agencies created to serve the material advancement and modernization of the country.³⁴

³¹ The religion of humanity consisted in the worship of the great achievements of mankind. On the religion of humanity and its crisscrossing with the Roman Catholic Church, see: Todd Diacon, *Stringing Together a Nation. Candido Mariano da Silva Rondon and the Construction of a Modern Brazil, 1906-1930*, Durham: Duke University Press, 2004, p.80-84; Todd Diacon, 'Cândido Mariano da Silva Rondon. One man's search for the Brazilian nation', in Peter Beattie, *The Human Tradition in Modern Brazil*, Wilmington: Scholarly Resources inc., 2004, pp.107-120, p.111; Rodney Rhodes Gollo, 'The birth of a new political philosophy: religion and Positivism in nineteenth century Brazil' in Gregory Gilson and Irving Levinson (eds.) *Latin American Positivism. New Historical and Philosophical Essays*, Lanham, Boulder, New York, Toronto, Plymouth: Lexington Books, 2012, pp.153-173. Paul Arbousse Bastide, 'Sur le Positivisme politique et religieux au Brésil', *Romantisme. Aspects d'une modernité* (1979) 23, pp.79-97.

³² Nachman, op. cit. (27), p.12-22.

³³ On Comte's Law of Three Stages, see: Auguste Comte, *Cours de Philosophie Positive*, 6 vols., Paris, 1842 and *Système de Politique Positive*, 4 vols., Paris, 1854; For a quick description of Comte's evolutionary Law of Three Stages and its appropriation in Brazil, see: Nachman, op. cit. (27), p.2-3.

³⁴ Nachman, op. cit. (27), p.13-16; Petraglia-Kropf, op. cit. (28), p.207-213; Rose, op. cit. (28).

Under the Republic, the small but growing population of scientists and engineers was invested with a social mission, which legitimized their involvement in the country's reformation. Many positivist scientists and engineers embraced this social function and geared their work to serve national consolidation and modernization.³⁵ Anthropologists like Edgard Roquette Pinto and the writer-journalist-engineer Euclides da Cunha carried out the scientific investigation of national culture, customs and society with the goal of binding the nation. Positivist engineers served the nation through infrastructure development, like the military engineer Candido Mariano da Silva Rondon who constructed the first telegraph line across the Amazon, while positivist scientists were hired to conduct research to improve agricultural yields and design industrialization processes.³⁶ As such positivism precipitated the formation of a scientific culture oriented towards nation-building and political action of which the young Carneiro was a direct product and for whom applied science and modernization became a motto.

Carneiro was, like his father, a fervent disciple of the positivist philosophy of Comte and became one of the many scientists and engineers who, trained under the rule of the Republic, believed in the social utility of science for the nation. Young Carneiro grew up with the positivist teachings of Teixeira Mendes at Rio's Temple of Humanity – i.e., the Positivist Church of Brazil (IBP) – where the secular Religion of Humanity of Comte was



Figure 17 – The positivist church of Rio de Janeiro (c. 1900)

³⁵ Petraglia-Kropf, *op. cit.* (28), p.203-206.

³⁶ For a detailed account of Candido Rondon's positivism, see: Diacon, *op. cit.* (31), p.79-99.

worshiped. Baptized at the Temple of Humanity, Carneiro embraced the elitist positivist faith in the triumph of humanity through the orderly rule of a scientific and technical form of government. Unlike Needham, Carneiro was trained in industrial chemistry at Rio's Escola Politécnica, one of Brazil's strongest positivist havens in the interwar period.³⁷ There, Carneiro did not only learn to become an industrial chemist but he also embraced the positivist ethos that established scientific research as an instrument of progress and defined the work of the scientist as a practice of social and national relevance. Following his graduation, he went on to work at the Brazilian Geological and Mineralogical Survey Service of the Ministry of Agriculture in 1924 where he worked as chemist studying the composition of essences of Amazonian plants like Anda-Acu and Nhamuhy for various uses such as lubricants for airplane engines. Carneiro obtained a scholarship in 1927 to do his PhD on the stimulant properties of Guarana (*Paulinia cupana*), an endemic plant of the Amazon forest, in Paris at the Pasteur Institute, which he concluded in 1931.³⁸

At the Ministry of Agriculture Carneiro began to orient his research on Brazilian plants with the goal to derive applications socially and economically beneficial for Brazil. Regarding his PhD thesis, he confessed in 1982 that "like the rest of my research, it emphasized Brazilian issues".³⁹ Throughout the 1920s and 1930s, whether in Brazil or Paris, Carneiro pursued a line of research dedicated to improve the social usefulness and commercial value of Brazil's natural resources. Unlike Needham, who was still concerned with fundamental embryological research on the origins of life, Carneiro researched, for instance, the chemical properties of coffee, maté and tea to identify, industrially extract and commercialize several by-products such as bio-plastics or caffeine as a means to undermine the economic losses induced by overproduction of the early 1930s.⁴⁰ When Needham obtained the readership, and settled into a career in fundamental science, Carneiro just returned to Rio where he combined applied research and public functions following his nomination at the recently created National Institute of Technology. Entering the crisis-ridden 1930s, both Carneiro and Needham mobilized science to address social problems, although differently from one another. As we will see in the following subsections, Carneiro engaged with society technocratically as part of the technical services of

³⁷ Petraglia-Kropf, op. cit. (28).

³⁸ Magali Romero Sa, 'Paulo Carneiro e o curare: em busca do principio ativo' in Marcos Chor Maio, (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.43-65, p.47.

³⁹ Maio and Drummond, op. cit. (24), p.271.

⁴⁰ Paulo Carneiro to Fonseca Costa, 30 May 1933, Carneiro Papers, Arcevo Fiocruz, Rio de Janeiro (subsequently CP), PC.GI.AI.03/Cartas; Paulo Carneiro to Jayme Guedes, 2 January 1940, CP, PC.GI.AI.05/Cartoes; see also: Marcos Jungmann Bhering and Marcos Chor Maio, 'Entre ciência e política: o positivismo de Paulo Carneiro na Secretaria de Agricultura, Indústria e Comércio de Pernambuco (1935)', *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.435-451, p.440.

the Brazilian federalstate whereas Needham, in contrast, embraced radical leftist politics to face the turmoil of interwar society.

Carneiro's technocratic statesmanship and Needham's radicalism

In the face of the economic slump, massive unemployment and the rise of Fascism, Needham grew through the 1930s from being “unpolitical [...] and vaguely progressive” to an influential figure of the leftist SRS movement.⁴¹ Needham engaged in favor of causes as diverse as Pacifism, anti-Fascism, Socialism and scientific unionism, which he and his comrades of the SRS movement conceived as one and the same fight to defend and promote the advancement of science. Believing in the emancipatory power of science, they combated against the military misuse of science, organized the rescue of Nazi-persecuted continental scientists, defended the conditions of scientific workers and fostered the advancement of a scientific form of Socialism.⁴² Despite their relative distance from the Labour Movement in the early 1930s, leftist scientists like Needham became influential players in Britain's radical left at the end of the decade and this, according to Werskey, McGucken and Petitjean, facilitated the involvement of several of its members in governmental and international organizations during and after World War II.⁴³ Inspired by the USSR and its scientific approach to government, Needham and his comrades fought for the advent of a scientifically planned socialist society in Britain to emancipate the working class, liberate science's advancement and ultimately bring mankind towards history's end.

At the Ministry of Agriculture, Carneiro faced turmoil as well. After four years in Paris, Carneiro returned to civil service in a politically unstable and economically weakened Brazil. Upon his return in 1931, he found the First Republic had been overthrown by the Revolution of 1930, which had installed the provisional government of Getulio Vargas. Reinforced by Sao Paulo's failing Constitutionalist Revolution of 1932, Vargas' provisional government asserted Brazil's centralization and the rule of the federal government over

⁴¹ Joseph Needham, 'Metamorphoses of scepticism. Introductory essay (1941)' in Joseph Needham, *Time: the Refreshing River (Essays and Addresses, 1932-1942)*, London: George Allen and Unwin Ltd., 1943, pp.7-27, p.12.

⁴² Gary Werskey, 'British scientists and 'outsider' politics, 1931-1945', *Science Studies* (1971) 1, pp.67-83; Werskey, op. cit. (22), p.212-257; William McGucken, *Scientists, Society and State. The Social Relations of Science Movement in Great Britain 1931-1947*, Columbus: Ohio State University Press, 1984, p.71-94; on relief work see: David Zimmerman, 'The Society for the Protection of Science and Learning and the politization of British science in the 1930s', *Minerva* (2006) 44, pp.25-45.

⁴³ McGucken, op. cit. (42), p.155-342; Werskey, op. cit. (22), p.261-277; Patrick Petitjean, 'Needham, Anglo-French civilities and ecumenical science', in Irfan Habib and Dhruv Raina, *Situating the History of Science: Dialogues with Joseph Needham*, New Delhi: Oxford University Press, 1999, pp.152-197, p.166-167

the country and against the oligarchs of the regional ruling class. Despite outbursts of contestation such as military mutinies, the fascist opposition of the Brazilian Integralist Action and a communist insurrection led by Brazil's Communist Party, Vargas was elected president in 1934. He fulfilled this function until 1937 when he seized power with a militarily supported coup and established the authoritarian Estado Novo.⁴⁴ The new regime is known for having imposed a fascist-inspired corporatist, authoritarian and repressive dictatorship personalized and orchestrated by its leader Vargas.⁴⁵

The political change of the 1930s brought optimism and opportunities to Brazil's administrative and intellectual elites of which Carneiro was a representative. As Carneiro recalled: "This post-revolutionary period was extremely fruitful for Brazil. Scientific and technological initiatives arose on all sides".⁴⁶ As head of the provisional government, as elected president and finally as dictator, Vargas pursued the socio-economic modernization and political centralization of Brazil that had been timidly initiated in the 1920s.⁴⁷ Vargas sought to establish a powerful technocratic federal administration, which he modelled after Roosevelt's New Deal, Mussolini's fascist corporatism and Staline's Soviet planning and infused this with home-grown positivism.⁴⁸ Vargas' authoritarian

⁴⁴ For a concise account of Brazil's severe political crisis in the early 1930s, see: Boris Fausto and Sergio Fausto, *A Concise History of Brazil*, Cambridge: Cambridge University Press, second edition, 1999, p.186-210; Dulce Pandolfi, 'Os anos 1930: as incertezas do regime' in Jorge Ferreira and Lucilia de Almeida Neves Delgado (Eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo: do Início da Década de 1930 ao Apogeu do Estado Novo*, Rio de Janeiro: Civilização Brasileira, 2003, vol. 2, pp.13-37.

⁴⁵ For an overview of the Estado Novo as a political regime see: Dulce Pandolfi (ed.) *Repensando o Estado Novo*, Rio de Janeiro Editora Fundação Getulio Vargas, 1999; On Vargas himself, see: Jens Hentschke (ed.) *Vargas and Brazil. New Perspectives*, Basingstoke, New York: Palgrave Macmillan, 2006; Robert Levine, *Father of the Poor? Vargas and his Era*, Cambridge: Cambridge University Press, 1998; For an overview of the Estado Novo as a repressive regime see: Robert Sterling Rose, *One of the Forgotten Things. Getulio Vargas and Brazilian Social Control, 1930-1954*, Westport: Greenwood Press, 2000; Elizabeth Cancelli, 'Ação e repressão política num circuito integrado internacionalmente, in Dulce Pandolfi (ed.) *Repensando o Estado Novo*, Rio de Janeiro: Editora Fundação Getulio Vargas, 1999, pp.309-326; Elizabeth Cancelli, *O mundo da violência: a polícia da era Vargas*. Brasília: Editora Universidade de Brasília, 1994.

⁴⁶ 'Maio and Drummond, op. cit. (24), p.274.

⁴⁷ Maria Celina d'Araujo, 'Estado, classe trabalhadora e políticas sociais', in Jorge Ferreira and Lucilia de Almeida Neves Delgado (Eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo: do Início da Década de 1930 ao Apogeu do Estado Novo*, Rio de Janeiro: Civilização Brasileira, 2003, Vol. 2, p. 145-177; Gilberto Hochman and Cristina Fonseca, 'O que há de novo? Políticas de saúde pública e previdência, 1937-1945' in Dulce Pandolfi (ed.) *Repensando o Estado Novo*, Rio de Janeiro Editora Fundação Getulio Vargas, 1999, p.73-94.

⁴⁸ Bhering and Maio, op. cit. (40), p.440; Pandolfi, op. cit. (44); Jens Hentschke, 'The Vargas era. Institutional and development model revisited: themes, debates, and lacunas. An introduction' in Jens Hentschke (ed.) *Vargas and Brazil. New Perspectives*, Basingstoke, New York: Palgrave Macmillan, 2006, pp.1-30, p.23-24; see also on the role of the military, Frank McCann, 'The military and the dictatorship: Getúlio, Góes and Dutra' in Jens Hentschke (ed.) *Vargas and Brazil. New Perspectives*, Basingstoke, New York: Palgrave Macmillan, 2006, pp.109-142; On the regime's corporatist features, see: Aspásia de Alcântara Camargo, Dulce Pandolfi; Maria Celina d'Araujo, Eduardo Gomes and Mario Grynspan, *O Golpe Silencioso: As Origens da República Corporativa*. Rio de Janeiro: Rio Fundo Editora, 1989, p.24-25.

and conservative modernization program consisted in building a powerful central state regulating and structuring all spheres of society. In Vargas' view, to develop and control Brazil, the state had the responsibility to pacify the nation and promote and organize its growth and well-being. This program was carried out through the centralization of the military, the nationalization and industrialization of the mining and the coffee sector, the reorganization of labor under the aegis of state controlled unions, as well as intensified repressions especially against the political left. The technocratic state flourished. Vargas's administration created a new set of institutions such as the Ministry of Labour, Industry and Commerce (MAIC) in 1930 and the National Institute of Coffee in 1933 and he set up two universities – the university of São Paulo in 1934 and the University of the Federal District a year later – to fill the newly established state services with a scientifically trained bureaucratic elite.⁴⁹

Carneiro was at the heart of Brazil's technocratic turn. Unlike Needham's radicalism and street-level activism, Carneiro's involvement in Brazil's public affairs was civil and technocratic in character. He multiplied scientific and civil functions in a continuously growing and shifting administration. Between 1931 and 1934, Carneiro was nominated by Vargas himself as head of section at the Institute of Oil to the Ministry of Agriculture and the newly created National Institute of Technology where he researched the chemical properties of curare, while he would also be advising the Minister of Agriculture Juarez Tavora as cabinet member.⁵⁰ In 1935, Carneiro took on new administrative responsibilities when he obtained the seat of Secretary of Agriculture, Industry and Commerce (SAICP) of the northern state of Pernambuco. Appointed by Pernambuco's governor Carlos de Lima Cavalcanti, a reformist figure of the modernization movement of the 1930s and future ally in the creation of the IIHA, Carneiro sought to establish the necessary institutional frame needed to modernize the agricultural economy of the Pernambuco state. As we will see, the Pernambucan experience, as exemplary of Carneiro's public engagement, will allow us to scrutinize Carneiro's positivist conception of science, society and social change despite the relative failure of his mandate.

In sum, throughout the tumultuous 1930s, both Needham and Carneiro grew increasingly concerned with the socio-political problems of their time. At the same time,

⁴⁹ On Vargas' rule, see: Stanley Hilton, 'Vargas and Brazilian economic development, 1930– 1945', *Journal of Economic History* (1975) 35, pp.754-778; Monica Pimenta Velloso 'Os intelectuais e a política cultural do Estado Novo' and Maria Antonieta Leopoldi, 'A economia política do primeiro governo Vargas (1930-1945): a política econômica em tempos de turbulência' in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo do Início de Década 1930 ao apogeu do Estado Novo*, Rio de Janeiro: Civilizacao Brasileira, 2003, pp.145-180, pp.241-286; Izabel Noll, *La Construction du Varguisme. L'Ordre pour Principe, le Progrès comme Fin* Dissertation submitted to École des Hautes Études en Sciences Sociales, 2003; Cancelli, op. cit. (45) .

⁵⁰ Bhering and Maio, op. cit. (40), p.438.

and as I will show below, Needham and Carneiro did not separate their work as scientists from their political and civic engagements but rather based their activism on the insights they drew from their research activities. As socially minded scientists, both developed a peculiar worldview in which science and politics were closely intertwined. For them, science was a political resource and model that would stimulate social change and legitimize the figure of the scientist in the government of human affairs. As we will see in the last section of this chapter, Needham's evolutionary Marxism and Carneiro's positivism substantially undergirded their respective vision of post-war international science and its role at UNESCO for the promotion of peace. We will however first reconstruct, compare and contrast their respective worldviews.

Needham's idealist evolutionary Marxism

Throughout the 1930s, Needham and other British elite scientists such as Bernal and Haldane became leading figures of the SRSM. As Gary Werskey first showed in his seminal work the *Visible College*, the Scientific Left stood by a particular conception of science and politics known as the *Social Relations of Science* (SRS).⁵¹ Considered as the scientific left's leading theoretician, Bernal formally theorized this unique scientific strain of Socialism in his famous book *The Social Function of Science*. In essence, Bernal contended that Socialism was desirable, and that the co-advancement of science and Socialism as pioneered in Soviet Russia would bring about greater social change⁵². While the existing historiography on the SRS movement convincingly revealed the scientized nature of its socialist agenda, it tends to overlook the variety of views among its members. Since Gary Werskey's *Visible College*, Needham's SRS outlook has been amalgamated to Bernal's *The Social Functions of Science*, which has been assumed to represent the views of the SRSM as a whole. His take on SRS theory was however noticeably different as it comprised an evolutionary emphasis and a spiritual cautiousness absent from the canons of SRS as theorized by Bernal. Needham rooted his approach to the co-advancement of science and politics in his research in biochemical embryology and colored it with a spiritual idealism he had cultivated from childhood. Although inspired by Bernal's scientific system, Needham nurtured a humanist scepticism of Bernal's absolute scientism, which he feared to be ruthless and blind to the face of imperfection and the numinous dimensions of human experience that he valued as a Christian.⁵³

⁵¹ Werskey, op. cit. (22), p.176-257.

⁵² John Desmond Bernal, *The Social Function of Science*, London: George Routledge & Sons Ltd., 1939.

⁵³ Werskey, op. cit. (22), p.200, p.203-204.

Needham thus merged scientism and Marxism into a sort of humanist bio-Marxist evolutionism. He saw the world embracing “the giant vista of evolution”.⁵⁴ Drawing from contemporary research in the natural and social sciences, Needham envisioned Nature as a unified whole with mankind as its crown. Nature was not static but in motion through evolution which he saw as “the passage from simplicity to complexity [...] from low to high organization”.⁵⁵ He contended that the evolutionary process was Nature’s way of binding as well as diversifying its many entities, whether social, natural, living or non-living into “a series of levels [of organization], rising above one another by a succession of steps”.⁵⁶ To each entity, Needham associated what he called a level of organisation. Each level was characterized by the degree of integration and centralisation that structured its constitutive parts and the complexity of its organization. Convinced of the universality of evolution, Needham regarded this evolutionary process as an entry point to penetrate all spheres of life, including human social life. “We must think of sociological development”, he postulated, “as continuous with biological [development]. History is the continuation of Natural History”.⁵⁷

Needham’s reading of social evolution resonated very much with the teleological and deterministic interpretation Herbert Spencer gave of it fifty years earlier in his system of synthetic philosophy.⁵⁸ Yet the mechanic of change differed between the two. While Spencer valued competition, Needham identified its opposite, cooperation between people, as “the necessary foundation to a higher order of human society”.⁵⁹ Needham conceived cooperation – e.g., between cells, organisms and ultimately human beings – as the triggering mechanism behind evolutionary social change, and science as its indicator. Consequently, he considered that a full scientific understanding of mankind’s evolutionary course should enable the scientist to confidently affirm, contra Spencer, that “the [capitalist] state in which we know [society] today was not, to a very high degree of probability, its final state”.⁶⁰ For Needham science was not just an innocent and passive mirror of nature’

⁵⁴ Joseph Needham, ‘Integrative levels: a reevaluation of the idea of progress (Herbert Spencer Lecture at Oxford University, 1937)’ in Joseph Needham, *Time: the Refreshing River (Essays and Addresses, 1932-1942)*, London: George Allen and Unwin Ltd., 1943, pp.233-272, p.258, p.233-272.

⁵⁵ Joseph Needham, ‘The gist of evolution. A plain statement concerning the coming into being of our world (1931)’ in Joseph Needham, *History is on our Side. A Contribution to Political Religion and Scientific Faith*, London: George Allen and Unwin Limited, 1946, pp.121-145, p.121.

⁵⁶ Needham, op. cit. (55), p.124.

⁵⁷ Joseph Needham, ‘History is on our side. An address to the clergy (1937)’ in Joseph Needham, *History is on our Side. A Contribution to Political Religion and Scientific Faith*, London: George Allen and Unwin Limited, 1946, pp.22-34, p.24.

⁵⁸ Herbert Spencer, *Principles of Sociology*, London and Edinburgh: Williams and Norgate, 1876; Herbert Spencer, *Principles of Biology*, London, Edinburgh and Oxford: Williams and Norgate, 1898; Spencer, *First Principles*, 6th edn, London: Williams and Norgate, 1900.

⁵⁹ Needham, op. cit. (54), p.260.

⁶⁰ Needham, op. cit. (57), p.22-23.

s evolutionary march. It constituted a powerful political compass that could guide the transcendence of Capitalism towards evolutionary, sound Socialism. This belief led him to affirm in 1937, when Fascism threatened to take over Europe, that the world faced a choice between Fascist regression, Capitalist exploitation and the advancement towards Socialism: between contradicting nature's evolutionary rules and embracing them to move on to the political and biological harmony of a collectivist society.⁶¹

Needham subscribed to the idea that science, understood as an intellectual endeavor, was nature's mirror and as such part of nature's realm. But he, with his socialist minded comrades, did not ignore what they considered all the more true of science: the fact that as a social institution, science and its representatives "did not live in a vacuum [and were] conditioned by the structure of the world they lived in".⁶² Needham believed that enacting science's essential features – e.g., rationality, the scientific method, autonomy and freedom of thought – would heighten its growth and transformative power; he nevertheless feared that their negation could lead to science's demise. In his Carmalt Lecture at Yale, Needham explicated that science depended on material and cultural conditions and for this reason one "must not dissociate scientific advances from the technical needs and processes of the time, and the economic structure in which all are embedded".⁶³ For him, science and its progress were not eternal. Science could rise and fall depending on the state of human affairs.

Studying the historical development of science, Needham observed that science functioned differently whether it evolved in a fascist, capitalist, soviet or collectivist organisation of society. In unison with his leftist comrades, he concluded that science could therefore either be pure or impure, growing or dying, constructive or destructive, depending on the context of its elaboration and use. Needham, furthermore, added to the SRS contextual approach to the workings of science a distinct evolutionary typology in which fascist and capitalist regimes lay at the foot of the ladder as degenerated social orders oppressive of science while Marxist collectivism stood at its top as "the only theory that could guarantee that science would be used for the benefit of mankind".⁶⁴ While Needham understood science as having immense explanatory and transformative power, he depicted it nonetheless as an alarmingly fragile entity likely to be swayed by unreasoned societal choices. Needham perceived science as a clay-footed giant: powerful enough to transform society, and yet so frail as to perish in an instant. In the face of the growing

⁶¹ Needham, op. cit. (57).

⁶² Joseph Needham 'Limiting factors in the history of science observed in the history of embryology (Carmalt Lecture at Yale University, 1935)' in Joseph Needham, *Time: The Refreshing River (Essays and Addresses, 1932-1942)*, London: George Allen and Unwin Ltd, 1943, pp.141-159, p.145.

⁶³ Needham, op. cit. (62), p.144.

⁶⁴ Joseph Needham, 'Rough notes for lecture biology and Marxism', c.1930s, NP, Folder G.57.

fascist threat, Needham regarded the growth of science not as a self-propelled and eternal enterprise but rather as a political project tied to, and dependent upon, society's destiny.

Within this frame, social change was inevitable but treacherous and possibly dangerous. Needham conceded that change would only occur through a conscious human choice because mankind, unlike any other life form, became increasingly in control of its evolutionary destiny as it reached higher forms of social life. Yet, for Needham, Nature could be accommodated but never fully ruled out. It made mankind's relative independence from Nature both a strength and a weakness – it opened mankind's realm of possibilities to embrace either progressive or destructive evolutionary tracks. In that regard, Needham concluded that to move towards higher organisational levels progress had to remain within the frame of evolution. Thus, if an historical consciousness of the working class' own conditions was a necessary pre-requisite to elicit social change, Needham suggested that biological awareness was indispensable to guarantee that the revolutionary process would spark *desirable* change. In his view, a conscious revolutionary working class alone would not guarantee a shift towards a higher form of evolution. This twist on Marxist theory reveals the underlying politics of Needham's deterministic bio-Marxism that put social change as much in the hands of the scientist as in that of the working class. Needham remarkably exposed this unifying narrative in his article *Pavlov and Lenin* published in the *Daily Worker* following the death of the physiologist Ivan Pavlov in February 1936.⁶⁵ He showed the decisive role of Pavlov and Lenin in the advent of Soviet Russia: "Giant figures – the one of Knowledge, the other of Comradeship – they point the way to the new world, the coming of which nothing shall in the end, prevent".⁶⁶ Thus, and unlike Marxist theory, revolutionary consciousness meant for Needham the alliance of two fronts – the scientists in their laboratories and the workers in their factories. Needham's bio-Marxist narrative established the scientist as the worker's brother in arms, standing out as his natural guide and protector shedding light on the right revolutionary path to Socialism. As we will see in a later section this picture of the scientist as a political guide remained a powerful axiom in Needham's UNESCO years when he promoted the free scientist as being naturally endowed to guide mankind towards world peace and mutual understanding.

⁶⁵ Reproduced in: Joseph Needham, 'Pavlov and Lenin. A commemoration of two great men (1936)' in Joseph Needham, *History is on Our Side. A contribution to Political Religion and Scientific Faith*, London: George Allen & Unwin Limited, 1946, pp.114-120.

⁶⁶ Needham, op. cit. (65), p.120.

Carneiro's positivist pragmatism

Unlike Needham who grew as a radical scientist in the laboratories of Cambridge University and on the radical fringes of Britain's cultural left, Carneiro was a pure product of Brazil's republican positivism. He was an heir of figures of Brazil's modernization movement of the First Republic like the army engineer and explorer Cândido Mariano da Silva Rondon or the anthropologist Edgar Roquette-Pinto.⁶⁷ He also studied in three of Brazil's main positivist strongholds of the interwar period: the IBP, Rio's Polytechnic School and finally Vargas' new MAIC. As shown by the Brazilian historians José Murillo de Carvalho, Marcos Jungmann Bhering and Marcos Chor Maio, the IBP and MAIC constituted the breeding ground of a new, counter-imperial elite model in which scientists like Carneiro were introduced in Brazil's politics and state administration with the belief that technical and applied knowledge would ensure the nation's social progress.⁶⁸ Like his father, Carneiro ardently followed Auguste Comte's positivist philosophy, which he strove to preserve by reviving Comte's *Société Positiviste* as well as by restoring Comte's former house in Paris.⁶⁹

While he spiritually embraced the positivist spirit, he also oriented his public and scientific career to the application of positivist principles, at first in MAIC's specialized agencies and later in Pernambuco. For Carneiro, Comte was "a philosopher, a renovator, who was a spiritual leader and a sort of prophet of tomorrow's society as well".⁷⁰ "I am, of heart and spirit, fully positivist", Carneiro declared in 1936 when undertaking Pernambuco's administrative renovation, "and in every of my acts I strive to impress the spirit of order and progress which the scientific religion [i.e., positivism], in its dedication

⁶⁷ Angela Alonso, 'Raízes positivistas do reformismo dos anos 1930: o caso Paulo Carneiro', in Marcos Chor Maio (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.23-42, p.23; More generally on the modernization movement in interwar Brazil and the role of positivism in it, see: Micael Herschmann and Carlos Alberto Messeder Pereira, 'O imaginário moderno no Brasil' in Micael Herschmann and Carlos Alberto Messeder Pereira, *A Invenção do Brasil Moderno. Medicina, Educação e Engenharia nos anos 20-30*, Rio de Janeiro: Rocco, 1994, pp.9-42, p.26-29, p.32-42; José Jerônimo de Alencar Alves, 'As ciências na academia e as expectativas de progresso e modernização, 1916-1929' in Maria Amélia Dantes (ed.) *Espaços da Ciência no Brasil*, Rio de Janeiro: Editora Fiocruz, 2001, pp.185-202, p.186-188; Nachman, op. cit. (27), p.18-22; On Candido Rondon: Diacon, op. cit. (31); On Roquette Pinto: Nísia Trindade Lima and Dominichi Miranda de Sá (eds.) *Antropologia Brasileira. Ciência e Educação na obra de Edgar Roquette-Pinto*, Belo Horizonte: Editora Universidade Federal de Minas Gerais, 2008.

⁶⁸ José Murillo de Carvalho, 'A ortodoxia positivista no Brasil: um bolchevismo de classe média', in José Murillo de Carvalho, *Pontos e Bordados. Escritos de História e Política*, Belo Horizonte: Editora Universidade Federal de Minas Gerais, 2005, second edition, pp.189-201; Bhering and Maio, op. cit. (40), p.437.

⁶⁹ Priscila Fraiz and Eudardo Queiroz Reis, 'Paulo Carneiro e a Casa de Augusto Comte', in Marcos Chor Maio (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004, pp.67-88.

⁷⁰ Maio and Drummond, op. cit. (24), p278.

to humanity, imposes as the basis to all forms of moral, social and political renovation”⁷¹ In that regard, as Angela Alonso noted, Carneiro’s conception of positivism was very orthodox.⁷² He made the rule of experts, the rational use of scientific knowledge to resolve social issues and the socio-scientific interventionism of a strong federal state into the cornerstones of the advancement of civilization. Like his role models Francis Bacon, Nicolas de Condorcet and Comte, Carneiro held the universal republic of scientists as model for social and moral progress, which he first tried to follow at Pernambuco and later with the IIHA.⁷³

Even though Carneiro failed to bring his institutional reform of Pernambuco’s economy to completion between 1935 and 1937, this experience has been shown by Bhering and Maio to be a watershed in his public engagement and positivist reformism.⁷⁴ For them, Carneiro’s Pernambucan experience also exemplified the continued influence of positivism on Brazil’s politics, public administration and the professionalization of Brazilian science over the first half of the twentieth century.⁷⁵ Building upon Bhering and Maio’s insights, I will here elaborate on Carneiro’s approach to social change, government and the role of science in it, which he made particularly explicit in Pernambuco.

When Carneiro took office in March 1935, Pernambuco was a remote and poor agricultural state of Brazil’s Nordeste.⁷⁶ Cavalcanti appointed Carneiro as part of his plan to strengthen autonomous public power, advance social and agricultural reforms in order to modernize one of Brazil’s most underdeveloped states. However, as head of SAICP, Carneiro conceived his mandate as part of broader and deeper civilizational progress. Modernizing Pernambuco’s economy thus implied the reformation of the state’s social and labor organization, which he saw as “the necessary condition [... to maintain order and initiate progress].”⁷⁷ Like Needham, Carneiro targeted the worker’s well-being as the

⁷¹ Paulo Carneiro, Texto de uma entrevista dada a um jornal do Rio (?), ca 1936, CP, PC.GI.AI.04.v.4/relatorios 07/12/1935 – 01/08/10936, p.3.

⁷² Alonso, op. cit. (67), p.32-39.

⁷³ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.8-9, p.13; ‘Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléia estadual constituinte, realizada em 3 de maio de 1935, sob a presidência do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléia em volume contendo as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete’, 3 May 1935, CP, PC.GI.AI.04.v.3/Discursos, p.7-8.

⁷⁴ Bhering and Maio, op. cit. (40); see also: Marcos Jungmann Bhering, *Positivismo e Modernizacao: Políticas e Institutos Científicos de Agricultura no Brasil (1905-1935)*, Dissertation submitted to Fundação Oswaldo Cruz, 2008, p.124-132.

⁷⁵ On the Pernambucan experience and Carneiro’s experiments (e.g., IPA) see: Bhering, op. cit. (74); Alonso, op. cit. (67).

⁷⁶ Bhering, op. cit. (74), p.441.

⁷⁷ ‘Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléia estadual constituinte, realizada em 3 de maio de 1935, sob a presidência do exmo. Sr. dr. Antonio Vicente de Andrade



Figure 18 – Paulo Carneiro (first row, sixth from the left) at the inauguration of the Institute of Agronomical Research of Pernambuco, Recife, 1935

marker and generator of civilizational progress.⁷⁸ For Carneiro, the worker's social, moral and physical decay compromised social and economic progress as much as it made the sole technical modernization of the state's economic processes sterile. In his introductory speech to the constituent state assembly of Pernambuco in May 1935, Carneiro declared "the problem of Pernambuco's economic organization was above all a problem of heart. It was less a material issue than a spiritual one".⁷⁹ For him, the equation was simple, "improving

Bezerra e publicada nos anais da referida assembléa em volume contend as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete, 3 May 1935, CP, PC.GI.AI.04.v.3/ Discursos 03/05/1935 – 07/09/1935, p.1.

⁷⁸ 'Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléa estadual constituinte, realizada em 3 de maio de 1935, sob a presidencia do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléa em volume contend as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete, 3 May 1935, CP, PC.GI.AI.04.v.3/ Discursos 03/05/1935 – 07/09/1935, p.7-9.

⁷⁹ 'Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléa estadual constituinte, realizada em 3 de maio de 1935, sob a presidencia do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléa em volume contend as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete, 3 May 1935, CP, PC.GI.AI.04.v.3/ Discursos 03/05/1935 – 07/09/1935, p.15.

man would improve the land while improving land and man together would improve the products drawn from agricultural production.”⁸⁰ In his view, technical and social progress would be reachable only “when man would have been sufficiently uplifted to do so.”⁸¹

Carneiro turned to science to solve Pernambuco’s complex social and material problems. Knowing and tackling these issues scientifically was the lynchpin of his modernization plan and science the cornerstone of his conception of social change. Like Needham, Carneiro believed that mankind’s sound evolution was above all a problem of science. Following Comte’s principles, he considered decoding nature’s organizing principles as the soundest way “to establish the adequate industrial regime to heighten mankind’s level of sociability on stable foundations.”⁸² As he explained at the inauguration of the Agronomic Research Institute in September 1935, science had already proved its transformative power in every domain in which it had been applied.⁸³ Carneiro believed that since Bacon, Condorcet and Comte had modelled science to renovate society, “the dazzling progress of modern civilization in all its surprising and fascinating aspects is the outcome of the silent and resolute labor in research laboratories.”⁸⁴ He thought “a handful of scientists permanently revolutionize our collective destinies, continuously improving the inhospitable conditions of our planet [and] organizing a society increasingly converging and united [...] fighting the scourges of climate, epidemics, wars and vices [...] aware of [their opportunities and their duties]” to make the world a better place.⁸⁵

Yet, for Carneiro, science did not only enable social and material progress. He expected that mankind’s gradual scientific mastery over nature and his own destiny would

⁸⁰ ‘Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléia estadual constituinte, realizada em 3 de maio de 1935, sob a presidência do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléia em volume contendo as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete’, 3 May 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.7.

⁸¹ ‘Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléia estadual constituinte, realizada em 3 de maio de 1935, sob a presidência do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléia em volume contendo as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete’, 3 May 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.14

⁸² ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.8.

⁸³ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.7.

⁸⁴ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.10.

⁸⁵ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.10.

infuse society with a positivist spirit or, in Comte's own words, a tendency to "predict and provide" based on nature's laws.⁸⁶ "Human evolution", Carneiro postulated "brings increasingly our minds and spirit towards speculations of a scientific character and in turn makes our thinking everyday more positive".⁸⁷ He was convinced that a well-running republic of scientists, would ultimately infuse society with values of universality, peace and solidarity and pave the way for human progress, moral unity and social peace. Science was also a pacifier and alternative to the more radical forms of social change then proliferating in Brazil. In that regard, Carneiro and Needham differed. For Needham, science was the handmaid to revolutionary politics that, seen from his SRS outlook, constituted in his view the engine behind humanity's evolutionary progress. Unlike Needham, Carneiro believed that the republic of scientists would bring social harmony between classes through evolutionary sound progress. He claimed that the expert positivist rule, based on nature's unequivocal truths, could thus enable incremental and harmonious progress against the destabilizing promise of revolutions that radicals like the Brazilian Communist Party held at the time.⁸⁸

As the purveyor of material progress and the repository of mankind's moral betterment, applied science was presented as the bedrock of good governance. To carry out his mission, Carneiro envisioned politics like "the hygienist, the doctor and the biologist approach an individual organism".⁸⁹ It was for him a matter of problem solving. Like the doctor, the scientist would conduct a careful examination of the "laws of sociology, biology, chemistry and physics that regulate the phenomena and institutions of all orders" upon which he would devise the adequate technical solution "that would create moral depth and material wellbeing".⁹⁰ Reduced to scientifically solvable problems, Carneiro considered that "the bulk of the big issues of politics eluded parliamentarians and bureaucrats because, [they]

⁸⁶ 'Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro; 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.8.

⁸⁷ 'Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro; 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.7.

⁸⁸ On the repeated communist insurrections of 1935, see Marly de Almeida Vianna, 'O PCB, a ANL e as insurreições de novembro de 1935', in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo do Início de Década 1930 ao apogeu do Estado Novo*, Rio de Janeiro: Civilizacao Brasileira, 2003, pp.63-105.

⁸⁹ 'Discurso do sr. Paulo Carneiro, copiado da ata da decimal sétima sessão da assembléa estadual constituinte, realizada em 3 de maio de 1935, sob a presidencia do exmo. Sr. dr. Antonio Vicente de Andrade Bezerra e publicada nos anais da referida assembléa em volume contend as sessões de 8 de abril a 10 de julho de 1935, página duzentos e noventa e nove a trezentos e sete', 3 May 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.29.

⁹⁰ Paulo Carneiro, Texto de uma entrevista dada a um jornal do Rio (?), ca 1936, CP, PC.GI.AI.04.v.4/Relatorios 07/12/1935 – 01/08/10936, p.2-3.

were problems of laboratories that required, to be solved, the assistance of pedologists, geneticists, phytopathologist and microbiologists”⁹¹ Like Needham, Carneiro believed that governing society called for the expertise of nature and society’s attentive observers.

For this technocratic approach to politics as a form of social engineering Carneiro needed a powerful interventionist state and a well-structured scientific workforce. To do so, Carneiro launched the creation of new scientific institutes such as the Agronomic Research Institute and new social organisations like the Social Organization for Agricultural Labor with which he aimed to modernize agricultural production and to scientifically reorganize Pernambuco’s agricultural life based on cooperative principles.⁹² For Carneiro, the vitality and power of science depended on the socio-economic context as well. “In this domain, the research institutes’ range of action” he argued “depends on the economic and social situation of each country”.⁹³ Carneiro claimed that if a robust scientific infrastructure indicated the degree of advancement of a country, the latter determined science’s vitality and its capacity to move society forward. Accordingly, Carneiro attributed much of Brazil’s limited development to the immaturity of its sciences and “the absence of science in its long history”.⁹⁴ His Pernambucan experience however came to an abrupt end in late 1936, after only eighteen months on the job. Accused of communist convictions by the local agrarian elite in a context of heightened communist radicalization and repression in the run-up to the establishment of the Estado Novo, Carneiro was forced to flee to France in 1937 where he stayed until the end of WWII.⁹⁵

Through political militancy and public service, Needham and Carneiro elaborated a scientific interpretation of social change and politics in the 1930s. They depicted science

⁹¹ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.12.

⁹² Paulo Carneiro, Texto de uma entrevista dada a um jornal do Rio (?), ca 1936, CP, PC.GI.AI.04.v.4/relatorios 07/12/1935 – 01/08/10936, p.2; ‘Cooperativas, colonizacao, habitacao rural e alimentacao’, undated, CP, PC.GI.AI.04.v.4/Relatorios 07/12/1935 – 01/08/10936, p.1.

⁹³ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.10.

⁹⁴ ‘Instituto de Pesquisas Agronomicas, discurso do Secretario de Agricultura, Industria e Comercio, Dr. Paulo E. de Berredo Carneiro’, 7 September 1935, CP, PC.GI.AI.04.v.3/Discursos 03/05/1935 – 07/09/1935, p.10

⁹⁵ Marcos Jungmann Bhering and Marcos Chor Maio, ‘Entre ciência e política: o positivismo de Paulo Carneiro na Secretaria de Agricultura, Indústria e Comércio de Pernambuco (1935)’, *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.435-451, p.447-448; For an overview of the repressive political context and the escalation of authoritarianism in the years preceding the establishment of the Estado Novo, see: Fausto and Fausto, op. cit. (44), p.208; Pandolfi, op. cit. (44); **Marcos Chor Maio and Roney Cytrynowicz, ‘Ação Integralista Brasileira: um movimento fascista no Brasil (1932-1938)’** in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo do Início de Década 1930 ao apogeu do Estado Novo*, Rio de Janeiro: Civilizacao Brasileira, 2003, pp.39-62.

as an authoritative political resource with which Needham hoped to guide mankind towards the ineluctable socialist transformation of society and Carneiro wished to engineer Brazil's modernization. In both visions, the scientist stood out as a legitimate agent of social change. Needham construed the united scientists as omniscient political leaders guiding the workers to mankind's revolutionary end, while Carneiro modelled the scientist as a cold-headed technocrat crafting the nation's incremental progress based on his unequivocal scientific understanding of its problems. Both, however, acknowledged that the power of science depended greatly on its socio-economic context. If Needham feared the debilitating threat of Capitalism and Fascism on the fitness of science, Carneiro took the measure of how the underdevelopment of nations like his own could maintain science feeble.

Unlike Needham who, in the 1930s, assumed the unity of scientists worldwide as evident, Carneiro experienced both the scientific divide that separated the West and Brazil as well as the complicated access to the centers of modern science that were then almost exclusively located in Europe and North America. We will see in the following section that Carneiro's and Needham's experience of international science shaped their vision of science as well as its international function. While Needham re-interpreted his conception of science from his experience in China, Carneiro reinforced his faith in closer scientific cooperation during his extensive stays in France.

INTERNATIONAL SCIENCE; SCIENTIFIC MOBILITIES

At the Natural Science Section, Needham and Carneiro regretted that, in practice, the existing organization of science excluded non-Western scientists from the major scientific debates of the time, despite their conviction of the inherent universality of the scientific method. With the ISCS and the IIHA, both Needham and Carneiro sought to overcome this division and therefore problematized the existing shape of international science. The reorganization of international science turned out to be a disputed object among UNESCO scientists. Indeed as we will see in more details in section 3, Carneiro and his colleague, the Brazilian physiologist Miguel Ozorio de Almeida, raised objections against Needham's concept of the Dark Zone and his decision to appoint the British colonial botanist Edred John Henri Corner to oversee the IIHA's creation in the Amazon. As we will see with Needham and Carneiro, these divergent views were intimately associated with their peculiar experience of doing research across science's internal bounds. Prior to his time at UNESCO, Carneiro had worked at the Pasteur Institute in Paris in the 1930s and Needham bolstered Sino-British scientific cooperation during the war as head of the SBSCO in China.

By investigating how Carneiro and Needham experienced and conceived international science, I will also problematize scientific mobility – its lack, and the barriers to it – as an important, yet forgotten dimension of the scientists’ understanding of the social, political and international functions of science. As place and transnational contacts have been shown to be crucial factors in shaping modern science and its political ideology following the spatial and transnational turn, growing attention has been given to mobility of scientists.⁹⁶ We will see here that the way Needham and Carneiro experienced moving across science’s internal divides shaped the way each problematized international science, envision its reorganization and unification, and ultimately conceived of its peace function. In this section, I will first distinguish what scientific mobility meant for a scientist like Needham who practiced science from an internationally renowned university like Cambridge as compared to a scientist from the South like Carneiro who, in Brazil, was part of an embryonic scientific community that evolved in the shadow of prestigious Western institutions such as Cambridge. We will then move on to follow Carneiro to France and Needham to China to retrace how each experienced moving across science’s North-South divide.

For long, Needham enjoyed the internationality of science as a given. Operating from Cambridge’s renowned Dunn Laboratory of Biochemistry, one of the greatest scientific centers of the interwar period, Needham travelled extensively throughout the Western world during his 20-year long career as a biochemist. In the 1920s, Needham had, for instance, worked on embryonic animal life at different marine biological laboratories such as the French Marine Biological Station in Roscoff, the Massachusetts Woods Hole institute and the Hopkins Marine Station in Pacific Grove, California before sojourning throughout the 1930s in Franz Knoop’s laboratory in Freiburg, in Albert Brachet’s laboratory in Brussels and the Institute of the embryologist Otto Mangold in Berlin.⁹⁷ His works travelled widely

⁹⁶ On the spatial turn see the review article, by Diarmid Finnegan, ‘The spatial turn: geographical approaches in the history of science’, *Journal of the History of Biology* (2008) 41, pp.369-388 and Raf de Bont and Jens Lachmund ‘Introduction: knowing nature, making space’ in Raf de Bont and Jens Lachmund (eds.) *Spatializing the History of Ecology. Sites, Journeys, Mappings*, London: Taylor and Francis, 2017, pp.1-16; Prior to the spatial turn, the works on scientific travels explored the mobility of science from the dichotomy national-international, see for instance: Sverker Sörlin, ‘National and international aspects of cross-boundary science: scientific travel in the eighteenth century’, in Elisabeth Crawford, Terry Shinn and Sverker Sörlin (eds.) *Denationalizing Science: The Contexts of International Scientific Practice*. Dordrecht: Springer, 1993, pp.43-72. On the experience of forced migration and its effect on scientific change, see: Mitchell Ash and Alfons Söllner (eds.) *Forced Migration and Scientific Change: Emigré German-Speaking Scientists and Scholars after 1933*, Cambridge: Cambridge University Press, 2002; Robin Rider, ‘Alarm and opportunity: emigration of mathematicians and physicists to Britain and the United States, 1933-1945’, *Historical Studies in the Physical Sciences* (1984) 15, pp.107-176.

⁹⁷ Maurice Goldsmith, *Joseph Needham. 20th Century Renaissance Man*, Paris: UNESCO publishing, 1995, p.36 and p.40; Simon Winchester, *Bomb, Book and Compass Joseph Needham and the Great Secrets of China*, London: Viking Penguin group, 2008, p.22 and p.26.

too. Needham received international attention for his appraised 2000-page long *Chemical Embryology* published in 1931 and his 1942 *Biochemistry and Morphogenesis*, which earned him invitations for lectures from Cornell University to Moscow.⁹⁸

Another landmark of Needham's scientific mobility was his involvement with like-minded American and French SRS scientists into a sort of scientific *internationale* throughout the 1930s. He became especially active within the French-British SRS circles that thrived from the early 1930s until well after the war. As Petitjean and Dosso demonstrated, this entente unfolded into a multifaceted constellation of professional, political, institutional and personal relations. Even though they stroke some significant scientific partnerships such as between Hopkins, Needham, the biophysicist René Wurmser and the biochemist Louis Rapkine on protoplasmic research in the late 1920s, these French-British networks focused particularly on politically issues such as the struggle for the co-advancement of science and Socialism as well as the defence of science against fascist distortions and persecutions throughout the 1930s. These trans-Channel friendships came to perform a significant role during and after the war as well. Crowther, the Nobel prize winning physicist Frédéric Joliot-Curie and Rapkine created for instance the Anglo French Society of Science in April 1940 to bolster collaborative warfare research between French and British laboratories, and to facilitate the insertion of French scientists in US and British laboratories following the French Debacle.⁹⁹ Following the war's end, many members of these French-British SRS networks such as Rapkine, Joliot-Curie and Needham worked together for the purpose of post-war reconstruction and peace promotion at both the national and international level.¹⁰⁰ Through this antifascist and pro-science activism, these particular French and British left-wing circles pieced together a solid transnational popular front of science which, as we have seen, Needham mobilized to insert S at UNESCO.

Needham's seamless political and scientific mobility throughout Europe and North America contrasts strongly with Carneiro's treacherous experience of international science. Carneiro did have a substantial international career before his thirty-five-year-long service at UNESCO. From his first stay in France in 1927 to his deportation by the Nazis to the concentration camp of Bad Godesberg in 1942, he spent 11 years working

⁹⁸ Joseph Needham, *Chemical Embryology*, Cambridge: Cambridge University Press, 1931; Joseph Needham, *Biochemistry and Morphogenesis*, Cambridge: Cambridge University Press, 1942.

⁹⁹ Diane Dosso, 'La construction de la coopération scientifique Franco-Britannique (des années 1920 à la Seconde Guerre Mondiale)', in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'exemple de Cambridge*, Paris: Magnart-Vuibert, 2009, pp.117-138.

¹⁰⁰ Patrick Petitjean, 'Sur quelques aspects des sociabilités scientifiques entre Cambridge et Paris dans les années 1930' in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'exemple de Cambridge*, Paris: Magnart-Vuibert, 2009, pp.139-174, p.170.

at the Pasteur Institute. At the Institute, he earned his stripes as a biochemist when he presented his work on the chemical and physiological properties of curare at the French Académie des Sciences between 1938 and 1941 and received the Nativelle prize of the Académie de Médecine in 1941.¹⁰¹ In Paris, Carneiro did not only become a respected chemist. He grew into a major figure of French Positivism as well. From his early days in Paris, he dedicated himself to republish Auguste Comte's works and to refurbish his former house on Rue Monsieur-le-Prince into a major Comtean center, which is still active to this day.¹⁰² Carneiro's experience in Paris was remarkable for its duration as much as for the scientific prestige he obtained at the Pasteur Institute. His success, however, came at a price. Unlike Needham, Carneiro had to negotiate with French and Brazilian authorities on his research agenda, satisfy a variety of other commitments that exceeded his mere capacity of scientist and embrace a career as technical diplomat for the Brazilian state to move to France and carry on with his research.¹⁰³ If these multifaceted commitments underlined his unaltered devotion to serve Brazil, they also testified of the complexity for scientists arising from the fringes of international science to operate in the prestigious centers of science of Europe and North America.

Leaving for science, working for Brazil: barriers and conditions to Carneiro's international mobility

The interwar period had seen scientific and intellectual exchanges between the North and the South intensify. This was particularly true for Latin America, where France and Germany sought to strengthen their influence through a new form of cultural diplomacy during the interwar period.¹⁰⁴ In the 1920s, France had for instance promoted closer cooperation with Brazilian scientists with initiatives like the *Groupement* and the *Comité France-Amérique*. Though designed to expand France's cultural sphere of influence,

¹⁰¹ Paulo Carneiro to Exmo. Snr. Presidente, 7 October 1944, CP, PC.GI.AI.05/Cartas 17/11/1936 – 20/11/1945; On Carneiro's scientific achievements in Paris, see: Sá, op. cit. (38).

¹⁰² Fraiz and Reis, op. cit. (69).

¹⁰³ Paulo Carneiro to Jayme Guedes (President of the National Department of Coffee), 2 January 1940, CP, PC.GI.AI.05/Cartas 17/11/1936 – 20/11/1945.

¹⁰⁴ Juliette Dumont, 'De la coopération intellectuelle à la diplomatie culturelle: le parcours du Brésil dans l'entre-deux-guerres', *Caravelle* (2012) 99, pp.217-238; Corinne Pernet, 'Culture as policy: cultural exchanges between Europe and Latin America in the interwar period', *Puente@Europa* (2007) 5, pp.121-126; Magali Romero Sá, Jaime Benchimol, Simone Kropf, Larissa Viana and André Felipe Cândido da Silva, 'Medicine, science, and power: relations between France, Germany, and Brazil during 1919-1942', *História, Ciências, Saúde – Manguinhos* (2009) 16, pp.247-261; Patrick Petitjean, 'Entre a ciência e a diplomacia: a organização da influência científica Francesa na América Latina, 1900-1940', in Amélia Hamburger and Patrick Petitjean (eds.) *A Ciência nas relações Brasil-França, 1850-1950*, São Paulo: Editora da Universidade de São Paulo, 1996, pp.89-120.



Figure 19 – Paulo Carneiro in Paris, France, c.1939



Figure 20 – Paulo Carneiro organizing the archives of the house of Auguste Comte, Paris, c.1940

based on the idea of common Latin traits – i.e., *le génie latin* – between French and Latin American intellectuals, these channels enabled local scientists to obtain greater visibility for their works back in Europe. As shown by Magali Romero Sá and Larissa Moreira Viana, these channels offered opportunities for Brazilian scientists to publish *comptes rendus* of their findings in French journals, and eventually elicit cooperation with foreign scientists.¹⁰⁵ Yet effective cooperation and exchanges remained rare and entering within Europe’s scientific circles was no bed of roses.¹⁰⁶ Nonetheless, Carneiro, like a handful of other Brazilian scientists such as Paulo Duarte, Miguel Ozorio de Almeida and Carlos Chagas Filho, benefited from these schemes to set a firm foot in France.¹⁰⁷

To come to France, Carneiro had to overcome a variety of challenges on both sides of the Atlantic. He first had to fit within the limited possibilities offered by the Pasteur Institute. Although enthusiastic about Carneiro’s return to the Pasteur Institute, his former PhD supervisor and mentor, the French chemist Gabriel Bertrand, made the terms of the cooperation clear. In a letter to Carneiro from 1934, Bertrand expressed how interested the institute was in further researching plants like coffee, guarana and maté and made explicit how scientists like Carneiro could facilitate this enterprise. Bertrand suggested to Carneiro, who then worked at the National Institute of Coffee of the world’s largest coffee producer, that in order to come “it would be useful to collect leaves, but also stems and roots at different stages of development to analyze them.”¹⁰⁸ For the Institute, Southern scientists like Carneiro were interesting to hire for the access to rare natural objects they offered rather than for their research expertise *per se*. Carneiro eventually arrived in Paris two years later bringing with him large samples of the tropical plants that Bertrand had requested him.¹⁰⁹ With this cooperation proposal, the Pasteur Institute enabled Carneiro to stay in Paris but it also restricted his research agenda to the provision and study of specific tropical objects of interest to the institute. Although Carneiro joined one of the world’s leading scientific institute he remained confined to subaltern scientific fields like tropical chemistry, which did not directly concern his core expertise. On the Brazilian side, Carneiro was also particularly constrained. As he revealed in a letter to

¹⁰⁵ Magali Romero Sá and Larissa Moreira Viana, ‘La science médicale entre la France et le Brésil: stratégies d’échange scientifique dans l’entre-deux-guerres’, *Cahiers des Amériques Latines* (2010) 65, pp.125-144, p.137.

¹⁰⁶ Note for instance that Carneiro had failed to come earlier for lack of funds at the Comité France-Brazil and the rejection of his Rockefeller grant. Paulo Carneiro, ‘Memorandum’, undated, CP, PC.DP.IC.10/memorando.

¹⁰⁷ Patrick Petitjean, ‘Miguel, Paul, Henri et les autres. Les réseaux scientifiques Franco-Bréiliens dans les années 1930’ in Antonio Augusto Videira and Silvio Salinas (eds.), *A Cultura da Física: Contribuições em Homenagem a Amelia Imperio Hamburger*, São Paulo: Editora Livraria da Física, 2001, pp.59-94.

¹⁰⁸ Gabriel Bertrand to Paulo Carneiro, 26 Juillet 1934, CP, PC.DP.IC.01/Cartas 05/09/1929 – 08/06/1977.

¹⁰⁹ Gabriel Bertrand to Paulo Carneiro, 17 Avril 1936, CP, PC.DP.IC.01/Cartas 05/09/1929 – 08/06/1977; On Carneiro’s coming at the Institut Pasteur in Paris, see: Sá, op. cit. (38), p.50-51.

Bertrand in 1934, he was compelled by local authorities to work as “a representative of the Brazilian government [to the Pasteur Institute]” and to operate within a precise plan of research delineated and subsidized by the National Institute of Coffee “to obtain from the institute authorization to forward to [Bertrand] a proposal for scientific collaboration”.¹¹⁰ Even though the scheme did not materialize, it further divulges how Carneiro’s coming to Paris as well as his agenda were not decided by and for himself but participated in the advancement of Brazil scientific and economic agenda.

Carneiro could only come to Paris under the patronage of the Brazilian state. In order to obtain approval and financial support, Carneiro later negotiated with his employer, the director of the National Institute of Technology, that he would not only conduct research on curare as initially agreed with the Pasteur Institute but also serve Brazil’s interests “by holding, in official or private settings, conferences and practical demonstrations, of scientific or technical character, to display potentially exportable Brazilian products”.¹¹¹ Accordingly, and alongside his research activities at the Pasteur Institute, Carneiro had to work for the Brazilian Office of Advertisement and Commercial Expansion in France between 1937 and 1941 to represent Brazil’s interests regarding the commerce of tropical products like café in France and in Europe.¹¹² Throughout his French years, Carneiro travelled Europe less as a scientist than as a representative of the Brazilian state, and especially of the Ministry of Agriculture. In 1933, for instance, he attended a chemistry conference in France, he visited Portugal regarding oil legislations and stopped in Geneva to discuss agricultural issues at the International Labor Organisation.¹¹³ Through these experiences, Carneiro did not only rise as a respected tropical biochemist but developed the life and ethos of a technical diplomat. His international career conferred Carneiro with substantial prestige and authority back home where he joined the Brazilian Academy of Science in 1939. By 1938, Carneiro was considered an asset by the Brazilian state and featured for the Foreign Office, among “the leading representatives of Brazil’s intellectual elite [who] contribute to the good name and prestige of [Brazil’s] national culture”.¹¹⁴ Eventually, Carneiro successfully relied on these valued credentials to request Getúlio

¹¹⁰ Paulo Carneiro to Gabriel Bertrand, 10 October, 1934, CP, PC.GI.AI.01/Cartas 30/10/1931 – 10/10/1934.

¹¹¹ Paulo Carneiro to Director of the Instituto Nacional de Tecnologia, May 1936, PC.DP.IC.01/Cartas 05/09/1929 – 08/06/1977, p.2.

¹¹² Paulo Carneiro to Exmo. Snr. Presidente, 7 October 1944, CP, PC.GI.AI.05/Cartas 17/11/1936 – 20/11/1945.

¹¹³ Paulo Carneiro to Exmo. Sr. Ministro da Agricultura, 1933, PC.GI.AI.01/Relatorios de Viagem (xx/xx/1933), p.2.

¹¹⁴ Letter L.M. de Souza Dantas to Oswaldo Aranha (Ministro de Relações Exteriores), 3 December 1938, PC.DP.IC.01/Cartas 05/09/1929 – 08/06/1977, p.1.

Vargas to send him back to Paris following his liberation from the camps in 1943 and participate in the UN reconstruction effort following the end of WWII.¹¹⁵

A closer look into Carneiro's stay in France – and the conditions prevailing to his prolonged time from 1936 to his deportation – revealed the multifarious dimensions pervading his research at the Pasteur Institute. To conduct research in France, Carneiro had to Brasilianize his research and embrace the life of a diplomat and technical expert. His scientific achievements were indissociable to his service to Brazil just as his self-fashioning as a scientist intertwined with his becoming as a technical international expert in the service of the Brazilian state. Unlike Needham, Carneiro's practice of science served national and economic purposes. These ties were all the more evident when considering that the research undertaken at the Pasteur Institute directly supported his job as technical diplomat for the promotion of Brazilian coffee on European markets. Even though overlooked, this experience of international science and its extra-scientific implications profoundly shaped his understanding of international cooperation and his conception of scientific internationalism as we will see in section three.

The view from China: Needham and the hierarchical structure of international science

If Carneiro endured science's uneven growth and international disharmony coming to France, Needham became especially mindful of its Eurocentric spread when he left for Chongqing. During his mission at the SBSCO, Needham did not only wonder about China's heritage and the premises of his well-known Grand Question – “Why is it that the modern experimental and theoretical system of science arose not in China, but in Western Europe?”¹¹⁶ Needham also questioned science's actual universality and, as we have seen, designed the ISCS as the solution to reassert it. In China, Needham thus grappled with the problematic European confinement of science's spatiality and imagined the ecumenical foundations of its universalism.¹¹⁷

Throughout his mission, Needham relied on his evolutionary outlook to picture the past and present state of Chinese science. From his observations, He composed a narrative

¹¹⁵ Paulo Carneiro to Exmo. Snr. Presidente, 7 October 1944, CP, PC.GI.AI.05/Cartas 17/11/1936 – 20/11/1945, p.2.

¹¹⁶ Joseph Needham, 'Abstract of a lecture on science and civilization in China', October 1944, NP, Folder C.73; Kenneth Boulding, 'The great laws of change', in Nicholas Georgescu-Roegen, Anthony Tang, Fred Westfield and James Worley (eds.), *Evolution, Welfare and Time in Economics*, Lexington: Lexington Books, 1976, pp.3-14, p. 9.

¹¹⁷ On Needham's investigations of Chinese science and his stay in Chongqing, see: Thomas Mougey, 'Needham at the crossroads: history, politics and international science in wartime China (1942-1946)', *The British Journal For the History of Science* (2017) 50, pp.83-109

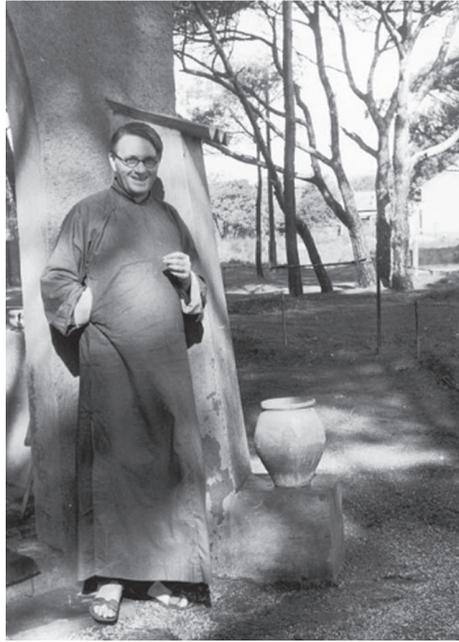


Figure 21 – Joseph Needham in Chinese dress, Chongqing, China, c. January-March 1946



Figure 22 – Joseph Needham (first on the left) on horseback in the desert of Gobi near Yue Ya Quan (Crescent Moon Lake) on his way to visit the famous Buddhist Mogao Grottoes near Dunhuang in China's North Western Province of Gansu, c. August 1943

of unity and continuity between East and West, past and present science. He concluded that “there was only one international human science”, and his Chinese colleagues were incontestably part of it.¹¹⁸ Needham refuted the erroneous and “ridiculous” idea that “China had no science” and that the Chinese were inherently unfit for the exigencies of scientific work.¹¹⁹ Instead, in his accounts, Needham not only testified to the quality of the work of his Chinese colleagues, but also portrayed their resourcefulness and accomplishments as the manifestation of the scientific spirit and method. Even “without gas, running water, electric light, or any of the services generally regarded as necessary for scientific work,” Needham argued, the Chinese scientists “contrived somehow to keep science going, both for its own sake, and for the defence of their country against a specific type of Fascism, Japanese imperialism.”¹²⁰ Ultimately, Needham regarded his colleagues “not as inferior or scientifically backward Orientals, but as full partners with us in the worldwide enterprise of human science and technology.”¹²¹ With these portrayals, Needham magnified a sense of commonness of cause and equality of standards between both communities. By melding Eastern and Western scientists into a single ecumenical embodiment of science, Needham ultimately exalted science’s unity and universality.

If the Chinese quickly showed themselves to be legitimate partners, their ancestors proved to be crucial precursors of modern science for Needham. On his journeys, Needham observed the new as attentively as he explored the old – China’s scientific heritage.¹²² Needham studied Chinese history from an evolutionary perspective. He intended to find out where China stood in relation to science’s growth, that is, how and when it contributed to its advancement, as well as why science stopped progressing in China for so long. In the face of increasing evidence of past technical and theoretical achievements, Needham rapidly concluded that ancient Chinese science offered enough fodder to reevaluate the origins of modern science. He eagerly revealed that “it was the Chinese who first discovered the magnetic compass, gunpowder, paper and printing” which all were said to be European and decisive in the growth of modern science.¹²³ For

¹¹⁸ Needham, ‘Science and agriculture...’, op. cit. (83), p.258.

¹¹⁹ Needham, ‘Science and agriculture...’, op. cit. (83), p.255; Joseph Needham, ‘Abstract of a lecture on science and civilization in China’, October 1944, NP, Folder C.73.

¹²⁰ Natural Science Division, *Guide Booklet: Note of the Section on the Chinese Scientific War Effort and the Work of the Sino-British Science Co-operation Office, International Scientific Exhibition, Paris, 1946*, UA, file UNESCO/Nat. Sci./2, p.2.

¹²¹ Joseph Needham to Percy Roxby, February 1946, NA, Folder C.98.

¹²² Huan Hsing-Tsung, ‘Peregrinations with Joseph Needham in China, 1943–44’, in Li Guohao, Zhang Mengwen and Cao Tianqi (eds.), *Explorations in the History of Science and Technology in China*, Shanghai: Shanghai Classics Publishing House, 1982, pp. 39–76.

¹²³ Needham, op. cit. (67), p.50.

Needham, these historical artefacts attested that China was as historically significant as Europe in the development of modern science.

With his findings, Needham began to contemplate modern science as an ecumenical product rather than a strictly European invention. When repeatedly telling the Chinese that “Modern science was your inheritance as much as mine” Needham defined science as the product of a linear and ecumenical process shaped by the historical interchange between all traditions of science, Eastern and Western alike.¹²⁴ Yet he was not oblivious to their existing difficulties, and despite seeing a direct link between past and present he was well aware of the gap that separated the former prestige of Chinese science and its present state.

As an attentive observer of science’s history, Needham was as astonished by Chinese science’s ancient advancement as he was baffled by the stagnation it had experienced over the last centuries. This incongruity motivated an extensive historical investigation into the socio-economic processes that caused the collapse of Chinese science. Needham inscribed his investigation into China’s past in continuity with his earlier work on the socio-economic causes behind the process of scientific change. These investigations constituted an integral part of his Marxist activism as well since he built on these historical insights to foresee mankind’s soundest evolutionary path. Interestingly, the same activist approach to historical writing guided the way in which Needham approached the paradox of Chinese science. Like he did with British science, Needham intended as much to understand China’s scientific depletion as to outline the conditions of its revival by investigating its specific historical and social context.

In trying to explain the mysterious halt of science’s growth under the Ming dynasty (1368– 1643), Needham therefore turned to the “geographical, climatic, social and economic conditions” that he had earlier considered in studying the growth of Western science.¹²⁵ This standpoint was particularly well articulated in the lecture *Science and Agriculture in China and the West* that Needham gave before the Chinese Agricultural Association in Chongqing, in February 1944. In his paper, Needham identified “the failure of Capitalism to arise in China” and the rise of what he called “Asiatic bureaucratism” instead as the dominant cause behind the developmental halt of Chinese science.¹²⁶ The rise of bureaucratism and the civil servant, unlike that of Capitalism and the merchant, eventually lessened the need for new forms of knowledge and hence for science. In Europe, the capitalist spirit of the merchant class had bolstered the need to know “the properties of matter in inanimate things”, in order to sell and buy the products they had brought

¹²⁴ Needham, ‘Science and agriculture...’, op. cit. (83), p.258.

¹²⁵ Needham, ‘Science and agriculture...’, op. cit. (83), p.255.

¹²⁶ Needham, ‘Science and agriculture...’, op. cit. (83), p.256–257.

back from the newly discovered Americas.¹²⁷ This demand for new knowledge in turn paved the way for the growth of the fundamental disciplines of modern science: physics, chemistry and biology. But none of this had happened in China.

For Needham, Chinese science failed to transform from traditional to modern not because it lacked the qualities to bring about such a change, nor because of inherent differences of epistemological and ontological nature with European science. Needham explained science's diversity predominantly in light of its social relations which he saw different from context to context. As he argued, it was "because of the differences in climatic conditions, in geographical conditions and as a result in social and economic conditions" that the scientific traditions of China and Europe "had to follow these different courses".¹²⁸ These contextual differences forced him to distinguish science into a Chinese and a European branch. Needham did not believe science to be qualitatively different in different cultures. Only its level of development depended on cultures, not its contents. In concluding his lecture, Needham reasserted this faith in science's unity when he proclaimed that "there was no such thing as 'foreign' or 'Chinese' science" in absolute terms.¹²⁹ Science was a uniquely universal endeavor whose diversity only arose once the context of its undertaking was considered. Just as he had regarded science becoming Nazi, and therefore degenerated, as it was subordinated to irrational racialist theories in the 1930s, Needham saw science becoming Chinese, and therefore vegetative, from the moment when bureaucratic order undermined its vitality.

While Needham attributed China's scientific decline to contextual differences with Europe, he also recognized its isolation as a major hindrance to modernization and participation in the international scientific game. As we have seen in the previous chapter, Needham's interactions with local scholars, like Shung-Sung Lo and Soong led him to identify the lack of exchanges between China and the West as well as to criticize the *laissez faire* organization of science as definite causes of China's scientific stagnation. His commitment to bolster greater cooperation between the two communities and to later advocate for the *periphery principle* brought him to question the eurocentrism underlying modern science. With the ISCS Needham envisioned a more inclusive organization of science where greater international cooperation could break the isolation of communities like the Chinese and imperial scientists he worked with during his SBSCO mission.

¹²⁷ Needham, 'Science and agriculture...', op. cit. (83), p.257.

¹²⁸ Needham, 'Science and agriculture...', op. cit. (83), p.257.

¹²⁹ Needham, 'Science and agriculture...', op. cit. (83), p.258.

The promise of international cooperation

Based on their experiences in China and France, Needham and Carneiro had cultivated a strong belief in the power of international scientific cooperation. Needham identified and Carneiro experienced its Western limitations as a definite hindrance to science's further advancement and considered its extension as an essential factor of the progress of society. With his *periphery principle*, we have seen Needham consecrating international scientific cooperation as a powerful emancipatory tool for peripheral communities. He sought to liberate Dark Zone scientists from isolation, enable them to contribute to the further advancement of science and empower them to answer society's social needs. With the IIHA, Carneiro showed that he entertained a similar conviction in the power of greater cooperation. He conceived the IIHA as the means to bring the best of modern science from its Western centers to work from and on the Amazon region together with local communities that had so far been left aside. That Carneiro proposed to UNESCO to create the IIHA is not much of a surprise considering his winding scientific trajectory. To make it as a respected scientist, Carneiro had suffered the limitations of international science as well as benefited from its power. Before his complicated yet successful Parisian experience, Carneiro had struggled to bolster international contacts between Brazilian and foreign scientific organizations as well. In Pernambuco, Carneiro unsuccessfully tried hiring foreign researchers for his IPA. In that regard he solicited the ILO and several North American and German institutes to appoint colonization specialists and hire junior researchers.¹³⁰

Although a challenge, evolving in or with the West was above all a necessity for Brazilian scientists in Carneiro's eyes. From his own experience at the Pasteur Institute, Carneiro enjoyed the top-notch facilities and the stable intellectual and institutional environment he needed to advance his research and which he had been unable to find in Brazil. His five years at Pasteur contrasted drastically with his experience of doing research back home. Indeed, between 1931 and 1935 Carneiro worked successively in different research institutes which all underwent drastic reorganizations under Vargas' unstable first presidential mandate. In Paris, Carneiro had the opportunity to achieve major breakthroughs on curare and coffee that had so far remained unforeseeable in Brazil due to the embryonic and unstable scientific infrastructure. Finally, the Pasteur Institute empowered Carneiro back home and enabled him to push the gates of the Preparatory Commission of UNESCO in spring 1946 as a member of the Brazilian delegation at

¹³⁰ Charles Alexander to Paulo Carneiro, 26 april 1935; Dr. Inman and (unknown) to Paulo Carneiro, 12 April 1935; Dr. Atto to Paulo Carneiro, 2 May 1935, CP, PC.GI.AI.04.v.3/Cartas 12/04/1935 – 07/12/1935; H. Fuss (Chef de la section du Chômage et des Migrations, ILO) to Paulo Carneiro, 12 September 1933, CP, PC.GI.AI.03/Cartas 30/05/1933 – 27/08/1935.

UNESCO. Enabled by and in the service of Brazil, these experiences, and his devotion to Brazilian Comtean positivism, led Carneiro to see European science and its standards as a scientific and moral model for Brazil's progress. Reporting on his European travels, Carneiro postulated that:

“Countries with a burgeoning scientific history like those of South America can benefit more than any other from the knowledge and experience of older centers of scientific investigation that are represented by their leading figures at these important international meetings”.¹³¹

In his evolutionary view, in which scientifically nascent nations like Brazil were lagging behind the leading scientific nations of Europe, Carneiro was convinced that international cooperation offered a good opportunity for Brazil to heighten its scientific standards, catch up with Europe and become a legitimate international player. Breaking with Brazil's isolation through international cooperation was what Carneiro sought to accomplish first in Pernambuco and later with the creation of the IIHA.

On the eve of their appointments at the Preparatory Commission, both Needham and Carneiro came to similar conclusions as to the future of science. Like Needham with his *periphery principle*, Carneiro defended the integration of marginalized scientists via closer cooperation. At the Preparatory Commission's Committee on Natural Sciences, Needham and Carneiro spoke in unison to urge the future organization to carry out the re-integration of science through closer North-South exchanges. Yet, this common plea for a reorganization of science came from distinct experiences of the excluding hierarchies and uneven spread of science. In France, Carneiro cultivated a vision of the scientist in the service of the nation while Needham theorized the scientist's inherent universal identity during his time at the SBSCO. These different experiences entrenched each of them in distinctive notions of being a scientist, of his allegiances and his relation to society. These experiences undergirded their UNESCO proposals to reorganize the existing scientific structure and articulate science's peace function. As we will see in the final section of this chapter, both also entrenched international scientific cooperation within different internationalist frames.

¹³¹ Paulo Carneiro to Exmo. Sr. Ministro da Agricultura, 1933, PC.GI.AI.01/Relatorios de Viagem (xx/xx/1933), p.21.

SCIENTIFIC INTERNATIONALISM(S)

At the Preparatory Commission, Needham and Carneiro respectively proposed the *periphery principle* and the IIHA not only to deal with the inherent organizational problems of science. Both articulated their plans at the heart of UNESCO's peace mission. They believed that international contact could augur the birth of a well-integrated world community of science whose unity would contribute to a durable peace. While Needham established the *periphery principle* as the cornerstone of an ecumenical dialogue that would erase borders, Carneiro contended that international scientific cooperation could bring about peace by bolstering the moral and social maturation of nations. Unlike the existing literature, I will show through this foray into Needham's ecumenism and Carneiro's positivist Latin-americanism that the future of the IIHA was not jeopardized only once it reached the field. I will argue that the ideological and political eclecticism governing the Natural Science Section of UNESCO in its early days, as exemplified by Carneiro's and Needham's distinct conception of science's peace function, fed tensions regarding the IIHA as early as its design phase in Paris. I will therefore contest the well-ingrained 'diffusionist view' that continues to problematize North-South cooperation as an issue of failing translation in which the well-ordained plan devised in the North collapses in the face of unforeseen peripheral chaos. In this last section, I will contest this narrative structure by problematizing the design phase at the Natural Science Section as well. To do so, I will unveil the tensions that arose between Needham, Huxley, Corner, Carneiro and his compatriot Miguel Ozorio de Almeida who were the leading protagonists behind the IIHA's design in early 1947.

Needham's Scientific ecumenism: ecumenical science and the dissolution of nations

Global historians of science have mostly understood Needham's concept of ecumenical science as a conceptual breakthrough that paved the way to a global, less Eurocentric approach to the study of the origins of modern science. Yet, seen in relation with the *periphery principle*, scientific ecumenism appears to be more than a historiographical novelty as for Needham it constituted the overarching philosophy of his conception of science for peace at UNESCO. The concept of scientific ecumenism strengthened his plea for the *periphery principle* and further legitimized the mobilisation of international science for UNESCO's peace building purposes.

Both the *periphery principle* and scientific ecumenism stemmed from Needham's unshakable evolutionary faith in cooperation. As we have seen, Needham had envisioned science as a powerful machinery for progressive social change since the early 1930s.

Needham believed that science, and its representatives, the scientists, could shepherd humankind to a higher and more harmonious organizational order, because it emulated nature's cooperative mechanics of evolution. At UNESCO, Needham continued to foresee harmony in enhanced cooperative attitudes. He declared at his 1948 Boyle lecture in Oxford on *Science and International Relations* that "[UNESCO's] most obvious way to carry out its purpose for peace was to encourage all those ways in which people from many countries meet together to do a concrete job of work." Needham continued by arguing that "there was no field which had a stronger tradition of international community work than that of the natural sciences, and it could indeed be taken as a model."¹³² Since scientists were "naturally world minded" and science was "essentially and traditionally international and cooperative," Needham made it clear at the Committee on Natural Sciences of the Preparatory Commission that the scientist could well be UNESCO's best agent for the promotion of world peace.¹³³ In that regard, Needham embraced a traditional form of scientific internationalism based on the so-called functionalist idea of an erosion of national allegiances through the transnational loyalties among technical groups. However, reducing Needham's internationalism to mere functionalism would overshadow its ecumenical foundations.

While developing his fascination for China's past and present, Needham started to envision science as an ecumenical human endeavor. In Cambridge, he had seen science as a European achievement. Once in China, as he zoomed out to embrace China's past contribution, Needham came to understand it as a truly universal and ecumenical creation. For Needham, science grew over a long period of time and "was the result of co-operation between men and the accumulation from one age to another." It was clear that "the peoples of the whole world have all made their contributions."¹³⁴ With China, science's history and geography expanded – from hundreds of years to several millennia; from the narrow European perimeter to America and China. He realized that while modern science had indeed grown in Europe, it might not have been possible without the contributions of others, like the Chinese who "in so many directions began the story both in thought and actual experimental work."¹³⁵ Because of its ecumenism, science bore in his view a unique unifying power. In investigating its origins, Needham witnessed Eastern

¹³² Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NA, Folder G.70, p.6.

¹³³ Preparatory Commission, 'Progress report on the program of the UNESCO', 1946, UA, file UNESCO/Prep.Com./51, pp.III.B.1.

¹³⁴ Joseph Needham, 'Science and society by a Chinese student reporter', in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948, pp.120-121, p.120.

¹³⁵ Needham, 'Science and agriculture...', op. cit. (83), p.258.

and Western cultures in dialogue contributing together to human progress. It followed, as we have seen, that Needham openly questioned the use of expressions such as “foreign” or “Western” science and preferred the idea of one international human science as the “common possession” of all scientists.¹³⁶ Importantly, this ecumenism that engendered modern science was not only a thing of the past for Needham. If these ecumenical exchanges between Eastern and Western scientific traditions spawned modern science, Needham trusted it would bring about its future advancement as well as a world of change for humankind.

For Needham if greater cooperation could broaden the pool of available knowledge and extend science’s capacity to eliminate the risks of war arising from unsolved socio-technical needs, reviving science’s ecumenical nature could pave the way to new supranational forms of solidarity that would replace the war-prone nation-states. He deemed the revival of science’s ecumenism to be the pathway towards the “inauguration of one whole collective society”.¹³⁷ “If we make further efforts in this direction,” Needham claimed, quoting Confucius, to the staff and students of the West China Union University in Hua Ta that, “the age of ‘All within the four seas are one family’ will not be far distant”.¹³⁸ In the torment of war but with its end in sight, Needham firmly believed that a truly international science would be “the forecast of the world of tomorrow, as well as the inheritance of scientists the world over”.¹³⁹ The challenge of turning international science from a Western to an ecumenical structure was therefore an essential evolutionary step in Needham’s view. The *periphery principle* and the IIHA were in that regard, the initial stages of an organizational shift from a nation-state world order to a truly supranational, or ecumenical order. Needham believed that the interchange between scientists and the dialogue between science’s various historical traditions could augur the unification of mankind into a single, war-free entity. In their final report, Needham and the Committee on Natural Sciences hence declared that “to ensure a lasting peace, steps—such as the ISCS—must be taken to smooth out as quickly as possible the quantitative differences in ‘scientific density’ which now exist between different regions, and thus minimize, if not remove, the tensions which invariably lead to war”.¹⁴⁰ The reorganization of international

¹³⁶ Needham, ‘Science and agriculture...’, op. cit. (83), p.257.

¹³⁷ Needham, op. cit. (134), p.121.

¹³⁸ Note that the original quote by Confucius goes as follow “All within the four seas are one’s brother” and was used by Needham to refer to Confucian cosmopolitanism. As Joseph Chang explained, with this saying Confucius extended the notion of brotherhood vertically and horizontally to include anyone in the world. Joseph Chan, ‘Territorial boundaries and Confucianism’ in Daniel Bel (ed.) *Confucian Political Ethics*, Princeton: Princeton University Press, 2010, pp.61-84 p.65-66; On Confucian cosmopolitanism, see: Philip Ivanhoe, ‘Confucian cosmopolitanism’, *Journal of Religious Ethics* (2014) 42, pp.22-44.

¹³⁹ Needham, op. cit. (134), p.121.

¹⁴⁰ ‘UNESCO, Preparatory Commission, revised progress report on the program of the United Nations

science was not the pacifying agent of the existing nation-based order of international affairs, but the instrument of its replacement.

Carneiro's positivist internationalism: Brazil and Latin America for the advancement of mankind

In his speech *Choisir entre l'Imperialisme et la Paix* given in Paris in the late 1930s, Carneiro made explicit his positivist conception of a peaceful and progressive world order. Unlike Needham, he believed in the advancement of peace through the advancement of nations. Not all forms of national growth, however, found favor in his positivist eyes. He especially denigrated the war-hungry imperialist strategies of leading European nations as an egoistic and retrograde form of civilizational regression, which he deemed, bound to degenerate in war fever. Instead, Carneiro postulated that nations should be driven by “un élan de fraternité” rather than militarist expansionism¹⁴¹. Following the evolutionary precepts of positivism, nations thus should recognize collaboration and solidarity between them as the powerhouse of their moral, material and social advancement. He proclaimed to his positivist comrades that positivism had taught mankind that sound progress depended on the recognition of “the soothing and constructive mediations of altruism” and “the continuous search for new possibilities of collaboration between the people within a form of solidarity more fraternal and increasingly vast”.¹⁴²

While, like Needham, Carneiro erected solidarity and collaboration as essential vectors of progress, he did not see change as a break in which existing organizational units, like nations, would be dissolved. Carneiro viewed progress as a slow, harmonious movement through which existing social units were strengthened rather than replaced. In that regard, Carneiro did not discard nations and foresaw in their mutual reinforcement the path to peace and progress. For him, the progress of the whole depended on the progress of the parts. In this regard, Carneiro considered that “every nation, big or small had obligations regarding the advancement of international brotherhood”.¹⁴³ This was particularly true for bigger and more advanced nations such as France and Britain, which, he believed, had a special responsibility to assist smaller nations. Carneiro believed that greater intellectual

Educational Scientific and Cultural Organisation, Chapter V natural sciences, 11 September 1946, UA, file UNESCO C/2, p.3.

¹⁴¹ Paulo Carneiro, ‘Choisir entre l'imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.4.

¹⁴² Paulo Carneiro, ‘Choisir entre l'imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.15-16.

¹⁴³ Paulo Carneiro, ‘Choisir entre l'imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.15.

and scientific exchanges with European nations in particular could enable countries like Brazil to embrace the highest positivist, scientific and cultural standards these leading nations had cultivated following the French Revolution. This conviction explains why he relentlessly attempted to establish cooperation between French and Brazilian scientists and positivists throughout the 1930s.

Carneiro, however, contemplated regional forms of solidarity as well. If nations had in his view obligations towards each other, it was all the more true to those being part of what he called “the family of peoples”.¹⁴⁴ For Carneiro, nations were predisposed to cooperate with nations with which they shared a particular historical bond. In that regard, he believed it was natural for Latin America to cultivate an American solidarity.¹⁴⁵ This emphasis on transcontinental solidarity manifested itself in Godesberg on the occasion of the *Conférence Ibero-Américaine* that Carneiro launched while imprisoned. There he invited his fellow inmates, all South Americans, to join him in reflecting on “the future American community” in order to “complete the work of continental solidarity”.¹⁴⁶

Carneiro’s vision of Latin American solidarity differed from Pan-Americanism, which had dominated continental cooperation since the late nineteenth century. Pan-Americanism encompassed two competing imaginaries of solidarity in the Americas. It had its origins in the Latin American independences of the 1820s and 1830s when Simon Bolivar called the newly independent nations to create a confederation of states with the goal to resist Europe’s imperialism and strengthen their economic and cultural relationships.¹⁴⁷ Bolivar’s Latin Pan-Americanism however faded by the end of the century when the United States advanced a hemispheric conception of Pan-Americanism that bound North and South America. US Secretary of State James Blaine introduced the notion of Pan-Americanism at the first Conference of American States in 1889-1890 as an attempt to keep Europe away from American affairs and assert the leading role of the US in the western hemisphere. As a vehicle of US hegemony, the Pan-American movement came to be associated to the broader idea of Western Hemisphere, which designated US continental policy since the early 1800s. It included multiple unilateral and multilateral

¹⁴⁴ Paulo Carneiro, ‘Choisir entre l’imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.16.

¹⁴⁵ Paulo Carneiro, ‘Ouverture de la série de conférences Ibéro-Américaines à Godesberg’, 14 January 1944, CP, PC.GI.AI.05/Disursos de abertura 14/01/1944.

¹⁴⁶ Paulo Carneiro, ‘Ouverture de la série de conférences Ibéro-Américaines à Godesberg’, 14 January 1944, CP, PC.GI.AI.05/Disursos de abertura 14/01/1944, p.4.

¹⁴⁷ Steven Haynes, *Alternative Vision: the United States, Latin America and the League of Nations during the Republican Ascendancy*, Dissertation submitted to Kent State University, 2012, p.86-87; On Bolivar’s Pan-American views, see: Sara Castro-Klarén, ‘Framing Pan-Americanism: Simon Bolivar’s findings’, *The New Centennial Review* (2003) 3, pp.25-53.

instruments such as the nineteenth century Monroe and Drago Doctrine (1823 and 1902) as well as the Pan-American movement of the first half of the twentieth century.¹⁴⁸

From the 1900s, Pan-Americanism broadened rapidly into a complex and multifaceted movement that exceeded peace-building and power relations to include multilateral cooperation on cultural, scientific and technical matters such as sanitation, urban housing and development.¹⁴⁹ Besides regular Pan-American conferences, the Pan-American Union (PAU) (1910) but also other agencies such as the Pan-American Sanitary Bureau became major institutional actors that actively promoted economic cooperation, diffused Pan-American ideals and sponsored cultural and scientific exchanges. Even though Latin Americans manipulated the possibility of cooperation to advance local-regional purposes, Pan-Americanism largely remained an expression of US nationalism and expansionism. It predominantly advanced the geopolitical agenda of the United States and produced representations of Latin America as a homogenous cultural and political entity that served US economic, political and military needs.¹⁵⁰

Carneiro seemed to inscribe his vision of “American Solidarity” in the Latin Americanist tradition endorsed by Simon Bolivar rather than the dominant model of US Pan-Americanism. His vision exemplified this tradition, which lived on since the early days of the independence movement.¹⁵¹ The engagement of the Latin American elite in favor of a Latin American-centered version of Pan-Americanism took place within various spaces. The PAU became for many Latin Americans the only effective means to bring the countries of Latin America together. As Mark Jeffrey Petersen showed in the case of Chile, the spaces and institutions of Pan-Americanism proved to be significant arenas for Latin Americans to advance a version of pan-Americanism with a greater regionalist, Latin American focus.¹⁵²

¹⁴⁸ Juan Pablo Scarfi and Andrew Tillman, ‘Cooperation and hegemony in US-Latin American relations: an introduction’ in Juan Pablo Scarfi and Andrew Tillman (Eds.) *Cooperation and Hegemony in US-Latin American Relations. Revisiting the Western Hemisphere Idea*, Basingstoke and New York: Palgrave Macmillan, 2016, pp.1-30, p.4-6; See also: David Sheinin (ed.) *Beyond the Ideal: Pan Americanism in Inter-American Affairs*, Westport: Greenwood Press, 2000.

¹⁴⁹ On the multifaceted nature and expression of Pan-Americanism, see for instance: Juan Pablo Scarfi, *International Law and Pan-Americanism in the Americas, 1890-1942*, Dissertation submitted to Cambridge University, 2013; Donna Guy, ‘The pan American child congresses, 1916 to 1942: pan Americanism, child reform, and the welfare state in Latin America’, *Journal of Family History* (1998) 23, pp.272-291; Ricardo Salvatore, ‘Imperial mechanics: South America’s hemispheric integration in the machine age’, *American Quarterly* (2006) 58, pp.662-691; Corine Pernet, “‘For the genuine culture of the americas’: musical folklore, popular arts, and the cultural politics of pan Americanism, 1933-1950’ in Jessica Gienow-Hecht (ed.) *De-Centering America*, New York: Berghahn Books, 2008, pp.132-168

¹⁵⁰ Stephen Park, *The Pan American Imagination: Contested Visions of the Hemisphere in Twentieth-Century Literature*, Charlottesville: University of Virginia Press, 2015.

¹⁵¹ On the history of the idea of continental solidarity and identity specific to Latin America, see: Leslie Bethell, ‘Brazil and “Latin America”’, *Journal of Latin American Studies* (2010) 42, pp.457-485.

¹⁵² Mark Jeffrey Petersen, “‘The vanguard of pan Americanism’. Chile and inter-American multilateralism in the early 20th century’ in Juan Pablo Scarfi and Andrew Tillman (Eds.) *Cooperation and Hegemony in*

Local-regional purposes and counter-hegemonic narratives of hemispheric solidarity were also explored elsewhere such as at the League of Nations or, as we have seen in chapter 2, at the IIIC conference in Havana.¹⁵³ There, scientists and intellectuals like Ozorio de Almeida and Carneiro sought to build the cultural foundations and political imaginaries of a regionalism independent of both Europe and the United States.¹⁵⁴

Following his return to Brazil, Carneiro sought to advance his positivist version of Pan-Americanism as member of the Brazilian Commission of Intellectual Cooperation. On a visit to Montevideo, in November 1944, he argued that the frontier separating Brazil from Uruguay was “an imaginary frontier”.¹⁵⁵ In his talk on *The Organization and Finalities of Intellectual Cooperation in the Postwar World*, Carneiro praised the common heritage Brazil and Uruguay shared. This heritage was the basis of “traditional fraternity” and the stepstone to an “American solidarity” that “a history of common endeavors and successes definitely sealed” and “personal contacts between the men of science and the men of letters of our two countries will maintain unalterable”.¹⁵⁶ Carneiro contemplated these bilateral and regional interchanges as essential steps for the “mental and moral regeneration needed to establish a better international regime”.¹⁵⁷ Interestingly, and in contrast with Needham, the best means to advance peace and progress was for Carneiro to serve the nation through bilateral and regional cooperation with other nations. In Carneiro’s positivist order, international cooperation did not undermine the nations. On the contrary, international cooperation reinforced the nations, which could continue to

US-Latin American Relations. Revisiting the Western Hemisphere Idea, Basingstoke and New York: Palgrave Macmillan, 2016, pp.111-137

¹⁵³ On Latin American intellectuals at the League of Nations, see: Corinne Pernet, ‘Twists, turns and dead alleys: the League of Nations and intellectual cooperation in times of war’, *Journal of Modern European History* (2014) 12, pp.342-357; Corinne Pernet, “‘The spirit of harmony’” and the politics of (Latin American) history at the League of Nations’ in Alan McPherson and Yannick Wehrli, *Beyond Geopolitics: New Histories of Latin America at the League of Nations*, Albuquerque: University of New Mexico Press, 2015, pp.135-154; More broadly on Latin America and the League of Nations, see: Alan McPherson and Yannick Wehrli, *Beyond Geopolitics. New Histories of Latin America at the League of Nations*, Albuquerque: University of New Mexico Press, 2015.

¹⁵⁴ On Miguel Ozorio de Almeida, see: Leticia Pumar Alves de Souza, ‘Between national and international science and education: Miguel Ozorio de Almeida and the League of Nations’ Intellectual Cooperation Project’ in Alan McPherson and Yannick Wehrli, *Beyond Geopolitics. New Histories of Latin America at the League of Nations*, Albuquerque: University of New Mexico Press, 2015, pp.169-184; Leticia Pumar Alves de Souza, *A Ciência e seus Fins: Internacionalismo, Universalismo e Autonomia na Trajetória do Fisiologista Miguel Ozório de Almeida (1890-1953)*, Dissertation submitted to Fundação Oswaldo Cruz. Casa de Oswaldo Cruz, 2015.

¹⁵⁵ ‘A fronteira entre o Uruguai e o Brasil e uma linha imaginária’, *A Noite*, 25 november 1944, CP, PC.GI.AI.01/Recortes de Jornais.

¹⁵⁶ ‘A fronteira entre o Uruguai e o Brasil e uma linha imaginária’, *A Noite*, 25 november 1944, CP, PC.GI.AI.01/Recortes de Jornais.

¹⁵⁷ Paulo Carneiro, ‘Choisir entre l’imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.17.

grow harmoniously together by clustering with other regionally and historically close nations. For Carneiro, the advent of the positivist stage of evolution came through the incremental co-advancement of the national and the international.

If Carneiro made the scientist into the architects of the modernization of nations, he also believed they were crucial for a peaceful and progressive world order. “This harmonious collaboration [...] cleared of any form of exclusively egoistic interests [...] and in the supreme service of humanity” would only be possible when “enough clear-sightedness would have reacted energetically against the lunacy of imperialism”.¹⁵⁸ Whether through the revival of Comte’s international positivist society or the emergence of a universal republic of scientists, which he contemplated in Pernambuco and proposed to inaugurate with the IIHA, Carneiro believed scientists to be the enlightened minds who could infuse humanity with the positivist spirit of peace and duty of solidarity.¹⁵⁹ Yet, in accordance to his evolutionary view, the advancement of the whole – i.e., humanity – depended on the advancement of its parts, which were for Carneiro the nation-states. As the primary building block of the international community, the nation state was in his view the frame within which the scientists should start to build the positivist order. Hence Carneiro postulated that positivist progress and the capacity of the scientists to generate it depended on the nation state and more specifically on its level of moral, material and scientific advancement. However, Carneiro noted from experience that some nations, like France, are more advanced and their scientists thus empowered to contribute to positivist progress than other nations, like Brazil, whose backwardness hindered the national development of science and the country’s capacity to participate in inducing positivist change worldwide. Providing this historical inequity between nations, Carneiro did not believe in the emergence of a positivist order for as long as all sections of the international scientific community, and therefore every nation behind them provided them access to the same high moral and scientific standards.

To solve this evolutionary conundrum, Carneiro therefore suggested that a way for less advanced scientific communities like the Brazilian scientists to get access to the high standards required to stimulate domestic positivist change was to engage in closer cooperation with the more advanced scientific communities of Europe and North America. This reasoning is particularly striking when it comes to the first version of the IIHA project Carneiro submitted to the Getulio Vargas three months before the

¹⁵⁸ Paulo Carneiro, ‘Choisir entre l’imperialisme et la paix’, undated, CP, PC.VP.PO.v.23/Cadernos de Apontamentos S/D, p.17-18.

¹⁵⁹ Paulo Carneiro, ‘L’union positiviste’, CP, PC.VP.PO.01.v.23/Cadernos de Apontamentos; Paulo Carneiro, ‘Renaissance de la société positiviste’, CP, PC.VP.PO.01.v.23/Cadernos de Apontamentos.

Preparatory Commission of UNESCO started in January 1946.¹⁶⁰ While the IIHA sought the cooperation of multiple countries, the Hylean Institute revolved around “close scientific cooperation between France and Brazil through the creation of a research institute [...] formed by Brazilian and French botanists, zoologists and geologists”.¹⁶¹ Carneiro wished to stimulate the valorization of the Amazon region – Brazil’s largest underdeveloped hinterland territory. To do so, he envisioned the plan as a means to upgrade local scientific infrastructures in and research efforts on the Amazon region. The Institute should “ensure the continuity that naturalists and ethnographers had so far lacked to conduct research in this region”.¹⁶² With that goal in mind, Carneiro wished to stimulate local research capacities by establishing that research would be equally conducted in both Brazil and France at all stages of the research process, thus breaking from the usual pattern in which Brazil was just a place of collection of data and the essential scientific work was conducted in Europe. The Hylean Institute’s museums and specialized libraries would also be “the permanent repositories of collections and studies hitherto dispersed and made inaccessible to the vast majority of its most concerned readers” (i.e., the South Americans).¹⁶³

All in all, Carneiro believed that “the specialists and resources that such institute would bring together will contribute to realize the innumerable plans that had for so long been aborted for lack of men and material means”.¹⁶⁴ The same spirit animated the IIHA proposals Carneiro presented to the Committee on Natural Sciences of the Preparatory Commission five months later. With the IIHA, he however first aimed to “infuse a new life” into Latin America’s rich Amazonian hinterland at large.¹⁶⁵ International scientific cooperation would bolster regional progress of the Latin American family, and elevate local scientific and moral standards, which he believed, conditioned the continent’s contribution to the universal good of mankind.

Although Needham and Carneiro considered international scientific cooperation as essential vectors of science’s revitalization and a necessity to strengthen UNESCO’s peace mission, they envisioned it in different ways. Needham envisioned international

¹⁶⁰ Carneiro’s proposal was discussed on 21 January 1946, see: *Diário Oficial* (Seção 1), 27 February 1946, CP, PC.RI.IH.01/diário oficial 27/02/1946.

¹⁶¹ Paulo Carneiro, ‘Projeto de criação de um “instituto da Hiléia Amazonica” (Fundação internacional)’, undated, CP, folder PC.RI.IH.01/subprojetos S/D, p.1.

¹⁶² Paulo Carneiro, ‘Projeto de criação de um “instituto da Hiléia Amazonica” (Fundação internacional)’, undated, CP, folder PC.RI.IH.01/subprojetos S/D, p.3.

¹⁶³ Paulo Carneiro, ‘Projeto de criação de um “instituto da Hiléia Amazonica” (Fundação internacional)’, undated, CP, folder PC.RI.IH.01/subprojetos S/D, p.3.

¹⁶⁴ Paulo Carneiro, ‘Projeto de criação de um “instituto da Hiléia Amazonica” (Fundação internacional)’, undated, CP, folder PC.RI.IH.01/subprojetos S/D, p.3.

¹⁶⁵ ‘UNESCO, Preparatory Commission, minutes of proceedings of the committee on natural sciences held at 47, Belgrave Square, London, S.W.I, on Saturday 1st June, 1946 at 3 p.m., Session IV’, UA, Box 20 File F/6/3/78 – minutes, p.3.

cooperation as the tool to overcome national frames and make global peace and progress possible. While Carneiro believed that science could facilitate peace as well, he did not see in its advancement the weakening of the nation state but its reinforcement. With the IIHA, Carneiro unveiled a conception of science's internationalism at the crossroad of two conflicting scientific discourses. With Needham, he was an actor of the growing "diplomacy of science" that emerged with the UN and at the same time cultivated a technocratic and nation-centered vision of science that, as we will see in chapter 6, lived on within Brazil's post-war scientific and development agencies that were the CNPq, the SPVEA and the INPA.

In the last section of this chapter, I will demonstrate that Needham's and Carneiro's differing conceptions of the international function of science did not only hinder the implementation of the IIHA on the field. I will unravel how Needham's worldview, though appealing to Southern scientists like Carneiro at first, entailed problematic dimensions that obstructed the design phase of the plan at the Natural Science Section as well.

COMPETING VISIONS OF THE IIHA

In November 1946, the First General Conference of UNESCO designated the Natural Science Section to prepare the ground for the IIHA's implementation in the field. Between UNESCO's first General Conference and May 1947, Needham and his team undertook a variety of tasks. They designed the so-called Field Scientific Cooperation Office (OFSCO) and appointed the scientists to staff them. They also sought to refine Carneiro's original IIHA proposal and planned to kick-off the implementation of the future institute with the first meeting of the International Commission for the Hylean Amazon to be held in Belém in August 1947. The process was not straightforward, however, and the planning divided the small community of scientists involved with the Natural Science Section. Carneiro, who had been appointed on UNESCO's Executive Bureau, and Ozorio de Almeida, who represented Brazil on the First General Conference of UNESCO, criticized the choices made by the NS division regarding the appointment of the field staff, the definition of its functions, and their relations to locals. They also voiced their concerns about the way the IIHA was inserted within Needham's broader international science program.

These seemingly insignificant disputes over the practicalities of the IIHA's implementation expressed deeper political and ideological concerns regarding Needham's ecumenical vision and his *periphery principle*. Two episodes were significant in that regard: Ozorio's critique of Needham's Bright and Dark Zone at the First General Conference in Paris in November 1946 and Carneiro's opposition to the nomination of the British botanist



Figure 23 – Paulo Carneiro and, on his right, Brazilian physiologist Miguel Ozorio de Almeida (first row from the right) at UNESCO’s first General Conference, Paris, France, November 1946

Edred John Henri Corner and the Greek tropical doctor Basile Malamos as the Principal and Assistant Officers of the Latin American FSCO created in May 1947 in Rio de Janeiro.

Against scientific imperialism: the critique of Miguel Ozorio de Almeida

Most Southern participants at UNESCO’s General Conference and at the Preparatory Commission received Needham and his depiction of the world of science as divided into a Dark and Bright Zone with enthusiasm. Carneiro had even replicated the division to defend the IIHA at the Preparatory Commission in May 1946, after his colleague, the Brazilian biologist Carlos Chagas Filho, claimed at the meeting of the Sub-Commission on Natural Sciences of the First General Conference six months earlier that the *periphery principle* could make a definite difference for scientists like himself “coming from one of these dark zones”.¹⁶⁶ Needham’s worldview did not go unchallenged however. During that same meeting of the Sub-Commission on Natural Sciences, Miguel Ozorio de Almeida

¹⁶⁶ ‘UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m.’; 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.7.

tempered Chagas' enthusiasm by a subtle and yet forceful exposition of what he called "the scientific imperialism" underlying Needham's worldview.

In his speech, Ozorio de Almeida agreed that the asymmetrical development of science was a problem. In that respect, he subscribed to Needham's division of science and believed that "too much importance cannot be attached to what are described as the two zones in the civilized world, the 'Bright' and the 'Dark zone'" and continued by defending the recognition of such "division of the world into two zones [as] not only necessary but obvious".¹⁶⁷ In that respect, he welcomed projects like the IIHA, which he thought, would enable UNESCO to "spread these Bright Zones and enlighten the Dark Zones".¹⁶⁸ Yet, in a digression on the causes that led to the Dark Zone's assumed scientific decadence, Ozorio de Almeida threw his powerful critique against Needham's representation of science and of his *periphery principle*.

If Needham particularly emphasized natural, social and economic factors to explain the downfall of science in Dark Zone countries like China, Ozorio de Almeida turned to "moral questions" and what he called "a sort of scientific imperialism".¹⁶⁹ This imperialism, he believed, was central to understand why the Dark Zone had vegetated scientifically as well as why the achievements of Dark Zone scientists were poorly acknowledged. What Ozorio de Almeida called scientific imperialism referred to an attitude practised by scientists "which only believe in what has been done in their own country and sometimes despise work done elsewhere".¹⁷⁰ While he did not deny the backwardness of the so-called Dark Zone, he reminded the proponents of its emancipation – i.e., Needham – that the darkness they problematized may have been amplified by this disregard for the achievement of others, especially less advanced and emerging nations like Brazil. Indeed, Ozorio de Almeida did not fail to remind his audience that despite great impediments,

¹⁶⁷ 'UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.9.

¹⁶⁸ 'UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.9-10.

¹⁶⁹ 'UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.11.

¹⁷⁰ 'UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.11.

“even in Dark Zone countries, some scientific work had been done and that certain personalities have attained the highest standards of scientific research.”¹⁷¹

With his notion of scientific imperialism, Ozorio de Almeida brought to the fore the fact that, in its formulation, the concept of Dark Zone may have reproduced a Eurocentrism that misrepresented and perpetuated the backwardness UNESCO and Needham intended to overcome. The notion had a double meaning. By scientific imperialism, Ozorio denounced the actual blindness on the part of Western scientists who, centered on themselves, fail to notice the achievements made by others beyond the boundaries of their national communities. But, and more importantly, Ozorio de Almeida’s critique also highlighted Europe and North America’s historical expansionist tendencies, which he believed Needham’s concept of Dark Zone perpetuated into UNESCO’s scientific program. He feared that because of this imperialist attitude, the program would reproduce the historical subordination of the South to scientific transfers from the North rather than organized global exchanges involving all scientific communities on an equal basis. Ozorio warned the promoters of the IIHA that “this state of mind, [which had] to some extent prevented scientific development in countries of the Dark Zone” still existed in the concept of Dark Zone and thus may impede the success of UNESCO’s scientific enterprise.¹⁷²

A closer look at Needham’s ecumenical worldview may substantiate Ozorio de Almeida’s scepticism and explain his critique. Needham’s ecumenism was rooted in a double-edged evolutionary perspective. As we have seen, Needham recognized China and what he later called the Dark Zone as legitimate members of modern science. The promise of ecumenism, however, withheld a curse that Ozorio de Almeida pointed out. The evolutionary precepts that undergirded his ecumenical view reinforced a sense of hierarchy between an advanced North and a backward South. Analysing his investigation of Chinese science, we have seen that Needham had determined China’s impeded advancement against the backdrop of the successful growth of science in capitalist Europe, which inevitably stood as the model to follow. If for him science should not be distinguished in terms of Western or Eastern sciences, it was certainly different in light of their respective social contexts. As he further clarified at the 1946 General Conference, “a division arises [between Bright and Dark Zone] from purely historical circumstances

¹⁷¹ UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.10.

¹⁷² UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the second meeting held at UNESCO House, 19 Avenue Kléber, Paris (16e), on Monday December 2nd, 1946, at 10:30 a.m., 2 December 1946, UA, UNESCO/C/Prog. Com./S.C.Nat.Sci./V.R.2, p.12.

which have allowed science to develop earlier in Western Europe and North America, so that it is much less advanced in regions such as Asia, Africa and parts of South America”.¹⁷³

The apparent relativism of Needham’s externalist perspective quickly gave way to a sort of evolutionary tyranny. In such a narrative Dark Zone countries like China or Brazil were perpetually condemned to comply with the trail of evolution Needham foresaw. Driven by his belief in a unitary science, Needham did not value Chinese science and the scientific Dark Zone for themselves and in themselves – that is as different takes on the understanding of nature – but for their contribution to the advancement of and against the yardstick of Western modern science. In Chongqing in 1943 and at UNESCO three years later, Needham did not see China nor the Dark Zone but the West as the actual contributor to the growth of science. Needham believed that China and the Dark Zone, “had to master applied science as a whole [first], just as the Westerners had done” to pretend to match up the scientific record of the West, and retrieve a prominent scientific role along the Western communities.¹⁷⁴ While Needham was convinced progress and harmony would reign with the advent of a new, modern ecumenism, this ecumenism was not yet conceivable as long as China and the Dark Zone lagged behind the achievements of Europe and North America.

Against scientific imperialism: the critique of Paulo Carneiro

In April 1947, as the NS division finalized its work plan for the implementation of the IIHA in the field, Carneiro revived Ozorio de Almeida’s critique when, in a letter to Huxley, he expressed his concerns regarding the appointment of the British botanist Corner as head of the Latin American FSCO and as IIHA coordinator. Carneiro wrote, “[if] Corner possesses, undoubtedly, the scientific titles and the personal qualities required by the functions you have granted him, these, however high they are, are not sufficient to succeed in his mission”.¹⁷⁵ For Carneiro, who argued that historical and cultural closeness was essential to facilitate higher forms of solidarity, scientific excellence was not enough to stimulate international and regional scientific cooperation. He perceived Corner’s lack of “pre-

¹⁷³ ‘UNESCO, General Conference, first session, program commission, sub-commission on natural sciences. Provisional verbatim record of the First meeting held at UNESCO House, 19, Avenue Kléber, Paris, 16e, on Saturday, November 30th 1946, at 10.30 a.m.’, 11 March 1947, UA, UNESCO/C/Prog.Com./S.C.Nat.Sci./V.R.1, p.4.

¹⁷⁴ Joseph Needham, ‘Article VII: the Chungking Industrial and Mining Exhibition (1944)’, in Joseph Needham and Dorothy Needham, *Science Outpost. Papers of the Sino-British Science Co-operation Office (British Council Scientific Office in China) 1942-1946*, London: The Pilot Press Ltd. 1948, pp.189-194, p.194.

¹⁷⁵ Paulo Carneiro to Director-General Julian Huxley, 16 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1.

existing knowledge of South American countries, of their personalities and languages” as a problem as great as the absence of considerations for the appointment of “a strong South American scientific personality” to oversee the creation of the IIHA.¹⁷⁶ More generally, Carneiro lamented the overall disregard for Latin Americans. He was puzzled by the fact that the NS division did not consult with any local scientific and political authorities, who were in the end primarily concerned with the project, and regretted that he never had a chance to discuss the IIHA’s making with either Huxley, Needham or Corner even though it would “facilitate UNESCO’s mission in South America”.¹⁷⁷ Carneiro’s critique of Corner’s appointment did not however concern Corner alone. It ultimately questioned both the NS division’s staffing policy for field personnel and the ideological precepts – i.e., Needham’s unitary and evolutionary view of science – that defined it.

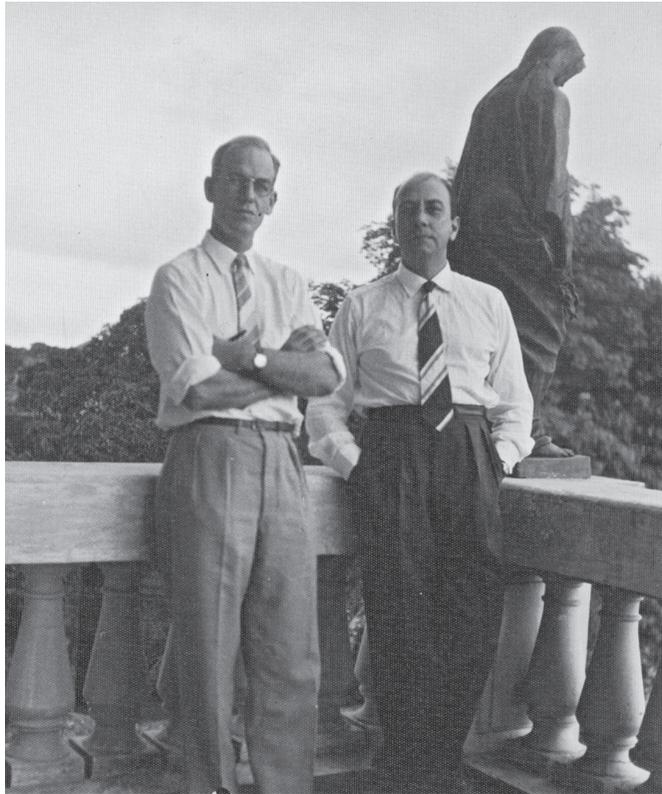


Figure 24 – British botanist and UNESCO scientific field officer Edred Corner (1906-1996) and Paulo Carneiro, c.1947-1948

¹⁷⁶ Paulo Carneiro to Director-General Julian Huxley, 16 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1, p.2.

¹⁷⁷ Paulo Carneiro to Director-General Julian Huxley, 16 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2

To put the *periphery principle* to practice and assist the creation of the IIHA in the field, Needham and the NS division created the first Latin American FSCO. Needham modelled the FSCO after his own SBSCO and the wartime Scientific Liaison Offices he had defended in his memoranda. Established in Rio de Janeiro, the Latin American FSCO was the first of 4 field offices that UNESCO planned to establish throughout the Dark Zone. The FSCO was mandated to “engage in every type of liaison work which will assist the scientists of the region” ranging from “exchanging scientific information, calling regional conference, arranging expeditions” to supervising the creation of IIHA on the field.¹⁷⁸ Huxley, Needham and the NS division put the lead of the FSCO in Western hands by appointing Corner and Malamos as the principal FSCO officers. Local involvement was limited to subordinate functions. The NS division originally sought to appoint “a young Brazilian scientist, preferably a physicist or chemist to second part or whole-time for the work of the office in the absence of Corner and Malamos regarding the IIHA”.¹⁷⁹

The same logic undergirded the way the NS division planned the organization of the IIHA. Needham and his team had divided the IIHA into disciplinary sections such as ecology, botany, anthropology and nutrition science. Like with the FSCO, the division of labor was clear. If each section would comprise a scientific team made up of local and Western scientists, all were to be organized under the directorship of a prominent Western scientist. While the Swiss anthropologist Alfred Metraux was thought of to act as director of the anthropology section and the Italian-born botanist Adolpho Ducke for botany, the NS division “hoped to get the service of two scientists from the USA for nutritional science and perhaps also for tropical pathology”.¹⁸⁰ If most had experience of doing research in Latin America, like Ducke who directed the botanical Gardens of Rio and the Czech entomologist they wanted for zoology who worked at the Goeldi Museum, none were Latin Americans.¹⁸¹ Local participation was foreseen but reduced to a role of technical assistant and cultural facilitator. The guidelines issued by the NS division, specified in that regard that each section was to be seconded by “as many young scientists as possible

¹⁷⁸ ‘UNESCO, 1947 program for the field science co-operation office, Latin America, natural science section’, ca 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1; ‘UNESCO, 1947 program for the field scientific co-operation office, Latin America, division of natural sciences, UNESCO, 25 March 1947, UA, UNESCO/N.S./3/1947, p.1.

¹⁷⁹ ‘UNESCO, 1947 program for the field science co-operation office, Latin America, natural science section’, ca 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

¹⁸⁰ ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.4.

¹⁸¹ ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.4.

from the nine countries of the Hylean Amazon” “drawn from local scientific circles [and] familiar with the cultural traditions of the region”.¹⁸²

The prominent role given to Western scientists may be explained by Needham’s strong belief in the idea of unitary science. A closer look at the motives behind the nomination of Corner and Malamos as heads of the FSCO highlights how this vision of science guided the NS division’s staff policy. Corner trained in botany, physiology and tropical biology in Cambridge before serving for the British Colonial Service as a botanist in Singapore between 1929 and February 1947, when the NS division hired him. Even though he is mostly remembered for his role in saving the Botanic Gardens and the Herbarium of Singapore from destruction during the Japanese occupation, Corner also “had a great international reputation as a botanist and mycologist” and “made important contributions to knowledge in this field” according to the Cambridge Botanist Frederick T. Brooks.¹⁸³ Although an exponent of British colonial science, Needham valued his “wide knowledge of botanical and other tropical life” and his experience in the Dark Zone, which he saw as essential to “explore the possibility of establishing [the IIHA] in the Amazon region”.¹⁸⁴ Similarly, Corner’s assistant, Malamos stood out for his expertise in tropical medicine which he acquired working as assistant director of the Tropeninstitut of Hamburg, and as fellow of the Royal Society of Medicine and Tropical Medicine in London.¹⁸⁵

The cases of Corner and Malamos exemplify how Needham’s faith in a unitary science pervaded the action of the NS division. Even though, Corner had built his career on the study of South East-Asian botany and Malamos specialized on Mediterranean diseases, both found grace in Needham’s eyes. What mattered to Needham was above all their quality as scientists: both were internationally acclaimed and built their scientific expertise in the Dark Zone. For Needham, Malamos and Corner embodied the tropical scientist. In his eyes, their scientific excellence made them qualified to seamlessly operate either in the Indonesian forest or the Amazonian jungle. Unlike Carneiro who viewed Amazonian science at the IIHA as primarily local, Needham defended a different conceptualization of scientific space in which the local (e.g., of the Amazon) and the universal level (e.g., of the scientific laws) intertwined. In his analysis of Arctic ecological science, Stephen Bocking problematized this ambivalent notion of place in science. He showed how in

¹⁸² ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project. Appendix, notes on biological work for the international institute of Hylean Amazon’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.1; ‘UNESCO, natural sciences division, field science co-operation offices’, 12 June 1947, UA, Nat.Sci./28/1947, p.5.

¹⁸³ Edgar Barton Worthington to UNESCO personnel officer, 30 July 1947, UA, Per/Rec.1/13; Frederick Brooks to UNESCO personnel officer, 28 June 1947, UA, Per/Rec.1/13.

¹⁸⁴ UNESCO (likely to be Julian Huxley) to George Hall (the Colonial Secretary), ca 1947, Per/Rec.1/13.

¹⁸⁵ ‘Application for employment, personal files of Basile Malamos’, 11 December 1946, UA, Per/Rec.1/35.

the 1960s and 1970s Arctic ecologists built Arctic science as both situated in this region and at the same time mobile and relevant to understand phenomena taking place beyond its geographic boundaries.¹⁸⁶ Just as Bocking's Arctic scientists, Needham conceived the Amazon as a place different and yet analogous to other parts of the world. For Needham, Corner's tropical botany and Malamos' tropical medicine was neither strictly local nor fully universal but a combination of both as he considered their knowledge to be situated and at the same time relevant to the world's other tropical territories. This conception of the IIHA's future scientific program as trans-tropical underlay a conception of tropical regions as interchangeable and may therefore explain why Needham and Huxley contemplated "cooperation with the persons and organizations concerned with science within the British Commonwealth and Empire of great mutual advantage".¹⁸⁷

If the selection of field staff reflected Needham's belief in the unity of science, the labor division adopted for the FSCO and IIHA by the NS division reproduced his understanding of science's evolutionary development. As we have seen Needham had divided science into an underdeveloped and scientifically immature Dark Zone and a scientifically advanced Bright Zone that engendered modern science. This evolutionary reading of the scientific order not only underpinned his advocacy for greater Southbound exchanges, it also structured the labor division he imagined to implement the *periphery principle*. This is generally visible in the staff policy for the IIHA and FSCO. In both cases, the NS division portrayed Western and local scientists along Needham's evolutionary view of science with each category embodying the traits associated to the scientific reality of its geographical origins. While the European and North Americans involved had to be mature and well-established scientists, their local counterparts were supposed to be young of age, scientifically inexperienced and therefore in need of guidance.

These portrayals bore problematic implications on the division of labor envisioned in the field and caused concern for Carneiro. The NS division made this evolutionary-based labor distribution particularly explicit in an appendix note on biological work for the IIHA. While European and North American scientists as "heads of sections would decide on the nature of the scientific work", the NS division hoped to staff each section with "young and physically active biologists [...] from the countries of the Hylean Amazon". Even though the NS division expected these Latin American scientists to "have little or no first-hand knowledge of the fauna or flora of the region", Needham and his colleagues

¹⁸⁶ Stephen Bocking, 'Situated yet mobile. Examining the environmental history of Arctic ecological science', in Dolly Jørgensen, Finn Arne Jørgensen and Sara Pritchard, *New Natures: Joining Environmental History with Science and Technology Studies*, Pittsburgh: University of Pittsburgh Press, pp.164-178.

¹⁸⁷ Julian Huxley to the British Colonial Service, 2 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

thought that their involvement would “enable them to become acquainted with the living plants and animals in the forest”. Ideally, experienced, Western-trained scientists like Ducke “would make progress much more rapid” and enable the local staff to become “sufficiently experienced to contemplate large expeditions”.¹⁸⁸

While Dark and Bright Zone scientists were for the NS division considered to be members of the same family and speaking the same language, their reunion entailed new divisions and hierarchies. And if the idea of a unitary science and its division into a Dark and Bright Zone enabled to problematize and address the issue of science’s uneven development, it also reproduced problematic hierarchies in the field. The organization of the *periphery principle* entailed an infantilization of Dark Zone scientists, which transcribed in practice into their relegation to subaltern functions in the knowledge-building process and their marginalization from the preparation of the Belém conference. A closer look at Corner’s consultation tour prior to Belém reveals, for instance, that he was instructed to consult with leading British and American political and scientific authorities before initiating any contacts with South American scientists.¹⁸⁹

Besides the critique against Corner’s appointment, Carneiro openly criticized this relegation in his letter to Huxley and warned the NS division of the disastrous consequences this approach might bring about for the IIHA. We have seen that, for Carneiro historical and cultural closeness formed the backbone to the success of any attempt at international cooperation, which was a dimension, he believed, the NS division should cultivate for the success of IIHA. Like Ozorio de Almeida, Carneiro feared that the lack of consultation with local authorities and the absence of local figures in the design of the Amazon project may lead Latin American countries to perceive UNESCO’s plan as an imperialist enterprise. “Do not forget, Monsieur the Director General”, Carneiro warned, “the countries of South America are particularly meticulous and dislike to have the impression of being treated like colonies to which study missions are sent and in which they did not participate in from the very beginning”.¹⁹⁰ He later boldly argued that this relegation could cost the participation of Brazil and Latin American countries at the Belém meeting, if it not nipped the project in the bud. “So much for the scientific mission [i.e., the International Science Program] as for the Amazonian project, nothing could be achieved by Dr Corner without the support of a South American man of science” and more generally without

¹⁸⁸ ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project. Appendix, notes on biological work for the international institute of Hylean Amazon’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.1.

¹⁸⁹ ‘Itinerary. Paris – U.S.A – Rio de Janeiro for E. J. H. Corner, principal field scientific officer, Latin America, and officer in charge of the Hylean Amazon project’, 31/03/1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

¹⁹⁰ Paulo Carneiro to Julian Huxley, 16 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1.



Figure 25 – From the left, Paulo Carneiro (first) with Basile Malamos (second), Miss Malamos (third) and Edred Corner (fifth) at the International Commission on the IIHA in Belém, 12 August 1947

the involvement of locals at all stages of the process.¹⁹¹ Concluding his letter, Carneiro warned Huxley that without greater local involvement the creation of the IIHA as well as the planned creation of FSCOs in the Far- and Middle East would remain a faint illusion.

Huxley and the NS division eventually fulfilled part of Carneiro's request. Days before Corner's and Malamos' departure for Rio, Huxley acknowledged as "desirable that someone should be appointed Special Consultant of UNESCO" to Corner and he appointed Carneiro as "obviously the most suitable person for the work".¹⁹² Yet, while UNESCO appointed a few more special consultants such as Jaime Torres Bodet, Arenales and replaced Corner by the Brazilian anthropologist Heloisa Alberto Torres as head of the IIHA's International Commission, most guidelines and prerogatives as to the labor distribution and power structure within the IIHA remained unchanged.

CONCLUSION

In this chapter, I further explored the making of UNESCO by unravelling the trajectories, worldviews and agendas of the leading figures of UNESCO's first scientific program,

¹⁹¹ Paulo Carneiro to Julian Huxley, 16 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1.

¹⁹² 'Memorandum on question of special consultant from Brazil for the Hylean Amazon project', 24/04/1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

Needham and Carneiro. As we have seen in Chapter 2, Needham had been the driving figure behind the campaign that led to the insertion of science at UNESCO while Carneiro, who stepped in during the preparatory commission, played a significant role in converting Needham's vision into a workable program with his IIHA proposals.

Retracing their scientific and political trajectories as well as reconstructing their conceptions of science helped to highlight significant similarities, which contributed to put the IIHA on the agenda of UNESCO. At the Preparatory Commission, both problematized the Eurocentric organization of science and advocated for a globally inclusive reorganization of science's international circuits which each observed while travelling across science's developmental divide. While Needham witnessed the isolation of Chinese scientists during his stay in Chongqing, Carneiro experienced first-hand the challenges of doing science in Brazil. As a Brazilian scientist he also faced – unlike Needham – several constraints when he moved to Paris to integrate science's prestigious centers.

Despite significantly different political and scientific trajectories, Needham and Carneiro shared a common belief in the transformative power of science. They, however, conceptualized the political function of science differently. Seen from a Marxist perspective, science was for Needham a powerful instrument to decode nature's rules but also highlight the path of revolutionary progress. Needham believed science could orient revolutionary change whose endpoint consisted in the downfall of Capitalism, the advent of scientific Socialism and the establishment of an international society. Carneiro also conceived science as society's problem solver by essence. As a positivist, he sought to engineer society, reinforce the state and uplift the nation by the application of scientific knowledge. Unlike for Needham, change was in his eyes an orderly process that the state should organize and the scientist concretize via scientific research and interventions.

These conceptual tensions regarding the nature of social change and the role of science in it were further reflected in their understanding of scientific internationalism. Although both agreed on the problem of science's uneven development and worried about its wider consequences for the advancement of science and the progress of mankind more generally, each held distinct notions of the international function of science. Needham defended an ecumenical vision of scientific internationalism according to which welding all of mankind's scientific traditions into a common cooperative endeavor would not only liberate modern science's advancement but also contribute to establish a durable international society freed from the rule of nation-states and the dangers of nationalism. While Carneiro also had the welfare of mankind on his mind, he defended a more utilitarian and state-centered internationalism. As a Brazilian positivist, Carneiro regarded the growth of science and the development of the Brazilian nation as indissociable processes. Accordingly, he primarily imagined international scientific cooperation as an instrument to model Brazil

and the Latin American “family of nations” as equal partners to the old continent in the moral and material progress of mankind.

These differences nourished significant disputes in Paris regarding the modelling of the IIHA and, as we will see in chapter 5, prefigured deeper clashes in the field. The critiques of Carneiro and his compatriot Ozorio de Almeida on Needham’s Dark Zone concept revealed tensions within the NS division regarding its future actions in Latin America. These divergences of view did not only delay the preparatory work on the IIHA but brought to the fore profound disagreements as to the shape and goals of North-South scientific cooperation which breached the consensus around Needham’s ecumenical conception of the IIHA. With their critiques, Carneiro and Ozorio de Almeida unveiled how, despite clear emancipatory intentions, Needham’s ecumenical internationalism unwittingly reproduced existing hierarchies between Western and Southern scientists. These tensions, furthermore, continued to permeate the implementation of the IIHA in the field. When the NS division continued in Paris to look to scientifically reinforce the project by increasing the involvement of Western scientists and institutions, Carneiro strove in Brazil to make Latin America the main focus of the IIHA, which he saw, from his positivist internationalist perspective, as the condition of the project’s durable success. If both critiques brought about certain adjustments such as the appointment of Carneiro as special adviser to Corner, the worldview adopted by the Natural Science Section when coordinating the implementation of the IIHA essentially remained the same, which, as we will see in the next chapter, led to its gradual marginalization after the Belém meeting.



The first part of this dissertation showed that the consecration of the IIHA as a program priority for UNESCO was not an incongruity. The projected international laboratory culminated a series of inter-related institutional and ideological shifts that saw UNESCO replace the League’s IIIC, the scientist overthrow the literary intellectual and the social and international functions of science rule out lofty intellectual cooperation. By granting the IIHA top-priority, UNESCO officials acknowledged the global re-organization of science and the development of its social and international functions as the new horizon of peace-making. These shifts materialized the establishment of a scientific culture of international peace-building at UNESCO that was unknown to the League and which manifested itself throughout the whole emerging UN system. Just like Needham, Huxley and Carneiro at UNESCO, other scientists participated in the making of the UN system and successfully inserted scientific approaches to post-war reconstruction and peace-building. Laugier planned to create a central organization of science to guide world reconstruction, Boyd Orr

proposed the World Food Board, a science-driven plan to enhance global food production and distribution at FAO while the Canadian psychiatrist Brock Chisholm endorsed at WHO a vast social psychiatry project that promoted world citizenship.¹⁹³

By retrieving the interwar and wartime origins of the IIHA, chapter 2 and 3 looked at how, in the case of UNESCO, scientists imagined and campaigned to institute scientific diplomacy and technocracy as a new and authoritative mode of governing post-war international affairs. Both chapters followed scientists, traced their bustling pre-war and wartime activism, reconstructed their ambitious political imaginaries and scrutinized the controversies they overcame in order to establish themselves as legitimate peace-makers and their diverse scientific discourses as accepted imaginaries of peace and progress in the recomposed international arena of the 1940s.

This foray revealed that the instatement of scientific diplomacy at UNESCO was not a linear and monolithic process but a messy, polyphonic and disputed one. The wartime period staged significant controversies where old paradigms like the League's tradition of intellectual cooperation were attacked and eventually overthrown. At UNESCO, we saw Needham and Huxley clashing with the guardians of the League order such as Alfred Zimmern who fiercely resisted against their scientific conception of intellectual cooperation. Yet, tensions concerned the community of science as well. Scientists were divided regarding the political functions of science. Regardless of those like the members of the Society for Freedom in Science who refused science's politicization in the first place, the scientists who campaigned to apply scientific solutions to post-war peace-building defended competing conceptions of the social and international function of science.¹⁹⁴ The divisions between Needham and Carneiro over the design, organization and international purpose of the IIHA reflected such distinct conceptions of the international and social functions of UNESCO science.

¹⁹³ Patrick Petitjean, 'International scientific cooperation. Finding a footing. The sciences within the United Nations system' and 'giving science for peace a chance. The post-war international laboratory projects' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac, and Gail Archibald, eds., *Sixty Years of Science at UNESCO, 1945-2005*, Paris, 2006, pp.48-52, pp.52-57 ; Amy Staples, 'To win the peace: the Food and Agriculture Organization, Sir John Boyd Orr, and the World Food Board proposals', *Peace and Change* (2003) 28, pp.495-523; Harry Yi-Jui Wu, 'World citizenship and the emergence of the social psychiatry project of the World Health Organization, 1948-c. 1965', *History of Psychiatry* (2015) 26, pp.166-181.

¹⁹⁴ In England, the SRS ideas that Needham and Huxley implemented at UNESCO were opposed by the Society for Freedom in Science. Its members supported the ideal of freedom in science and frowned upon the SRS idea that science should be planned with the goal of resolving society's needs in mind. On the Society for Freedom in Science, see: William McGucken, 'On freedom and planning in science: the Society for Freedom in Science, 1940-1946', *Minerva* (1978) 16, pp.42-72 and Anna-K. Mayer, 'Setting up a discipline, II: British history of science and the "end of ideology", 1931-1948', *Studies in History and Philosophy of Science* (2004) 35, pp.41-72.

By exploring the making of UNESCO science, the first part of this dissertation yielded new insights on UNESCO itself that re-evaluate some deeply seated assumptions regarding its beginning and the kind of peace-building regime the new agency intended to pursue. First, Needham's campaign for the inclusion of science highlighted the significant role performed by non-state and non-western actors in the shaping of the new UN agencies. Needham relied substantially on a variety of scientists from China, the British Empire and Latin America to obtain the inclusion of science at UNESCO. These scientists did not only support Needham in his campaign but informed the project he defended and eventually conducted as director of the NS Division. By retracing the making of UNESCO science, chapter 2 and 3 challenged the still prevailing idea that UNESCO was the product of the sole agency of Great Power delegations which denied the part that non-state and non-western actors like Needham and his supporters played in the process. Second, UNESCO science was built on a constellation of ideals sparked by the turmoil of the 1930s and operationalized during the war. Needham and Huxley modelled their vision of international science and scientific peace-building based on fringe ideals of science like SRS and wartime practices of scientific exchange like the Empire's Scientific Liaison Offices. By showing the way interwar ideologies of science informed the shaping of UNESCO science, the first two chapters of this dissertation contest the still widely accepted origin story of UNESCO that cast the UN agency as a sharp break away from the interwar period.

After having reconstructed the making of UNESCO's science mandate and retrieved the ideals underlying the IIHA, I will examine in the second and last part of this dissertation how these ideals and the tensions dividing its promoters were eventually put to practice as the NS division undertook the construction of the IIHA in the heart of the Amazon.

Part **2**

SCIENTIFIC WORLDMAKING IN
THE JUNGLE



Figure 26 – Aerial view of the Amazon basin, c.1943

On August 12, 1947, Edred John Henri Corner, the field representative of UNESCO to Latin America, proposed to the Latin American delegates and scientists of the International Commission for the Hylean Amazon UNESCO's solution to the failing domestication of Amazonia: the International Institute for the Hylean Amazon (IIHA). In Belém, the historic portal of the Amazon Basin, Corner asserted to his audience of local diplomats and scientists that he came to “help forward the understanding and enjoyment of this vast terrain, the Hilean Amazonica” with a new possibility to discover and domesticate this “labyrinth of wonders” that had hitherto resisted man's grasp and grip. He promised to bring science to the benefits of Amazonians and build up in “a region where nature is so bountiful” the basis of a modern civilization. Corner further insisted on the international significance of the IIHA and the realm of its action, the Amazon, for the whole world. He added that, as he flew over the Amazon on his way to Belém, he “looked down on [the vast stretches of forest and water] and could not help seeing in the picture Nature's framing of a long peace”. Corner eventually concluded that the Amazon, “its greatest river and broadest forests”, had been “a schoolboy's dream, a young man's dream and still an old man's dream, unending” that the IIHA would finally materialize.¹

¹ ‘Appendix to resume of the general proceedings of the conference, Reply to the inaugural speech by his Excellency the governor of the State of Pará, on the opening day of the International Commission on the Hylean Amazon Project of UNESCO by E.J.H. Corner, principal field scientific officer, UNESCO, Latin America, and head of the Hylean Amazon project for UNESCO’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2-3.

Corner's exalted rhetoric in which dreams of immediate abundance and civilization were entangled with images of idyllic and yet lethal nature was by no means new. This dual representation had fed a plethora of technologically powered and scientifically guided plans to conquer the region as much as the latter's impenetrable forests wrecked these colonizing enterprises. Ranging from Marquis de Pombal's eighteenth century agricultural reforms, to the late nineteenth century rubber boom and including the early twentieth century monumental developmental projects like the 364km long Madeira-Mamoré railroad and Henry Ford's utopic factory, *Fordlandia*, the bulk of these trails of modernity failed to tame Amazonia's nature.² With the IIHA, Corner, and his assistant Malamos, hoped to break new grounds and bring the region out of its perceived misery and into the twentieth century. However, UNESCO did not set foot in what looked like a sleepy Eden to Corner but a politically disputed territory. Around the end of the war, a plurality of actors competed to refashion Amazonia. In Rio de Janeiro, statesmen of the Estado Novo (1937-1945) imagined Amazonia as the epicenter of Brazil's unification and modernization. In Washington, diplomats strived to turn the lush forest into the free world's largest reservoir of resources against the axis and the antagonizing USSR. Finally, a broad range of UN-sponsored scientific experts contemplated the cooperative exploitation of the region's immense resources to solve the pressing challenges of world reconstruction.

SCIENTIFIC WORLDMAKING

In the late 1940s, Amazonia galvanized the imagination of a variety of local and global actors. UNESCO's IIHA project came to catalyse what can be defined as worldmaking processes. Mark Mazower and David Milne used the notion of worldmaking to describe the shifting visions of respectively the world underlying post-WWII developmentalism and twentieth century American diplomacy.³ Milne used the notion to highlight how US

² On the Pombaline reforms: Barbara Sommer, 'Cracking down on the Cunhamenas: renegade Amazonian traders under Pombaline reform', *Journal of Latin American Studies* (2006) 38, pp.767-791; Kenneth Maxwell, 'The Spark: Pombal, the Amazon and the Jesuits', *Portuguese Studies* (2001) 17, pp.168-183; John Hemming, *Amazon Frontier: The Defeat of the Brazilian Indians*, London: MacMillan, 1987; Colin MacLachlan, 'The Indian directorate: forced acculturation in Portuguese America (1757-1799)', *The Americas* (1972) 28, pp.357-387; On the Madeira-Mamoré railroad: Renato Ignácio da Silva, *Madeira - Mamoré - Martírios: Caminhos da Ilusão*, São Paulo: RENIG, Editora e Assessoria Publicitária, 1991; Susanna Hecht and Alexander Cockburn, *The Fate of the Forest: Developers, Destroyers and Defenders of the Amazon*, London: Verso, 1989; Manoel Rodrigues Ferreira, *A Ferrovia do Diabolo: História de uma Estrada de Ferro na Amazônia*, São Paulo: Melhoramentos, Secretaria de Estado da Cultura, 1981; On Fordlandia: Greg Grandin, *Fordlandia. The Rise and Fall of Henry Ford's Forgotten Jungle City*, New York: Metropolitan Books, 2009; Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History*, New York: Cambridge University Press, 1987, p.67-86; Donald Kennedy and Marjorie Lucks, 'Rubber, blight and mosquitoes: biogeography meets the global economy', *Environmental History* (1999) 4, pp.369-383.

³ Mark Mazower, *Governing the World. The History of an Idea*, New York: The Penguin Press, 2012,

diplomats mobilized expert knowledge to design strategies to “make’ a world in which America is best positioned to thrive”⁴. It points out the actor’s belief that with the help of expert knowledge the world could be made or remade. For Mazower and Milne, the concept thus helps to underline worldviews that transcend traditional socio-political structures and, helped by science, explore the possibility to enact different national and international orders. Inspired by Mazower and Milne’s pioneering use of the concept, I expand this notion of worldmaking to investigate the IIHA. Unlike them, I believe that science does not merely inspire policy-makers in their ‘making’ processes, but that the scientists and their technocratic ideals actually shape the possibility and the forms of these processes. In that regard, the notion is particularly relevant to investigate the IIHA as its creation occurred in a decade – i.e., the 1940s – that witnessed the rise of the scientist in the conduct of political and diplomatic affairs.⁵ Understanding the creation of the IIHA in terms of worldmaking processes therefore helps to bring to the fore the scientists and the ways they proposed to scientifically view the –social and natural – world and how they intended to “(re)make” it accordingly (i.e., in line with its assumed natural/historical course). Finally, the notion of worldmaking enables to deconstruct the ‘making’ processes associated to the IIHA and therefore stress their socially constructed nature. Unlike what their promoters advocated, these scientifically informed visions reflected not so much nature’s ways, but rather the norms, practices and ideals of specific local contexts. Despite a similar appeal to the transformative power of science, the competing worldmaking visions associated to the IIHA stemmed from very distinct political and scientific backgrounds and conveyed in turn relatively different notions of tropical nature and international order.

I will argue that between 1947 and 1954, three worldmaking visions competed and dominated the long debates on the future institute’s organization, functions and purposes: Tropical ecumenism, pan-Amazonian positivism and Brazilian technocratic developmentalism. Needham and the NS division designed the ecumenical view of Amazonia and the tropics based on Needham’s ecumenical principle and inspired by the modernizing reform ideals of the British Empire. For Needham, Corner and his staff at the NS division – whom I refer to as the zonal ecumenists –, the IIHA was the platform from which scientists could lay down the foundations of a new international society in the heart of Amazonia. The local scientists involved however quickly differed from UNESCO’s internationalist scheme. Carneiro and his cohort of Latin-Americanist positivists pursued a long-held dream to inaugurate a pan-Amazonian civilization rooted in the precepts of

p.278-281.

⁴ David Milne, *Worldmaking. The Art and Science of American Diplomacy*, New York: Farrar, Strauss and Giroux, 2015, p.10.

⁵ For relevant references see, chapter 1, footnote 32, 33, 36 and 37.

Table 1: Worldmaking visions at the IIHA

	Tropical Ecumenism	Pan-Amazonian positivism	Brazilian technocratic developmentalism
What	The unification of the tropics	The creation of a Pan-Amazonian civilization in the service of Latin-America's political and cultural integration	The brazilianization of the Amazon and the modernization of Brazil
Who	The zonal ecumenists: UNESCO staff (Needham, Huxley, the natural science section, Corner, Malamos, ...)	The Latin-Americanist positivists: Carneiro, the members of the Belém commission, the interim commission of the IIHA, the local positivists involved, local Amazonian authorities	The Brazilian technocratic nationalists: intertwined two groups: Arthur Reis' Amazonian developmentalists and Alvaro Alberto da Motta e Silva's techno-scientific nationalists. The Amazonian developmentalists: the planners of the SPVEA and the INPA and Brazil's elite development planners more generally The military-scientific nationalists: the organizers and members of the CNPq and Brazil's techno-scientific elite
IIHA's shape	International laboratory (universally open)	Amazonian Laboratory (regionally open)	Brazilian Laboratory (regional/nationally limited)
Science and scientific ideologies	Internationalist function: international scientific cooperation for peace Zonal universalism: producing knowledge relevant to all tropical zones. Fundamental Human ecology: fundamental science first to enable applied research for sound local development	Regionalist function: enhance regional concord through cooperation Regionalism with universal implications: producing knowledge relevant for local Amazonian issues, which may generate universally relevant insights. Practical Human ecology: knowing to provide local solutions for the exploitation of the Amazon	Nationalist function: Science as instrument of national advancement Scientific nationalism: science as a national resource. Scientific modernization: applied science to exploit, dominate and modernize Amazonia; applied science in the service of the Brazilianisation of Amazonia and the advancement of Brazil
New spaces	Turning Amazon into an international space/society	Building hylean civilization/solidarities	Brazilianize Amazonia; strengthening Brazil's sovereignty and national integrity.

Comtean positivism. They envisioned the IIHA as the outpost of a tropical civilization that would bind the multi-national Amazonian society by stimulating local social change through scientific research. The last vision corresponded to the burgeoning techno-developmental nationalism that Third World countries came to champion a decade later. Opposed to the internationalist aspirations of UNESCO and sceptical of the regionalism of the local positivists, Brazil's rising technocratic nationalists rejected the IIHA and agreed to replace it by the Superintendence for the Planning of the Economic Valorisation of the Amazon (SPVEA), the National Research Council (CNPq) and the National Institute for Amazonian Research (INPA). These national agencies were created to conquer backward Amazonia and advance the maturation of Brazil as a modern and independent country through it.

RECONSTRUCTION IN THE TROPICS

The IIHA has received significant scholarly attention over the past two decades.⁶ While most research focused on the causes of the IIHA's demise, some went further and traced the legacy of the IIHA's failure on the institutionalization of Brazilian science.⁷ As opposed to the existing literature, I shed a new light on this episode by focusing on the three worldmaking processes that arose and crystalized around and against the IIHA. In the next three chapters, I revisit the IIHA and Brazil's new developmental trinity as related but neglected episodes of the post-WWII reconstruction process and retrieve Amazonia as one of its important political stages. I will reconstruct these worldmaking processes and explore how Amazonia and its primordial nature were imagined and disputed as a new frontier of modernity. Just as Europe was a laboratory of reconstruction in the late 1940s, I demonstrate that Amazonia, and more broadly tropical nature became the laboratory for scientists and science-minded administrators alike to craft new social and international orders. I will pay attention to the way science permeated these projected visions and, more specifically, how its granted social and international functions challenged or reinforced

⁶ Marcos Chor Maio and Magali Romero Sá even pointed out in an exhaustive review of the existing literature on the IIHA that Brazilian scholars had scrutinized the IIHA experience since its demise in the early 1950s, see Marcos Chor Maio and Magali Romero Sá, 'Ciência na periferia: a UNESCO, a proposta de criação do Instituto Internacional da Hiléia Amazônica e as origens do INPA', *História, Ciências, Saúde – Manguinhos* (2000) 4, pp.975-1017, p.976-977.

⁷ Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50; Rodrigo Cesar da Silva Magalhães and Marcos Chor Maio, 'Desenvolvimento, ciência e política: o debate sobre a criação do Instituto Internacional da Hiléia Amazônica', *História, Ciências, Saúde – Manguinhos* (2007) 14, pp.169-189; On the local legacy of the IIHA, see: Marcos Chor Maio, 'A UNESCO e o projeto de criação de um laboratório científico internacional na Amazônia', *Estudos Avançados* (2005) 19, pp.115-130; Maio and Sá, op. cit. (6).

the existing social organization dominated by the nation state and its international order centered on the West. Despite the IIHA's failure, I finally show that all three worldmaking visions – tropical ecumenism, pan-Amazonian positivism and Brazilian technocratic developmentalism – left both local and global imprints on the political and scientific landscape.

This inquiry into the making of new worlds in the Amazonian jungle, calls for several historiographical shifts. The first has to do with the approach of failed international institutions. I will scrutinize the IIHA's making as a short but creative sequence following Susan Pedersen's call to look at international institutions beyond failure/success approaches.⁸ In a review of recent historiography on the League of Nations (LoN), Pedersen notes that despite the shortcomings and limitations of its policies, it is erroneous to consider that the League did not bear marks on twentieth century society. The League's Mandates Committee, for instance, while failing to introduce a new post-imperialist society, did in the end distribute new roles and produce new interactions and ways of thinking that significantly altered colonial rule.⁹ Following this approach, I will analyse what the making and un-making of the IIHA meant for the promotion of world peace, the spread and uses of science in the periphery and the conceptualization of the Amazon region. Just as it has been done with the LoN, the next three chapters contribute to a recent trend to view the UN beyond realism – i.e., as more than a mere extension of national interests – and explore the social, political and international impact of its actions.¹⁰

The second historiographical shift has to do with the period of the late 1940s, recently rediscovered as the era of reconstruction. Post-WWII reconstruction emerged as a historiographical object at the end of the Cold War and has since received significant scholarly attention. Reconstruction corresponds to the short but creative time window separating the end of WWII and the full-blown advent of the Cold War by the early 1950s, when a wide range of alternative worldmaking processes flourished. As pointed out by Mazower, reconstruction is a rich and growing historiographical subject.¹¹ Recently, a body of literature focused on the technocratic approach that came to dominate the reconstruction question in the 1940s and questioned its political implications at the national and international level. Pioneered by the work of John Krige, this literature uncovered how nation states actively enrolled science in international affairs and

⁸ Susan Pedersen, 'Back to the League of Nations', *American Historical Review* (2007) 112, pp.1091-1117.

⁹ Susan Pedersen, 'Samoa at Geneva: Petitions and peoples before the Mandates Commission of the League of Nations', *Journal of Imperial and Commonwealth History* (2012) 40, pp.231-61.

¹⁰ On the legacy and impact of UNESCO's action, see the newly published book by Poul Duedahl, *A History of UNESCO. Global Actions and Impacts*, London: Palgrave MacMillan UK, 2016.

¹¹ For an overview of the range of historiographical issues posed by the reconstruction period, see: Mark Mazower, 'Reconstruction: the historiographical issues', *Past and Present*, (2011), 210 supp_6, pp.17-28.

reorganized it to strengthen their military, diplomatic and cultural influences throughout the 1940s.¹² More recently, John Krige and Jessica Wang furthered these investigations in a special issue of *History and Technology* (2015) by examining how political elites mobilized the transformative power of science and technology to imagine new futures, orient nation-building and modernize state formation to meet the challenges and uncertainty of the postwar world.¹³ So far the historiography's focus has gravitated around Europe. Even though recent work has attempted to broaden the analysis to include the Global South, the reconstruction process remains studied and built as a predominantly Western subject, despite the war's worldwide implications.¹⁴ The literature has overall mainly focused on Europe and North America and has scrutinized almost exclusively Big Science projects such as satellite technology, nuclear research and the making of the atomic bomb.¹⁵ Overall little attention has been paid to the Global South, and even less so to so-called natural spaces like Amazonia in understanding reconstruction. Just as for the atomic bomb, the IIHA and Brazil's alternative trinity entailed shifting notions of world order and nation-building revealing the Global South and tropical nature as significant yet disregarded sites of reconstruction.

Investigating the IIHA and its replacement as episodes of reconstruction contributes to retrieve Amazonia's role in contemporary world history. In the footsteps of critical anthropologists who contested the a-historical and a-social conception of the Amazon in the late 1980s, historians have increasingly recognized Amazonia's rich economic, social and political history.¹⁶ While some demonstrated the nineteenth century Amazonian rubber industry as a significant building block of global Capitalism, others revealed Amazonia as a coveted territory. Amazonia's natural resources sparked fierce territorial competition between local and global powers as early as the seventeenth century. This colonial scramble

¹² John Krige and Kai-Hendrik Barth, 'Science, technology and international affairs', *Osiris* (2006) 21, pp.1-21; Naomi Oreskes and John Krige (eds.), *Science and Technology in the Global Cold War*, Cambridge: MIT Press, 2014.

¹³ John Krige and Jessica Wang, 'Nation, knowledge and imagined futures: science, technology and nation-building, post-1945', *History and Technology* (2015) 31, pp.171-179.

¹⁴ Although underrepresented, the Global South has recently received greater attention, see for instance the articles published in the special issue of *History and Technology* (2015) edited by John Krige and Jessica Wang but also: Jahnvi Phalkey, *Atomic Stage. Big Science in Twentieth Century India*, Ranikhet: Permanent Black, 2013; Joshua Barker, 'Engineers and political dreams. Indonesia in the satellite age', *Current Anthropology* (2005) 46, pp.723-747.

¹⁵ Francis Gavin, *Nuclear Statecraft. History and Strategy in America's Atomic Age*. Ithaca: Cornell University Press, 2012; John Krige, 'Atoms for peace, scientific internationalism and scientific intelligence', *Osiris* (2006) 21, pp.161-181.

¹⁶ Hecht and Cockburn, op. cit. (2); Marianne Schmink and Charles Wood (eds.) *Frontier Expansion in Amazonia*, Gainesville: University Press of Florida, 1984; More recently, see: Stephen Nugent and Mark Harris, *Some Other Amazonians. Perspectives on Modern Amazonia*, London: Institute for the Study of the Americas, 2004; Paul Little, *Amazonia: Territorial Struggles on Perennial Frontiers*, Baltimore & London: John Hopkins University Press, 2001.

in the heart of the Amazon had global and regional political implications. The disputes around Amazonia's vast forests participated in remodeling European Empires, creating new independent nation states such as Brazil, Peru and Bolivia as well as advancing Pan-American relations.¹⁷ More recently, environmental historians addressed the man-made nature of Amazonia and showed, for instance, how Brazil's ecologically damaging modernization policy precipitated the globalization of environmental issues such as deforestation in the 1980s.¹⁸ Overall, if this diverse Amazonian historiography contributes to interrogate Amazonia's naturality, Manuela Picq and Seth Garfield have argued that the region's share in the political, cultural and economic construction of the modern world still remains to be researched. Both authors regret that unquestioned ontological and epistemological reasons continue to exclude Amazonia from global contemporary history.¹⁹ According to Picq and Garfield, the widespread representation of Amazonia as predominantly natural combined with the region's uncomfortable position on the margin of the grand narratives of Capitalism and the nation state still impede the recognition of the region as a crucial part in forging what we know as the modern international and social order. By investigating the IHA's worldmakings processes as episodes of technocratic reconstruction, I intend to show in the next three chapters Amazonia's role in the shaping of contemporary world politics.

¹⁷ Teresa Cribelli, 'Nationalism and the search for agro-industrial commodities in 19th century Brazil', *Journal of Latin American Studies* (2013) 45, pp.545-579; Michael Stanfield, *Red Rubber, Bleeding Trees: Violence, Slavery, and Empire in Northwest Amazonia, 1850-1933*, Albuquerque: University of New Mexico Press, 1998; Susanna Hecht, *The scramble for the Amazon and the "Lost Paradise" of Euclides da Cunha*, Chicago: Chicago University Press 2013; Seth Garfield, *In Search of the Amazon. Brazil, the United States, and the Nature of a Region*, Durham and London: Duke University Press, 2013; Xenia Wilkinson, *Tapping the Amazon for Victory: Brazil's Battle for Rubber of World War II*, Dissertation submitted to Georgetown University, 2009.

¹⁸ David Cleary, 'Towards an environmental history of the Amazon: from prehistory to the nineteenth century', *Latin American Research Review* (2001) 36, pp.65-95; Antoine Acker, "'O maior incêndio do planeta': como a Volkswagen e o regime military Brasileiro acidentalmente ajudaram a transformar a Amazônia em uma arena política global", *Revista Brasileira de História* (2014) 34, pp.13-33.

¹⁹ Garfield, op. cit. (17); Manuela Picq, 'Rethinking international relations from the Amazon', *Revista Brasileira de Política Internacional* (2016) 59, pp.1-17.

Chapter 4

UNESCO'S ECOLOGICAL WORLD ORDER:
BUILDING TROPICAL ECUMENISM IN
THE AMAZON

“Our mission is to see if it is possible to bring into the Amazon region the knowledge that expeditions have gained about it and to use this knowledge for the benefit of its inhabitants [and] build up a new source of [scientific] enterprise which will care for and protect the character of the region”.¹ With these, pronounced as part of his opening speech to the ‘International Commission for the IIHA’ in Belém in August 1947, Corner championed the IIHA as a forward-looking initiative and stressed that the future institute would bring an auspicious future for the region. “[By] enlisting the energy and enthusiasm of explorers and investigators from all parts of the world”, the IIHA, Corner promised, would harness the power of science to overcome the historical “difficulty man find in living in a region [like the Amazon] where Nature is so bountiful”.² As Corner further explained, the aim of the IIHA was to explore “the richness and peculiarity of the Amazon’s dense forests, which holds so much for science” and in doing so, develop “knowledge for the benefit of its inhabitants” whose impoverishment, disease and destruction, Corner believed, stemmed from his misuse and misunderstanding of his forested surroundings.³ The IIHA was therefore about bringing the world community of science to “establish in the region itself a permanent organisation for scientific, educational and cultural progress” in the service of the inhabitants of the Amazon.⁴

Although Corner insisted on the value of the IIHA for the Amazon, the NS division conceived the future institute as a project of global significance. In Paris, Needham, Corner and the staff of the NS division conceived the IIHA as the center of a web of international research stations that they hope to spread across all the tropical zones of the world. For Needham, the IIHA was to become a scientific lighthouse in the Dark

¹ ‘Appendix to resume of the general proceedings of the conference, Reply to the inaugural speech by his Excellency the governor of the State of Pará, on the opening day of the International Commission on the Hylean Amazon Project of UNESCO by E.J.H. Corner, principal field scientific officer, UNESCO, Latin America, and head of the Hylean Amazon project for UNESCO’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

² ‘Appendix to resume of the general proceedings of the conference, Reply to the inaugural speech by his Excellency the governor of the State of Pará, on the opening day of the International Commission on the Hylean Amazon Project of UNESCO by E.J.H. Corner, principal field scientific officer, UNESCO, Latin America, and head of the Hylean Amazon project for UNESCO’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1-2.

³ ‘Appendix to resume of the general proceedings of the conference, Reply to the inaugural speech by his Excellency the governor of the State of Pará, on the opening day of the International Commission on the Hylean Amazon Project of UNESCO by E.J.H. Corner, principal field scientific officer, UNESCO, Latin America, and head of the Hylean Amazon project for UNESCO’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

⁴ ‘Appendix to resume of the general proceedings of the conference, Reply to the inaugural speech by his Excellency the governor of the State of Pará, on the opening day of the International Commission on the Hylean Amazon Project of UNESCO by E.J.H. Corner, principal field scientific officer, UNESCO, Latin America, and head of the Hylean Amazon project for UNESCO’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

Zone. With its network of field stations, the IIHA would contribute to turn the tropics – which represented a large section of the Dark Zone – into a workable research landscape. By extension, Needham thought the IIHA could consolidate the formation of a leading community of international scientists outside Europe and North America by creating a platform that would enable scientists from around the world to meet and study the tropics. For Needham and his staff the IIHA served international science as well as UNESCO's peace-building goals. By stimulating new scientific and cooperative patterns in the Dark Zone, the IIHA stimulated peaceful cooperation between scientists from the Bright and Dark Zone. But, and more interestingly, Needham and his staff contended that the IIHA would contribute to tackle the problems of tropical life and in doing so create new solidarities between the so far disparate and isolated communities populating the tropics. They claimed that the scientific work made possible by the IIHA would enable the formation of new scientifically forged communities between the world's tropical population, what I call zonal ecumenism.⁵

The way Needham and his staff, who I call the zonal ecumenists, conceived the IIHA and its wider worldmaking agenda was infused with Needham's ecumenical and periphery principles as seen in chapter 2. But to build the IIHA's vast scientific network, the zonal ecumenists also relied on the British and Dutch Empires. Under the impulse of Huxley and Corner, who both had worked as imperial scientists prior to their appointment at UNESCO, the zonal ecumenists looked up to the British and Dutch colonial scientific institutions, which they considered as the most organized and successful scientific enterprise outside the Bright Zone. The IIHA embraced the British Empire's rising ecological agenda in the tropics, replicated the scientific organisation within the Dutch field stations in Indonesia and strived to enrol the research staff and institutes of the British Empire into the IIHA's zonal network.⁶

This chapter will look at UNESCO's IIHA plans and explore the ties Needham and the zonal ecumenists established with the British and Dutch Empires. By explaining how they conceived the co-advancement of science and peace at the IIHA, I will illuminate the important role played by imperial experts and scientists in UNESCO's attempts to rebuild

⁵ UNESCO, *Science and UNESCO. International Scientific Cooperation. Tasks and Functions of the Secretariat's Division of Natural Sciences*, London: The Pilot Press, 1946, UA, UNESCO/Prep.Com./Nat.Sci. Com./12, p.12-15, p.18-20, p.42-45; 'UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.3-28.

⁶ Huxley pleaded for close cooperation between the scientific institutions of the British Empire and UNESCO during the Royal Society Empire Scientific Conference of 1946, see: Julian Huxley, 'Empire cooperation in the scientific field with UNESCO and other UN organizations', in *The Royal Society Empire Scientific Conference, June-July 1946, Report, Vol.II*, London and Edinburgh: Morrison and Gibb Ltd., 1948; On the British Empire's ecological outlook, see: Peder Anker, *Imperial Ecology. Environmental Order in the British Empire, 1895-1945*, Cambridge: Harvard University Press, 2001.

post-war peace. In chapter 2 we have seen how imperial scientists participated in the formation of UNESCO's scientific mandate. In this chapter, we will see that these scientists, but also their institutions, practices and worldviews continued to be a prevalent influence for the staff of the NS division to envision the IIHA and its peace-building mission. These relations between UNESCO's scientific staff and the British Empire illustrate the claims made by the New Imperial History that imperial agents became an important source of expertise in the emerging technical services of the UN.⁷ Investigating the ties between the zonal ecumenists and the British Empire regarding the IIHA, will substantiate these observed transfers. This chapter will therefore contribute to this literature by analysing how imperial experts, practices and worldviews travelled to UNESCO and guided the IIHA plans that Needham and the NS division undertook in the Amazon. This chapter will bring to the fore the Empire and its tropical territories as significant actors and spaces of the reconstruction of international peace at the end of the 1940s. Before delving into the NS division's imperial connection, let us first look at the way Needham and his staff designed the IIHA.

UNESCO'S ECUMENICAL AMAZONIA

In Belém, and despite the Amazonian emphasis of his speech, Corner did not present his audience with a regional research institute. Indeed, back in Paris, Needham and the zonal ecumenists had framed the IIHA to deal with the tropics at large. The future laboratory was to become the "main center for equatorial research" in the world and as such was supposed to spread beyond the Amazon and across the many tropical zones of the world via a large network of field stations scattered from Manaus to Malaya.⁸ The IIHA was to be made available to scientists from around the world and in the service of all human communities concerned by life in the tropics. With the IIHA, Needham and his NS division sought to expand the geographical boundaries of science and the scientists' range of research subjects by bringing under scientific scrutiny "the very inadequately known resources of the tropical rainforest zone".⁹

⁷ On the international careering of former colonial experts, see: Jennifer Gold, 'The reconfiguration of scientific career networks in the late colonial period: the case of the Food and Agriculture Organization and the British Colonial Forestry Service', in Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave MacMillan, 2011, pp.297-320; Joseph Morgan Hodge, 'British colonial expertise, postcolonial careering and the early history of international development', *Journal of Modern European History* (2010) 8, pp.24-46; Anthony Kirk-Greene, 'Decolonization: the ultimate diaspora', *Journal of Contemporary History* (2001) 36, pp.133-151.

⁸ 'UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.12.

⁹ 'UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.3-28, p.11-12.

The IIHA was the leading vessel of UNESCO's international science program and the model Needham hoped to later replicate for the study of the world's other understudied polar and arid zones. In a report to ECOSOC on the question of establishing UN-sponsored laboratories, Huxley, Needham and his ecumenist team explained the principles they used to design their program of international laboratories. They conceived these laboratories as a "concerted attack" on the Eurocentric organization of the sciences.¹⁰ The IIHA and the other international laboratories the NS division intended to build were modelled on a set of principles that aimed at overcoming the scientifically under-researched and underdeveloped Dark Zone. Based on Needham's memoranda, the principle of remoteness bound these laboratories to "gain knowledge which can only be acquired in places far away from the main centers of existing science", while the periphery principle charged them of providing the Dark Zone with the institutional and material conditions required to conduct research in these neglected places.¹¹

Developing the Dark Zone was however only a means to a broader end for Needham and his staff. The international laboratory initiative was geared towards the reinforcement of world peace, which the NS division sought to serve via a third principle: the principle of bio-geographical zone. Inspired by ecological research, this last principle aimed at establishing via UNESCO's laboratories "zonally organized research" across the globe, which as we will see entailed important peace-making implications for UNESCO.¹² Before turning to the origins of this "zonal conception" and reconstruct its worldmaking implications, I will first here look at UNESCO's IIHA proposals and examine how this concept of zonal research was used and what it entailed regarding the scientific study of the tropics.

The zonal perspective: Amazonia and the tropical zone

For Needham and the zonal ecumenists, the world had been so far unequally investigated. In their report to ECOSOC on the question of establishing UN international laboratories, Huxley, Needham, the Secretariat of UNESCO and the NS division pointed out that the existing scientific understanding of nature was essentially limited to the temperate environment typical of Europe and North America. Amazonia exemplified these shortcomings of science. Despite being recognized as "the largest drainage basin and

¹⁰ 'UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.17, p.25.

¹¹ 'UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.17, p.19.

¹² UNESCO, report on the question of United Nations research laboratories and observatories', 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.23.

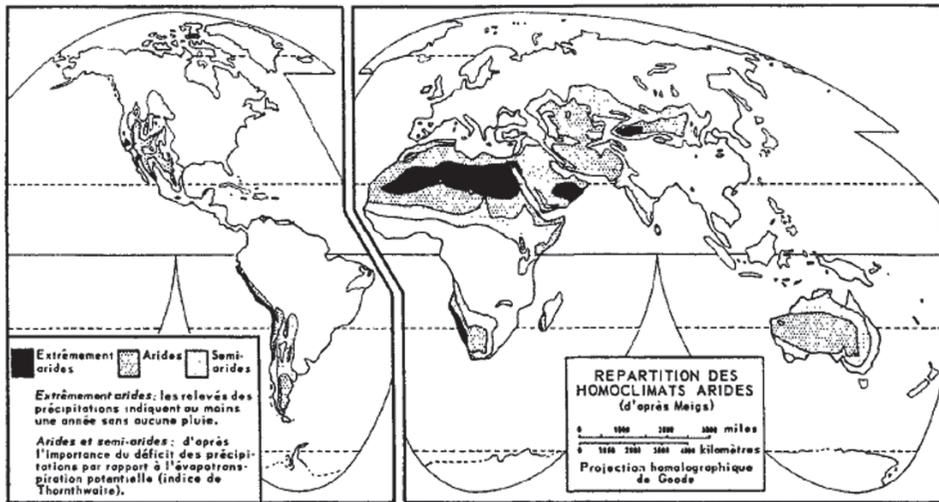


Figure 27 – The zonal view at work - map of the world's arid zones as seen by the Natural Science Division

the largest forest reserve in the world”, Needham noted in the report that “every kind of scientific work, botanical zoological, chemical, mineralogical, geological, anthropological, nutritional and medicinal, was needed to open up this vast reservoir and raise the standard of life of its inhabitants”.¹³ If Carneiro had proposed the IIHA to bring Amazonia under the full light of science, Needham and the zonal ecumenists pondered on the possibility to build up the proposed institute to deal with the tropics as a whole. They wondered, “[considering that] the Amazonian forest was only a part of the great equatorial rain forest which girdles the globe [...] could not institutes [like the IIHA] be formed to deal with problems common to all parts of this and other zones?”¹⁴ As they further clarified in a book detailing the program of the NS division, Needham and his staff believed that “instead of establishing an institute in the Amazon Basin solely oriented towards local problems, it might be desirable to establish there a center of international work oriented towards all tropical humidity problems in general, life and nutrition in rain-forest areas, tropicalisation of equipment, etc.”¹⁵

¹³ ‘UNESCO, report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.22-23.

¹⁴ ‘UNESCO, report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.23; For Carneiro’s proposal as received by UNESCO, see: Appendix IV, Preparatory Commission, natural science sub-commission, Suggestions for the scientific program of UNESCO by the Brazilian delegation, May 1946. Creation of an “International Institute of the Hylean Amazon”, UA, UNESCO/Prep.Com/Nat.Sci.Com/4, in ‘UNESCO, report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947.

¹⁵ UNESCO, UNESCO/Prep.Com./Nat.Sci.Com./12, op. cit. (5), p.45.

Needham and the NS division designed the IIHA based on a zonal representation of the world. For them, the world was divided into four climatic zones: the polar zone, the temperate zone, the arid zone and the humid equatorial zone. The humid equatorial zone designated the “gallery forest areas” and the “single equatorial rain-forest zone”, of which Amazonia was the most iconic representative, which they contrasted with the arid zone that “centered on the two desert belts” girdling the tropics.¹⁶ To each zone corresponded a set of problems peculiar to its climatic and environmental features. For instance, the major problems of the arid zones “concerned the absence of sufficient rainfall [and] the problem of erosion” whereas those of the tropical zone “were how to withstand humid heat”.¹⁷ Needham and his team postulated that by identifying and solving zonal problems such as excessive humidity the scientific program of the IIHA would benefit just as much to Amazonia as it would to Tropical Africa and Malaya.

As described in chapter 3, the NS section conceived the ecological program of the IIHA as both situated and mobile.¹⁸ IIHA research was neither strictly local, as the tropical ecological knowledge drawn from the Amazon was relevant beyond the immediate study range of the IIHA, nor fully universal as its circulation exceeded the Amazon basin but remained limited to the other tropical zones of the world alone. However, Needham and his staff observed that if each zone was affected by a set of common issues, only the temperate zone – or in other words Europe and North America – had been adequately studied so far. The other three were marked by scientific disregard and underdevelopment. For them, organizing and conducting the systematic exploration of these largely ignored environments constituted the core objective of the international laboratory initiative of UNESCO. If the IIHA was the first attempt of UNESCO at organising scientific research and institutions around the concept of zone, it was not going to be the only one. Needham, Huxley and the NS division designed the IIHA to become “a model international cooperative project” to be replicated for the arid and polar zones.¹⁹ Modelled on the IIHA,

¹⁶ ‘UNESCO, Report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.24.

¹⁷ ‘UNESCO, Report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.24.

¹⁸ On the importance and ambivalence of place in science, see: Stephen Bocking, ‘Situated yet mobile. Examining the environmental history of Arctic ecological science’, in Dolly Jørgensen, Finn Arne Jørgensen and Sara Pritchard, *New Natures: Joining Environmental History with Science and Technology Studies*, Pittsburgh: University of Pittsburgh Press, pp.164-178.

¹⁹ ‘Memorandum of instructions to Dr. Corner for guidance at the meeting of the Belém commission, including notes on the agenda’, 30 July 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1; Regarding UNESCO’s plan for the Antarctic zone, see: ‘Memorandum by Dr. Julian Huxley on possible internationalization of scientific research in the Antarctic’, 2 September 1947, CP, PC.RI.IH.05/memorandos 12/02/1948; For the arid zone, see: Joseph Needham, ‘Science and international relations’, fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NA, Folder G.70, p.8.

the NS division contemplated “a center for arid tropical problems [that] might be located at Bagdad, Khartoum or Alice Springs; a center for arid temperate problems at Lanchow [whereas] Northern Canada or Greenland might provide a site for an Arctic-Antarctic center”.²⁰

The IIHA’s goals were to boost the exploration of the tropics and build up the scientific apparatus whose absence had so far impeded tropical science and societies to progress. Located in the heart of Amazonia, the IIHA would stimulate zonal wide research by being “allied with a chain of smaller stations in areas such as Africa, Malaya, New Guinea, etc., where opportunities would be available for the study of the specific problems of those sectors of the zone”.²¹ With these laboratories, the zonal ecumenists at the NS division also sought to bring the Dark Zone on the scientific world map. They imagined the creation of the IIHA as an opportunity to renovate existing tropical institutions such as the Museu Goeldi in Belém and create new modern scientific infrastructure. While the Museu Goeldi would see its herbariums and botanical collections refurbished and expanded to become one of the largest international pools of tropical knowledge in the world, new subsidiary laboratories, forest reserves and botanical and zoological gardens would be created throughout the Amazon to facilitate zonal research in the field.²²

Building zonal research was a global enterprise. UNESCO’s zonal ecumenists enrolled the Amazonian states and other tropical countries like India in the creation of the IIHA but relied on the involvement of the world’s great centers of tropical science based in Europe and America to frame and organize its zonal research program. Here Needham’s *periphery principle* was essential here. Western participation was a means to hasten the inclusion of the IIHA and local scientific communities into the existing Western-based networks of tropical science. More pragmatically, however, enrolling non-Amazonian institutions was also perceived by Needham and his staff as an indispensable alternative to “circumvent the undoable challenge of building [the IIHA’s] own comprehensive library, collections and staff of specialists” which were not readily available in Amazonia.²³ Hence,

²⁰ UNESCO, UNESCO/Prep.Com./Nat.Sci.Com./12, op. cit. (5), p.45.

²¹ ‘UNESCO, Report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.25.

²² On the renovation of the Goeldi Museum, see: ‘Conference on the International Institute of the Hylean Amazon; Report of the committee on natural sciences. Report of the subcommittee on botany’, ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947; on the concept of international pools of knowledge, see: ‘UNESCO, report on the question of United Nations research laboratories and observatories’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.14-15; On the creation of new zoological, botanical and economic garden, see: ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project’ and its ‘Appendix: Notes on biological work for the International Institute of Hylean Amazon’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502.

²³ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Ama-

long before any consultations with the local Latin American scientists directly concerned by the IIHA had been conducted, the NS division had invited American and European institutions such as the New York Botanical Garden to participate in the construction and scientific governance of the IIHA. They also planned to appoint several International Committees of specialists and nominate a handful of eminent scientists as “honorary or special consultants” to assist the IIHA’s scientific council.²⁴ More than mere advisors, these committees and consultants would define the research priorities the scientific council would eventually decide upon. Indeed, as Corner suggested, the director of the IIHA, appointed by UNESCO, should be empowered to consult these committees and call international meetings of specialists “before developing any line of work” to consider “the exact nature of the work of the institute”, “the question of associate institutes” to involve and “the program of work, both short- and long-term”.²⁵ Finally, as we have seen in chapter 3, highly qualified Western researchers were also sought to prepare the daily research work of the IIHA, which Needham and his zonal ecumenists deemed fitter than locals to carry out these tasks in accordance to the highest scientific standards.

Human ecology: zonal research and international solidarities

In spite of the involvement of top-notch scientists from Europe and America, the scientific study of the tropics remained in the eyes of the zonal ecumenists a tremendous challenge for the future institute. For Needham and his staff, the equatorial tropics were a challenge to science and humanity and Amazonia the quintessence of the tropical forest’s mysteries, perils and promises. Despite the region’s rich natural supplies, Corner noted that “obstruction through superabundance of trees, disease through excessive humidity and malnutrition through ignorance of suitable agriculture”, historically “impeded human progress” in the region.²⁶ From his in-field observations, he concluded that Amazonians were stuck in “the primary phase of the battle against nature”.²⁷ For the zonal ecumenists, this primitive relation to nature explained the scientific backwardness of the tropics. They regretted that occupation of tropical land had not been guided by science and deplored

zon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.3.

²⁴ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.3.

²⁵ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.3.

²⁶ ‘Hylean Amazon Project, UNESCO. Notes by E.J.H. Corner’, 22 September 1947, CP, PC.RI.IH.04/Projetos 22/09/1947 to 23/10/1948, p.8.

²⁷ Edred John Henri Corner, ‘Biologia tropical: um problema internacional’, undated, CP, PC.RI.IH.02/Ensaio S/D, p.3.

that scientific insights on the tropics were either obsolete or missing entirely.²⁸ Before thinking about development, Needham and his team judged that “a great deal more must be known about the land, its plants and animals and about the ways of life of the people that have lived on the land during many centuries.”²⁹ They postulated that human ecology could provide the adequate perspective so far missing to overcome tropical challenges to human life.

Needham and the zonal ecumenists sought to establish the IIHA as a world-leading laboratory in human ecology.³⁰ The human ecological approach consisted in studying vegetal, animal and human life together as inter-connected processes shaped and being shaped by their common habitat. The resulting knowledge would make it possible “to figure out the optimum requirements for human existence in the humid tropics” and, as the zonal ecumenists advocated, inform the maintenance and development of human society throughout the world’s equatorial zone.³¹ This “modern approach to the theater of trees” entailed some radical breaks with traditional study and management of tropical environments.³² For the zonal ecumenists, human ecology was a departure from conventional, desk-based, disciplinary-centered tropical research. In a paper defending an ecological approach to tropical biology, Corner reasserted a long standing trope of field biology that researchers had to “study the living not the dead”, close their obsolete collections of dead matter and leave their European laboratories to “go to the tropics” to understand the tropical life “in its living state, within its environment.”³³ Field-based

²⁸ Corner argued for instance that the Amazon region “may be considered as one of the least bright parts of the world”, in ‘Hylean Amazon Project, UNESCO. Notes by E.J.H. Corner’, 22 September 1947, CP, PC.RI.IH.04/Projetos 22/09/1947 to 23/10/1948, p.9.

²⁹ ‘UNESCO, International Institute of the Hylean Amazon (IIHA), the Hylean Amazon: a challenge to man by F. J. Malina’, 17 January 1949, UA, UNESCO/NS/IIHA/20, p.1.

³⁰ On the historical origins of human ecology, see: Sharon Kingsland, *The Evolution of American Ecology, 1890-2000*, Baltimore: Johns Hopkins University Press, 2005; Eugene Cittadino, ‘The failed promise of human ecology’ in Michael Shortland (ed.) *Science and Nature. Essays in the History of the Environmental Sciences*, Oxford: British Society for the History of Science, 1993, pp.251-283.

³¹ ‘UNESCO, The Hylean Amazon Project’, 28 May 1947, UA, Nat.Sci./Lat.Am./Hyl./1, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

³² ‘UNESCO, The Hylean Amazon Project’, 28 May 1947, UA, Nat.Sci./Lat.Am./Hyl./1, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

³³ Although Corner depicted in-field tropical biology as a break in tropical research, Raf de Bont and Robert Kohler showed that the idea of investigating natural life within its environment was by this time an accepted trope in biological research for more than seventy years see: Raf de Bont, *Stations in the Field: a History of Place-Based Animal Research, 1870-1930*, Chicago: University of Chicago Press, 2015 and Robert Kohler, *Landscapes and Labscales. Exploring the Lab-Field Border in Biology*, Chicago: University of Chicago Press, 2002; ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project’ and its ‘Appendix: Notes on biological work for the International Institute of Hylean Amazon’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.8; Edred John Henri Corner, ‘Biologia tropical: um problema internacional’, undated, CP, PC.RI.IH.02/Ensaio S/D, p.3.

and locally sourced research was erected as the IIHA's guiding ecological principle. For Needham and his staff, field ecological knowledge enabled "the study of the natural inhabitants of the Hylean Amazon as the best suited to the region" and prevent "opening up nature in ignorance and wholesale destruction of its wealth".³⁴ Rather than "improving soil-productivity by the introduction of foreign plants and animals", the IIHA sought to design ecologically sound solutions to fix, enhance, or construct liveable tropics from within.³⁵

The NS division's ecological conception of Amazonia and the tropics as an integrated whole required a new order of science. IIHA's human ecology agenda involved a multiplicity of disciplines like zoology, anthropology and botany, which the zonal ecumenists strived to string together in interdisciplinary projects such as the "study of forest-lake formations" or the "hydrobiology of lagoons in relation to fisheries".³⁶ For Needham, Huxley and Corner, IIHA's ecological perspective implied to blur the binaries of pure-applied and social-natural science that conventionally structured science. They argued that "human ecology will naturally bring the institute in relation with problems of public health, nutrition, occupation, [...] and most other basic concerns of government" and lead the different sections of the institute to work together.³⁷ Needham and his staff considered for instance that interdisciplinary research teams composed of anthropologists, ethnologists, social scientists as well as tropical disease and nutritional experts were best suited to adequately study local communities.³⁸ Instead of organizing research by disciplines, ecology unified the research agenda of the IIHA.

Needham's zonal ecumenists clustered research around *both* a regional and a zonal focus to produce knowledge relevant to both Amazonian needs and the needs of the world's other tropical communities. Although they defined zonal research as the main priority of the IIHA, they included regional research for both ecological and political reasons. Regional research pertained to the study of issues specific to the Amazon forest and its alteration by man. It also "gave first consideration to the needs of Latin American countries" in order to reinforce their financial involvement in the project which the

³⁴ 'UNESCO, The Hylean Amazon Project', 28 May 1947, UA, Nat.Sci./Lat.Am./Hyl./1, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

³⁵ 'UNESCO, The Hylean Amazon Project', 28 May 1947, UA, Nat.Sci./Lat.Am./Hyl./1, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

³⁶ 'Hylean Amazon Project, UNESCO. Notes by E.J.H. Corner', 22 September 1947, CP, PC.RI.IH.04/Projetos 22/09/1947 to 23/10/1948, p.7-8.

³⁷ 'UNESCO, The Hylean Amazon Project', 28 May 1947, UA, Nat.Sci./Lat.Am./Hyl./1, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2.

³⁸ 'Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon', 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947.

IIHA's finances heavily depended on.³⁹ The regional focus enabled the main sponsors of the institute to address the specific needs associated to areas such as Amazonia's cooler northern mountain range or its south-western grasslands. It also granted them priority use of the planned Amazonian field stations. The NS division for instance agreed to lend the Riberalta institute half the year to the exclusive use of Amazonian countries in exchange of their financial support to the IIHA.⁴⁰

Zonal research, on the other hand, "pertained to the conditions and peculiarities of the humid tropics in general".⁴¹ It focused on both fundamental and practical issues such as soil science or river fisheries as long as they bore a zonal aspect. Needham and the zonal ecumenists prioritized zonal research because it could yield a better understanding of the basic interrelations between man, plants and animals in equatorial settings that was thought necessary to design adequate interventions to facilitate human settlement and nature protection. They announced that the knowledge produced at the IIHA "would supply to economic planners the basis for useful exploitation of the area for the benefit of the people of the world as well as those in the area".⁴² To carry out this vast plan, which exceeded UNESCO's limited manpower and resources by far, Huxley, Needham and their team of zonal ecumenists turned to the administrations of colonial Empires and their well-established expertise on the tropics.

THE COLONIAL TEMPLATE

The British colonial Empire and its scientific expertise had already a strong influence on UNESCO science. In chapter 2, we saw how Needham modelled his ISCS and the FSCOs after the SLOs connecting London and the Commonwealth during the war. In Chapter 3, we discussed how Needham's *periphery principle* led him to appoint Corner and Malamos, two former colonial scientists, to carry out the work of UNESCO's Latin American FSCO as well as to conduct the creation of the IIHA. Under Huxley's impulse, Needham and his coalition of zonal ecumenists continued to look towards the colonial Empires and their scientific institutions to model the IIHA.

³⁹ 'Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project', 31 March 1947, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.3.

⁴⁰ 'Report of the scientific commission of the Hilea Amazonica de Bolivia', 5 February 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948, p.3.

⁴¹ 'Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project', 31 March 1947, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.3.

⁴² 'Memorandum of instructions to Dr. Corner for guidance at the meeting of the Belém commission, including notes on the agenda', 30 July 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.5.

Huxley's imperial connections

The technocratic reforms and scientific policies developed by the British Empire appeared as an inspiration for UNESCO's zonal ecumenists in the design of the IIHA. Huxley and Needham's interest for the reorganisation of the British colonial sciences in the 1930s-1940s can be explained by their own personal trajectories. While Huxley had been closely involved with British Colonial Africa in the 1930s and was one of the many British scientists that the Colonial Office enrolled to design its scientific policies in the 1940s, Needham worked with Imperial scientists from India and Australia during his mission in Chongqing. Needham and Huxley's colonial connection also reflected the growing role the British Empire came to play in Britain's scientific life from the mid-1930s. As Sabine Clarke demonstrated, the Colonial Office enrolled since the early 1930s large numbers of eminent Britain-based scientists like the physiologist Archibald Vivian Hill and prominent metropolitan organizations such as the Royal Society and the Department of Scientific and Industrial Research (DSIR) to design colonial scientific reforms and conduct research on the British tropics.⁴³ The Colonial Office also became a powerful actor in the expansion of research in Britain following the creation of the Research Fund in 1940, which commanded the second largest sponsor of scientific research in the metropolis until 1950.⁴⁴ With the Research Fund, the Colonial Office hired the services of the universities of Cambridge, Birmingham, Liverpool, Manchester and the Imperial College to carry out research relevant to the tropics.⁴⁵ As members of Britain's elite science, Needham and Huxley were therefore likely to be acquainted with or, in the case of Huxley, active participants in the scientific reform of the British Empire.

Huxley activated his colonial connections for the IIHA. Like Needham, who appreciated the work of the CSLO, Huxley kept the colonial sciences in high regard. Before his appointment as Director-General of UNESCO, Huxley had been closely involved with the technocratic turn the Colonial Office engaged in the early 1930s to modernize the British Colonial Empire. The Colonial Office Advisory Committee on Native Education appointed him to conduct fieldwork in East Africa in 1929.⁴⁶ Out of this enterprise, Huxley published *Africa View* in 1932, which earned him a reputation at the Colonial Office regarding scientific and development policy.⁴⁷ Two years later, Huxley was made a member of the general

⁴³ Sabine Clarke, 'A technocratic imperial state? The Colonial Office and scientific research, 1940-1960', *Twentieth Century British History* (2007) 18, pp. 453-480.

⁴⁴ Clarke, *op. cit.* (43), p.456-457.

⁴⁵ Charles Joseph Jeffries, *A Review of Colonial Research, 1940-1960*, London: Her Majesty's Stationary Office, 1964.

⁴⁶ Anker, *op. cit.* (6), p.128.

⁴⁷ Julian Huxley, *Africa View*, London: Chatto & Windus, 1932.



Figure 28 – Edred Corner with one of the «botanical monkeys» that he famously used to help him collect field specimens, Singapore, c.1940-1944



Figure 29 – Julian Huxley photographing mud-hopper fish off a mangrove swamp near Dar-es-Salaam, Tanganyika, c.1932

committee of Lord Hailey's *African Research Survey* and played a significant role in the appointment of the ecologist Edgar Barton Worthington for the scientific section of the survey.⁴⁸ Hailey's *African Survey* and Worthington's *Science in Africa* would become the bedrock of the Colonial Office's large-scale colonial reform of the 1940s and, as we will see below, the model that Needham's zonal ecumenists used to design the zonal research agenda of the IIHA.⁴⁹

Huxley continued to participate in the Empire's modernization efforts following his appointment in 1943 as a member of the Demography Advisory Group, which counselled the Colonial Office and the Colonial Research Council on population issues.⁵⁰ Huxley was not only officially involved with the Colonial Office's scientific reforms, but regularly published books on the future of the British Empire in which he reasserted his trust in the evolutionary utility and efficiency of British colonial rule. Emma Hunter recalls for instance that Huxley asserted in his 1941 book *Democracy Marches* that developing the British Empire was a crucial part of the job of British democracy outside its own country.⁵¹ A year before his appointment at UNESCO, Huxley continued to demonstrate concern and interest for the Empire with the publication of the *Future of the Colonies* in 1944.⁵² For Huxley, the British Empire, and more specifically its scientific services, had a relevant role to play in the post-war world and at UNESCO.⁵³ Huxley activated his imperial connections and obtained, for instance, the authorisation from the Colonial Office to appoint Corner to lead the creation of the IIHA. Together, Huxley, Needham and Corner drew on the scientific policies inaugurated by the Colonial Office in the 1940s to model the IIHA.

The African Research Survey and the modernization of the British Empire through science

At the time of the creation of the IIHA, European colonial Empires had been undergoing some profound transformations. The colonial authorities of the British, Dutch and French

⁴⁸ Anker, op. cit. (6), p.129; Lord Hailey, *An African Survey. A Study of Problems Arising in Africa South of the Sahara*, London: Oxford University Press, 1938, p.vii.

⁴⁹ On Lord Hailey and the African Survey, see: John Cell, *Hailey: A Study in British Imperialism, 1872-1969*, Cambridge: Cambridge University Press, 1992.

⁵⁰ Karl Ittmann, 'Demography as policy science in the British Empire, 1918-1970', *Journal of Policy History* (2003) 15, pp.417-448, p.434; Karl Ittmann, 'The Colonial Office and the population question in the British Empire, 1918-1962', *Journal of Imperial and Commonwealth History* (1999) 27, pp.55-81, p.67-68.

⁵¹ Emma Hunter, *Political Thought and the Public Sphere in Tanzania. Freedom, Democracy and Citizenship in the Era of Decolonization*, Cambridge: Cambridge University Press, 2015, p.74; Julian Huxley, *Democracy Marches*, London: Chatto and Windus, 1941.

⁵² Julian Huxley and Phyllis Dean, *The Future of the Colonies*, Pilot Press Limited, 1944; see also: Julian Huxley, 'Colonies in a changing world', *Political Quarterly* (1942) 13, pp.384-399.

⁵³ On the way Huxley's biological ideas tie in with his conception of society and the role of Empire in particular, see Marianne Sommer, *History Within. The Science, Culture and Politics of Bones, Organisms and Molecules*, Chicago: University of Chicago Press, 2016, p.180-231.

Empires looked up to science and rational planning to reinvigorate the colonial rule.⁵⁴ With the development of colonial research, the imperial elites did not only transform the Empire's mission, governance and organisation but reinvented the colonial tropics. The technocratic shift of colonial rule became particularly acute for the British Empire in the 1940s and was closely associated to the African Research Survey conducted by Lord Hailey and Edgar Worthington a decade earlier.⁵⁵ Peder Anker pointed out that the African Research Survey culminated interwar discussions on Africa's development problems and the inadequate organization of Empire.⁵⁶ The African Research Survey was launched to explore new solutions to organize the continent and the Empire in a more productive way. Started in 1931, under the lead of Lord Hailey, an experienced colonial administrator, the survey was completed in 1938 with the publication of the massive 1837 page-long report, titled *An African Survey*.⁵⁷ Hailey had two objectives, collecting knowledge of all of Africa and recommending policy, which he did successfully as the Colonial Office made his *African Survey* the conceptual framework of the Empire's modernization until the early 1950s. Hailey surveyed a wide variety of problems ranging from economic development to labor and demography. The Survey also focused on issues of scientific research in Africa which Worthington investigated and published a year later in his *Science in Africa*.⁵⁸ Worthington's *Science in Africa* bore an influence on the development of colonial science in the 1940s that would prove just as important as Hailey's *African Survey* on the development policies of the Colonial Office.

⁵⁴ Although the 1940s marked a high time for the development of science in the colonies, colonial authorities had started to enrol science as early as the late 1890s. The turn of the century marked for the British Empire the birth of a 'science for development' movement. On the 'science for development movement', see the works of Michael Worboys who introduced the concept to depict the increasing enrolment in and influence of scientists on imperial administration and governance. Michael Worboys, *Science and British Colonial Imperialism, 1895-1940*, Dissertation submitted to University of Sussex, 1979; See also Michael Worboys, 'British colonial science policy (1918-1930)' in Patrick Petitjean (ed.) *Les Sciences Coloniales. Figures et Institutions*, Paris: Orstom Editions, 1996, p.99-111. On the British Empire's technocratic turn of the 1940s, see for instance: Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave Macmillan, 2011; On the Dutch Empire, see: Robert-Jan Wille. 'The co-production of station morphology and agricultural management in the tropics. Transformations in botany at the Botanical Garden at Buitenzorg, Java 1880-1904', in Denise Phillips and Sharon Kingsland (Eds.), *New Perspectives on the History of Life Sciences and Agriculture*, New York, Dordrecht & London: Springer, 2015, pp. 253-275; Andrew Goss, *The Floracrats. State-Sponsored Science and the Failure of the Enlightenment in Indonesia*, Madison: The University of Wisconsin Press, 2011; On the French Empire, see: Patrick Petitjean (ed.), *Les Sciences Coloniales. Figures et Institutions*, Paris: Orstom Editions, 1996.

⁵⁵ Helen Tilley, *Africa as a Living Laboratory. Empire, Development and the Problem of Scientific Knowledge, 1870-1950*, Chicago: University of Chicago Press, 2011, p.69-114; Sabine Clarke, 'The Research Council System and the politics of medical and agricultural research for the British colonial Empire, 1940-1952', *Medical History* (2013) 57, pp.338-358.

⁵⁶ Anker, op. cit. (6), p.124-128.

⁵⁷ Hailey, op. cit. (48); on the making of the African survey, see: John Cell, 'Lord Hailey and the making of the African Survey', *African Affairs* (1989) 88, pp.481-505.

⁵⁸ Hailey, op. cit. (48), p.1611-1633.



Figure 30 – British colonial administrator Lord William Malcolm Hailey, First Baron Hailey (1872-1969), 1929.

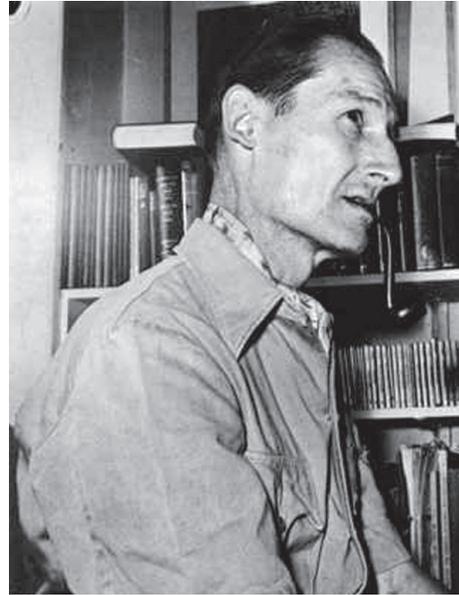


Figure 31 – British ecologist and science administrator for the British Empire Edgar Barton Worthington (1905-2001)

In his survey, Worthington approached Africa as a unified whole with the goal to pool the scattered and compartmentalized knowledge of Africa into one synthetic account of the ways in which scientific knowledge in fields such as forestry, plant industry or anthropology was produced and the extent to which it was applied to the colonies. For Worthington, the survey primarily highlighted how little of Africa had been explored, how dysfunctional the knowledge gathered was and how, in his view, the Empire's disregard for science impeded the development of civilization in the colonies. Nevertheless, Worthington saw in Africa's under-development reasons to be hopeful for the future of the Empire on African soil. "For the very reason that the greater part of Africa is still in the early stage of development, the continent", Worthington claimed, "may offer the most fruitful field in history for experiment concerning the place of expert scientific knowledge in land planning".⁵⁹

Worthington elevated land planning, or the analysis of the existing utilization and potentiality of land, into the fundament of any form of socio-economic intervention. He pleaded for an understanding of the land through global surveys and *in situ* fundamental research to plan adapted land utilization. Any development scheme designed without a

⁵⁹ Edgar Barton Worthington, *Science in Africa. A Review of Scientific Research Relating to Tropical and Southern Africa*, Oxford: Oxford University press, 1938, p.17, p18.

proper scientific foundation was in his eyes bound to fail and would bring about disastrous consequences on nature and human occupation. Good planning relied on fundamental research. Worthington however noted that scientists were too isolated from one another and confined by the colonial administration to the resolution of immediate and local problems. The Empire's development therefore required a profound reorganization of colonial expertise. Throughout his 746-page-long survey, Worthington challenged both the regional compartmentalization of the Empire's services and the organization of science in the colonies. He pleaded for the rise of fundamental scientific research in the colonies which he made the province of highly-qualified and experience researchers from the metropolis.⁶⁰ With this last plea, he wished to see the great universities of Britain play a greater role in the modern scientific development of Africa.

The recommendations made by Hailey and Worthington precipitated the adoption of the Colonial Development and Welfare Acts (CD&WA) in 1940 and 1945.⁶¹ According to the *New Imperial History*, the CD&WA marked the beginning of a technological and technocratic turn in the history of the British Empire.⁶² It institutionalized a new approach to colonial development dominated by ideas of planning, state-led interventionism and the scientific management of the colonial resources.⁶³ This technocratic shift implied an immense demand for new kinds of knowledge and experts leading the Colonial Office to sore from 8,000 to 18,000, mostly technical and scientific, officers in 1954.⁶⁴ To tackle these needs, the Colonial Office enrolled the Royal Society and Britain's research councils in several planning committees like the Colonial Research Committee (CRC). The goals of these committees were to provide a scientific foundation for colonial development, build up and systematize an in-depth understanding of tropical conditions as well as enhance the participation of the major centers of research in the West in this effort.⁶⁵ These

⁶⁰ Worthington, op. cit. (59), p.17.

⁶¹ The technocratic changes induced by the CD&WA were nothing new for the technical staff of the Colonial Office. Joseph Morgan Hodge showed that the use of science and planning had been already burgeoning within the Colonial Office's technical services as early as the late 1920s, see: Joseph Morgan Hodge, 'Science, development, and Empire: the Colonial Advisory Council on Agriculture and Animal Health, 1929-1943', *The Journal of Imperial and Commonwealth History* (2002) 30, pp.1-26; Joseph Morgan Hodge, *Triumph of the Expert. Agrarian Doctrines of Development and the Legacies of British Colonialism*, Athens: Ohio University Press, 2007.

⁶² Clarke, op. cit. (43).

⁶³ Hodge, op. cit. (61), p.179-180, p.207-209.

⁶⁴ Clarke, op. cit. (43), p.455; Anthony Kirk-Greene, *On Crown Service. A History of HM Colonial and Overseas Civil Services 1837-1997*, London: I.B. Tauris, 1999, p.51.

⁶⁵ Christian Jennings, 'Unexploited assets: imperial imagination, practical limitations, and marine fisheries research in East Africa, 1917-1953', in Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave Macmillan, 2011, pp.253-274, p.260-262; Sabine Clarke, "'The chance to send their first class men out to the colonies': the making of the Colonial Research Service", in Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-*

planning committees convinced the Colonial Office to expand fundamental research in the colonies and shift the Empire's technical services from regionally compartmentalized organisations to centralized and Empire-wide services.⁶⁶ Following the guidelines of the CRC, the Colonial Office created in 1950 a new and autonomous branch of the colonial service dedicated to scientific researchers, the Colonial Research Service. First suggested by Worthington a decade earlier, this novel Empire-wide Research Service consisted of a mobile corps of metropolitan scientists dedicated to undertake long-term research projects in the colonies. Meanwhile, other planning committees like the Committee for Colonial Agricultural, Animal Health and Forestry Research (CCAAHFR) established between 1944 and 1950 a considerable number of field stations and laboratories to enable scientific researchers from Britain to carry out field research in the colonies. Existing stations, such as the isolated Amani agricultural research stations in Tanganyika, were either inserted in an Empire-wide network or replaced by new regional research stations like the East African Agricultural and Forestry Research Organization.⁶⁷ In total, the Research Fund of the Colonial Officesponsored the creation of a coordinated network of about forty stations scattered throughout Africa, the West Indies and South East Asia between 1944 and 1951.⁶⁸ These concerned agriculture and animal health but also disciplines that had so far not been significantly supported by the Colonial Office such as fishery, tropical medicine and social sciences.⁶⁹

Colonial models: the IIHA, Buitenzorg and the imperial alliance at UNESCO

In Paris, Needham's zonal ecumenists had their eyes turned on the Colonial Office's reform of colonial science but also on the internationally renowned Buitenzorg botanical station of the Dutch Empire when imagining UNESCO's scientific mandate. Although Needham never referred to the work of the planning committees of the Colonial Office, his proposals to create an International Science Cooperation Service in 1943 closely resembled the CRC's 1942 plans to create a Colonial Research Service. The influence of

1970, Houndmills, Basingstoke, New York: Palgrave Macmillan, 2011, pp.187-208, p.188; Clarke, op. cit. (55), p.340; As Clarke pointed out the CRC was seen as the DSIR of the Colonial Office, Clarke, op. cit. (43), p.467, p.469-470.

⁶⁶ Brett Bennett, 'The consolidation and reconfiguration of 'British' networks of science, 1800-1970', in Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave Macmillan, 2011, pp.30-45, p.36; Hodge, op. cit. (61), p.2.

⁶⁷ Clarke, op. cit., p.345-346.

⁶⁸ For an overview see Sabine Clarke's table of institutions created with the research fund between 1940 and 1951 in Clarke, op. cit. (43), p.472-474.

⁶⁹ Clarke, op. cit. (43), p.474.

the Dutch and British Empire transpired more evidently in the case of the IIHA. Corner and his assistant Malamos, whom Needham had sent in Latin America to organize the construction of the IIHA and its web of field stations, took the field research laboratories of the Colonial Office as a template. In that regard, Corner and Malamos benefited from the colonial expertise of Huxley. Huxley had included a paper by the Dutch bryologist Frans Verdoorn on the Dutch Buitenzorg botanical station in Java in the working papers that were prepared to guide Corner and Malamos in sketching the preliminary design of the IIHA's facilities in Manaus.⁷⁰

For most of the first half of the twentieth century, Dutch colonial science and more specifically the Buitenzorg institute had enjoyed international fame as a model field station, especially among the Colonial Office's technical experts.⁷¹ In his paper, Verdoorn sought to revive the institute's past glory and erect it as a blueprint to develop postwar tropical research.⁷² For Verdoorn the success of the Buitenzorg stemmed from the efforts of Melchior Treub who during his directorship strived to organize the institute to accommodate visiting researchers from around the world.⁷³ In Treub's footsteps, Verdoorn thus prescribed a list of guiding organizational principles that he believed were "an economical and easy way" to promote research "in any part of the tropics."⁷⁴ Building upon his twenty years of colonial service in British Singapore and his field experience in Indonesia, Corner combined Verdoorn's principles and the British Empire's new international field stations to design his plan for the IIHA facilities.

Although the IIHA would never see the light of day, Corner drafted some elaborate designs for both the IIHA and its field stations. Like with Verdoorn and his British counterparts, Corner's aim was to design field stations that enticed high profile researchers

⁷⁰ Julian Huxley to Dr. Enrique Perez-Arbelaez, 26 February 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948; On Frans Verdoorn, see the short biography by Bert Theunissen, 'Frans Verdoorn (1906-1984) – Biohistorie', *Studium – tijdschrift voor Wetenschaps- en Universiteitsgeschiedenis* (2013) 6, pp.292-295.

⁷¹ Goss, op. cit. (54), p.59-76; Andrew Goss, 'Decent colonialism? Pure science and colonial ideology in the Netherlands East Indies, 1910-1929', *Journal of Southeast Asian Studies* (2009) 40, pp.187-214; Peter Boomgaard, 'The making and unmaking of tropical science. Dutch research on Indonesia, 1600-2000', *Bijdragen tot de Taal-, Land- en Volkenkunde* (2000) 162, pp.191-217. The Buitenzorg also inspired American ecologists to design their own tropical laboratories, see: Megan Raby, 'A laboratory for tropical ecology. Colonial models and American science at Cinchona, Jamaica' in Raf de Bont and Jens Lachmund, *Spatializing the History of Ecology. Sites, Journeys, Mapping*, New York, London: Routledge, 2017, pp.56-78.

⁷² 'UNESCO, report on the question of United Nations research laboratories and observatories, Appendix X. On the need for International Visitors' Research Stations in certain areas of the tropics by Frans Verdoorn, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, pp.84-90.

⁷³ Robert-Jan Wille and Megan Raby have shown how Buitenzorg served as a place for inter-imperial contacts as early as the late nineteenth century, see: Wille, op. cit. (54) and Raby, op. cit. (71).

⁷⁴ 'UNESCO, report on the question of United Nations research laboratories and observatories, Appendix X. On the need for International Visitors' Research Stations in certain areas of the tropics by Frans Verdoorn, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, pp.84-90, p.88.

to conduct field research “for periods of six months to two years in the tropics”.⁷⁵ The scientific experts of both Dutch and British Empires recognized that the appointment of expert permanent staff in the field and the existence of modern scientific facilities was as essential to the success of a field station as, as Verdoorn claimed, the availability of a “modern dormitory and restaurant”.⁷⁶ Likewise, Corner proposed that both the IIHA central institute and its associated field stations should be composed of “a minimum permanent staff and offered maximum facilities to visiting scientists whether for research or travel”.⁷⁷ Following a prospective visit in the Bolivian Hylea, Corner spelled out the organizing principles for the IIHA's field stations that he deemed UNESCO should recreate throughout the tropical zone. Suggesting to create a center for the southern region of the Hylean Amazon, Corner argued that this “future international center for the southern Hylea” in Riberalta should be large enough to “accommodate a library, a laboratory, a space for the storage and management of collections ...] and a natural forest reserve” to be used by visiting scientists to collect and process findings on the spot.⁷⁸ Finally, the Manaus institute and its field stations would be staffed with English speaking, “active staff, well acquainted with field conditions” and headed by high profile tropical specialists from scientific centers in Europe and the United States.⁷⁹

British colonial science was however more than a model. UNESCO contemplated actual cooperation with the field stations of the British Empire from the early days of the international laboratory program. Huxley, then the freshly appointed director-general of UNESCO, addressed the scientists of the British Empire in July 1946 at the RSESC in that regard. In his talk *Empire Cooperation in the Scientific Field with UNESCO and other UN Organisations*, he pleaded for greater cooperation between UNESCO's science section and the Empire's sciences in the tropical zone. Huxley argued that the Empire and UNESCO could mutually benefit from working together as both sought “to raise the amount and level of scientific personnel and facilities in the less favored regions of the world towards that prevailing in the more advanced regions”.⁸⁰ He also explained how the existing and future institutions of science in the Empire could contribute to the advancement of the

⁷⁵ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.1.

⁷⁶ ‘UNESCO, report on the question of United Nations research laboratories and observatories, Appendix X. On the need for International Visitors’ Research Stations in certain areas of the tropics by Frans Verdoorn’, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, pp.84-90, p.86.

⁷⁷ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.1.

⁷⁸ ‘Report of the scientific commission of the Hilea Amazonica de Bolivia’, 5 February 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948, p.3.

⁷⁹ ‘Tentative suggestions for the organization and work of an International Institute of the Hylean Amazon’, 28 May 1947, Nat.Sci./Lat. Am./Hyl./2, CP, PC.RI.IH.03/subprojetos 28/05/1947, p.1-2.

⁸⁰ Huxley, op. cit. (6), p.114.

work of UNESCO in the Dark Zone. For Huxley it was not only UNESCO that would benefit from the Empire's experience, manpower and institutions of tropical science. By joining forces, Huxley and the zonal ecumenists believed that UNESCO and the British Empire could lift up the underdeveloped regions of the world. Following the RSESC, Huxley maintained his efforts to enrol the British Empire Scientific institutions in UNESCO's zonal research program. In April 1947, Huxley put Corner in contact with the Empire's relevant authorities to conclude a partnership with the scientific organization of the British Empire.⁸¹

BUILDING A WORLD OF ZONES

The Empire's influence on UNESCO's plan was not merely organizational and institutional but also conceptual and scientific. The imperial ecological ideas, views as well as institutional practices that dominated the debates on colonial development since the early 1930s travelled with their advocates. After the war, UNESCO became a hotspot of ecological thinking outside the Empire.⁸² Ecology infused the new specialized agency's approach to world peace. Being an ecologist himself, Huxley defined his UNESCO philosophy from an ecological and evolutionary perspective, and Needham's zonal ecumenists adopted human ecology as the scientific framework for the future IIHA. Adopting human ecology at the IIHA had important worldmaking implications for UNESCO's zonal ecumenists. For the IIHA, they envisioned what I named tropical ecumenism, which, as we will see in this last section, designates the making of a new world order based on zonal and pan-tropical solidarities. Just like Worthington who had used ecology to 'make' Africa the experimental ground for the reinforcement of the British Empire, Huxley, Needham and the zonal ecumenists at UNESCO relied on human ecology to 'make' the Amazon region and the tropics their laboratory for the promotion of zonal peace.

⁸¹ Huxley wrote to Corner: "It appears to use that cooperation with the persons and organizations concerned with science within the British Commonwealth and Empire would be of great mutual advantage". Julian Huxley to E.J.H Corner, 2 April 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

⁸² Anker, op. cit. (6), p.230-236; For a case study demonstrating the application of ecological thinking to colonial development, see: Sven Speek, 'Ecological concepts of development? The case of colonial Zambia', in Joseph Hodge, Gerald Hödl and Martina Kopf, *Developing Africa: Concepts and Practices in Twentieth Century Colonialism*, Manchester: Manchester University Press, 2014, pp.133-154. For an overview of the literature on colonialism and Empire, see: William Beinart and Lotte Hughes, *Environment and Empire*, Oxford: Oxford University Press, 2007 and more specifically Chapter 12 'Imperial Scientists, Ecology and Conservation'.

The human ecological view of nature

In his history of imperial ecology, Peder Anker showed that human ecology grew hand in hand with the Empire's imperative to order colonial nature into a controllable and thriving economy.⁸³ Anker demonstrated how, through the course of the first half of the twentieth century, ecology rose as an enticing approach to nature for scientists and, as a product of Empire, as a promising mode of intervention for the administrators of the Colonial Office. Although ecology had existed as a botanical subdiscipline since the late 1890s, it was only from the late 1920s that the Oxford School of imperial ecology established human ecology as a systemic approach to understand human relations to nature. Anker introduced the label 'Oxford school of imperial ecology' to designate a thriving Oxford University-based network of scientists which developed human ecology to analyse the enmeshment of the economy of nature with the commercial economy of the Empire. Anker showed that throughout the 1930s ecologists like Arthur George Tansley, Julian Huxley, Edgar Barton Worthington and Charles Sutherland Elton theorized human ecology into a scientific and practical toolbox to study, control, plan and engineer the British Empire's underdeveloped natural and human resources. With concepts such as Tansley's ecosystem and Elton's ecological zone and tools like aerial photography and ecological surveys, they mapped nature as a mosaic of interconnected zones or systems each defined by environmental possibilities for plants to grow, animals to thrive and humans to settle. This mechanistic and systemic approach enabled the ecologists to not only explore and chart tropical nature but also identify and construct ecologically sound environmental and social orders that suited the British Empire's imperative to better control the human and natural resources of the colonies.⁸⁴

Thanks to the managerial and practical appeal of human ecology, many Oxford ecologists ended up on the Colonial Office's payroll to design and implement the construction of the barren land of the British colonies into productive forests, high-yielding farmlands and profitable subsoil. Worthington is a particularly telling example for our case. As I will show below, his surveys did not only exemplify the worldmaking implications of a human ecological view of nature. They also illustrated how politically attractive human ecology was in the 1940s as his surveys appealed as much to the reformers of the British Empire as it fascinated the architects of the newly established UNESCO and the promoters of the IIHA. As Anker showed, Worthington had impressed Huxley who, in turn, contributed to his rise as an influential reformer within the imperial

⁸³ Anker, op. cit. (6); Speek, op. cit. (82).

⁸⁴ Anker, op. cit. (6), p.79-107; Speek, op. cit. (82), p.133-135.

administration and later popularized his human ecological surveys at UNESCO. As a friend of and patron to the young ecologist, Huxley had recommended Worthington for the African Research Survey in 1931 and for the position of director of the Freshwater Biological Association of the British Empire in 1937.⁸⁵ Huxley later actively promoted human ecology at UNESCO where, as Director General, he likely played a decisive role in its implementation at the IIHA.⁸⁶ Huxley must have found a welcoming audience as Needham and, more importantly, Corner were both acquainted with Worthington. Corner and Worthington had been friends from childhood and studied together at Cambridge in the 1920s before parting to pursue distinctive tropical careers in the colonies.⁸⁷ Needham had corresponded with Worthington when the latter worked as demonstrator in Zoology at Cambridge in the 1930s and they shared a common passion for Morris dancing which they performed together as members of the Cambridge Morris Men since the mid-1920s.⁸⁸

Prior to his involvement with the African Research Survey, Worthington crafted his ecological expertise in Africa to the service of Empire. He began his career with research into the collapsing fisheries of the African Lake District in the late 1920s and early 1930s. Both works were inspired by the conceptual pillars of Oxford imperial ecology that were Elton's *Animal Ecology*, Tansley's *Practical Plant Ecology* and Carr-Saunders's *The Population Problem*.⁸⁹ For his fishing survey, Worthington divided Lake Albert, Lake George and Lake Bunyoni into a set of specific ecological zones (e.g. surface waters, shallow waters, deep waters...), determined the nature of the food chains and identified ways to construct new lake environments suitable for the colonial economy.⁹⁰ Based on his surveys, he formulated a wide range of practical recommendations to meticulously 'construct' the ecosystems of the lakes to strengthen the supply of fish for European consumption, serve the colonial

⁸⁵ Edgar Barton Worthington, *The Ecological Century: A Personal Appraisal*, Oxford: Clarendon Press, 1983, p.50-68.

⁸⁶ Worthington recalled that one of his preliminary report on African science profoundly impressed Huxley who declared at the African Research Survey committee that he "found this report so exciting that it kept him awake at nights", in Worthington, op. cit. (85), p.30, p.33; Anker, op. cit. (6), p.196.

⁸⁷ Worthington, op. cit. (85), p.2, p.4.

⁸⁸ Worthington, op. cit. (85), p.3; Katja Ganzenmüller, Marion Lowman and Lucy McCann, *Catalogue of the Papers of Edgar Barton Worthington, 1912-1984*, Bodleian Library, University of Oxford, Department of Special Collection, 2017, C.5, folders 4-10.

⁸⁹ Arthur Georges Tansley, *Practical Plant Ecology. A Guide for Beginners in Field Study of Plant Communities*, London: George Allen and Unwin Ltd., 1923; Charles Elton, *Animal Ecology*, New York: The Macmillan Company, 1927; Alexander Morris Carr-Saunders, *The Population Problem. A Study in Human Evolution*, Oxford: At the Clarendon Press, 1922.

⁹⁰ Edgar Barton Worthington, *A Report on the Fisheries of Uganda. Investigated by the Cambridge Expedition to the East African Lakes, 1930-1931*, London: Crown Agents for the Colonies, 1932; Edgar Barton Worthington, 'The lakes of Kenya and Uganda', *The Geographical Journal* (1932) 79, pp.275-293; Edgar Barton Worthington, 'The life of lake Albert and lake Kioga', *The Geographical Journal* (1929) 74, pp.109-129; For an overview and discussion of the ecological aspects of Worthington's fishing survey, see: Anker, op. cit. (6), p.208-215.

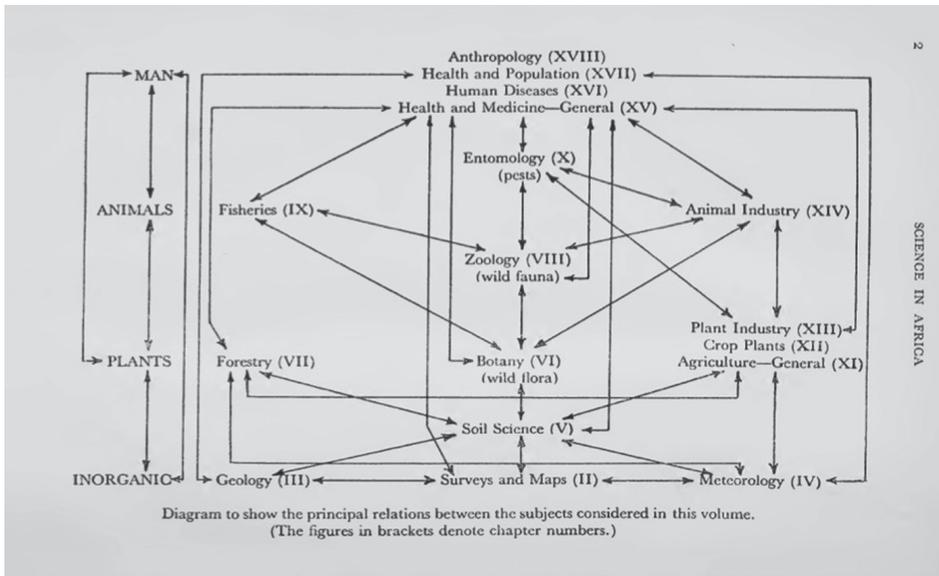


Figure 32 – Worthington's ecological diagram from *Science in Africa* (1938)

fishing industry and the rising tourist population of British anglers.⁹¹

Worthington applied the same principles for his survey *Science in Africa*. Just like for the African Lakes, he 'made' Africa into an ecological zone formed by a variety of interacting natural processes of which man was an integral part. Worthington illustrated his approach with an ecological diagram. Through this diagram, he recapitulated the state of academic knowledge regarding the natural and human processes of the African continent and highlighted how these processes interacted with each other. By stringing together all of the continent's human and natural life, Worthington was enabled to depict for the first time Africa as a single integrated ecological system (see figure 32).⁹²

Worthington believed that an understanding – and thus improvement – of African nature depended on knowledge of "all branches of physical, biological and human activity reacting on each other", which made up what he referred to as Africa's "ecological complex".⁹³ These processes – and their related academic knowledge – such as land configuration (Surveys and Maps, II) and soil structure (Geology, III) were believed to evolve in relation to each other. Worthington insisted that the study of man implied the study of all aspects of the environment that are imposed on him (e.g., conditions of health and nutrition) or modified by him through activities such as agriculture and forestry. The ecological view

⁹¹ Worthington, op. cit. (90); Worthington, 'The life of lake Albert...', op. cit. (90).

⁹² Worthington, op. cit. (59), p.4.

⁹³ Worthington, op. cit. (59), p.15.

assumed that as an integrated whole, the balance of nature may change by a variation in the climate or the single-minded use of a natural resource, the same way that progress in one field – e.g., botany – may be hampered by neglect of a related study field – e.g., forestry or zoology. The ecological perspective thus implied a mechanistic construction of nature. In his survey, Worthington analyzed the balance of nature of the African continent with the aim to identify the many destructive and possible constructive colonial factors that altered or may improve its equilibrium in favor of colonial development. Worthington ‘made’ Africa into “a complex system of levers and links all balanced with each other” surveying “the extra weight placed on any parts of the system that may cause the whole to change its equilibrium” for better or worse.⁹⁴ He deplored, for instance, that hasty deforestation in the Gold Coast limited the availability of water in the soil and thereby endangered the water supply that was needed for the development of colonial farming and plantations in the region. In such a system, adequate ecological knowledge was paramount which explains why, as we have seen above, Worthington strongly lobbied the Colonial Office for more fundamental research in the colonies.

UNESCO and the politics of human ecology: the unification of the tropics and zonal internationalism

Science in Africa demonstrates the worldmaking power of human ecology. Worthington’s ecological surveys enabled the appropriation and mastering of African nature and society and made scientific research its main repository. Via human ecology, ecologist like Worthington and Huxley conceptualized nature and the knowledge of it into a manageable integrated whole. The integrative power of an ecological survey like Worthington’s enabled the scientists to represent the complexities of a region, a continent or, in the case of UNESCO, a climatic zone into a collection of inter-connected and transformable ecological zones. Viewed from an ecological standpoint, nature becomes a manageable and malleable “system of levers and links” that the scientists could operate and reorder to serve the development of colonial economies. With the zonal view and the ecological survey, human ecology empowered the scientific expert as the authoritative pilot of the colonial management of nature.

The ecological view bore far reaching worldmaking implications for the British Empire and beyond. Several historians have recently documented how in the 1940s imperial ecology strengthened and unified the British Empire itself and its relation to Africa. In the footsteps of Peder Anker, Hellen Tilley has further explored how surveys like the African

⁹⁴ Worthington, op. cit. (59), p.4.

Research Survey contributed to make Africa into a laboratory and how this systemic view redefined the terms of British colonial rule.⁹⁵ Meanwhile other new imperial historians, like Hodge and Clarke, traced the ways in which the rise of ecological and scientific experts like Worthington brought about a profound reorganization of the institutional apparatus of the British Empire and a redefinition of its approach to colonial development policy.⁹⁶ As Anker pointed out, the the horizon of the ecologists exceeded the British Empire. Many like the British naturalist and ecologist Max Nicholson and Worthington mobilized imperial human ecology to organize nature conservation at the international level after the war, while others, notably Huxley at UNESCO or John Boyd Orr at the FAO, made it into a cornerstone of the UN organisation in its early years.⁹⁷

Needham and the zonal ecumenists fashioned their worldmaking vision – tropical ecumenism – based on the precepts of human ecology. As we have seen, human ecology informed their division of the world into four climatic zones and became from the outset of the project the scientific frame of the future IIHA. Needham's zonal ecumenists sought via the IIHA to stimulate the study of the humid tropics from a human ecology perspective. The principles were similar to those applied by Worthington. The plan was to uncover and manage the interrelations of man and tropical nature in order to serve the 'making' of tropical ecosystems suitable for human society and for a sustainable utilization of tropical resources. To this end, Corner and the staff of the NS division relied on the creation of botanical and economic gardens as well as nature reserves. These gardens worked as an experimental space or as Corner put it a "reservoir of experimental material".⁹⁸ Corner and the zonal ecumenists sought to create a specific garden for each ecological subzone of the Amazonian tropics such as the lowland rainforest, the lowland seasonal forests or the mountain forests.⁹⁹ As Corner described, the economic garden would provide an ecosystem with which IIHA scientists could study groups of plants and animals of economic importance. It included, for instance, investigations into the cultivation of the cocoa and the rubber trees, the ecology of freshwater fish and the control

⁹⁵ Tilley, *op.cit.* (55).

⁹⁶ Hodge, *op. cit.* (61), p.179-206.

⁹⁷ Anker showed that other ecologists of the South-African tradition also played an important part, most notably Jan Smuts with his racist UN charter of Human rights that followed a long involvement at the LoN, Anker, *op. cit.* (6), p.185-195.

⁹⁸ 'Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project' and its 'Appendix: Notes on biological work for the International Institute of Hylean Amazon', 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.9. On the experimental use of botanical and economic gardens see: Kohler, *op. cit.* (33).

⁹⁹ 'Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project' and its 'Appendix: Notes on biological work for the International Institute of Hylean Amazon', 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.9.

of the destructive action of termites and ants.¹⁰⁰ The finality of such studies consisted in designing managerial interventions to either adjust the economy of nature, by modifying, for instance, the fish ecology to favor the development of valuable species for fisheries or modify the economy of Amazonian settlers by adapting crops resistant to ants and termites. The botanical gardens and the nature reserves would on the other hand focus on keeping a “careful watch on the advance of civilization” by providing a space to study the impact of man on nature and develop interventions to contain nature destruction.¹⁰¹

Just like ecology served the reinforcement and unification of Empire, human ecological research at the IIHA served UNESCO’s mission to advance world peace. For Needham and the zonal ecumenists, human ecology did not just lay the scientific foundations conducive to civilizational development in the tropics. Ecological and zonal research unified the tropics into a tropical ecumenism, which served UNESCO’s projected view of a world pacified by integration through the promotion of common values, mutual understanding and cooperation. Human ecology ‘made’ the tropical world into a homogenous set of ecological zones, stripped down to a collection of complex food-chains and environmental processes. From an ecological standpoint, the local specificities of these sub-zones and their human communities gave way to a unifying set of basic bio-social features common to all whether in the heart of Amazonia or Indonesia. Tropical ecumenism – i.e., the ecological unification of the tropics – provided UNESCO with a scientifically grounded alternative form of belonging to the prevailing nation-state.

Corner had observed from his time in Singapore that “little was known in Tropical Asia of the great number of natural products of the Hylean Amazon” to later realize once in Amazonia, that “reciprocally, little was known in the Hylean Amazon of the natural products of Asia.”¹⁰² As a strong advocate of the IIHA and its ecological approach, Corner believed that the IIHA could bring “the tropical cultures of New and Old Worlds to cooperate” and bring about “great prosperity.”¹⁰³ By organizing the tropics into a tropical ecumenical community, the IIHA thus enhanced a form of zonal internationalism, which it aimed to replicate later with the IIZA for the world’s arid zones. This zonal bond would

¹⁰⁰ ‘UNESCO, general information on the conference for the establishment of the International Institute for the Hylean Amazon, Annex I, scope and program of the proposed International Institute of the Hylean Amazon’, 12 February 1948, UA, IIHA/1 Nat.Sci./42 Annex I, p.2.

¹⁰¹ ‘Draft 1947 program for the field co-operation office, division of natural sciences, Latin America; and the Hylean Amazon project’ and its ‘Appendix: Notes on biological work for the International Institute of Hylean Amazon’, 31 March 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, file 5.6502, p.9.

¹⁰² ‘UNESCO, International Institute of the Hylean Amazon (IIHA). Report on the progress of the Hylean Amazon project of UNESCO, 1947-1948 in South America by E. J. H. Corner, executive secretary, Interim Commission, IIHA, Manaus, Brazil’, 18 November 1948, UA, UNESCO/NS/IIHA/13, p.13.

¹⁰³ ‘UNESCO, International Institute of the Hylean Amazon (IIHA). Report on the progress of the Hylean Amazon project of UNESCO, 1947-1948 in South America by E. J. H. Corner, executive secretary, Interim Commission, IIHA, Manaus, Brazil’, 18 November 1948, UA, UNESCO/NS/IIHA/13, p.13.

not only contain the side effects of nationalism but crackle both the North-South and national divides in favor of international integration.¹⁰⁴ The 'making' of the world into ecologically defined ecumenical zones participated in the evolutionary advancement towards a world society that Needham and Huxley theorized and believed to be inevitable.

Ultimately, zonal research also enhanced science's natural internationalism and the unity of scientists, which Needham had defended since the 1930s as the condition to peace and progress. Human ecology challenged the conventional divisions of science by eliciting greater cooperation between the disciplines from the natural and social sciences but also between researchers dealing with practical and fundamental research. For UNESCO's ecumenists, the advancement of zonal ecumenism was thus "a rational challenge to those who maintain that states cannot and never will collaborate".¹⁰⁵ Not only the IIHA would bring scientists from around the world to cooperate in the study of nature, but it also offered an alternative to the isolation of vast territories like the Amazonian Basin and the African continent by inserting these spaces into a zonal community of interest and by erecting the tropical zone into a new scientific hotspot – just as Worthington did with Africa.

Interestingly, unifying the tropics reflected the ambivalent goals of universality and locality that stood at the core of the scientific program of UNESCO. The unification of the tropics served the universalizing agenda of UNESCO by binding disparate regions together and producing broader transnational identities than those embodied by the existing political entities of nation-states and Empires. Tropical ecumenism also served Needham's agenda to break the marginality of the Dark Zone and assert the specificities of its scientific spaces, which he and his team reinforced via the creation of ecological zones. Zonal ecumenism enabled the circulation of findings within the tropical zones but hindered their application from zone to zone, e.g., from temperate zones to tropical ones. By conceiving zonal knowledge as both situated and mobile, Needham and the ecumenists adopted a conception of scientific space in between universalism and localism that advanced international integration but maintained Dark Zone 'tropical' realities scientifically and ecologically distinct.¹⁰⁶

¹⁰⁴ UNESCO, report on the question of United Nations research laboratories and observatories, 20 February 1947, UA, UNESCO/Nat.Sci.24/1947, p.24-25.

¹⁰⁵ Joseph Needham, 'Science and international relations', fifteenth Robert Boyle Lecture, Oxford University Junior Scientific Club, 1 June 1948, NP, Folder G.70, p.8.

¹⁰⁶ On the ambivalence of scientific place, see: Bocking, op. cit. (18).

CONCLUSION

The plan for the IIHA that Corner exposed in Belem, in August 1947, differed greatly from the project Carneiro had introduced a year earlier during the Preparatory Commission of UNESCO. While Carneiro hoped to create a platform that could foster international scientific cooperation in the Amazon region, Needham, Corner and the zonal ecumenists sought to make the IIHA a research center concerned with the tropics at large. In the version prepared by UNESCO, the IIHA thus exceeded the mere Amazon region since Needham and the NS division conceived the future laboratory as the headquarters of a wide network of field stations that would cover the world's various tropical zones. With this network, the zonal ecumenists believed the IIHA could tackle the problems of scientific development in the Dark Zone and provide scientific solutions to the challenge of human life in the tropics.

The imagined zonal institute bore also far-reaching political implications. For the NS division the IIHA's zonal research program contributed directly to the peace-building goals of UNESCO in two different ways. First, the IIHA constituted a unique platform to enhance truly global scientific cooperation as it aimed to bring together specialists from all over the world and across the Bright-Dark Zone divide Needham had observed while in China. The IIHA was a milestone in the creation of a single, ecumenical community of science which Needham had theorized in Chongqing as the ultimate, evolutionary model by which international scientific cooperation and mutual understanding could be genuinely achieved to the benefit of humankind as a whole. Second, the zonal ecumenists postulated that through its zonal program the IIHA underscored and materialized new zonal identities, interactions and forms of belonging that would cut across the boundaries of the nation state. Needham and his staff believed that the research program of the IIHA would contribute to create trans-tropical communities that would challenge the primacy of the nation state as the primary unit of international organisation. By highlighting bio-social commonalities between the various nations inhabiting across the world's tropical zone, the IIHA provided a common ground for tropical people to culturally relate, commercially exchange and eventually come together to improve their destinies as one, and reduce the risks of divisions induced by nationalism. The IIHA was part of a broader plan to inaugurate an ecumenical world order. Needham and his staff sought to replicate the IIHA experience with the creation of the IIZA for the arid zones.

In this chapter, I also showed how a variety of fringe ideals and practices inherited from the interwar period gained authority within UNESCO where they were eventually put to practice with the IIHA project. The IIHA brought together ideals that had little if no political, international and scientific visibility during the 1930s and during WWII. The

SRS idea of the social function of science, the wartime institutionalization of international scientific cooperation, the challenge and promise of North-South ecumenical exchanges and the imperial technocratic practices of tropical management gained international authority at UNESCO. The IIHA, and its zonal ecumenical worldmaking is a telling demonstration of the way UNESCO and more generally the UN operated, in its early years, as a prolific experimental ground where scientists gained greater international legitimacy and could put formerly fringe ideals of world order like SRS to practice.

With the IIHA, the zonal ecumenists also participated in rehabilitating the Empire as a credible international actor. Mazower showed how much of a model the British Empire had been for the architects of the LoN. The South African statesman Jan Smuts and Zimmern looked up to the British Empire as a model of civilization and peaceful international cooperation.¹⁰⁷ Twenty-five years later, some of the leading figures of UNESCO continued to look up to the British Empire to conduct their peace-building mission. Just as Smuts and Zimmern used imperial ideas like the British Commonwealth and imperial internationalism to envision the League's action and the architecture of post-WWI peace, Huxley, Needham, Corner and the NS division adopted imperial ecology, enrolled imperial experts and sought to cooperate with imperial research stations to shed the foundations of post-WWII peace and progress across the globe.

The British, and to a lesser extent the Dutch empires offered expertise, methods, institutions and imaginaries that Huxley and Needham utilized to envision, organize and carry out the science program of UNESCO and the IIHA in particular. The IIHA served an imaginary of world order that intertwined the ecumenical vision of Needham and the ecological reordering of the tropics of the British colonial tropics. Besides reproducing imperial imaginaries of world order, the NS division hired former colonial experts, like Corner, and looked forward to furthering cooperation between UNESCO and the European empires. The ecumenical project of the NS division for the tropical and arid zones established these imperial experts as authoritative Worldmaking figures. Tropical and arid realities were to be remoulded by the imperial experts based on its ecological arsenal while indigenous knowledges were ignored as irrelevant and local scientific expertise was sidelined as immature.

In that regard, the IIHA project questions the role and place the literature grants to colonial Empires in the post-war era. The fact that UNESCO's scientists looked up to the Dutch and British Empire to design and implement their plan reveals that Empires remained politically appealing after 1945. This contrasts with the common tendency

¹⁰⁷ Mark Mazower, *No Enchanted Palace: The End of Empire and the Ideological Origins of the United Nations*, New Jersey: Princeton University Press, 2009, p.28-103

particularly visible in reconstruction and international history to overlook colonial empires and their territories. As pointed out by the proponents of New Imperial History, scholars tend to misconceive colonial Empires as static entities rooted in conservative conceptions of colonial rule inherited from the nineteenth century. Yet, the New Imperial History has shown late-colonial empires to be thriving scientific and political organizations experimenting with planning and the transformative power of science as much as the European metropolises.¹⁰⁸ This chapter has demonstrated in the case of UNESCO's IIHA that colonial empires were not crumbling political fossils but appeared as immense laboratories of modernity that worked as a blueprint to the emerging UNESCO and the zonal ecumenists. This chapter brought to the fore the colonial empires and their tropical territories as significant actors and spaces of the reconstruction process of the late 1940s and showed them as active producers of scientific views of the world.

As Corner and Malamos flew to Latin America in spring 1947 to conduct the implementation of the IIHA in the Amazon, the ecumenists in Paris expected their plans to find an enthusiastic welcoming from the local authorities and scientists that had been awaiting the IIHA since Carneiro presented it at the Preparatory Commission of UNESCO. Corner was confident, like the rest of the NS division, that the institute would be swiftly established by the end of 1949 at the latest. The plan of the ecumenists, however, faced instead fierce resistance in the Amazon from Carneiro's positivists and Brazil's techno-nationalists. The dissenting local voices and their alternative aspirations for the Amazon region even proved fatal for the IIHA. As we will see in the following chapters, if Carneiro's positivists slowed down the process and modified the shape of the IIHA, it was Brazil's techno-nationalists who eventually condemned UNESCO's zonal ecumenism by replacing the IIHA with a national techno-developmental plan to modernize the Brazilian Amazon.

¹⁰⁸ Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave MacMillan, 2011.

Chapter 5

LATIN AMERICA'S MARE NOSTRUM: POSITIVIST SCIENCE AND THE RISE OF THE PAN-AMAZONIAN CIVILIZATION

Corner and Malamos, organized in the heart of Amazonia the ‘International Commission for the IIHA’ in August 1947 in Belém and the ‘Conference for the Establishment of the IIHA’ less than a year later in Iquitos to garner support to UNESCO’s IIHA plan. Both conferences proved to be of historical significance for the region, which had never hosted an international gathering of global significance before. UNESCO celebrated the two meetings as successes since all nine Amazonian countries involved – except for British Guiana – agreed in Iquitos to create the IIHA and granted the future institute with a legal convention, a financial protocol, a working program and an interim scientific council.¹

Nonetheless, UNESCO faced several external challenges. First, the political instability of the region made federal commitments to the IIHA uncertain as governmental instability, sudden coups and civil uprisings were then current in the region.² Second, the Cold War diplomacy of the United States in the region overshadowed the making of the IIHA. All eyes were turned on the US-led ‘Conference for the Maintenance of Continental Peace and Security’ of August 1947 in Rio de Janeiro and the ‘Ninth International Conference of American States’ of April 1948 in Bogota, which took place at the same time as the Belém and the Iquitos conferences. Third, the British and the Dutch who were involved via their Guiana territories and possessed a modern scientific infrastructure on which UNESCO counted, decided to step back from the IIHA process to focus on the economic crisis and anti-colonial uprisings in their Empires.³

Meanwhile, UNESCO’s field representative Corner and his special counsellor Carneiro had conducted intense negotiations since their arrival in Latin America in April 1947 to obtain financial backing from local authorities and to secure the support of the Latin American scientific community. Even though both struggled to stir interest for UNESCO’s initiative at the government level, they managed to gather a wide base of local supporters around the IIHA. This assembly – mustered mainly by Carneiro and composed of scientists, intellectuals and diplomats – did not just welcome the IIHA. They also played a significant role to keep the project alive both locally and internationally. Their coming together in Belém crowned UNESCO’s first IIHA conference with success, while their backstage activism at UNESCO’s Second General Conference – what the *New Yorker* described as “Carneiro’s winning samba” – helped to maintain the IIHA as a priority on the organization’s agenda for 1948.⁴

¹ ‘UNESCO, nine nations agree to create Hylean Amazon Institute, Press release n°69, 14 May 1948, UA, 330.19(8)A01 IIHA Part III - 1/III/48 to 30/VI/48; ‘Hylean Amazon Institute created. Iquitos conference establishes seat of IIHA in Manaus Brazil’, *UNESCO Courier* (June 1948) 1, p.1-2.

² ‘Arenales’ report’, undated, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.6-9, p.15-16.

³ ‘Arenales’ report’, undated, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1-3.

⁴ On the Mexico manoeuvre, see: Edred John Henri Corner to Joseph Needham, 12 Janvier 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948; Lillian Ross, ‘UNESCO Xo Chimilio and

Although Carneiro and his coalition defended the creation of the IIHA, they did not welcome the way Needham and his ecumenical team had planned it. As early as the Belém conference, Carneiro fired the first battery of criticisms following the inaugural speech given by Corner. The father of the IIHA openly doubted the fact that the ecumenical plan of UNESCO could realize Corner's pledges of progress and prosperity. Carneiro, followed by the Brazilian anthropologist Heloisa Alberto Torres, regretted, once more, the lack of involvement of Amazonian parties in the preliminary design of the future laboratory. Carneiro wended up his critique by claiming that, all "matters should be considered by the [Belém] Commission" and warned Corner that it was "to the interest of future general meetings – and therefore to the IIHA as a project – to know how different countries visualize the problems we discuss".⁵ These critiques did not go unheeded. Carneiro and Alberto Torres' concerns eventually re-opened the IIHA's agenda and delayed the adoption of a legally and financially binding agreement that UNESCO had originally expected at the Belém meeting.

Eventually, the Latin Americans managed to modify the set up as much as the broader political agenda and worldmaking processes the NS division had imagined for the future IIHA. Reminiscent of tensions between Carneiro, Needham and Huxley in Paris – as seen in chapter 3 – the clash between Carneiro and Corner in Belém reflected competing worldmaking aspirations. Carneiro's coalition disagreed with Needham's ecumenical plan and the future scientific activities, socio-political and international functions of the Amazonian institute. Instead, Carneiro and his supporters sought to cast via the IIHA the foundations of a modern, pan-Amazonian society through the rational domestication of the Amazon forest, which I named pan-Amazonian positivism.

This chapter will focus on this dispute between Needham's zonal ecumenists and Carneiro's coalition whom I call the Latin American positivists. I will argue that the rise to prominence of Carneiro and his coalition resulted from two factors. First, they were sensitive to the tormented international history of the Amazon Basin. Accordingly, they framed the IIHA as a regional institute to pacify the region, unlike the ecumenists who, they thought, ran the risk of further dividing it by opening the IIHA to non-Latin American interests. Second, the Latin American positivists mobilized local imaginaries and aspirations to envision the IIHA. They grounded the institute in a positivist conception of science and the Amazon. Unlike the ecumenists, I will show that Carneiro's positivists

likely Oscar', *New Yorker*, 9 July 1948, CP, PC.RI.HI.04/Recortes de Revistas 10/1/1948; see also: Marcos Chor Maio and Magali Romero Sá, 'Ciência na periferia: a UNESCO, a proposta de criação do Instituto Internacional da Hiléia Amazônica e as origens do INPA', *História, Ciências, Saúde – Manguinhos* (2000) 4, pp.975-1017, p.995-996.

⁵ Resume of the general proceedings of the conference, circa August 1947, UNESCO archives, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.6

conceived IIHA science primarily as an utilitarian instrument of progress while they envisioned Amazonia less as a virgin natural space than as a positivist social utopia where continental modernity and unity could be attained through positivist reform.

In opposition to UNESCO's plan, Carneiro and his coalition thus imposed during the Iquitos conference what I labelled as Pan-Amazonian positivism as the dominant worldview for the future IIHA. The existing literature has largely ignored this conceptual shift and interpreted the tensions at play during the Belém and Iquitos conferences from a strictly diplomatic perspective. By focusing on alleged international-national tensions between UNESCO, the involved Latin American states and the United States, the existing studies tend to overlook the fact that other conceptual and political fault lines played out during these expert meetings.⁶ The rise of the Latin Americans highlights the fact that the scientists involved in the IIHA's making never really unified around a common conception of the future institute. As I reconstruct this shift, I will underscore the tensions and differences that divided the IIHA's main supporters and will reflect on the way these differences eventually weakened the IIHA project long before Brazilian parliamentarians and technocrats allegedly sealed its tragic fate in 1952.

By retrieving what the Pan-Amazonian positivist vision for the IIHA entailed, I will also participate in the on-going re-evaluation of Latin American positivism, and more specifically Brazilian positivism. Although historians have claimed that the influence of positivism declined in Brazil during the interwar period, we will see in chapter 6 that some of the positivist ideals described in this chapter eventually figured prominently in Brazil's rising technocratic approach to Amazonian development in the 1950s.⁷ In this chapter

⁶ Domingues and Petitjean have mostly focused on the Brazilian and US stance to explain the breakdown of the IIHA and interpreted the tensions at play during the Belem and Iquitos meetings as a result of diplomatic tensions between local states, UNESCO state-members and UNESCO's departments. If Maio highlighted conceptual tensions between UNESCO and Latin American scientists during the design of the IIHA plan in Paris, he however also tends to fall back on diplomatic factors to explain the tensions in Belem and Iquitos. Finally, exception should be made of Maio and Sá, who succinctly pointed to the rise of conceptual tensions in Belem and Iquitos. Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50; Marcos Chor Maio, 'A UNESCO e o projeto de criação de um laboratório científico internacional na Amazônia', *Estudos Avançados* (2005) 19, pp.115-130; Maio and Sá, op. cit. (4).

⁷ On recent reassessment of the influence of scientific positivism in Brazil, see: Angela Alonso, 'De positivismo e de positivistas: Interpretações do positivismo Brasileiro', *Revista Brasileira de Informação Bibliográfica em Ciências Sociais* (1996) 42, pp.109-134; Simone Petraglia-Kropf, 'O saber para prever, a fim de prover – A engenharia de um Brasil moderno', in Micael Herschman and Carlos Alberto Pereira, *A Invenção do Brasil Moderno Medicina Educação e Engenharia nos Anos 20-30*, Rio de Janeiro: Rocco, 1994, pp.202-223; see also, Robert Nachman, 'Positivism, modernization and the middle class in Brazil', *The Hispanic American Historical Review* (1977) 57, pp.1-23, p.18, p.22-23; Ivan Lins, *História do Positivismo no Brasil*, São Paulo: Companhia Editora Nacional, 1964; On the historiography that actually argued the decline of scientific positivism after 1910 in Brazil, see in particular Simon Schwartzman, *Um Espaço para a Ciência. A Formação da Comunidade Científica no Brasil*, Brasília: PCT/CNPq/CEE, 2001; For an overview of the debate, see: Marcos Jungmann Bhering and Marcos Chor Maio, 'Entre ciência e política: o

and the next, my emphasis on Carneiro's positivists will therefore contribute to explore the forms and purposes of postwar positivism as formulated during the IIHA's making. This will allow me to shed some light on the way it infused postwar developmentalism in Brazil in chapter 6.

AMAZONIAN DISSENT

Who were these voices dissenting with UNESCO's plan? They arose in echo to Carneiro who in Belém repeated his critiques against UNESCO's approach to the creation of the IIHA which he felt side-lined local opinions and concerns. A coalition of adversaries, which I name the Latin American positivists, followed in the footsteps of Carneiro who became in their eyes their leading figure as well as a representative of the IIHA project of equal importance to Corner, UNESCO's official appointee. A year later at the Iquitos conference, the ranks of Carneiro's coalition of Latin American positivists expanded into a diverse crowd of direct partners and indirect sympathizers.⁸

The Amazonian positivists: dissenting allies?

Since the launch of the IIHA project, Carneiro garnered around the proposed laboratory a vast and diverse network of supporters. I divided this coalition into two distinct circles based on the trade of its members and the form of their implication in the making of the IIHA. The first and largest circle of the two designates the numerous scientists that contributed directly and indirectly in shaping the scientific agenda of the IIHA. The second encompasses a collection of political figures, diplomats and intellectuals who shared a long-standing interest in the Amazon region and who stimulated the Pan-Amazonian purpose of the IIHA.

The first circle consisted of Latin American and mostly Brazilian scientists such as the anthropologist and director of the National Museum Heloísa Alberto Torres, the agronomist and director of the Agronomical Institute of the North (IAN) Felisberto Camargo, the zoologist Candido de Mello Leitão, the chemist Descartes Garcia Paula and the Colombian botanist Enrique Pérez Arbeláez. Most members of this intellectually homogenous circle occupied important functions in the IIHA's making and all were instrumental in shaping and advancing an alternative, namely positivist and regionalist,

positivismo de Paulo Carneiro na Secretaria de Agricultura, Indústria e Comércio de Pernambuco (1935); *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.435-451, p.436.

⁸ Carneiro gave an overview of the Latin American supporters of the IIHA in Paulo Carneiro, 'Memorandum para o sr. Secretário Geral', 6 October 1948, CP, PC.RI.IH.06/Memorandos 6/10/1948, p.1-3.

Pan-Amazonian worldmaking vision for the IIHA. Carneiro was acclaimed in Belém as one of the “obstetricians of the IIHA” alongside Corner.⁹ Pérez Arbeláez, for his part, became the organizer, the rapporteur of the Iquitos meeting and the vice president of the first session of the Interim Commission in Manaus. He also conducted a bibliographical survey in the summer of 1948 as part of the survey team appointed by the Iquitos conference to elaborate the scientific program for the IIHA. Alberto Torres was appointed president of the Interim Commission and rapporteur to the scientific committee of the Iquitos meeting, presided by her friend the charismatic French anthropologist and Americanist Paul Rivet.

The first circle included also a vast network of IIHA-supportive scientists that Alberto Torres and Carneiro in particular drew from their personal networks. These included for instance Miguel Ozorio de Almeida and Carlos Chagas Filho who, alongside Carneiro, had defended the IIHA at UNESCO’s first General Conference, the American agronomist and old friend of Carneiro Alberto Rhoad from the Inter-American Institute for Agricultural sciences in Turrialba, Costa Rica, and Mario Da Silva Pinto, a colleague of Alberto Torres from the National Museum.¹⁰ Professional scientific organizations were also involved such as the Brazilian Society for the Progress of Science (SBPC), the Brazilian Institute for Education, Science and Culture (IBECC) and the 1949 UNESCO-sponsored Latin American Conference for the Development and Organization of Science (LACDOS). While their connection with the IIHA was indirect, they contributed to popularize Carneiro’s Pan-Amazonian project within the continent’s scientific community. Through IBECC, for instance, Carneiro obtained the opportunity to present his vision of the IIHA to a large panel of scientists while LACDOS and the SBPC used the IIHA as a symbol for the advancement of an autonomous native science in Latin America and an alternative future for the continent.¹¹

⁹ ‘Resume of the general proceedings of the conference’, circa August 1947, UNESCO archives, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.50.

¹⁰ Through Alberto Rhoad, Carneiro established contact with the Organisation of American States’ Inter-American Institute of Agricultural Sciences, in Turrialba, Costa Rica. The Institute was one of the few international research centre in the region, thus reinforcing the regional character Carneiro aimed to give to the IIHA. See: Alberto Rhoad to Paulo Carneiro, 4 August 1947, CP, PC.RI.HI.03/Cartas 8/6/1947 a 7/3/1948; ‘Summary of discussion at the Inter-American Institute of Agricultural Sciences at Turrialba, Costa Rica on 28 October 1947’, CP, PC.RI.HI.05/Roteiros 28/10/1947 a 27/4/1948.

¹¹ On Carneiro and IBECC, see: Paulo Carneiro to Levi Carneiro, 9 September 1947, CP, PC.RI.IH.03/Cartas 8/6/1947 a 7/3/1948; Levi Carneiro (President of IBECC) to the President of the Comissão Parlamentar da Valorização do Vale Amazônico, september 1947, CP, PC.RI.IH.03/Roteiros 09/1947; Paulo Carneiro to Levi Carneiro, 3 March 1948, CP, PC.RI.IH.04/Cartas 19/9/1947 a 13/5/1948; ‘Memorandum para o sr. Secretário Geral’, 6 october 1948, CP, PC.RI.IH.06/Memorandos 6/10/1948, p.1-3; More generally on the support of IBECC, LACDOS and SBPC towards the IIHA, see: Patrick Petitjean; ‘Le département des sciences naturelles de l’UNESCO et les scientifiques latino-américains à la fin des années 1940’, *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2009) 4, pp.437-452.

The second circle encompassed some key Amazonian politicians and government officials – figures such as the governor of the Brazilian state of Para, Moura Carvalho, the governor of the state of Amazonas Leopoldo Amerim and his delegate Leoncio de Salignac e Sousa as well as Leopoldo Perez from Brazil's Special Commission for the Planning of the Economic Valorization of the Amazon (CEPVEA). It also included some diplomatically and symbolically important figures who had in the past engaged in favor of Amazonia such as the Ecuadorian and Peruvian diplomats Rafael Alvarado and Luis Alayza y Paz Soldán but also the Brazilian military *sertanistas*¹² that were Captain Braz Dias de Aguiar and the famous Marechal Candido Mariano da Silva Rondon. As we will see in further details below, all had played a significant role in pacifying and defining the geopolitical shape of the Amazon region during the past decade. Many of them, like Leoncio de Salignac e Souza, Alvarado and Alayza y Paz Soldán actively participated in the making of the IIHA, convinced of the institute's capacity to strengthen peace in the region. Alvarado and Alayza y Paz Soldán, respectively president and vice-president of the Iquitos conference, occupied strategic positions in the constitutional process and were particularly active in sharpening the regionalist agenda promoted by Carneiro.

The members of the two circles were bound by a common concern for the Amazon and its progress. They shared a common positivist worldview and a trust in the transformative power of science. Positivism had been the guiding philosophy of Latin America's Republics since the wars of independence between 1810 and 1830 as well as the overarching frame within which science developed on the continent.¹³ Carneiro's background as described in chapter 3 epitomized the trajectory that many Brazilian scientists at IIHA such as Alberto Torres, Camargo but also Chagas Filho and Ozorio de Almeida followed coming from or working in strongholds of Brazilian positivism like the Polytechnic School of Rio de Janeiro, the IAN and the National Museum.

Positivism historically mediated the continent's relation to nature as well. As we will see below, natural spaces like Amazonia bore a special meaning in the positivist worldview. It represented an essential civilizational frontier, which, Carneiro, Camargo and most scientists within the coalition had sought to advance through their scientific and state career during the interwar and wartime period.¹⁴ Altogether, the scientists and diplomats

¹² Sertanistas military refers to early twentieth century pioneering explorers and experts of the non-colonized parts of Brazil such as Amazonia in particular.

¹³ Marshall Eakin, 'Guest editor's introduction. Field science in Latin America', *The Americas* (2002) 58, pp.509-511, p.510; see also: Stuart McCook, *States of Nature: Science, Agriculture and Environment in the Spanish Caribbean, 1760-1940*, University of Texas Press, 2002.

¹⁴ On Felisberto Camargo and in particular for his role in Vargas' Rubber Battle, see: Warren Dean, *Brazil and the Struggle for Rubber. A Study in Environmental History*, Cambridge: Cambridge University Press, 1987, p.87-107; Seth Garfield, *In Search of the Amazon. Brazil, the United States, and the Nature of a Region*, Durham: Duke University Press, 2013, p.36-39 and footnote 166; Greg Grandin makes a fine portrait

filling the ranks of Carneiro's coalition shared a common concern for Amazonia's territorial divisions, underdevelopment and marginality and seized the IIHA as an opportunity to tackle these challenges. The IIHA represented a credible alternative to past and present plans like Article 199 of Brazil's 1946 Constitution which made the development of Amazonia a constitutional obligation but the implementation of which remained vague and uncertain¹⁵. More than supporting the original plans for the IIHA, Carneiro's coalition appropriated the institute and advanced a scientific agenda and a worldmaking vision for the future institute that was significantly different from UNESCO's original zonal plan. Before delving into the philosophical and political origins of Carneiro's Pan-American worldmaking vision, I will first distinguish the regionalist set up his coalition proposed against UNESCO's zonal model.

The positivist set up: from a zonal to an Amazonian institute

The Belém conference turned into a tribune for UNESCO's opposition. No sooner had Corner introduced UNESCO's zonal plan than Carneiro fired his first critique. He condemned UNESCO's predefined design and hoped to open the IIHA's scope and functions to discussion. Carneiro repeated his earlier critique against UNESCO's disregard for local views and re-affirmed the necessity to consider local aspirations more seriously. Supported by Alberto Torres and the Amazonians of the conference, he called out to Corner requesting that the conference "investigates on the spot all aspects of the establishment of the institute of the Hylean Amazon, including both immediate and long term plans".¹⁶ As opposed to UNESCO's zonal plan, they aspired to establish an institute, which would primarily focus on the Amazon and serve the practical and cultural needs of the region as well as the continent.

The virulent critiques against UNESCO's plan were more political than scientific. Carneiro tackled UNESCO's method (i.e., ignoring local views, overshadowed by the *periphery principle*) as well as the project's scope (i.e., building a tropical zone), but none of his critiques rejected the approach (i.e., human ecology). On the contrary, the Amazonians welcomed human ecology at the IIHA. Alberto Torres and Pérez Arbeláez were ecologists themselves. Alberto Torres, furthermore, was familiar with Huxley's interwar ecological theories. As demonstrated by Domingues, Alberto Torres used Huxley's idea

of Felisberto Camargo in 'Epilogue: Still waiting for Henry Ford' Greg Grandin, *Fordlandia. The Rise and Fall of Henry Ford's Forgotten Jungle City*, New York: Metropolitan Books, 2009.

¹⁵ Maio, op. cit. (6), p.120.

¹⁶ 'Resume of the general proceedings of the conference', circa August 1947, UNESCO archives, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.7.

of the “economy of nature” in her own anthropological investigations and contributed to popularize the ecological approach at the National Museum of Rio de Janeiro of which she was the director since 1938.¹⁷ Pérez Arbeláez had explored the Mexican countryside with Huxley during the Second General Conference in Mexico in November 1947 and maintained a friendly correspondence ever since.¹⁸ During his mission to survey the Magdalena River for the Interim Commission of the IHA, he shared in a letter to Huxley how he wished his friend could be there to explore together “this world of plants, of animals and of men where the puzzles are so many and the problems of such interest!”¹⁹ Pérez Arbeláez was also a pioneer of ecological research in Latin America and is remembered today as the founding father of ecology in Colombia.²⁰

Human ecology, furthermore, did appeal to positivist scientists like Carneiro. Its managerial and interventionist nature suited the positivist goals of order and progress that were based on a better scientific understanding of the laws of nature. The program committees that were organized to fulfil Carneiro's request to re-open the IHA's scientific program, and the interim scientific council that was appointed a year later to implement the committees' research proposals, therefore recognized the value of human ecology. For Carneiro's coalition of Latin American positivists, as for the imperial ecologists a decade earlier, “nothing of consequence could be achieved in improving the conditions of human society and economic prosperity” in the region without a thorough understanding and inventory of its biotic ecosystem.²¹

In the eyes of the Amazonian positivists human ecology was thus an all-encompassing managerial and practical tool through which Amazonian life could be planned. The research proposals they advanced at the Belém conference concerned all aspects of human occupation of the tropics and included agriculture and nutrition, but also immigration, colonization and education which UNESCO had refused to include in its plans.²² The

¹⁷ Heloisa Maria Bertol Domingues, ‘Heloisa Alberto Torres e o inquérito nacional sobre ciências naturais e antropológicas, 1946’, *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.625-643, p.633-635; On Huxley's ecological concepts, see: Julian Huxley and Edward Neville da Costa Andrade, *More Simple Science: Earth and Man*, New York, London: Harper and brothers, 1936.

¹⁸ Julian Huxley to Enrique Pérez-Arbeláez, 26 February 1948, UA, 330.19 (8) A01 IHA Part II from 1/I/1948 up to 31/II/1948

¹⁹ Enrique Pérez-Arbeláez to Julian Huxley, 13 March 1948, UA, 330.19 (8) A01 IHA Part III from 1/III/1948 to 30/VI/1948.

²⁰ Santiago Mutis Duran, ‘Enrique Pérez Arbeláez. O la segunda expedición botánica’, *Nomadas* (2000) 12, pp.206-219 p.207; Mateo Cardona Vallejo, ‘Enrique Pérez Arbeláez (1896-1972). El hombre que veía crecer las plantas’, *Revista La Tadeo* (2002) 67, p.47-54; Santiago Mutis Duran, ‘Enrique Pérez Arbeláez: padre de la ecología en Colombia’, *Revista Credencial Historia* (1999) 113.

²¹ ‘Conference on the International Institute of the Hylean Amazon; Report of the committee on natural sciences. Report of the subcommittee on geology, physical geography and pedology’, ca August 1947, UA, 330.19 (8) A01 IHA Part I up to 31/XII/1947, p.1.

²² ‘Resume of the general proceedings of the conference’, circa August 1947, UNESCO archives, 330.19

coalition's leading figures, Carneiro, Alberto Torres and Pérez Arbeláez claimed that these were all issues of adaptation of man to nature and hence problems of human ecology.²³ Pérez Arbeláez' botany committee, for instance, recommended the conduct of botanical surveys "to search out and bring into cultivation wild plants which would be of utility to the Amazonian community" and therefore facilitate exploitation and strengthen conservation of Amazonia's natural resources.²⁴ This rational approach to exploitation guided the other committees, which explored locally relevant research orientations as well. The zoological subcommittee recommended to study "the conservation and utilization of useful animals and the control of those harmful or noxious to man" while the agricultural subcommittee advocated forestry research for rational extraction and reforestation as well as applied research to increase the efficiency of the exploitation of exporting trees, such as cacao and rubber trees.²⁵ Both the committees and the Interim Commission also relied on the ecologist's favorite tool: the survey. The Interim Commission planned a largescale survey program. It included soil, freshwater, forest, agriculture and geological surveys of the whole of the Hylean Amazon region.²⁶ Just like Hailey's and Worthington's, these surveys aimed at yielding economically and socially valuable knowledge in order to inform and design specific developmental interventions.

Although they were enthusiastic about UNESCO's approach of human ecology, the Amazonian positivists challenged its zonal conception of the institute. The quarrel on the institute's scope of action crystallized during the negotiations of the convention. This convention was a crucial step in the IIHA's making. Its adoption set in stone the institute's legal status, rules of procedures but also, and more importantly, its scope of action, its functions as well as its membership. Appointed by UNESCO's second General Conference, Huxley and his secretariat prepared in the winter of 1948 a draft that defined the IIHA as a zonal institute at the service of Amazonian members as well as other governments concerned with the tropical zone.²⁷ Huxley disregarded Corner's warning that such

(8) A01 IIHA Part I up to 31/XII/1947, p.3, p.11-12.

²³ 'Resume of the general proceedings of the conference', circa August 1947, UNESCO archives, 330.19

(8) A01 IIHA Part I up to 31/XII/1947, p.11-12.

²⁴ 'Conference on the International Institute of the Hylean Amazon; Report of the committee on natural sciences. Report of subcommittee on botany', ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1

²⁵ 'Conference on the International Institute of the Hylean Amazon. Report of the committee on natural sciences. Report of zoological subcommittee', ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1; 'Conference on the International Institute of the Hylean Amazon. Report of the committee on natural sciences. Report of the subcommittee for agriculture, forestry and fisheries of the committee for natural sciences of the Hylean Amazon project, Belém, August 14th and 15th, 1947', UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.2-3.

²⁶ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.6, p.9-13.

²⁷ 'Details for the convention of the international institute of the Hylean Amazon (IIHA)', 5 January

“cosmopolitan internationalism” might jeopardize the vital participation of Hylean countries.²⁸ Instead, he reinforced with his proposal the participation of non-Amazonian tropical countries like India or Belgium via the Congo, whose inclusion UNESCO had been seeking since the first General Conference in November 1946.²⁹

Carneiro's positivist coalition, however, disapproved UNESCO's attempt to include non-Amazonian actors in the organisation of the IIHA. For Pérez Arbeláez, Amazonian countries should retain primacy over the institute's organisation. As he explained to Huxley, “in [his] view Colombia's position is one thing and, for instance, India's quite another” and “a distinction must be made between the Amazonian States, which are owners agreeing to surrender certain rights, and other states, which are entering into no commitments”.³⁰ Unsurprisingly, the Amazonian positivists, led at the Iquitos conference by Alberto Torres and Pérez Arbeláez, rejected UNESCO's convention. As an alternative, they adopted a text that reinforced Amazonian control over the Interim Commission and the directorship of the future institute, of which UNESCO was also almost excluded.³¹ Besides reinforcing local control on the IIHA, the final convention narrowed down the IIHA's mission to serve its state members only and strengthen international scientific cooperation on Amazonian research.³²

Headed by Alberto Torres, the Interim Commission for the IIHA finished to bury the zonal ambition of UNESCO. The Iquitos conference appointed a survey team in the Huallaga River and the interim commission to clarify and organize the working program of the IIHA based on the propositions made in Belém and within the regional scope it had defined. Supported by the representative of France, Rivet, the president of the Interim Commission Alberto Torres and its vice president Pérez Arbeláez disregarded Paris and

1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948; ‘UNESCO, draft convention of the International Institute of the Hylean Amazon’, 3 February 1948, UA, IIHA/2 Nat.Sci./43.

²⁸ ‘IIHA. Notes on its international character by E. J. H. Corner, UNESCO FSCO, Latin America, 3 March 1948’, UA, 330.19 (8) A01 IIHA Part III from 1/III/1948 to 30/VI/1948, p.1.

²⁹ Edred John Henri Corner to William Purnell, ‘The Hylean Amazon Project, UNESCO 1948 for the International Institute of the Hylean Amazon (IIHA)’, 6 December 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1; ‘UNESCO, general information on the conference for the establishment of the International Institute for the Hylean Amazon, Annex I, scope and program of the proposed International Institute of the Hylean Amazon’, 12 February 1948, UA, IIHA/1 Nat.Sci./42 Annex I, p.1; On UNESCO's negotiations with India see: Sachindra Nath Dasgupta to Pierre Auger, 29 May 1948, UA, 330.19 (8) A01 IIHA Part III 1/III/48 to 30/VI/48.

³⁰ Enrique Pérez Arbeláez to Julian Huxley, 12 March 1948, UA, 330.19 (8) A01 IIHA Part III from 1/III/1948 to 30/VI/1948.

³¹ ‘UNESCO, final act of the conference for the establishment of the International Institute of the Hylean Amazon, Annex I, Convention of the International Institute of the Hylean Amazon’, 14 June 1948, UA, UNESCO/NS/IIHA/10 Annex I, p.5-7.

³² ‘UNESCO, final act of the conference for the establishment of the International Institute of the Hylean Amazon, Annex I, Convention of the International Institute of the Hylean Amazon’, 14 June 1948, UA, UNESCO/NS/IIHA/10 Annex I, p.1-2.

oriented the work of the survey team to investigate the Amazonian agenda that they and the program committees had contributed to formulate and popularize in Belém.³³ The Interim Commission materialized this regional shift. First, as an introduction to its first meeting in Manaus, its members paid allegiance to the pioneers of the institute, and its regional plan with a tribute to Alberto Torres, Carneiro and Fred Sopper, who had organized for the Rockefeller Foundation multiple yellow fever and hookworm campaigns throughout Brazil since 1920 and who presided the Belém conference.³⁴ The commission also marked a minute of silence to Captain Braz Dias de Aguiar, who, as we will see below, had dedicated his career to the pacification of the Amazon region and who most notably contributed to the boundary arbitration between Peru and Ecuador in 1942.³⁵ But also programmatically, the Interim Commission designed a work plan that defined the regional set up, purposes and research agenda for the IIHA.³⁶

The Interim Commission recognized the value of the network-based set up that Corner and the Bolivian Commission for the Hylean Amazon proposed. Unlike UNESCO's scheme, the Interim Commission restricted the network of field stations organized around the IIHA's headquarter in Manaus to the Amazon region.³⁷ It planned the creation of regional centers in Archidona (Ecuador), Belém do Para (Brazil), Iquitos (Peru), Riberalta (Bolivia), San Fernando de Atabapo (Venezuela) and Sibundoy (Colombia).³⁸ It also investigated possibilities to involve other Amazonian and Latin American research centers such as the IAN and the Interamerican Institute of Agricultural sciences, in Costa

³³ Rivet supported the positivists and the creation of the IIHA through two texts, see: 'Memorandum reservado' and 'L'Institut de l'Hylea Amazonica', undated, Archives of the Museum d'Histoire Naturelle, Paris, Paul Rivet papers, correspondence Paul Rivet, 2AP1B8a – UNESCO.

³⁴ In 1947, Fred Sopper had been appointed director of the Pan American Sanitary Bureau prior to his involvement with the IIHA as president of the Belém conference. See: 'Biographical information', the Fred L. Soper Papers, US National Library of Medicine, Bethesda, retrieved from: <https://profiles.nlm.nih.gov/ps/retrieve/Narrative/VV/p-nid/76>.

³⁵ Captain Braz Dias de Aguiar had for instance played an active role in the pacification of the north-western part of the Amazon before participating in the Belém Commission. He led the Ecuador-Peru Boundary Commission from 1942 and until his death on 17 December 1947 with which he arbitrated the negotiations of six critical areas along the Cordillera del Condor, and between the Zamora and the Santiago River. The work of the Commission served as a basis to pacify the relations between Peru and Ecuador via the Rio Protocol of 1948. David Scott Palmer, 'Peru-Ecuador border conflict: missed opportunities, misplaced nationalism and multilateral peacekeeping', *Journal of Interamerican Studies and World Affairs* (1997) 39, pp.109-148, p.111-114.

³⁶ 'UNESCO, International Institute of the Hylean Amazon, interim commission. First Session. Summary report of the first meeting held at Manaus (Amazonas) on 14 May 1948', 24 June 1948, UA, NS/IIHA/SR 1; IC.IIHA/4, p.4-5.

³⁷ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.6.

³⁸ 'UNESCO, final act of the conference for the establishment of the International Institute of the Hylean Amazon', 14 June 1948, UA, UNESCO/NS/IIHA/10, p.2.

Rica.³⁹ Modelled on the approach and conclusions of the Huallaga river survey team, the Interim Commission recommended a program of exploration of socio-economically interesting areas of the Amazon region such as the Oyapoc and Rio Madre De Dios River, the Orinoco headwaters as well as the Mato Grosso region.⁴⁰ The program of exploration was supported by special surveys on soil, freshwater and forest, all focusing on issues of economic valorization and environmental management.⁴¹ This extensive program of fieldwork was to be complemented with laboratory research in basic and developmental science. The Interim Commission proposed basic research in botany, zoology, geology, biochemistry and physics which had to serve a broader program of developmental studies in agriculture, fishery, forestry and soil conservation.⁴² Laboratory research was meant to advance specific interventions.⁴³ Research on pest control and freshwater food chains would serve the creation of new fisheries while mycological studies on the pest *sauva ant* would be helpful in the production of a forester's manual for the Hylean Amazon.⁴⁴ Finally, and unlike the original zonal plans of Needham's ecumenists, Carneiro's Amazonian positivists insisted on the need to reinforce the cultural and educational functions of science. In order to improve the public's understanding of the biosocial realities of Amazonia, the Interim Commission planned the creation of new scientific institutions open to the public such as museums, botanical gardens and local societies.⁴⁵

The constitutional process that took place in Belém, Iquitos and Manaus strengthened the IIHA. Under the Amazonian positivists' impulse, it also produced a politically and

³⁹ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA. Appendix V-a, memorandum about cooperation between the institute of Hylean Amazon and the inter-american institute of agricultural sciences, in a project of agricultural research, presented by Dr. Manuel Elgueta, representative of this institute in the conference for the establishment of the institute of Hylean Amazon', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11 Appendix V-a.

⁴⁰ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.7-8.

⁴¹ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.9-13.

⁴² 'Interim Commission of the International Institute of the Hylean Amazon, draft agenda, Appendix 1, organization of the IIHA, FSCO/LA/48/1, Appendix 1; 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.13-15.

⁴³ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.14.

⁴⁴ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.14; Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA, Appendix VII, research on the *sauva ant*', 26 November 1948, UNESCO archives, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.sec./IC/IIHA/11.

⁴⁵ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.2, p.4.

philosophically different institute from the one envisioned by Needham and the zonal ecumenists. Rather than a research agenda dominated by long-term zonal research, Carneiro's positivist coalition promoted practical, locally focused research to serve the empowerment of Amazonia and, as we will see below, Latin America's unification. These organizational, legal, and scientific differences conveyed also distinct worldmaking aspirations, which I will detail and contextualize in the following section.

THE POSITIVIST TEMPLATE

Carneiro's Amazonian positivists defined the IIHA as a center for home-grown science, dedicated to serve regional developmental goals and protect Amazonia's exceptional natural beauty. For them, the IIHA was to produce science about, for and in Amazonia. This regionalist definition of IIHA science – distant from the ecological and universalizing conception defended by Needham and the zonal ecumenists – reflected the tormented diplomatic history of the region. It also found its roots in a scientific as well as cultural and historical relation to nature and Amazonia typical of Latin America. For the cultural elites of the young republics that mushroomed throughout Latin America at the end of the nineteenth century, Amazonia became an important nation-building marker that they used to cultivate local, non-European identities and modernities. The Amazonians envisioned the IIHA within this Latin American political and intellectual tradition.

IIHA and the 'Hylean' Concord

For Needham and the zonal ecumenists at UNESCO, the notion of Hylea had a mere scientific function. Meaning 'wooded', the term Hylea enabled them to delineate the research landscape of the IIHA as the forests of the broader Amazonian basin.⁴⁶ Carneiro and his Amazonian coalition also used the notion, but proposed a more elaborate definition. If, for them, the Hylea referred to a specific landscape, it also encompassed broader international, political and evolutionary meanings. The notion of Hylea highlighted the region's inherent internationality and evoked its rich internationalist past. In his original 1946 IIHA proposal, Carneiro already emphasized the international nature of the Hylean Amazon and how its "four and quarter million square miles" spread over the boundaries of nine distinct countries.⁴⁷ For him, the notion of Hylea also echoed a long tradition

⁴⁶ 'UNESCO, International Institute of the Hylean Amazon (IIHA), the Hylean Amazon: a challenge to man by F. J. Malina', 17 January 1949, UA, UNESCO/NS/IIHA/20, p.1.

⁴⁷ 'UNESCO, Preparatory Commission, natural sciences committee, suggestions for the scientific program of UNESCO. Creation of an International Institute of the Hylean Amazon submitted by Professor

of international scientific cooperation in the Amazon. As he pointed out repeatedly, the area owed its exploration to multiple international expeditions led by adventure-minded scientists such as the French Aimé Bonpland, the British Richard Spruce, the Swiss-Brazilian Emilio Goeldi and the German Alexander Von Humboldt. It was in fact the latter who first introduced the notion of Hylea in the early nineteenth century.⁴⁸

As an international landscape and internationalist construct, the Hylea appealed to many Amazonian diplomats and statesmen of the second circle such as Alayza y Paz Soldán, Rafael Alvaredo, Leoncio de Salignac and Captain Braz Dias de Aguiar. For them and for Carneiro, building the IIHA, and, through it a unified Hylean space, represented a tool to pacify a region that had historically been marked by war and division rather than peace and cohesion. The Amazonian promoters of the IIHA were well aware that the construction of the institute was taking place in a violently divided territory that all nations invited to sit at the negotiation table had bitterly fought each other to conquer and control it. It was against one hundred and fifty years of territorial disputes, guerrilla fights and wandering troops that Carneiro's Amazonian positivists sought to build through the IIHA a Hylean concord among the historical foes that Brazil, Columbia, Peru, Bolivia, Ecuador and Venezuela were.

Hostility dated back to the 1830s when the Iberian colonial Empires disintegrated into a number of impoverished nations. Aspiration to regional control combined with vague territorial demarcations and old claims inherited from colonial times opened the gate for countless boundary disputes over the largely unexplored Amazon.⁴⁹ In the 1890s, competition grew out of control around the Amazon western flank during the so-called rubber boom as rivers of money started to flow from the extraction of the region's globally demanded rubber. From the 1880s to the collapse of the Amazon's rubber industry in 1912, Peru, Bolivia, Brazil, Colombia and Ecuador, but also imperial powers such as France and the United States engaged in what geographer Susanna Hecht referred to as the *Scramble for the Amazon* and its highly profitable rubber forests and gold deposits.⁵⁰

At the turn of the twentieth century, the region of Acre (south-west of Amazonia) and its dense rubber forests became the theater of fierce guerrilla wars and tense diplomatic transactions. Originally, Acre belonged to Bolivia and remained of little interest due to

Paulo de Berredo Carneiro, May 1946, UA, UNESCO/Prep.Com./Nat.Sci.Com./4, p.1.

⁴⁸ 'UNESCO, Preparatory Commission, natural sciences committee, suggestions for the scientific program of UNESCO. Creation of an International Institute of the Hylean Amazon submitted by Professor Paulo de Berredo Carneiro, May 1946, UA, UNESCO/Prep.Com./Nat.Sci.Com./4, p.1.

⁴⁹ Robert Burr, 'The balance of power in nineteenth-century South America: An exploratory essay', *The Hispanic American Historical Review* (1955) 35, pp.37-60, p.41-44; Susanna Hecht, *The Scramble for the Amazon and the "Lost Paradise" of Euclides da Cunha*, Chicago: University of Chicago Press, 2013, p.90-97.

⁵⁰ Hecht, op. cit. (49), p.101.

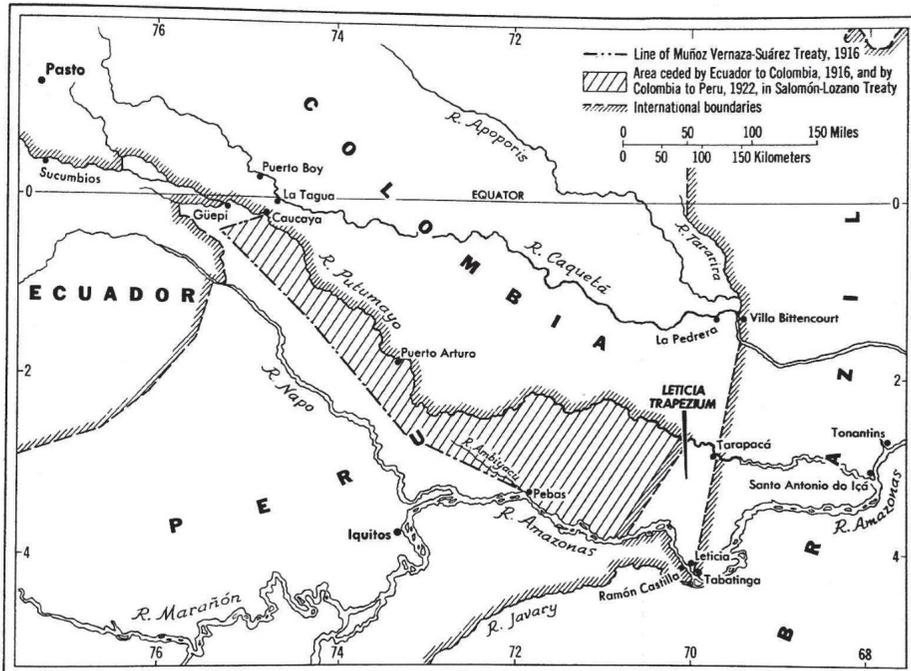


Figure 31 – The Leticia dispute: boundary and treaty lines, 1916-1934

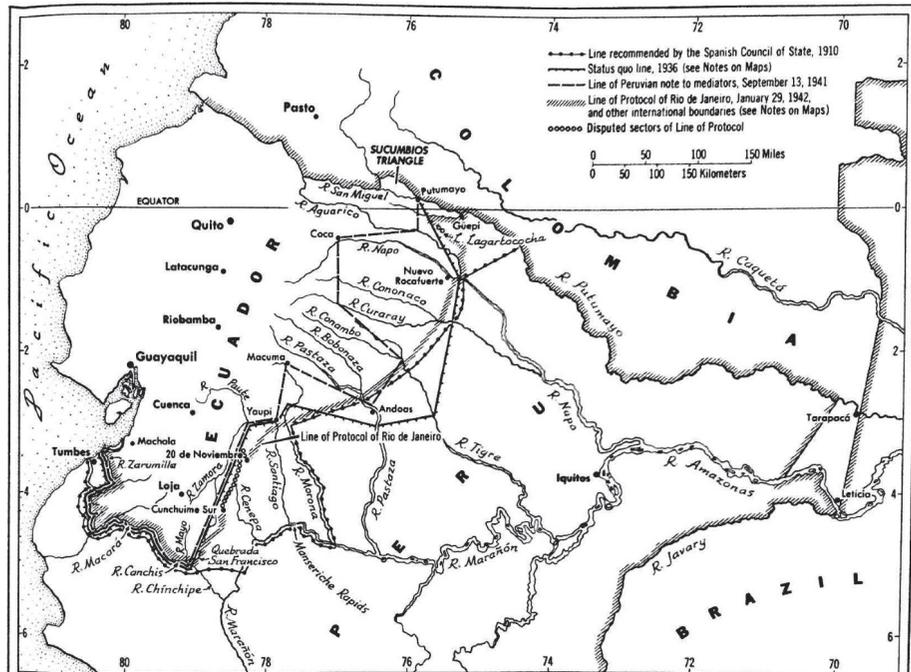


Figure 32 – The Marañón conflict: Territorial lines and boundaries, 1910-1941

its inaccessibility and low commercial value. The rise of the price of rubber, however, brought thousands of adventurers from Brazil, Peru and even the United States to Acre's dense rubber tree forests. What followed was a tripartite five-year-long guerrilla war (aka the War of Acre – see figure 34) that opposed Bolivia, Brazil and Peru for the control of the region of Acre.⁵¹ Although Brazil came out as the winner and was entitled by the Treaty of Petropolis of 1903 to annex the rubber rich territories of Acre, the newly defined boundaries remained fragile and disputed. The Treaty combined with the rubber crash of 1912 brought about a fragile peace that was rapidly threatened throughout the first half of the twentieth century by conflicts spurred by unsettled claims. Two of them – the Leticia dispute of 1932 and the Marañon conflict of 1941-1942 – opened old wounds and strained the diplomatic context in which the IIHA negotiations were taking place.

On August 31, 1932, a Peruvian armed group of Amazonian frontiersmen assaulted the town of Leticia, Colombia's only access to the Amazon river system.⁵² The hamlet was economically and politically important as it granted Colombia the status of an Amazonian power (see figure 35).⁵³ The incidents quickly built up into a full-scale war and threatened to set the region ablaze.⁵⁴ After multiple battles and months of international negotiations under the aegis of the League of Nations, Brazil and the United States, the Protocol of Rio was ratified, subsequently organizing the Peruvian delivery of Leticia to Colombia and thus closing the dispute on September 1935.⁵⁵ The Protocol of Rio had however unintended effects as it contributed to weaken Ecuador's position in the Amazon. Not only did it bring Ecuador to brusquely share a 300-mile-long boundary with its enemy Peru, but it denied sovereignty on the Oriente region which Ecuadorans had claimed as theirs since the mid-nineteenth century.⁵⁶ The Leticia dispute thus precipitated the fallout of a century old diplomatic deadlock with the Marañón⁵⁷ conflict of 1941 between Ecuador and Peru over the control of the rubber, gold and petrol resources of the Oriente region.⁵⁸ The Leticia dispute, precipitated the breakout of a largescale and continuous fighting front on the entire

⁵¹ On the War of Acre, see: Hecht, op. cit. (49), p.165, p.168-169, p.175, p.177-178, p.181.

⁵² Lester Woolsey, 'The Leticia Dispute between Colombia and Peru', *The American Journal of International Law* (1933) 27, pp.317-324, p.317-318; Pierre-Etienne Bourneuf, "'We have been making history': The League of Nations and the Leticia Dispute (1932-1934)", *The International History Review* (2016) 39, pp.592-614, p.594.

⁵³ Bryce Wood, *The United States and Latin American Wars, 1932-1942*, New York and London: Columbia University Press, 1966, p.169-170.

⁵⁴ Wood, op. cit. (53), p.175-176.

⁵⁵ Wood, op. cit. (53), p.194, p.210, p.221, p.251.

⁵⁶ Wood, op. cit. (53), p.194, p.170-171.

⁵⁷ The Marañon is the name given to the Amazon River east of Iquitos

⁵⁸ Sarah Radcliffe, 'Frontiers and popular nationhood: geographies of identity in the Ecuador-Peru border dispute', *Political Geography* (1998) 17, pp.273-293, p. 273.

length of the southeastern border of Ecuador.⁵⁹ The ratification of the Rio Protocol in 1942 ended organized fighting along the Ecuador-Peru border but opened a disputed process of boundary demarcation between 1942-1948 that eventually cut Ecuador off from the Amazon River system and poisoned the relations between Ecuador and Peru to this day.⁶⁰ Iquitos, the siege of the Second IHA conference, was at the heart of this dispute which the release of a new mapping of the region by the US army air corps had revived in 1946.⁶¹

The lingering border tensions combined with the fear of a second scramble following the new rubber boom of WWII only heightened concerns among Carneiro's positivist coalition regarding the precariousness of Amazonian peace.⁶² Aware of Amazonia's tragic past, Carneiro's second circle – i.e., the Amazonian diplomats – rooted the making of the IHA into a Pan-Amazonian worldmaking approach. Some of Carneiro's supporters, such as the Brazilian Captain Braz Dias de Aguiar took part in the resolutions of these conflicts. Braz Dias de Aguiar, who the Interim Commission celebrated alongside Carneiro as a pioneering figure of the IHA, had participated in the resolution of the Marañon conflict as head of the demarcation commission of the Rio Protocol between 1942 and 1947, before dying that same year.⁶³ The creation of the IHA hence appeared to them as much as a possibility for the consolidation of peace in the Amazon as a condition to the future institute's success. In line with Carneiro's positivist internationalism, the Amazonian diplomats Alvaredo, Alayza y Paz Soldán, but also Pérez Arbeláez, made the IHA's creation an instrument of Amazonia's pacification and unification. The organization of the second IHA conference in Iquitos, in which they actively participated, reflected this peace-building ambition.

Huxley provoked a general outcry among the Amazonian positivists when he announced his plan to organize the second IHA conference in Lima.⁶⁴ For Huxley, Needham and the zonal ecumenists, locating the conference in the Peruvian capital was important in order to generate the visibility among Latin America's governments that they thought the IHA lacked so far.⁶⁵ However, not only did Huxley's proposals side-line the

⁵⁹ Wood, op. cit. (53), p.194, p.256-257, p.277-278, p.282, p.290.

⁶⁰ Palmer, op. cit. (35), p.112; Radcliffe, op. cit. (58), p. 279.

⁶¹ Palmer, op. cit. (35), p.113.

⁶² On the US sponsored rubber frenzy during WWII, see: Xenia Vunovic Wilkinson, *Tapping the Amazon for Victory: Brazil's "Battle for Rubber" of World War II*, dissertation submitted to Georgetown University, 2009; Garfield, op. cit. (14), p.49-85 and p.86-126.

⁶³ Palmer, op. cit. (35), p.114; Ronald Bruce St. John, Rachel Bradley and Clive Schofield, 'The Ecuador-Peru boundary dispute: the road to settlement', *Boundary and Territory Briefing* (1999) 3, pp.1-65, p.38-39.

⁶⁴ Frank Malina to Edred John Henri Corner, 25 February 1948, UA, 5.65/1948, 330.19 (8) A01 IHA Part II from 1/I/1948 up to 31/II/1948, p.2.

⁶⁵ 'Arenales' report. Section II. Organization of the conference', undated, UA, 330.19 (8) A01 IHA Part I up to 31/XII/1947, p.1-3.

Amazonians' own plan to see the conference taking place in Amazonia's western territories, as they had commonly decided during an informal meeting at UNESCO's second General Conference in Mexico, but it also questioned their attempts to strengthen the future institute's Amazonian character. The Amazonians opposed Huxley and UNESCO's zonal ecumenists, pleading that "the conference should take place on the banks of the Amazon", and the institute remain "Amazonian".⁶⁶ As UNESCO's first-hand observer in this dispute, Corner explained in his confidential report that Carneiro's Amazonian coalition distrusted the capital cities and their Amazonian politics. By rejecting Lima, the Amazonian positivists sought to break away from mainstream Amazonian politics which, they argued, condemned Amazonia as a "place for extractive exploitation in the colonial sense" and a mere battleground for territorial nationalism, as shown with the Amazon Scramble.⁶⁷

In opposition to Huxley's original suggestion, Carneiro and the Amazonians planned during the second General Conference of UNESCO in Mexico to organize the second IIHA conference back in the historical heart of the Amazon Scramble. The plan was to make the conference itinerant, starting from Amazonia's western edge in Tingo Maria and stopping in Iquitos, Leticia to finally reach its center, in Manaus.⁶⁸ The tour was neither strictly scientifically driven nor politically innocent. As we have seen, all four cities had been and were still disputed territories or nationalist outposts during the late nineteenth Amazon Scramble. With their itinerant conference, the Amazonians sought to turn Amazonia's western corner from a nationalist battleground into an emblem of Amazonian concord. Even though Leticia and Tingo Maria had been removed for logistical reasons and replaced by Iquitos and Manaus, Carneiro's coalition succeeded in organizing the IIHA's making as a pan-Amazonian peace process by convening instead the second conference in Iquitos and Manaus, the outposts of Peruvian and Brazilian's imperialism in the region.

Besides anchoring the IIHA's making in Amazonia, the conference's organizers Alayza y Paz Soldán and Pérez Arbeláez punctuated the process with multiple symbolic peace ceremonies such as a cruise on the Amazon on board of a Peruvian warship involved in the Marañon Conflict of 1941 or the planting of "a tree of Amazon confraternity" and the "laying of the first stone of the monument to commemorate the conference".⁶⁹ Begun

⁶⁶ Luis Alayza y Paz Soldán to Julian Huxley, 6 March 1948, UA, 330.19 (8) A01 IIHA Part III from 1/III/1948 to 30/VI/1948.

⁶⁷ 'Confidential report on the Hylean Amazon Project, conferences at Iquitos and Manaus, May 1948 from E.J.H Corner, head, Hylean Amazon project, UNESCO to Director General', 30 May 1948, UA, 330.19 (8) A01 IIHA Part III 1/III/48 to 30/VI/48, p.2; Edred John Henri Corner to Frank Malina, 9 March 1948, UA, 330.19 (8) A01 IIHA Part III from 1/III/1948 to 30/VI/1948.

⁶⁸ 'Arenales' report. Section II. Organization of the conference', undated, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.1-2.

⁶⁹ 'UNESCO, International Institute of the Hylean Amazon (IIHA), report on the progress of the

in the East, in Belém, and successfully concluded in the west in Iquitos and Manaus, the constitutional process took place across the vast basin of the Amazon. In their eyes, it demonstrated how “the Hylean Amazon Project was sincerely concerned with the Amazon itself, and not an extraneous undertaking from a distant capital”.⁷⁰ As we will see in the last section of this chapter, these Pan-Amazonian marks symbolized the positivist regionalist purpose that Carneiro and his coalition sought to give to the IIHA’s scientific program.

Hylea as ‘Mundo in formacion’: modernity and identity in the Amazon

Carneiro and the Amazonian positivists modelled the IIHA within two imaginaries of the Hylean Amazon – Hylea as ‘mundo in formacion’ (i.e., ‘world in the making’) and Hylea as a civilization in the making. They appropriated with these imaginaries a mode of interaction with nature that had originally been developed as a vehicle of Latin American nationalism to advance internationalist aspirations instead.

Carneiro and his positivist acolytes used Hylea to define the Amazon as ‘materia propia’ (i.e., archetypal matter) or ‘materia primaria’ (i.e., primary matter), that is as ‘world in the making’.⁷¹ In a letter to the Brazilian Academy of Letters, Alvarado explained that, in the early nineteenth century, Humboldt and Bonpland had introduced the notion of Hylea to emphasize Amazonia’s natural diversity, wealth and singularity. Although a dated highbrow term in his view, Alvarado pointed out that the notion helped stressing the exceptionality of the Amazonian natural landscape as opposed to the world’s other tropical zones. As Alvarado explained, this exceptionality designated for the positivists the “extraordinary magnitude of the tropical landscape” that was the Amazon Basin and “the unfathomable content of this symbol of nature”. But, and more importantly, it also underscored the gravity of “the Amazonian problems” and how, science and the IIHA in particular could underscore the possibilities offered by the “region’s wealth” to produce “incalculable benefits for all”.⁷²

This ambivalent notion of Amazonian exceptionalism – to preserve and to exploit – claimed by Carneiro’s coalition builds upon a Latin American tradition of natural romanticism and naturalistic nation-building inherited from the nineteenth century.

Hylean Amazon project of UNESCO, 1947-1948 in South America by E.J.H. Corner, Executive Secretary, Interim Commission, IIHA, Manaus, Brazil, 18 November 1948, UA, UNESCO/NS/IIHA/13, p.6.

⁷⁰ ‘Confidential report on the Hylean Amazon Project, conferences at Iquitos and Manaus, May 1948 from E.J.H Corner, head, Hylean Amazon project, UNESCO to Director General, 30 May 1948, UA, 330.19 (8) A01 IIHA Part III 1/III/48 to 30/VI/48, p.2.

⁷¹ Rafael Alvarado (Delegacion del Ecuador) to João Neves de Fontoura (Presidente de la Academia Brasileira de Letras), 10 September 1947, CP, PC.RI.IH.03/Cartas 8/6/1947 a 7/3/1948, p.5.

⁷² Rafael Alvarado (Delegacion del Ecuador) to João Neves de Fontoura (Presidente de la Academia Brasileira de Letras), 10 September 1947, CP, PC.RI.IH.03/Cartas 8/6/1947 a 7/3/1948, p.2, p.4-6.

Combining Enlightenment science and emerging romantic aesthetics, pioneering naturalists like Alexander von Humboldt and Charles Marie de La Condamine forged a tradition of scientific exploration that represented Amazonia as the world's biological archive and a place of mythical endeavor combining awe-inspiring depiction of an Edenic yet perilous nature.⁷³ Although celebrated as unique, Amazonia was not the only tropical landscape that western explorers idealized. When Humboldt and La Condamine associated Amazonia's tropical exceptionality to its giant forests and manifold invisible hazards, other explorers like the American explorer Henry Morton Stanley and the British geographer Richard Francis Burton did the same for Africa and its dangerous big game. These depictions of untamed exceptional nature awakened local interests for the so far neglected backlands of Latin America.⁷⁴ From the late nineteenth century onward, local romantic writers, modernist poets, positivist scientists and reformers picked up this Humboldtian tradition and cultivated the continent's wild nature and primitive cultures into a nationalist marker for the nascent Latin American republics.⁷⁵ Science played a major role in these naturalistic forms of nationalism. The young republics massively hired scientists to produce surveys, floras and museums to nationalize the continent's nature and turn its features into traits of the country's identity.⁷⁶ The exaltation of the nation through Latin America's exceptional nature – what Kauffman identified as naturalistic nationalism – became a prevailing feature of the continent's nation-building processes at the turn of the twentieth century.⁷⁷

⁷³ Hecht, op. cit. (49), p.283-287, p.424.

⁷⁴ Seth Garfield, 'A nationalist environment: Indians, nature, and the construction of the Xingu National Park in Brazil', *Luso-Brazilian Review* (2004) 41, pp.139-167.

⁷⁵ Erik Camayd-Freixas and José Eduardo González, *Primitivism and Identity in Latin America: Essays on Art, Literature and Culture*, Tucson: The University of Arizona Press, 2000; For a fine review of Latin America's primitivist and naturalist traditions, see the chapter 'Natureza e identidade nacional nas Americas' in Maria Ligia Coelho Prado, *América Latina no Século XIX: Tramas, Telas, e Textos*, São Paulo and Bauru: EDUSP and EDUSC, 1999, pp.179-216; On the specific case of Brazil see: José Murillo de Carvalho, 'O motivo edênico no imaginário social brasileiro', in Dulce Chaves Pandolfi, José Murillo de Carvalho, Leandro Piquet Carneiro and Mario Grynspan (eds.) *Cidadania, Justiça e Violência*, Rio de Janeiro: Editora Fundação Getulio Vargas, 1999, pp.19-43, p.19-25; Susanna Hecht, 'The last unfinished page of Genesis: Euclides Da Cunha and the Amazon', *Historical Geography* (2004) 32, pp.43-69; Marco Aurélio Coelho de Paiva, 'O sertão Amazônico: O inferno de Alberto Rangel', *Sociologia* (2011) 13, pp.332-362; Elizabeth Marchant "Naturalism, race, and nationalism in Aluisio Azevedo's *O Mulato*" *Hispania* (2000) 83, pp. 445–453.

⁷⁶ On naturalistic nationalism in Latin America, see: McCook, op. cit. (13), p.26-46; Eakin, op. cit. (13); Evelyn Fishburn and Eduardo Ortiz (eds.) *Science and the creative imagination of Latin America*, London: Institute for the Study of the Americas, 2005; On natural history museums in Latin America, see: Regina Horta Duarte, 'Between the national and the universal. Natural history networks in Latin America in the nineteenth and twentieth centuries', *Isis* (2013) 104, pp.777-787; Maria Margaret Lopes and Irina Podgorny, 'The shaping of Latin American museums of natural history, 1850-1990', *Osiris*, (2000) 15, pp.108-118; on Brazil's Amazonian nationalism, see: Garfield, op. cit. (74); Teresa Cribelli, "'These industrial forests': economic nationalism and the search for agro-industrial commodities in nineteenth-century Brazil", *Journal of Latin American Studies* (2013) 45, pp.545-579.

⁷⁷ Erik Kaufmann, 'Naturalizing the nation: the rise of naturalistic nationalism in the United States and

‘Mundo in formacion’ however meant more to the positivist scientists in Carneiro’s alliance than just a unique primeval world. Understood as world in the making or to be made, the notion of Hylea evoked above all a modernist conception of nature that was popular among Latin American scientists. The exceptionalism of Latin America’s nature was not only associated to its natural beauty and scientific wealth but also to its immense resources.⁷⁸ As Susanna Hecht showed, the expeditions of Humboldt, La Condamine and the many more Western naturalists who penetrated tropical Latin America were appointed by local and European colonial authorities to open up the great forests to economic exploitation and national-colonial expansion. Their depiction of an idyllic nature came hand in hand with the production of concepts of imperial conquest and development as well as imaginaries of human domination over nature.⁷⁹ Galvanized by the swiftly growing demand for tropical goods, local elites sponsored throughout the nineteenth century scientists and explorers to discover, domesticate, cultivate and market the continent’s untamed natural resources.

These fact-checkers, as Hecht calls them, were particularly active in Amazonia during the rubber boom. In the footsteps of Humboldt and La Condamine, they popularized a dual depiction of the Amazonian tropics as both a pristine Eden to preserve and a limitless reservoir of resources to tame.⁸⁰ State-sponsored – especially by Brazil – they flocked into Amazonia as the architects of an emerging Brazilian imperialism in the region. These surveyors and economic explorers mobilized the sciences to map, claim, and order the vast *terra incognita* that Amazonia was and transformed it into the region’s cradle of national and economic progress. Brazilian engineer and writer Euclides da Cunha was one of Amazonia’s most famous agents of Empire who mapped, narrated as well as constructed Amazonia as the bedrock of a bustling Luso-Brazilian tropical civilization.⁸¹

Some twenty years after the rubber crash plunged Amazonia into oblivion, the Estado Novo revived da Cunha’s view of Amazonia as a place of human – and more importantly Brazilian – endeavor. For the authoritative regime, the Amazon was both a traditional place to be proud of and a place to modernize and transform. To this end, the Estado Novo sponsored throughout the 1930s and 1940s a host of artists, writers and scientists to shape the Amazonian hinterland into a symbol of the Brazilian nation and the frontline

Canada, *Comparative Studies in Society and History* (1998) 40, pp.666-695, p.666-69.

⁷⁸ This is for instance made particularly clear in the works of Teresa Cribelli for Brazil and Stuart McCook for the Caribbean and Latin America more generally: Cribelli, *op. cit.* (76); McCook, *op. cit.* (13), p.47-76, p.105-127.

⁷⁹ Hecht, *op. cit.* (49), p.283-287.

⁸⁰ Hecht, *op. cit.* (49), p.287-290.

⁸¹ Hecht, *op. cit.* (49), p.421-450.

of Brazil's progress.⁸² Writers and artists like Percy Lau and his plates (see Figure 46, 47 and 48, p.264) idealized the traditional way of life of the Brazilian settler and the way he appropriated the pristine natural landscape of the Amazon.⁸³ Meanwhile, a battery of scientists and specialists were enrolled to utilize the untapped resources of the Amazon and turn the region into a pillar of Brazil's modernity. Hired in the 1930s as agents of Estado Novo's tropicalism, Carneiro, and his research on Amazonian curare and guarana, perpetuated, like Garcia Paula and other members of his positivist coalition, da Cunha's civilizational and modernist utopian challenge.

For the Brazilian scientists, who were dominant in Carneiro's coalition, this conception of Amazonian nature as a birthplace of Latin American identity and modernity undergirded their worldmaking visions of the IIHA – and contrasted with Needham's predominantly naturalistic zonal perspective. In their eyes, the IIHA embodied the solution to Da Cunha's utopia, which re-emerged in the 1930s and 1940s as the continent's modernist frontier for many positivist intellectuals like Carneiro.⁸⁴

The Euclidian challenge: da Cunha's dreams of civilization in the Amazon

The turn-of-the-century writer Euclides Da Cunha is today mostly remembered as one of Brazil's greatest literary figures. With Alfredo Rangel, Artur Azevedo, Jose Verissimo and Henrique Coelho Neto, Da Cunha epitomized a generation of *mestizo* writers, who embodied the ideals of the new republic and through their writings thematized Brazil's relegated *sertão* – Brazil's undeveloped interior territory, including Amazonia.⁸⁵ Born in 1866, da Cunha was a product of late nineteenth century Brazilian republicanism.⁸⁶ He was a humanist, a disciple of Auguste Comte, an admirer of the French social conscious writers Émile Zola and Victor Hugo and a follower of his life mentor the abolitionist and republican Benjamin Constant – the architect of Brazil's first republic. At the military school of Praia Vermelha, Rio de Janeiro, – a hotspot of republican contestation in the 1880s – the young da Cunha also acquired a strong scientific identity as he devoted

⁸² Garfield, op. cit. (14), p.9-48.

⁸³ Heliana Angotti-Salgueiro, 'A construção de representações nacionais: os desenhos de Percy Lau na Revista Brasileira de Geografia e outras "visões iconográficas" do Brasil moderno', *Anais do Museu Paulista* (2005) 13, pp.21-72.

⁸⁴ Da Cunha did not only put Amazonia on the map of Brazil's national project, but, as Maio and Sá pointed out, he also contributed to revive scientific interest for the region among Brazilian scientists, see: Maio and Sá, op. cit. (4), p.978.

⁸⁵ On this generation of *Sertão* writers, see: Natália Peixoto Bravo de Souza, *A Militância em Torno da Glorificação de Euclides da Cunha: um Projeto Político-Ideológico*, dissertation submitted to Universidade de São Paulo, 2010, p.37; Regina Abreu, *O enigma de os Sertões*, Rio de Janeiro: Rocco, 1988.

⁸⁶ Hecht, op. cit. (49), p.17-32.

himself to applied sciences and graduated as a civil engineer. Scientifically trained and politically formed as a positivist republican, young da Cunha was moulded to become the technocratic architect of Brazil's still frail republican regime. After leaving the army in 1896, he travelled Brazil's vast interior as journalist. In 1897, he chronicled in his masterpiece *Os Sertões* (translated to English as *Rebellion in the Backlands*) the brutal suppression of the *Canudos* uprising by the Brazilian military (1896-1897) in Bahia's backland.⁸⁷ In 1902, the baron of Rio Branco – Brazil's foreign minister and astute architect of Brazil's Amazonian expansion – appointed Da Cunha to lead the joint survey team to resolve the border contest that resulted from the War of Acre. Just like with *Os Sertões*, da Cunha intended to chronicle in his unfinished *O Paraíso Perdido* (translated to English as *Lost Paradise*) Brazil's making in its Amazonian margin, recounting the region's dazzling nature, unearthing its geopolitical complexity and criticizing the violent exploitation of man and nature he had observed while surveying the region of Acre.⁸⁸

Despite his early death in 1909, da Cunha left a profound mark on the making of modern Brazil and the country's progressive intelligentsia. His books, *Os Sertões* and his incomplete and lesser-known *O Paraíso Perdido*, profoundly modified Brazil's foundational republican fictions by inscribing its neglected hinterland – the *Sertaõ* and Amazonia – in the heart of the Brazilian project.⁸⁹ In 1911, his friends and followers from Brazil's progressive intelligentsia such as the *sertanista*⁹⁰ writers Alberto Rangel and Edgard Sussekind de Mendonça and the positivist anthropologist Edgar Roquette-Pinto founded the Guild of Euclides da Cunha in Rio de Janeiro.⁹¹ Originally created to honor da Cunha and popularize his works, the Guild quickly became a platform for Euclidian and positivists, which via its own publication, the *Revista do Grêmio Euclides da Cunha* and the activism of related organizations such as the Brazilian Scientific Bookshop and

⁸⁷ Euclides da Cunha, *Os Sertões*, Rio de Janeiro: Laemmert, 1903. For a version translated to English, see: Euclides da Cunha, *Rebellion in the Backlands (Os Sertões)*, translated by Samuel Putnam, Chicago: University of Chicago Press, 1970.

⁸⁸ Da Cunha left his *O Paraíso Perdido* unfinished, as he died tragically, killed by the lover of his wife, a young army lieutenant, he attempted to kill on August 15, 1909; Hecht, op. cit. (75), p.50.

⁸⁹ Hecht, op. cit. (75), p.47, p.63-64.

⁹⁰ From the early 1900s, the term became used to designate a group of explorers who developed a profound understanding of the Brazilian hinterland and who sought to valorize these overlooked territories. They worked to search for resources or, like Da Cunha, to survey these unmapped territories. They also chronicled the way of life in these remote backlands and idealized the natural beauty they found in it. These novels – known as *sertanista* novels – became popular at the turn of the twentieth century and an important contribution to the project of nation building.

⁹¹ de Souza, op. cit. (85), p.48-49; Natália Peixoto Bravo de Souza, 'O papel dos euclidianos cariocas na monumentalização de Euclides da Cunha' in *Anais do XXVI Simposio Nacional de Historia - ANPUH*, São Paulo, 2011, p.2; Natália Peixoto Bravo de Souza and Gastão Galvão, 'O estigma de uma obra: a trajetória de Euclides da Cunha e suas reapropriações sob o ponto de vista do positivismo e do evolutionismo', *Revista da SBHC* (2007) 5, pp.173-184, p.183.

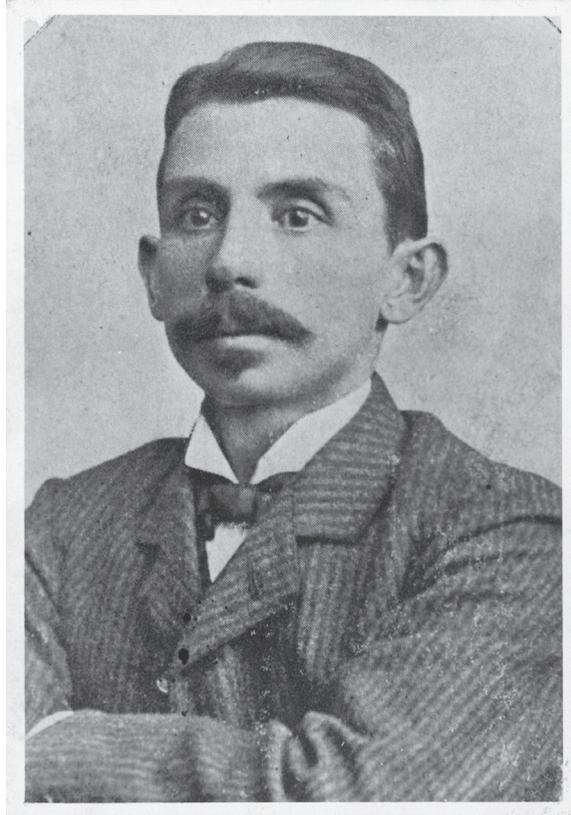


Figure 33 – Brazilian writer, sociologist and engineer Euclides da Cunha (1866-1909)

the Brazilian Association for Education (ABE), promoted the advancement of scientific modernization, scientific education as well as social justice in Brazil.⁹² By the early 1930s, Da Cunha was monumentalized as a symbol of Brazil's interwar progress and modernism. While, on the one hand, positivist disciples like Roquette-Pinto made da Cunha the figurehead of the advancement of science and its application to Brazilian society, on the other hand, the theoreticians of the Estado Novo such as Cassiano Ricardo and Gilberto Freyre glorified him as a modern *bandeirante*⁹³ and made him a pioneering figure of Brazil's territorial unification. They, for instance, framed the regime's *Marcha Para o Oeste* (known in English as the *March to the West*), an unprecedented developmental plan launched in 1937 to integrate the Brazil Amazon to the rest of the national body, as a direct answer

⁹² de Souza, op. cit. (91), p.3, p.11-12.

⁹³ The *bandeirante*, the figures of *Bandeirismo* refer to the seventeenth century Brazilian flag-bearing explorer, slaver and fortune hunter who penetrated the interior of Brazil and expanded the effective borders of the Brazilian colony as they ventured into unmapped territory.

to the civilizational challenges that da Cunha had envisioned thirty years earlier.⁹⁴ In the 1930s and 1940s, da Cunha hence catalysed two modernist aspirations, which sought the invention of a local Brazilian modernity through the development of local science and the economic modernization of Amazonia and its integration to the national unit hinterland.

Many Brazilians in Carneiro's Amazonian coalition had contributed to Cunha's glorification and to advance the societal projects that came to be associated to his name since the 1930s. Carneiro had been almost as much an Euclidian as he was a Comtean disciple. He was a student and friend of the positivist and fervent Euclidian Francisco Venâncio Filho, a frequent visitor of Rio's Brazilian Scientific Bookshop, and a founding member of the ABE, which he and other leading Euclidians Egdard Susseking, Roquette-Pinto had created in 1924.⁹⁵ He and his family, actively contributed to the making of da Cunha as a positivist figure. Via the House of Auguste Comte in Paris and the Brazilian Association of the Friends of Auguste Comte the Carneiro's, father and son, established close and strong connections with the Euclidians from the Guild of Euclides da Cunha.⁹⁶ The chemist Ruben Descartes de Paula, an IIHA supporter and colleague of Carneiro at Brazil's National Institute of Technology (INT) in the mid-1930s, was also a member of the Brazilian Association of the Friends of Auguste Comte, and closely involved in the relations with the Euclidian Guild.⁹⁷ Others like Alberto Torres navigated these Euclidian circles as well. She had been a close friend of Candido Rondon, one of da Cunha's closest companions, and a disciple of Roquette-Pinto at the National Museum. Besides writing extensively on da Cunha, Roquette-Pinto had infused the Museum's anthropological approach with Cunha's perspective, of which Alberto Torres was a product.⁹⁸ He had also created at the National Museum a study room, the room Euclides da Cunha, that was dedicated to Cunhan scholarship.⁹⁹ Da Cunha was also a reference point to many, if not all, the Brazilian scientists at the IIHA, who had become scientists in the 1930s when the Brazilian interior became a pressing concern for the federal state. Carneiro and Descartes de Paula had for instance worked on the valorisation and industrialization processes of new resources as members at the Estado Novo's newly created INT.¹⁰⁰ Camargo led the Amazonian IAN, which the Vargas administration created to promote rational agriculture and to revive rubber production in the Amazon while Alberto Torres headed the National Council for the Protection of Indians.¹⁰¹

⁹⁴ Abreu, op. cit. (85), p.320-321.

⁹⁵ Francisco Costa, 'A legião de Euclides da Cunha. Francisco Venâncio Filho: o surgimento do euclidianismo', *Revista USP* (2002) 54, pp.52-65.

⁹⁶ de Souza, op. cit. (85), p.68-69, p.82.

⁹⁷ de Souza, op. cit. (85), p.86-88.

⁹⁸ de Souza, op. cit. (85), p.9; Abreu, op. cit. (85), p.321.

⁹⁹ de Souza, op. cit. (85), p.74; Abreu, op. cit. (85), p.306, p.328.

¹⁰⁰ Maria Helena Magalhães Castro and Simon Schwartzman, *Tecnologia para a Indústria: a História do Instituto Nacional de Tecnologia*, Rio de Janeiro: Centro Edelstein de Pesquisas Sociais, 2008, p.26-27.

¹⁰¹ On Camargo, see: Dean, op. cit. (14), p.87-107.

In these circumstances – as positivist reformists and scientific *sertanistas* – the Brazilian positivists in Carneiro's coalition naturally referred to Da Cunha and located their vision of the IIHA within his *Paraíso Perdido* – Cunha's Amazonian civilizational utopia. In his report of the Belém commission, the Brazilian chemist Descartes Garcia Paula presented the IIHA as a response to the abandonment of Amazonia – what Garcia Paula called a “man-made desert” – da Cunha denounced in the early 1900s and that the region had continued to be ever since.¹⁰² Similarly, in 1950, in an attempt to obtain Brazil's support for the IIHA, Carneiro explained to the Staff of the Brazilian Armed Forces (EMFA) that the IIHA followed in the footsteps of Da Cunha and other *Sertanistas* like Rangel and Candido Rondon who called to put the neglected yet promising forests of Amazonia on the map of progress.¹⁰³

How did da Cunha's Amazonia look like? As Susanna Hecht pointed out, Da Cunha did not see Amazonia as an empty Eden as most scholars of the time did. Analysing his Amazonian writings, she argued that he conceived Amazonia as the ground of an emerging, vibrant and yet brutal civilization. He scientifically theorized, empirically observed and literarily narrated a civilization in the making of which he conceived himself as the first chronicler. Unlike the Western travellers and naturalists who established the canons of an ‘edenized’ conception of Amazonia, da Cunha entered the region's bustling rubber forests at the peak of the rubber boom. As an agent of Brazil's Amazonian expansion, he contributed to build this frontierland as his survey work sought to settle a territorial dispute that defined the life and future of millions of rubber tappers, the geopolitical shape of a continent and the growth of an emerging industrial Capitalism that connected the region to the world's industrial centers.

Da Cunha relied heavily on science to contest *tabula rasa* narratives of Amazonia. As a positivist, he trusted the scientific method and its lexicon to be his best tool to understand, represent and emancipate the Amazon. In Hecht's view, da Cunha became one of the best Amazonian specialists of his time.¹⁰⁴ He studied the latest scientific theories and exploration reports from European and North American naturalists and revised them using a wide range of neglected sources. He scrutinized detailed seventeenth century chronicles, maps and reports produced by Amazonia's many Jesuit, Dominican and Franciscan missionaries

¹⁰² ‘Alguns aspétos de conferência do Instituto Internacional da Hiléia Amazônica e de Belém por Ruben Descartes Garcia Paula’, undated, CP, PC.RI.IH.03/Roteiros 9/1947, p.2; On Garcia Paula's and Carneiro's connection at the INT, see: Castro and Schwartzman, op. cit. (100), p.26, p.44.

¹⁰³ Paulo Carneiro to senhor Ministro de Estado das Relações Exteriores (Raul Fernandes), 2 February 1949, CP, PC.RI.IH.06/Apontamentos 2/2/1949 a 9/4/1949, p.2; ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 April 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.10.

¹⁰⁴ Susanna Hecht, ‘The last unfinished page of Genesis: Euclides Da Cunha and the Amazon’, *Historical Geography* (2004) 32, pp.43-69, p.57.

and collected all forms of knowledge from native Amazonians regarding their lifestyle, their utilisation of the Amazonian landscape and resources as well as the myths and tales constitutive of the region.¹⁰⁵ He also relied on new data collected by rubber surveyors as well as his own which he collected as part of his Survey Mission in the Purus.¹⁰⁶ Based on his formidable and eclectic erudition, he refuted the dominant geomorphological, environmental and racial theories of the time that conceived Amazonian nature as old and static and that condemned local mixed blood population as genetically degenerate and unfit for the task of colonizing and exploiting the Amazon.¹⁰⁷ He turned these theories on their head and presented Amazonia as a young and evershifting social and natural landscape shaped by the *caboclo* and *cafuz* – Amazonia's mixed blood inhabitants¹⁰⁸ – whom he designated as the evolutionarily fittest to tropical life.

This extensive process of revision was based on a native counter-science that he put together prior and during his exploration of the Purus. This embryo of creole or native science occupied a central place in his Amazonian worldview as it legitimized and fuelled his vision of a birthing local civilization. His scientific and sociological observations, such as the complex fluvial and floodplain dynamics and their usage by local rubber tapper provided him with powerful evidence as well as new metaphors to envision and imagine Amazonia as a place of human and mostly Brazilian endeavor.¹⁰⁹ As a surveyor, da Cunha used his map-making to create a Luso-Brazilian civilization. If his depiction served to legitimize Brazil's imperialism in the Purus, it also celebrated its main architect: the inchoate and so far invisible diaspora of *caboclo* and migrant workers who flooded the region over centuries. Da Cunha explained how they adapted to Amazonia's ecosystem through processes of biological, social and cultural hybridization. These syncretic processes produced in his eyes a specific environment – such as the complex forest and river trails known as *varadouros*¹¹⁰ and the *estradas*¹¹¹ – culture and temperament that turned Amazonia from a swamp to an emerging tropical civilization.¹¹²

¹⁰⁵ Hecht, op. cit. (49), p.281-282; p.287-289; p.291-295; p.382-384.

¹⁰⁶ Hecht, op. cit. (49), p.289-290.

¹⁰⁷ Such as the dominant understanding of Amazonia's landforms that was based on William Morris Davis' cycle of erosion model and which da Cunha refuted in favour of the plate tectonics model of geologists Orville Derby and Frederico Hartt as Hecht explained in Hecht, op. cit. (49), p.234-236, p.233-249.

¹⁰⁸ As defined by Hecht, a *caboclo* designate an acculturated Indian and a *cafuz* designate a person of mixed black and Indian ancestry.

¹⁰⁹ Hecht, op. cit. (49), p.347, p.351-353.

¹¹⁰ As defined by Hecht: Forest trail connecting watersheds, headwaters, or tributaries of the Amazon. Some were pre-Columbian, and many were developed in the rubber period to improve the speed of movement of products, to avoid custom houses and for military purposes during the many guerrilla wars, in Hecht, op. cit. (49), p.493

¹¹¹ As defined by Hecht: Rubber tapping trail in Hecht, op. cit. (49), p.492

¹¹² Hecht, op. cit. (49), p.366-369.

Despite his Brazilian nationalism, Da Cunha projected a narrative of emancipation on Amazonia that was of wider resonance for Latin Americans in search for a regional identity and modernity for the southern continent.¹¹³ It turned Amazonia's natural exceptionality into traits of national uniqueness and the modernist imaginary of an untapped reservoir whose exploitation could fuel the emerging republic's modernization. Da Cunha's Amazonia was both and more. His Amazonia – and the process of its fabrication (creole science) – established Amazonia's tropicity as the foundational condition of a non-European and local – or creole – civilization in the region (and Latin America at large). Da Cunha built his vision of Amazonia on science, and more specifically on a creole form of science, which bound the scientific method to a variety of local sources of knowledge. With it, he overthrew past Eurocentric narratives and imagined Amazonia's civilizational future based on autochthonous culture, knowledge and ways of knowing. Both the civilizational vision and the challenge of its making through a local form of science formed the backdrop against which Carneiro and his coalition envisioned the IIHA. Quoting da Cunha, Carneiro also regretted that scientists so far “did not go in Amazonia for Amazonia, but rather to enrich [national and foreign] museums, botanical gardens and laboratories”.¹¹⁴ In his eyes the IIHA embodied the growth of a local Amazonian science that da Cunha had longed for. For Carneiro, It was “the only solution to initiate a new era of understanding of the region and to undertake a mode of investigation suited to embrace the region's specificities”.¹¹⁵ The IIHA and its plan to produce local science was thus an ambitious attempt to take up da Cunha's positivist promise. As Carneiro explained to the Brazilian military,

“The institute will be a bond of friendship and cooperation between the Amazonian countries, a permanent source of culture in the vast region where it has been designed to carry out its activities and a valuable instrument for the study and protection of tropical nature with the intention to gradually turn it into a favorable site for the settlement of man”.¹¹⁶

¹¹³ Da Cunha saturated his writings on Amazonia with idioms of Brazilian nationalism and imperialism. His literary production constituted the intellectual apparatus Rio Branco orchestrated to claim national primacy in the boundary negotiations over the Purus. However, as Hecht shows, da Cunha also pursued his own political and cultural agenda for a more socially just Amazonia and denouncing the oppressive and brutal labour regime of rubber extraction, Hecht, *op. cit.* (49), p.348.

¹¹⁴ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.10.

¹¹⁵ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.11.

¹¹⁶ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.15.

Via the IIHA, Carneiro and his positivist colleagues gave a continental span to Cunha's civilizational challenge. By tackling the peripherality of Amazonia that da Cunha regretted in the early 1900s, the Amazonian positivists conceived the Hylean Institute as the stepping-stone to address Latin America's scientific and civilizational peripherality. As we will see in this last section, the Amazonian design of the IIHA served a regionalist worldmaking strategy that boiled down to the creation of an Amazonian civilization and from it, the advancement of Latin America's peaceful integration.

BUILDING A POSITIVIST CIVILIZATION IN THE AMAZON

Carneiro's positivist coalition conceived the IIHA as the stepping-stone to a new Pan-Amazonian and positivist civilization in a region that was still often regarded as a *Green Hell* Introduced in 1908 by the Brazilian novelist and friend of da Cunha Alberto Rangel in his eponymous collection of short stories, *Green Hell* did not refer to Amazonia as a harsh and unforgiving nature to humanity.¹¹⁷ It rather deconstructed the myth of an Amazonian *Eldorado* and describes instead the life and violence during the Amazonian rubber boom. It depicts the struggle both of nature and local communities that was brought on by the violent subordination of Amazonia to modern agro-industrial Capitalism.¹¹⁸ Based on Rangel and da Cunha's critical depiction of the violent social reality of the Amazon, the question of inhabiting Amazonia meant for the positivists more than championing the battle of man against nature.¹¹⁹ It was namely a challenge of social, economic and political nature. Following in the footsteps of Rangel and da Cunha, the transformation of the *Green Hell* that was Amazonia meant for Carneiro and the Amazonian positivists to foster native Amazonian culture, tackle the brutal exploitation of man and nature and replace territorial imperialism with Latin-Americanism.

Science and the IIHA were at the center of this civilizational and Latin-Americanist project. For Leoncio Salignac de Souza, the IIHA was an opportunity to "open Amazonia to contemporary civilization, and start a cycle of work and order, of hope and fraternity" while for Carneiro, it was the tool to "transform a region so far hostile to man into a

¹¹⁷ Alberto Rangel, *Inferno verde. Scenas e scenarios do Amazonas com um prefacio de Euclides da Cunha*. Genova: S. A. I. Cliches Celluloide Bacigalupi, 1908; See also, Coelho de Paiva, op. cit. (75).

¹¹⁸ Camilo Jaramillo, 'Green hells: monstrous vegetations in twentieth century representations of Amazonia' in Keetley Dawn and Angela Tenga, *Plant Horror: Approaches to the Monstrous Vegetal in Fiction and Film*, London: Palgrave Macmillan, 2016, pp.91-109, p.96-98; Candace Slater, *Entangled Edens: Visions of the Amazon*, Berkeley: University of California Press, 2001 p.97-98.

¹¹⁹ Rômulo de Paula Andrade, "'Conquistar a terra, dominar a água, sujeitar a floresta': Getúlio Vargas e a revista 'Cultura Política' redescobrem a Amazônia (1940-1941)", *Boletim do Museum Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.453-468.

habitat suitable to the rise of a civilization of its own type".¹²⁰ If human ecology constituted the dominant frame and approach for both Needham and Carneiro, it was operationalized differently (i.e., zonal vs. regional/local) and thereby produced distinct worldmaking effects. Unlike Needham and the zonal ecumenists at UNESCO, the Amazonians' scientific program did not exclusively aim at improving the scientific management and economic domestication of Amazonia but also at advancing the political, educational and cultural goals that Carneiro and the Amazonian positivists deemed essential to the development of a tropical and regionally integrative civilization in the Amazon. Homegrown science was needed to embrace Amazonia's perceived specificity but also to produce the socio-economic as well as moral and cultural conditions that could unify and strengthen Latin America as a whole.

Positivist science and the civilizational awakening of the Amazon

The program of exploration proposed by the interim commission exemplified the civilizational and regionalist worldmaking that Carneiro's coalition envisioned for the IIHA. The program was modelled on the Huallaga Valley survey which sought "to make known the conditions in which the inhabitants of the Rio Huallaga valley live [and] the way they adapt themselves to the geographic environment". The survey also explored the region's ecosystem to identify how it had been altered, how it could be better utilized while, at the same time, defining the means "to protect and preserve its natural treasure".¹²¹ In line with the Huallaga survey the Interim Commission thus sought to record and protect the biotic and social realities of these spaces, which were regarded as some of the region's "most richly endowed by nature", as much as to identify sustainable forms of economic valorisation.¹²²

With the program of exploration, Alberto Torres and the Interim Commission also intended to better understand the on-going mass-colonization of parts of Amazonia. Following Vargas' colonisation campaign, the Oyapoc River and Northern Mato Grosso had been under great human pressure. Colonisation posed a variety of socio-economic challenges, caused significant environmental destruction and threatened the little-known

¹²⁰ 'Abrir a Amazônia a civilização contempóránea é iniciar um novo ciclo de trabalho e de ordem, de esperanças e fraternidade', *O jornal*, Belém, ca August 1947, CP, PC.RI.IH.03/Recortes de Jornais 3/8/1947 a 12/8/1947; Paulo Carneiro to senhor Ministro de Estado das Relações Exteriores (Raul Fernandes), 10 March 1948, CP, PC.RI.IH.05/Cartas 18/02/1948 a 13/07/1949, p.2.

¹²¹ 'UNESCO, International Institute of the Hylean Amazon (IIHA). Ethnological survey of the valley of the Rio Huallaga, Peru by Anibal Buitron', 17 December 1948, UA, UNESCO/NS/IIHA/18A, p.7; 'UNESCO, International Institute of the Hylean Amazon (IIHA). Report on the exploration of the river Huallaga, Peru by Candido Bolivar', 14 January 1949, UA, UNESCO/NS/IIHA/19, p.4.

¹²² 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.8.

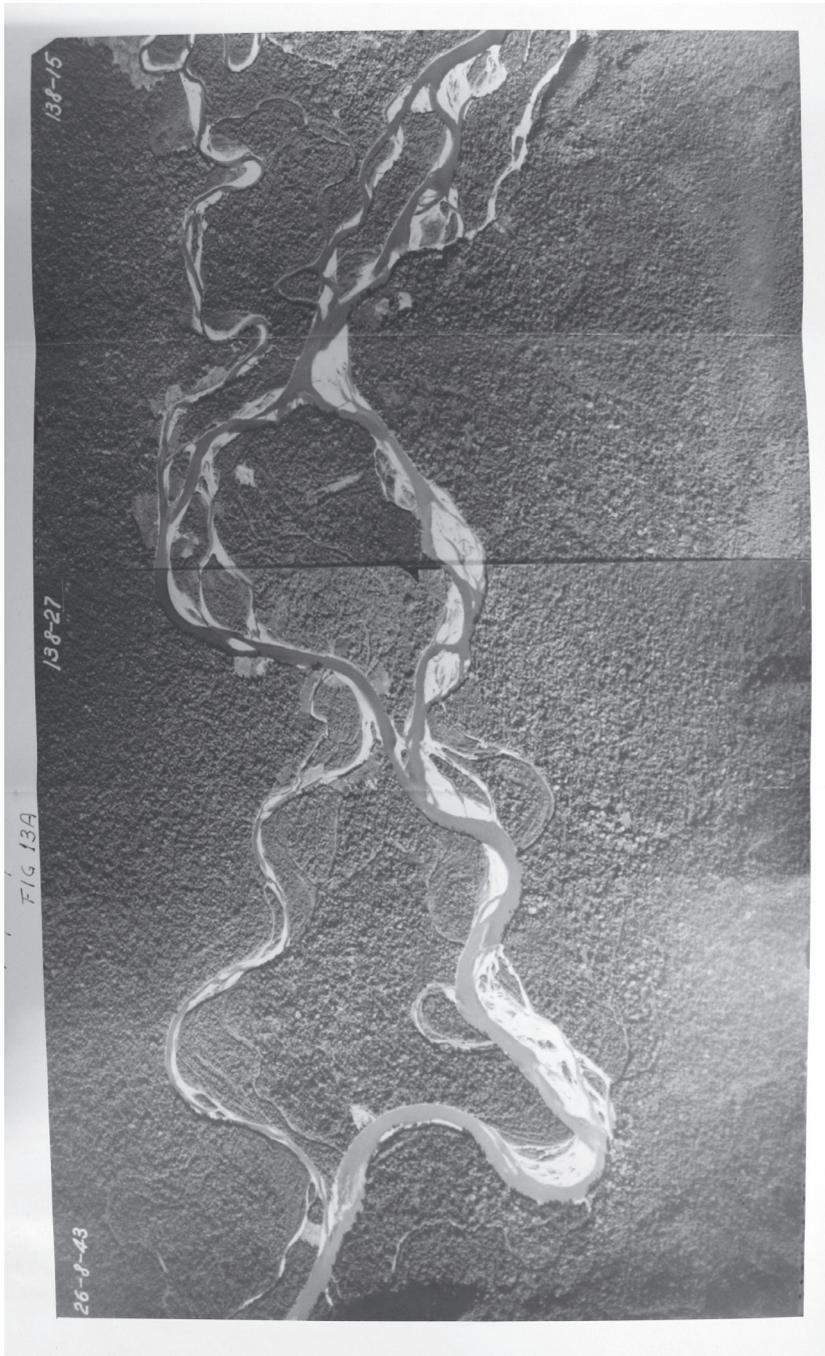


Figure 34 – Aerial photograph of a section of the Huallaga river valley, Peru, where the work of the survey team appointed by the IIHA's Interim Commission took place over the summer of 1948

local indigenous communities occupying these stretches of land. These explorations aimed at containing but also improving ways of occupying the land that would safeguard both the existing natural environment as much as the cultural landscape.¹²³ Exploration ultimately targeted border regions, which had been the object of local and global imperialism and were still disputed territories and sources of tension between Amazonian states. If some explorations, such as in the Upper Rio Negro and Upper Orinoco (the Leticia area) specifically aimed at solving these tensions through scientific mapping, all aimed at pacifying Amazonia by involving the Amazonian countries together in its development.¹²⁴ The plan to create a network of field stations throughout the region also reinforced the IIHA's peace-building functions. The Amazonians sought to build several local stations in the formerly disputed areas of Acre (Riberalta station) and the region of Iquitos (Iquitos and Archidona stations) whose action and territorial range they thought would contribute to blur territorial divisions and bring local communities and scientists to work together in these former lands of discord.

Finally, Carneiro's coalition granted the IIHA a program of scientific education, which could be seen as the institute's *mission civilisatrice*. As an advocate of scientific education at the ABE, Carneiro insisted on the cultural and educational function of the IIHA. The interim commission considered that the "problems of education fell clearly within the scope of the IIHA" and planned to conduct educational and social anthropological surveys accordingly.¹²⁵ For Carneiro as for Alberto Torres' Commission, the IIHA was to enhance a better understanding of the biosocial realities of Amazonia, and of the need to protect it. This was to be achieved through publications "of semi-popular works" such as *A History of Amazon Population, Legends of the Hylean Amazon, The Way of the Caboclo* or *Amazon Scenery and its Geological Background*.¹²⁶ The IIHA would also organize the creation of a set of scientific institutions open to the public. Their function would be to display the bio-cultural diversity of the Amazonian forest and highlight its cultural value not so much to the world, as first intended by Needham and the ecumenists, but to its own population.¹²⁷ It entailed the renovation of existing institutions – namely the Museu Goeldi – and the creation of new ones. The Amazonians envisioned the creation of "a

¹²³ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.7-8.

¹²⁴ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.8.

¹²⁵ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.12-13.

¹²⁶ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.16.

¹²⁷ 'Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA', 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.4.

large Central Museum of the Hylean Amazon” in Manaus, an Amazonian Museum in Iquitos, the renovation of the Museu Goeldi in Belém and the opening of public botanical gardens and parks.¹²⁸ All would be “an adjunct to the progress of educational and scientific services of the state of Amazonas” and “were necessary as great edifying facts maintaining contact between town and country in the life of the [Amazonian] citizen”.¹²⁹ The IIHA would finally foster the creation of local scientific societies throughout Amazonia, starting with a Natural History Society to “bring the work of the IIHA [and Amazonia] into close contact with [its] people”.¹³⁰

Although Carneiro and the Amazonian positivists made the IIHA into the handmaiden of Amazonia’s bio-cultural identity, the Amazonians counted on the standards of modern science as established in North America and Europe and relied on “the indispensable cooperation of the most qualified scientific specialists” to do so.¹³¹ Their conception of ecological research had a strong local focus but remained modern scientific in content rather than creole as Cunha had preconized. As Carneiro explained, the scientific agenda of the IIHA differed from existing, European approaches to Amazonia for its attention to the region’s symbiotic specificities and its socio-economic needs. The Interim Commission fostered a research program for the IIHA that zoomed in on the Amazon “from the Andes to the Atlantic Ocean and into every drainage basins of the great valley”.¹³²

While Carneiro and his positivist colleagues intended to involve indigenous knowledge such as “the ethno-botanical practices of the aboriginal people”, the place given to folk knowledge in their scientific program remained ultimately marginal.¹³³ Rather, the Amazonian positivists conceived the locals, their knowledge and practices less as active partners and resources than as silent receivers and objects of modern science’s transforming touch. They most often aimed to either transform or reify local populations and their lifestyles in records and museums via various studies of, for instance, “the folkloric and linguistic features of the diverse indigenous groups [of the region]”.¹³⁴ The Amazonians

¹²⁸ Paulo Carneiro to senhor Ministro de Estado das Relações Exteriores (Raul Fernandes), 10 March 1948, CP, PC.RI.IH.05/Cartas 18/02/1948 a 13/07/1949, p.2; ‘Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA’, 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.6.

¹²⁹ ‘Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA’, 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.2, p.4.

¹³⁰ ‘Interim commission. International Institute of the Hylean Amazon. Draft program for the IIHA’, 26 November 1948, UA, 330.19 (8) A01 IIHA Part IIb VI/46 to XXII/48, Ex.Sec./IC/IIHA/11, p.5.

¹³¹ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.11.

¹³² ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.11.

¹³³ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.15.

¹³⁴ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo

defended an elitist notion of the local. When Carneiro and his positivist colleagues complained about the way the ecumenists sidelined the participation of locals in the IIHA, they did not criticize the lack of involvement of Amazonia's inhabitants, but rather their own exclusion. Unlike Amazonia's inhabitants, deprived of scientific knowledge, they, as qualified practitioners of modern science and experienced observers of the Amazon, believed to be entitled to participate in the IIHA's scientific and development mission for the region. Hence, while complaining about their marginalization, Carneiro and his coalition of positivist scientists might have been involved in marginalizing others, namely the Amazonian people they sought to represent.

Carneiro and his coalition of Amazonian positivists modelled the IIHA to serve an ambitious civilizational transformation of Amazonia, albeit without the Amazonians. The scientific work of the IIHA served the modernization, unification and cultural awakening of the area. The IIHA and its local approach to human ecology constructed the Amazon as a culturally, socially and environmentally unique entity. By singling the Amazon out, the positivists' worldmaking agenda rejected the homogenising notion of tropical zone that Needham and the ecumenists originally proposed. This worldmaking agenda had also far reaching international implications. Carneiro and his coalition believed that the birth of a scientific civilization in the Amazon would put the region back on the map, but contribute to overcome Latin America's divisions and its marginality in the history of mankind.

Latin America's mare nostrum and the Hylean contribution to mankind

Corner complained to Malina that "internationalism was understood by very few people" and "that there may be many misunderstandings of the international purpose of the project, leading to misconceptions of foreign intrusion".¹³⁵ Yet, Carneiro and the Amazonians did not misunderstand Corner, as the latter wrongly assumed, but defended a different notion of internationalism theorized within the continental bounds of Latin America. As we have seen, Carneiro's positivist IIHA opened as another attempt at valorising Amazonia

Carneiro, eng. químico, 26 Avril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.11. See also the recommendations made by the interim commission's survey team and the ethnological survey in particular, 'UNESCO, International Institute of the Hylean Amazon (IIHA). Report on the exploration of the river Huallaga, Peru by Candido Bolivar, 14 January 1949, UA, UNESCO/NS/IIHA/19, p.4 and 'UNESCO, International Institute of the Hylean Amazon (IIHA). Ethnological survey of the valley of the Rio Huallaga, Peru by Anibal Buitron, 17 December 1948, UA, UNESCO/NS/IIHA/18A.

¹³⁵ Edred John Henri Corner to Frank Malina, 18 February 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948; 'UNESCO, International Institute of the Hylean Amazon (IIHA), report on the progress of the Hylean Amazon project of UNESCO, 1947-1948 in South America by E.J.H. Corner, Executive Secretary, Interim Commission, IIHA, Manaus, Brazil, 18 November 1948, UA, UNESCO/NS/IIHA/13, p.5.

which followed in the footsteps of late nineteenth century rubber imperialism, Cunha's aborted Luso-Brazilian civilization and Vargas's frustrated *March to the West*. Although it built upon these attempts and the long historical tradition that linked Latin America's emerging republics with Amazonia, Carneiro's positivist IIHA did not serve any one of these nationalistic endeavors. For the Amazonians, the IIHA and the development of local Amazonian science served a pan-Amazonian and Latin-Americanist agenda. Via the IIHA, Carneiro's positivist coalition aimed at establishing the condition to an Amazonian civilization that would help strengthen what Carneiro called the Latin American family of nations.

The IIHA was the internationalist answer to the Cunhan challenge. The Amazonians entrusted the future institute with regional and continental functions. From the onset of the project, we have seen Carneiro and his colleagues infusing the IIHA's making with peace-building symbols but also organizing its deployment and inner workings to induce cooperative attitudes among Amazonia's former foes. Many, like Pérez Arbeláez, believed that the IIHA and "the presence in the Amazon of scientists from diverse countries collaborating on the same issue guarantees peace in the Amazon".¹³⁶ For Carneiro's coalition the pacification of the Amazon was crucial because they envisioned the region as the keystone to a prosperous and united Latin America. As Pérez Arbeláez rightly reminded the audience of the Iquitos meeting, Amazonia had been "a core point of discord" that had divided the continent for centuries.¹³⁷ Amazonia caused innumerable wars affecting Latin America at large as even Chile and Argentina had to get involved in the resolution of some of these open conflicts to maintain continental stability.¹³⁸

Amazonia's geographical and geopolitical centrality led the Amazonians to imagine the Hylean Basin as the continent's *mare nostrum*. Alayza y Paz Soldán introduced the idea during the Belém conference, in his answer to the inaugural speeches pronounced by Moura Carvalho and Corner. The Amazon and his affluents the Ucayali and the Marañon, Alayza declared, "spread all over life, fecundity and paths that benefit to a handful of republics of South America, which, like the people of antiquity with the Old

¹³⁶ 'Informe del delegado suplente, consejero científico de la delegación de Colombia, Dr. Enrique Pérez Arbeláez, sobre el proyecto Amazónico de UNESCO', March 1948, CP, PC.RI.IH.05/Relatorios xx/05/1948 a 14/01/1949, p.2.

¹³⁷ 'Informe del delegado suplente, consejero científico de la delegación de Colombia, Dr. Enrique Pérez Arbeláez, sobre el proyecto Amazónico de UNESCO', March 1948, CP, PC.RI.IH.05/Relatorios xx/05/1948 a 14/01/1949, p.1.

¹³⁸ Argentina and Chile took for instance a leading role in the Rio Protocol that contributed to contain the conflict between Peru and Ecuador between 1940 and 1941, see: Radcliffe, op. cit. (58), p.275; St. John, Bradley and Schofield, op. cit. (63), p.18, p.31-32, More generally on the origins and increasing involvement of Chile and Argentina in Amazonian tensions, see: Burr, op. cit. (49), p.60.

Mediterranean, we could rightly call 'Mare Nostrum'".¹³⁹ The Roman notion of *mare nostrum* encapsulated the importance of the Mediterranean Sea for the Roman Empire. It was the cradle of the Roman civilization from which Rome drew its power, identity and culture and by which it kept its many provinces commercially and culturally united. For the Amazonian positivists, Amazonia could, with the help of science, fulfil the same purpose for Latin America. In the eyes of Carneiro and his coalition, the IIHA served the making of Amazonia into Latin America's *mare nostrum* by stimulating local culture, emulating rational economic development and strengthening international cooperation in its midst. Perez-Arbelaez believed in such a civilization to "prepare the independence of the continent", "strengthen peace" and "safeguard the indigenous tradition" that singularized Latin America.¹⁴⁰ It would contribute "to the progress and well being of the Americas" and reinforce "the prosperity and fraternity of the involved countries" in Mello Leitão's and Pernambuco Filho's view.¹⁴¹ The birth of a tropical civilization in the Amazon would infuse the continent with an "international spirit" and a sense of belonging among Latin American nations whose absence had, for many like Carneiro, inhibited the continent's progress.¹⁴²

The Amazonians believed that building a united and modernized Amazonia via a locally rooted IIHA would open new perspectives of peace, prosperity, cultural emancipation and unity for the continent. The idea of a tropical *mare nostrum* fitted in Carneiro's positivist internationalism as described in chapter 3. We have seen that Carneiro believed in the advancement of mankind through the "fraternal" and "cooperative" advancement of the nations. The progress of the whole (mankind) depended on the co-advancement of the parts (the nations). He also considered that these cooperative attitudes were more likely to develop between nations with which they shared a particular historical and cultural bond. In his eyes, mankind was divided in nations but also families of nations such as the European or the Latin American family. The building of a tropical civilization or Latin America's *mare nostrum* was in Carneiro's positivist eyes the path to the binding of the continent into a mature family of nation like Europe. Carneiro and his coalition believed that this continental maturation would empower Latin America to a greater and more significant world role, which its leading intellectual elite had been pursuing following the

¹³⁹ 'Appendix to resume of the general proceedings of the conference, speech by Dr. Luiz Alayza y Paz Soldán, delegate of Peru', ca August 1947, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.5.

¹⁴⁰ 'Memorandum sobre I.I.H.A.', undated, CP, PC.RI.IH.04/Memorandos xx/xx/1947, p.1.

¹⁴¹ 'Resume of the general proceedings of the conference', circa August 1947, UNESCO archives, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.45.

¹⁴² 'O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico', 26 Abril 1950, CP, PC.RI.IH.06/Disursos 26/4/1950, p.1-2; 'Abrir a Amazônia a civilização contempóranea é iniciar um novo ciclo de trabalho e de ordem, de esperanças e fraternidade', *O jornal*, Belém, ca August 1947, CP, PC.RI.IH.03/Recortes de Jornais 3/8/1947 a 12/8/1947.

establishment of republican regimes throughout the continent during the second half of the nineteenth century. As Carneiro explained to minister João Neves da Fontoura, by sponsoring the IIHA the federal government would contribute to strengthen Brazil and participate in overcoming its isolation on the regional and international stage.¹⁴³ With the birth of a tropical civilization common to all Latin American nations, Carneiro and the Amazonian positivists believed that Latin American nations could finally participate in the progress of mankind. This contribution to mankind was a moral obligation and evolutionary necessity. For them, as Carneiro explained to the EMFA, participation in “the international life [...] was an inseparable demonstration of the level of civilization we have reached”. “Refusing it”, Carneiro continued, “would retrograde us to primary forms of structure”.¹⁴⁴ More than a threat to the Latin American spirit and national composition, embracing “the international spirit” was in his eyes “the best guarantee of independence and freedom of every [participating] country”.¹⁴⁵ For the Amazonians, promoting the common good was ultimately a high form of patriotism, a moral duty in the service of the nation.¹⁴⁶

The Amazonian positivists thus designed the IIHA to accelerate the civilizational maturation of the continent and through it highlight the value of the Hylean Amazon to humanity. The IIHA reinforced the continent’s ability to respond to long-term issues such as the world’s soil erosion and resource depletion but also to immediate challenges such as overpopulation and reconstruction¹⁴⁷. Pérez Arbeláez considered that the IIHA’s civilizational project could serve the needs of war-devastated countries. With “the study of the Amazon”, Pérez Arbeláez argued, Latin America “makes the most generous gift to the world: its natural resources, its forests, and its possibilities [...] whose exploitation will benefit first and foremost the world”.¹⁴⁸ Pérez Arbeláez, furthering da Silva Pinto’s proposals that the Amazon “could receive through rational immigration the world’s excesses of population”, declared that the IIHA and Amazonia should become vital parts

¹⁴³ ‘Carta de Paulo E. de Berrêdo Carneiro ao ministro Joao Neves da Fontoura sobre o Instituto Internacional da Hileia Amazonica’, 5 May 1951, CP, PC.RI.IH.06/Cartas 19/5/1941-16/03/1953, p.4.

¹⁴⁴ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.1.

¹⁴⁵ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.1.

¹⁴⁶ Lineu de Albuquerque Mello, ‘Em defesa de uma convenção (O Instituto Internacional da Hiléia Amazônica)’, *Correio da Manhã*, 9 April 1949, PC.RI.IH.06/Apontamentos 02/02/1949 a 09/09/1949, p.1-2, p.10.

¹⁴⁷ ‘O Instituto Internacional da Hiléia Amazônica e a cooperação internacional, Dr. Paulo E. de Berrêdo Carneiro, eng. químico’, 26 Abril 1950, CP, PC.RI.IH.06/Discursos 26/4/1950, p.5-7.

¹⁴⁸ ‘Informe del delegado suplente, consejero científico de la delegación de Colombia, Dr. Enrique Pérez Arbeláez, sobre el proyecto Amazónico de UNESCO’, March 1948, CP, PC.RI.IH.05/Relatorios xx/05/1948 a 14/01/1949, p.2.

of the reconstruction effort and its humanitarian challenges. As he noted, “for many, for thousands of people, reconstruction [...] consists in emigrating”.¹⁴⁹ With the IIHA, he claimed, Latin America could decently absorb the waves of migrants with “the preparation of immigration camps from a hygienic, agricultural, and human perspective, which can be prepared in South America where there is limitless and fertile land as well as the greatest spirit of hospitality and democracy. In this regard, the Amazonian project of UNESCO is an international and European project of reconstruction”.¹⁵⁰

CONCLUSION

By the end of 1949, when the design of the IIHA reached its final form and was to be handed down to each participating state for parliamentary approval, the IIHA was firmly in the hands of Carneiro and the Latin Americans who had engaged actively in its making. The NS division in Paris welcomed the engagement of local scientists. They saw their involvement as crucial to convince the concerned state to take over the funding of the IIHA from UNESCO whose financial commitments towards the future laboratory were to be drastically reduced from January 1950. However, to Corner's concern, Carneiro and the Amazonians did not endorse the ecumenical plan of UNESCO but imposed at the Iquitos conference a regionalist conception of the IIHA. Indeed, as Corner observed first-hand, the future shape of the IIHA turned, following the Iquitos and Manaus meetings, towards a regional-positivist laboratory that the Amazonians successfully imposed via the Interim Commission in Manaus. With the positivists, the IIHA became a research institute focused on researching the Amazon and producing knowledge relevant to the civilizational awakening of the region. With field stations spread throughout the whole basin, the positivist IIHA was to serve the concerned Amazonian nations and advance Latin-American integration.

Although both the zonal ecumenists and the positivists rooted the IIHA within the ecological tradition, their approach to science in the Amazon entailed differing worldmaking implications. For Needham and the ecumenists, human ecology homogenized and naturalized the tropics. As we have seen in chapter 4, it defined the tropical zone as a set of common biotic properties, socio-economic possibilities and issues

¹⁴⁹ Mario da Silva Pinto to Julian Huxley, ref: DNPM 316/47 – LPM495/47, 10 April 1947, CP, PC.RI.IH.02/cartas 10/4/1947 a 25/3/1947; ‘Informe del delegado suplente, consejero científico de la delegación de Colombia, Dr. Enrique Pérez Arbeláez, sobre el proyecto Amazónico de UNESCO’, March 1948, CP, PC.RI.IH.05/Relatorios xx/05/1948 a 14/01/1949, p.2.

¹⁵⁰ ‘Informe del delegado suplente, consejero científico de la delegación de Colombia, Dr. Enrique Pérez Arbeláez, sobre el proyecto Amazónico de UNESCO’, March 1948, CP, PC.RI.IH.05/Relatorios xx/05/1948 a 14/01/1949, p.2.

of which the Amazon was just a part of a broader whole. Carneiro's positivist coalition mobilized human ecology differently, within a relation to tropical nature inherited from da Cunha and Latin American positivism more generally. The positivist take of the Amazonians on human ecology highlighted rather than smoothed out the natural and cultural singularities of the Amazon basin. Unlike the zonal ecumenists who saw the tropics as a problem of nature, the positivists tended to conceive Amazonia as a historically located civilizational conundrum, whose problematic character was less its nature than its complex political constituency, its chaotic and war torn history as well as its socio-cultural backwardness. The resulting differences of conceptions of tropical nature undergirded distinct worldmaking effects. While for Needham's ecumenists human ecology produced zonal ecumenism – i.e., the unification of the tropics – Carneiro's positivists used human ecology in the service of the unification of the Amazon region and the reinforcement of Latin America's unity and civilizational development.

By retrieving the discontented voices of Carneiro and his coalition and reconstructing their dissenting plan and agenda for the IIHA, this chapter also revealed that UNESCO faced significant resistance even before the virulent opposition of the Brazilian parliament that is said to have taken the project down between 1950 and 1952. Interestingly, the case of Carneiro's coalition compels to see the IIHA story beyond the diplomatic angle as he and his supporters did not formulate nationalist and anti-imperialist counter-arguments against UNESCO's proposals but rather envisaged a different construct and agenda for the proposed laboratory. Their resistance and their proposals stemmed from a local positivist discourse of science, politics and society that stood apart from the discourses used by Needham and the zonal ecumenists to design their own plan. In Belem and more so in Iquitos, the zonal ecumenists collided with an intellectual-scientific tradition, positivism, that they chose, or were led, to ignore out of the scientific precepts and imaginaries that structured their zonal IIHA proposals. While ecumenism and the underlying insistence on the immaturity of the Dark Zone led the zonal ecumenists to sideline local actors like the Amazonians, the imperial ecological and zonal view tended to empty and naturalize tropical spaces, and, as a result, ignore local socio-historical realities. With Carneiro's Amazonians, Needham and his staff faced positivism, a strong and locally rooted tradition of thought that had significantly different conception of the Amazon, of its potential and of the role and function of international science in it.

The activism of Carneiro's coalition around the IIHA also reveals that positivism remained a vivid ideological resource among the scientific and intellectual elite of the region after WWII, and thus long after its commonly assumed decline by the late 1910s. This chapter thus participates in the on-going re-evaluation of the influence of positivism on Latin America by unravelling the positivist worldmaking vision of Carneiro's coalition.

Although it is true that positivism lost traction over the first half of the twentieth century as a structured movement in Latin America and in one of its historical strongholds, Brazil, Carneiro's coalition demonstrates however that it remained a powerful ideology. Carneiro and his coalition showed how positivism lived on and continued to inspire societal changes after the war, although more diffusely than in its heyday at the turn of the century. They invoked da Cunha's positivist vision of Amazonia, involved positivist figures like Candido Rondon and put to practice the ordering power that Comte granted to science. Although it failed to materialize with the IIHA, we will see that some of its aspirations found a receptacle in Brazil with the creation of the CNPq and the INPA.

Although Needham, Huxley and the ecumenists at UNESCO were concerned that Carneiro's coalition hijacked the IIHA, all were confident that the convention would be ratified by the founding states of Amazonia and that political and financial continuity would be consequently secured. Despite their divisions on the shape and purpose of the future laboratory, ecumenists and positivists sought in their own ways and following their own plans to make the creation of the IIHA a success. Both groups had reason to believe the convention would be ratified. Since the Iquitos conference, Brazil, Bolivia, Colombia, France, Holland, Peru, Venezuela and Ecuador signed the convention, and although all except for France were ad referendum, and therefore required ratification from parliaments back home, no one really doubted ratification would be obtained in due time.¹⁵¹ Although ratification by five of the nine founding nations was officially required to put the IIHA in motion, it would however not suffice if Brazil refused to sign. For its territorial domination of the Amazon and its scientific workforce, Brazil was a key player. Even though it initiated the project in 1946, co-organized two of the three constitutional conferences, we will see that Brazil eventually rejected the convention in 1951, a decision that led the IIHA to its demise a year later in 1952.

¹⁵¹ Professeur Eustathiades to André de Blonay (chef du bureau des Relations Extérieures), objet: procédure à suivre pour l'acceptation et la mise en vigueur des Actes relatifs à l'Institut International de l'Hyléa Amazonienne, 10 August 1948, UA, 330.19 (8) A01 IIHA Part III from 1/VI/48 up to 30/VIII/1948.

Chapter 6

TECHNOCRATIC DEVELOPMENTALISM:
BRAZIL'S PURSUIT OF MODERNITY IN
THE AMAZON

The success of the Iquitos meeting put the future of the IIHA in the hands of its constitutive states. The conference had defined the convention creating the IIHA, a financial protocol and the basic outline of the future institute whose existence now depended on the ratification of these arrangements by at least five of the nine states composing the Hylea. Although UNESCO expected that ratification would be completed by the middle of 1949, the process proved uncertain.¹ For Arenales, who toured Amazonia to promote the IIHA in the months leading up to the Iquitos meeting, the ratification looked grim. The concerned governments either ignored or distrusted the future institute, like in Venezuela and in Brazil, or were impeded by major political crises², which left, for instance, the Peruvian, Bolivian and Colombian governments powerless to advance ratification.³ Corner shared Arenales' concerns. He noted that in Brazil "the disinterestedness was dismaying" and, as his assistant Celia Neves observed, scepticism and opposition was rising against the IIHA, which was seen as "a dangerous opening for foreign interference".⁴

However, Corner remained confident and believed that Brazil was an example and once ratification obtained he "had little doubts [...] other countries will be enabled to follow suit".⁵ Brazil was the IIHA's key player: it had by far the largest Amazonian territory and subsequently represented the main financial contribution to the IIHA. Accordingly, UNESCO deployed significant energy to assist the ratification process in Brazil. Pierre Auger, the head of the NS division, came to Rio de Janeiro in January 1949 to facilitate the ratification of the convention.⁶ Meanwhile, Corner, Torres and Carneiro, assisted by Neves actively negotiated Brazil's financial contribution with the Brazilian authorities, organized a press campaign and lobbied the congress to prepare the parliamentary debates

¹ 'UNESCO, International Institute of the Hylean Amazon, report on the work of UNESCO during 1948 in establishing the IIHA', 18 October 1948, UA, UNESCO/NS/IIHA/12, p.1-2

² Peru was in a constant state of political crisis according to Arenales. The situation culminated with a military coup by General Manuel Odria in October 1948, which wiped out the government, which had showed enthusiasm and support thus far. In Colombia the assassination of the presidential candidate Jorge Eliecer Gaetan on April 9 1948, opened the so called 'La Violencia', a ten-year civil war from 1948 to 1958 between the conservative and Liberal party.

³ Emilio Arenales to Julian Huxley, André de Blonay and Frank Malina, 'subject: my mission to Latin America', 20 February 1948, UA, 330.19 (8) A01 IIHA Part II from 1/I/1948 up to 31/II/1948, p.2-3; 'Arenales' report', undated, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947, p.6-8, p.10-11, p.15.

⁴ 'Confidential report, Hylean Amazon Project, UNESCO 1947-1948' by Edred John Henri Corner to Pierre Auger (Director, Natural Sciences, UNESCO), 15 October 1948, UA, 330.19 (8) A01 IIHA Part IV from 1/IX/48 up to 30/XII/1948, p.3; Celia Neves (Interim Commission, IIHA) to Natural Sciences Department, 'Confidential', 11 January 1949, UA, 330.19 (8) A01 IIHA Part V from 1/I/49, p.3

⁵ 'Confidential report, Hylean Amazon Project, UNESCO 1947-1948' by Edred John Henri Corner to Pierre Auger (Director, Natural Sciences, UNESCO), 15 October 1948, UA, 330.19 (8) A01 IIHA Part IV from 1/IX/48 up to 30/XII/1948, p.3

⁶ Celia Neves (Interim Commission, IIHA) to Natural Sciences Department, 'Confidential', 11 January 1949, UA, 330.19 (8) A01 IIHA Part V from 1/I/49, p.2.

that president Enrico Gaspar Dutra initiated in November 1948.⁷ Despite their efforts, the Brazilian congress eventually buried the IIHA proposals in the archives in 1951 after two long and bitterly fought years of parliamentary deliberations.

The rejection of the IIHA has been seen as yet another demonstration of the ineluctable political primacy of the national over the international.⁸ Yet Marcos Chor Maio suggested that the IIHA, despite its failure, catalysed discussions on the organization of science in Brazil and, in particular, contributed to the creation of the National Institute for Amazonian Research (INPA) – Brazil’s very own IIHA.⁹ In this chapter, I will expand on Maio’s conclusions and build upon the literature on the *March to the West*, and particularly the work of Seth Garfield to analyse what the rejection of the IIHA by the Brazilian congress meant for postwar Brazil.¹⁰ The debates on the IIHA took place after the fall of the Estado Novo in 1945 which opened a decade-long period of institutional recomposition and political uncertainty for Brazil. It was then that a coalition of Brazilian scientists and state-hired specialists came up with a technocratic response to both the IIHA and Brazil’s uncertain postwar future. From the early 1930s to the late 1950s, the members of this third group – that I designate as the technocratic nationalists – envisioned Brazil’s empowerment through the combined development of state-backed science and the modernization of the Amazon. They sought to achieve this national regeneration through the combined action of three newly minted technocratic agencies, the National Research Council (CNPq), the Superintendence for the Planning of the Economic Valorisation of the Amazon (SPVEA) and the INPA. In a first section, I will recollect how this technocratic nationalist front formed and demonstrate how the IIHA’s making shaped the institutional trinity they eventually created together.

⁷ Letter to Edred John Henri Corner, 5 August 1948, UA, 330.19 (8) A01 IIHA Part III from 1/VI/48 up to 30/VIII/1948; Celia Neves to Edred John Henri Corner, 6 September 1948, UA, 330.19 (8) A01 IIHA Part IV from 1/IX/48 up to 30/XII/1948.

⁸ Heloisa Maria Bertol Domingues and Patrick Petitjean, ‘International science, Brazil and diplomacy in UNESCO (1946-1950)’, *Science, Technology and Society*, (2004) 9, pp.29-50; Patrick Petitjean and Heloisa Maria Bertol Domingues, ‘A redescoberta da Amazônia num projeto da UNESCO: o Instituto Internacional da Hiléia Amazonica’, *Estudos Históricos* (2000) 14, pp.265-292, p.282-288.

⁹ Maio even described the birth of the INPA as a “processo antropofágico”, strengthening thus the kinship between the IIHA and INPA, see Marcos Chor Maio, ‘A tradução local de um projeto internacional: a UNESCO, o CNPq e a criação do INPA’, in Priscilla Faulhaber and Peter Mann de Toledo (eds.), *Conhecimento e Fronteira: História da Ciência na Amazônia*, Belém: Museu Paraense Emílio Goeldi Editoração, 2001, pp.51-81, p.75; see also, Marcos Chor Maio, ‘A UNESCO e o projeto de criação de um laboratório científico internacional na Amazônia’, *Estudos Avançados* (2005) 19, pp.115-130.

¹⁰ Seth Garfield, *In Search of the Amazon. Brazil, the United States, and the Nature of a Region*, Durham and London: Duke University Press, 2013; Other important works include: Rômulo de Paula Andrade, “Conquistar a terra, dominar a água, sujeitar a floresta”: Getúlio Vargas e a revista “Cultura Política” redescobrem a Amazônia (1940-1941)’, *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.453-468; Maria Verónica Secreto, ‘A ocupação dos “espaços vazios” no governo Vargas: do “Discurso do rio Amazonas” à saga dos soldados da borracha’, *Revista Estudos Históricos* (2007) 40, pp.115-135.

The historiography has seen the CNPq, the SPVEA and the INPA merely as significant institutional transformations for Brazilian science and the Brazilian state.¹¹ Little has been said however of the scientific and political discourses and the modes of interventions and governance that this arising technocratic nationalist coalition had crafted for these specialized agencies.¹² This chapter will delve into these developments and shed light on the last of the three worldmaking visions, Brazilian technocratic developmentalism, that emerged in response to the IIHA. I argue that the making of these institutions and their underlying vision of science and technocracy as well as their conception of Amazonian development were pivotal in the attempts of these technocratic nationalists to construct modern Brazil. I will particularly analyse the *First Five-Year Valorization Plan (PPQ)* as the main expression of Brazilian technocratic developmentalism and scrutinize what the PPQ and its underlying worldmaking ideals of science and modernization entailed for Brazil and the Amazon region.

‘FEAR OF INTRUSION’: THE IIHA AND BRAZIL’S TECHNOCRATIC RESPONSE TO THE AMAZONIAN QUESTION

Dutra opened the parliamentary deliberations on the IIHA on 20 October 1948, with a presidential message that recommended the congress to approve of the Iquitos convention.¹³ Despite Dutra’s engagement, the convention immediately triggered a fierce opposition led in the congress by the former Brazilian president and nationalist Artur Bernardes. The diverse group of detractors shared a strong aversion against the IIHA that

¹¹ On the SPVEA, see: José Raimundo Barreto Trindade (ed.), *Seis décadas de intervenção estatal na Amazônia. A SPVEA, Auge e crise do ciclo ideológico do desenvolvimentismo Brasileiro*. Belém: Editora Paka-Tatu, 2014; Gilberto Marques, ‘SPVEA: o estado na crise do desenvolvimento regional amazônico (1953-1966)’, *Revista de Sociedade Brasileira de Economia Política* (2013) 34, pp.163-198; Antonio de Oliveira Jr., ‘Amazônia: a gênese de uma região de planejamento’, *Revista de Ciências Humanas* (2009) 9, pp.37-53; On the CNPq, see: Shozo Motoyama, ‘A gênese do CNPq’, *Revista da Sociedade Brasileira de História da Ciência* (1985) 2, pp.27-46; Shozo Motoyama, *Prelúdio para uma História. Ciência e Tecnologia no Brasil*, São Paulo: Editora da Universidade de São Paulo, Fundação de Amparo à Pesquisa do Estado de São Paulo, 2004, pp.249-316; Ana Maria Ribeiro de Andrade, ‘Ideais políticos: a criação do Conselho Nacional de Pesquisas’, *Parcerias Estratégicas* (2001) 6, pp.221-242; On the INPA, see: Priscilla Faulhaber, ‘A história dos institutos de pesquisa na Amazônia’, *Estudos Avançados* (2005) 19, pp.241-257; Ângela Nascimento dos Santos Panzu and Eduardo Gomes da Silva Filho, ‘A construção do conhecimento no Instituto Nacional de Pesquisas da Amazônia - INPA, por meio de suas expedições científicas (1954-1975)’, *Oficina do Historiador* (2015) 8, p.7-23.

¹² Notable exceptions by Marcos Chor Maio and Peter Weigel who explored, the politics of science underlying the INPA, see: Maio, op. cit. (9); Peter Weigel, ‘O papel da Ciência do Inpa no desenvolvimento da Amazônia’, in Priscilla Faulhaber and Peter Mann de Toledo (eds.), *Conhecimento e Fronteira: História da Ciência na Amazônia*, Belém: Museu Paraense Emílio Goeldi Editoração, 2001, pp.269-290.

¹³ ‘Mensagem nº536 de Eurico Gaspar Dutra’, 20 October 1948, *Diário do Congresso Nacional*, p.10448-10449, retrieved from: <http://imagem.camara.gov.br/diarios.asp>

they saw as an insidious threat against Brazil's security, sovereignty and future prosperity. If the communists accused the IIHA promoters to "mutilate and betray the sovereignty of the Fatherland" as early as August 1947, it was the nationalist Bernardes who fired the fiercest volley of attacks against the IIHA advocates.¹⁴ Profusively relayed in the press, Bernardes used the National Security Commission (CSN) that he presided, to denounce the convention as "the loss of the Amazon" as it "aims to possess the Amazon to exploit its riches" and "to challenge Brazil's northern borders, compromising its defense and security".¹⁵ The supporters riposted. Some, like the vice-president of the Commission for Diplomacy Lima Cavalcanti, defended the IIHA as an opportunity "to transform Amazonia into a fertile granary" and enable Brazil to participate in the postwar efforts "that lay the world of tomorrow".¹⁶ Others such as the writer and member of the Special Commission for the Planning of the Economic Valorization of the Amazon (CEPVEA) Dr. Ocelio de Madeiros accused Bernardes and his cohort to "threaten the future of Amazonia" and "create obstacles to the march of science, cooperation and international understanding".¹⁷ The existing literature on the IIHA identified exacerbated nationalism as the root cause of the IIHA's demise and portrayed the Brazilian parliament as its burial place.¹⁸ Some, like Magalhaes and Maio, showed that the return of democracy in 1946 under the presidency of General Eurico Gaspar Dutra was marked by a polarization between partisans of a nationalist approach to development and the advocates of an internationally oriented model.¹⁹ Tensions had been crystallizing on sovereignty issues before Dutra requested the parliament to deliberate on the IIHA. In 1947 and 1948, debates on the legal status of Amazonia and disputes on Dutra's proposal to open Brazil's oil deposits to foreign actors brought the parliament to deal with the IIHA convention as a matter of national sovereignty.²⁰ For Magalhaes and Maio, the IIHA became another battlefield for these

¹⁴ 'A substituição de corpo pátrio', *A Luta - Unidade e Disciplina*, 30 August 1947, CP, PC.RI.HI.03/Cartas 8/6/1947 a 7/3/1948.

¹⁵ 'Relatório e parecer do senhor deputado Artur Bernardes, Comissão de Segurança Nacional', *Diário do Congresso Nacional*, 28 January 1949, p.431-432, retrieved from: <http://imagem.camara.gov.br/diarios.asp>; On the anti-IIHA press campaign, see: 'Querem desmembrar o Brasil', *O Radical*, 4 February 1949; 'Querem internacionalizar a Amazonia', *Folha do Povo*, 4 February 1949, CP, PC.RI.IH.06/Recortes de Jornais 13/10/198 a 20/03/1949.

¹⁶ 'Instituto da Hiléia Amazônica - Debates na Câmara dos deputados', *Itamaraty - Boletim do Serviço de Informações Para o Exterior*, n°55, 28 February 1950, CP, PC.RI.IH.06/Boletim informativo 28/2/1950 a 31/05/1950 p.113 and p.119.

¹⁷ 'Necessário ao Brasil o Instituto da Hiléia', *Correio de Manhã*, 15 May 1949, CP, PC.RI.IH.06/Cartas 19/5/1941-16/03/1953.

¹⁸ See references mentioned in footnote 8.

¹⁹ Rodrigo Cesar da Silva Magalhães and Marcos Chor Maio, 'Desenvolvimento, ciência e política: o debate sobre a criação do Instituto Internacional da Hiléia Amazônica', *História, Ciências, Saúde - Manuais* (2007) 14, pp.169-189, p.178.

20 Maio, op. cit. (9), p.122-123.

vivid debates on Brazil's development which resulted in the triumph of the nationalists and the dismissal of both Dutra's oil plans and Carneiro's IIHA.²¹

If nationalist concerns and rhetoric permeated the rich and lengthy discussion of the IIHA convention, a closer look at the debate shows that the divergences between supporters and detractors of the IIHA were fewer than the convergences. Although most recognized that openness to international parties should be more tightly controlled and more firmly subordinated to the will of the concerned sovereign states, all acknowledged the scientific and developmental utility of the IIHA. The powerful General Staff of the Brazilian Armed Forces (EMFA) exemplified this attitude. In his assessment of the IIHA, the chief of the EMFA General Salvador Cesar Obino acknowledged that, for its scientific and developmental value, the IIHA "cannot be opposed by anyone who has the slightest understanding of the vastness of the Amazon region and the complexity of its problems".²² Yet, Obino and his staff were concerned that the international character of the IIHA convention would impede Brazil's capacities to defend and develop the Amazon region on its own terms. "Not only does the structure of the IIHA not offer us the resources to safeguard our interests", Obino asserted "but it reduces us into an isolated voice in the midst of an antagonistic choir".²³ For Obino and the military it was clear, "Brazil could not accept the convention on the Hylean Amazon" as long as the control of the Hylean state members over the IIHA's activities was not reinforced.²⁴ Likewise, Bernardes and his cohort recognized the potential developmental value that the institutionalization of science and the involvement of its best practitioners, as proposed with the IIHA, could have for the region's awakening and for Brazil's advancement. On October 19, 1949, Bernardes confessed to the CSN that "no one will deny the importance of scientific cooperation for the future development of the Amazon" and that "no one was opposed to the idea of an IIHA".²⁵ The well-known nationalist poet, Menotti del Picchia, shared Bernardes' stand. He reminded the congress that Brazil "never closed its doors to cooperation to help the march of human progress" and shared his hopes in "the rationalization of [Amazonia]'s use for the good of mankind" providing "it is carried out without risks of denationalization of the

²¹ Magalhaes and Maio, op. cit. (19).

²² 'Estado-Maior das Forças Armadas to Exmo. Sr. Presidente da Câmara dos Deputados', 31 March 1949, CP, PC.RI.IH.06/Cartas 19/5/1941-16/03/1953, p.3-4.

²³ 'Estado-Maior das Forças Armadas to Exmo. Sr. Presidente da Câmara dos Deputados', 31 March 1949, CP, PC.RI.IH.06/Cartas 19/5/1941-16/03/1953, p.3-4.

²⁴ 'Estado-Maior das Forças Armadas to Exmo. Sr. Presidente da Câmara dos Deputados', 31 March 1949, CP, PC.RI.IH.06/Cartas 19/5/1941-16/03/1953, p.3-4.

²⁵ 'Comissão de Segurança Nacional, 15.^a Reunião em 19 de Outubro de 1949', *Diário de Congresso Nacional*, 21 October 1949, p.9928, retrieved from: <http://imagem.camara.gov.br/diarios.asp>; 'Bulletin radiotélégraphique, Carlos A. Bernardes (Ambassade du Brésil à Paris), n°1243 em 24 October 1949', CP, PC.RI.IH.06/Boletim Radiotelegrafico 9/10/1949-24/10/1949.

Amazon”.²⁶ For the nationalists, the convention’s international character was the problem, not the IIHA and its developmental promise.

This convergence of opinions regarding the risks and benefits associated to the IIHA eventually led supporters and detractors to reach a compromise, which first expressed itself in the form of an additional protocol to save the Iquitos convention. As explained by Carlos de Lima Cavalcanti of the pro-IIHA Commission for Diplomacy and Treaties, the additional protocol prepared by the Foreign Office, modified the sovereignty-challenging articles of the convention that stirred up attacks from the nationalists and reservations from the military.²⁷ Although the new text reinforced the control of the Amazonian states on the institute’s activities and hence strengthened its regional character, it did not draw the IIHA negotiation out of paralysis nor fully satisfied its opponents. It did, however, pave the way for a coalition of technocratic nationalists to advance the creation of the CNPq (1951), the SPVEA (1953) and the national twin to the IIHA, the INPA (1954) as an alternative, state-led path to the advancement of Brazilian science and the development of Amazonia that IIHA supporters and opponents alike had recognized as crucial for Brazil.

Brazil’s technocratic trinity: the SPVEA, the CNPq and the INPA

The debates on the IIHA provided momentum for Brazil’s technocratic elite to organize and tackle together the country’s scientific and Amazonian problems. The former dictator and president of the Republic Getulio Vargas, the military scientist Alvaro Alberto da Motta e Silva and the historian of Amazonia Arthur Cezar Reis were particularly instrumental in this process. Reis and Alvaro Alberto not only took the reins of the CNPq, the SPVEA and the INPA but it was also they who organized the technocratic nationalist front that made the creation of these agencies possible.²⁸ This front brought together diverse Amazonian specialists that Reis garnered to create the SPVEA and a flock of scientists, engineers and military men that Alvaro Alberto astutely associated to build the CNPq. Reis’ Amazonian developmentalists and Alvaro Alberto’s coalition of military-scientific nationalists were bound by a fervent sense of the nation, an unequivocal trust in the state’s disciplining action and a strong faith in the transformative power of science and technology. Both factions eventually merged into a cohesive entity – whom I have so far referred to as the technocratic nationalists – when Reis and Alvaro Alberto took on the formulation of

²⁶ ‘A 10 de outubro de 1948, em mensagem’ by Menotti del Piccha, 10 October 1948, CP, PC.RI.IH.06/discursos, p.8.

²⁷ ‘Excerpt from newspaper report on address by M. Lima Cavalcanti to the Parliament of Brazil’, undated, UA, 330.19 (8) A01 IIHA Part I up to 31/XII/1947.

²⁸ As superintendent of the SPVEA, Reis participated in the making of the INPA as member of the CNPq’s special commission on the INPA that Alvaro Alberto summoned in 1953.



Figure 35 – Brazilian military officer, scientist, and first president of the CNPq, Admiral Álvaro Alberto da Motta e Silva (1889-1976)



Figure 36 – Brazilian historian of Amazonia, director of the SPVEA and the INPA, Arthur César Ferreira Reis (1906-1993)

Brazil's alternative to the IIHA. Over little less than a decade, the two groups worked together as Reis and Alvaro Alberto mobilized them in the making of the SPVEA, the CNPq, and more specifically the INPA, which was later re-organized by Reis' SPVEA and Alvaro Alberto's CNPq.

Although Reis appeared at a late stage in the making of the SPVEA, it was under his guidance that the planning agency finally emerged. Deadlocked for half a decade, the question of Amazonia's valorisation was eventually resolved by the *Technical Conference on the Economic Valorisation of Amazonia* that Vargas organized in 1951 to devise a national plan for Amazonia's socio-economic awakening.²⁹ Vargas summoned Arthur Reis and Romulo Almeida, two of his closest collaborators regarding economic planning, to organize and orient the work of the largest state-sponsored conference on the Amazon ever organized in the country.³⁰ As the president of the conference Romulo Almeida explained in his introductory speech, the conference aimed at "objectively demonstrating that the Brazilian amazon has resources" that via adequate, rational public action, "[could] make it a flourishing region, growing from its own means and contributing to

²⁹ Iberê de Souza Cardoso and Aédo de Carvoliva, 'Superintendência do plano de valorização econômica da Amazônia, Escola Brasileira de Administração Pública, série de casos de planejamento econômico regional', Fundação Getulio Vargas, 1955, p.32, retrieved from: <http://bibliotecadigital.fgv.br/dspace/handle/10438/11834>; Marques, op. cit. (11), p.170.

³⁰ Romulo Almeida was a member of Vargas' Civil Office and the head of the Economic Advisory Board of the Republic while Reis headed of the Division for Economic Expansion.

the development of Brazil and to the development of its neighboring countries and the friends of the continent”.³¹ The three-month long conference thus dealt with all aspects of Amazonia’s alleged underdevelopment and enabled its acting secretary, Reis, and the wide gallery of economists, zoologists and agronomists he garnered to explore how science driven public action could contribute to valorize the region’s potential for Brazil without the kind of risks entailed by the IIHA.³² Striving to interlock the development of Amazonia with Vargas’ broader national goals, the conference attendees made Amazonia a stepping-stone of the reinforcement of Brazil’s economy and national unity.³³ The success of the Technical Conference eventually paved the way to the creation of the SPVEA in 1953, and catapulted Reis as its first superintendent.

The federal law 1806 of 6 January 1953 creating the SPVEA, granted Reis and his staff the task to “stimulate the occupation of Amazonia in a Brazilian fashion”, and “build an economically stable and growing society” that would “develop in parallel and complement to the Brazilian economy”.³⁴ What became the main locus of Amazonian development was in the hands of Reis who appointed the Planning Commission to first devise the Program of Emergency (1954) which laid the conceptual and programmatic guidelines of the PPQ (1955-1959). Both plans reflected the technocratic worldview of Reis’ Commission. Based on the conclusions of the Technical Conference, Reis and his staff relied heavily on science to imagine and design the SPVEA’s modernization plans. As Reis and the SPVEA planners explained in a report detailing the rationale behind the PPQ, the modernization of the Amazon was a technical and scientific task that required a greater scientific understanding and technical mastery of the complex biotic reality of the Amazon. “Only via scientific investigation, which”, they believed, “can reveal Amazonia’s reality in all its depth and details, can we frame and solve its problems”.³⁵ The development of science and the

³¹ SPVEA, *Valorização Econômica da Amazônia: subsídios para seu planejamento. Relatórios e principais contribuições da conferência técnica sobre Valorização Econômica da Amazônia*. Rio de Janeiro: Departamento de Imprensa Nacional, 1954, p.vi

³² Reis was particularly sensitive to foreign intrusion in Amazonia and strengthening the Brazilian identity of Amazonia. But his attitude to the IIHA remained ambivalent. Although he recognized the risk that the IIHA posed to for Brazil’s sovereignty, he also regretted its collapse. He believed the IIHA could have helped a great deal to advance scientific knowledge on the region and in turn accelerate its development, see for instance : Arthur Cezar Ferreira Reis, *A Amazônia e a Cobiça Internacional*, Rio de Janeiro: Gráfica Records Editora, 1968, third edition; Cardoso and Carvoliva, op. cit. (29), p.32.

³³ Marques, op. cit. (11), p.167.

³⁴ As reproduced in: SPVEA, ‘Presidência da República, Superintendência do Plano de Valorização Econômica da Amazônia, Perspectiva do primeiro plano quinquenal e concepção preliminar da valorização econômica da Amazônia’, Belém: SPVEA Setor de Coordenação e Divulgação, 1954, p.4, retrieved from: <http://www.sudam.gov.br/conteudo/menus/referencias/biblioteca/arquivos/PlanoQuinquenal-doc-02928320140903115431.pdf>

³⁵ SPVEA, op. cit. (34), p.28.

enrolment of a broad range of scientists and specialists were in his eyes an indispensable condition to Amazonia's integration, and in turn, Brazil's development and independence.

The plans formulated by Reis and his developmentalists reflected a continued belief in the transformative power of science among the Brazilian scientific elite which had finally found its momentum in the creation of the CNPq in 1951. It was Alvaro Alberto who organized the commission that created the CNPq and it was Alvaro Alberto who managed to build the coalition of scientists, engineers and science-minded military men that put the postwar development of science in Brazil on the new regime's agenda. After World War II, the scientists employed the authority they had obtained by participating in Brazil's war effort to claim better research conditions and turn the advancement of science into a national priority. Between 1945 and 1949, discussions on science policy, the role of science for society and the construction of a national research council multiplied within the country's self-organized communities of biologists and physicists but also at the Brazilian Academy of Science (ABC), at the newly found Brazilian Society for the Progress of Science (SBPC) and at the UNESCO-sponsored Brazilian Institute for Education, Science and Culture (IBECC).³⁶

Meanwhile, the military establishment worried about the techno-scientific race unfolding around the fast and strategic development of nuclear energy. As Brazil's delegate to the failed UN Atomic Energy Commission (UNAEC) for the peaceful development of nuclear energy (1946-1948), Alvaro Alberto witnessed first hand the unfolding of a peace-threatening international scramble for atomic and technoscientific mastery.³⁷ Alvaro Alberto alerted the military establishment as well as President Dutra about the risks that this technoscientific race represented for Brazil and explained how its scientific underdevelopment would ineluctably threaten the country's national integrity in the near future. Alarmed by Alvaro Alberto's report, the Brazilian military establishment recognized the need to stimulate science for national security and advocated for the adoption of a federal scientific policy. Alvaro Alberto eventually brought together the military and the scientists following his return from New York in 1948. As president of the ABC and the military's first man regarding science and the atom, Alvaro Alberto astutely merged both

³⁶ de Andrade, op. cit. (11), p.225; Ana Maria Ribeiro de Andrade, 'Alianças estratégicas no processo de criação do CNPq' in Christina Helena da Motta Barboza (ed.), *Histórias de Ciência e Tecnologia no Brasil*, Rio de Janeiro: Museu de Astronomia e Ciências Afins – MAST/MCTI, 2016, pp.161-177, p.164; Motoyama, op. cit. (11), p.38-41; Alex Gonçalves Varela, Heloisa Maria Bertol Domingues and Carlos Alberto Coimbra, 'A circulação internacional dos cientistas Brasileiros nos primeiros anos do CNPq (1951-1955)', *Revista Brasileira de Historia da Ciência* (2013) 6, pp.301-319, p.304. On IBECC, see: Antonio Carlos Souza de Abrantes and Nara Azevedo, 'O Instituto Brasileiro de Educação, Ciência e Cultura e a institucionalização da ciência no Brasil, 1946-1966', *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* (2010) 5, pp.469-489, p.471-473.

³⁷ de Andrade, op. cit. (11), p.225; Motoyama, op. cit. (11), p.38-41



Figure 37 – Alvaro Alberto (right) discussing the creation of the CNPq with President of the Brazilian Republic Enrico Gaspar Dutra (1883-1974), c.1949

groups under the same banner of scientific and national progress to obtain from Dutra, after years of negotiations, the creation of the CNPq in 1951.³⁸

The creation of the CNPq did not just confirm the dominant position of Alvaro Alberto, who became the council's first president, and his military-scientific coalition which prevailed on the executive council but consecrated their vision of science for Brazil. Together, they planned the advancement of science not for science's sake but for Brazil's sake. In a report to President Eurico Gaspar Dutra, Alvaro Alberto described the future CNPq as the "General Staff of the Sciences".³⁹ The military metaphor reflected the military's stranglehold on the council as much as it illustrated the new agency's power to organize and subordinate the development of science and technology in the service of the nation.⁴⁰ "Its final objective", Alvaro Alberto declared in his first activity report,

³⁸ de Andrade, op. cit. (36), p.163-164.

³⁹ Alvaro Alberto da Motta e Silva, 'Exposição de motivos enviada ao senhor Presidente da República, General Eurico Gaspar Dutra, pela comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas', CNPq/INPA papers, Museu de Astronomia e Ciências Afins archives, Rio de Janeiro (subsequently C/IP), CNPq.t.1.1.001, p.3.

⁴⁰ Upon the creation of the CNPq, the military was in control of the new agency as two military men, Alvaro Alberto and the coronel Armando Dubois Ferreira occupied the council's presidency and vice-presidency, while numerous scientists like the chemist Orlando de Fonseca Rangel Sobrinho also represented the EMFA's national security agenda at the council. On the council's composition, see: O Conselho Nacional de Pesquisas, *Informacoes gerais e regulamentacao do processo de concessao de auxilios para pesquisas*, Rio

“was to contribute to the practical implementation of the policy laid by your excellency i.e., the President of the Republic]: the increase of the standard of living of the Brazilian people by the scientifically enhanced use of our potentialities having for guideline the aphorism your excellency once preached, ‘teaching to build for eternity’”⁴¹ In practice, Alvaro Alberto’s council organized the professionalization of research in Brazil, improved and monitored the efficiency of Brazil’s laboratories but also funded and oriented their research program to serve the interests of state.⁴² Unlike other NRCs, the CNPq was also authorized to conduct its own research and to create its own laboratories.⁴³ Even though nuclear research took priority as “one of the cardinal goals of the council”, Alvaro Alberto’s council created a variety of new specialized institutes and research centers throughout the country.⁴⁴ Created in 1952, the INPA was one of them, albeit it came out somewhat unexpectedly as the architects of the CNPq did not see Amazonia as a priority.

Although Alvaro Alberto and the CNPq initially ignored Amazonia, Reis and the architects of the SPVEA as well as Carneiro and his Amazonian positivist coalition saw in the new council an opportunity to salvage the IIHA and develop science in the Amazon. At the Technical Conference, Reis and his partners believed that a scientific apparatus dedicated to research the Amazon was an indispensable instrument to rationalize and orient the work of the future SPVEA. Jorge Latour, an influential member of Alvaro Alberto’s CNPq commission, a fierce opponent to the IIHA and a participant in Reis’

de Janeiro: CNPq, 1952, C/IP, CNPq.T.1.1.002-002, p.20-21; Ana Maria Ribeiro de Andrade, ‘Alianças estratégicas no processo de criação do CNPq’ in Christina Helena da Motta Barboza, *Historias de ciencia e tecnologia no Brasil*, Rio de Janeiro: Museu de Astronomia e Ciências Afins, 2016, pp.161-177, p.166. On the power and functions granted to the CNPq, see: ‘Lei N°1.310 - de 15 de Janeiro de 1951 cria o Conselho Nacional de Pesquisas, e dá outras providências’, and ‘Decreto n° 29.433 - de 4 de Abril de 1951, aprova o regulamento do Conselho Nacional de Pesquisas’, C/IP, CNPq.t.1.1.002_001, p.3-5, p.14.

⁴¹ ‘Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getulio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional’, 1953, C/IP, CNPQ.T.1.2.007-005, p.32.

⁴² ‘Considerões gerais apresentadas a sua excellencia o senhor Presidente da República pelo Almirante Álvaro Alberto’ and ‘Esbôço de diretrizes gerais da política de pesquisas constantes de uma proposição apresentada pelo presidente Álvaro Alberto na primeira reunião do Conselho Nacional de Pesquisas, em 17 Abril de 1951’, in ‘Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getulio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional’, 1953, C/IP, CNPQ.T.1.2.007-005, p.19, p.21-22, p.25 and p.87-88.

⁴³ ‘Lei N°1.310 - de 15 de Janeiro de 1951 cria o Conselho Nacional de Pesquisas, e dá outras providências’, and ‘Decreto n° 29.433 - de 4 de Abril de 1951, aprova o regulamento do Conselho Nacional de Pesquisas’, C/IP, CNPq.t.1.1.002_001, p.3.

⁴⁴ ‘Considerões gerais apresentadas a sua excellencia o senhor Presidente da República pelo Almirante Álvaro Alberto’ and ‘Retrospecto das atividades do Conselho Nacional de Pesquisas no campo das pesquisas científica e tecnológicas, no ano de 1951’ in ‘Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getulio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional’, 1953, C/IP, CNPQ.T.1.2.007-005, p.27, p.28-31; p.37-40; ‘Relatório das atividades do Conselho Nacional de Pesquisas em 1952, apresentado ao Presidente da República, o Exmo. Sr. Dr. Getulio Dornelles Vargas’, 1953, C/IP, CNPq.t.1.2.007-004, p.88, p.94, p.96.

Technical Conference had proposed to the Parliament and the CNPq the creation of a National Institute of the Amazon as a variation of and replacement to the IIHA.⁴⁵ In that regard, Reis and his partners benefited from Carneiro's attempts to salvage the IIHA to convince Alvaro Alberto to explore the creation of a national institute for the Amazon. As long-time advocates of the advancement of science and the development of the Amazon at home, Carneiro, Camargo and Torres pressured Alvaro Alberto as well. In 1952, Carneiro requested Alvaro Alberto to assess the IIHA and reflect on the Amazonian question via his friend the former UNESCO delegate Carlos Chagas who now headed the division for biological research at the CNPq.⁴⁶ Alvaro Alberto eventually agreed to appoint at the CNPq a Commission for the Study of the Amazon in May 1952 that eventually led to the creation of the INPA in October 1952.⁴⁷

Established in Manaus in 1953, the new INPA reflected the aspirations of the broad coalition undergirding its successful creation. The INPA resembled the IIHA in many ways. Its first directors, Olympio de Fonseca (1954-1955) and Arthur Reis (1956-1959), not only modelled the INPA after the functions and set up of the IIHA, but were also inspired by Alvaro Alberto's vision of the INPA. Under their impulse, the INPA sponsored the development of Amazonia's scientific apparatus by providing training, courses and fundings for research for future researchers and undertook research projects in various fields ranging from agrarian geography to aerophotogrammetry.⁴⁸ Like the IIHA, the INPA was open to international cooperation. It relied substantially on foreign expertise as provided for instance by the FAO, organized a variety of conferences and expeditions involving foreign scientists and was authorized to provide assistance to neighboring countries in the same spirit as Carneiro's coalition defended at IIHA.⁴⁹ In 1955, the INPA took over the IIHA's plan to renovate the Museu Goeldi by re-equipping its laboratories

⁴⁵ As shown by Maio, Latour was a fierce detractor of the IIHA which he saw as an open gate to the arrival of millions of war refugees in Brazil. He attempted to destabilize its creation by ordering Itamaraty to open an investigation on Corner and Malamos. In: Maio, op. cit. (9), p.64.

⁴⁶ Paulo Carneiro to Carlos Chagas, 31 May 1952, CP, PC.RI.IH.07/Cartas 13/5/1952 à 07/08/1979.

⁴⁷ Paulo Carneiro to Carlos Chagas, 4 July 1952, CP, PC.RI.IH.07/Cartas 13/5/1952 à 07/08/1979.

⁴⁸ 'Conselho Nacional de Pesquisas, relatório das atividades do conselho nacional de pesquisas em 1955, apresentado, ao excelentíssimo senho Presidente da República em 8 de fevereiro de 1956', 8 February 1956, C/IP, CNPq.t.1.2.007-0009, p.98-99; 'Instituto Nacional de Pesquisas da Amazonia. Relatório das atividades durante o primeiro semestre de 1956', C/IP, CNPq.t.6.4.003-0001, p.10-11.

⁴⁹ Early on, Reis solicited technical assistance from FAO and UNESCO and organized several scientific conferences in which foreign scientists like the Dutch botanist F.A. von Baren, the American chemist Rod-erick A. Barnes and the French arborist André Aubréville gave lectures. 'Conselho Nacional de Pesquisas, relatório das atividades do conselho nacional de pesquisas em 1955, apresentado, ao excelentíssimo senho Presidente da República em 8 de fevereiro de 1956', 8 February 1956, C/IP, CNPq.t.1.2.007-0009, p.98; 'Instituto Nacional de Pesquisas da Amazonia. Relatório das atividades durante o primeiro semestre de 1956', C/IP, CNPq.t.6.4.003-0001, p.12, p.16; 'Relatório das atividades do Conselho Nacional de Pesquisas em 1956', 1957, C/IP, CNPq.t.1.2.007-0013, p.69; William Rodrigues, Marlene Freitas da Silva, Algenir Ferraz Suano da Silva and Maria de Nazaré Góes Ribeiro, 'Criação e evolução do INPA (1954-1981)', *Acta*



Figure 38 – Paulo Carneiro shaking hands with Alvaro Alberto during a meeting preparing the creation of the INPA, c.1952-1953



Figure 39 – Arthur Reis being appointed director of the INPA, c.1956

Amazonica (1981) 11, pp.7-23, p.11, p.13.

and refurbishing its library with the ambition to morph the century-old museum into a major research center in the region.⁵⁰ At the same time, the INPA remained deeply anchored in the emerging technocratic frame that Reis and Alvaro Alberto instaled at the SPVEA and the CNPq. Many among the INPA's architects had participated in the creation of the SPVEA and the CNPq. The INPA's mission was therefore to conduct "the scientific and technological study of the physical environment of and the living conditions in the Amazon region, with a view to serve human well-being and the demands of culture, economy and national security".⁵¹ With the support of Alvaro Alberto's CNPq, the newly created INPA worked hand in hand with the SPVEA. As we will see in the last section of this chapter, the INPA became an important actor in the making of the SPVEA's PPQ.

Over a little less than a decade, Reis, Alvaro Alberto and the complex constellation of Brazilian experts that composed their technocratic-nationalist coalition succeeded in responding to the threats and challenges posed by the IIHA. Not only did the creation of the SPVEA, the CNPq and the INPA enable them to overcome political marginality, but it also empowered them to operate a break from Brazil's historically unsuccessful attempts to organize Brazilian science and develop the Amazon region. Reis and Alvaro Alberto's coalition of technocratic nationalists succeeded in shifting the historically peripheral concerns that were the advancement of science on the one hand and the development of Amazonia on the other hand into the pillars of modern Brazil. In the next two sections, I will contextualize this shift and scrutinize how, throughout the period 1930-1960, the question of the development of Amazonia (section 2) and the question of the development of science (section 3) produced new practices of modernization, imaginaries of modernity and of Brazil – i.e., Brazilian Technocratic developmentalism – which eventually culminated with the SPVEA's PPQ (section 4).

SCRAMBLING FOR THE AMAZON

While, as we have seen, international pressure on Amazonia accelerated the creation of the SPVEA, the CNPq and the INPA, growing internal concerns for regional underdevelopment also contributed to raise local interest in the so far neglected Amazonian hinterland. The creation of the SPVEA and the launch of the PPQ culminated a period of profound political transformations in Brazil during which the country's

⁵⁰ 'Conselho Nacional de Pesquisas, relatório das atividades do conselho nacional de pesquisas em 1955, apresentado, ao excelentíssimo senho Presidente da República em 8 de fevereiro de 1956', 8 February 1956, C/IP, CNPq.t.1.2.007-0009, p.97-98; 'Instituto Nacional de Pesquisas da Amazonia, relatório das atividades durante o primeiro semestre de 1956', C/IP, CNPq.T.6.4.003-0001, p.1-6.

⁵¹ 'Instituto nacional de pesquisas da Amazônia, decreto n°35.133, 1 de marzo de 1954', 1954, C/IP, CNPq.T.6.4.001-009, pp.3-8, p.4.

backland arose as a prominent national issue. This period, stretching between 1930 and 1960, was a watershed in the political history of Brazil. In just thirty years, Brazil moved from the Revolution of 1930 that terminated the Old Republic (1889-1930) to a military coup in 1945 that ended the authoritarian Estado Novo (1937-1945) and opened a temporary return to democracy (1945-1964). During this period of mutation, the presidencies of Getúlio Vargas and Joscelino Kubitschek established the central state as the country's leading modernizing agent and elevated the question of the rehabilitation of the Amazon into a national priority.⁵² This section will compare and contrast the visions of modernization and the nation-building narratives that Vargas and Reis, two leading figures of Amazonian development in the period, associated to their respective Amazonian plans. This comparison will shed light on what Vargas' *March to the West* and Reis' PPQ say about Brazil's modernization, about Amazonia, and about its place in the country's modernization process.

The March to the West

Throughout his two-decade-long reign over Brazil, Vargas established the central government as the country's leading modernizing agent. Following his arrival to power during the Revolution of 1930, Vargas overthrew the First Republic and the powerful oligarchies of the southern coffee-growing states who controlled the republican regime. The establishment of the authoritarian regime of the *Estado Novo* in 1937 sealed the subordination of the regional oligarchies to Vargas, its unique leader, and his central government whose political hegemony was growingly asserted as Vargas government cultivated federal interventionism and created a machinery to coordinate and advance the country's modernization.⁵³ Over the 1930s, and as we have seen with Carneiro, the central government built a institutional technocratic sector to plan and implement Vargas' program of 'conservative modernization'.^{54/55} These agencies organized orderly economic

⁵² Garfield, op. cit. (10), p.9-10, p.45-48.

⁵³ Boris Fausto and Sergio Fausto, *A Concise History of Brazil*, Cambridge: Cambridge University Press, second edition, 1999, p.194; Maria Helena Capelato, 'O Estado Novo: o que trouxe de novo?' in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo. Do Início da Década de 1930 ao Apogeu do Estado Novo*, Livro 2, Rio de Janeiro: Civilização Brasileira, 2003, pp.107-143, p.119; On the Constitutionalist War of 1932, see: Leslie Bethell, 'Politics in Brazil under Vargas, 1930-1945', in Leslie Bethell (ed.), *The Cambridge History of Latin America, Volume IX, Brazil since 1930*, Cambridge: Cambridge University Press, 2008, pp.3-86, p.25-32.

⁵⁴ Capelato, op. cit. (53), p.119; Eli Diniz, 'Engenharia institucional e políticas públicas: dos conselhos técnicos às câmaras setoriais', in Dulce Pandolfi, *Repensando o Estado Novo*, Rio de Janeiro: Editora Fundação Getulio Vargas, 1999, p.21-38; Bethell, op. cit. (53), p.57-58.

⁵⁵ Monica Pimenta Velloso, 'Os intelectuais e a política cultural do Estado Novo' in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo. Do Início*

development, ensured general well-being and pacified the nation through a mixture of political repression, economic planning, nationalization and industrialization as well as the promotion of a new cultural nationalism.⁵⁶ The regulatory and interventionist role of the federal state kept on expanding after the war.⁵⁷ Returning to power in 1951, Vargas resumed the state-led industrialization he initiated during the *Estado Novo* with a largescale nationalist plan for development which entailed the creation of several giant state firms such as Petrobras (1953) and Eletrobras (1954). Kubitschek, his successor, scaled up Vargas' development policy by promising "fifty years of progress in five" via his state-led "plan of goals".⁵⁸

The reinforcement of the federal level throughout the period heightened the concern for the country's lack of unity and the problem of regional underdevelopment which propelled the interest of the federal elites for the rehabilitation of Brazil's hinterland. During the 1930s and 1940s, the marginality of Brazil's northern and western territories from the national project became a major concern for the federal state. Attempts to tackle regional underdevelopment multiplied at the federal level with the launch of several largescale interventions starting with the *Estado Novo's March to the West* (1937), the *Battle for Rubber* (1942) and continuing with regional planning agencies like the *Commission for the São Francisco Valley* (1948) in the state of Bahia, the SPVEA in Amazonia and the *Superintendency for the Development of the Northeast* (1959) in the Nordeste region. These largescale federal state-interventions sought via planning and technoscientific fixes to overcome the socio-economic backwardness of Brazil's peripheral territories but also to reinforce the country as a whole by granting these forgotten territories a place that they never had so far in the wider advancement of the nation.

For its sheer size, its isolation and the extent of its underdevelopment, Amazonia became the main locus of the federal state's rising regional concern during the period. In the 1930s, the decline of the immense Amazonian territory, the economic potential offered by its untamed natural resources and growing international interests for these natural reserves galvanized the imagination of Vargas and the *Estado Novo's* technocratic

da Década de 1930 ao Apogeu do Estado Novo, Livro 2, Rio de Janeiro: Civilização Brasileira, 2003, pp.145-179, p.148, p.152; Sérgio Miceli, 'A política cultural' in Dulce Pandolfi, *Repensando o Estado Novo*, Rio de Janeiro: editora Fundação Getúlio Vargas, 1999, pp.191-196; Bethell, op. cit. (53), p.61-62.

⁵⁶ Capelato, op. cit. (53), p.113, p.115, p.118-120; Maria Antonieta Leopoldi, 'A economia política do primeiro governo Vargas (1930-1945): a política econômica em tempos de turbulência', in Jorge Ferreira and Lucilia de Almeida Neves Delgado (eds.), *O Brasil Republicano. O Tempo do Nacional-Estatismo. Do Início da Década de 1930 ao Apogeu do Estado Novo*, Livro 2, Rio de Janeiro: Civilização Brasileira, 2003, pp.241-285, p.247-250, p.252-263; Arion Sayão Romita, 'Justiça do trabalho: produto do Estado Novo', Dulce Pandolfi, *Repensando o Estado Novo*, Rio de Janeiro: Editora Fundação Getulio Vargas, 1999, pp.95-112; Bethell, op. cit. (53), p.4, p.22-23; Fausto and Fausto, op. cit. (53), p.193, p.195, p.198, p.202.

⁵⁷ Fausto and Fausto, op. cit. (53), p.233-235.

⁵⁸ Fausto and Fausto, op. cit. (53), p.249, p.251.

agents. Hostage of socio-economic cycles of booms and busts, chronic demographic deficit and crippled with poverty-derived insalubrity and epidemics, the region afflicted workers, deterred investors and therefore challenged attempts to establish patterns of growth and development in its midst. At the same time, the region's uncharted land, its vast resources and its relative emptiness fuelled a variety of ambitions among the *Estado Novo's* elite. Amazonia embodied aspirations for economic development, for territorial unification and control, for social improvement and for modernization that the *Estado Novo's* experts sought to overcome with the potential of science and planning when Vargas launched the *March to the West* in 1937.⁵⁹



Figure 40 – ‘The true sense of Brazilianness is the march to the west’, *Estado Novo* dictator launching the *March to the West*, c.1937

⁵⁹ Seth Garfield provides a detailed overview of the various groups concerned with the Amazon and the kind of aspirations each attached to the region in *Chapter 1: Border and Progress. The Amazon and the Estado Novo*. For a general overview see p.11-12 in particular. Garfield, op. cit. (14), p.11-12.

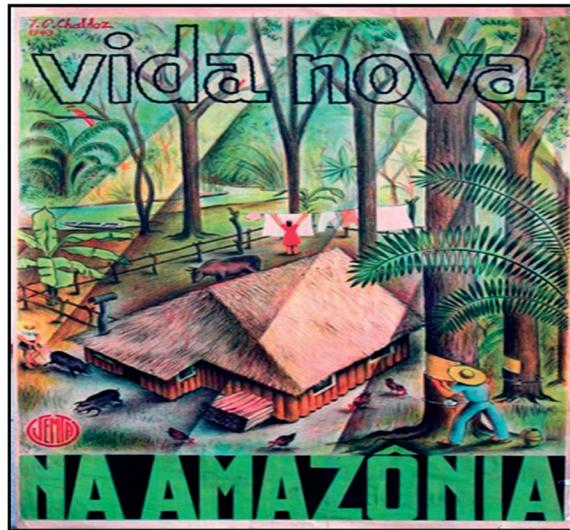


Figure 41 – 'The new life in the Amazon' - propaganda poster for the March to the West by Swiss publicist and illustrator Jean- Pierre Chabloz (1910-1984), c.1940-1945



Figure 42 – 'More rubber for the victory', propaganda poster for the Battle for Rubber by Jean-Pierre Chabloz, c.1942-1945

The *March to the West* made the development of Amazonia a state-back enterprise for the first time since the short-lived *Rubber Defense Plan* in 1912.⁶⁰ In Manaus, Vargas, the “savior of Amazonia”, outlined in his famous *speech of the Rio Amazonas* the goals of his Amazonian policy.⁶¹ “Nothing will deter us [i.e., the Brazilians] from this undertaking which is, in the twentieth century, the greatest task for civilized man: to conquer and dominate the valleys of the great equatorial torrents, transforming its blind force and extraordinary fertility into disciplined energy”.⁶² The *March to the West* consisted in a large arsenal of experts, technical agencies, public discourses and technoscientific fixes that the government deployed to transform the Amazon landscape and support the Brazilian people in his pioneering work of conquest and colonization of the region. Between 1937 and 1945, a host of agencies organized colonization, rationalized production, nationalized transport and improved lifestyles. The Department of Land and Colonization (DTC) created in 1938 administered the rational distribution of land and organized technical assistance to small landholders while the National Department of Immigration (DNI) launched recruitment policies to facilitate the transfer of workers to tap rubber trees and cultivate the land. Established in 1939, the IAN conducted research into Amazonian soils, crop diversification and improvement such as the development of high-yielding varieties of rubber tree to facilitate agricultural development and improve rubber extraction. Meanwhile the Service for the Study of Great Endemic Diseases (SEGE), launched in 1940, conducted epidemiological surveys and organized large public health campaigns to eradicate the region’s chronic epidemics.⁶³ The launched of the US-sponsored *Battle for Rubber* in 1942 intensified the *Estado Novo*’s efforts to occupy and valorize the Amazon although it recentered state action on scaling up rubber production and distribution to supply the US war effort with rubber.⁶⁴

⁶⁰ The recovery plan was nevertheless the first largescale state-led intervention in the region. Rio aimed to revive the region by modernizing its rubber industry, stimulating long-term colonization and diversifying its economy through agricultural transition. The plan eventually foundered a couple of years later. The region’s political marginality under the republican system combined with the ascendancy of Asian rubber led the congress to deny additional funding in 1914, which not only condemned the plan but consigned Amazonia back to political oblivion. Garfield, op. cit. (14), p.23.

⁶¹ Quoted from Garfield, op. cit. (14), p.19.

⁶² President Getúlio Vargas, ‘Discurso do Rio Amazonas’, *Revista Brasileira de Geografia*, número de abril-junho de 1942, pp.259-262, p.261.

⁶³ Garfield, op. cit. (14), p.19-23, 32-39; Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History*, Cambridge: Cambridge University Press, 1987, p.99-102.

⁶⁴ Although, as Lucia Arrais Morales noted, Vargas found ways to re-direct a small share of the US aid to advance the broader developmental goals defined in the *March to the West*. Lucia Arrais Morales in *Vai e Vem, vira e volta: as rotas dos soldados da borracha*, São Paulo: Anna Blume, 2002 and further explored by Vunovic Wilkinson and Seth Garfield. On the developmental implications of the Battle for Rubber, see: Xenia Vunovic Wilkinson, *Tapping the Amazon for Victory: Brazil’s “Battle for Rubber” of World War II*, dissertation submitted to Georgetown University, 2009, p.257-259; Garfield, op. cit. (14), p.207-209.

The way Vargas and the *Estado Novo* condemned Amazonia's traditional nomadic lifestyles and its extractivist economy based on the collection of botanicals – i.e., the so-called *drogas do sertão* – and the way they envisioned the modernization of the region were not new. The demonization of extractivism and the valorization of rational agriculture had both a long history. Critiques of extractivism date back to the first rubber boom while attempts to expand agricultural practices had started during the colonial period.⁶⁵ Similarly, Vargas' reliance on science and technology perpetuated an old positivist tradition that had brought a flock of scientists in the Amazon to civilize the region, modernize its economy and heal its population.⁶⁶ However, unlike these past experiences of modernization, Vargas nationalized the Amazon question, established the state and its batteries of technical agencies as the main modernizing force and introduced a novel technocratic approach to the task of regional modernization. While past attempts to transform Amazonia remained issue-specific, isolated, localized and relatively small in scale, Vargas' amazonian policy displayed the embryo of an integrated and multi-dimensional approach to the modernization of Amazonian and its rubber production in particular. Inspired by planning experiences such as the American *Tennessee Valley Authority*, the sanitarians of the SEGE, the planners of the DTC and the agronomists of the IAN established health program, subsidized migration, ran agronomic research and rationalized rubber trade as part of the same, coordinated plan to consolidate occupation and modernize the rubber industry.⁶⁷

The *March to the West* was a milestone for postwar Amazonia that bore a significant influence on Reis and the creators of the SPVEA. Born in Manaus in 1906, Reis was himself a product of the technocratic and centralist spirit that flourished under Vargas. The advent of the new regime in 1930 bolstered his career as historian and civil servant. Like Carneiro and many other specialists, young Reis benefited from the regime's interest for the Brazilian hinterland and its demand for expert knowledge to rise as an intellectual and a figure of Amazonian modernization.⁶⁸ As a member of the Brazilian Institute of History

⁶⁵ Rafael Chambouleyron, 'Cacao, Bark-Clove and Agriculture in the Portuguese Amazon Region in the Seventeenth and Early Eighteenth Century', *Luso-Brazilian Review* (2014) 51, p.1-35; Hecht, op. cit. (49); Barbara Wenstein, *The Amazon Rubber Boom, 1850-1920*, Stanford: Stanford University Press, 1983.

⁶⁶ Scientists and engineers had been mobilized since the early days of Brazil's independence to explore the region and modernize its economy via for instance the Museu Paraense Emilio Goeldi in Belem but also to improve the local population's living and health conditions as Oswaldo Cruz did in the early twentieth century. Nelson Sanjad, *A Coruja de Minerva. O Museu Paraense entre o Império e a Republica (1866-1907)*, Rio de Janeiro: Editora Fiocruz, IBRAM and MPEG, 2010; Nancy Stepan, *Beginnings of Brazilian Science. Oswaldo Cruz, Medical Research and Policy, 1890-1920*, New York: Science History Publications, 1976; Gilberto Hochman, *The Sanitation of Brazil. Nation, State and Public Health, 1889-1930*, Urbana: University of Illinois Press, 2016.

⁶⁷ Garfield, op. cit. (14); Dean, op. cit. (63); Wilkinson, op.cit (64).

⁶⁸ Angela de Castro Gomes, 'A "Cultura histórica" do Estado Novo', *Luso-Brazilian Review* (1999) 36,

and Geography (IHGB), the regime's hotspots for the making of a national historical culture, Reis fulfilled Vargas' nation-building aspiration to explore the interior of Brazil, nationalize its rural authenticity and underscore these territories' untamed potential for the reinforcement of the nation.⁶⁹ After a decade of profuse scholarship, the publication of *A Política de Portugal no Vale Amazônico* (1940) eventually consecrated him as a leading Amazonian thinker.⁷⁰ His scholarly authority combined with an engagement in favour of regional development enabled him to participate in the discussions surrounding the *March to the West* before becoming one of the leading postwar theoreticians of regional and Amazonian development.⁷¹ From 1946 to the early 1960s, Reis successively took charge of the federal Division for Economic Expansion between 1946 and 1953, the SPVEA in 1953, and the INPA in 1956.

When he launched the SPVEA's PPQ in 1955, Reis followed in Vargas' footsteps and embraced the technocratic spirit of the *March to the West*. As we will see in more details in the last section of this chapter, Reis scaled up the technocratic and integrated approach to rubber production of the *March to the West*, enrolled its experts and agencies and looked up to the same models like the TVA to structure the SPVEA's action. Like Vargas who popularized a nationalist discourse that cast Amazonia as the future of Brazil, Reis also assigned to the SPVEA's modernizing action a national signification. With the *March to the West* and the SPVEA's PPQ, Vargas and Reis accentuated the absence of national unity and highlighted the inadequacies of the existing national narratives inherited from the Old Republic.⁷² With Vargas and Reis, Amazonia morphed into a significant site to rethink nation-building and both, as they aimed to develop Amazonia, imagined in its midst the making of modern Brazil. Yet, and although Reis followed in the footsteps of Vargas' policies, the approach to Amazonian development he and his colleagues promoted at SPVEA and

pp.103-108; Hélio Dantas, *Arthur César Ferreira Reis. Trajetória Intelectual e Escrita da História*, Jundiaí: Paco Editorial, 2014, p.45-78.

⁶⁹ For an illustration of the work of idealization of rural Brazil, see: Heliana Angotti-Salgueiro, 'A construção de representações nacionais: os desenhos de Percy Lau na Revista Brasileira de Geografia e outras "visões iconográficas" do Brasil moderno', *Anais do Museu Paulista* (2005) 13, pp.21-72; Sidney da Silva Lobato, 'O futuro da Amazônia: horizonte de expectativa de Arthur Reis (década de 1950)', *Confins - Revue Franco-Brésilienne de Géographie* (2016) 28, pp.1-17, p.4; Sidney da Silva Lobato, 'Estado, nação e região na obra de Arthur César Ferreira Reis', *Diálogos* (2009) 13, pp.625-642, p.627; Alexandre Pacheco, 'A narrativa heroico-nacionalista de Arthur Reis na representação da defesa da Amazônia pelos portugueses e luso-brasileiros em *A Amazônia e a cobiça internacional* - anos de 1960', *Historia da Historiografia* (2012) 10, pp.94-110, p.104; see also: Castro Gomes, op. cit. (68).

⁷⁰ Lauriano Miranda da Silva and Alexandre Pacheco, 'A influência do regionalismo de Gilberto Freyre em Leandro Tocantins e Arthur César Reis (década de 1960)', *Revista Labirinto* (2011) 15, pp.44-53, p.49; César Ferreira Reis, Arthur, *A Política de Portugal no Vale Amazônico*, Belém, 1940.

⁷¹ Dantas, op. cit. (68), p.23-44.

⁷² Andrade, op. cit. (10); Eliane Manso Pereira, 'O Estado Novo e a March Para Oeste', *História Revista* (1997) 2, pp.113-129; Garfield, op. cit. (14), p.9-48.



Figure 43 – ‘Map of the Northern territories of Brazil representing the ideal types and aspects of Brazilian rurality as proposed by Peruvian illustrator Percy Lau (1903-1972) in his book ‘Tipos e Aspectos do Brasil’ (1940)



Figure 44 – Ideal typical view of Amazonian nature as depicted by Percy Lau in his book ‘Tipos e Aspectos do Brasil’



Figure 45 – The traditional Brazilian rubber tapper as depicted by Percy Lau in his book ‘Tipos e Aspectos do Brasil’

the political signification they granted to the region differed from Vargas' model. Before delving into the SPVEA's PPQ itself, let us first scrutinize how Reis integrated the Amazon to the national body and how his narrative, which consecrated technocratic development as Brazil's foundation, differed from Vargas' vision of Brazil which emphasized the importance of spontaneous colonization instead.

Spontaneous colonisation vs. colonial administration: Contrasted visions of Brazil's formation and modernization

Vargas and Reis based their approach to Amazonia's integration to the national body on differing understanding of Brazil's colonial origins and the process by which the country was constituted. While Vargas envisioned the *March to the West* as the final stage of a history of spontaneous colonization, Reis conceived Brazil as the product of colonial administration and made the SPVEA its modern heir.

The *March to the West* was modelled on a frontier vision of Brazil's history which the ideologues of the *Estado Novo* such as Cassiano Ricardo had theorized with his eponymous book *A March para o Oeste* and Vargas popularized in his *Discurso do Rio Amazonas*.⁷³ Cassiano Ricardo modelled the conquest of Brazil's hinterland over the frontier thesis of Frederick Jackson Turner who established the westward-moving frontier as formative of American identity.⁷⁴ Likewise, Ricardo postulated that the sense of history for Brazil was not seaward but inward, to the hinterland. Ricardo made conquest, and more specifically the spontaneous colonization of the interior consubstantial to Brazil. In his book, he argued that the country grew territorially and spiritually starting from the very first Portuguese settlers, continuing with the so-called *Bandeirismo Paulista*⁷⁵ of the seventeenth and eighteenth century, and, moving towards completion with the cattle-ranchers, the farmers and the rubber-tappers enrolled through the *Estado Novo's March to the West*. For Cassiano, what he called the Brazilian spirit – “the pioneer instinct” or *bandeirismo* – was the product of this incessant process of spontaneous conquest initiated

⁷³ Vargas, op. cit. (62); Cassiano Ricardo, *March para Oeste (A Influência da Bandeira na Formação Social e Política do Brasil)*, São Paulo: Edusp, Fourth edition, 1970.

⁷⁴ Frederick Jackson Turner, *The Frontier in American History*, New York: Henry Holt and Company, 1953, third edition.

⁷⁵ *Bandeirismo* designates the Portuguese fortune hunters (*bandeirantes*) who, from the seventeenth century, explored the hinterland of Brazil. The most famous *bandeirantes* such as Antônio Raposo Tavares, came from São Paulo (Paulistas) and led expeditions called *bandeiras* (flag in Portuguese) in search of gold, silver and diamond mines as well as indigenous people to capture and enslave. As they explored the unmapped interior of Brazil, the *bandeirantes* contributed to expand the borders of the Brazilian colony and extend the power of Portugal over the region. Following the independence of Brazil, the *bandeirantes* became celebrated as the first nation-builders.

from Brazil's south-eastern Atlantic shores – Brazil's historical-civilizational center – and expanding towards the assumed peripheral and culturally inanimate territories of the North.

Vargas' frontier narrative thus instated the Amazonian periphery, and its insertion to the national unit as a defining stage for the completion of Brazil's nation-building process. The *March to the West*, Vargas announced, "will define our destinies as a nation".⁷⁶ Even though Amazonia was stamped as Brazilian on the world map, Ricardo and Vargas considered the Amazon as the last incomplete chapter in the history of Brazil. As Vargas emphatically put it in Manaus, "the Amazon, under the fruitful impulse of our will and our work, will cease to be, after all, a mere chapter in the history of the earth and, like the other great rivers of the world, will become a chapter in the history of civilization".⁷⁷ The task concerned every Brazilian. As Vargas extolled, "conquering the land, dominating the water, subjugating the forest have been our tasks" for centuries and thus defined and concerned every Brazilian.⁷⁸ To this end, Vargas counted on everyone from the Amazonian frontiersmen who had historically advanced Brazil's occupation of the North to every Brazilian who, with his pioneering spirit, he hoped to entice to come occupy Amazonia and participate in reviving its rubber industry.

For Vargas, the tragedy of the Amazon was not to be blamed on the Brazilian pioneer and his supposed natural indolence, quite the contrary. For them, the rubber boom of the late nineteenth century exemplified the paradox in which the Amazon pioneers were caught up in. On the one hand, the rubber boom revealed the sheer force of the Brazilian pioneer, whose spirit of conquest and ingenuous capacities enabled him to conquer and domesticate the region's vast rubber forests. On the other hand, as Vargas and his ideologues pointed out, his colonizing effects were lost and wasted by the First Republic's disregard for the Amazon and its laissez faire attitude to rubber extraction which destroyed, nature, eroded national unity and alienated the tappers to advance the interests of international capital rather than those of his people. Vargas and his ideologues believed in spontaneous colonization as a foundational act of the Brazilian identity that the Old Republic neglected and that they sought to revive in the Amazon via the *March to the West*.

The purpose of the *March to the West* was to revive and stimulate this tradition of spontaneous colonization. For the regime, the success of the conquest of Amazonia required to fill the "demographic emptiness" that stemmed from the rubber crash, revive *Bandeirismo* in the region and grant the Brazilian settlers with the right incentives, the right conditions and a national purpose in order for them to successfully carry out their

⁷⁶ Vargas, op. cit. (62), p.262.

⁷⁷ Vargas, op. cit. (62), p.261.

⁷⁸ Vargas, op. cit. (62), p.260, p.259.

natural task of colonization.⁷⁹ The *March to the West*, its technocratic agencies and the technological fixes each deployed were instruments to stimulate and funnel/channel towards Amazonia the Brazilian's natural tendency to conquer and colonize. The IAN, the SEGE and the DTC stimulated spontaneous colonization by providing an instrument of production to the new settlers in the form of rational rubber production and by deploying various technological solutions to improve the tapper's sanitary conditions and his productivity. The state's agencies did not just stimulate but also celebrated spontaneous colonization with the figure of the *Rubber Soldier*, which the regime's propaganda erected into the patriotic agent of Amazonia's brazilianisation.⁸⁰

Reis rejected the regime's frontier narrative and contested the underlying idea that Amazonia had no history, which Vargas purported with the *March to the West* by conceiving the region as the last, unwritten chapter of the history of Brazil. "We are not the land of no one, as it has often times been portrayed. Neither are we a green hell", Reis argued.⁸¹ As historian, he strived to give his homeland a place in the history of Brazil, which he claimed had started just like the rest of the country with the Portuguese colonization.⁸² Reis made Portugal's colonizing experience the genesis of Brazil and of Amazonia.⁸³ In his view, Brazil as a nation was not the product of a linear outward process and Amazonia was therefore not the last chapter of Brazil's historical formation but the emanation of the Portuguese colonial administration and the product of planned colonization. Reis postulated that Brazil originated in the structuring and civilizing action of the Portuguese colonial state, which created, perfected and unified the newfound land, from Rio de Janeiro to Amazonia, into a relatively homogenous entity called Brazil.⁸⁴

The disarray of Amazonia stemmed from the discontinuation of the Portuguese civilizing effort. Reis argued that independence, and more importantly in his eyes, the replacement of the Portuguese colonial administration by a liberal, laissez faire state loosened rather than strengthened the nation. Independence and the rise of liberalism terminated, in his view, the Portuguese "constructive work" and set the maturation of Brazil and, more specifically, the development of peripheral regions like Amazonia back to "ground zero".⁸⁵ The removal of the colonial administration brought violence and chaos

⁷⁹ Vargas, op. cit. (62), p.260.

⁸⁰ Garfield, op. cit. (14), p.45; p.106-111.

⁸¹ Arthur Cezar Ferreira Reis, *Por Deus e Pela Patria (Discurso de Paraninfo)*, Manaus: Tipografia Fenix, 1935, p.15-16.

⁸² Reis, op. cit. (70).

⁸³ Arthur Cezar Ferreira Reis, *Limites e Demarcações na Amazônia Brasileira. A fronteira com as Colônias Espanholas*, Rio de Janeiro, Imprensa Nacional, 1947; see also: Pacheco, op. cit. (69), p.98-99.

⁸⁴ Reis gave a meticulous account of the nature of Portugal's civilizing action in the Amazon in his book: *Território do Amapá: Perfil Histórico*, Rio de Janeiro: Departamento de Imprensa Nacional, 1949.

⁸⁵ Arthur Cezar Ferreira Reis, 'A Amazônia na conjuntura internacional' in Arthur Cezar Ferreira Reis,

to the hinterland, which crystalized in the violent Cabanagem social revolt (1835-1840) and the destructive rubber boom.⁸⁶ For Reis, the tragedy of the rubber boom illustrated less the power of the Brazilian people than its decomposition in the absence of rational administration. The birthing unified nation that Portugal built dissolved into a variety of regional entities while the modern and civilized Brazilian colonist that the Portuguese colonial administration shaped up was left to vegetate, if not collapse like the Amazonian rubber tapper to the “social primitivism” of survival in its absence.⁸⁷

In his eyes, the Portuguese presence in Brazil and in the Amazon was thus more than exotism, adventure and the product of spontaneous occupation. For Reis, the fact that Portugal was the only nation to have successfully colonized and defended the Amazon from other land-hungry European Empires stemmed from the efficiency of its colonial administration.⁸⁸ Reis found in the colonial administration and its approach to colonization a technocratic spirit through which the newfound land was structured into the homogeneous political entity known as Brazil. He idealized the modernization policies devised during the directorate of the Marquis of Pombal, which in his view symbolized the peak of the technocratic spirit and rational approach that Portugal deployed to construct Brazil. In the Amazon, Reis argued that Pombal and his colonial administration planned and organized all aspects of the emerging Amazonian society from economy and education to the study of the region's nature.⁸⁹

Reis remarked that science was central in the Portuguese colonizing work.⁹⁰ The Pombaline administration carried out its civilizing mission relying on the systematic utilization of what he referred to as rational planning and scientific exploration. Throughout the eighteenth century Portugal organized extensive exploratory research in astronomy,

A Amazonia e a Integridade do Brasil, Manaus: Edições do Governo do Estado do Amazonas/Secretaria de Imprensa e Divulgação, 1966, pp.35-78, p.44-46; See also: Dantas, op. cit. (68), p.84-92.

⁸⁶ The Cabanagem was a social revolt and a separatist movement sparked by the region's extreme poverty and political invisibility after the independence. The revolt and its death toll – an estimated 40 % of the total population of Para, Amazonia's most populated state – is said depopulated and destroyed the economic structure of Amazonia. See: Mark Harris, *Rebellion on the Amazon: The Cabanagem, Race, and Popular Culture in the North of Brazil, 1798-1840*, Cambridge: Cambridge University Press, 2010.

⁸⁷ Arthur Cezar Ferreira Reis, *A Amazonia que os Portugueses Revelaram ao Mundo*, Rio de Janeiro: MEC/Serviço de Documentação, 1956, p.19; see also: Lobato, op. cit. (69).

⁸⁸ Reis, op. cit. (32).

⁸⁹ Arthur Cezar Ferreira Reis, *Aspectos da Experiência Portuguesa na Amazônia*, Manaus: Edições do Governo do Estado do Amazonas, 1966; Arthur Cezar Ferreira Reis, *A Amazonia e a Integridade do Brasil*, Manaus: Edições do Governo do Estado do Amazonas/Secretaria de Imprensa e Divulgação, 1966; Arthur Cezar Ferreira Reis, *Estadistas Portugueses na Amazônia*. Rio de Janeiro: Edições Dois Mundos, 1948; see also, detailed account of Reis' view of Portugal's colonization in Dantas, op. cit. (68), p.79-84.

⁹⁰ Arthur Cezar Ferreira Reis, 'O jardim botânico de Belém', in Arthur Cezar Ferreira Reis, *Aspectos da Experiência Portuguesa na Amazônia*, Manaus: Edições do Governo do Estado do Amazonas, 1966, pp.253-276.

geography but also zoology and botany.⁹¹ Via the botanical garden of Belém (1798), the Portuguese investigated the cultivation of local species and acclimatized foreign varieties to facilitate the transition to high yielding agriculture in the region. Scientific explorations guided expansion and strengthened protection against foreign intrusion. Scientific surveys unravelled the Amazon's potential while agricultural experiments endowed the colonizers with new, adapted methods and tools to valorize and occupy the land. Reis believed Portugal threw the foundations of modernity in Brazil and in the Amazon not just by initiating the transition from “extractivism” to “agriculture” but, and more importantly, by elaborating a rational method by which they organize it.⁹²

Reis did not only associated the origins of Brazil as a nation to the Portuguese technocratic experience, but found in it a historically sound model of development he sought to revive in order to restore control over Amazonia and to strengthen Brazil's dwindling unity.⁹³ Portugal's technocracy thus infused Reis' vision of development, which he reinstated through the SPVEA.⁹⁴ Reis conceived the SPVEA as the modern day expression of the technocratic approach to colonization of the Portuguese colonial administration. He mimicked the Portuguese and granted planning and science a role equally central to the SPVEA as he believed it to be in to the Portuguese colonial administration. In his narrative, the colonial expert like the SPVEA planners, his modern day descendent, prevailed and replaced the Brazilian pioneer as the pivotal organizer of Amazonia's occupation, development and its re-integration to the national body.

Between 1937 and 1954, Vargas and Reis contributed to reverse the country's relation to the Amazon and succeeded to instate the development of the country's northern territories into a matter of national significance. Vargas had blazed this trail with the *March to the West*, which Reis followed and built upon later on with the SPVEA. Vargas and Reis however differed in their understanding of the nation, the place of Amazonia in it and the process by which successful development could be achieved. Vargas conceived Amazonia as the last stage of Brazil's development. For Vargas and his ideologues, Brazil was the product of a tradition of spontaneous colonization. The *March to the West* was merely a canvas to this natural unfolding towards the west. Reis rejected the frontier narrative of Vargas and claimed instead that the colonial administration and its technocratic approach – not spontaneous colonization – made the newfound territories into a staple of civilization

⁹¹ Reis, op. cit. (70), p.85-90.

⁹² Arthur César Ferreira Reis. 'Aspectos econômicos da dominação lusitana na Amazônia', *Boletim Geográfico*, June 1947, ano V, n.51, pp.262-274, p.268.

⁹³ Lobato's review of the scholarship of Reis illustrates this well, see: Sidney da Silva Lobato, 'Estado, nação ...', op. cit. (69).

⁹⁴ On the rising intellectual consensus at IGHB over the positive action of Portugal's colonization on Brazil's formation, see: Lobato, op. cit. (69), p.10.

that came to be known as Brazil. For Reis, the SPVEA was the modern-day incarnation of this original technocratic spirit. Like the Portuguese did through their administration, Reis aimed via the dispositive assembled for the PPQ to organize, control, valorize and thus re-brazilianize the Amazonian North. Unlike with Vargas, technocracy was an end in itself for Reis. The specialized agencies Vargas deployed were secondary in the sense that they were created to stimulate and merely accompany the Brazilian's pioneering spirit and spontaneous colonization. For Reis, however, technocracy was what gave meaning to the territories that made up Brazil and was what would make the reintegration of Amazonia in the national body possible.

Reis' Amazonian vision reflected the changes of his time. He did not just construct a narrative that put Amazonia back in the national project but it also legitimized the technocratic turn he and his coalition intended to insufflate in postwar Brazil. Depending on technocratic means to develop Amazonia, Reis and his colleagues were, as we have seen, also demanding relevant scientific and technological expertise and thus supported another of Brazil's crucial shift in the period 1930-1960 that was the development of science. Hence, to understand the full-breadth of the SPVEA's actions in the Amazon which we will explore in the last section of this chapter, we first need to turn to the development of the sciences in Brazil over the period 1930-1960 and explore how, one of its leading advocates, Alvaro Alberto, made it into a strategic, state-owned instrument of modernization of postwar Brazil.

SCRAMBLING FOR SCIENCE

The creation of the CNPq marked a turning point in the history of science in Brazil. When Alvaro Alberto took office, Brazilian scientists had come a long way in their struggle for institutionalization, professionalization and recognition. Before the CNPq was created, Brazil's scientific institutions were small, lowly funded, poorly staffed and uncoordinated, although scientists and technologists had benefited from the technocratic turn initiated by Vargas in the 1930s. As Vargas and Reis did with the question of Amazonia's rehabilitation, Alvaro Alberto turned the question of the development of science and technology into an imperative condition of Brazil's postwar modernization.

Historically, the formation of Brazil has been intimately linked to modern science. It accompanied the young nation from the times of the Portuguese colonization, as reminded – and somewhat idealized by Reis – to the rise of technocratic rule in the 1930s. If science was everywhere, it was however invisible in the Western sense as Botelho

and Schwartzman pointed out.⁹⁵ From the late nineteenth century to the end of WWII, science did not develop in Brazil's few universities nor for its own sake but within a handful of technical agencies created to serve the sporadic modernization policies of the federal state and the regional oligarchies.⁹⁶ The scientist did not exist in the Western sense either although many were the practitioners and promoters of science. Several social groups from engineers, civil servants, positivists but also military men, socialists and revolutionaries relied on science to envision Brazil's future or merely operationalize the country's modernization like Carneiro did with the agronomic institute he created in Pernambuco. Science was mostly an ideology mobilized to remove traditional classes – lawyers and priests – from power and distinguish the modern republic from the old Empire.⁹⁷ In practice, scientists struggled to exist outside the utilitarian frame defined by the Republic and its local oligarchies.⁹⁸ The republican elite mostly ignored the scientists' aspirations for autonomy and neglected the development of basic research, which only sporadically surfaced in centers like the Instituto Oswaldo Cruz.⁹⁹

Although the ABC and the scientists campaigned since the early 1920s to promote the development of science and higher education in Brazil, their efforts remained vain.

⁹⁵ Antonio José Junqueira Botelho and Simon Schwartzman, 'Growing pains: Brazilian scientists and their shifting roles', in Jacques Gaillard, Venni Krishna and Roland Waast (eds.), *Scientific Communities in the Developing World*, New Delhi, Thousand Oaks, London: Sage Publications, 1997, pp.336-354, p.338-341.

⁹⁶ Until 1946, there was only three universities in Brazil, the Federal University of Rio de Janeiro (1920), the University of São Paulo (1934) and the University of the Federal District (1935). On science in nineteenth century Brazil and during the First Republic, see: Maria Amélia Dantes (ed.) *Espaços da Ciência no Brasil*, Rio de Janeiro: Editora Fiocruz, 2001; Motoyama, *Prelúdio para uma História*. op. cit. (11), p.134-248; Simon Schwartzman, 'Capítulo 3, a ciência no império' in *Um Espaço para a Ciência. A Formação da Comunidade Científica no Brasil*, Brasília: PCT/CNPq/CEE, 2001, pp.1-23, p.5-10. For an overview of the scientific apparatus underlying Brazil's agricultural modernization in the late nineteenth century to the Second World War, see: Cyro Mascarenhas Rodrigues, 'A pesquisa agropecuária federal no período compreendido entre a República Velha e o Estado Novo', *Cadernos de Ciência e Tecnologia* (1987) 4, pp.129-153; The agricultural sciences pre-existed the Republic and were first organized by the Empire throughout the nineteenth century, see: Heloisa Maria Bertol Domingues, *Ciência – Um Caso de política. As Relações entre as Ciências Naturais e a Agricultura no Brasil Império*. Dissertation submitted to Universidade de São Paulo, 1995.

⁹⁷ Botelho and Schwartzman, op. cit. (95), p.339-340.

⁹⁸ José Jerônimo de Alencar Alves, 'As ciências na academia e as expectativas de progresso e modernização, 1916-1929' in Maria Amélia Dantes (ed.) *Espaços da Ciência no Brasil*, Rio de Janeiro: Editora Fiocruz, 2001, pp.185-202, p.194-195.

⁹⁹ Antonio José Junqueira Botelho, 'The professionalization of Brazilian scientists, the Brazilian Society for the Progress of Science (SBPC) and the State, 1948-1960', *Social Studies of Science* (1990) 20, pp.473-502, p.478-479; On the role of the Instituto Oswaldo Cruz in the growth of science in Brazil, see: Stepan, op. cit. (66); On the specific role of the IOC in the development of basic research, see: Motoyama, *Prelúdio para uma História*. op. cit. (11), p.253; Motoyama, op. cit. (11), p.28-29; Carlos Eduardo Calaça, 'Vivendo em Manguinhos: a trajetória de um grupo de cientistas no Instituto Oswaldo Cruz', *História, Ciências, Saúde – Manguinhos* (2001) 7, pp.587-606.

¹⁰⁰ Their hobbyhorse, the creation of a national research council, went unheeded and was even ignored by the science-minded/technocratic government of Vargas in the 1930s. Vargas repeatedly turned down the ABC's proposals to create a national research council to build basic science capacities for the country.¹⁰¹ Instead, the regime reinforced applied research of immediate economic utility such as in agriculture with the creation of agencies like the INT and the IAN.¹⁰²

The mobilization of the scientists in the war effort during WWII and the growing interest of the military in scientific progress changed the status of science and nationalized the question of its blatant underdevelopment.¹⁰³ Empowered by their role in the war effort, scientists and engineers united to challenge the status quo and demand the creation of a national research council as well as the adoption of an ambitious science policy for the country.¹⁰⁴ As we have seen, this mobilization garnered Brazil's old and new scientific organizations such as the ABC and the SBPC and benefited enormously from the involvement of the military.¹⁰⁵ This alliance, unified under the leadership of Alvaro Alberto, proved decisive in the creation of the CNPq in 1951.

UN atomic negotiations and the problem of science in Brazil

The role of military men like Alvaro Alberto in the creation of the CNPq culminated half a century of close ties between the Brazilian military and science.¹⁰⁶ Ever since the rise of the Republic, the army had been the guardian of the Republic's positivist spirit and its schools a sanctuary of science since the 1870s. By the 1930s, science stopped to be a

¹⁰⁰ For an overview of the process of professionalization of science in Brazil, see: Simon Schwartzman, 'Capítulo 7, a profissionalização da ciência' in *Um Espaço para a Ciência. A Formação da Comunidade Científica no Brasil*, Brasília: PCT/CNPq/CEE, 2001, pp.1-26. See also: Alves, op. cit. (98), p.188-189; Motoyama, *Prelúdio para uma História*. op. cit. (11), p.264-265.

¹⁰¹ Motoyama, *Prelúdio para uma História*. op. cit. (11), p.254-264, p.269-272; On the Universidade de São Paulo, see: Botelho and Schwartzman, op. cit. (95), p.341-343; On the Instituto Nacional de Tecnologia, see: Maria Helena Magalhães Castro and Simon Schwartzman, *Tecnologia para a Indústria: a História do Instituto Nacional de Tecnologia*, Rio de Janeiro: Centro Edelstein de Pesquisas Sociais, 2008, p.25-40.

¹⁰² de Andrade, op. cit. (36), p.162-163; Motoyama, *Prelúdio para uma História*. op. cit. (11), p.252-257.

¹⁰³ Motoyama, *Prelúdio para uma História*. op. cit. (11), p.275-277; Simon Schwartzman, 'Capítulo 6, as raízes das tradições científicas' in *Um Espaço para a Ciência. A Formação da Comunidade Científica no Brasil*, Brasília: PCT/CNPq/CEE, 2001, pp.1-25, p.20-21; Antonio José Junqueira Botelho, 'The professionalization of Brazilian scientists, the Brazilian Society for the Progress of Science (SBPC) and the State, 1948-1960', *Social Studies of Science* (1990) 20, pp.473-502, p.478-480.

¹⁰⁴ Botelho, op. cit. (103), p.480-481; Motoyama, 'op. cit. (11), p.36-37.

¹⁰⁵ On the ABC, see: Erno Paulinyi, *Esboço Histórico da Academia Brasileira de Ciências*, Brasília: CNPq, 1998; On the SBPC, see: Antonio Botelho, op. cit. (103); Motoyama, 'op. cit. (11), p.40-41; On the military, see: de Andrade, op. cit. (36), p.164.

¹⁰⁶ Maria Cecília Sina Forjaz, 'Cientistas e militares no desenvolvimento do CNPq (1950-1985)', *Revista Brasileira de Informação Bibliográfica em Ciências Sociais* (1999) 28, pp.71-99; Motoyama, op. cit. (11), p.35-36.

mere ideological resource to become a matter of national security for the military. As the threat to national security heightened with the geopolitical rumblings of the 1930s and 1940s, the military's concern for national security started to exceed border protection. A new interventionist doctrine emerged in the military's high command in which national security did not merely rely on pure military power anymore but also on the country's socio-economic and technoscientific capacities for development. Between the late 1930s and the 1950s, this doctrine, which influential figures like the former minister of war and future president of the Republic Dutra defended, contributed to make the military into a powerful actor in a variety of policy-making spheres ranging from the nationalization of strategic resources, industrialization and the socio-economic development of peripheral regions like the Amazon.¹⁰⁷ The potential of science – notably the destructive as well as transformative power of nuclear energy – reinforced their interests and involvement in the development of science in Brazil, which they came to dominate under the impulse of Alvaro Alberto.¹⁰⁸

Alvaro Alberto exemplified the military's intricate bond with science. He was both a military man and a scientist. Born in 1889, he trained as a soldier at the Escola Naval, before graduating as a chemical engineer from the polytechnic school of Rio de Janeiro and the polytechnical school of Brussels. Involved in the war effort as an explosives scientist and as a member of the powerful CSN, Alvaro Alberto contemplated the strategic power of science and the opportunities of the dawning atomic era first-hand. Aware of the growing strategic importance of science and the atom, Alvaro Alberto renewed his activism after WWII in favor of the development of Brazil's nuclear program and the creation of a CNPq for which he had campaigned since the early 1920s as founder and president of the ABC (1935-1937).¹⁰⁹ Alvaro Alberto's proposals remained unanswered until he returned from the failed UN Atomic Energy Commission (UNAEC) where he represented Brazil between 1946 and 1948. The failure of UNAEC proved decisive in the creation of the CNPq and Brazil's nuclear program but also contributed to transform the federal state's attitude to science and technology more generally.

The bombings of Hiroshima and Nagasaki had galvanized interests for nuclear developments North and South. Besides the usual suspects – the Great Powers like France, Britain, the USSR and the sole possessor of the atomic weapon in 1946, the United States

¹⁰⁷ Heráclio Tavares, 'Cientistas de farda: a presença de militares professores no Centro Brasileiro de Pesquisas Físicas', *Ciência e Sociedade* (2014) 2, pp.8-16; Forjaz, op. cit. (106).

¹⁰⁸ The purpose of the ESG was to "develop and consolidate the knowledge regarding the planification of national security", see: Motoyama, 'op. cit. (11), p.42.

¹⁰⁹ Forjaz, op. cit. (106), p.75-77; on Alvaro Alberto's time at ABC, see: Shozo Motoyama and João Carlos Vítor Garcia (eds.) *O Almirante e o Novo Promotou: Alvaro Alberto e a Ciências e Tecnologias*, São Paulo : EDUNESP/Centro Interunidade de História da Ciência e da Tecnologia, 1996, p.223-227.

– emerging Southern countries like India and Brazil contemplated, not without fear, the power of the atom as an emancipatory tool.¹¹⁰ “Atomic energy”, Alvaro Alberto gravely postulated, “imposed on us to take a number of measures to safeguard our economic future and our prestige”.¹¹¹ In response to the fear and interest sparked by the Japanese bombings, the UN General assembly convoked the UNAEC in January 1946 to deal with the problems raised by the ‘discovery of the atom’ and organize the means of its pacific development.¹¹² For its thorium deposits, Brazil was invited to participate and sent to UNEAC a delegation led by Alvaro Alberto whose goal was to establish Brazil as a leading actor of the nuclear race unfolding in the immediate postwar era.¹¹³ Backed by the CSN, Alvaro Alberto led the Brazilian delegation at UNEAC to seize the opportunities opened by the commission to make Brazil a leading nuclear nation.

The commission immediately polarized between the US and the Soviet position. The US delegation suggested to create an international expert-based agency – the Atomic Development Authority (ADA) – to control the development of atomic power worldwide. The delegation also argued that the United States should retain its nuclear arsenal and withhold the atomic technology for as long as the ADA was not fully effective.¹¹⁴ Fearing the US’ nuclear monopoly, the Soviet delegation rejected the US plan and searched to outlaw atomic weapons as the necessary pre-requisite to a functional ADA.¹¹⁵ Before the US-Soviet deadlock killed the UNAEC in 1948, negotiations continued and offered an opportunity for Alvaro Alberto to advance Brazil’s nuclear ambition.¹¹⁶ For the time being, Alvaro Alberto thus established contacts with leading nuclear physicists such as Albert Einstein and Robert Oppenheimer, sent Brazilian scientists to America’s leading nuclear research centers and defended the interests of Brazil and other nuclear fuel producing

¹¹⁰ On the origins and creation of India’s nuclear program, see: Jahnavi Phalkey, *Atomic Stage. Big Science in Twentieth Century India*, Ranikhet: Permanent Black, 2013.

¹¹¹ Álvaro Alberto da Motta e Silva, ‘564ª Sessão do Conselho Deliberativo, Anais do CNPq, Rio de Janeiro, secundo Trimestre de 1961’, C/IP, p.16-17.

¹¹² ‘United Nations General Assembly, session 1, resolution 1. VIII. Resolutions adopted on the reports of the first committee. Establishment of a commission to deal with the problems raised by the discovery of atomic energy’, 24 January 1946, A/RES/1, United Nations archives, Official Document System of the United Nations (ODS) (subsequently UNODS), retrieved from: [http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/1\(I\)](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/1(I))

¹¹³ Túlio Sérgio Henrique Ferreira and Vanessa Horácio Lira, ‘Enriquecimento de animosidades: o início da política nuclear brasileira’, *Revista Carta Internacional* (2016) 11, pp.77-98, p.80.

¹¹⁴ Richard Hewlett and Oscar Anderson Jr., *The New World, 1939/1946. A History of the United States Atomic Energy Commission. Volume I*, University Park: The Pennsylvania State University Press, 1962, p.558-567 and p.576-578.

¹¹⁵ David Kearn, ‘The Baruch Plan and the quest for atomic disarmament’, *Diplomacy and Statecraft* (2010) 21, pp.41-67, p.56; Hewlett and Anderson Jr., op. cit. (114), p.582-585.

¹¹⁶ ‘United Nations General Assembly, session 3, resolution 191. Reports of the atomic energy commission’, 4 November 1948, UNODS, A/RES/191(III) retrieved from: [http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/191\(III\)](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/191(III))

countries.¹¹⁷ In that regard, he opposed the planned dispossession of Brazil's ownership over its valuable thorium ore and sought to facilitate technological transfers in exchange of atomic ore in order to help fuel-producing countries to access atomic technology and valorize their deposits.¹¹⁸

The failure of the UNAEC generated geopolitical uncertainty and several problems for Brazil. In a context of growing East-West tensions, the unregulated American monopoly on humanity's most destructive weapon posed a threat to the fragile postwar peace. It also left countries like Brazil to develop the atom based on their sole – and limited – domestic capacities as no international agreement was found and the rule of secrecy prevailed following the US Atomic Energy Act of 1946 that prohibited the diffusion of atomic knowledge and technology. In addition, Brazil was impeded to utilize and valorize its own thorium or obtain technological transfer in exchange of its ore by the trade agreement it had ratified with the United States in 1945.¹¹⁹ In that context, Brazil's nuclear ambition looked particularly compromised and left the country with no other options than advancing its atomic program relying on its own, limited technical and scientific means.

The situation inherited from UNAEC's failure thus highlighted the strategic character of science and technology as well. For Alvaro Alberto and the military as much as for the president of the ABC Arthur Moses and the scientists the atomic technology was in itself a strategic goal but the technoscientific advances required in its making – and which Brazil lacked then – were, in their view, no less politically problematic for Brazil. Even though “we do not lack of the fundamental raw materials”, Alvaro problematized, “we rely, also, on a higher resource, that is the spiritual raw material [of science] that are our scientists and researchers, whose numbers are, however, insufficient in most specialities”.¹²⁰ For Alvaro Alberto and his coalition of military-scientific nationalists, the possibilities of the atom were one of the many possibilities the state-led development of science and technology could enable.

¹¹⁷ Leandro da Silva Batista Pereira, *Vitória na Derrota: Álvaro Alberto e as Origens da Política Nuclear Brasileira*, dissertation submitted to Centro de Pesquisa e Documentação de Fundação Getúlio Vargas, 2013, pp.40-42.

¹¹⁸ Hewlett and Anderson Jr., op. cit. (114), p.615-616; Pereira, op. cit. (117), p.42-45.

¹¹⁹ Ferreira and Lira, op. cit. (113), p.80; Raquel dos Santos Oliveira, 'A segurança nacional e os minerais estratégicos: os debates entre militares e civis sobre os acordos atômicos Brasil-Estado Unidos (1945-1955)', *36º encontro Anual da Associação Nacional de Pós-Graduação e Pesquisa em Ciências Sociais (AN-POCS)*, 21 a 25 outubro 2012, Aguas de Lindóia, p.6-7.

¹²⁰ Alvaro Alberto da Motta e Silva, 'Exposição de motivos enviada ao senhor Presidente da República, General Eurico Gaspar Dutra, pela comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas', *C/IP, CNPq.t.1.1.001*, p.14.

Brazil's scientific frontier

The aftermath of the UNAEC brought Brazil's technocratic nationalists to locate science at the core of the Brazilian national project. For them, the shape of the immediate postwar order boiled down to a scramble for science in which Brazil risked to be irremediably sidelined by advanced nations like the US, France and Britain if the advancement of science was not taken more seriously. Their vision of science – as much as their sense of urgency to develop it – was very much inspired by the way Western Europe and North America reinforced their international power-position and their level of progress via organized state-back science. Many Brazilian scientists had built an expert understanding of the science policies that Europe and North America were implementing. Carlos Chagas had witnessed the creation of the CNRS in 1939, which he sought to recreate in Brazil upon his return.¹²¹ Between 1947 and 1948, Arthur Moses organized at the ABC several discussions on Vannevar Bush's report *Science – The Endless Frontier* and on European and North American science policy more generally.¹²² Meanwhile, in New York, Alvaro Alberto witnessed first-hand wartime and postwar science policy of the United States. He observed the Manhattan project, the Office of Scientific Research and Development (OSDR) and the shaping of America's postwar science policy. Alvaro Alberto and the technocratic nationalists drew on these experiences to create the CNPq. They provided them with a technical template but also a set of political and scientific discourses such as Bush's idea of science as a frontier of progress, which they used to imagine Brazil's post-war future and its relation to science and technology.

In this context, and like Bush in his report, Alvaro Alberto and the preparatory commission of the CNPq pointed out how science and its underdevelopment were fundamental problems upon which Brazil's future inextricably depended. "To exploit the potential of our resources, to raise the standards of living of our people and to strengthen the integrity of the Brazilian nation", the commission concluded, "the creation of the new organization [i.e., the CNPq] is an urgent imperative of our historical evolution".¹²³ From the presidency to the congress, including the commissions that had discarded the IIHA, everyone approved the commission's narrative that Brazil could not afford to ignore the dawn of a new scientific age. "To survive and to progress", the Constitution and Justice Commission firmly believed "the country cannot wait any longer to create an institution

¹²¹ Varela, Domingues and Coimbra, op. cit. (36), p.304; Motoyama, 'op. cit. (11), p.31-32.

¹²² Vannevar Bush, *Science. The Endless Frontier. A Report to the President on a Program for Postwar Scientific Research*, Washington: National Science Foundation, 1960, second edition.

¹²³ Álvaro Alberto da Motta e Silva, 'Exposição de motivos enviada ao senhor Presidente da República, General Eurico Gaspar Dutra, pela comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas', C/IP, CNPq.t.1.1.001, p.2.

like the CNPq” while the CSN deemed that the creation of the CNPq would respond to “an undeniable and urgent imperative of national security”.¹²⁴

With the CNPq, Alvaro Alberto and his technocratic nationalists hoped to harness the transformative power of science and to invent the conditions of Brazil’s growth, independence and modernity. The CNPq was therefore more than a significant episode for the advancement of Brazilian science. “The date inaugurating the CNPq’s activities”, Alvaro Alberto declared on the CNPq’s opening meeting, “will remain a milestone in the history of the Brazilian civilization”.¹²⁵ He and the technocratic nationalists envisioned the CNPq and science in general as Brazil’s engine of modernity. Referring to President Harry Truman, Alvaro Alberto concurred with the idea that “economic progress and national security depended on basic scientific research and technological development”.¹²⁶ With state-back science, they believed Brazil could acquire atomic power regardless of America’s reticence, expand and modernize its industrial apparatus, better understand and control its territory and thus conquer its political independence.¹²⁷

The CNPq opened a new chapter in Brazil’s history and its struggle for independence. Alvaro Alberto inscribed the CNPq in Brazil’s patriotic history of defence of the homeland from foreign intrusion. For him, this relentless combat was now to be fought in the laboratories, as the battlefield of the wars of tomorrow. If in the past, “issues were solved with arquebuses in Guararapes¹²⁸: today, they are solved in the silence of the laboratories”.¹²⁹ For him “the victories in the military campaigns of the future will depend much more on the work of the cabinet, the achievements of the laboratory and industrial development than through direct confrontations on the battlefields”.¹³⁰ Inserting the scientists into

¹²⁴ ‘Paracer da Comissão de Segurança Nacional, nº260/1949 Cria o CNPq: tendo pareceres favoráveis das Comissões de Educação e Cultura, Constituição e Justiça, e Segurança Nacional...’, 12 May 1950, *Diário de Congresso Nacional*, p.3333-3334, retrieved from: <http://imagem.camara.gov.br/diarios.asp>.

¹²⁵ ‘Oração do senhor presidente almirante Álvaro Alberto, por ocasião do início das atividades do conselho nacional de pesquisas’ in ‘Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getulio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional’, 1953, C/IP, CNPQ.T.1.2.007-005, pp.71-82, p.71.

¹²⁶ ‘Considerações gerais apresentadas a sua excelência o senhor Presidente da República pelo Almirante Álvaro Alberto, Fevereiro 1952’ in ‘Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getulio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional’, 1953, C/IP, CNPQ.T.1.2.007-005, pp.13-32, p.14.

¹²⁷ Álvaro Alberto da Motta e Silva, ‘Exposição de motivos enviada ao senhor Presidente da República, General Eurico Gaspar Dutra, pela comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas’, C/IP, CNPq.t.1.1.001, p.14-16.

¹²⁸ Here Alvaro Alberto referred to the Battle of Guararapes (1648), an important episode of Colonial Brazil, during which the outnumbered Portuguese forces defeated the Dutch army in Pernambuco and put an halt to the imperial ambition of the Dutch Republic in Colonial Brazil.

¹²⁹ ‘Parte das notas taquigráficas da 364ª sessão ordinária, realizada em 25 janeiro de 1955, à qual, compareceu, como convidado, o Senhor Almirante Álvaro Alberto, Presidente do Conselho Nacional de Pesquisas’, 31 January 1955, C/IP, CNPq.t.1.1.005-001, p.20.

¹³⁰ ‘Parte das notas taquigráficas da 364ª sessão ordinária, realizada em 25 janeiro de 1955, à qual, com-

Brazil's tumultuous national history, Alvaro Alberto made them the heir of Brazil's past patriots who fought for the country's independence. If the scientists became Brazil's soldiers in "the wars of sages and laboratories", the CNPq that Alvaro directed would become Brazil's "General Staff of the Sciences".¹³¹ To build Brazil, Alvaro argued, "required the establishment of a General Staff of the Sciences, Technologies and Industry to trace clear paths and to prevent dispersions of efforts [...] towards the progress of science [and] the growth and security of Brazil".¹³² This military metaphor that Alvaro first introduced in 1949 became particularly popular and came to embody the CNPq's status and function for most of its supporters.¹³³

The military metaphor exemplified Brazil's shifting attitude to science and how it grew into an important pillar of Brazil's postwar worldmaking. Alvaro Alberto's reference to the military was not innocent. Brazil's military had been an essential unifying agent in the country's recent history and an essential force in the advent of both the Republic and its underlying positivist philosophy. The metaphor thus symbolically turned science into the military's equal, making the scientists and their practice the agent of Brazil's progress and independence. Like the military in the early days of the republic, the scientists became in Alvaro's view the architects of the Brazil of tomorrow, what he referred to as "the great patriotic task".¹³⁴

With the SPVEA, the INPA and the CNPq, Reis, Alvaro Alberto and the technocratic nationalists assembled a vision of modern Brazil in which science-driven modernization lay as its foundation. When Reis established Portuguese colonial technocracy as a founding feature of the Brazilian nation, Alvaro Alberto theorized technocratic change as the condition to Brazil's survival in the atomic era. For them, technocratic developmentalism had and should continue to bind, transform and strengthen the country. The SPVEA's

pareceu, como convidado, o Senhor Almirante Álvaro Alberto, Presidente do Conselho Nacional de Pesquisas', 31 January 1955, C/IP, CNPq.t.1.1.005-001, p.21.

¹³¹ 'Oração do senhor presidente almirante Álvaro Alberto, por ocasião do início das atividades do conselho nacional de pesquisas' in 'Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getúlio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional', 1953, C/IP, CNPQ.T.1.2.007-005, pp.71-82, p.72.

¹³² Álvaro Alberto da Motta e Silva, 'Exposição de motivos enviada ao senhor Presidente da República, General Eurico Gaspar Dutra, pela comissão incumbida de elaborar o anteprojeto de estruturação do conselho nacional de pesquisas', C/IP, CNPq.t.1.1.001, p.3-4.

¹³³ Dutra took the metaphor over when he officialised the beginning of the negotiations for the creation of the CNPq in May 1949, 'Mensagem do senhor Presidente da República, General Eurico Gaspar Dutra ao congresso nacional propondo a criação do conselho nacional de pesquisas' in 'Relatório de suas atividades no período de 16 de Abril a 31 de Dezembro de 1951 apresentado ao exmo. Sr. Presidente da República, Dr. Getúlio Dornelles Vargas, Rio de Janeiro: Departamento de Imprensa Nacional', 1953, C/IP, CNPQ.T.1.2.007-005, pp.55-56, p.56.

¹³⁴ 'Parte das notas taquigráficas da 364ª sessão ordinária, realizada em 25 janeiro de 1955, à qual, compareceu, como convidado, o Senhor Almirante Álvaro Alberto, Presidente do Conselho Nacional de Pesquisas', 31 January 1955, C/IP, CNPq.t.1.1.005-001, p.16.

PPQ in the Amazon symbolized their technocratic ambition for the nation. In the final section of this chapter, I will detail what the technocratic nationalists' vision looked like in practice by investigating the elaboration of the PPQ and the method they deployed in its making.

AMAZONIA: BRAZIL'S LABORATORY OF TECHNOCRATIC DEVELOPMENTALISM

In 1955, the SPVEA officially launched the PPQ, what became the largest modernization plan ever attempted for Brazil's immense Amazonian hinterland. With this ambitious plan, Reis and the SPVEA planners aimed at durably overcoming the region's chronic socio-economic instability and its marginal position vis-à-vis the rest of the national body. Although, as we have seen in section two, the SPVEA's developmental goals were not new, Reis and his staff stood out for their approach to the process of modernization. The PPQ exceeded mere territorial reclaiming and regional economic development. Reis and his team of planners adopted a method of modernization rationally organized the full-blown reinvention of the region and of Brazil through it. Unlike past experiences, Reis and his staff envisioned the goals of expanding land occupation, organizing agro-industrial development and establishing communication and commercial ties between Amazonia and the country's industrial southeast as the many facets of a single, region- – if not nation- – wide problem of structural underdevelopment. Through the PPQ, the SPVEA advanced a method that was novel in terms of scale, by operating beyond the regional level, in terms of approach, by conceiving modernization as a multidimensional and integrated process and with regard to the role of science and technology on which the technocratic nationalists at SPVEA relied exclusively to model interventions. Before unravelling what the method entailed in practice, let us first look at how it permeated the SPVEA at the organizational level.

The SPVEA was to operate on a different political and financial scale than its predecessors. Although a regional planning institute, the SPVEA was politically and financially backed by the federal government, which was to earmark at least three per cent of its annual budget to the SPVEA. Besides being granted unmatched financial capacities, the SPVEA was authorized to seek technical assistance with the UN agencies, like FAO, involve any public agencies and collaborate with the private sector to carry out its task of modernization. Interestingly, the SPVEA absorbed into its structure most existing development and scientific agencies in Amazonia like the Museu Paraense Emílio Goeldi, the agencies of the *March to the West* as well as the newly created INPA. These institutions were eventually adjusted to serve the modernization agenda of the SPVEA. Take, for

instance, the INPA whose scope of scientific activities was drastically reduced following the appointment of Reis as new director in 1956 to focus on applied research relevant to the implementation of the PPQ.¹³⁵

The organization of the SPVEA reflected the agency's regional scale of action and multi-dimensional approach to modernization as well. The SPVEA's administration was decentralized with its headquarters in Belém and two regional divisions, one in Manaus to deal with Amazonia's western territories and the other in Cuiabá, to focus on the colonization fronts in Southern Amazonia. The Superintendent, Reis, was assisted by the Planning Commission, which was composed of six specialists and nine representatives of the concerned Amazonian states. Together they were to define the PPQ and relied on the expertise of six specialized sub-commissions for agricultural production, natural resources, transport, communication and energy, credit and commerce, healthcare and cultural development.¹³⁶ Despite the high degree of specialization within the SPVEA, the Planning Commission and its sub-commissions were organized in such a way as to enable the formulation of a multi-dimensional and integrated approach to modernization. While the specialized sub-commissions dealt with a variety of aspects ranging from agricultural, animal and forestry production to the social development of local populations, the sub-commission of coordination strove to generate coherence of action and provided the Planning Commission with an integrated set of measures to stimulate Amazonia's modernization. The PPQ resulted from this coordinated and integrated approach.

Amazonia as laboratory of technocratic developmentalism

Reis and the Planning Commission designed the PPQ based on a multi-dimensional approach to Amazonia's underdevelopment. The Planning Commission did not problematize Amazonia as just a naturalistic challenge, as Needham's zonal ecumenists did, but conceived it primordially as a human, social and natural conundrum. What preoccupied the SPVEA planners, as Iberê de Souza Cardoso and Aédo de Carvoliva explained, were less "the conditions of the Amazonian environment [which] did not impede progress [or] the Amazonian climate [that] was not hostile to human life". Quite the contrary, "[Amazonia's] peculiar geographical and demographic conditions, historical process, the primitive nature of its economy [and] the volatility of its social structure

¹³⁵ Relatório das atividades do conselho nacional de pesquisas em 1955, apresentado, ao excelentíssimo senhor Presidente da República em 8 de fevereiro de 1956. 8 February 1956. C/IP, CNPq.t.1.2.007-0009, p.98 (subsequently referred to as CNPq.t.1.2.007-0009). On the SPVEA's attitude towards the INPA, see: SPVEA. *Primeiro Plano Quinquenal*, vol. 1, Rio de Janeiro: Departamento de Imprensa Nacional, v.1, 1955, p.356.

¹³⁶ Cardoso and Carvoliva, op. cit. (29), p.41-43.

[...] were the primary causes of its many problems”¹³⁷ Amazonia’s social primitivism and economic *atraso* were, for Reis and his experts, the result of a web of seven core challenges. These challenges concerned the natural landscape of Amazonia such as the problem of production and industrialization of raw material including agriculture, its socio-economic infrastructure with the problem of transport, the problem of distribution of capital, and its population via the problem of nutrition, the problem of health, the problem of cultural development and the problem of recuperation of the extractivist populations.¹³⁸ The SPVEA considered these challenges of equal importance and addressed them as interconnected issues that required an integrated and coordinated approach in order to be solved.

The SPVEA opted for a new legal and territorial definition of Amazonia that served the PPQ’s integrated approach to Amazonian modernization. Besides the intervention-friendly administrative framework called *Amazônia Legal*, the SPVEA introduced with the PPQ a re-construction of the region based on the concept of *zoneamento* or zoning.¹³⁹ *Zoneamento* consisted in the demarcation of economically promising and politically strategic zones on which SPVEA’s interventions would primarily take place. The Planning Commission selected each zone methodically based on a combination of social, economic and political criteria. As the Planning Commission explained, a zone had to demonstrate “a conjunction of favorable factors that would enable the fastest form of development” such as a dense population, rich soils, abundant forests and accessibility.¹⁴⁰ But it should also display a strategic value regarding land occupation. In accordance with the military, the SPVEA planners located several zones in disputed borderlands like Acre or in areas neighboring the existing pioneer fronts of Mato Grosso and Nordeste to facilitate the transfer of population from the denser southern and northeastern states to the less populated Amazonian territories.

Although political aspects were also considered, the work of demarcation undergirding the SPVEA’s plan of *zonaemento* was predominantly scientific and involved institutions like the INPA. The INPA conducted several large-scale expeditions involving international researchers along the rivers Urubu, Manacapuru and Branco. The first campaign in the Territory of Rio Branco in Amazonia’s Northern border between 1954 and 1955 exemplifies how science permeated the PPQ by stirring and propelling every level of the valorization process. The Rio Branco expeditions involved fifty-seven

¹³⁷ Cardoso and Carvoliva, op. cit. (29), p.60, p.3-4.

¹³⁸ SPVEA, op. cit. (34), p.5.

¹³⁹ *Amazônia Legal* designates a new territorial division of the Amazon region that grouped nine Brazilian states (Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, Tocantins, parts of Mato Grosso and Maranhão) into a unique planning territory, which aimed at facilitating federal developmental interventions

¹⁴⁰ SPVEA, op. cit. (34), p.8.

Brazilian researchers as well as the French geographers Francis Ruellan and his assistant Yvonne Beigbeder from the École Pratique des Hautes Études.¹⁴¹ The expeditions aimed at preparing several surveys of the formerly rubber-rich Rio Branco territory, which served as a basis for the SPVEA's zoning plan in the region (zoning number eight on the SPVEA's zoning map). These surveys provided an understanding of the geographical and geomorphological structure of the region and were used to orient colonization, facilitate the prospection of high-value mining and localize appropriate land for the construction of hydroelectric dams, roads and military airbases.¹⁴²

The Planning Commission eventually identified twenty-eight zones in total and approached each as laboratories of modernization. As the SPVEA's zoning map shows, these zones were homogeneously scattered along the entire length of Brazil's Amazonian border and along the banks of the Amazon River, the region's main transport system. The Planning Commission hoped to create with these zones a tight web of interconnected settlements, which, to the military's satisfaction, would also contribute to reinforce Brazilian presence and control over formerly empty stretches of the national territory. Besides demonstrating Brazilian authority over Amazonia, these zones worked as testing benches within which the SPVEA's experts could experiment with modernization. Their goal was as much to transform these zones into stable and thriving communities as it was to identify the ways and methods to scientifically engineer this transformative process. Each zone worked as an ideal-typical sample of the Amazonian bio-social landscape where planners could rationally identify and scientifically craft new socio-economic, but also technical, moral and human structures conducive of durable development. With *zonaemento*, they broke down the region's social and natural landscape into experimental spaces within which they designed and applied a program of modernization that could be replicated elsewhere in Brazil.

Just as these zones were defined rationally, the challenges that the SPVEA planners faced in each of them were also considered "technical problems" that they sought to comprehend and overcome with scientific research and technological interventions.¹⁴³ "Scientific research" as Reis repeatedly argued, "was evidently essential to enable the design of definitive solutions" to Amazonia's underdevelopment.¹⁴⁴ These novel scientific insights

¹⁴¹ On the Rio Branco expeditions and the INPA expeditions over the period 1954-1975, see: CN-Pq.T.6.4.003-0001, p.10. See also: Ângela Nascimento dos Santos Panzu, *O Instituto Nacional de Pesquisas da Amazônia: trajetória institucional por meio de suas práticas científicas, 1954-1975*, Dissertation (Mestre em História), Manaus: Universidade Federal do Amazonas, 2015, p.63.

¹⁴² Francis Ruellan, *Expedições Geomorfológicas no Território do Rio Branco*. Rio de Janeiro: INPA, 1957 as referred to and described in Panzu, op. cit. (141), p.55-88; CNPq.T.6.4.003-0001, p.10.

¹⁴³ SPVEA, op. cit. (34), p.23.

¹⁴⁴ Arthur César Ferreira Reis, 'Fundamentos, história, estrutura e funcionamento da S.P.V.E.A.' in Arthur César Ferreira Reis, *A Amazônia e a Integridade do Brasil*. Manaus: Edições Governo do Estado do Ama-



Figure 47 – Members of the INPA expedition in the Territory of Rio Branco, Brazil, including the French geographer and geomorphologist Yvonne Beigbeder (1927-1967), c.1954-1959

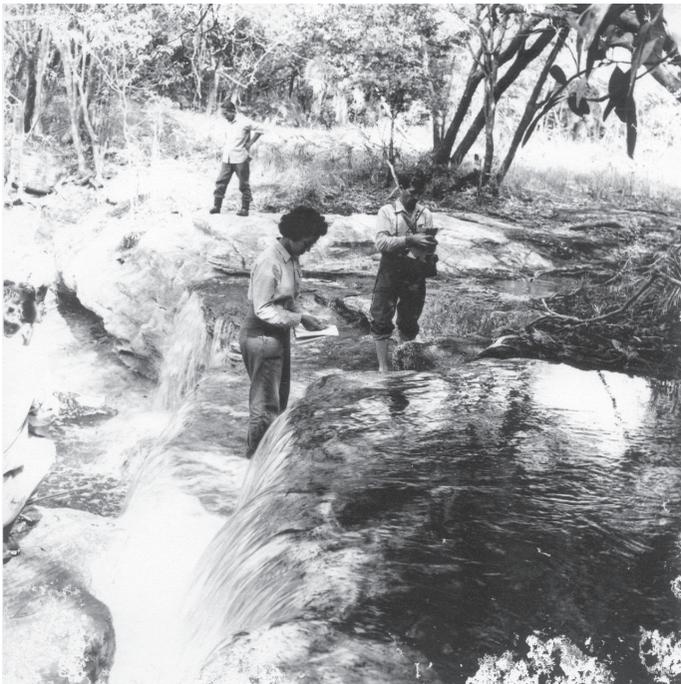


Figure 48 – Members of the INPA expeditions in the Territory of Rio Branco conducting topographical observations (including Yvonne Beigbeder), c.1954-1959



Figure 49 – Yvonne Beigbeder (right) and other members of the INPA expeditions on horseback crossing the Tiporém River in the Territory of Rio Branco, c.1954-1959

and technologies of Amazonia were “to guide, update, and improve the [PPQ] and provide the technical elements required for its execution”.¹⁴⁵ As a key institution in the SPVEA’s set up, the INPA illustrates the technoscientific commodification of Amazonia that undergirded both the planning and interventions of the PPQ. Concretely, the INPA was expected to yield new geological, hydrographical, botanical and social understandings of Amazonia’s bio-social reality. The work of the INPA was important for the modernization process as its action facilitated the translation of economically inert sections of the Amazonian environment into quantifiable, modifiable and exploitable resources. As the SPVEA experts explained, “to know [these spaces] is to invent them, and, by extention, know how to dispose of them”, which would eventually contribute to “one day, incorporate [these spaces] into the economic life of the region”.¹⁴⁶

To scientifically commodify Amazonia’s ecosystem, the INPA deployed a vast program of practical research that ranged from studying the composition, utility and cultivation capacity of endemic plants to conducting ecological surveys on the food chains of potentially marketable fish. This work of commodification and valorization is particularly

¹⁴⁵ Cardoso and Carvoliva, op. cit. (29), p.20.

¹⁴⁶ SPVEA. *Primeiro Plano Quinquenal, vol.1*, Rio de Janeiro: Departamento de Imprensa Nacional, 1955, p.361

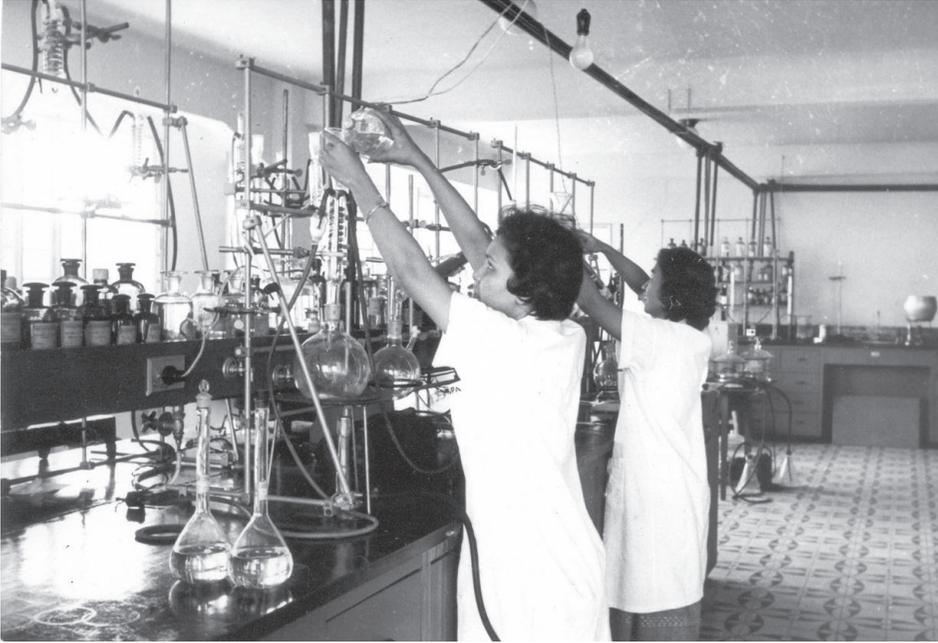


Figure 50 – Laboratory work at the INPA, Manaus, c.1952-1959

visible in the action of the Center for Forestry Research and the Chemistry Division of the institute. In 1954, the Center for Forestry Research carried out investigations on rational forestry and its industrial commodification via research on biofuel extraction and the creation of pilot factories on cellulose in view of stimulating paper production in the region. Meanwhile the Chemistry Division designed the industrialization of fertilizer production and investigated the extraction process of several endemic plant oils such as buriti for the soap, oil and rubber industry. In that regard, the institute's research activities served directly the agricultural and industrial ambition of the PPQ.¹⁴⁷

The scientific commodification – and hence cognitive appropriation – of Amazonia that the SPVEA organized with the PPQ via institutions like the INPA served a multi-dimensional reorganization of the region's bio-social reality. The SPVEA sought to initiate an evolutionary leap forward with the PPQ by “gradually converting the extractivist economy of the Amazonian forestland and the commercial economy as developed in

¹⁴⁷ CNPq.t.1.2.007-0009, p.98; Relatório das atividades do Conselho Nacional de Pesquisas em 1956. 1957. C/IP, CNPq.t.1.2.007-0013, p.67; Instituto Nacional de Pesquisas da Amazonia, relatório das atividades durante o primeiro semestre de 1956. 1956. C/IP, CNPq.T.6.4.003-0001, p.8, p.14-15 (subsequently referred to as CNPq.T.6.4.003-0001).

Amazonia's urban centers into an agricultural and industrial economy".¹⁴⁸ As we have seen above, the PPQ's attempt to create in the twenty-eight zones a web of nuclei of agro-industrial development responded to a plurality of problems that encompassed the transformation and improvement of the land, the reorganization of the socio-economic structure, the recovery of man and the development of the technoscientific infrastructure required to monitor, control and plan this multi-dimensional process of transformation.

Rather than dealing with each problem individually and in isolation from one another, the SPVEA devised an approach that addressed these problems altogether as part of the same plan of action. The approach of the SPVEA was integrated at the level of the *zonaemento* as the PPQ's action on agriculture for instance demonstrates. In each zone identified as suitable for agriculture, the SPVEA deployed a multilevel intervention, where land, man and socio-economic structure were to be reworked. As the first level of intervention, the Planning Commission sought to reorganize agricultural land and production by elaborating adapted agricultural processes for crop and cattle production. This intervention consisted in organizing a web of experimental stations whose role was to identify appropriate plants to the appropriate soil, craft and distribute high-yielding seeds to the farmers and optimize the agricultural cycle that could allow them to valorize their fields all year round. Similar processes of rationalization were laid out for cattle ranching.¹⁴⁹ As the second level of intervention, the SPVEA focused on 'the recovery' of existing population of extractivist tappers and trained professional farmers to operate these rationalized units of agricultural production. Instructing the farmers ranged from improving their technical knowledge, their capacities and transforming their conceptions of agriculture by deploying teams of agronomists and experts to assist them.¹⁵⁰ Finally, the third level of intervention consisted in designing an appropriate economic framework to stimulate competitive agricultural development. The SPVEA planners thus sought to create a special credit system – the *crédito bancário rural* – to enhance public and private investment in agricultural production, to organize the farmers in cooperatives to grant them and their production a power position on local and national markets as well as to establish a minimum price to protect local production against commercial speculation.¹⁵¹

Although promoted at the level of the zone, rational agriculture, cattle ranching and the extraction of raw materials were also coordinated at the level of the region and linked by industrialization processes. The development of agriculture and the expansion of the extraction sector were accompanied by large-scale industrial projects. The SPVEA

¹⁴⁸ SPVEA, op. cit. (34), p.20.

¹⁴⁹ SPVEA, op. cit. (34), p.5-6; SPVEA, op. cit. (146), p.76.

¹⁵⁰ SPVEA, op. cit. (34), p.5-6, p.14-15.

¹⁵¹ SPVEA, op. cit. (34), p.6, p.8.

aimed to expand the extractive sector to include forestry, mining and fishing and reinforce each sector with the creation of an industrial machinery to process the raw materials into manufactured goods. For forestry, for instance, the SPVEA sought to create several factories to produce plywood, paper, construction products and a shipyard to build a fleet of wooden fishing boats.¹⁵² Similar industrialization processes were planned in the agricultural sector where the goal was to enable the production of foodstuff for the region. Industrialization was conceived as a building block of Amazonia's modernization. The resulting manufactured goods were then utilized, in return, to strengthen agriculture, cattle ranching and extraction as well as to improve the general living conditions of the Amazonians. The growing wood industry was to provide the material required to sustain colonization and build agricultural settlements, while the food industry was to guarantee Amazonia's self-sufficiency and facilitate the fixation of man, helping to supply the labor force required by the labor-intensive extraction sector.¹⁵³ Altogether the coordinated development of these labor-intensive zones would eventually counter old patterns of dispersion associated with traditional extractivism by concentrating and sedentarizing the population.¹⁵⁴ In turn, this process would facilitate the enhancement of other aspects of Amazonian life such as health and education.¹⁵⁵

The engine of Brazilian modernity

Technocratic developmentalism was conducted in the Amazon "pensando no Brazil", an epitome that the staff of the CNPq, SPVEA and INPA regularly used to conclude their reports. *Pensando no Brazil* did not merely display the devotion of the technocratic nationalists to Brazil but reflected also how their engagement for advancing Amazonia's development and the science and technology undergirding it, served the advancement of Brazil as a whole. As Reis and the SPVEA planners put it "the problems of Amazonia are ultimately the problems of Brazil" and so were the solutions they advanced. The SPVEA's technocratic interventions in the Amazon was as Reis claimed about "safeguarding national sovereignty and exploiting the potentiality of Brazil". The work of the PPQ in the Amazon was thus conceived as an experience of wider relevance to the country's larger developmental and nation-building agenda.

¹⁵² Relatório das atividades do Conselho Nacional de Pesquisas em 1956. C/IP, CNPq.t.1.2.007-0013, p.69; Arthur Cezar Ferreira Reis, 'O planejamento regional – suas características e particularidades, ensinamentos decorrentes de experiências estrangeiras.' *Revista Brasileira de Geografia*, número de outubro-dezembro 1958, pp.341-381, p.373-374; SPVEA, op. cit. (34), p.6..

¹⁵³ SPVEA, op. cit. (34), p.5-7.

¹⁵⁴ SPVEA, op. cit. (34), p.22-23.

¹⁵⁵ SPVEA, op. cit. (34), p.12-14, p.26, p.14-15.

The SPVEA planners sought through the PPQ's interventions to anchor the Amazon in the national body and transform the region into a significant actor of the nation's development. The agro-industrial powerhouse the SPVEA planned to build in Amazonia was organized to supply transformed products suitable for the growing industry of Brazil's southeastern states and build the region into a major export region.¹⁵⁶ This entailed the construction of export infrastructures including silos, warehouses, industrial slaughterhouses, cold storage rooms, and purge chambers to valorize, sort out, store and package foodstuff for national and international exports.¹⁵⁷ This export industry was supported by the construction of an ambitious multimodal transport system to open up Amazonia and fully insert it in national and international markets. With a better connection between Brazil's north and south, modernized harbors and river transport systems and the construction of airports the SPVEA sought to Amazonia to national and international markets but also to facilitate workforce mobility into Amazonia at national scale.¹⁵⁸ In that regard, the SPVEA planned the construction of multiple highways to accelerate the spread of existing pioneer fronts in the neighboring States of Maranhão, Goiás and Rondônia.¹⁵⁹ The completion in 1960 of the 2.200 km long highway between Belém and Brazil's new capital Brasília symbolized the SPVEA's attempt to open up Amazonia and integrate the region into the rest of the nation.

The technocratic apparatus deployed by the PPQ to implement the SPVEA's imagined agroindustry prepared the cognitive appropriation of Amazonia and the wholesale commodification of its biodiversity in the 1960s and 1970s under the Military Regime. The many scientists and technicians that were hired through the PPQ enabled the SPVEA planners to conceive nature as a manageable, quantifiable and malleable system. As we have seen with the zoning plan, science helped the Planning Commission to reorder, territorialize and functionalize the Amazon region. By identifying favorable areas of development based on a combination of social, environmental and geological factors, zoning attributed a function for each territory to either provide resources to exploit, land to occupy or the natural means for people to circulate and goods to flow in and out of the region. Nature could be valorized, that is altered – and, in the process, deteriorated – to serve the production of the resources thought to be required to insert the region into the rest of Brazil and establish it as an abundant storehouse. Via this planned reordering of the Amazon basin, the SPVEA conferred to the region's biological reality the economic

¹⁵⁶ SPVEA, op. cit. (34), p.7 ; SPVEA, op. cit. (146), p.85, p.90.

¹⁵⁷ SPVEA, op. cit. (146), p.85.

¹⁵⁸ SPVEA, op. cit. (34), p.9-12.

¹⁵⁹ SPVEA, op. cit. (34), p.9.

function of a plentiful pool of resources and in turn signaled the availability of the region as a provider of raw material.

Although the PPQ's actual effects turned out to be rather limited, the technocratic nationalists crafted in the Amazon a technocratic and developmentalist vision of Brazil and Amazonia that the military regime forcefully endorsed till its demise in 1985. did not succeed in implementing much of the intended change. From the mid-1960s, the regime launched the *War of Development* through *Operação Amazônia* and under the guidance of an empowered SPVEA, named the Superintendency for the Development of Amazonia (SUDAM). Just as postulated a decade earlier by Reis and the SPVEA, the military regime melded authoritarian economic planning, heavy state interventionism with a reliance on high-impact technoscientific processes to tackle the underdevelopment of Amazonia and connect it to the rest of Brazil. The colonization and development of the Amazon was pursued through pharaonic highway, dams and agricultural projects. One of them was Volkswagen's (VW) Companhia Vale do Rio Cristalino 140000-hectare computerized cattle ranch (CVRC). The cattle ranch was modelled as a joint venture involving the VW company and SUDAM and operated in the Amazon between 1973 to 1986. Encompassing the entire chain of beef production, the ranch converted 140,000 hectares of forestland into farm fields where up to 200,000 heads of cattle were expected to graze before being transformed, packaged and marketed on the spot.¹⁶⁰ As Antoine Acker showed, the CVRC became the regime's laboratory to operate the conversion of the Amazon into a modern export economy and elaborate solutions to the hunger crisis ravaging the "Third World". The emancipatory prospect of Brazil's modernist frontier in the Amazon, however, would give way to unprecedented destruction and growing social and environmental outrage in the late 1970s and 1980s. The model of tropical modernity envisioned by Reis in the 1950s and perfected by the military regime in the 1960s and 1970s was undone and eventually replaced by more sustainable alternatives that arose with the emerging environmental age of the late 1980s.¹⁶¹

CONCLUSION

A decade after the launch of the IIHA project by UNESCO, Alvaro Alberto, Arthur Reis and their coalition of technocratic nationalists built the foundations of modern Brazil on the remains of Needham's ecumenical ideals and Carneiro's positivist endeavor. Unlike Needham and Carneiro, they and their coalition of technocratic nationalists associated

¹⁶⁰ Antoine Acker, *Volkswagen in the Amazon. The Tragedy of Global Development in Modern Brazil*, Cambridge: Cambridge University Press, 2017, pp.68-70.

¹⁶¹ Acker, op. cit. (160), pp.262-290.

science and Amazonia for the benefit of Brazil, first and foremost, which they theorized into a worldmaking vision that I called Brazilian technocratic developmentalism. This worldmaking vision established the co-advancement of state-back science and state-planned Amazonian development as the foundation of Brazil's national unity and modernity. This chapter has shown that this new vision of modern Brazil emerged from a combination of domestic and international factors. Reis, Alvaro Alberto and their coalition of technocratic nationalists built on the Estado Novo's experience of technocratic regional development and used the political momentum created by the IIHA debates and the UNAEC's failure to formulate an alternative nation-building narrative that imagined technocratic developmentalism as a model of national development. This worldmaking vision permeated Brazil's postwar federal state and its approach to governance as it found its expression in the CNPq, the SPVEA and the INPA. As we have seen with the case of the PPQ, technocratic developmentalism became within these new technical agencies an actual political program and a method to carry out the country's modernization as well. Despite its limited effects, the PPQ became a model that the Military Regime adopted and perfected to develop the Amazon between 1964 and 1985.

This chapter, displaying Brazil's technocratic turn from the Amazon, was the last of a triptych that explored the different spatialities, forms and politics that the rise of technocracy took in the immediate postwar period. Reis and Alvaro Alberto's Brazilian technocratic developmentalism contrasted with Needham's tropical ecumenism and Carneiro's pan-Amazonian positivism in terms of political spatialization. If science respectively 'made' the rise of zonal and continental entities possible for Needham and Carneiro, its development served to reinforce the nation for Reis and Alvaro Alberto. In that regard, Brazilian technocratic developmentalism seemed to reproduce the political appropriation of science by the state that Krige and others have described for postwar North America and Europe.¹⁶² As we have seen, Reis and Alvaro Alberto based their conception of science as an instrument of the state's empowerment on practices appropriated from the West. However, and as Gyan Prakash and Jahnvi Phalkey have pointed out for India, the rise of technocratic developmentalism was not merely an attempt to catch up with an advanced West.¹⁶³ Just as with India, the Brazilian technocratic nationalists mobilized

¹⁶² John Krige and Kai-Hendrik Barth, 'Science, technology and international affairs', *Osiris* (2006) 21, pp.1-21; Naomi Oreskes and John Krige (eds.), *Science and Technology in the Global Cold War*, Cambridge: MIT Press, 2014.

¹⁶³ Gyan Prakash, *Another Reason: Science and the Imagination of Modern India*, Princeton: Princeton University Press, 1999; Jahnvi Phalkey, 'Introduction to focus: science, history and modern India', *Isis* (2013) 104, pp.330-336; Phalkey, op. cit. (110); see also: David Arnold, 'Nehruvian science and post-colonial India', *Isis* (2013) 104, pp.360-370; Stuart Leslie, 'Atomic structures: the architecture of nuclear nationalism in India and Pakistan', *History and Technology* (2015) 31, pp.220-242.

modern science to respond to a variety of local socio-economic imperatives – i.e., regional underdevelopment – as well as broader political and symbolic needs to invent a distinct, non-European identity and break the cycle of dependency with the West.

The IIHA and the INPA demonstrated a common belief among the different actors involved in the capacity of science to create a modern identity for a peripheral place like the Amazon. In each project we have seen scientific research to be pivotal in fostering the socio-economic, political and environmental transformations that could bring Amazonia on the map of the future of mankind. However, the actors involved disagreed on the proposed transformations, which reflected disputed notions of tropicality.

Needham and the zonal ecumenists reproduced a popular European and North American notion of tropicality that flourished with Europe's colonial expansion. Arnold described tropicality as a trope built by Western explorers, naturalists and scientists over the nineteenth century that homogenized the tropics into a unique, naturalistic and primitive, abundant but dangerous intra-tropical zone.¹⁶⁴ He also showed how the notion, closely associated with the rise of modern science, purported the idea that only science (and its operative the white settler) could transform the tropics' pitfalls and exploit its abundant resources. Needham's ecumenists grounded zonal ecumenism within this Western construction of the tropics. Although zonal ecumenism put the tropics on UNESCO's peace agenda and promised unequalled scientific and human development for the Dark Zone, it reproduced the hierarchies inherent of the environmental determinism and 'possibilism' so typical of Western tropicality. Zonal ecumenism reduced the tropics to a uniform environmental reality predominantly defined by an assumed primordial nature rather than by culture and which rehabilitated one of its originators, the Empire and its technicians, as the architects of tropical progress.

For Carneiro's positivists and the Brazilian technocratic nationalists, the zonal ecumenism of UNESCO empowered the crumbling Empires and the dominant West, who were offered a prominent role at IIHA rather than the local – colonized and non-colonized – populations who were kept in the position of a transparent and passive recipient of change. Despite a different agenda, Carneiro's positivists and Reis' developmentalists shared a conception of tropicality that opposed Western tropicality. Both sought with the help of science to enact a singular, non-European yet modern tropical identity for the communities of the Amazon. As heir of da Cunha, Carneiro and Reis moved away from

¹⁶⁴ David Arnold, "Illusory Riches": representations of the tropical world, 1840-1850', *Singapore Journal of Tropical Geography* (2000) 21, pp.6-18; on tropicality, see also: introduction to the special issue by Felix Driver and Brenda Yeoh, 'Constructing the tropics: introduction', *Singapore Journal of Tropical Geography* (2000) 21, pp.1-5; David Arnold, *The Problem of Nature: Environment, Culture and European Expansion*, Oxford: Oxford University Press, 1996, pp.141-169; Felix Driver, 'Imagining the tropics: views and visions of the tropical world', *Singapore Journal of Tropical Geography* (2004) 25, pp.1-17.

a naturalistic vision of the Amazon. Although, like the ecumenists, the positivists and the Brazilian technocrats recognized that the Amazon catalyzed the problems of extreme periphery, these were seen less as environmental than as political and social. They did not mobilize science to reify the Amazon into a natural Eden but, like da Cunha did and prophesized half a century earlier, they used scientific research to magnify Amazonia's specificities and solve the political causes at the root of its underdevelopment and marginality. For Carneiro and the positivists, ecological research could highlight the Amazon's specific social and natural features and contribute to shed the scientific, cultural and moral foundations to a tropical civilization common to all Amazonian nations. The technocratic nationalists employed science to strip the region from its sluggish social primitivism, assert its brazilianity and construct the Brazil of tomorrow in the heart of the Amazon.

Both Carneiro's pan-Amazonian positivism and Reis' technocratic developmentalism were attempts to deploy counter-hegemonic models of the tropics that challenged the way the West – and Needham's ecumenists – naturalized, reified and subordinated the tropical world against the assumed normality and advancement of the temperate North.¹⁶⁵ Although Carneiro's pan-Amazonian positivism eventually faded with the abandonment of the IIHA, the science-driven tropical developmentalism, formalized in the 1950s at the SPVEA by Reis and the technocratic nationalists lived on after the *First Five-year Valorisation Plan* and found its full blown expression in the developmental projects of the military regime in the 1960s and 1970s. Tracing the making of zonal ecumenism, pan-Amazonian positivism and Brazilian technocratic developmentalism as I did in the last three chapters, contributes to a deeper understanding of the ways by which diverse scientific ideals and practices inherited from the 1930s and 1940s were assembled into coherent political imaginaries, methods and institutions that established technocracy as a prevailing model for the governance of man and nature to this date.

¹⁶⁵ On the idea of counter models of tropicality, see: Daniel Clayton, 'Militant tropicality: war, revolution and the reconfiguration of the « tropics » c.1940-1975', *Transactions of the Institute of British Geographers* (2013) 38, pp.180-192.

Chapter 7

IN THE DARK ZONE, A NEW WORLD ORDER

In February 1952, when the reports announcing the end of the IIHA in Latin America landed on the desks of the Natural Science Section, those who inaugurated the project six years earlier were no longer present.¹ In Paris, everything had changed. The IIHA's main advocates, Joseph Needham, Julian Huxley, Edred Corner and Paulo Carneiro had left the stage. Needham and Huxley stepped down prematurely in 1948 and 1949 as a result of fierce criticism regarding their views of UNESCO science and the lack of tangible results. For their leftist leaning and their closeness to the USSR in the 1930s, both were also distrusted as pro-communist by Anglo-Saxon member states.² Corner quitted embittered by years of vain sacrifices in the Amazon and returned to Cambridge in 1949. Only Carneiro stayed at UNESCO but shifted his commitment to educational and cultural projects.³

With the Mexican writer Jaime Torres Bodet as Director-General and the French physicist Pierre Auger as director of the NS division, UNESCO moved away from Huxley's and Needham's technocratic and South-centered agenda.⁴ As Bodet rejected Huxley's scientific humanism and returned to intellectual exchanges to bridge the gap between East

¹ Frank Malina to Miss Hallorun, 1 July 1952, UA, 330.19(8)A01 IIHA – Part V – From 1/1/1949; Pierre Auger to Hirasharu Kujimoto (acting secretary general, Japanese national commission), 7 November 1952, UA, 330.19(8)A01 IIHA – Part V – From 1/1/1949.

² On Needham's replacement, see: Patrick Petitjean, 'Visions and revisions. Defining UNESCO's scientific culture, 1945-1965' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty years of science at UNESCO*, Paris: UNESCO publishing, 2006, pp.29-34, p.30-31; On Huxley's replacement, see: John Toye and Richard Toye, 'One world, two cultures? Alfred Zimmern, Julian Huxley and the ideological origins of UNESCO', *History* (2010) 95, pp.308-331; Chloé Maurel, 'Le rêve d'un gouvernement mondial des années 1920 aux années 1950. L'exemple de l'UNESCO', *Histoire@Politique* (2010) 10, pp.2-20 p.13; Chloé Maurel, *L'UNESCO de 1945 à 1974 (Thèse de Doctorat d'Histoire Contemporaine)*, Dissertation submitted to École Doctorale d'Histoire de Paris I, 2005, p.60-67, p.75-76.

³ Carneiro pursued a prolific career at UNESCO as Brazilian delegate and member of the Executive Council. He took part in multiple projects such as the International Commission and Editorial Committee of the Scientific and Cultural History of Mankind Project, UNESCO's study of race relations in Brazil and the protection of world cultural heritage. Carneiro remained involved with UNESCO until his death in 1982. On Carneiro's career at UNESCO, see: Marcos Chor Maio, 'Trajetória e produção intelectual de Paulo Carneiro', in Marcos Chor Maio, (eds.) *Ciência, Política e Relações Internacionais: Ensaio sobre Paulo Carneiro*, Rio de Janeiro and Paris: Fiocruz/UNESCO, 2004 pp.309-314, p.313-314; Marcos Chor Maio, 'UNESCO and the study of race relations in Brazil: regional or national issue?', *Latin American Research Review* (2001) 36, pp.118-136; Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50, p.48; On Corner, see: David Mabblerley, 'Edred John Henry Corner, C.B.E. 12 January 1906-14 September 1996: Elected F.R.S. 1955', *Biographical Memoirs of Fellows of the Royal Society* (1999) 45, pp.85.

⁴ On the re-orientation of UNESCO science, see: Petitjean, op. cit. (2); Patrick Petitjean, 'Blazing the trail. Needham and UNESCO: perspectives and realizations' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty years of science at UNESCO*, Paris: UNESCO publishing, 2006, pp.29-34, pp.43-47; Domingues and Petitjean, op.cit. (3), p.47; Aant Elzinga, 'UNESCO and the politics of international cooperation in the realm of science', in Patrick Petitjean (ed.) *Les Sciences Coloniales – Figures et Institutions*, Paris: Orstom edition, 1996, pp.163-202, p.172-173.

and West, science was no longer a program priority.⁵ At the NS division, Auger's focus on the development of Big Science projects in Europe such as the European Organization for Nuclear Research undermined Needham's *periphery principle*.⁶ Unlike Needham who sought to empower the Dark Zone scientists, Auger did not prioritize the Global South and served the scientific interests of the states by providing assistance on scientific policy and by facilitating bilateral exchanges of technical equipment and applied knowledge. UNESCO's new bosses furthermore hastened to bury the IIHA in its archives to prevent the project's embarrassing ending to further tarnish the credibility UNESCO still lacked in the early 1950s.⁷

Taken together, the IIHA seemed to have left little if no marks on both UNESCO and the world it was supposed to pacify and develop. The IIHA might seem to have failed, crushed by Brazil's unwillingness to establish the institute on its soil while its main promoters were hurriedly dismissed under US anti-communist pressure. At first sight, hence, the episode of the IIHA seems to feed the widely held idea that UN organizations have little importance in the conduct of world affairs.⁸ Since the UN's very beginning, realist historians and political scientists have repeatedly deplored the intrinsic impotence of the UN and dismissed it as a mere instrument – or mask – of great power politics.⁹ This narrative of the UN as irrelevant did not just persist to this day but proliferated outside academia as well. States challenged the UN time and again. Reagan pulled the US out of UNESCO in the 1980s in opposition to the agency's "tilt towards the Soviet Union" before Trump ranted against the UN's inefficiency and removed the US out of

⁵ Maurel, op. cit. (2), p.60-67, p.76, p.90-95.

⁶ On the creation International Computation Centre, see: David Nofre, 'Managing the technological edge: The UNESCO International Computation Centre and the limits to the transfer of computer technology, 1946-61', *Annals of Science* (2014) 71, pp.410-431, p.415-416; On the creation of the CERN, see: Pierre Auger, 'Scientific cooperation in Western Europe', *Minerva* (1963) 4, pp.428-438; Patrick Petitjean, 'Cool heads in the Cold War. Pierre Auger and the founding of CERN' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty years of science at UNESCO*, Paris: UNESCO publishing, 2006, pp.57-60; Armin Hermann, John Krige, Ulrike Mersits, and Dominique Pestre, *History of CERN, Volume 1, Launching the European Organization for Nuclear Research*, Amsterdam: North Holland, 1987.

⁷ Patrick Petitjean argued that until the 1960s, the IIHA project was "a so-called 'white elephant' for UNESCO functionaries" and was "not to be pronounced in UNESCO circles", see: Patrick Petitjean, 'Introducing the symposium "Refounding the International Scientific Relations in the Post-war Period. The Exact and Natural Sciences Division of UNESCO in its first Years"', *Twenty-First International Congress for the History of Science and Technology*, Mexico, 2005, p.4.

⁸ Sunil Amrith and Glenda Sluga, 'New histories of the United Nations', *Journal of World History* (2008) 19, pp.251-274; Mark Mazower, *No Enchanted Palace: the End of Empire and the Ideological Origins of the United Nations*, Princeton: Princeton University Press, 2009, p.1-14; Glenda Sluga, 'The transnational history of international institutions', *Journal of Global History* (2011) 6, pp.219-222; Mark Mazower, *Governing the World. The History of an Idea*, London: The Penguin Press, 2012, p.xi-xix.

⁹ On realist accounts of the UN from international history and international relations, see footnotes 32 and 33 from Chapter 1.

UNESCO once again, this time to protest against an alleged anti-Israel bias.¹⁰ This general scepticism against the UN, however, undermines its policies and distorts our perceptions of its political significance on contemporary world politics.

By revisiting the creation of UNESCO and the (un)making of IIHA, this book challenges two interconnected realist axioms regarding UNESCO: the first is that UNESCO and its actions are irrelevant to understand the changes undergirding mid-twentieth century history. And second, that UNESCO was, above all, a Great Power affair and the product of a political process led by and in the service of leading Western powers. In doing so, I contribute to rethink the historiographical and political value of the UN in general and UNESCO in particular.¹¹ By placing the history of UNESCO in twentieth century international history, I intersected histories of scientific internationalism, imperial reform and technocratic reconstruction to revisit old topics such as WWII and the prologue of the Cold War. In doing so, I established the periodization 1937-1959 as an alternative chronology to the idea of the 1940s as a clean break that sharply separates the twentieth century into two clear-cut temporalities. This alternative periodization helps to highlight how post-war changes like the establishment of UNESCO and the scientization of society were less the product of a radical break away from the interwar period than the maturation of ideas and processes born in the 1930s.

Intrigued by the unfortunate ending of the IIHA, I embarked on a journey back in time to retrieve how UNESCO participated in shaping the post-war technocratic order and in defining the roles and functions that have and have not been attributed to science in the period. At the core of this history have been the political ideals and activism of an eclectic group of Western and Southern scientists who harnessed the betterment of the world to the transformative power of science. I have examined how scientists like Needham in China and Carneiro in Brazil theorized science as an engine of modernity, peace and progress and engaged in the construction of the UN where they deployed their internationalist and scientific discourses to make sense of the challenges of post-WWII peace. I have illuminated how the united front behind the IIHA was torn apart by competing visions of the international and social function of science and how it led

¹⁰ On Trump's decision to pull out of UNESCO, see: Colum Lynch, 'U.S. to pull out of UNESCO, again', October 2017, *Foreign Policy*; Gardiner Harris and Steven Erlanger, 'U.S. will withdraw From UNESCO, citing its 'anti-Israel bias', 12 October 2017, *The New York Times*; Bernard Gwertzman, 'U.S. is quitting UNESCO, affirms backing for U.N.', 30 December 1983, *The New York Times*.

¹¹ I here follow the guidelines that new historians of the UN like Sunnil Amrith, Glenda Sluga have spear-headed in the past decade. For more details on the significance of renewed historical interest in the UN, see: Amrith and Sluga, op. cit. (8); Glenda Sluga, 'The transnational history of international institutions', *Journal of Global History* (2011) 6, pp.219-222; Sandrine Kott, 'Les organisations internationales. Terrains d'étude de la globalisation. Jalons pour une approche socio-historique', *Critique Internationale* (2011) 3, pp.9-16.

to the abandonment of the IIHA project in favor of Brazil's INPA. By retracing the far eastern roots of UNESCO science and the trajectory of the IIHA from their origins in 1930s scientific ideals to the establishment in Brazil of the SPVEA-INPA in the mid-1950s, I captured the making of science as a dominant tool and ideology of public and international affairs between 1937 and 1959.

Altogether, my dissertation demonstrates the significant role UNESCO performed to advance technocratic rule in the 1940s and 1950s. By reconstructing the different steps of the IIHA's making, I have highlighted several historical processes such as the international activism of scientists during the war, the insertion of science in UNESCO, the scientification of intellectual cooperation and the production of scientific worldmaking in the tropics. These processes question our understanding of the period 1937-1959 and the nature of the political and international changes that took place by putting science at its center. They illustrate the ways in which science became a significant political instrument and imaginary throughout the 1940s and what the scientist's newly achieved authority entailed for the reordering of the post-war world.

These processes also shed light on new actors, terrains and visions of the post-war world from the Global South and revive the significance of others, like UNESCO and the late European colonial Empires that have too often been relegated to the sidelines of post-war history. Seen within the clean break paradigm inherited from WWII, late colonial Empires have often figured in the post-war historiography only as the irrelevant vestiges of the pre-war era, bound to break under the staggering blows of postcolonial progress that the war had set in motion. Instead, and as I showed as one of the red threads of this dissertation, the late British Empire played a pioneering role in setting the changes that marked the period 1937-1959 by undertaking technocratic reforms, redefining colonial rule and producing ways of knowing that were picked up widely in the metropolis and at the UN.

In this concluding chapter, I will draw these processes together and illuminate the role of the UN, the British Empire and the Global South in them to sort out answers to the three main research questions of this dissertation. First, I have examined the ways scientists determined science as the engine of post-war modernity and analysed how they defined what a technocratic world order was to entail regarding the existing political and international orders. Second, I analysed how reconstruction, and more specifically the dawn of technocracy after WWII operated as a global process. It involved a variety of actors, terrains and ideas of science from the Global South that played a role equally significant to that of the Great Powers of the West in the scientific reordering of the post-war era. I showed how Southern scientists produced alternative conceptualizations of science as engine of modernity to those advanced in the West and explained how these

visions challenged existing Eurocentric hierarchies. Third, I traced back the origins of UNESCO and explored the impacts of the new organization's actions in the case of the IIHA. Moving beyond national-international and success-failure binaries to investigate the IIHA's demise, I questioned our understanding of the legacy left by international organizations like UNESCO. I will organize my findings in a broader context to shed new light on our understanding of the international and political re-composition of the 1940s and 1950s, and, finally, suggest some topics for further research.

REVISITING THE WAR: WORLD PEACE AND INTERWAR FUTURES, 1939-1945

By closely reconstructing Needham's coalition, recollecting the ideas of its members and tracing the backstage negotiations that made the insertion of science at UNESCO possible, the first two chapters of this dissertation contributed to debunk the making of UNESCO as anything but straightforward and inevitable.¹² Rather than a smooth and teleological enterprise as the historiography tends to picture it, I demonstrated that UNESCO's scientific mandate was a late and disputed addition that Needham and his supporters obtained against an institutional process that had ignored science from the onset. Furthermore, the insertion of science showed that the CAME, although it became known as the antechamber of UNESCO, was not the only site of its making. Investigating Needham's campaign revealed that the making of UNESCO as a scientific agency took place outside the CAME process and between a variety of sites such as the SBSCO in Chongqing, the BSCO in Washington and the *Royal Society Empire Scientific Conference* in London. These places and the many scientists from Europe, North America, the British colonies and China that were involved in it were as many significant sites and actors in the making of UNESCO.

Historicizing the creation of UNESCO tells also something about our understanding of the war period. WWII dominates our understanding of the first half of the 1940s because of the multi-layered nature of the conflict, the sheer size of the war effort and the transformations it implied for the war-waging nations.¹³ Nonetheless, the period 1939-1945 saw also a multiplication of spaces and initiatives dealing with the building of peace such as the well-known Bretton Woods and San Francisco conferences of 1944

¹² Following the historiographical guidelines enumerated by the International Scientific Committee for the UNESCO History Project, I have re-contextualized in a broader, *longue durée* perspective the beginning of UNESCO and retrieved the – successful and defeated – actors and ideas mobilized in its creation. For references on the new history of the UN, see footnote 23 from chapter 1.

¹³ On the idea of WWII as a multi-layered conflict, see: Mark Mazower, *Dark Continent: Europe's Twentieth Century*, London: Penguin books, 1998, p.185-252.

and 1945. The lesser-known events like the CAME and the IIIC Conference in Havana and actions like Needham's campaign that this dissertation has examined were equally significant moments at which cultural and scientific ways of organizing post-war peace were explored.

As I have shown, the making of UNESCO's scientific mandate involved a variety of competing peace building initiatives. Central to this dissertation was Needham's international campaign for an ecumenical re-organization of science that would empower scientists to participate in the global advancement of peace and development. During his campaign, Needham encountered other initiatives that explored competing ways to enhance peace whether by means of educational, cultural or scientific cooperation. The CAME and the intellectual networks of the former IIIC defended the role of cultural cooperation. While, in London, the CAME planned educational and cultural reconstruction in war-torn countries, Former IIIC members gathered in Havana, to prepare the re-opening of the institute and defend the role of intellectual cooperation in the organization of post-war peace. Meanwhile, in Britain, scientists supported Needham's ecumenical initiative, and organized several international conferences to discuss how science could better contribute to the war effort and identify ways by which it could be used for reconstruction in peacetime.

These initiatives illustrate the fact that preparing the post-war world did not start with the surrender of Germany and Japan in 1945.¹⁴ Quite the contrary, and as the making of UNESCO science demonstrated, the building of peace was a wartime priority that began shortly after the outbreak of war in 1940-1941. Furthermore, initiatives like Needham's reveal that post-war peace did not only interest the leading Allied Powers of Europe and North America as the historiography tends to assume, but involved also the governments, diplomats, intellectuals and scientists of the Global South.¹⁵ These actors pursued

¹⁴ Note that if historians of WWII and reconstruction have recognized that the post-war era did not start in 1945, they however tend to consider post-war peace to be a late concern that manifested itself not earlier than 1943. Mark Mazower described for instance how the war served competing imaginaries of Europe while Jessica Reinisch and Harold James, respectively showed how the UN Relief and Rehabilitation Administration (UNRRA) sparked discussion on the future of international cooperation and how economists competed regarding the future shape of the international economic order during the conference of Bretton Woods. Mazower, op. cit (13), p.141-252; Jessica Reinisch, 'Internationalism in relief: the birth (and death) of UNRRA', *Past and Present* (2011) supp_6, pp.258-289; Harold James, 'The multiple contexts of Bretton Woods', *Past and Present* (2011) supp_6, pp.290-308.

¹⁵ More generally, the historiography has paid little regard for other non-European battlegrounds such as the Sino-Japanese War as Rana Mitter noted in *Forgotten Ally. China's World War II, 1937-1945*, Boston: Houghton Mifflin Hachette, 2013; see also: Rana Mitter, 'Changed by the war: the changing historiography of wartime China and new interpretations of modern Chinese society', *The Chinese Historical Review* (2010) 17, pp.4-18; More generally on reconstruction and technocracy in southern contexts, see the following special issues: John Krige and Jessica Wang, 'Science, technology and nation-building, post-1945', *History and Technology* (2015) 31, and Naomi Oreskes and John Krige (eds.), *Science and Technology in*

distinct conceptions of a peaceful order with more or less success. Even though some, like the Latin American intellectuals of the Havana conference failed to revive intellectual cooperation as conducted at the IIIC, others, like Needham and his coalition of Dark Zone scientists managed to turn their critique of the uneven organization of modern science into a major program for peace at UNESCO. Regardless of their outcome, these peace-building initiatives illustrate how the formation of UNESCO was not the product of a clean break. The surrender of Germany and Japan did not end an era and UNESCO did not start another as the organizers of the post-war and their observers fiercely prophesized. I have shown that the establishment of UNESCO and its peace-keeping mission were hard-earned and disputed constructs, shaped in important ways by the experiences of wartime and the visions of the future crafted throughout the interwar period.

Let me recall here to which extent UNESCO was tied up with the ideas, practices and institutions of the interwar years. One important interwar approach to peace and progress, intellectual cooperation, permeated the discussions about the future UNESCO. Former LoN leaders like Zimmern looked up to the interwar IIIC as the blueprint for UNESCO. Just as they did after WWI, they claimed at the CAME that post-WWII peace depended less on international law and material modernization than on the necessity to craft higher moral and cultural standards for humankind via civilizational exchanges between the world's leading intellectuals. Meanwhile, scientists like Huxley and Needham rejected intellectual cooperation as irrelevant and advanced a scientific conception of peace and progress that found its origins in Europe's radical SRS movement. Back in the 1930s, the SRS movement conceptualized the social and international functions of science that Needham, Bernal and Laugier eventually successfully imposed a decade later as a major peace-building instrument across the UN. SRS scientists were not alone however in advocating the scientization of political and international affairs. From the early 1930s, imperial authorities had gradually turned to science to revitalize the colonies while state services in France and Britain for instance enrolled scientists, among whom figured SRS leaders like Needham, to modernize public action and later rationalize the war effort.

Regardless of their outcome, these peace-building initiatives were not only heterogeneous but often competed with one another for authority over international cooperation. In chapter 2, I examined the clash that opposed Zimmern to Needham and Huxley over the nature of intellectual cooperation while, in chapter 3, I pointed out internal dissensions during UNESCO's Preparatory Commission when Carneiro and Ozorio de Almeida criticized the scientific imperialism underlying Needham's *periphery principle*. Interestingly, other visions eventually interlaced and reinforced each other during the

the Global Cold War, Cambridge, MA: MIT Press, 2014.

war. At UNESCO, the scientific internationalism proclaimed by Needham and Huxley eventually grew hand in hand with the technocratic practices of the British Empire. The war saw the British Empire turn into a technoscientific enterprise, with the establishment of a trans-imperial network of research stations and the adoption of ecological approaches to colonial management. As I showed in chapter 2 and 4, these practices travelled when Needham and Huxley appropriated them to design UNESCO science and when they explored the cooperation between UNESCO and the scientific services of the British Empire.

The demise of the IIIC, the advent of SRS internationalism and imperial technocratic practices exemplified how the meetings leading up to the creation of UNESCO functioned as an intellectual, political and philosophical marketplace, where trade-offs between competing interwar visions of world order and peace took place. Although a hegemonic view at CAME, Zimmern's moral-humanist approach to intellectual cooperation was eventually overthrown at UNESCO by Huxley and Needham who, claiming a peace-building role for science, applied their SRS-inspired vision of science and enrolled the British Empire's technocratic reform to successfully scientize the practice of intellectual cooperation. The replacement of the intellectual by the scientist and the lofty cultural interexchange by technoscientific cooperation did not only install science as a major UN peacemaker but also participated in mainstreaming the scientific ideals of the SRS movement and the technocratic conceptions of the British Empire.

These trade-offs between interwar intellectual cooperation and wartime scientific internationalism produced some radical changes but did not entail the wholesale riddance of the existing international order. In his triumph, Needham consecrated the scientist as UNESCO's peacemaker to the detriment of the intellectual but, like his predecessor at the IIIC, he continued to believe in the Empire and its capacity to organize a peaceful international order. International historians have already pointed out the colonial origins of the UN and how intellectual figures like Zimmern and Smuts saw imperial ideas of the British Commonwealth as a civilizational and international model for the organization of the world at large.¹⁶ The design of UNESCO science shows that it was not only the nineteenth century gentlemanly conceptions of Commonwealth that infused the UN. Needham and Huxley took the Empire's rising technocratic culture as a blueprint to advance peace and overcome the marginalization of the Dark Zone from world progress.

The closeness to imperialist ideals at UNESCO became later on a point of contention between Needham, Huxley and Southern scientists like Carneiro and Ozorio de Almeida.

¹⁶ Mazower, op. cit. (8), p.28-103; Glenda Sluga, 'UNESCO and the (one) world of Julian Huxley', *Journal of World History* (2010) 21, pp.393-418.

In chapter 3, we have seen how Carneiro and Ozorio opposed the NS division's over-reliance on colonial expertise, criticized the cultural imperialism inherent to the concept of Dark Zone and disapproved of the patronizing staff policy of the NS division which they believed marginalized local scientists. These critiques question the predominance of East-West tensions in our understanding of the international and political recomposition at play in the 1940s.¹⁷ The imperial hierarchies underlying UNESCO science and the subsequent disputes dividing Needham and Carneiro illustrate how North-South tensions were also a significant issue that shaped UNESCO and its imaginaries of the postwar order.

The Havana Conference, Needham's campaign and the Brazilian criticisms of the Dark Zone program of UNESCO illuminate how the North-South hierarchies structuring the international order were a core issue of the building of post-war peace. When the Latin American members of the IIIC gathered in Havana it was to reassert their faith in cultural diplomacy but also to challenge the Eurocentric geography of the IIIC by putting Latin America on the map of intellectual cooperation. Needham and his coalition campaigned for UNESCO science to anchor the scientist in the operation of peace but also to empower the Dark Zone scientists and re-construct the ecumenical dialogue between the world's diverse traditions of science. However, if the marginality of the Global South figured as a prominent concern in the design of UNESCO science, the tensions between Needham, Huxley, Carneiro and Ozorio de Almeida exemplified how in this process, Southern voices continued to be sidelined and how Eurocentric attitudes were reproduced.

To sum up, this section demonstrated that behind the insertion of science at UNESCO lies a world of negotiations and controversies between competing visions of post-war peace. Scrutinizing the activities of scientists like Needham and intellectuals like Zimmern has shed new light on the beginning of UNESCO and the evolution of intellectual cooperation. In this section, I have argued that the competition for a role in the reordering of the post-war between these diverse groups entailed a profound transformation of the terms and geography of cultural and intellectual cooperation. At UNESCO, the intellectual who ruled over international cooperation in the first half of the twentieth century via the IIIC and cultural diplomacy became replaced by the scientist as the main architect of the post-war era. The Global South figured prominently in this conceptual and political shift. Southern

¹⁷ Although Cold War politics has been predominating as the frame of reference to understand the late 1940s, Mark Mazower argued that the end of the Cold War renewed interest for the origins of the postwar order as a historical problem rather than a prologue to the Iron Curtain. The new vistas on the 1940s concern various phenomena such as the proto-history of the European integration movement, the reconfiguration of internationalism, the legacy of WWII on the process of reconstruction, see: Mark Mazower, 'Reconstruction: the historiographical issues', *Past and Present* (2011) 210 suppl_6, pp.17-28, p.17-20, p.22-23.

scientists advanced alternative visions of intellectual cooperation but also contributed to put the problem of North-South hierarchies at the heart of the turn to technocracy.

REVISITING THE POST-WAR: SCIENTIFIC RECONSTRUCTION FROM THE TROPICS, 1946-1959

The previous section has focused on the making of UNESCO science and pointed out how the Global South, its actors, views and issues figured prominently in the shift from intellectual to scientific internationalism throughout the 1940s. In this section, we move from the wartime ideals to the post-war practices of technocracy and see how the ideals advanced in the making of UNESCO were carried out as solutions to the challenges of reconstruction. I argue that the Global South was significant as an experimental site of reconstruction and as a producer of technocratic practices and ideals, what I called scientific worldmaking. These global features of post-war technocracy were particularly visible in the making and unmaking of the IIHA. I show that the scientific reordering of the post-war world was neither neutral nor monolithic but a politically disputed process. The differences and tensions that rose between Carneiro and Needham in the making of UNESCO widened with the launch of the IIHA. The making of the IIHA sparked controversies between Needham's zonal ecumenists, the Latin American positivists and the Brazilian technocrats as each group wove their respective vision of science as engine of modernity into differing notions of progress and international order.

Let us first review the various technocratic initiatives that I explored in this dissertation. The making of the IIHA, the INPA but also the renovation of the scientific services of the British Empire took place in tropical Amazonia, tropical Africa and tropical Asia. Groups of scientists and technocrats from the West and the Global South alike, advanced science on tropical nature to build the tropics into the starting point of new political orders at the national and international level. As described in chapter 4, Needham's NS division proposed to create the IIHA as the world's leading center of tropical research to advance ecological solutions to the pressing social needs faced by the marginalized people of the tropics. To this end, Needham, Corner and Huxley mirrored the British Empire's technocratic practices. Since the early 1930s, the Colonial Office recruited thousands of scientists, created new research stations throughout the Empire, fostered ecological research and interventions to modernize the management of its underdeveloped tropical colonies in Africa and Asia.

In contrast with Needham, Carneiro's positivists and the Brazilian technocrats perceived the development of sciences like tropical botany, pedology, i.e., the study of soil formation, but also anthropology as a means to set the region free from colonial and

imperial domination. The Latin American positivists viewed the IIHA as the catalyst of a Pan-Amazonian civilization. For Carneiro, the IIHA's ecological agenda primarily served the region's unity by addressing the developmental, cultural and political needs of all Amazonians. Eventually, Brazil put an end to the IIHA and replaced it with the CNPq, the SPVEA and the INPA. With this technoscientific trinity, technocratic nationalists like Alvaro Alberto and Arthur Reis aimed at conquering what became seen as Brazil's last frontier, the Amazon. They projected on the region the Brazil of the future that they hoped to build through a large-scale valorisation plan that scientifically re-organized the Brazilian Amazon, modernized Amazonia's archaic economy and technically empowered the Amazonian settler to conquer the vast basin.

The technocratic worldmaking processes that the episode of the IIHA has illuminated contest certain myths in the literature, and in particular, the tendency to represent technocracy as an instrument exclusively of the West.¹⁸ Decentering the post-war dawn of technocracy as I did with the analysis of the IIHA has several implications. First, the technocratic experiences described in this dissertation should not be understood as peripheral processes of which relevance was essentially local. On the contrary, the British Empire's technocratic turn, the IIHA, and the SPVEA-INPA produced imaginaries that had international and national implications and which concerned the reordering of the world at large. The British Empire found in imperial ecology the tools to modernize and reorganize the colonies into a single inter-related unit and ultimately reassert the post-war power of the Empire as a political organization. The IIHA served international purposes as well. For Needham and the NS division, the IIHA's zonal ecological approach to development underscored social and environmental commonalities between the world's tropical zone and stimulated new trans-tropical cooperation between the concerned communities. Although more regionally focused, the positivists aimed with the IIHA to bridge Latin America's divisions and establish the development of the Amazon as the cornerstone of Latin America's unity and progress.

Second, the IIHA, the SPVEA-INPA and the Empire's technocratic reform displayed in this dissertation took place simultaneously with the processes of modernization launched in the West, which the literature had portrayed as founding moments of post-war technocracy. As shown in chapter 2 and 4, the British Empire enrolled science on a large scale since the mid-1930s. In the 1940s, it became an experience that inspired the technocratic reconstruction of mainland Britain and infused the programs of UNESCO and many other UN agencies.¹⁹ Furthermore, each experience described in this dissertation

¹⁸ John Krige and Kai-Hendrik Barth, 'Science, technology and international affairs', *Osiris* (2006) 21, pp.1-21; Oreskes and Krige, op. cit. (15).

¹⁹ For references on the way the Empires' technocratic experience influenced postwar reconstruction at

showed how technocratic approaches in the South were not mere reproductions of Western precedents. Take for instance Brazil's CNPq. When, in 1945, Alvaro Alberto and his scientific colleagues first debated Vanevar Bush's report, *Science - The Endless Frontier*, which is considered the landmark of postwar state-run science policy, they had been campaigning for and preparing the creation of a state-led national research council for decades already. The political challenges Bush associated to the development of science and the solutions he proposed to make science a national priority had been on the agenda of Vargas' government and Brazil's scientific community since the early 1930s. Ever since, multiple proposals for a CNPq had been elaborated, although to no avail. Rather than introducing the idea of a national scientific policy and a template for a national research council in Brazil, the Bush report and the decision of the US administration to support the development of science therein, provided the political urgency that convinced the government to create in 1948 the CNPq according to the plans the Brazilian scientific elite elaborated since the early 1920s. My accounts of the IIHA and the CNPq thus contest diffusionist readings of technocracy that tends to portray the West as the initiator of technocratic change and Southern technocracy to analogues of Western patterns. Instead, this dissertation suggests to understand scientific reconstruction as a global and multi-sited process.

These experiences of the IIHA and the INPA do not only extend the geography of reconstruction. They also widen our understanding of post-war technocracy by introducing alternative narratives of post-war modernity to those endeavored in the West. In the West, post-war technocracy manifested itself primarily through state-led ventures in Big Science.²⁰ Western powers envisioned their advancement through large scale, technologically complex and highly centralized projects such as the development of nuclear power and the expansion of a powerful military-industrial complex. Unlike the existing literature, I showed in my dissertation that technocracy in the South took particularly decentralized forms and operated within spaces we do not generally associate with modern technology like tropical nature. There, Needham, Carneiro and Reis initiated alternative patterns of technocratic change. With the IIHA and the INPA, they deployed low-key research programs to dissect the tropical world and produced localized interventions and technologies that facilitated occupation and valorisation of the tropics.

Building tropical modernity with science did not just consist in opening the tropics to largescale human occupation and to Western modernity. The (un)making of the IIHA and

large see footnotes 57 and 58 from chapter 1 and footnote 7 from chapter 4.

²⁰ For relevant references on post-war technocracy, Big Science and its development beyond the western world see footnotes 420, 42, and 44 from chapter 1 and footnote 14 from the introduction to the second part of this dissertation.

INPA also produced counter-narratives of modernity that sought to shake up the cultural and international hegemony of the West. In different ways, Needham, Carneiro and Reis challenged the state-based, North-centered and West-driven organization of international affairs. Needham's zonal ecumenism and Brazil's tropical technocracy altered the nation-centered and Eurocentric nature of international affairs. For Needham and Huxley, zonal research elicited new zonal solidarities that could contribute to reinforce world peace by undermining the primacy of nation-states on international affairs. In a similar vein, Carneiro and the positivists associated the IIHA to a new regionalism for Latin America. From its Pan-Amazonian organisation to its transformative scientific agenda, the positivist IIHA organized Amazonia as Latin America's meeting point and the source of its emancipation from historical dependence to European colonialism and American imperialism. Although Reis and Alvaro Alberto endorsed the CNPq-INPA to serve Brazil and therefore the nation-state, they framed Brazil's technocratic renovation as a strategy to contest the Eurocentric organization of world affairs. Empowered by science and able to organize the means of its independence from imperial and colonial forces, Brazil would assert its sovereignty and reinforce its capacity to independently participate in world governance.

Yet, these processes entailed also problematic mediations of Western patterns. Needham's IIHA and Alberto's CNPq reproduced certain arrangements and representations inherent to the order they wished to shake up. By Taking over colonial expertise and ecological theories, Needham and Huxley reproduced the domination patterns that the Empire's naturalizing and homogenising representations of the tropics induced. Moreover, they rehabilitated the European colonial Empires as an international actor as they intended to involve their scientific institutions as crucial partners of their zonal plan. Although the failure of the IIHA prevented actual cooperation, such cooperation would take place in 1951 with the Arid Zone Research Program, the IIHA's equivalent for the arid zone.²¹ Likewise, Brazil faced similar problems of mediation with its technocratic trinity. In the domination of Amazonia by scientific means, the Brazilian technocrats envisioned the flourishing of a modern tropical identity that set Brazil free from the cultural domination of the West. Yet in doing so, they borrowed scientific theories, technical tools and narratives from the West, which had historically sustained Brazil's subjugation to Western interests. The INPA had to build the Brazilianization of the Amazon on knowledge and approaches that had originally served the making of Amazonia as an international

21 Malcolm Hadley 'Nature to the fore. The early years of UNESCO's environmental program, 1945-1965' in Patrick Petitjean, Vladimir Zharov, Gisbert Glaser, Jacques Richardson, Bruno de Padirac and Gail Archibald (eds.) *Sixty Years of Science at UNESCO*, Paris: UNESCO publishing, 2006, pp.201-232, p.209-214.

market rather than a component of Brazil. With the INPA, Brazil faced the same paradox of postcolonial science that newly independent countries like India had to tackle in the 1950s: the necessity to borrow from the West the tools and narratives that established their dependency to build the terms of their independence.²²

1937-1959: THE AGE OF GLOBAL TECHNOCRACY

The previous sections consisted of a two-step foray into the 1940s. In Section one I focused on the making of UNESCO science and shed light on the engagement of scientists in the building of peace during the war. In section two I turned to the post-war practices of technocracy and examined more specifically what the scientific reordering of the tropics entailed politically and internationally. My investigations on the creation of UNESCO question our understanding of the post-war period that established the 1940s as a moment of abrupt rupture with the interwar period. More broadly, the different processes of scientific world reordering I have highlighted throughout this dissertation displayed the years 1937-1959 as a period in which science gradually emerged in the 1930s and stabilized in the late 1940s as the world's engine of modernity. Altogether, my insights call for a re-evaluation of our conception of the 1940s and suggest to understand the changes associated to this decade less as the product of radical ruptures than the outcome of a gradual process. I argue that focusing on the period 1937-1959 to appreciate the political and international changes of the mid-twentieth century, enables us to underscore important and otherwise invisible shifts such as the dawn of technocracy.

The 1940s have been recognized, politically and historiographically, as a core decade of the twentieth century. Yet, Mark Mazower argued that the decade remains an elusive moment and our understanding of the period continues to be dominated by an emphasis on WWII and the rise of Cold War tensions.²³ The world conflict that marked the first half of the 1940s keeps on dominating our understanding of the period. WWII and its ending in particular are commonly conceived as a clean break that separates the twentieth century in two distinct epochs, one terminated in the carnage of WWII and the other organized

²² On science and postcolonial dependency in the case of India and China, see: Jahnvi Phalkey, 'Introduction, focus: science, history and modern India', *Isis* (2013) 104, pp.330-336; Jahnvi Phalkey and Zuoyue Wang, 'Planning for Science and Technology in China and India', *British Journal for the History of Science - Themes* (2016) 1, pp.83-113.

²³ The 1940s are however starting to be rediscovered and contextualized differently than previously. International and UN historians like Mark Mazower are shedding a new light on the 1940s by examining the continuities with the interwar period and decentering the perspective away from the war itself and its European theatre. Despite the growing critical historiography of the period, Mazower pointed out that the war-inherited representations of the 1940s continue to abide. For an overview of the historiography, see: Mazower, *op. cit.* (17).

by the gelling of the Cold War. Just as WWII dominates our understanding of the period 1939-1945, the Cold War continues to inform our conception of the post-war years, 1945-1949. Mazower further points out that historians have generally seen the ending of the war, the building of peace, and reconstruction, retrospectively, as the prologue of the Cold War. For instance, rising East-West tensions are said to have pre-empted UN internationalism and subordinated its institutions to the role of agent of Western diplomacy. Likewise, post-war reconstruction has been portrayed until recently as a process essentially serving the formation and stabilization of bloc politics.²⁴

Following Mazower's critical reinterpretation of postwar reconstruction, my dissertation questions this periodization of the mid-twentieth century that depicts the 1940s as a moment of rupture. I demonstrated that the 1940s, and more specifically the years 1940-1945 were not a clean break but part of a larger period of reinvention in which interwar ideas like SRS, confronted with the experience of war, continued to thrive. World conceptions such as imperial ecology and trans-imperial science inherited from the 1930s informed the changes articulated in the 1940s. As I showed, UNESCO was born out of a contention between LoN intellectuals and militant scientists, between a paradigm of intellectual cooperation that dominated international cultural affairs since 1919 and a scientized conception of peace and progress that arose from the fringes of science such as the SRS movement and imperial ecology. Although the IIC's approach to intellectual cooperation was not renewed at UNESCO, the insertion of science at UNESCO demonstrates how the new UN agency did not arise in full rejection of the past. The shifts of the 1940s were no clean breaks with the interwar period, just as their stabilization and manifestation in practice in the immediate post-war cannot be reduced to Cold War politics. By moving beyond Cold War binaries I showed how North-South issues shaped the birth of the UN system and modelled postwar technocracy as well.

Opting for a wider periodization, 1937-1959 enabled me to demonstrate that the making of science as the engine of postwar modernity became, like reformist interventionism, indissociably associated to the redefinition of the post-war world order and a major political shift of the mid-twentieth century. Throughout this dissertation, I explained how scientists theorized, pressed forward and implemented the rule of science over international and political affairs between the early 1930s and 1959. I argued how technocracy became a mandatory part of national and international governance and science a significant source for new imaginaries of peace, progress and modernity. These imaginaries proliferated across the whole political spectrum in the crisis-laden 1930s. On the side of the cultural left, the SRS movement in France and Britain theorized and

²⁴ Mazower, *op. cit.* (17).

popularized a form of scientific Socialism inspired by the USSR, while in Brazil a positivist, top-down technocratic culture arose that strengthened Brazil's independence as much as it empowered the dictatorial rule of President Vargas. Similarly, imperial scientists theorized ecology into a tool of Empire that reinvented colonial rule – i.e., colonial development – and remodelled the organization of the British Empire.

These scientific and technocratic cultures produced new political imaginaries and horizons for humankind. For the SRS movement, science was the compass of revolutionary progress and the instrument of humankind's liberation from Capitalism and nationalism. The ecologists established ecology as a bio-social organizer which unified Empire and optimized the social and natural economy of the colonies. In a similar vein, the Brazilian positivists pursued orderly and incremental change by promoting the top-down reorganization of the nation based on the natural laws that science alone could reveal and the state implement. As I showed, these technocratic imaginaries eventually moved from the fringes of the scientific and political chessboard to become an active part of the reconstruction process in the 1940s. While UNESCO established science as one of its main instruments for the advancement of world peace, the British Empire and nation states like Brazil made the institutionalization of science the condition of their independence and modernization.

Postwar technocracy owed much to the scientists themselves. The technocratic turn was not a product of the state alone, as the growing historiography on the subject still tends to suggest.²⁵ As one of the red threads of this dissertation, I demonstrated that the scientists were central at every stage of the technocratic transformation of politics. Scientists popularized new scientific imaginaries of politics via Pacifism and class struggle like the SRS scientists, scientific education and reformism like the Brazilian positivists, or ecological planning like the imperial ecologists. Their engagement in the war effort and their participation in the building of peace during the war resulted in the creation of new political institutions like UNESCO or the CNPq where many of their technocratic ideals were put to practice. Needham's ecumenism is a case in point as it became a program priority at UNESCO.²⁶ As a result of their activism scientists such as Needham obtained

²⁵ To get an overview of the state-centred character of the existing literature on technocracy, see footnotes 16, 17, 44, 45 and 59 from chapter 1.

²⁶ Same could be said of the SRS movement. Many of its theoreticians came to occupy important functions at the national and international level during and after WWII. As McGucken and Werskey have shown the leading SRS figures occupied important functions in the British administration and contributed to create new technocratic institutions. Focusing on the ties between the French and the British SRS movement, Petitjean also pointed out how some SRS figures, like Laugier at ECOSOC, came to occupy key functions within the UN while others participated in designing post-war France's scientific policy. See: Patrick Petitjean, 'The joint establishment of the World Federation of Scientific Worker and UNESCO after World War II', *Minerva* (2008) 46, pp.247-270; Patrick Petitjean, 'Sur quelques aspects des sociabil-

new political authority in international affairs, which the removal of the IIIC at UNESCO and the replacement of the intellectual by the scientist as the new architect of the post-war era best exemplified.

The politization of science and the scientization of politics took place in both hemispheres. The Global South figured prominently in the advent of technocracy and Southern scientists were ubiquitous in endorsing this shift. The success of Needham's campaign depended heavily on the involvement of imperial and Chinese scientists. Needham drew heavily from their visions and practices of science to formulate his ecumenical project. He managed to make his plan a core mandate of the new UNESCO in great part thanks to the activism of imperial experts like Alexander King and Chinese scientists like Soong Tse-Ven. The (un)making of the IIHA also displayed Latin American scientists as active producers of original technocratic ideals. Carneiro's IIHA model and his vision of a scientific civilization in the heart of Amazonia built essentially on positivist conceptions of the Amazon and the transformative power of science. Likewise, the technocratic vision embodied in the Brazilian CNPq-INPA illustrates how the local scientific elite melded European technocracy with local positivist and authoritarian approaches to social change.

Paradoxically, the making of the IIHA also displayed the British Empire as a major actor of the technocratic turn. The Empire's technocracy did not only anticipate the reorganization of science and many of the technocratic reforms undertaken in Britain in the 1940s, it also inspired new visions of world order at the UN and UNESCO. These new insights into the technocratic renovation of the British Empire challenge our conception of the late colonial Empires as static and crumbling organizations. By exploring imperial scientific modernization, I demonstrated in this dissertation that late colonial Empires were key actors of the making of post-war technocracy and an authoritative model for the architects of the UN. Taken together, both imperial and Latin American technocratic experiences deepen our understanding of the dawn of technocracy as a global and disputed process: While the British Empire shows how the canons of Western technocracy rose to a significant extent from imperial reform, the positivist IIHA and the nationalist INPA shed light on the production of counter-narratives to Western technocracy as we know it.

itiés scientifiques entre Cambridge et Paris dans les années 1930' in Patrick Petitjean, Stéphane Schmitt and Catherine Jami, *Science, Histoire et Politique. L'Exemple de Cambridge*, Paris: Magnat-Vuibert, 2009, pp.139-174; Patrick Petitjean, 'Needham, Anglo-French civilities and ecumenical science', in Irfan Habib and Dhruv Raina, *Situating the History of Science: Dialogues with Joseph Needham*, New Delhi: Oxford University Press, 1999, pp.152-197, p.166-167.

TAKING THE UN SERIOUSLY: THE ROAD AHEAD

The previous sections have demonstrated the dawn of technocracy as a major political and international shift of the mid-twentieth century. This dissertation has however also focused on UNESCO as I revisited its creation, investigated its beginnings and scrutinized its actions with the case of the IIHA. Despite the fact that UNESCO and many of its counterparts at the UN, have celebrated their seventieth anniversary last year, the UN system remained a relatively overlooked protagonist of post-WWII history until the turn of the millennium.²⁷ As new historians of the LoN and the UN have pointed out, this relative disinterest for the UN might be explained by the fact that the existing literature organized and continues to be organized around problematic binaries of success-failure and national-international to study the UN system.²⁸ In this section, I question the relevance of such binaries. Based on my findings, I will here identify ways to overcome them by reflecting on the impact of UNESCO's action and the complicated interplay between internationalism and nationalism. Finally, my investigations of UNESCO's action and its role in the making of post-war technocracy illuminated a couple of paths for future research on the UN, which I will lay out to conclude this chapter.

As I recalled in the introduction of this concluding chapter, historians have generally categorized the IIHA experience as a failure, smashed by the implacable will of nations over international aspirations. Labelling the IIHA as a failure builds upon two problematic assumptions, which I intend to question here.

First, applying the concept of failure to the IIHA presupposes the fecklessness of the project as opposed to the concept of success from which ensues a sense of performativity, that is the idea that the project shaped the reality it inhabited from the mere fact that it came to exist. In that regard, the fact that the IIHA never saw the light of day not only became the main historiographical concern – i.e., why did the project fail? – but it also deprived the fallen institute, and by extension its promoter, UNESCO, from any form of agency on the space it intended to occupy and transform. By focusing on the actors involved in its making, tracing the ideas and practices associated to the IIHA and reconstructing the disputes that punctuated its (un)making, I retrieve the scientific and

²⁷ Exception made of Inis Claude's *Swords into Ploughshares*, most balanced general histories of the UN have sprang in the 2000s and 2010s following in the footsteps of major works by Renollet for UNESCO and Kennedy and Mazower for the UN. See: Inis Claude, *Swords into Ploughshares: The Problems and Progress of International Organisation*, New York: Random House, fourth edition, 1984; Jean-Jacques Renollet, *L'UNESCO oubliée: La Société des Nations et la Coopération Intellectuelle (1919-1946)*, Paris: Publications de la Sorbonne, 1999; Paul Kennedy, *The Parliament of Man: The Past, Present and Future of the United Nations*, New York: Vintage Books, 2007; Mazower, op. cit. (8).

²⁸ For an overview of the new history of the League of Nations and the United Nations, see footnotes 31, 34, 35, and 36 from chapter 1.

political effects engendered by the institute regardless of its actual fate. Doing so allowed me to demonstrate that despite the fact that the IIHA never saw the light of day, the proposed institute left a significant legacy.

Undoubtedly, the decision of Brazil to not endorse the establishment of the IIHA on its soil condemned the IIHA in Latin America. However, the fact that Brazil's elite refused to endorse the IIHA did not mean that it rejected the project per se. A closer look at the reception of the IIHA in Brazil showed that the proposed institute was less the problem than Brazil's relation to its Amazonian hinterland. Both partisans and opponents of the Hylean institute quarrelled less about the institute itself than about the issues of national and regional sovereignty associated to it. Aware of Brazil's limited control over its largely abandoned Amazonian territory, Brazilian parliamentarians considered the primacy of Amazonian nations over the institute as Brazil's best option to reinforce its sovereignty over a territory that so far eluded national control. Yet behind the emphatic debates in Congress, everyone acknowledged the scientific and economic value of the IIHA. As I showed, while debates kept firing away in parliament, the technocratic elite of the country used the IIHA to shape up a national equivalent, the INPA, and establish the modernization and occupation of Amazonia as the condition to Brazil's sovereignty. Meanwhile, at UNESCO, the IIHA and its promoters also left a lineage despite their removal. The IIHA inspired its twin program for the Arid Zone, the Advisory Committee on Arid Zone Research, which went on to become a success.²⁹ Human ecology remained a priority as in the 1950s UNESCO sponsored a revision of Worthington's *Science in Africa* and participated actively in the international discussions on environmental protection.³⁰ Finally, as the IIHA's fate darkened, the NS division organized in parallel the Humid Tropical Zone Program, which followed in the footsteps of Needham's zonal approach.³¹

²⁹ Hadley, op. cit. (21), p.209-214; Michel Batisse, 'A long look at the world's arid lands', *UNESCO Courier* (1994) January issue, pp.34-39 and Michel Batisse, *The UNESCO Water Adventure: From Desert to Water... From the 'Arid Zone Program' to the 'International Hydrological Decade', 1948-1974*, Paris: UNESCO edition, 2005.

³⁰ 'Survey of the natural resources of the African continent prepared by UNESCO for the Economic Commission for Africa at the request of the Executive Secretary', 1961, UA, UNESCO/NS/NR/2 + Annex I-VIII; WS/0261.165.

³¹ Hadley, op. cit. (21), p.214-216; Malcolm Hadley, 'Humid tropics research and UNESCO: an introduction and overview', in *Proceedings of the Regional Seminar on Forests of the Humid Tropics of South and South-East Asia (Kandy, Sri Lanka, 19-22 March 1996)*, Colombo, Natural Resources, Energy and Science Authority of Sri Lanka and MAB National Committee, 1999 pp.XXXV-XXXV; On the beginnings of the Humid Tropics Research Program, see: 'Humid Tropics Research Program. Notes on UNESCO's "Humid Tropical Zone" program by Professor Théodore Monod, Director, Institut Français de l'Afrique Noire, Dakar', 5 September 1955, UA, UNESCO/NS/HT/9; 'Humid Tropics Research Program. Suggestions for research in the humid tropics by Dr. Marlin Cline, Cornell University, Ithaca, New York', 31 January 1956, UA, UNESCO/NS/HT/30.

By following the actors and emphasizing the IIHA in terms of impact and legacy rather than success or failure, I demonstrated that the IIHA had far-reaching implications. In Brazil, the IIHA catalysed the creation of a new scientific apparatus, revived national concern in the Amazon basin and stimulated the formulation of new conceptions of national advancement. At UNESCO, the IIHA participated in shaping the UN agency into an important organisation in the debates on the utilisation, protection and conservation of nature.³² Altogether, focusing on impact and legacy has enabled me to shed light on the diverse and wide-ranging implications of UNESCO's action that a success-failure binary had otherwise obliterated.

My approach also questions the adequacy of an international-national binary, the second assumption I challenged in this dissertation. This binary undergirds most of the existing historiography on the IIHA. Past and present studies of the IIHA have indeed stressed that the IIHA failed because Brazil refused to endorse the program in the Amazon and member-states in Paris, organized along US Cold War imperatives, removed Huxley and Needham in opposition to the leftist orientation they intended to give UNESCO.³³ Understanding the feud on the IIHA in terms of international-national tensions, the literature tends to portray UNESCO and its actions as irremediably subordinated to state will. Although growingly contested, this binary, a foundational pillar of the history of international organisations, continues to prove problematic today as it still informs a segment of the existing international and diplomatic historiography. By assuming the political primacy of nation-states over international affairs from the onset, these studies deny international organisations like UNESCO any agency and autonomy beyond what nation-states deem acceptable to grant them.

In chapter 6, the making of the INPA illustrates the complex interplay of the national and the international. Not only did the INPA emerge as a mirror of the proposed IIHA, but it embraced some of the internationalist ideals of its model as well. Although it served the advancement of Brazil's occupation of the Amazon, the INPA perpetuated, from the onset, some of the regionalist aspirations defended by Carneiro's positivists. The

³² Anna-Katharina Wöbse, "The world after all was one": the international environmental network of UNESCO and IUPN, 1945-1950; *Contemporary European History* (2011) 20, pp.331-348; Simone Schleper, *Life on Earth. Controversies on the Science and Politics of global Nature Conservation, 1960-1980*, dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2017; Hans Schouwenburg, *Strategies to Save the Earth. Nature Conservation Experts and Sustainable Development, 1980-2000*, Dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2017.

³³ Heloisa Maria Bertol Domingues and Patrick Petitjean, 'International science, Brazil and diplomacy in UNESCO (1946-1950)', *Science, Technology and Society* (2004) 9, pp.29-50; Patrick Petitjean and Heloisa Maria Bertol Domingues, 'A redescoberta da Amazônia num projeto da UNESCO: o Instituto Internacional da Hiléia Amazonica', *Estudos Históricos* (2000) 14, pp.265-292, p.282-288; Petitjean, op. cit. (4); Petitjean, op. cit (2); Petitjean, op cit. (7).

convention creating the INPA stipulated that the new Amazonian institute would also be a platform open to all Amazonian scientists and a source of expertise for the neighboring countries looking to valorize their Amazonian territories. Throughout the 1950s, the INPA also relied on international expertise by participating actively in the technical cooperation schemes and research projects proposed by UNESCO, FAO and WHO. Finally, and following the military coup of 1964, the INPA revived the internationalist spirit of its still-born ancestor, the IIHA, as it became a major international center for tropical research and a relatively independent and critical voice to the military regime and its authoritarian plan to modernize the Amazon.³⁴ Altogether the INPA did not constitute a nationalist break away from the IIHA. In practice, the establishment and actions of the INPA displayed strong entanglements with regional and international practices, and revealed UNESCO as a crucial actor of the institute's stabilization. The INPA highlights the complex entanglements of nationalist and internationalist agendas and illuminates the capacity of institutions like UNESCO to leave a lasting imprint on nation-states through their actions.

The demonstration of the multi-layered impacts of the IIHA experience I provided in this dissertation questions the adequateness of national-international and success-failure binaries to grasp the breadth and impact of international organizations on the shaping of late twentieth century history. By showing the substantial part played by UNESCO in the political, scientific and international shifts that unfolded in the period 1937-1959, my dissertation contributes to underscore the historical role of UN organisations like UNESCO. In so doing, it also strengthens the historiographical value of international organisations as terrain and agent of historical change. By investigating UNESCO's early years, I contested the teleological narratives associated to the birth of the UN, displayed postwar technocracy as a central political and international feature of mid-twentieth century history and highlighted the role of Global South actors, ideas and terrains in its shaping.

To conclude, it is this association – the birth of the UN and the birth of post-WWII technocracy – that I have delineated in the case of UNESCO that I would like to bring together and explore here as a venue for further research. The story of UNESCO science indicated that the UN system as a whole functioned as an important arena in the making of the rule of technocracy. Although the enrolment of science in public affairs begun before

³⁴ Antoine Acker, *Volkswagen in the Amazon. The Tragedy of Global Development in Modern Brazil*, Cambridge: Cambridge University Press, 2017, p.118, p.120, p.129; Kathryn Hochstetler and Margaret Keck, *Greening Brazil, Environmental Activism in State and Society*, Durham and London: Duke University Press, 2007, p.30, p.64, p.156; Ronald Foresta, *Amazon Conservation in the Age of Development: the Limits of Providence*, Gainesville: University of Florida Press, 1991, p.32.

and intensified with the war effort as Edgerton has rightly highlighted, I showed that the Allies' war effort was not the only starting point of post-war technocracy. During and after the war, many were the Needhams, Huxleys and Laugiers who explored the building of the UN as an opportunity to advance technocratic visions of world order and solutions to post-war challenges.

Interestingly, many of the leaders who idealized the UN technical agencies – UNESCO as we have seen but also FAO and WHO – as the appropriate framework for a new, technocratic world, had their roots in science and strong ties to imperial technocracy. Like Huxley, the president of the FAO John Boyd Orr, had strong links with the technocratic agencies of the late British Empire and took those to his new tasks.³⁵ UNESCO, FAO and WHO experimented with global technocratic projects such as FAO's World Food Board to increase agricultural productivity and rationalize food distribution or UNESCO's IIHA to enhance human colonization of the tropics.³⁶ My investigations of the IIHA have pointed at evident connections between the Empire's technocratic approach to colonial rule and the emergence of UNESCO during the 1940s. But nobody has yet scrutinized the massive transfer of personnel, practices and ideas from late imperial technocracy to the other specialized agencies of the UN such as FAO and WHO.³⁷

The technocratic and imperial origins of the UN further challenge our conception of the UN as a product and agent of international law alone.³⁸ It suggests that many, especially the scientists, viewed the UN institutions differently, as a platform and instrument for the scientific reconstruction of the world. My investigation of the opposition between intellectuals and scientists at UNESCO may well be one episode of a wider conflict that arose throughout the entire UN system. From 1945, hence, two radically different visions of the UN competed: One rooted in *laissez faire* international law and its related cultural practices – i.e., intellectual cooperation – and the other establishing science as

³⁵ On UN's imperial ties, see: Amy Staples, 'To win the peace: the Food and Agriculture Organization, Sir John Boyd Orr, and the World Food Board Proposals', *Peace and Change* (2003) 28, pp.495-523; Peder Anker, *Imperial Ecology. Environmental Order in the British Empire, 1895-1945*, Cambridge: Harvard University Press, 2001.

³⁶ Staples, op. cit. (35).

³⁷ Only a few articles have explored the international careering of former colonial experts, see: Jennifer Gold, 'The reconfiguration of scientific career networks in the late colonial period: the case of the Food and Agriculture Organization and the British Colonial Forestry Service', in Brett Bennett and Joseph Morgan Hodge, *Science and Empire. Knowledge and Networks of Science Across the British Empire, 1800-1970*, Houndmills, Basingstoke, New York: Palgrave MacMillan, 2011, pp.297-320; Joseph Morgan Hodge, 'British colonial expertise, post-colonial careering and the early history of international development', *Journal of Modern European History* (2010) 8, pp.24-46; Anthony Kirk-Greene, 'Decolonization: the ultimate diaspora', *Journal of Contemporary History* (2001) 36, pp.133-151.

³⁸ The emphasis on the UN as predominantly defined by human rights and international law is particularly visible in the works of Mark Mazower, see: Mark Mazower, 'The strange triumph of human rights, 1933-1950', *Historical Journal* (2004) 47, pp.379-398; Mazower, op. cit. (8).

the UN system's primary means to advance peaceful order and progress worldwide. This confrontation involves asking how scientific internationalism and technocracy have come to be legitimized at the other UN agencies as authoritative practices of international governance and how the two models cohabited and intertwined.

Although Europe and North America came to develop massive expert-based apparatuses of public action after the war, we have seen that the West was not the only arena in which science was involved in the conduct of public affairs from the 1940s. The UN was another. As I showed for UNESCO and pointed out for other agencies, the UN was also designed as a platform for the technocratic advancement of peace in which alternative visions of the rule of experts took shape. Just as the UN became a venue for anti-imperialism in the late 1950s, as Mark Mazower showed, the UN's technical agencies turned into a critical arena to imperial and Western modernization plans.³⁹ In the 1950s and 1960s, UNESCO, FAO and WHO developed technocratic practices that suited the non-alignment politics of the emerging Third World. FAO criticized the application of 'Atoms for Peace' to agriculture while UNESCO recycled colonial ecological expertise to plan post-colonial Africa's development.⁴⁰ International history has only started to take seriously the political agency and independence of the UN from Great Power and Cold War politics.⁴¹ But little research has been done on the way this autonomy materialized in practice and the type of alternatives the UN agencies formulated to the discourses of modernization deployed in the Third World by the Soviet Union and the United States to contain each other's world influence.⁴² These are the kind of issues that the insights and the approach provided by this dissertation have opened for future research.

From the publication of Needham's scientific pamphlets in Cambridge, the scientific reforms of Carneiro in Pernambuco in 1935 to the establishment of the INPA in 1954 in Manaus, technocracy had moved from a utopian promise to a state-supported, worldwide and compulsory approach to governance. The idea of reordering the world by science originated within the fringes of the scientific community and gained political and international authority outside scientific circles to become a primary venture by which

³⁹ Mazower, op. cit. (8), p.149-189.

⁴⁰ Jacob Darwin Hamblin, 'Let there be light ... and bread: the United Nations, the developing world, and atomic energy's Green Revolution', *History and Technology* (2009) 25, pp.25-48; Christophe Bonneuil, 'Development as experiment: science and state building in late colonial and post-colonial Africa, 1930-1970', *Osiris* (2000) 15, pp.258-281; see also: 'Survey of the natural resources of the African continent', 5 February 1962, UA, UNESCO/NS/NR/2. Add.3.

⁴¹ Mazower, op. cit. (8), and op. cit., 'Governing the world...' (8); Glenda Sluga, *Internationalism in the Age of Nationalism*, Philadelphia: University of Pennsylvania Press, 2013.

⁴² For a concrete example of the confrontation of Soviet and American discourse of modernization, see: Vincent Lagendijk, 'Divided development: post-war ideas on river utilisation and their influence on the development of the Danube', *The International History Review* (2015) 37, pp.80-98

WWII was waged and the challenges of reconstruction were solved. This dissertation has demonstrated that technocracy figured as a major shift of the mid-twentieth century world. It also points out that we cannot grasp the full breadth of this technocratic shift without envisioning its unfolding as a global process and without analysing the ideas, strategies, and controversies of one of its prime movers, the scientists. Although indissociable of Western Great Powers and the Cold War, technocracy extended beyond the frame of the nation-state and outside the north-based two-bloc system of the Cold War. Imaginaries and practices of scientific reordering sprang up throughout the Southern hemisphere as well, from the British Colonies in Africa to Brazil, and responded to differing international challenges such as the Northern-centric architecture of international affairs and the unequal power relations between North and South. In the process scientists appeared as key actors and the UN as a coveted terrain of the advancement of counter-narratives of international order, technocracy and post-war modernity. By pointing out the shaping of the UN as a technocratic system and by illuminating the global dawn of technocracy as a major mid-twentieth century transformation, my dissertation contributes to restore the significance of the UN as an actor of socio-political change and a privilege historiographical standpoint to re-examine post-war history.

LIST OF ABBREVIATIONS

ABC	Brazilian Academy of Science / Academia Brasileira de Ciências
ABE	Brazilian Association for Education / Associação Brasileira de Educação
BWC	Biology War Committee
BAAS	British Association for the Advancement of Science
BAScW	British Association of Scientific Workers
BCSO	British Commonwealth Scientific Office
BCSC	British Commonwealth Science Committee
BCSS	British Commonwealth Scientific Service
CAME	Conference of Allied Ministers of Education
CCAAHFR	Committee for Colonial Agricultural, Animal Health and Forestry Research
CD&WA	Colonial Development and Welfare Act
CEPVEA	Comissão Especial para o Plano de Valorização Econômica da Amazônia / Special Commission for the Planning of the Economic Valorization of the Amazon
CNPq	Centro Nacional de Pesquisas / Brazilian National Research Council
CRC	Colonial Research Committee
CSLO	Commonwealth Scientific Liaison Offices
CSN	Comissão de Segurança Nacional / National Security Commission

CSN	Conselho de Segurança Nacional / National Security Council
CSSR	Commission on Science and Social Relations
DSIR	British Department of Scientific and Industrial Research
DSIRS	Division for the Social and International Relations of Science
ECOSOC	United Nations Economic and Social Council
EMFA	Estado Maior das Forças Armadas / General Staff of the Brazilian Armed Forces
FAO	Food and Agriculture Organisation
FSCOs	Field Science Cooperation Offices
IAN	Instituto Agronomico do Norte / Agronomic Institute of the North
IBECC	Instituto Brasileiro de Educação, Ciência e Cultura / Brazilian Institute for Education, Science and Culture
IBP	Igreja Positivista do Brasil / Positivist Church of Brazil
ICSU	International Council of Scientific Unions
IHGB	Instituto Historico e Geografico Brasileiro / Brazilian Institute of History and Geography
IIC	International Institute of Intellectual Cooperation
IIHA	International Institute for the Hylean Amazon
IIZA	International Institute for the Arid Zone

INPA	Instituto Nacional de Pesquisas da Amazonia / National Institute for Amazonian Research
INT	Instituto Nacional de Tecnologia / National Institute of Technology
IMPA	Instituto de Matematica Pura e Aplicada / Institute of Pure and Applied Mathematics
ISCS	International Science Cooperation Service
Itamaraty	Brazilian Foreign Office
LACDOS	Latin American Conference for the Development and Organization of Science
MAIC	Ministerio da Agricultura, Indústria e Comércio / Ministry of Labor, Industry and Commerce
NS division	Natural Science Division of UNESCO
NCIC	National Committees of Intellectual Cooperation
OAS	Organization of American States
OIC	Organization of Intellectual Cooperation
PAU	Pan American Union
PPQ	Primeiro Plano Quinquenal / First Five-Year Valorization Plan
RSESC	Royal Society Empire Scientific Conference
SAICP	Secretario de Agricultura, Indústria e Comércio de Pernambuco / Secretary of Agriculture, Industry and Commerce
SBPC	Sociedade Brasileira para o Progresso da Ciência / Brazilian Society for the Progress of Science
SBSCO	Sino-British Scientific Cooperation Office

SEGE	Serviço de Estudos de Grandes Endemias / Service for the Study of Great Endemic Studies
SLO	Scientific Liaison Offices
SNM	Serviço Nacional de Malaria / National Malaria Service
SPVEA	Superintendência do Plano de Valorização Econômica da Amazônia / Superintendence for the Planning of the Economic Valorisation of the Amazon
SUDAM	Superintendência do Desenvolvimento da Amazônia / Superintendency for the Development of the Amazon
UN	United Nations
UNAEC	UN Atomic Energy Commission
UNECO	United Nations Educational and Cultural Organization
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFSwW	World Federation of Scientific Workers

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Arcevo Arquivístico, Casa de Oswaldo Cruz (Fiocruz), Rio de Janeiro

Carlos Chagas Filho Papers

Paulo Carneiro Papers

Arquivo de História de Ciência, Museu de Astronomia e Ciências Afins, Rio de Janeiro

CNPq archives

INPA archives

Ministry of Foreign Affairs (Itamaraty), Rio de Janeiro

Brazil's UNESCO delegation, 1947-1954

Museu Nacional, Rio de Janeiro

Heloisa Alberto Torres Papers

BRITAIN

Cambridge University Library, Cambridge

Joseph Needham Papers

FRANCE

UNESCO Archives, Paris

Conference of Allied Ministers of Education Archives, 1942-1945

Preparatory Commission Archives, 1945-1946

Staff files, Joseph Needham

Staff files, Edred John Henri Corner

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International Institute for the Hylean Amazon Archives

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- Figure 37** Brazilian military officer, scientist, and first president of the CNPq, Admiral Álvaro Alberto da Motta e Silva (1889-1976) reproduced with kind permission from Arquivo de História de Ciência, Museu de Astronomia e Ciências Afins, CNPq.F.0183_001, © Museu de Astronomia e Ciências Afins, Rio de Janeiro.
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- Figure 40** Paulo Carneiro shaking hands with Alvaro Alberto during a meeting preparing the creation of the INPA, c.1952-1953 reproduced with kind permission from Arquivo de História de Ciência, Museu de Astronomia e Ciências Afins, CNPq.F.0099_001a, © Museu de Astronomia e Ciências Afins, Rio de Janeiro.
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SUMMARY

Enlightening the Dark Zone examines the ideas, achievements and failures of scientists to turn science into a powerful engine of peace and modernity in the middle of the twentieth century. It scrutinizes an ambitious plan by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to create an International Institute for the Hylean Amazon (IIHA) in the heart of the Amazon forest in 1946. Scientists from North America, Latin America and Europe partook in creating a world-leading laboratory for tropical research through which they aspired no less than building world peace and modernizing the underdeveloped tropical confines of the globe. Despite its laudable intentions and an initial enthusiastic welcoming from local scientists, the IIHA was quickly resisted, remodeled and eventually undone in 1952 by the interventions of Latin American actors and events. In 1947, the Latin American scientists involved with the making of the IIHA coalesced to redefine the proposed institute from a global to a regional institute. They feared that UNESCO's proposal would not help emancipate the Amazon but rather re-instate old colonial patterns that would renew the subjection of the Amazon to the benefit of the North. The remodeling of the IIHA was however abruptly terminated when the Brazilian parliament, backed by Brazil's technocratic elite, rejected UNESCO's project in 1952 and create in its place the National Institute for Amazonian Research (INPA) and the Superintendence for the Planning of the Economic Valorization of the Amazon (SPVEA) in 1954. By reconstructing the ideological origins of the projected laboratory and the tumultuous disputes that sparked its tragic termination six years later, this monograph draws up a bigger picture on how scientists mobilized science as a political instrument and ideology to shape national and global modes of governance between 1937 to 1959.

The aims of this study are threefold. First, it looks at the political activism of scientists from North and South and seeks to understand how they succeeded in taking up an increasingly visible role in the international political arena in the 1930s and 1940s. Second, it emphasizes the worldviews of these scientists and unravels what exact political functions they assigned to science and how their different conceptualizations of technocratic rule competed in the reordering of post-war society. Lastly, it zooms in on the effects of these scientific worldviews on the post-war reconstruction process. Focusing on the IIHA, this monograph examines how the scientific reordering of the post-war world proposed by scientists produced new conceptions of post-war modernity as well as alternative forms of world order.

This study answers these questions by following the conflicts and controversies that punctuated the making of the IIHA. Stretching over the period 1937-1959, this journey takes us from China, where the British biochemist Joseph Needham challenged the existing international organization of science and successfully conducted a worldwide campaign in favor of science at UNESCO, to London and Paris, where he and Northern

and Southern scientists quarreled about the nature and purpose of the scientific program of UNESCO. From Paris, where UNESCO scientists devised a plan to create the IIHA, we travel to the heart of the Amazon to reconstruct the disputed making of the project, witness its demise, and trace its reinvention into the National Institute for Amazonian Research (INPA) in Brazil. Focusing on local voices, this query into the unsuccessful establishment of the IIHA does not just show different models of what the IIHA was to be but sheds light on competing visions of world order, science and modernity in the tropics.

The making of the IIHA, as it moves back and forth across the North-South divide, also offers an opportunity to show how technocracy as a political ideology flourished across the globe and, in turn, to decenter the recent narratives on post-war international and reconstruction history. The tumultuous history of the IIHA reveals how much the advent of post-war technocracy in the 1940s and 1950s was construed beyond the nation state, across the globe and through the political engagement of scientists from North and South. Technocracy was not a mere western invention and this book demonstrates how it also arose from often overlooked places standing outside the Western world that Needham named the *Dark Zone*. These places such as British colonial Africa, war-torn China and the vast forests of Amazonia were not mere canvas for western-inspired technocratic change but a prolific source of alternate visions of science and society. Looking at the global and transnational geography of reconstruction and more specifically at its peripheral ends like Amazonia shows the building of post-war technocracy as a polyphonic, dialogical and disputed process involving Western and Southern scientists alike.

This monograph is divided into two parts, which follow chronologically the making and unmaking of the IIHA across its entire lifespan and highlight thematically the rise of post-war technocracy and its competing shapes. The first part traces the ideological origins of the IIHA into the politicized fringes of science in the 1930s and reconstructs the various ideals of technocracy that arose before and during WWII. The second part of the book looks at the actual implementation of the IIHA and its reinvention as the INPA between 1946 and 1959. In doing so, it emphasizes the ways by which post-war technocracy was endorsed and disputed as well as what these competing visions of technocracy entailed regarding the shape of the post-war political and international order.

Part 1 '*Scientific Ideals of World Order: Scientific Internationalism and Technocratic Rule for Peace*' digs into the intellectual and ideological origins of the IIHA project. Chapter 2 examines the international campaign that Needham orchestrated from China during WWII to obtain the creation of a scientific mandate for UNESCO. Chapter 3 turns to the scientific and political trajectory of the leading architects of the IIHA, Needham and the Brazilian chemist Paulo Carneiro. Along the way, the first part of this book revisits the interwar period as the background to understand how scientists formulated, advocated and

succeeded in transforming science and the question of its development into a politically significant matter for the reordering of the post-WWII world. Focusing on the creation of UNESCO, chapter 2 retraces how scientists campaigned for the inclusion of science in the new UN agency and shows how such scientific mandate transformed the terms of cultural diplomacy as previously defined by UNESCO's ancestor the International Institute for Intellectual Cooperation (IIIC). By unraveling the wartime discussions on the role of science in the post-war era and recollecting the political, international and social functions that leftist scientists, imperial experts and Brazilian positivists granted to science in the 1930s, chapter 2 and 3 explore how scientists conceived science as the engine of modernity and framed themselves as carriers of progress. The politicization of science, however, was neither a monolithic nor an undisputed process as several imaginaries of a scientific world order competed. These competing imaginaries and the tensions they sparked infused the post-war reconstruction process, the creation of new technocratic institutions and the attempts of scientists to create conditions of peace and progress via science in particular.

Part 2 '*Scientific Worldmaking in the Jungle*' closely investigates the implementation of the IIHA in the heart of the Amazon basin and reconstructs the controversies that led to its demise and replacement by the INPA in Brazil. To this end, three distinct groups of scientists, which competed in the making of the IIHA, were singled out, each of which advanced a different conception of the institute. Part 2 mobilizes the notion of "worldmaking" to underscore how these three groups of scientists intended to remake the world based on competing scientific conceptions of the social and the natural world. Each chapter is dedicated to one controversial sequence of the making and unmaking of the IIHA and successively looks at the worldmaking visions each group sought the IIHA to embody. In chapter 4, Needham and the Natural Science division of UNESCO looked at the technocratic reforms of the British Empire to design the IIHA as the platform from which scientists could lay down the foundations of a new pan-tropical society in the heart of the Amazon. Chapter 5 focuses on a group of Latin American positivists who contested UNESCO's plan and re-modelled the IIHA as an instrument of regional integration. Based on local positivist imaginaries and practices of science, they aimed to build a positivist social utopia where continental modernity and unity could be attained through the scientific action of the IIHA. Chapter 6 re-visits the tragic end of the IIHA that followed Brazil's decision to terminate the laboratory project of UNESCO. The Brazilian technocrats built upon the IIHA proposals to launch a vast process of national modernization. They placed the co-advancement of national science and the development of Amazonia at the center of Brazil's national project. They mobilized modern science to respond to a variety of local socio-economic imperatives as well as broader political needs to invent a distinct, non-European identity for Brazil and break the country's cycle of

dependency with the West. Via a set of technocratic institutions, including the INPA and the SPVEA, they institutionalized and mobilized scientific research to strip the Brazilian Amazon from its sluggish primitivism, assert its Brazilianity and construct the Brazil of the future in its midst.

Taken together, this monograph highlights the significant role scientists performed in producing scientific and technocratic cultures that established science as the engine of post-war modernity. It dissects the ways in which these new technocratic imaginaries challenged the existing, cultural, political and international order. These insights suggest three historiographical revisions. First, tracing the IIHA shows that the politization of science and the scientization of politics was not a Western invention but a disputed process that took place in both hemispheres. Second, the rise of post-war technocracy calls for a revision of our perception of the mid-twentieth century. The 1940s were less a moment of abrupt rupture with the interwar period than the outcome of a gradual process of adaptation. Focusing on the period 1937-1959 to appreciate the political and international changes of the mid-twentieth century, contributes to underscore important and otherwise invisible shifts such as the rise of technocracy. Finally, this study urges to consider the UN seriously. By showing the substantial part played by UNESCO in the political, scientific and international shifts that unfolded in the period 1937-1959, this monograph underscores the historical role of UN agencies like UNESCO. In so doing, it also strengthens the historiographical value of international organisations as terrain and agent of historical change. By investigating UNESCO's early years, it contests the teleological narratives associated to the birth of the UN, displays post-war technocracy as a central political and international feature of mid-twentieth century history and highlights the role of Global South actors, ideas and terrains in modelling the post-war order.

VALORISATION ADDENDUM

STUDYING THE HISTORY OF SCIENTIFIC ACTIVISM TO RETHINK VALORIZATION

In the early 2000s, the Dutch government issued a series of policy papers aiming at strengthening knowledge valorization. The idea behind valorization was to have the academic world give something back to the public.¹ Scientific research was conceived as a public investment which scientists should repay by designing technical innovations, marketable goods and more generally stimulants to economic growth. The enticement to knowledge valorization, and in particular its emphasis on “converting results of research into economic value”, triggered heated debates and provoked a wave of indignation within the academic community.²

Despite its limits and the dispute surrounding it, the imperative of valorization is fortuitous in the sense that it compelled the scientific community to think about their place in and relation to society.³ With this addendum, I would like to contribute to this reflection on valorization by questioning more broadly the existing modes of interaction between scientists and society. I intend to question valorization as a mode of interaction, dissect the forms of engagement pre-existing the imperative of valorization and reflect on what sound valorization could be. My dissertation is to a large extent concerned with the societal engagement of scientists and has shown that engagement was a rich tradition in the natural sciences that took various forms, served competing agendas and often produced unintended outcomes.

¹ Ministry of Education, Culture and Science, Nota Wetenschapsbudget 2004: ‘Focus op excellentie en meer waard’ (26 November 2003); Ministry of Education, Culture and Science, Valorisatie van onderzoek als taak van de universiteiten (27 January 2005).

² Science in Transition, Position paper: ‘Waarom de wetenschap niet werkt zoals het moet, en wat daar aan te doen is’ (9 september 2013) available online: www.scienceintransition.nl/wp-content/uploads/2013/09/POSITION-PAPER-16-sep-2013.pdf, Willem Halffman and Hans Radder, ‘Het Academisch Manifest’, *Krisis: Tijdschrift voor actuele filosofie* (2013) 3, pp.2-18. Elsewhere, and notably in the United States, academic research is growingly showing the negative impact of valorization on the organization of academia. Recent studies by Lawrence Busch and Joseph Hermanowicz have for instance shown how valorization reduces the scope of knowledge that is being produced by scientists and transmitted to students, heightened competition between the members of the academic community who think of themselves less as seekers of knowledge than as economic actors. Lawrence Busch, *Knowledge for Sale. The Neoliberal Takeover of Higher Education*, Cambridge: MIT Press, 2017 and Joseph Hermanowicz, ‘Universities, academic careers and the valorization of ‘shiny things’, *Research in the Sociology of Organizations* (2016) 46, p.303-328.

³ In this regard, Hans Schouwenburg responded to the imperative of valorization by proposing an interesting reflection on the societal value of history and historians. In his valorization addendum, he attempts to identify the peculiar means and ways by which historical thinking as conducted by historians can have a societal impact and explains how he put his historical expertise and skills to practice. Hans Schouwenburg, ‘Studying the History of Sustainable Development to Further Future Implementation’ in Hans Schouwenburg, *Strategies to Save the Earth. Nature Conservation Experts and Sustainable Development, 1980-2000*, Dissertation submitted to Maastricht University, Faculty of Arts and Social Sciences, 2017.

In this addendum, I will therefore elaborate on the relevance of my dissertation to explore three critical points regarding the imperative of valorization and the societal involvement of scientists today. First, I will reflect on the imperative of valorization from the perspective of the government demanding it and highlight both its limits and value. Second, I will use to explore how the scientific community has approached societal engagement prior to the valorization imperative. I will then discuss what I label as activism and objectivism as the dominant traditions of engagement within the scientific community. Finally, after reconstructing the different modes of interactions between scientists and society proposed by both the government and the scientific community, I will reflect on the power, but also the practical risks and pitfalls faced by each model. I will here intend to move beyond the stranglehold of valorization to re-imagine the societal engagement of academia. Hence, with some irony, this analysis can be considered a valorization of my thesis.

The problem of valorization

With valorization, the government determined a particular type of knowledge production that should be stimulated. As we have seen above, public authorities argued that the scientists' societal duty lies within the economic sphere and knowledge production should yield products suitable to participate in the knowledge economy. Furthermore, the advocates of valorization invoked its necessity to overcome what is widely assumed as an active choice of scientists to refrain from engaging with societal debates. My research has however displayed how, since the late 1920s, a significant number of scientists were concerned and involved with society.⁴

In this dissertation, I have highlighted how the societal involvement of scientists intensified through the mid-twentieth century. Scientists from a broad range of disciplines and from the whole breadth of the political spectrum engaged with society by mobilizing their scientific insights and expertise to inform their actions. We have seen for instance how the British biochemist Joseph Needham and the crystallographer John Desmond Bernal mobilized their scientific authority and expertise to advance pacifism, socialism and anti-fascism. Moderate reformists like the Brazilian chemist Paulo Carneiro and the British biologist Julian Huxley advocated and endorsed state-led social reformism. While Huxley participated in designing scientific interventions to modernize the British Empire, Carneiro attempted to create new technical institutions to rationally solve issues of social

⁴ Although the societal engagement of these scientists modelled contemporary modes of interactions between science and society, one should bear in mind that the way these scientists behaved close to a century ago might be different from the ways scientists act nowadays.

inequity in the Brazilian state of Pernambuco. Finally, we saw how conservative figures like the Brazilian military chemist Alvaro Alberto da Motta e Silva, who pioneered Brazil's postwar scientific policy, promoted the state-led development of science as a matter of national security.

The premises of the imperative of valorization hence erroneously suggest that scientists did not engage with society. Valorization denies a complex and rich history of interactions between scientists and society that bore significant implications. My research has demonstrated, for instance, that the activism of Needham at UNESCO led to the extension of the peace-building mandates of the main cultural agency of the UN system to encompass the natural sciences while the policy work and leadership of the Brazilian historian Arthur César Ferreira Reis defined the model of development of the Amazon that has informed the modernization of the region ever since.

Another limit of valorization lies in its normative character. The advocates of valorization further deny science's history of activism by disciplining scientists to mainly focus on the production of economic value at the expense of social and political engagement. Although the Dutch government proposed in 2009 a new definition of valorization that considered activities that enable scientists to make knowledge available to societal problems and to third parties beyond business and industry, this update, as commentators like the Rathenau Institute pointed out, continues to insist on commercial value and fails to define adequately the non-economic dimensions of the concept.⁵ Again, my dissertation yields interesting insights and examples to expand the terms of interactions beyond economic valorization. The scientists I examined embraced a variety of societal functions ranging from political activism to institutional leadership and policy making including already valorization in the narrow economic sense as well.

I have looked for instance at how Joseph Needham and John Desmond Bernal reflected on the social responsibility of scientists and the social function of science. Together with a small group of leftist scientists, they invented a form of scientific activism in the 1930s where scientific research and leftist activism merged to advance pacifism, socialism and anti-fascism as well as the application of science to social needs. They also participated in political life by experimenting with policy advocacy. Via the Cambridge Scientists' Anti-War Group, Needham and Bernal conducted experiments in the late 1930s to scientifically test the Air Raid Precautions measures of the British government.

⁵ Leonie van Drooge and Stefan de Jong, *Valorisatie: Onderzoekers doen al veel meer dan ze denken*, Den Haag: Rathenau Instituut, 2015, available online: www.rathenau.nl/nl/publicatie/valorisatie%C2%A0Onderzoekers-doen-al-veel-meer-dan-ze-denken. See also: InnovatiePlatform, *Van voornemens naar voorsprong: Kennismet circuleren. Voorstel voor een Nederlandse valorisatieagenda* (Den Haag: InnovatiePlatform, 2009).

The results of their tests led to revisions of the government's policies on gas-proof rooms, masks and anti-bomb shelters.⁶ Meanwhile, Huxley championed technocratic policy-making in the period by bolstering the debates on state planning in the 1930s, by intervening in the technocratic reforms of the British Empire in the 1940s, and by leading, as Director General, the peace-building work of the newly created UNESCO in 1946. In Brazil, Carneiro and Reis conducted what the Dutch government today understands as valorization work. Carneiro, who envisioned his scientific work as a service to the nation, went on to produce knowledge that improved the commercial value of several endemic tropical plants of Brazil such as curare, whereas Reis coordinated the modernization and valorization of the Amazon basin at the SPVEA.

By applying a narrow, economic definition of societal interaction, valorization puts knowledge production in direct subordination to the needs of economic competition. In doing so it tends to ignore a variety of other modes of interactions by which scientists actively participate in the social, cultural and political life of society.

The problem of engagement

As the examples above suggest, interactions between scientists and society pre-existed the imperative of valorization. Historically, these interactions can be distinguished in two distinct modes of engagement, which scientists have used to interact with the world: activism and objectivism. As described above, scientific activism appears as a century old tradition and designates forms of engagement by which scientists organized knowledge production or mobilized scientific knowledge to inform political actions and produce political statements about society. In that regard, my research depicts how scientists deployed various forms of activism, which ranged from militantism, societal critique to policy advocacy and policy-making. It also highlights that this tradition echoed and exceeded the more commonly known figure of the 'public intellectual' that is generally associated with the humanities.⁷ On the other end, what I call objectivism designates a rapport of science to society that maintains science outside society, marks its neutrality and nonpartisan character. Objectivism arose in direct opposition to the raise of scientific activism. It builds on the traditional values associated to modern science and the attempts of scholars to detach themselves from society, its norms and biases via the so-called

⁶ On the work of the Cambridge Scientists' Anti-War Group, see Gary Werskey, *The Visible College: a Collective Biography of British Scientists and Socialists of the 1930s*, London: Free Association books, 1988, p.223-234.

⁷ A tradition that we have seen as being deeply anchored in the humanities with the work of the International Institute for Intellectual Cooperation and the international activism at the League of Nations of literary figures such as Alfred Zimmermann, Jean Jacques Mayoux and Paul Valéry.

scientific method, to observe society objectively. Objectivists concur on a conception of science as value-free and autonomous from society's moral, political and social values. For them, neutrality, autonomy and disinterestedness are the values that grant scientists the power to speak with authority about nature.

Although scientific activists also mobilized the value of objectivity to legitimize their engagement, advocates of objectivism increasingly frowned upon their political commitments and received their scientific claims with suspicion. Objectivists raised the imperative of autonomy and the imperative of neutrality to reject scientific activism. The wartime advocacy of Needham, Bernal and Huxley in favor of governmental planning in science that I depicted in my research was for instance criticized by the Society for Freedom in Science (SFS). Spearheading the combat against the spread of Marxist ideas among the British scientific community and defending the neutrality of science, the SFS contributed to sideline politically active scientists from Britain's scientific establishment.⁸ We also saw that the leftist activism of Needham and Huxley eventually dented their scientific authority causing their ousting from UNESCO and their blacklisting by the US government.⁹ Similar concern for the neutrality and autonomy of science fueled defiance in Brazil as well. In the 1950s, scientists at the SBPC opposed Alvaro Alberto's activist and state-led conception of national science. They sought to reassert the autonomy of science and its capacity to speak freely about nature against the stranglehold of the newly created National Research Council (CNPq) and the restriction its political agenda imposed on the production of scientific knowledge in Brazil.

Altogether, the kind of scientific activism described in my dissertation lost strength in the second half of the twentieth century, tamed by the Cold War. It instead gave way to the rule of objectivism within the scientific community. Today the scientific experts of the Intergovernmental Panel on Climate Change (IPCC) exemplify the objectivist mode of interaction that dominates the rapport of science to society. Set up in 1988, the IPCC is the international body in charge of providing policy-makers with a scientific basis regarding climate change. The panel is objectivist in the sense that it is framed in such a way as to keep the action of its experts strictly outside of politics. The panel assesses climate change and reviews the options taken by government to tackle climate change but does not tell policy-makers what actions to take. The work of the panel is organized as to cultivate

⁸ On the Society for Freedom in Science, see: William McGucken, 'On Freedom and Planning in Science: the Society for Freedom in Science, 1940-1946', *Minerva* (1978) 16, pp.42-72; Jessica Reinisch, 'The Society for Freedom in Science, 1940-1963', M.Sc. Dissertation, submitted to Imperial College London, 2000.

⁹ On the causes behind Needham's blacklisting by the government of the United States, see: Tom Buchanan, 'The courage of Galileo: Joseph Needham and the « germ warfare » allegations in the Korean war', *History* (2001) 86, pp.503-522.

neutrality, autonomy and objectivity, and produces knowledge that is policy-relevant but not policy-restrictive.¹⁰

Yet, despite symbolic and procedural distancing as exemplified by the work of the IPCC, objectivism is hard to maintain in practice without some form of activism. How hard it is to maintain science depoliticized was illustrated very well by the March for Science of 22 April 2017. The March was organized worldwide to protest against anti-climate politics and anti-science policies that were impersonated by Donald Trump. It aimed to claim the societal relevance of science but also re-assert the necessary autonomy of science. Although it mobilized activist methods by taking the streets in multi-city demonstrations, the organizers intended to keep the movement nonpartisan.¹¹

The March is interesting in two ways, reflecting the legacy of academia's established tradition of interactions. First, it blended objectivism with activism even though the participants aimed to defend an objectivist standpoint for science. The March set to protect the a-political nature, autonomy and capacity of science to produce irrefutable facts about nature and society that, the participants in the March believe, may prove of value to the latter as a provider of unbiased facts for policy decision. Yet, the participants of the March mobilized methods and attitudes of scientific activism such as street demonstrations and political commentary that scientists like Needham and Bernal had introduced and cultivated in the 1930s. Although they strove to maintain the objectivist binary between scientific facts and political ideology, many embraced activism by pronouncing engaged declarations against Trump's scientific and environmental policies that were as political in character as Trump's denial of the environmental crisis and the science backing it. Second, although the March pursued an objectivist agenda, it still strongly divided the scientific community. Some scientists opposed the March. They saw it as a mobilization against Trump's government that was guided by activism and partisanship, which they believed would eventually threaten rather than strengthen science's autonomy from society.¹²

¹⁰ 'IPCC factsheet: What is the IPCC?' and 'IPCC Fact sheet: How does the IPCC select its authors?' retrieved on 8 August 2018 from: http://www.ipcc.ch/news_and_events/docs/factsheets/FS_what_ipcc.pdf and http://www.ipcc.ch/news_and_events/docs/factsheets/FS_select_authors.pdf

¹¹ Nicholas St. Fleur, 'Scientists, Feeling Under Siege, March Against Trump Policies', *New York Times*, 22 April 2017, retrieved on 7 August 2018 from: <https://www.nytimes.com/2017/04/22/science/march-for-science.html>

¹² Michael Roston, 'The March for Science: Why Some Are Going, and Some Will Sit Out', *New York Times*, 17th April 2017, retrieved on 7 August 2018 from: <https://www.nytimes.com/2017/04/17/science/march-for-science-voices.html>

The challenges of societal engagement

In the face of these established traditions of interactions that I described above, we could question the value of valorization as formulated by the Dutch government. As we have seen, scientists have not only made valorization an integral part of their activities but also exerted a variety of societal roles and functions that exceeded the mere economic valorization of scientific knowledge. Despite its apparent redundancy, valorization remains nonetheless valuable as a question to scientists. The imperative of valorization invites scientists to reflect on their existing traditions of engagement, rediscover their societal value and seize the opportunity offered by the current debate to evaluate their societal impact. Such exercise, which I will conduct as the concluding part of this addendum, should also enable scientists and valorization advocates to keep in mind the pitfalls and challenges inherent to societal action.

Today, and since the neoliberal turn of the mid-1980s, activism has been frowned upon. Scientists are regularly warned against the risks activism may entail for both their personal career and for science more generally while those partaking in political protest, as some of the March participants did, underwent heavy criticism from their peers. Yet, and as my research showed, rejecting activism is rejecting a model of interaction that proved beneficial for science and society more generally.

Scientific activism may empower by giving a voice to ignored actors and visibility to disregarded causes. In my research, I have examined multiple instances where the activism of some scientists produced valuable effects for both science and society. A case in point is Needham's campaign for science at UNESCO. During the war, Needham succeeded in establishing science as a significant peace-building domain of UNESCO and made the isolation and underdevelopment of the scientific communities standing outside North America and Europe an issue of international importance. At UNESCO, Needham contributed to broaden the international community of science, strengthen the capacities of non-western scientists to participate in the advancement of science but also reinforce the role of scientists as peace-builders. What was true of Needham in the 1940s continues to be true of scientists to this date. As Steve Epstein has convincingly shown, the engagement of scientists in politically controversial issues and their collaboration with activist groups made possible major advances in medicine and the environment.¹³ And as we have seen in the case of the March for Science, scientific activism offers scientists tools to raise public awareness about neglected issues.

¹³ Steve Epstein, *Impure Science: AIDS, Activism and the Politics of Knowledge*, Berkeley: University of California Press, 1996

Such interactions may open new perspectives for the concerned actors. Although not a natural scientist myself, I have shared my historical insights into the origins of UNESCO with the staff of the UNESCO department of the Dutch Ministry of Education, Culture and Science. During this workshop, I broke down the official origin story of UNESCO by highlighting how, and for some years, UNESCO juggled with multiple identities, experimented with innovative ideas such as the creation of a diplomatic passport for scientists and involved a variety of informal agents, like scientists, to elaborate and implement its policies. All in all, my historical account of the origins of UNESCO brought my audience to perceive the UN agency with which they interacted differently, to explore alternative policy designs, to consider unforeseen partners and, as they argued, to eventually revive forgotten legacies. This experience in historical thinking gave the concerned actors a new sense of agency and widened their horizon of possible policy actions.

Yet, and despite their inherent values, activism, objectivism and, as we have seen above, valorization, are all three precarious postures. Engagement is rarely straightforward and entails various, often unintended and, to some extent, unforeseeable complications for the concerned actors. This is particularly true for scientific activism as my research showed in the case of Needham and Reis. As I mentioned above, Needham launched at UNESCO a program to empower the isolated and underdeveloped scientific communities of the South to participate in international scientific exchanges. Despite its pro-south agenda, the program relied on Eurocentric and imperialist conceptions of modern science unintended by its promoters, which appeared less emancipatory than oppressive in the eyes of the southern scientists it intended to assist. Heavily criticized, Needham's plan was accused of scientific imperialism and eventually discontinued a few years following its launch. Another instance that my dissertation highlighted concerns the Brazilian agency for the development of the Amazon basin (SPVEA). In the 1950s, the planning experts and scientists of the SPVEA launched a vast program of scientific research to modernize Amazonian society, improve the welfare of its populations and valorize the natural resources of the Amazon region. The program created multiple scientific institutes to provide rational-scientific responses to various developmental goals related to agro-farming, industrial forestry, welfare, urbanization and the construction of modern infrastructure. Despite the scientific and rational character of its policies, the valorization program of the SPVEA produced a variety of unintended adverse effects. Not only did it generate dramatic increases of poverty and inequality for local, and particularly indigenous communities but it also paved the way to the wholesale destruction of large sections of the Amazon rainforest in the 1970s and early 1980s.

Although Needham and the experts of SPVEA believed in the power of science and relied on sound science, both their initiatives produced unintended adverse effects nonetheless. Needham's plan was impeded by cultural biases inherent of the sciences while the modernization policies of the SPVEA uncritically served a productivist-modernist agenda that proved disastrous to the Amazon habitat. Both examples illustrate less the powerlessness of scientific activism, than the necessity for the 'activist scientist' to not only operate from scientific mastery but to also critically address the politics and values inherent of science and the politics for which a scientific intervention operates.

Objectivists proposed the neutrality of science as a remedy to prevent the unintended effects of activism. By maintaining a strict separation between the operation of science and the operation of politics and cultivating the objectivity and neutrality of science as the IPCC experts strove to endorse, it is generally believed within the scientific community that scientists can more authoritatively contribute to society by offering technical and objective solutions to its problems. However, the objectivists do not actually remove politics and ideology from science, which they believe to be the cause of society's malfunctions and the scientific activist's misfortunes. They more often than not ignore politics, despite it being a phenomenon that is as inherent of society and its challenges as it is to the sciences themselves. The separation between value-laden activism and value-free science is not only an untenable paradigm but as treacherous and perverse for the objectivists as uncritical engagement is to the scientific activist.

Recent studies, including my dissertation, have shown that objectivism was not neutral and a-political but inherently political as its conceptualizations are entangled with various political, social, economic and religious interests.¹⁴ Science, Technology and Society studies (STS) have pointed out how all sciences make value judgments that produce varying interpretation of realities. Science is organized around norms and political hierarchies that, as my research repeatedly demonstrated permeate the scientific work and societal interactions of scientists.

If scientists are political, even, and all the more so when speaking in the name of scientific neutrality, the scientific concerns they seek to tackle are often inescapably political as well. Just as the scientists of the SPVEA researching and organizing how to valorize the Amazonian forest, the experts of the IPCC investigating ways to mitigate climate change grapple with issues standing at the intersection of science and politics. In that regard, the objectivist attitude that still dominates climate change is untenable. First, the deficit of adequate international measures to contain climate change is a stark illustration

¹⁴ On the politics of neutrality see the work by Rebecka Lettevall, Geert Somsen and Sven Wildmalm (eds.), *Neutrality in Twentieth Century Europe. Intersections of Science, Culture and Politics after the First World War*, New York, London: Routledge, Taylor and Francis Group, 2012.

that scientific neutrality fails to generate the political attention required to produce the changes the IPCC demands of society. What is more, environmental skeptics attack the IPCC neutrality posture and weaken the scientific soundness, and therefore authority of its arguments by insisting on the values and interests IPCC experts inevitably have about climate change. Second, continuing to believe in the neutrality of climate change science (and any science) and therefore ignoring the political and ethical dimensions inherent to the issues at hand, also impedes the capacity of scientists to produce robust, scientifically sound and socially adapted understanding of and alternatives to climate change. By depoliticizing climate change and delegating the necessary reflection on the political feasibility and desirability of mitigation policies to society, the objectivists withdraw the scientific community from accounting for matters of social equality, development and power. Because of its objectivist posture the IPCC evinced these aspects despite their importance to provide a robust and full-blown understanding of the climate change crisis and to find the kind of allies within society that are indispensable to diminish the impact of climate change, clarify the ecological agenda and respond to climatoseptics.

CONCLUSION

In this valorization addendum, I have questioned the imperative of valorization and, in doing so, addressed, in broader terms, what the societal engagement of scientists means and entails. Valorization is problematic not just for the neoliberal pressure it imposes on academia. Based on my findings, I demonstrated that valorization also obliterates a long and rich history of societal engagements where scientists invented various ways to participate in societal debates. To foster the societal relevance of science, valorization advocates should seek to include rather than exclude existing practices of engagement.

This historical reflection on the societal engagement of scientists helped problematize the imperative of valorization but also questioned the nature of the existing modes of interactions with society that scientists chose to cultivate for themselves in the past century. Although each model of interaction - valorization, activism and objectivism - conceptualizes differently what scientists can do for society and how they should do it, all three are in one way or another challenged by politics (or lack thereof). Valorization tends to instrumentalize science to serve the needs of the market and in turn contribute to restrict both the realm of science and its potential contribution to society. Objectivism depoliticizes both science and society to speak authoritatively about the social and natural world. Yet in doing so objectivists are not jut unable to address the politics of neutrality and therefore their own, inevitable biases, but their statements are also contested for

ignoring the political fabric of the issues they intended to understand and mitigate. On the other side of the spectrum, if activism does recognize politics and scientific activists tend to do politics from science, their actions are bound to lash back for an ill-conception of the politics of science and the politics of engagement.

This query revealed societal engagement to be politically treacherous. It is not self-evident and scientific facts do not speak for themselves. Scientists often fail, or, in the case of the objectivists, refuse to produce the political work required to allow science to speak authoritatively and relevantly to society. Altogether, the manner scientists handle the politics of societal engagement appear in many ways inadequate and counter-productive and humanities scholars may prove useful allies to solve this deficiency. This addendum and the research supporting it, is a case in point. By contextualizing societal engagement and critically reflecting on the politics of science, my addendum provides tools and guidance for scientists to actively grapple with rather than ignore the political implications of societal engagement. It is through activities like these that the societal relevance of science may be improved and the societal engagement of scientists strengthened. As such, the conclusions of this critical appraisal of the modes of societal engagements of scientists, which I built on the contents of my dissertation, thus turns this appendix into a 'proper' valorization piece, however ironically.

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