ECOLOGICAL IMPERIALISM: A HOLISTIC ANALYSIS OF THE GUANO TRADE IN NINETEENTH-CENTURY PERU

by

MAURICIO BETANCOURT DE LA PARRA

A DISSERTATION

Presented to the Department of Sociology
and the Division of Graduate Studies of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

September 2022

DISSERTATION APPROVAL PAGE

Student: Mauricio Betancourt De la Parra

Title: Ecological Imperialism: A Holistic Analysis of the Guano Trade in Nineteenth-Century Peru

This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Philosophy degree in the Department of Sociology by:

John Bellamy Foster	Chairperson
Richard York	Core Member
Matthew Norton	Core Member
Carlos Aguirre	Institutional Representative

and

Krista Chronister	Vice Provost for Graduate Studies

Original approval signatures are on file with the University of Oregon Division of Graduate Studies.

Degree awarded September 2022

DISSERTATION ABSTRACT

Mauricio Betancourt De la Parra

Doctor of Philosophy

Department of Sociology

September 2022

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Theoretical studies of imperialism, dependency, unequal exchange, and world-systems have commonly overlooked the ecological foundation of cross-national trade and relations. More generally, in the social sciences the influence –or even the very existence– of external nature upon or beyond society has often been neglected, despite constituting the basis of economic flows. In addition, despite their valuable contributions, environmental sociology notions such as unequal ecological exchange remain undertheorized. Seeking to address these issues and drawing on data from archives in Peru, Great Britain, and France, as well as on primary sources available online and on an exhaustive analysis of secondary sources, this work provides a historical, sociological, and theoretical account of ecological imperialism (understood as the expropriation of the ecological wealth of one country by another) by means of examining a case study of the 19^{th}-century guano (bird dung) trade between Peru and Britain. The lens in this study is derived from ecology in the natural sciences and historical materialism in the social sciences, drawing for their interface on Karl Marx's concept of the metabolic rift, *i.e.* the loss of soil nutrients that are drained into cities where they are discarded as waste. This work gives a holistic understanding of the siphoning of Peru's nutrients into Europe and the United States, provides firsthand archival evidence about the atrocious living conditions of the guano diggers in Peru (chiefly Chinese bonded laborers), and emphasizes environmental conditions as much as social relations *vis-à-vis* center-periphery dynamics. This way, this study shows how the guano trade can enhance our understanding of the ecological, social, and unequal development effects of imperialism, both historically and today; how further analyses of socioecological phenomena can be carried out; and the importance of history for comprehending current socioecological inequalities within and across nations.

CURRICULUM VITAE

NAME OF AUTHOR: Mauricio Betancourt De la Parra

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
Universidad Nacional Autónoma de México, Mexico City

DEGREES AWARDED:

Doctor of Philosophy, Sociology, 2022, University of Oregon
Master of Arts, Sociology, 2019, University of Oregon
Master of Arts, Philosophy of Science, 2017, Universidad Nacional Autónoma de México
Bachelor of Science, Biology, 2014, Universidad Nacional Autónoma de México

AREAS OF SPECIAL INTEREST:

Environmental sociology; unequal exchange; political economy; agriculture and food systems; social theory; sociology of science

PROFESSIONAL EXPERIENCE:

Lecturer, University of Oregon, since 2020
Lecturer, Universidad Nacional Autónoma de México, 2016-17
Instructor, Inhumyc (High School), 2016-17

GRANTS, AWARDS, AND HONORS:

Wasby-Johnson Dissertation Award, *A Holistic Analysis of the Guano Trade in Nineteenth-Century Peru*, University of Oregon, 2021

Research Award for Publication, "The effect of Cuban agroecology in mitigating the metabolic rift: A quantitative approach to Latin American food production," University of Oregon, 2021

Best M.A. paper, "The effect of Cuban agroecology in mitigating the metabolic rift: A quantitative approach to Latin American food production," University of Oregon, 2020

Alfonso Caso Medal, highest GPA in the 2016-17 Master in Philosophy of Science Cohort, Universidad Nacional Autónoma de México (UNAM), 2017

Honorable mention (M.A.), outstanding thesis and *viva voce* exam, UNAM, 2017

Diploma of Achievement, academic excellence, UNAM, 2016

Candidate to the Gabino Barreda Medal, highest GPA in Bsc in Biology cohort, UNAM, 2016

Honorable mention (BSc), outstanding thesis and *viva voce* exam, UNAM, 2014

PUBLICATIONS (selected):

Loustaunau, Lola, Mauricio Betancourt, Brett Clark, and John Bellamy Foster. 2021. "Chinese Contract Labor, the Corporeal Rift, and Ecological Imperialism in Peru's Nineteenth-Century Guano Boom." *The Journal of Peasant Studies* 1–25. doi: 10.1080/03066150.2021.1979966.

Betancourt, Mauricio. 2020. "The Effect of Cuban Agroecology in Mitigating the Metabolic Rift: A Quantitative Approach to Latin American Food Production." *Global Environmental Change* 63:102075. doi: 10.1016/j.gloenvcha.2020.102075.

ACKNOWLEDGMENTS

I want to thank the following people and institutions who, in one way or another, made it possible for me to develop this work. First, I want to thank my parents and my brother for their permanent and unconditional love and support. Secondly, I want thank John Bellamy Foster for believing in me and for his teachings and advice, as well as for the crucial and much needed work he has developed for decades. I also want to thank Richard York, Matthew Norton, and Carlos Aguirre for their teachings and assistance in the preparation of this work. Thank you to Jill Harrison for all the advice and help she gave me throughout the program. My gratitude to Raoul Liévanos, Michael Dreiling, Kari Norgaard, Aaron Gullickson, and Ellen Scott, for their support and advice.

I would also like to acknowledge the following archives (and their staff) which hold many of the materials I relied on for much of the analysis below: the Archivo General de la Nación, Sede Palacio de Justicia, in Lima; The National Archives in Kew, London; the London Metropolitan Archives (Islington, London); the Schroder Archive (City, London); the Archives Nationales (Saint-Denis, Paris); Centre des Archives diplomatiques du ministère des Affaires étrangères (La Courneuve, Paris) (CADAE); Archives Nationales du Monde du Travail (Roubaix); and Centre des Archives diplomatiques (Nantes) (CADN).

In addition, I would like to thank the librarians of the Library of Congress of the United States, of the British Parliamentary Archives, and of the Instituto Riva-Agüero in Lima. Special thanks to Alberto Córdova, reference librarian at the latter institute, for providing me with 19^{th}-century issues of *El Comercio*. Thank you to the University of Virginia Press, for granting me to access the digital edition of the Papers of Daniel Webster. Thank you to the wonderful library system at the University of Oregon, especially to the Knight Library and the Design Library and their staff, for providing me with several materials I required for completing this work, and for allowing me to write many of the words below, inside their cozy walls. Special thanks to Catherine Flynn-Purvis, for the editorial guidance. Thank you to the Artangel arts organization for allowing me to access Dinh Q. Lê's film about the Chinchas. Thank you to the HathiTrust Digital Library, for giving me open access to countless primary sources online that I would have otherwise not been able to consult. Thank you to the Servicio Nacional de Áreas Naturales Protegidas por el Estado (SERNANP) for authorizing me to visit the Chincha Islands during my stay in Peru. Special thanks to Rodrigo Ramírez and Luis Cabezudo for accompanying me to the Chinchas.

I would also like to thank O. Adrian Pfiffner, Carlos Zavalaga, Irma Franke, Sven Beckertt, Rory Miller, Fred Magdoff, Lisa T. Yun, Heraclio Bonilla, Laurent Herment, Hendrik Snyders, Daniela Valencia, Edward Melillo, and Brett Clark, for sharing their valuable expertise with me.

My gratitude to Amanda Sikirica, Nick Theis, and Ken Hanson for their vital help, friendship, and love. You hold a special place in my heart. Thanks to Larissa Petrucci, Isabella Clark, Kindra De'Arman, and David Purucker for their friendship and teachings. Special thanks to Lola Loustaunau for her thoughtful insight, friendship, courage, and for being part of this project. The world needs more scholars like you. Thank you to Diego Contreras-Medrano for his essential help in so many regards throughout all my Ph.D. program. I could not have completed this Ph.D. without you.

Thank you to Antonella Onofrietti, Alonso Delfín, Luis Guzmán, Marina Bengoa, Diego Manco, Camila Osses, Nicolás Jaramillo, Gabriela Brown, Jorge Briceño, Wally Plada, Fana Guerrero, and Laura Trujillo, for your wonderful and genuine friendship, and for making my stay in Eugene even more pleasant. You will be missed.

My deepest gratitude to Tamara Niella and Ashleigh Landau for your love, companionship, and help writing and researching this work (including our delightful trip to Nantes), and especially for everything beyond it. You also hold a very special place in my heart. Thank you to my friend Francesco Arceri, for your trust, friendship, and for showing me a gorgeous piece of this planet.

Thank you to Ernesto Urrusti; for the love, the discussions, and the support across continents. I would have never completed this work without you. Thank you to María Gómez de León, for the love, support, and friendship, and for introducing me to the works of *Monthly Review* and J.B. Foster. I would have never completed this work without you either. Thank you to Fabián Aguirre, Emilio Mora, and Adrián Hernández, today and always, for your friendship and for everything you have taught and given me. Thank you to Cristina Alonso, for your love, support, and help while discussing this work, and for spurring me to visit so many wonderful places every summer, and for everything beyond. Thank you to Fernanda Herce, Tania Lara, and Mariana Benítez, for their friendship, example, and teachings. Thanks also to Daniela Sclavo, for the support, talks, and for helping me to access materials in Britain. I am also indebted to Véronique Darras and Jérôme Monnet for their kind hospitality. Thank you to Gabriela Ramírez, for her unconditional and long-lasting friendship, especially during rough times. My special gratitude to

Kathryn Rifenburg, for her solidarity when it was most needed. Thank you to Tobyanne Berenberg, my mentor and friend; I would have never completed this work without you.

My acknowledgment to the University of Oregon, for giving me the chance of being part of you. Thank you to the Graduate Teaching Fellows Federation (GTFF), for more than four decades of fights. Thank you to the Modern American School, the Inhumyc, the UNAM, and the University of Technology Sydney (UTS), for everything you have done for me. Thank you to the Mexican Council of Science and Technology (CONACyT) for its financial support through a Ph.D. scholarship, and to the Department of Sociology at the University of Oregon for granting me the Wasby-Johnson Dissertation Award, which allowed me to carry out the fieldwork to develop this work.

Last but not least, thank you to Adriana, for being my solidary partner throughout this project, for your love, support, laughs, and insight, for believing in me, for allowing me to be part of your life, for your teachings, for all the experiences together, for everything you have given me. Thanks also to Ringo, my beautiful companion, who stood by me throughout this Ph.D., giving me joy, peace, and love.

Each and every one of you are, in your own way, part of this project. Needless to say, you are spared from any remaining errors or omissions in it, of which I am solely responsible. Once again: thank you, gracias, mille mercis, grazie mille.

A mi padre, Alejandro Betancourt Covarrubias.
Amoroso, generoso, compartido, cumplido. Tenaz e irreverente.
Amante de las artes y las ciencias. Poeta.
Apasionado de los trenes, los gatos, la luna, el número cinco,
los globos y las flores rojos.
Revolucionario.
Mentor y amigo.
Nada humano te era ajeno.
En memoria.

A mi madre, Lourdes De la Parra Juambelz.
Sabia, sensible, amorosa y alegre.
Por la dicha y la gratitud de compartir este logro,
y todos aquellos por venir.

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INTRODUCTION: ECOLOGICAL IMPERIALISM, UNEQUAL EXCHANGE, AND THE METABOLIC RIFT

Modern imperialism is a historical stage of capitalism characterized by its global domination. The first theoretical analyses of imperialism as a novel phenomenon, beyond colonialism,[1] appeared in the early 20th century. Several theoretical attempts were made, beginning in the 1880s, at the time of the Scramble for Africa and prior to the First World War, to understand this new planetary order. A second wave of studies related to imperialism developed in the decades after the Second World War, when a vast portion of the erstwhile colonial or neocolonial world – in Africa, Asia, and Latin America– engaged in a series of liberation struggles. At this time, theories such as *dependency theory*, *unequal exchange*, and *world-systems*, which primarily examined the economic and/or political aspects of imperialism, were developed or revisited and put at the forefront of the new center-periphery discussions. However, as important, profound, and insightful as some of these theories have been, they have for the most part neglected the ecological aspect of imperialism, which has been subsumed under its economic countenance. Yet, the ecology of imperialism –concerned with use-value flows and the drain of real wealth as opposed to the traditionally studied monetary flows and exchange-value– is as or even more important than its economic facet, for it constitutes its material foundation.

More generally, in the social sciences there has been an important bias that largely persists to this day: the neglect of the influence, or even the very existence, of the natural world upon or beyond society (Catton and Dunlap 1978; Dunlap and Catton 1979; Foster 2000; Slater 2018a). Thus, a theory of imperialism that sufficiently incorporates its ecological aspect is needed. The aim of this work is to provide a historical, sociological, and theoretical account of ecological imperialism, understood as the expropriation of the ecological wealth of one country

[1] Amin (1977:103–4, 230–31) argues that, although intertwined, expansionism, colonialism, and imperialism are not synonymous. Expansionism is a general characteristic of capitalism; imperialism constitutes its contemporary global stage; and colonialism, which is historically prior to imperialism, preceded the latter through many forms. Relatedly, Lenin (1917) asserted that imperialism, essentially the monopoly stage of capitalism, started developing between 1875-1914. Thus, only the last years of the guano trade would correspond to this period. Yet, Lenin (1917:96) also stated that, in Britain, some tendencies of imperialism appeared "much earlier than the end of the nineteenth and beginning of the twentieth centuries; for two important distinguishing features of imperialism were observed in Great Britain in the middle of the nineteenth century, vis., vast colonial possessions and a monopolist position in world market." Thus, the guano trade corresponds both to a broader imperialism that includes colonialism and an embryonic imperialism in its strict monopoly sense. Some authors disagree with this view (*cf.* Bonilla 1984:76–77,140).

by another, based on a case study of the 19th-century guano (bird dung) trade (1840-80). Moreover, this is to be viewed within a neocolonial setting, which first emerged in Latin America, and which was integrally related to the emergence of the imperialist world system of today, requiring a more systematic expropriation of the world's resources on behalf of the capitalist core. The lens for the study will be derived from dialectical[2] ecology in the natural sciences and historical materialism in the social sciences, relying for the interface of the two on Karl Marx's concept of the metabolic rift (*i.e*. the loss of soil nutrients that are siphoned into cities as food or fiber, where they were discarded as waste) (Foster 2000, Levins and Lewontin 1985; Marx 1992).

I. Literature Review

A) Economic imperialism: Marx, Lenin, dependency theory, unequal exchange and development, and world-systems theory

The work of Karl Marx (and Friedrich Engels) represents a watershed in relation to studies of imperialism, dependency, world-systems, and unequal economic and ecological exchange (Birkan 2015; Brolin 2006; Foster and Holleman 2014). Although discussions around unequal exchange of labor precede Marx's time, and despite Marx's analysis was concerned, given the period when he lived, with the capitalist mode of production and not with capitalism as a theory of the capital world system (Amin 1976), Marx provided the essential starting points that have led to the most influential works on all these topics. For instance, in 1848 he stated that: "If the free traders cannot understand how one nation can grow rich at the expense of another, we need not wonder, since these same gentlemen also refuse to understand how within one country one class can enrich itself at the expense of another" (quoted in Emmanuel 1972:*vii*).

As for the concept of imperialism, Eric Hobsbawm (1989:60) observes that "[e]mperors and empires were old, but imperialism was quite new." This word first entered British politics in the 1870s and exploded into general use in the 1890s (*Ibid.*). Unknown to many, in an 1895 letter Cuban independence leader José Martí "already pointed out the danger hovering over the

[2] Roughly and following Levins and Lewontin (1985:272–75), a dialectical view posits that wholes are relations of heterogeneous parts that interpenetrate and have not prior existence as parts. It emphasizes historical change, interrelation of opposites, universal interconnection, and integrative levels, contrary to the reductionist view prevalent in mainstream science.

Americas and called imperialism by its name: imperialism" (Castro 1962:6). Between 1896 and 1902, this word became associated to the Jameson Raid in South Africa and the (second) Anglo-Boer War (1899-1902). In fact, J.A. Hobson's famous Imperialism (1902) arose from his visit to South Africa during this war. Following Hobson's book, several studies of imperialism appeared (*e.g.* Bukharin 1915; Hilferding 1910; Luxemburg 1913), but it was Lenin's groundbreaking *Imperialism, the Highest Stage of Capitalism* (1917), partly drawing on these previous works, which constituted and "remains the fundamental revolutionary work which defines the essentials of the contemporary system" (Amin 1977:107). Here, Lenin gave imperialism, a concept which now attained its "mature form," its coherence and influence (Fieldhouse 1961:192–94), and also related it to the idea of dependency (Chilcote 1974:18). Lenin's (1917:15) main aim was to show "the connection and interrelation between the principal economic characteristics of imperialism" while acknowledging he had "no opportunity to deal with the non-economic aspect of the question, however worthy it may be." I will return to this when dealing with its ecological aspect. Along with this work, Lenin gave pivotal speeches on imperialism at the Second (1920) and Third (1921) Congresses of the Communist International (Comintern), an organization which also inspired manifold works on the subject.

After Lenin's analyses, in the realm of theory, works on imperialism such as those by L. Woolf (1920), P.T. Moon (1928), P. Sweezy (1942), and J. Strachey (1959), among others, were published, as well as writings by the Comintern in the 1920s, particularly in India and China (RUPE 2007; Fieldhouse 1961). Around this time, Peruvian Marxist José Carlos Mariátegui also wrote his *Seven Interpretive Essays* (2010[1928]), importantly concerned with both imperialism and biophysical wealth flows. In the realm of reality, Amin (1977: 113–14,233) speaks of imperialism as having undergone two expansionist phases: (1) the classical "installation" (1880-1914), characterized by the expansion of unequal exchange, the international division of labor, and political forms of domination; and (2) import substitution (1945-1970), where large-scale intervention in the center and a shift from exports to import-substitution industries in the periphery prevail. During the second phase, a new wave of analyses and debates on the subject revived and ensued. Around these years, India's Independence (1947), the Chinese Revolution (1949), works by the novel United Nations Economic Commission for Latin America and the Caribbean (UN ECLA) (1949), the decolonization of Africa (1950s-1975), the Bandung Conference (1955), the Cuban Revolution (1959), and the Sino-Soviet debate (1956-1966), among other episodes, fueled and revitalized the discussions around imperialism, domination, decolonization, and socialism. The most influential theories around which these discussions revolved were dependency theory, unequal exchange and development, and world-systems theory.[3]

Dependency theory

The main theses of dependency theory –a new perspective on core-periphery relations and the link between development (of the productive forces) and underdevelopment– were established in the 1920s by the Comintern and translated by U.S. Marxist economist Paul Baran (1952,1957) after World War II. Baran –a Stanford Professor with a broad Soviet, German, and Harvard background– was "instrumental in bringing the monopoly capitalist interpretation into postwar western Marxism" (Brolin 2006:516). In Latin America and the Caribbean (LAC), dependency theory emerged in the 1950s and 60s, building on Baran's work. Here, this theory was partly a critique of ECLA's conservative perspective, as well as of those espoused by some Latin American communist parties, which conceived LAC as feudal, hence requiring industrialization to attain a bourgeois revolution that would create the material conditions necessary for the transition to socialism (Frank 1974:88; Wallerstein 2004:12). Beyond their basic agreement that capitalist development provokes underdevelopment in the periphery and that revolutions were necessary to change this state of affairs, there is a wide variety of currents and contributors to dependency analysis (*cf.* Dietz 1979,1980; Prashad 2007; Stavrianos 1981), such as those of "development of underdevelopment" (*e.g*. Frank, Galeano, Marini, dos Santos) and "dependent development" (*e.g.* Amin, and the less radical Cardoso and Faletto) (Foster 2014:22). Other contributions to the theory were made by scholars such as González Casanova (Mexico), Quijano (Peru), and de Ímaz (Argentina), along with Amin's (Egypt-France) works on dependency in Africa (Amin 1974, Chilcote 1974:5). Relatedly, Guyanese Marxist historian Walter Rodney (1972) provided perhaps the most exhaustive account of dependency, development, and underdevelopment in that continent.

[3] Many of the central pieces developed in these traditions were either originally published or translated by U.S.'s Monthly Review Press. *Cf. v.gr.* Baran (1952, 1957), Magdoff (1969, 1978), Frank (1967), Emmanuel (1972), Amin (1976, 1977), and Suwandi (2019).

Unequal (economic) exchange and unequal development

The topic of unequal or non-equivalent exchange has been discussed since the English 1620s mercantilist debates on trade (Birkan 2015:155; Brolin 2006:23; Foster and Clark 2020). In the 18th century, François Quesnay –head of the physiocrats– pointed to unequal exchange due to a difference in capital composition between agriculture and industry (Emmanuel 1972:174–75). Sir James Stuart and Adam Smith also suggested something close to this notion (Andersson 1976; Brolin 2006:10), but the first theory of unequal exchange arose out of David Ricardo's international trade theory, which remains the basis of mainstream trade theory (Foster and Holleman 2014:202). Roughly, Ricardo assumed that the factors of production –capital and labor– are immobile across borders and that international trade is the equalizing mechanism for prices, thus favoring comparative costs and the international division of labor (Birkan 2015:158; Emmanuel 1972). Yet, it was Marx who laid the foundations of unequal exchange *analysis* (Foster and Holleman 2014:203), and it was the Marxists who deepened this idea (Emmanuel 1972:175). Marx himself did not use the term "unequal exchange,"[4] which he considered contradictory, and referred to the "exchange of equivalents" in both the *Grundrisse* and *Capital*. That is, exchange was equal or else was not exchange but expropriation. Marx (1992) argued that the exchange of equivalents applied to the labor contract under capitalism as with commodity exchange generally. Workers were paid the equivalent of their labor-power's value, which was determined by its reproduction costs. Relatedly, Marx introduced the notion of "organic composition of capital," *i.e.* the proportion in which capital is divided into constant capital (means of production) and variable capital (labor-power), which partly explains values and prices and thus became one central element of unequal (economic) exchange analyses. Upon these foundations, in 1924 Austrian Marxist Otto Bauer articulated the first definite theory of unequal exchange (Foster and Holleman 2014:203).

Yet, as with dependency theory, the theory of unequal exchange became widespread in the 1960s and 70s through Marxist debate on falling terms of trade in the periphery (Brolin 2006:158). This debate revolved around the work of Greco-French economist Arghiri Emmanuel (Amin 1976:138), who used Marxist categories while also relying on Prebisch's and Keynes's traditions (Birkan 2015:157; Brolin 2006:4). In his Unequal Exchange (1972:*ix*), Emmanuel

[4] In his *Theories of Surplus Value* (1963), Marx does refer to the use of this term by authors such as S.N.H. Linguet, Malthus, Ricardo, James Mill, and J.F. Bray.

challenged Ricardo’s theory and sought to elucidate the “basic inner contradiction” of capitalism: gaining by losing and losing by gaining. His main aim was to explain the difference in development (and widening of the gap) between rich and poor nations, despite –indeed, due to– centuries of exchange and free trade; the existence of a group of countries that, no matter what they produce, always exchange a larger amount of their labor for less foreign labor. This, he argued, was due to a systemic structural disadvantage from the outset. Emmanuel did not claim this asymmetry could be solely explained by unequal exchange, although this was its main mechanism. He talked of unequal exchange in two senses: *sensu latu*, as apparent unequal exchange where wages are equal and organic compositions of capital differ; and *sensu stricto*, which entails both differences in organic compositions *and* wages. This latter sense is what Emmanuel (and others like Amin) considers unequal exchange (Birkan 2015:158–59; Emmanuel 1972:160; Foster and Holleman 2014).

An important elaboration on and critique of Emmanuel’s unequal exchange was developed by Amin, one of the foremost 20th-century Marxist scholars on imperialism. Amin (1976,1977) contends that Emmanuel stopped at the threshold of the real problem (*i.e.* international values) despite he was the first one to formulate it clearly. Under a historical-materialist, dialectical lens, Amin (1976,1977,1978,2010) developed a more complex view of unequal exchange (phenomenon), placing it as a component of a broader process of unequal *development* (essence). Amin (1977:45,211) conceptualizes unequal exchange as international trade and offers its “correct definition”: “the exchange of products whose production involves wage differentials greater than those of productivity.” That is, the main characteristic of unequal exchange is the exchange of more labor for less, given the differences in wages between center and periphery (Foster and Holleman 2014:205). Thus, unequal exchange is rooted in the unequal rates of labor-power exploitation throughout the world capitalist system. In all, Amin synthesized various traditions: dependency, unequal exchange, imperialism, and world-systems.

World-systems theory

Amin (1976:360–61) traces the origins of world-systems theory back to Lenin, who established the worldwide character of capitalism in contrast to the mere coexistence of capitalist countries. From the 1970s on, this theory spread and is used today in several social sciences (Chase-Dunn and Grimes 1995:387). In addition, the natural sciences’ notion of a holistic Earth System (*e.g.*

Steffen *et al.* 2015) is related to world-systems theory and, in fact, its “origin lie in ecology, as does its entire developmental history and of course its future” (Wallerstein 1993:305). World-systems’ main thesis is that, rather than developing along the same paths as the core countries before them (as modernization theories assert), peripheral countries are structurally constrained to developmental processes that reproduce their dependent status. This theory is based upon the premises that the world-economy is unified by the division of labor and that capitalism is a system of *endless* accumulation of capital. It also admits the possibility of upward or downward mobility *vis-à-vis* development, as well as the existence of a semi-periphery. Yet, world-systems has generally avoided the question of imperialism.

Immanuel Wallerstein is considered the originator of the current world-system perspective. He comes from an Africanist background and his study of the periphery was inspired by the writings of Frank and Amin (Frank and Gilles 1993:*xx*). Wallerstein (1974) argued that a world-system is a multicultural territorial division of labor whereby the production and exchange of raw materials and goods takes place to fulfill its inhabitants’ needs. He (2004:98) later defined it as “a system that is a world and that can be…located in an area less than the entire globe.” Here, it is world-systems (and not states) that are the units of analysis, and the core-periphery relationship is viewed as having a relational nature. Wallerstein (2004:11,15) explains that, in the social sciences, four debates around 1945-70 preceded the emergence of world-systems: ECLA’s and dependency analyses; discussions around Marx’s “Asiatic mode of production”; debates on the transition from feudalism to capitalism; and the triumph of the Annales school of historiography concerning “total history.” As for the last debate, Wallerstein recalls how, after 1945, this school thrived under the direction of Fernand Braudel, who criticized “event-dominated” history as well as “nomothetic eternal truths.” Instead, Braudel talked of structural time and cyclical processes, which were incorporated to world-systems. Wallerstein was also influenced by Karl Polanyi (2001), who distinguished three forms of economic organization: reciprocal, redistributive, and market, which correspond to the former’s own mini-systems, world-empires, and world-economies. There have also been attempts to relate world-systems theory to ecology (*e.g.* Moore 2015, which has its own problems). Yet, as important as all these ideas were, for the most part they neglected the ecology, which represents the basic, material foundation for the economy. Let us then deal with the *ecological* aspect of imperialism.

B) Ecological imperialism: unequal ecological exchange, emergy, and real wealth

As noted, in his classic 1917 work, Lenin could not deal with the non-economic aspects of imperialism, which –I argue– include its ecological features. I will now provide an overview of some works that have analyzed, to varying degrees, this aspect, and also point to some studies that are yet to be done in this regard. As was the case with its economic aspect, Marx also provided the foundations for a scientific, materialist, ecological analysis of capitalism and what would become its highest stage after his time: imperialism (Foster 2020; Foster and Holleman 2014). From the 1850s on, Marx was heavily influenced by chemist Justus Liebig, especially regarding his notion of metabolism (*Stoffwechsel*)[5] and his critique of industrial agriculture as a system of robbery (*Raubbau*) of the soil (Foster and Holleman 2014; Foster 2000). Carl Fraas's "agricultural physics" also influenced Marx, as did, more generally, Charles Darwin's materialist conception of nature (Foster 2000; Saitō 2017). Marx criticized the human alienation from the rest of nature, and borrowed the concept of metabolism from physiology and soil chemistry to refer to the material exchange within and between society and the environment to explain that, in capitalism, an "irreparable rift" in the human "metabolic interaction" with nature was produced as a consequence of the rural-urban antagonism (Angus 2018a; Marx 1993a:949).

After World War II, it was Shigeto Tsuru who in 1971 developed the initial theoretical formulation of environmental problems in relation to unequal development (Amin 1977:138). Interestingly, Frank, Amin, Emmanuel, Braudel, and the later Wallerstein also referred, to varying degrees, to certain ecological issues. For instance, Frank (1967:73–85) unknowingly provided an ecological treatment of the 19th-century nitrates trade in Chile. Also, as of late, Frank and Gilles (1996:40) stated that "it was ecological considerations that led to the formation of the world system in the first place." For his part, Amin's insights into environmental issues were incredibly sharp and profound. For instance, he posited that certain areas of our planet are plundered for the benefit of other regions, and that the impact of the world system on the price structures of African exports makes it impossible for Africans to allocate sufficient funds for

[5] Following Angus (2018b), the word metabolism came into general use in the 1830s through an influential book by physiologist Friedrich Tiedemann. The first known use of it by Marx is to be found in one of his neglected *London Notebooks* of March 1851, titled "Reflection." He elaborated on it even more in the *Grundrisse* (1857-61) and *Capital* (1867-83) (Saitō 2017). Marx got the concept of metabolism from *Mikrokosmos*, written by his friend the communist physician Ronald Daniels, and later also from Liebig (Foster and Clark 2016).

conserving their *wealth* (Amin 1977:138). Emmanuel also gave his theory an ecological tint by expressing it in terms of direct material inputs as opposed to ‘values’ (Brolin 2006:519).

Just as the exchange of more labor for less is at the basis of unequal economic exchange theory, the exchange of more *ecological use-value* (or nature’s product) for less underlies unequal ecological exchange (Foster and Holleman 2014:205). Unequal economic exchange is concerned with a ‘quantitative value problem’ (Sweezy 1942) related to exchange-value relations, whereas unequal ecological exchange deals with use-value relations and real wealth. Several studies have addressed the metabolic relations between the core and periphery under capitalism, showing how ecological disadvantages have also been systematically imposed on the periphery (*e.g.* Clark and Foster 2009; Hornborg 2006; Jorgensen *et al.* 2009). Charles Anderson (1976) was one of the first to link imperialist dependency and ecological debt, followed by Stephen Bunker (1985,1984), together with various attempts of ecological economists and environmental sociologists to delimit unequal ecological exchange in the work of Howard Odum (1988, 1991, 2005), Martínez-Alier (1987, 2002), Jorgensen *et al.* (2009), and many others. One feature that this theory shares with unequal economic exchange theories is that they are outside mainstream economics (Brolin 2006:5). Ecological exchange is also related to the notion of “ecological debt” (parallel to the foreign debt), dating back to Barry Commoner’s work and brought to the forefront in the 1990s (Hornborg and Martínez-Alier 2016:328), as well as to the “drain of wealth” (Foster and Clark 2020).

As for Bunker’s work, he sought to elaborate a synthesis of “externally focused theories” of imperialism, dependency, and world-systems with “internally focused theories” of modernization and modes of production (Brolin 2006:475; Bunker 1985,1984). He developed the notion of “mode of extraction” as the counterpart of the mode of production. For Bunker, unequal ecological exchange of energy and matter occurred to the periphery’s detriment, whose unbalanced flows provide a better measure of unequal exchange than do those of commodities measured in labor or prices. He then argued that imperialism and world-systems theories have not systematically explored the internal dynamics of extractive systems as a distinct economic type and that there is value in nature and in society, “and not just in commodities” (Bunker 1985:1061).

In turn, Joan Martínez Alier (1987) published a history of ecological economics covering the period from 1865 to the 1940s, where he mainly sought to advance the political aspects of ecological unequal exchange (Brolin 2006:22). For him, Nicholas Georgescu-Roegen (1971) has been the leading author in this field. Martínez-Alier (1987:15) talks of a "long standing divorce between Marxism and ecology," and mentions that "…neither Frank nor Wallerstein wrote the kind of ecological history which is now developing." His own contribution to ecological unequal exchange was inspired by the ECLA and dependency traditions, and his is interest in ecology arose while in Peru in 1973, via the novel ecological anthropology and agricultural energetics (Brolin 2006:488–502). He sought to gather a wide range of environmental debates under the name of "environmentalism of the poor," same which arise from the "unavoidable clash between the economy and the environment" (Brolin 2006:487; Martínez-Alier 2002:*ix*). For him, unequal ecological exchange has two causes: a lack of social, political, and economic power in the periphery to defend human health and the environment, and a difference in the ecological time necessary to produce the goods exported from the south relative to that to produce imported manufactured goods or services. Martínez-Alier's work is part of a tradition known as "first-stage ecosocialism" (FSE), which arose in the late 1980s amid a deep crisis within Marxism after the demise of socialism in eastern Europe (Foster and Burkett 2017:3; Foster in Burkett 2014:*viii*). Presupposing the existence of central ecological shortcomings in Marx's (and Engels's) works, scholars of this perspective[6] grafted green theory onto Marxism (or vice versa).

Second-stage ecosocialism, emergy, and the abolition of the value form

Along with Paul Burkett, John Bellamy Foster is the scholar most associated with "second-stage ecosocialism" (SSE) or ecological Marxism, the antithesis of FSE arising in the late 1990s (Foster and Burkett 2017:3). While aware of shortcomings in Marx's (and Engels's) work, the main thesis within this tradition is that there is no need to graft green theory –which on top of everything is an idealist and dualist perspective (Foster 2000:19)– onto Marxism, as the bases for providing a deep, materialist, and dialectical ecological critique of capitalism are already present in Marx's and Engels's works themselves. Another feature of SSE is that, contrary to Western Marxism and FSE, it not only does not separate social from natural science, but ties them holistically, as they contend Marx and Engels themselves did (Angus 2016:22–23). SSE also holds the view that often "an 'anti-Marxist' argument is only the apparent rejuvenation of a pre-

[6] James O'Connor, André Gorz, Ted Benton, Daniel Tanuro, Enrique Leff, Alain Lipietz, Martínez-Alier, Joel Kovel, and Michael Löwy, are among the names most associated with this stage (Foster and Burkett 2017:3–4).

Marxist idea" (Sartre in Foster 2000:10), and that many perspectives that Marx rejected (*e.g.* Prometheanism) "have been ironically transposed into a critique of Marx himself" (Foster 2000:135). This way, SSE contends to have rediscovered and recovered the ecological depths of Marx's thought, while at the same describing how it developed and changed in time (Foster and Burkett 2017:4; Foster 2000:20). In this vein, Marx's theory of metabolic rift, as developed by Foster (1999), has proved a powerful approach for analyzing specific environmental and social degradation instances under capitalism, both historical and contemporary (*e.g*. Betancourt 2020; Clark *et al*. 2018; Clark and Foster 2009; Clark and York 2005; Gunderson 2011; Liévanos *et al*. 2018; Longo et al. 2015; Mancus 2007; McClintock 2010; Weston 2014).

Likewise, Foster and Clark (2020, 2009, 2004) provided the starting points for studying what they have called ecological imperialism.[7] Roughly, they argue that imperialism is seldom understood "in terms of ecological damage wrought by the robbing of Third World countries of their resources and the destruction of their environments" (Foster and Clark 2009:312). That is, just as there are domestic urban-rural antagonisms provoked by capitalism, there is an international industrial-agricultural divide caused by imperialism, whereby the natural wealth of dependent countries is robbed by the core nations. Thus, local and global metabolic rifts intertwine in a single world system of robbery and exploitation. What is more, these rifts are not confined to the degradation of "external nature," but affect human metabolism as well, in a process Foster and Clark (2020) and Loustaunau *et al*. (2021) call the "corporeal rift."

In this vein, Foster and Hannah Holleman (2014:199) contend that "[t]he search for a meaningful theory of ecological imperialism has become…the holy grail of the ecological critique of the capitalist world system." Yet, a lack of an adequate theory of ecological imperialism –they argue– lies in the under-theorization of unequal ecological exchange, which should integrate history, geography, and biology, and encompass the formation of the world capitalist system. In addition, they contend that a wider synthesis of unequal exchange analysis with imperialism is essential, as well as deeper empirical analyses. In short, what they argue is missing is a dialectical synthesis between ecology, Marxian political economy, and

[7] This concept was first used by U.S. scholar Alfred W. Crosby in his *Ecological Imperialism* (1986), although in a very different sense from Foster and Clark's, concerning how the spread of European disease, flora, and fauna was an essential cause for colonization. The usage of the concept by Foster and Clark is more closely related to that of British historian Richard H. Grove in his *Green Imperialism* (1995), although the analysis made by this author is quite different from Foster's and Clark's. Relatedly, Cushman (2014) refers to "neo-ecological imperialism" in relation to the guano trade.

environmental social science; specifically, a Marxian/world-systems approach that draws (critically) on Odum's systems ecology and unequal ecological exchange, as well as on the destruction of real wealth by capitalist production. Moreover, according to Brolin (2006:526), what is still lacking in theories of unequal ecological exchange is "historical flesh and concreteness," as well as the use of economic-historical evidence on material transfers. The present work seeks to shed light on these issues via the analysis of the 19th-century Peruvian guano trade. Before moving on to this case study, however, it is necessary to briefly review system ecologist Howard T. Odum's views on unequal ecological exchange.

In 1982, Odum –together with David Scienceman– developed the concept of *emergy* (spelled with an 'm') as a measure of real wealth (*i.e.* usable products and services however produced) (Odum 1991:110). This notion was both a critique to the mainstream view of work in physics and a recognition that market value is an irrelevant measure wealth (Odum 1991:89-90). For Odum (1991:97), "it is incorrect to use energy as a measure of work or value, except where one is comparing energy flows of the same type." For example, a calorie of sunlight –he argued– contributes less energy than a calorie of coal, which in turn contributes less than a calorie of labor-power, to the economy. Thus, the emergy concept was introduced to put the contributions of different types of energy on a common basis, and is defined as "the energy of one type required in transformations to generate a flow or storage" (Odum 1988:1135). The emergy of a product is "like a memory" that records "the work which went into making it expressed in units of one type of energy (*e.g.* solar)" and its unit is the *emjoule* (Odum 1991:91). It thus can express embodied ecosystem work, *i.e.* the energy required to produce a use-value or an entire national economic system (Foster and Clark 2020; Foster and Holleman 2014:211). According to Brolin (2006:522), emergy is "arguably also the most comprehensive and inclusive estimation tool of ecological unequal exchange developed so far." Relatedly, Odum (1991:99, 1988:1135) defined *transformity* as the emergy per unit energy, or the energy of one type required per unit of energy of another. For instance, if 4 coal calories are needed to generate 1 electrical calorie, the coal transformity of electricity is 4 coal *emcalories* per calorie.

Odum thus contends that, internationally, exchange, interest rates, and repayments between countries should be calculated as to maintain emergy equity. If the exchange between nations could be based on emergy (rather than money), this might improve international cooperation, promote equity, and foster peaceful relations. In addition, Odum introduces the emergy investment ratio (EIR), *i.e.* the purchased emergy divided by the free environmental energy, which serves as an environmental impact indicator. He shows that the worldwide EIR is about 2 to 1, whereas in developed countries it is 7 to 1 or higher. Likewise, the emergy inequity factor (EIF) measures the ratio of official exchange rate to the emergy equitable exchange rate and shows, for instance, that the U.S. has more than a 10:1 advantage in emergy trade with several African countries (Foster and Holleman 2014:222). Odum (and Arding) (1991) developed a case study on unequal emergy exchange in Ecuador, which can contribute to a comprehensive understanding of ecological imperialism (Foster and Holleman 2014:221). Lonergan (1988), Sweeney *et al.* (2005), and Hall and Klitgaard (2012) also discuss or develop attempts to measure unequal ecological exchange.

Another crucial issue –which has created some confusion despite his clarifications– is that Odum did not seek to develop an energy theory of value (Foster and Holleman 2014:201). Rather, paralleling Marx, Odum's analysis established a distinction like that between use- and exchange-value and their contradictory relationship. This central distinction is related to what is known in environmental sociology as the Lauderdale Paradox. Wealth and riches were conceived as distinct in classical political economy (*e.g.* by Ricardo), but neoclassical economics (*e.g.* J.B. Say, J.S. Mill) discarded this distinction altogether. Marx revisited this chief difference, which remains overlooked in mainstream economics. The failure to understand this distinction has led to fruitless attempts at developing animal or energy theories of value, or values theories of nature, against the labor theory of value Marx (critically) used. Marx was a critique of the value form and was, in fact, concerned with its abolition as the social form of wealth (Foster and Burkett 2018). He made a distinction between concrete labor, which refers to the direct human metabolic transformation of nature to produce natural-material use-values, and abstract labor, which is undifferentiated and removed from all its physical aspects. For Marx, value is not a universal, intrinsic physical quality, but a reified social relation specific to capitalist societies and their division of labor. In short, Marx showed that, under capitalism, there was an inherent contradiction between the natural and the value forms, wherein abstract labor is the sole source of value in contrast to real wealth. Marx showed that this expropriation of nature, as if it were a "free gift," is not only a question of economic value, but also of material use value (Foster and Clark 2020). That is, although seldom recognized, robbery can occur in use-values categories too, when human beings or other parts of nature are expropriated without value. Thus, the distinction between wealth and riches is central to the theory of ecological imperialism because capital is primarily concerned with value flows but cannot dispense with material ones.

II. The Case Study: The Guano Trade in 19th-Century Peru (1840-80)

The guano trade in 19th-century Peru represents a classic example of ecological imperialism, whereby ecological degradation and human exploitation are inextricably tied. As we shall see, amid a serious soil exhaustion crisis and seeking to maximize agricultural production, in the mid-19th century Great Britain (and then continental Europe and the United States) resorted to guano –which had been used in Peru as a fertilizer for about 3,000 years– to vainly try to alleviate this situation (*i.e.* a metabolic rift). In turn, the main guano deposits in Peru were exhausted within four decades, as this substance became the world's chief and most coveted fertilizer from about 1845-80, which also incited confrontations of the world's empires both among themselves and with Peru. In addition, guano became the backbone of the Peruvian economy, forcing the country into an inescapable economic and ecological debt trap. Lastly, to extract the guano, Britain and the Peruvian oligarchy abducted thousands of Chinese (as well as other domestic laborers) and forced them to work as diggers under extremely harsh conditions of exploitation, thus creating a corporeal rift. This entwined story of entwined ecological degradation and human exploitation is the topic of the present work.

In particular, this work is comprised of three interrelated parts: ecological, historical, and theoretical. In the first part (Chapter 1) and under a materialist conception of nature, I synthesize and explain the unique geophysical and ecological conditions that allow for the formation of guano off Peru, where the world's most abundant and highest-quality deposits, around which the guano trade revolved, were located. I also point to the contradiction between the *ecological longue durée* of guano formation and the short and ravenous guano exhaustion caused by the brief guano trade. Secondly, in the historical part and under a materialist conception of history, Chapter 2 deals with the long metabolic rift caused by the privatization (expropriation) of the land in Britain, and its transformation from a self-sufficing to a profit-making activity that turned the countryside into a bread and meat factory, all while squandering the land, during the "first agricultural revolution" (~1485-1800). Since under a holistic lens it is impossible to understand Britain's agrarian history without considering its imperial affairs overseas, in Chapter 2 I also examine the genesis and development of the British Empire. In parallel, I also trace how

European chroniclers referred to guano and Peru's ecological conditions at the time. Chapter 3 focuses on the "second agricultural revolution" (~1815-1880), which further and more deeply transformed Britain's land into a factory-like system dependent on machinery and external inputs, creating a new food regime. Here, I also discuss the indigenous use of guano and why, how, and when Britain commodified this substance to fertilize its depleted soils, launching the guano trade.

Chapter 4 examines the early guano trade (1840-49), paying primary attention to the first deals made by the nascent Peruvian state and European merchants to maximize their profit at the expense of Peru's real wealth, as well as the brief but important African guano trade (1843-48). Chapter 5 analyzes the corporeal rift provoked by the Chinese ("coolie") trade, a racialized system of bonded labor created by Britain (~1830-74) through which Peru's guano diggers –a workforce of no more than 1,000 people at any given time that, living under atrocious conditions, removed over 10 million tons of guano– were recruited and coerced. In Chapter 6, I study the middle and late stages of the guano trade (1850-80), focusing on the Gibbs (1849-62) and Dreyfus (1869-76) sales monopolies, as well as on Britain's, the United States, and Spain's imperial entanglements to control the guano deposits in Peru and beyond. Finally, in the third and last part of the work, I return to the theories of ecological imperialism and the metabolic rift and establish the relevance of the seemingly distant guano trade in today's world. I argue why the ecology lies at the heart of the guano trade (and other unequal exchange processes) and why history matters to understand present day domestic and cross-national inequalities. In addition, I provide an overview of the scarred Peruvian guano industry in the 20th century and currently, and discuss selected British and U.S. 19th and 20th century imperial actions in South America that still bear important geopolitical consequences today. I also point to the questions and possibilities that remain open to keep advancing a solid theory of ecological imperialism, as well as to an alternative way in which humanity can relate to the rest of nature.

III. Methods

To carry out the present study, I visited eight different archives during the summer and fall of 2021, where I systematically reviewed a total of 203 materials on the guano trade *in situ*, with an emphasis on ecological, social, and imperial issues. Specifically, I visited the Archivo General de la Nación, Sede Palacio de Justicia, in Lima, that holds important correspondence between the

Chincha Islands (Peru's chief guano deposits) and the mainland, as well as information regarding the conditions and daily life of the Chinese and other laborers at the islands. In addition, I went to the National Archives in Kew, London, where the vast diplomatic correspondence (*e.g.* consular reports and letters) between Britain and Peru (and every other nation) is kept. These two archives hold the bulk of the primary sources I used. Third, I consulted the London Metropolitan Archives in Islington, London, which contain the correspondence and information of Antony Gibbs & Sons, the main guano trading house. Fourth, I visited the Schroder Archive in the City of London, in the headquarters of the asset management company Schroders, which made a good part of its fortune through the guano trade. J. Henry Schröder & Co. (which for instance lent money to the Confederates during the U.S. Civil War) was the agent of the French guano merchant Auguste Dreyfus during the late stage of the guano trade, and also made guano deals with Peru in the 20th century. Importantly, to my knowledge, this archive had eluded every other author dealing with the guano trade (*e.g.* Bonilla 1984), so it appears I am the first one to consult it for this end.

Fifth, since the French were also importantly involved in the guano trade, I also consulted the Archives Nationales in Saint-Denis, Paris, which contain diplomatic correspondence between France and Peru. Sixth, I went to the Centre des Archives diplomatiques du ministère des Affaires étrangères in La Courneuve, Paris, which hold political, consular, and commercial correspondence between France and Peru. Seventh, I visited the Centre des Archives diplomatiques in Nantes, which possess documents of the French diplomatic legation in Lima. Lastly, I consulted the Archives Nationales du Monde du Travail in Roubaix, which contain the papers of Dreyfus Frères et Cie. All this material was digitalized and systematized by the present author. Additionally, I also consulted several primary sources available online, such as the British Parliamentary Papers, the Papers of Daniel Webster (at the University of Virginia), and various newspapers, journal articles, photographs, diaries, and books of the day.

In addition to the foregoing archival fieldwork, I visited the Chincha Islands northwest of Pisco, in central Peru, to get a better sense and understanding of how the guano trade could have looked like, and of the ecological and social marks it left in the region. To my knowledge, I am the only author who has visited the key archives dealing with the guano trade in both Europe (Britain and France) and Peru, and has also been to the Chincha Islands. Thus, this holistic analysis is part of the distinct socioecological method (which emphasizes environmental conditions as much as social relations), set of concerns, and systematic outlook (lacking in other studies) under which I examined the guano trade.

On the other hand, I also relied on the key secondary sources dealing with the manifold aspects of the guano trade in the English, Spanish, and French literature. “Why another book on guano after the remarkable and successive ones by Levin, Mathew…and Hunt?” rightfully asked Peruvian historian Heraclio Bonilla in his classic *Guano y burguesía en el Perú* [*Guano and the bourgeoisie in Peru*] (1974), almost half a century ago. His answer: to tell the social and political aspect of the story (instead of the hitherto prevailing economic one) and to discuss the Dreyfus monopoly, previously overlooked. Yet, Bonilla’s question is even more relevant today, given the thousands of new pages about guano –many of them innovative– that have been written ever since. Thus, in addition to having a novel outlook and objective, relying on the foregoing eight archives, and having visited the Chinchas, no work thus far has pulled together the scattered economic, social, and ecological aspects of the guano trade, and considered them in relationship to one another. This is what I intend to do. For instance, social scientists from different disciplines have examined the economic, historical, political, and/or social aspects of this case (*cf.* Bonilla 1987, 1984; Hollett 2008; Hunt 1973a, 1973b; Gootenberg 1993; Levin 1960; Mathew 1981,1977a,1972,1970a; Méndez 1987a; Tantaleán Arbulú 2011; Vizcarra 2009, to name some of the most important). On the other hand, different natural scientists have studied various ecological processes related to Peruvian guano formation (*e.g.* Chavez *et al.* 2008; Duffy 1994; Hutchinson 1950; Montecino and Lange 2009; Murphy 1925; Vogt 1942), and a few environmental historians (Cushman 2014, 2005; Melillo 2012) have importantly combined aspects of both stories descriptively. Yet, in developing a historical, sociological, and theoretical account of ecological imperialism and building on Foster and Clark (2020, 2012, 2009) and Loustaunau *et al.* (2021), I also intend to create a synthesis that brings together all these pieces of the puzzle, and is able to offer paths for making generalizations about unequal ecological exchange. Finally, in addressing sociology’s common disregard of nature, I draw on Marx and Engels’s view that “[t]he writing of history must always set out from…natural bases and their modifications in the course of history through the action of man” (quoted in Slater 2018a:32).

CHAPTER 1. THE GEOLOGY, BIOLOGY, AND ECOLOGY AROUND GUANO FORMATION OFF PERU

> The first premise of all human history is, of course, the existence of living human individuals. Thus the first fact to be established is the physical organisation of these individuals and their consequent relation to the rest of nature. Of course, we cannot here go either into the actual physical nature of man, or into the natural conditions in which man finds himself – geological, hydrographical, climatic and so on. The writing of history must always set out from these natural bases and their modification in the course of history through the action of men…We know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of nature and the history of men are dependent on each other so long as men exist.
>
> – Karl Marx and Friedrich Engels, *The German Ideology*

> Natural science will one day incorporate the science of man, just as the science of man will incorporate natural science; there will be a *single* science.
>
> – Karl Marx, *Early Writings*

1.1. Geology of Peru's Coastal Islands

The islands off the coast of present-day Peru began to originate about 90 million years ago during the Mesozoic Era in Upper Cretaceous times (Pfiffner and Gonzalez 2013). Their existence is the result of the subduction of the oceanic Nazca Plate –today moving eastwards at about 72 mm per year– beneath the continental South American plate, in a process that also generated, and continues to form, the Central Andes of Peru (Hayes *et al.* 2014). These volcanic islands are part of the Coastal Belt –the westernmost segment of the Central Andes– which is made of the accreted Casma Volcanic Arc, in turn intruded (thrust into) by granites in the Upper Cretaceous. The Pacific rim of this belt has been drowned and the islands are erosional remnants, which have lied there for at least 11 million years (Cushman 2014:169). Their morphology suggests that they are mostly made of granite, an igneous, felsic, intrusive, and phaneritic (*i.e.* coarse-grained) rock composed chiefly of quartz, feldspar, and mica minerals, which is one of the planet's most common rocks at its surface, giving them their characteristic dark red color (Hutchinson 1950:33; Palmer 2006:222). These islands also contain basalt, sandstone, limestone, gypsum, and conglomerates, as well as gravels and silt of the former sea bottom, exhibiting small fossils of oysters (*Ostrea*) and barnacles (*Balanus*) (Hutchinson 1950:33–34; Murphy 1925:118). More than 84 islands –and countless islets– spread along this region, stretching some 1,800 km and covering about 12 degrees in latitude (Duffy 1994:69) (Figure 1.1). These oceanic islands and islets have an area of 94.36 km^2 (Webb and Fernández Baca 1990:10), and their highest peaks average an elevation of about 65 ± 40 m above mean sea level (SERNANP 2020).

Historically, several naturalists have studied the geology of these islands. For instance, while on his famous 4 year-, 9 month-, and 2 day-journey onboard the *Beagle* –which would influence the development of his theory of biological evolution by natural selection (Browne 1996; Desmond and Moore 1994)– in the latter half of July, 1835, Charles Darwin explored the island of San Lorenzo, Peru's largest, which he also sketched in his *Geological Diary*.

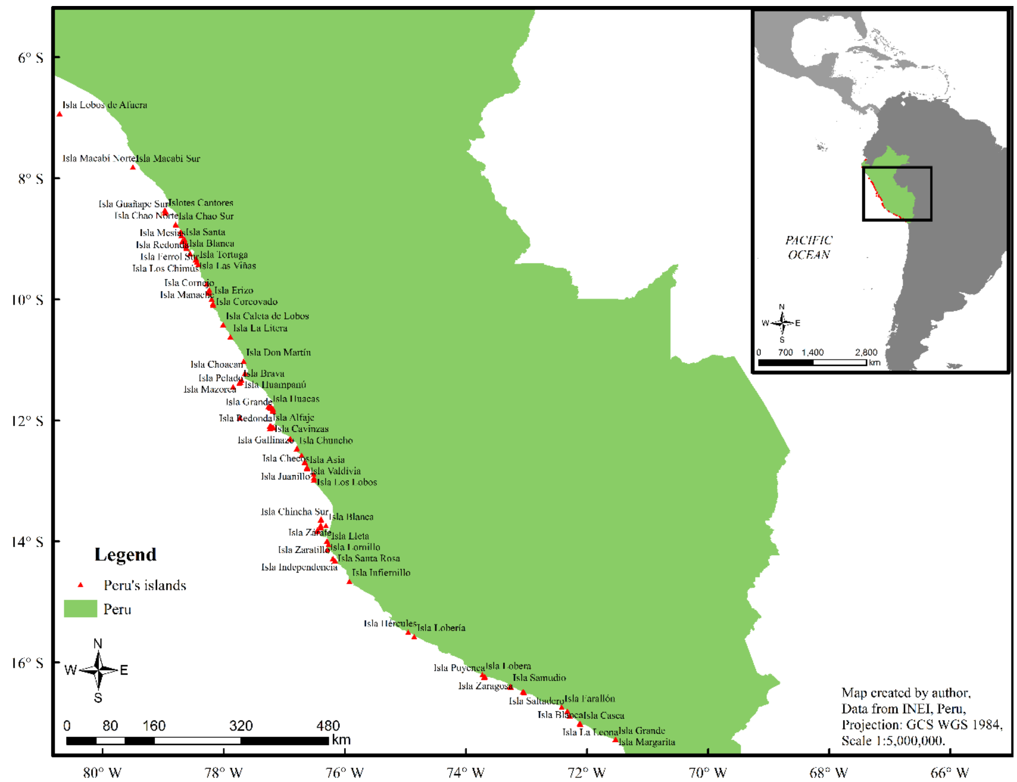

Figure 1.1. Selected islands off the coast of Peru.

1.2. Peru's coastal climate and the Humboldt Current System

1.2.1. Peru's coastal climate

Peru displays a great variety of climates due to its topography, its geographical coordinates, and the particular distribution of winds and oceanic currents along its territory. According to C.W. Thornthwaite's classification system,[8] Peru has 27 different climates, of which desert, cold,

[8] This is the system more widely used by Peruvian official publications on the subject (*e.g.* ADP 2014).

semi-dry, and warm with constant, abundant rainfall are the most prevalent (ADP 2014). The coast –a semi-flat 3,080 km-long and 60 to 170 km-wide region from the coastline to the Andes's western foothills, on average rising up to 1,000 m above sea level, and comprising 11.6% (149,857 km^2) of the country's total surface– exhibits, for the most part, a desert, semi-arid, and semi-warm climate (ADP 2014; MINAGRI 2015). Specifically, the *northern* part of the coast primarily has an arid, year-long-rain-deficient, semi-warm, and humid climate (E(d)B'1H3), showing an average annual temperature between 23 and 27.8°C, and annual rainfall levels of 20 to 800 mm, the highest on the shore. Likewise, an E(d)B'1H3 climate prevails in the *central* and *southern* regions of the coast, but with average annual temperatures between 16 and 23°C, and *extremely low yearly rainfall levels* that seldom exceed 20 mm (ADP 2014). In short, the warmer, northern coast receives more rain than its cooler and drier south and central counterpart. In addition, fog and mist habitually envelope the coast, with night and dawn drizzles (*garúas*) during the austral fall and winter (April-September), caused by stratiform clouds that tend to dissipate after midday.

1.2.2. "The enhanced fertility of the seas": The Humboldt Current System (HCS)

The Earth's climate is ultimately driven by solar energy impinging on equatorial latitudes, which is redistributed towards the poles through the oceans and the air (Davis 2017:226). This process has created an intricate, coupled ocean-atmosphere system, with links so tight that George Evelyn Hutchinson –one of Britain's foremost ecologists and former pupil of the socialist biologists Joseph Needham, John B.S. Haldane, and Lancelot Hogben[9] (Foster 2020:329)– asserted in a work that "[t]he interrelations of the climate and oceanic circulation are so intimate that no attempt will be made to separate them, and the peculiarities of both will be summarized together" (1950:9). Within the ocean-atmosphere system, dialectically, changes in oceanic conditions are both the cause and effect of changes in atmospheric ones, and vice versa (Philander in Davis 2017:244). This makes it futile to attempt to isolate the initiating factor of this entwined, complex whole, whose parts have no prior independent existence as parts (Davis 2017:245; *cf.* Levins and Lewontin 1985:267–77).

[9] Hogben would then help Hutchinson secure a position at Yale. Importantly, Hutchinson, who is often referred to as "the father" of U.S. ecology, would get Vernadsky's 'biosphere' concept accepted in this country (*cf.* Foster 2020).

In this process, the trade winds are the primary drivers of oceanic circulation. They are set up by a pressure difference in the atmosphere –in turn caused by uneven solar heating– blowing from high- to low-pressure areas (Montecino and Lange 2009:66). In the southeast Pacific region, this leads to northward (equatorward) winds along the South American coast, further steered in this direction by the Andes, running parallel to the coastline (Karstensen and Ulloa 2009:387). These equatorward trade winds off Chile and Peru set in motion a series of water currents caused by the frictional force they exert on the ocean's surface (*Ibid*.:385). Thus, the entire length of Peru's coast "is bathed by a cool ocean current, more uniform in character and more profound in its influence upon climate and living things than any other in the world" (Murphy 1925:28).This description corresponds to the Peru Current, also known as the Humboldt Current (named after German naturalist Alexander von Humboldt, who described some of its features in his 1845 *Cosmos*),[10] the Oceanic Peru Current, the Mentor Current, or the Peru-Humboldt Current (Montecino and Lange 2009:66), which since time immemorial has exerted a profound influence over the climate (and life) along the western coast of South America.

The Humboldt Current is formed as a result of the bifurcation of the northern segment of the Antarctic Circumpolar Current, and extends from about 45°S to 4°S, running along South America's west coast (GEF *et al.* 2002:18). As prominent U.S. ornithologist Frank M. Chapman (1925:*vii*) observed: "If Antarctica had extended an arm northward to the tropics overland instead of through the ocean the resulting effects on climate, flora and fauna would have been no more startling than those created by the Humboldt Current on its upward sweep along the shores of western South America." Thus, although Peru is situated between the equator and the Tropic of Capricorn, it exhibits both a coastal desert and a weather that is tempered by this cold ocean current (*Ibid*.:21). Hence, this current dramatically affects the climate off Peru by reducing air and sea surface temperature (Chavez *et al.* 2008:95; Chavez, Barber, and Sanderson 1989:333; Murphy 1925:30–31). This partly explains why, for instance, there are penguins off its coast.

[10] According to Andrea Wulf (2015:105), "though Humboldt was flattered to have [the current] named after him, he also protested. The fishing boys along the coast had known of the current for centuries, Humboldt said, all he had done was to have been the first to measure it and to discover that it was cold." According to Cushman (2014:24), "Humboldt…speculated (incorrectly) that the coldness of Peru's coastal waters originated in Antarctica [for which it is] often referred to as the Humboldt Current."

The Humboldt Current, which is more intense during the austral winter, transports sub-Antarctic, low-salinity (35%), cool (17-21°C), surface (<80 m deep) water northward at a speed of about 3.5 to 13 km a day (Montecino and Lange 2009:66; Webb and Fernández Baca 1990:892). The waters of this current exhibit a temperature that is unusually cold for a tropical ocean so close to the equator, where neighboring waters exceed 25°C. As noted, this contributes to the aridity of the coastal belt. In fact, so intense is the effect of this current upon the aridity of coastal Peru that, during his sojourn onboard the *Mantaro*, Murphy (1925:37) evokes the "dramatic suddenness of the break between the mangrove swamps and tree-bordered savannahs of Ecuador and the Deserts of Peru." "The traveler" –continues Murphy– "feels the effects of the current as soon as he enters it; he notes at the same time a sudden and extraordinary change in the world about him" (*Ibid*.:158). Murphy likewise recalls a local commenting that "[w]hen you see no more trees, it is Peru" (*Ibid*.:36). Moreover, he talks of Punta Pariñas (~4°40'S), where the current swerves west, as marking a line "which unlike the equator, could hardly be called imaginary, for it separated two great marine realms of striking differences in both physical features and faunal types."

The low temperature of the Humboldt Current is due both to the fact that it carries cold waters from the south pole northward, and especially to the process of coastal *upwelling* that develops in its midst (Karstensen and Ulloa 2009:387). Upwelling is a *physical process* whereby sub-superficial layers of water –which are colder than the water above– rise (are upwelled) towards the ocean's surface (*cf.* Bakun 1996:46). This phenomenon occurs as a result of the air-ocean being deflected eastward (in the Northern Hemisphere) or westward (*i.e.* towards the left in the Southern Hemisphere) due to the Coriolis Effect[11] and friction forces in the viscous water column (Schweigger 1958; Tarazona and Arntz 2001:231). Then, this largescale offshore movement of ocean-surface water causes –in accordance with the laws of mechanics whereby fluids flow from higher to lower pressures so as to conserve mass– that deeper waters move in and replace the newly deflected layers (Bakun 1996:45). This displacement of ocean-surface

[11] The Coriolis Effect (or force) is derived from Isaac Newton's classical mechanics equations when applied to a rotating coordinate system (Moore 2015). As the Earth rotates eastward about its fixed axis, an inertial force acting perpendicular to the direction of motion of a body in a given frame of reference (a medium), causes it to deflect or swerve towards the right in the Northern Hemisphere and towards the left in the Southern Hemisphere, relative to an observer sharing the same frame. This phenomenon was described by French mathematician Gaspard-Gustave de Coriolis (1835). The magnitude of the Coriolis force, $\vec{F}_c$, is given by the equation: $\vec{F}_c = -2m(\vec{\omega} \times \vec{v})$, where m is a body's mass, $\vec{\omega}$ is the angular velocity of a rotating system seen from an inertial frame, $\vec{v}$ is the body's velocity in the rotating system, and $\times$ is the cross product of these two vectors.

water, perpendicular to and provoked by the coastal winds, is known as *Ekman transport* –named after Swedish oceanographer Vagn Walfrid Ekman, who examined this phenomenon in his classic 1905's *On the Influence of the Earth's Rotation on Ocean-Currents*– and responds to a balance between the Coriolis force and wind stress (*Ibid*.:36) (Figure 3). Ekman transport is proportional to the wind stress and inversely proportional to latitude, so it attains its highest values the closer to the equator it occurs (and vice versa).[12] Thus, a given wind speed will cause about four times as much Ekman transport (and resulting upwelling) at, for instance, 9°S latitude (off Peru) than at 40°N latitude (off California) (*Ibid*.:154).

The upwelling of cold, deeper waters not only brings subsurface sea properties onto the ocean's upper layers, but also, more importantly, it carries vast influxes of nutrients into the illuminated surface (known as the *euphotic* or *epipelagic* zone), where they support life processes and make the upwelled regions some of the most abundant in oceanic biomass worldwide (*Ibid*.:18). This is why Hutchinson (1950:365) succinctly described upwelling as causing "the enhanced fertility of the seas." Likewise, in *The Sea Around Us* (2018 [1951]) –the book that made her world famous a decade before *Silent Spring* (Lear 2009)– Rachel Carson clearly described this process as follows:

> …upwelling of cold, mineral-laden water from deeper layers of the sea provides the fertilizing elements to sustain the great food chains…Down along the west coast of South America, the astonishing profusion of life in the Humboldt is maintained by upwelling, which not only keeps the waters of the current cold in all its 2,500-mile course to the Galapagos Islands but brings up the nutrient salts from the deeper layers. When upwelling takes place along coastlines, it is the result of the interplay of several forces–the winds, the surface currents, the rotation of the earth, and the shape of the hidden slopes of the continent's foundations. When the winds, combined with the deflecting effect of rotation, blow the surface waters offshore, deep water must rise to replace it.

The world's main coastal upwelling regions are all located along eastern ocean boundaries: the California Current region off the western U.S. and northwestern Mexico (28–43°N), the Canary Current off northwestern Africa (12–25°N), the Benguela Current System off southwestern Africa (15–35°S), and the Peru-Chile current system (4–14°S) (Bakun 1985, 1996:44–45; Hutchinson 1950:8; Jarre-Teichmann 1998). In addition, other important upwelling areas include the Somali Current, the northern portion of the Gulf of Guinea off Ivory Coast and

[12] Mathematically, in its simplest terms, Ekman transport, T, is defined by the equation $T = k \times (\tau f^{-1})$, where k is "the upward unit vector" and f is the Coriolis parameter (=$2\omega \sin \varphi$; where φ is latitude and ω is the angular velocity of the Earth, 7.29×10^{-5} s^{-1})(Maeda and Kishimoto 1970:301).

Ghana, the waters off southeastern Brazil, and India's Malabar Coast (Bakun 1996:46–47). All of these regions share several biophysical and ecological features, but it is Peru's current system –given a series of factors that will be addressed below– that stands alone in terms of fish biomass, which in turn has manifold ecological implications within this intricate whole (Bakun and Weeks 2008:290).

Off Peru, as noted, the trade winds blow equatorward with regularity, which causes westward Ekman transport and upwelling, as the Peru Current moves out to sea. For the most part, upwelling along the Peruvian coast is superficial, with low-oxygen (4 mL L^{-1}), saline, and cold water being drawn from a 50 to 150 m depth, and is particularly strong at 4-6°S, 7-9°S, 11-13°S, and 14-l6°S (Tarazona and Arntz 2001:231). Specifically, these upwelling plumes receive water from the Cromwell Current, Peru's Subsurface Countercurrent, and from sub-Antarctic temperate water (*Ibid*.). The volume of upwelled water off Peru totals about 3 x 10^{12} m^3s^{-1} (equivalent to filling some 1,200,000 Olympic-size swimming pools every second), with a mean upwelling rate of approximately 2.2 m^3s^{-1} per meter of coast, and an average ascending velocity of 20 x 10^{-5} cm s^{-1} (Chavez *et al*. 1989:53; *Ibid*. 2001). Upwelling off Peru occurs year-long and shows an annual cycle, being at its weakest (1.14 $m^3s\text{-}^1m^{-1}$) in January, and attaining its highest values (2.8 $m^3s^{-1}m^{-1}$) in July, during the austral winter. In addition, surface nutrients are present as far as some 180 km from the coast within a mean annual area of upwelling no bigger than 220 x 10^3km^2 (an extension almost three times the size of Lake Superior) (Copin-Montégut and Raimbault 1994:456; Nixon and Thomas 2001:2527). Of all coastal upwelling regions worldwide, Peru's is unique in that it is the one nearest to the equator, which allows for continuous nutrient enrichment with significantly less of the unfavorable turbulence that would be a byproduct at higher latitudes. Again, the same intensity of wind-driven coastal upwelling is about eight times more turbulent off California as off Peru. Thus, even relatively week winds along this coast can ultimately result in a high rate of upwelling, allowing nutrient *enrichment*, *concentration*, and *retention* at the steady coastal ocean surface, unlike anywhere else on Earth (Bakun 1996:155).

Additionally, Peru's upwelling system is located at the end of the Pacific equatorial wave guide, where it "bears the full immediate brunt" of El Niño-Southern Oscillation (ENSO) (Bakun and Weeks 2008:294) "After the cycle of the seasons" –says Davis (2017:253)– "ENSO is the most important source of global climate variability." As Norwegian-U.S. meteorologist Jacob

Bjerknes –son of Vilhelm Bjerknes, one of the founders of weather forecasting– put it, SO and El Niño are the respective atmospheric and oceanic expressions of solar energy cycling through the entwined ocean-atmosphere system (Bjerknes 1969; Davis 2017:243). ENSO (a term first used by Rasmusson and Carpenter in 1982) is the result of a profound alteration in the ocean-atmosphere system, and is constituted by the two aforementioned intertwined expressions. The SO results from a positive feedback loop, whereby the pressure differential between the eastern (high) and western (low) equatorial Pacific forces cold, dry air westward, where it progressively heats up and moistens, which in turn pools more warm air and water in the west, reinforcing this westward flow (Davis 2017:243). Thus, like a pressure, wind, and rainfall seesaw across the Pacific, this intensified flow or Walker circulation –as J. Bjerkens called it in honor of Sir Gilbert T. Walker[13]– is dialectically both the cause and effect of the flow.

Relatedly, El Niño[14] is the *warm* phase of the SO oscillation (its opposite being La Niña) and denotes and inversion wherein the trade winds are weak, and pressure is low over the eastern and high over the western tropical Pacific, which occurs about every two to seven years (Davis 2017:248; Philander 1990:4). El Niño manifests itself primarily as an incursion of warm waters from the western Pacific Ocean towards the coasts of The Americas, and is especially influential at tropical latitudes (Nelson 1978:598). The warming results from both the eastward transfer of warm surface waters by Walker circulation and the suppression of wind-driven coastal upwelling off Peru (Davis 2017:228; Philander 1990:24; Wyrtki 1975:572).[15] Off Peru, this phenomenon is a clear example of a qualitative change (a regime shift in the whole ecosystem) that originates from a quantitative one (*i.e.* an increase in water temperature). Consequently, ENSO exerts –both directly and indirectly– a profound influence on the climate and ecology[16]off Peru (as well as several other regions), as will be seen below.

[13] Walker was a British physicist who first used and defined the term Southern Oscillation (SO) in 1924. (*cf*. Davis 2017, chapter 7, for a succinct review of ENSO and the history of its discovery. See also Philander 1990).

[14] There exists some confusion because the term "El Niño" (Spanish for "the Child [Jesus]") was initially used only to describe a local, weak, warm, and seasonal current off the coast of Peru, that usually appeared around Christmas.

[15] Codispoti (1983:136) argues that: "The decreases in biological production associated with this perturbation do not arise from a reduction in upwelling as previously thought. Upwelling continues but the nutrient supply is reduced mainly because of a reduction in the nutrient content of the upwelling source waters."

[16] Of course, ENSO also has manifold economic, social, political, and cultural implications (*cf*. Davis 2017).

1.2.3. For simple to complex chemistry and from complex chemistry to biology

As noted, coastal upwelling brings cold waters with high nutrient content and low oxygen[17] levels to the ocean surface (Copin-Montégut and Raimbault 1994:441). The main nutrients in the ocean –which are concentrated within upwelling regions– are nitrogen (N), phosphorus (P), and carbon (C), along with other essential elements such as silicon (Si) and iron (Fe), all of which are present in diverse molecular forms. Each of these elements follows its own biogeochemical cycle, all of which have been ongoing for billions of years, and which are parts of the whole Earth-system metabolism. For instance, the ocean receives N from its inextricable interaction with the atmosphere (deposition), the inflow of rivers, and through metabolic processes within (fixation), and also loses this element through denitrification, oxidation, emissions, and burial (Duce *et al*. 2008:893). In sea water, more than 95% of N occurs as dissolved, gaseous N_2, the reminder being present either as nitrate (NO_3^-), nitrite (NO_2^-), ammonium (NH_4^+), or dissolved organic compounds (DON) (Voss *et al*. 2013:2). Likewise, the ocean receives C mostly as gaseous CO_2 it absorbs form the atmosphere (to which it also emits C), as well as from rivers, estuaries, and wetlands, which transport it in both inorganic (*e.g.* weathered carbonates) and organic (*e.g*. leaked C fixed by land photosynthesis) forms (Bauer *et al.* 2013; Regnier *et al.* 2013:2). Phosphates and silicates also reach the ocean via riverine runoffs of weathered rocks or coastal sediments, and so does Fe, which also enters as atmospheric dust (van Bennekom and Salomons 1981:33; Boyd and Ellwood 2010:678). In equatorial upwelling regions, the ratio (or stoichiometry) of C to N to P is about 137:18:1 (Martiny *et al*. 2013). That is, there are roughly 137 C atoms (or *e.g.* g or tons) and 18 N atoms (or g or t) for every P atom (or g or t). In

[17] At the opposite pole of the upwelling process and partly as its result, an ever richer rain of organic matter –dead organisms that thrived off the nutrients provided by upwelling and their refuse– sinks towards the sea bottom. During their downward journey, bacteria consume the oxygen (O_2) dissolved in the water at a faster rate than it is replenished by photosynthesis, exchange with the air, or lateral transfer (Bertagnolli and Stewart 2018). This, together with poor horizontal ventilation, creates an oxygen-deficient –indeed oxygen-minimum– layer of water, containing dramatically less of the gas than the sea above or below (Levin 2002:436). Off Peru, this permanent oxygen-minimum zone (OMZ) –volumetrically the fourth largest on Earth ($2.18 \pm 0.66 \times 10^6$ km^3, roughly four times the volume of the Black Sea)– develops from old, low-oxygen waters in the somewhat deep north Pacific Ocean, that are further O_2 depleted in the OMZ off Mexico, and are finally transported into the east Pacific coast, where the foregoing *in situ* O_2 consumption takes place (Fuenzalida *et al*. 2009:1003). Whereas the dissolved superficial O_2 concentration off Peru is about 2-7 mL L^{-1}, in the OMZ (located at a 50 to 700 m depth) O_2 levels drop below 0.5 mL L^{-1} (Tarazona and Arntz 2001:232). The OMZ is functionally anoxic, and only anaerobic microorganisms prosper in it, which makes it an essential sink for N (Chavez *et al*. 2008:95; Montecino and Lange 2009:71). In addition, O_2 concentrations seem to be the main selective factor for bacteria, invertebrate, and fish distribution off Peru (Tarazona and Arntz 2001:232).

particular, a study also found an average P:N:Si ratio of 1:7.4:7.3 at the Peruvian coast (Calienes, Guillén, and Lostaunau 1985:8).

Off Peru, the cold (~14°C) upwelled waters are characterized by high phosphate (PO_4^{3-}) (>2.5 μg L^{-1} = 2.6 x 10^{-5} mmol L^{-1}), silicate (*e.g.* $Si(OH)_4$) (up to 20 μg L^{-1}), nitrite (NO_2^-) (0.1-1.6 μg L^{-1}), and nitrate (NO_3^-) (0.5-20 μg L^{-1}) concentrations, that tend to decrease at about 90 km offshore (Copin-Montégut and Raimbault 1994:446; Tarazona and Arntz 2001:232).[18] These minuscule nutrients are the foundations upon which life –both directly and indirectly– produces and reproduces itself along this coast, giving rise to a varied and intimately interwoven web. In this process, nutrient consumption becomes also production, as living beings take and incorporate the environmental elements that produce them; and production is also consumption, as life, by producing itself, consumes the energy and matter it assimilates, discarding some of it as waste, which is then incorporated again into the cycle. Each process is thus immediately its opposite. Productive consumption and consumptive production are interpenetrated in this interaction between chemistry and biology (*cf.* Levins and Lewontin 1985; Marx 1993b:90–92).

1.3. Biology within the Humboldt Current Ecosystem or Biogeocoenose[19,20]

1.3.1. Bacteria and the nitrogen and sulfur cycles

Bacteria, which are sometimes overlooked in trophic chains, are essential to supporting oceanic ecosystems in general and off Peru in particular. Research suggests that the dominant N fixers in the ocean are the colony-forming cyanobacteria of the genus *Trichodesmium* (Bergman *et al.* 2013). These bacteria convert N_2 into forms that can be utilized by most marine organisms –in a

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[18] 1 microgram (μg) is equal to one millionth (1 x 10^{-6}) of a gram (g).

[19] It is important to note that what follows is primarily based on research carried out during the 20th and 21st centuries, although some of the scant and vital 19th-century analyses were also consulted. Throughout this work, it will be assumed that the overall 20th-century ecological conditions off Peru are sufficiently similar to those in the 19th century, which are the object of this investigation. Yet, this assumption is a reasonable one (*cf.* Hutchinson 1950:3).

[20] The biogeocoenose concept was developed by prominent Soviet geobotanist Vladimir I. Sukachev (1964:26), and is defined as a "a combination on a specific area of the earth's surface of homogeneous natural phenomena (atmosphere, mineral strata, vegetable, animal, and microbic life, soil, and water conditions), possessing its own specific type of interaction of these components and a definite type of interchange of their matter and energy among themselves and with other natural phenomena, and representing an internally-contradictory dialectical unity, being in constant movement and development." This holistic ecological notion is the Soviet counterpart to the Western concept of "ecosystem" developed by Arthur Tansley (1935:299), a British botanist also influenced by Marx via R. Lankester (*cf.* Foster 2020).

reaction catalyzed by nitrogenase, an enzyme system that requires iron (and sulfur and molybdenum)– as the foundation for essential compounds such as chlorophyll, proteins, nucleic acids, and adenosine triphosphate (ATP, the central source of energy in biological reactions) (Deutsch *et al.* 2007:163). This is why N (along with Fe) is a critical limiting element for life production and growth, as its concentration appears to be proportional to the amount of oceanic primary production in upwelling systems, in accordance to German scientists Carl Sprengel's and Justus Liebig's "law of the minimum" (*cf.* Chapter 2; Foster 2020:31; Mendo, Bohle-Carbonell, and Calienes 1989:65). In addition to *Trichodesmium*, another N_2 oceanic fixer is the cyanobacterium endosymbiont *Richelia intracellularis*, located in some diatoms (a group of unicellular algae), as well as other unicellular cyanobacteria such as *Cyanthoce* spp. (Gómez, Furuya, and Takeda 2005; Zehr *et al.* 2001). In particular, off Peru, *Thioploca araucae*, *T. chileae*, and *Beggiatoa* spp. mats occupy the oxygen-deficient regions under the euphotic zone. These extensive, filamentous, and benthic mats –located predominantly at a depth between 40 and 280 m and occurring over 3,000 km (~18°S-6°S)– store, transport, and convert nitrogen into biologically available compounds, and are thus central for the metabolic cycle of this element (and also sulfur) within the Humboldt Current (eco)System or biogeocoenose, hereafter referred to as the HCS (Fossing *et al*. 1995; Montecino *et al*. 2006:21–22; Tarazona and Arntz 2001:236).

1.3.2. Primary producers: phytoplankton

Phytoplankton ("plant wanderers," according their historical and poetic, albeit scientifically inaccurate, name) are miniscule photosynthetic *algae* that drift with the current, and are numerically most abundant in upwelling regions (Bowler, Vardi, and Allen 2010:334; Mann, Crawford, and Round 2017:7). Phytoplankton requires N, P, C, Si, and Fe –together with zinc, manganese, and vitamins– to synthesize proteins, nucleic acids, cell walls and membranes, chlorophyll, ATP, express several genes, and carry out manifold metabolic processes (Bowler *et al*. 2010:344; Brembu *et al*. 2017; Smith *et al.* 2019). In fact –as the influential U.S. oceanographer Alfred Redfield (1934) discovered– the growth of plankton is limited by the amounts of N and P available for its use. Phytoplankton is at the base of marine food chains, supporting much of the higher trophic levels by carrying out at least half of the planet's primary production, the process whereby autotroph organisms do photosynthesis, *i.e.* the harvesting of light energy to create carbohydrates from CO_2 and water (Bowler *et al.* 2010:334). The two main members of phytoplankton, both ocean-wide and within the HCS, are diatoms (division Bacillariophyta) and dinoflagellates (Pyrrophyta).

Diatoms, perhaps the best-known constituent of phytoplankton, of which there are some 100,000 estimated species worldwide, are a group of unicellular (even if sometimes colonial), photosynthetic, and mainly free-living algae, which occur mostly in marine and freshwater habitats (Mann *et al*. 2017:207). Their most distinctive feature is an elegant silicified cell wall known as *frustule*, a structure unlike anything present in other organisms (Bowler *et al.* 2010:334; Mann *et al.* 2017:207). Originally named by Lamarck[21]and de Candolle (1805:115), diatoms probably originated around the Early Mesozoic and appear in the fossil record since the Early Cretaceous (Bowler *et al.* 2010:341; Mann *et al.* 2017:213, 249). They represent the fast growing component of phytoplankton and are particularly dependent upon silica (to build their frustules), which they incorporate roughly in the same amount as N (Dugdale 1983:175; Grasse *et al.* 2016:1662). In fact, "[e]very atom of silicon entering the ocean has been estimated to be incorporated into a diatom cell wall approximately 40 times before sinking to the seafloor" (Bowler *et al.* 2010:334). Diatoms range in size from microns to mm, and generate about 40% (40-50 billion tons) of the total organic matter generated by photosynthesis in the ocean every year, an amount roughly corresponding to that of all tropical rain forests combined. In fact, a significant fraction of petroleum deposits is derived from sunken diatoms over geological timescales (*Ibid*.:335).

For their part, dinoflagellates –a name coined by C.G. Ehrenberg in 1830 (Moestrup and Calado 2018:3)– are another pervasive component of upwelling phytoplankton populations, second only to diatoms as primary producers in coastal waters. These primarily unicellular and asexually-reproducing organisms seem to grow more slowly than diatoms do (Carty and Parrow 2015:773; Dugdale 1983:175). More than 2,000 extant species of dinoflagellates have been described –of which 90 percent are marine– along with other 2,500 found in the fossil record all the way to the early Mesozoic, although these organisms might have originated much earlier,

[21] Lamarck, to whom, in the words of E. Haeckel (1876:111) (translated from German by E. Ray Lankester, a close friend of both Darwin and Marx, *cf.* Foster 2020): "will always belong the immortal glory of having for the first time worked out the theory of descent, as an independent scientific theory…and as the philosophical foundation of the whole science of biology," invented (along with G. Treviranus and K. Burdach) the very word "biology" in 1800. Lamarck also coined the term "invertebrate" and created the groups "Crustacea" and "Arachnida," as well as the "dichotomous key" for species identification. Moreover, in his 1802 *Hydrogéologie*, he first used the holistic word "biosphere", later recovered by Austrian geologist Eduard Suess and Soviet geochemist Vladimir I. Vernadsky (Vernadskiĭ 1998:172).

during the Early Cambrian (~520 million years ago) (Moldowan and Talyzina 1998:1168; Taylor, Hoppenrath, and Saldarriaga 2008:407, 413). About half of dinoflagellates are photosynthetic, with the remainder being either mixotrophs (*i.e*. capable of both carrying out photosynthesis and feeding) or grazers (strict heterotrophs), which eat other plankton such as diatoms or sometimes each other, and some species can even feed on zooplankton and fish eggs (SCRIPPS 2020; Taylor *et al.* 2008:407).[22]In addition, some dinoflagellates establish symbiotic relationships with other plankton (*e.g*. foraminifera), coral, jellyfish, flatworms, and mollusks (SCRIPPS 2020). Many of them range from 15 to 40 μm in size, although the largest, *Noctiluca*, may be up to two mm in diameter (*Ibid.*). Most dinoflagellates exhibit a pair of flagella which make them motile, and thus able to migrate through the water column in search for light or prey.

Off Peru, the HCS's phytoplankton community is composed of dinoflagellates (209 species), followed by diatoms (169 species) that form chains and have high reproduction rates, coccolithophores (12 species), phytoflagellates (4 species), and silicoflagellates (3 species) (GEF *et al.* 2002:31).[23] Among the most conspicuous diatoms are the genera *Chaetoceros* (*e.g. C. affinis*, *C. debilis*, *C. radicans*), *Coscinodiscus*, *Rhizosolenia*, *Skletonema,* and *Lithodesmium*. Likewise, some of the most abundant dinoflagellates are *Ceratium* (*e.g. C. gibberum*, *C. trichoceros*, *C. macroceros*), *Protoperidinium*, *Gymnodimium*, *Diplopsalis*, and *Ceratocorys* (Espinoza and Bertrand 2008:218; GEF *et al.* 2002:32; Medina *et al*. 2015:50; Tarazona and Arntz 2001:233). Additionally, important silico- or phytoflagellates within the HCS are *Dictyocha*, *Octactis*, and *Tetraselmis* (Espinoza and Bertrand 2008:218). In this upwelling system, phytoplankton biomass is large –especially in the austral spring, summer, and fall– averaging a volume of 3 mL m^{-3}, and producing about 3.84 mg C m^{-2} a day (GEF *et al.* 2002:32; Tarazona and Arntz 2001:32). Thus, interestingly and in seeming paradox, primary production off Peru is out of phase with the winter's upwelling peak (as noted, occurring in July), a unique trait among coastal upwelling systems that seems to be explained by iron and/or light limitations in the winter (Chavez *et al*. 2008:103; Montecino and Lange 2009:67; Pennington *et al.* 2006:297). In all, as Murphy (1925:179) articulately put it: "In this chain the diatoms [and the

[22] For this reason, some dinoflagellates are classified as zooplankton rather than as phytoplankton.

[23] Mann *et al.* (2017:208) and Carty and Parrow (2015:788) show, respectively, very illustrative photographs of diatoms and dinoflagellates.

other phytoplankton] are the connecting link with the animal world." Moreover, he summarized the interconnection of geological, physical, and ecological processes by stating that:

> It is upon such a causal sequence that the life of the Humboldt Current depends, a sequence beginning with the energy of the sun, and continuing through barometric pressure, winds, oceanic temperature, circulation, density, and salinity, bacterial action, the presence in the water of substances essential in small quantities for sustaining life, the physiology of microscopic sea weeds and the consequent building up of complex proteins suitable for the food of small forms of animal life (*Ibid.*).

This perspective was shared by Soviet scientists M.E. Vinogradov and E.A. Shushkina (1978), who examined the metabolism of all the elements of Peru's HCS. Leaving behind the realms of bacteria and algae, it is now to the animal world that we turn our attention.

1.3.3. Secondary producers: zooplankton and the animal word

The zooplankton –a diverse group comprised by both protists[24]and animals– are the most basal secondary producers of the ocean. Zooplankton feeds on phytoplankton, other zooplankton, and, as noted, may even prey on larvae and fish eggs, assimilating the nutrients (N, P, Si, Fe, vitamins, among others) the latter metabolized, as well as the organic C phytoplankton produced through photosynthesis. Marine zooplankton is composed by both organisms that remain in a planktonic stage throughout their whole lifetime (holoplankton), and those that are planktonic only during their larval stage (meroplankton), like some crustaceans, mollusks, and fishes (GEF *et al.* 2002:38). Off Peru, due to the foregoing upwelling of the nutrient-rich soup and the ensuing thriving of phytoplankton, zooplankton biomasses are among the highest for marine ecosystems at lower latitudes (Ayón *et al.* 2008:240).

The most important zooplankton group within the HCS are *crustaceans*, and among them the *copepods* –of which there are 152 known species in this ecosystem alone–, along with the amphipods (54 species), krill (13), cladocerans (5), and barnacles (cirripedes) (2) (GEF *et al.* 2002:38). Off northern Peru, an analysis found that as much as 98 percent of the zooplankton is composed of crustaceans, with copepods –especially the omnivore holoplanktonic species *Acartia tonsa* and *Parcalanus parvus*– being the most abundant and frequent group (Gutiérrez *et*

[24] The category of protists englobes unicellular organisms that have a nucleus (*i.e.* eukaryotes) and are not plants, fungi, or animals. They form a heterogeneous group of 80,000 described species (probably ~10% of the Earth's total) that do not share an immediate common ancestor (Brusca and Brusca 2003:2). *Cf.* Scamardella (1999) for a brief review of the history of the classification of these and other organisms.

al. 2005:25). In addition, there are more than 130 non-crustacean species of zooplankton off Peru, including jellyfish (60 species), siphonophores (29), chaetognats (14), salps (12), ctenophores (5), and polychaetes (4), among other groups such as decapods, brachiopods, bivalves, foraminiferans, rotifers, and radiolarians (*Ibid.*). The volume of zooplankton off Peru averages some 0.85 ± 0.4 mL m^{-3}, attaining its highest values over spring (Carrasco and Lozano 1989:84).

The species composition and distribution of zooplankton off Peru varies in relation to the concentration of nutrients and oxygen in the water, advection, trophic interactions, community succession, and larval production (Ayón *et al.* 2008:238). According to Santander (1981), there are three major zooplankton groups off Peru: that of the continental shelf (the shallow seabed closest to the landmass) within some 30 km off the coast; the continental slope group (located between the shelf's edge and the ocean floor); and the oceanic group, beyond 50 km off the coast. The first group is dominated by the copepods *A. tonsa* and *Centropages brachiatus*, followed by polychaetes' larvae, brachiopods, cirripeds, and countless radiolarians. The second one, by the coepods *P. parvus* and *Calanus* spp., along with siphonophores, bivalves, foraminiferans, and radiolarians; and the third group, by larger copepod species (*e.g. Corycaeus* spp., *Lucicutia flavicornis*, and *Corycella* spp.) (Tarazona and Arntz 2001:234). The highest zooplankton biomass and abundance is found where continental shelves are narrow (*i.e.* between 4-6°S and 14-16°S) and tends to decrease from north to south (Ayón *et al.* 2008:238; Tarazona and Arntz 2001:234). Due to the aforementioned oxygen-minimum zone (OMZ) at greater depths, most zooplankton is confined to the uppermost 30 m of water, although two species –the copepod *Eucalanus inermis* and the euphausiid *Euphasia mucronata*– can occupy this practically anoxic layer (Ayón *et al.* 2008:244).[25]

Euphausiids (krill) are another important group of zooplankton off Peru. These minute, shrimp-like, omnivorous crustaceans, that have existed since lower Cretaceous times (Jarman 2001), are particularly keen on devouring diatoms, and sustain countless animals by directly being the food of several species of squid, fish, penguins, seals, and even blue whales, among others. Off Peru, the endemic *E. mucronata* is the most abundant species of krill, which may contribute up to half of the total biomass in the HCS, playing a major role in transferring primary

[25] COPEPODIA (2020) and Riquelme-Bugueño *et al.* (2016:437) show, respectively, clear photographs of *Eucalanus* spp. and *Euphausia mucronata* (krill).

production to fish and other higher trophic levels (Ayón *et al.* 2008:247; Chavez *et al.* 2008:103; Montecino *et al*. 2006:12). *E. eximia* is also a very important species off Peru, particularly during El Niño years (Karstensen and Ulloa 2009:390), along with *E. tenera*, *E. distinguenda*, *E. lamelligera*, and *Nyctiphanes simplex* (Ayón *et al*. 2008:243). With this cyclical advent of ENSO's warm phase, zooplankton –and in turn fish– commonly experience high mortality rates, being temporarily replaced by invertebrates that thrive in or migrate from tropical areas, such as jellyfish, salps, chaetognaths, shrimp (*e.g. Xiphopeanus riveti*), crabs (*Euphylax* spp.), and lobsters (*Panulirus gracilis*) (Tarazona and Arntz 2001:240).

In all, zooplankton grazing consumes somewhere between 5% to almost 60% of primary production off Peru and northern Chile, although some studies suggest this value is closer to 25-35% (*cf*. Beers *et al.* 1971; Montecino *et al.* 2006:14). Yet, another distinctive feature of the HCS is its low (4-6%) energy transfer efficiency from primary to secondary production, which nonetheless can still sustain massive higher trophic levels (Jarre-Teichmann 1998; Tarazona and Arntz 2001:234), including populations of migratory fishes and invertebrates that occur further offshore (GEF *et al.* 2002:17). Relatedly, zooplankton recycles between 1 and 25% of the total N required to support phytoplankton production (*cf.* Ayón *et al.* 2008:249), thus simultaneously engaging in metabolic production and consumption. In turn, zooplankton participates in C exchanges through respiration, decay, and fecal matter that sinks to the OMZ (Montecino and Lange 2009:69). Importantly, despite decades of attainment of invaluable knowledge on the ecology, evolution, physiology, morphology, and behavior of zooplankton off Peru (and worldwide), vast pieces of this intricate whole are yet to be understood –or altogether discovered– as is the case with all other taxa within the ecosystem.

1.3.4. The fishes of the HCS: "the heavyweight champions of the world"

The marine fish community off Peru and Northern Chile is composed of at least 727 species: two lamprey, 108 of cartilaginous fishes (*e.g.* sharks and rays), and 617 bony fishes, the latter comprising 85% of the region's fish biodiversity (Vildoso *et al.* 1999:55–56). This varied community is composed of everything from rockpool, rocky and sandy bottoms, flounder, schooling, cusk-eel, to predaceous species (Murphy 1925:231). Fish diversity is higher off northern Peru, in the warmer, mangrove ecosystem closest to the equator, and decreases south of 6°S, in the colder, dry region influenced by the Peru-Humboldt Current, which is inhabited by roughly a dozen fish species, most of them endemic. Among the most ecologically (and economically) important species in the HCS are the Pereciformes (*i.e.* perch-like) Cabizna grunt (*Isacia conceptionis*), Chilean jack (or horse) mackerel (*Trachurus murphyi*), Corvina (*Cilus gilberti*), lorna drum (*Sciaena deliciosa*), Palm ruff (*Seriolella violacea*), and Peruvian grunt (*Anisotremus scapularis*); along with the Scombriformes (mackerel-like) bonito (*Sarda chiliensis*) and mackerel (*Scomber japonicus*); the Clupeiformes (herring-like) Pacific menhaden (*Ethmidium maculatum*), Peruvian anchoveta (*Engraulis ringens*) and Peruvian Pacific sardine (*Sardinops sagax*); and three species from different orders: the hake (*Merluccius gayi*), the mote sculpin (*Normanichthys crockeri*), and the Peruvian silverside (*Odontesthes regia*) (Muck 1989; Murphy 1925:59) (Figure 1.2).

Figure 1.2. Key fishes of the HCS. Up left, the anchoveta (*Engraulis ringens*) (© Robert Eakins); up right, the Peruvian silverside (*Odontesthes regia*) (©Alfredo Carvahlo). Down to the left, the bonito (*Sarda chiliensis*) and down to the right, the sardine (*Sardinops sagax*) (© Philippe Béarez). All images taken from FishBase.

These species were scientifically named by naturalists such as Georges Cuvier and Humboldt and, in particular, the sardine (*S. sagax*) and anchoveta (*E. ringens*) –the latter being the most abundant and important species of the HCS– were termed and described in 1842 by Darwin's "dour friend," the parson-naturalist and vicar of Swaffham Bulbeck, Leonard Jenyns (Desmond and Moore 1994:225; Pauly 2004). These two fishes –along with another 135 species– were dubbed from two specimens collected by Darwin while in or near Iquique's harbor, which Jenyns received out of kindness following other naturalists' reluctance to take them (Desmond and Moore 1994:225; Jenyns 1842:136–37). In fact, Jenyns himself had turned down the offer to join the *Beagle's* expedition on account of his parish duties and suggested – along with John S. Henslow, Jenyns's brother-in-law and Darwin's and Jenyns's mentor at Cambridge– that Darwin go instead (Desmond and Moore 1994:103). Darwin and his wife Emma even named their eighth child Leonard, in honor of Henslow's firstborn and Jenyns, and Jenyns was close enough to Darwin to receive one of the complementary copies of *On the Origin of Species* prior to its publication on 24 November 1859 (*Ibid*.:377, 477). This connection of seemingly disparate events shows how *E. ringens*, the main and most prevalent fish in Peru's littoral, is interrelated to the development of the most influential theory of evolution to this day, as well as to British imperial expansion.

As noted, *E. ringens* is a clupeoid, a type of fish that has existed since Lower Cretaceous times, and has been the most abundant small (<20 cm in length) pelagic fish off Peru for the last 25,000 years, and especially during the last 200 years (Chavez *et al.* 2008:97; Lavoué *et al.* 2013; Salvatteci *et al.* 2019:19). This omnivorous anchoveta is widely distributed along South America's west coast (~4-42°S), occurring by the trillions above the OMZ in the cold, nutrient-rich upwelled waters (Nelson 2005:380, 467; Salvatteci *et al.* 2019:3).[26]According to the currently most thorough study on Peruvian anchoveta stomach contents –based on more than 20,000 samples obtained over an eight-year period and combining the results of several earlier works– this species preys on at least 132 different taxa, including 38 diatoms, 34 copepods, 16 dinoflagellates, and 9 tintinnids, along with several other organisms (Espinoza and Bertrand 2008:216–23). In terms of *abundance*, phytoplankton –especially the diatoms *Coscinodiscus*, *Thalassiosira*, *Ditylum*, *Rhisozolenia*, and *Caetocheros*, along with the dinoflagellates *Protoperidinium* and *Ceratium*– dominates the diet of Peruvian anchoveta, comprising 99.5% of all ingested prey, the small remainder corresponding to zooplankton, particularly to copepods (chiefly *Eucalanus*, *Calanus*, and *Centropages*) and euphausiids (such as *E. mucronata*) (Medina *et al.* 2015:50; Espinoza and Bertrand 2008:217).[27] Although the amount of ingested zooplankton seems negligible, it actually contributes 98% of the anchoveta's dietary carbon,

[26] Among the first scientists to study the ecology of the anchoveta (and the HCS in general) was U.S. zoologist and marine biologist Robert E. Coker, who was appointed in June 1906 by the U.S. Bureau of Fisheries to "procure, with scientific principles as a guide, the conservation and reproduction of species of fish" in Peruvian waters (Cushman 2014:148). Murphy (1925) also studied the fish of Peru, as did U.S. ecologist William Vogt (1942) along with many others (*cf.* Rojas de Mendiola 1989:98).

[27] Specific nutrient flows, plankton species, and fish diets may vary importantly along Peru's diverse coast.

whereas phytoplankton provides only 2% of this element (Espinoza and Bertrand 2008:217). Thus, tracing C (or energy) flows is more ecologically insightful than relying on abundance counts, since the former reveal that, here, it is actually zooplankton –rather than phytoplankton as was commonly hitherto inferred– that primarily supports anchoveta (and sardine) populations off Peru (*Ibid*.:215). This is mainly due to the fact that zooplankton (copepods and euphausiids) –with a size range in the order of 10 mm– are some 10,000 times larger than phytoplankton (*e.g.* diatoms), which are about 10^{-3} mm in length (*Ibid*.:220). Thus, the anchoveta obtains nutrients from phytoplankton –as its long intestine, proper of herbivorous organisms, ascertains– and energy from zooplankton (Chavez *et al.* 2008:98).

In terms of its feeding habits, anchoveta larvae gradually shift from a phyto- to a zooplankton diet as they grow (in contrast to sardine of all size and classes, which rely on an almost pure zooplankton diet) (Muck, Rojas de Mendiola, and Antonietti 1989:91). In addition, anchoveta can also easily switch from filtering to particulate feeding (the main differences being a larger duration and a smaller rate of mouth opening in the former case, along with straight-line gliding) (Leong and O'Connell 1969:558–59; Rojas de Mendiola 1989:97). Anchoveta feed in massive schools, mainly during daytime between 7:00 and 18:00, when primary production is highest, although they have also been found to forage later in the evening and even at night (Espinoza and Bertrand 2008:219). Moreover, the anchoveta is extremely fecund, breeding and spawning year-round along Peru's entire coast (laying more than 30,000 eggs m^{-2}, a rate higher than many species), reaching sexual maturity after about one year, exhibiting fast growth rates, and a short life span (~4 years) (Salvatteci *et al*. 2019:3; Cushman 2014:172; GEF *et al.* 2002:40; Rojas de Mendiola 1989:97). All these trends show the remarkable plasticity and survival capability of the anchoveta, allowing it to efficiently forage at any time, place, and temperature –as well as on any type of prey– all while effectively reproducing within its range of viable conditions (Espinoza and Bertrand 2008:225).

At the same time, the anchoveta, in any given stage of its life cycle, is the main prey of other fishes (such as bonito, mackerel, horse mackerel, sardine, and hake), mollusks (octopuses and squids like *Dosidicus gigas*), marine mammals (like the fur seal *Arctocephalus australis* and the sea lion *Otaria flavescens*), and –as will be detailed below– the seabirds of Peru (Muck 1989:399; Pauly 1987:335). Yet, it appears that neither sea mammals nor most fishes have a major impact on the vast anchoveta populations (Pauly 1987:335). The anchoveta might also feed on its own eggs and larvae, which may reduce intraspecific (*i.e.* with itself) competition by ensuring their offspring access to enough nutrients, thus fostering this species' growth in yet another example of consumptive production (*cf.* Montecino *et al.* 2006:18; Pauly 1987:329). This fish is also a central source of recycled nutrients within the HCS, excreting almost 100 times more N (in the form of NH_4^+) than does zooplankton, which is then reincorporated into the ecosystem's metabolic pathways (Walsh 1975:201). Yet, as ecologically versatile as the anchoveta is, it is also very sensitive to environmental variation, as well as confined to the shallow (~0-20 m deep) upwelled water layer above the OMZ, where it is densely aggregated inshore (<50 km from coast) and unable to migrate long distances to escape adverse conditions (Chavez *et al.* 2008:98; Cushman 2014:172; Zavalaga and Paredes 1999:257).

In spite of these factors and inhabiting a zone with equal (or smaller) primary production levels than other coastal upwelling ecosystems on Earth,[28] the Peruvian anchoveta has been "the most densely packed mass of fish ever observed to essentially cover an entire large marine ecosystem" (Bakun 1996:19).[29] The HCS produces, by far, more fish biomass –dominated by anchoveta and to a much lesser extent sardine (in about a 10:1 ratio)– than any other such system, generally yielding 20 to 100 times as much fish (Bakun and Weeks 2008:292; De Vries and Pearcy 1982:101). This is the feature that makes the HCS absolutely unique: in no other place on Earth are there to be found so colossal schools of fish (with an anchoveta biomass of up to 30 million tons), that renew in a relatively short time (Espinoza and Bertrand 2008:225; Bakun 1996:19; Rojas de Mendiola 1989:97). What is more, the total biomass of anchoveta before heavy overfishing began in the 1950s may have even been five to ten times larger (De Vries and Pearcy 1982:105). In addition, Peru's coast also produces more fish *per area* than any other marine region: about 10 to 22% of the world fish catch in less than 0.1% of the planet's ocean surface (Chavez *et al.* 2008:95; Idyll 1973:22). This is why leading oceanographers Andrew Bakun and Scarla Weeks (2008) have referred to the HCS as the uncontested "heavyweight champion of the world" in terms of fish biomass.

[28] According to a thorough study by Carr (2001), the most primary-productive upwelling ecosystem is the Benguela Current (0.37 Gt C yr^{-1}), followed by the Canary (0.33 Gt C yr^{-1}), Peru-Humboldt (0.20 Gt C yr^{-1}), and California (0.04 Gt C yr^{-1}) current systems. (1 Gt = 10^9 t).

[29] This is before its collapse in 1972, a topic beyond the scope of this work that we will briefly address in the Conclusion.

The reasons underlying the unparalleled fish biomass within the HCS despite both its ordinary rates of primary production (that is, for being an upwelling region) and the anchoveta's foregoing ecological constraints –a phenomenon termed "the anchoveta paradox" or "puzzle" (Chavez *et al.* 2008; Massing *et al.* 2022)– are manifold, complex, and not wholly understood. Yet, it appears that this outcome results from the interaction of several factors. To start with, the upwelling process, along with the ensuing phyto- and zooplankton production, is undoubtedly a precondition for attaining such fish stock sizes (Rojas de Mendiola 1989:97). Yet, upwelling and high primary production are necessary –but not sufficient– conditions, which in and of themselves do not cause this unique phenomenon, which may be further driven by at least five processes. First, as noted, because of its latitude, the HCS is profoundly influenced by ENSO (more so than any other upwelling ecosystem), which subjects it to recurrent and intermittent rearrangements (regime shifts) that "reset" the ecosystem, influencing its intricate reproductive and predator-prey dynamics (Bakun and Weeks 2008:294; Chavez *et al*. 2008:98). Concretely, ENSO affects the upwelling process, provoking a rough 50% decrease in the concentration of nitrates, carbon, and other nutrients at the ocean's surface, which correspondingly diminishes primary production in the same proportion, causing significant mortality in some zooplankton and fish species (Chavez *et al*. 1989:53–54; Tarazona and Arntz 2001:240). During several El Niño events, the anchoveta's wide distribution has shrunk into a scattered population off southern Peru, as some individuals die off and others migrate to any upwelled, cooler waters nearby, or else descend to deeper seas (Bakun 1996:95; Tarazona and Arntz 2001:241). However, at the opposite pole, these disruptions may also favor the anchoveta –a low-trophic-level fish with a short life cycle and rapid population responses– while hindering the development of long-lived, mature successional species (Bakun 1996:153; Chavez *et al.* 2008:98).

Secondly, as noted, given the latitude of the HCS, upwelling produces uniquely nutrient-rich, concentrated, and retained, steady waters (Bakun 1996:155). Third, because of this *sui generis* upwelling setting, there is a very energy-efficient, albeit low, transfer of primary production to fish via zooplankton –in particular euphausiids– within an "optimal environmental window"[30](Chavez *et al.* 2008:103; Cury and Roy 1989). Fourth, the OMZ impacts the prey-

[30] In Ekman-type upwelling, if wind intensity is too low, water mixing is weak and primary production is diminished. Conversely, if wind intensity is too strong, turbulence disperses water nutrients, also causing low

predator dynamics of and around the anchoveta (*Ibid*.). Lastly, as noted, *E. ringens* can both filter and ingest phytoplankton (a skill that only sardines tend to have in other upwelling systems) and possesses a remarkable ecological plasticity (Bakun and Weeks 2008:294). Thus, it is no wonder that the Peruvian anchoveta, *E. ringens*, is the main food of the seabirds of Peru. As Murphy (1925:234) accurately put it, the anchoveta is "[t]he most abundant and important fish of the entire Peruvian littoral, the mainstay of the guano industry." Having described the interrelations among upwelling, the nutrients, plankton, and fishes of the HCS, let us give the floor to our protagonists: the majestic seabirds of Peru.

1.3.5. The guano birds, guano formation, and guano islands: a marine odyssey

Similar to what Aldo Leopold describes in his poetic and holistic "Odyssey" (1989), the nutrients that come from the rocks, the air, or the sea bottom, become the foundation for phytoplankton, which in turn supports zooplankton, which is then consumed by the fishes, who sustain the seabirds and allow for them to thrive (see Table 1.1 and Figure 1.3). Then, an important part of the nutrients finishes its journey (in the short term) as bird excreta that accumulates on the arid islands off Peru, the remainder returning to nourish the depths of the ocean. In fact, nutrients within the fishes' bodies that would otherwise be dispersed by oceanic circulation after their death, are *concentrated* by the seabirds (that feed on them) by means of their excreta, a part of which returns to the sea, allowing for inshore fish biomass increase (Hutchinson 1950:373). Thus, "[s]ince the nutrients derive in part from guano, we can consider guano birds as creatures which, to a certain degree, self-perpetuate their resources" (Vogt 1942:143), in yet another example of consumptive production. In this marine odyssey, too, "[i]n the flush of a century the rock decayed, and X [a given atom] was pulled out and up into the world of living things" (Leopold 1989:115).

The seabirds (and mammals) off Peru are at the top of the HCS's trophic chain. This ecosystem is inhabited by some 100 species of seabirds (of the roughly 315 existing worldwide), 10 of which are endemic to it (Goya *et al.* 2016:10). Among them are the Inca tern or zarcillo (*Larosterna inca*), the Humboldt penguin (*Spheniscus humboldti*), the Peruvian diving petrel or

production. There is thus an "optimal environmental window" for *moderate* upwelling systems (wind speed =~5-6 m s^{-1}) where primary production is maximized (*cf.* Cury and Roy 1989).

potoyunco (*Pelecanoides garnotii*), the guanay cormorant *Phalacrocorax* (or *Leucocarbo*)[31] *bougainvillii*, the Peruvian booby or piquero (*Sula variegata*), and the Peruvian pelican or alcatraz (*Pelecanus thagus*) (*Ibid*.:23). The guanay, piquero, and pelican (Figure 1.4) are the most ecologically (and economically) important, as well as usually the most abundant, species off Peru.

Table 1.1. Important genera/species within the HCS ecosystem.

Organism	Species/Genus (common name)
Bacteria	*Beggiatoa*
	Thioploca araucae
	T. chileae
Phytoplankton	**Diatoms**
	Chaetoceros *Rhizosolenia*
	Coscinodiscus *Skletonema*
	Lithodesmium
	Dinoflagellates
	Ceratium
	Ceratocorys
	Diplopsalis
	Gymnodimium
	Protoperidinium
Zooplankton	**Copepods**
	Acartia tonsa
	Centropages brachiatus
	Eucalanus inermis
	Parcalanus parvus
	Euphausiid
	Euphausia mucronata
Fishes	**Clupeiformes**
	Engraulis ringens (anchoveta)
	Sardinops sagax (sardine)
	Scombriformes
	Sarda chiliensis (bonito)
	Scomber japonicus (mackerel)
	Trachurus murphyi (horse mackerel)
	Others
	Normanichthys crockery (mote sculpin)
	Odontesthes regia (Peruvian silverside)
Birds	**Main guano birds**
	Pelecanus thagus (pelican or alcatraz)
	Phalacrocorax bougainvillii (guanay)
	Sula variegata (piquero)
	Secondary guano birds
	Larosterna inca (Inca tern)
	Pelecanoides garnotii (potoyunco)
	Puffinus griseus (sooty shearwater)
	Spheniscus humboldti (Humboldt penguin)
	Sula nebouxii (camanay)

[31]The classification of the guanay as belonging to the genus *Leucocarbo* was advanced by Siegel-Causey (1988), but then challenged by other molecular analyses such as Kennedy *et al*. (2014) which placed it back as a *Phalacrocorax* (*cf.* Baran and Harvey 2020).

1.3.5.1. “Three little birds”: the guanay cormorant, the piquero booby, and the pelican

Evolutionarily, cormorants, boobies, and pelicans –along with other groups of water-carnivore birds such as penguins, herons, and ibises– began diversifying some 60 to 65 million years ago, in early Cenozoic times. These birds have distinctive features such as large wings, fully webbed (totipalmate) feet, a gular pouch, and a salt gland –through which excess electrolytes are excreted– enclosed within the orbit (the skull’s cavity housing the eye) (Gibb, Kennedy, and Penny 2013; Nelson 2005). They are also unique in incubating their young via the warmth of their feet (Cushman 2014:170). Opposite to the anchoveta, interestingly, these birds are slow in reaching sexual maturity, and also exhibit high longevity and low reproductive rates (Jahncke 1998:2). Several scientists have studied these bird populations off Chile and Peru. For instance, R.C. Murphy, an ornithologist at New York’s Museum of Natural History and “the world’s undisputed authority on the marine birds of South America” (Cushman 2014:190) wrote *Bird Islands of Peru* (1925) and *Oceanic Birds of South America* (1936).[32] Murphy’s holistic perspective is evident when one discovers some of the aims of the expeditions that led to the publication of these works: “to investigate the oceanic conditions [which are] responsible for the abundance of life in Peruvian waters, as well as the interrelationships and distribution of this life” (Murphy 1925:*ix*; 1936:27). Some years later, U.S. renowned ecologist and ornithologist William Vogt –who was also a close friend of Aldo Leopold[33]– wrote *Informe sobre las aves guaneras* [*Report on the guano-producing birds*] (1942), and British Yale ecologist G.E. Hutchinson published *Biochemistry of vertebrate excretion* (1950). These four thorough works constitute and remain the unparalleled foundation on the knowledge of the seabirds of Peru and the ecosystem of which they are part, although a lot of research has been developed before, from, and after them (*e.g.* Ávila 1945, 1961; Coker 1919; Duffy 1994; Forbes 1913a, 1913b; Franke 2015; Jordán 1961; Lavalle 1914; Nelson 1978, 2005 to name a few of the key authors).

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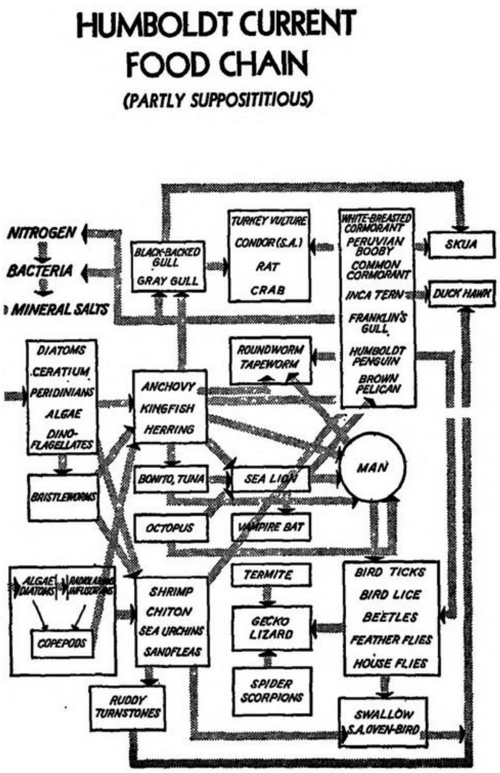
[32] *Cf.* Murphy (1921) too.

[33] *Cf.* Cushman 2014. The extensive correspondence between these two ecologists can be found at the Aldo Leopold Archives, held at the University of Wisconsin-Madison Libraries. It is available online at: http://digital.library.wisc.edu/1711.dl/AldoLeopold.ALCorresScZ.



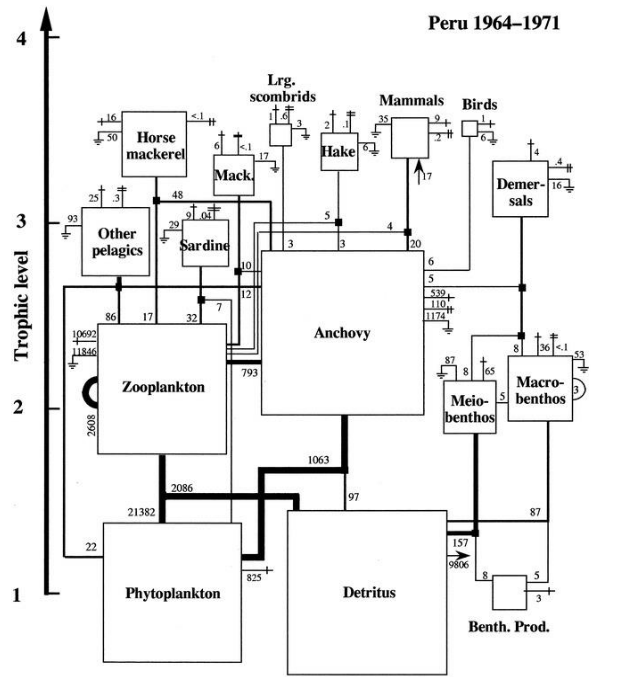


FIG. 2. Trophic flows in the Peruvian ecosystem, averaging the periods 1964–1971 and 1973–1981. The size of the boxes is proportional to the biomass of the corresponding components in the models, if the boxes are imagined as cubes instead of squares. Boxes are arranged along the vertical axis according to their trophic level, defined as 1 for primary producers and detritus and, for consumers, as 1 plus the mean trophic level of the prey items, weighted according to their fraction in the consumer's total diet. Flows of wet mass are in units of 10^3 kg·km^{-2}·yr^{-1}. Flows leave boxes on the upper half and enter them on the lower half. The width of the line indicates the order of magnitude of trophic flows. Flows of at least 10^3 kg·km^{-2}·yr^{-1} were rounded to integers, those less than that, to one digit. Trophic flows of <0.01% of the total consumption in the system, corresponding to ~3×10^3 kg·km^{-2}·yr^{-1} during 1964–1971 and to ~0.9×10^3 kg·km^{-2}·yr^{-1} during 1973–1981, were omitted for clarity. Biomass of detritus is a rough estimate.

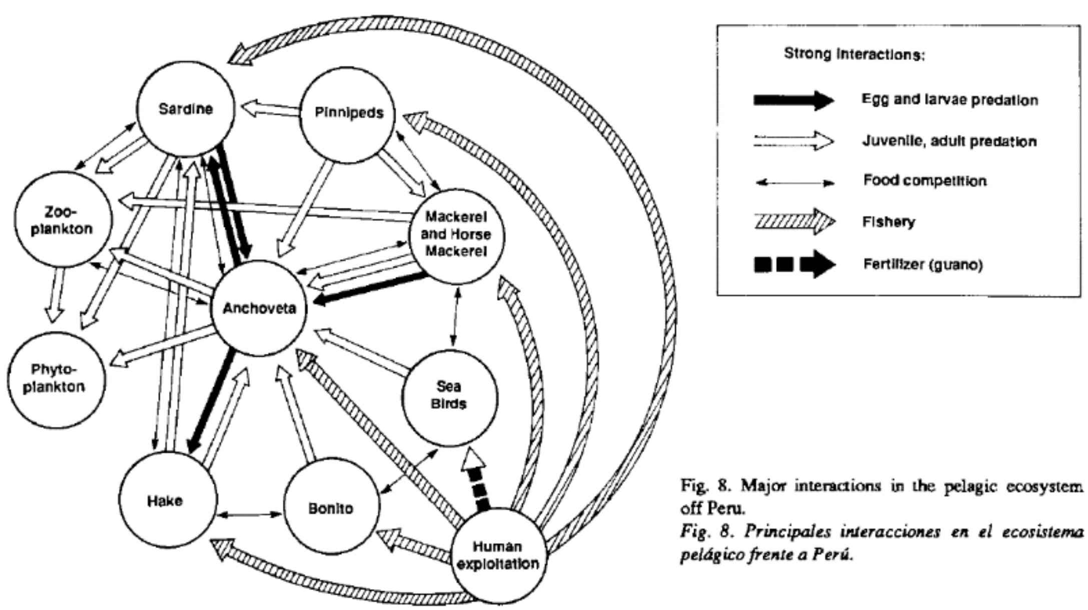


Fig. 8. Major interactions in the pelagic ecosystem off Peru.

Fig. 8. Principales interacciones en el ecosistema pelágico frente a Perú.

Figure 1.3. Main ecological interactions in the Humboldt Current ecosystem off Peru.
Note the centrality of the anchoveta. Figure up at the left taken from Vogt (1948:190); up, right figure taken from Jarre-Teichmann (1998:S96); figure below taken from Muck (1989:399).

Figure 1.4. The main guano birds of Peru: the guanay, *Phalacrocorax bougainvillii* (up to the left); the piquero, *Sula variegata* (up right), and the Peruvian pelican, *Pelecanus thagus* (below) (Taken from Goya *et al.* 2016:38, 42,46).

The guanay (presumably a Quechua word for 'guano producer') is known to science as *P. bougainvillii*, a name given by French naturalist René Primevère Lesson in 1837 (drawing on the work of Mathurin Brisson) following his expedition to the "southern seas" onboard *La Coquille* (1822-25). It means 'bald raven' and was named after admiral Hyacinthe de Bougainville (Grohmann, Quijada, and Calder 2016:4; Murphy 1925:73; Nelson 2005:98). This bare-facial-skinned species is probably derived from the Antarctic and reached the Peruvian coast by following the cold Humboldt Current (Murphy 1936:100; Vogt 1942:66). Since the publication of Coker's works in the early 20th century, scientists have understood the guanay as Peru's most important guano bird (Cushman 2014:170). For instance, Murphy (1925:71) termed the guanay “the most valuable bird in the world” (monetarily); the “king among avian benefactors” (*Ibid*.:73), “surpassing Shakespeare’s nightingale that sang on Juliet’s balcony, the dove that flew from Noah’s Ark, and, of course, the sad swallows of Gustavo Adolfo Béquer” (Galeano 1997:140; Romero 1949:339). This is because, over a long time, the guanay has provided more than 90 percent of the guano accumulated off Peru, being by far its most important bird species (Hutchinson 1950:14; Vogt 1942:29). The guanay is, typically, also the most abundant bird along Peru’s coast, with a population –when unaffected by ENSO’s foregoing disruption of the HCSs’ dynamics– of some 13.5 ± 5.7 million individuals (roughly between 3 and 7 times larger than the piquero’s, and some 18 to 42 times that of the pelican).[34] Interestingly, when visiting a colony of these birds around 1919, Murphy (1925:86) narrates how “[w]henever a man, sitting perfectly still, begins to talk to the guanayes in a loud voice, a silence voice falls over all the audience within hearing. Their mumbles and grunts die away, and they listen for awhile as if in amazement.”

Along with the piquero and the pelican, *P. bougainvillii* is distributed roughly between 6°8’ and 38°30’S, with its largest colonies found off Peru, coinciding with the most abundant schools of anchoveta, its main prey (Goya 2000:126). In particular, the emblematic Chincha Islands –which will be central throughout this work– have generally been among the chief nesting places of the guanay (Forbes 1913a:710). Guanayes are highly social animals, foraging by day on immense bands, usually gradually leaving their resting places between 6:00 and 10:00 and returning by 12-18h (again, coinciding with the anchoveta and other pelagic fishes’ feeding time) (Hutchinson 1950:14–15; Murphy 1925:88). Generally, they make one journey a day, although they may carry out two or three trips (or fly for longer) if food is scarce. Indeed, roughly a century ago, Scottish ornithologist H.O. Forbes (1913a:710) described this as “one of the most wonderful bird sights to be seen in the world. The going and coming of these birds is a marvellous spectacle, and the noise which they make is hardly less remarkable.” When leaving their colony, most guanayes fly in a “V” formation either south or north, parallel to the coast, seeking to feed on shallow anchoveta schools inshore by sight and from the air (Baran and

[34] These values ware calculated from time-series data from 1953-64 (between 6-14°S) (in Crawford and Jahncke 1999:149) prior to the collapse of some bird populations after 1965, due to El Niño, overfishing, and possibly other human disruptions. Based on this data, the average piquero population for 1953-64 was 1.91 ± 0.51 million, and that of the pelican, 0.32 ± 0.12 million. In addition, the mean guanay population of 1965-97 alarmingly *decreased* by 86%, on average, relative to its 1953-64 levels.

Harvey 2020; Zavalaga and Paredes 1999:254–57). To hunt down the anchoveta schools, "the front members of the band start feeding, the rear members fly up forward so to encircle [them], concentrating the food into the center or on occasions driving it out to sea" (Hutchinson 1950:15). In addition, sea lions (*O. flavescens*) and bonitos (*S. chiliensis*) hunt the anchoveta and other fishes from below, herding them to the surface where they are more accessible to the birds (Cushman 2014:172–6; Murphy 1925:79). Then, guanayes dive generally between 20 and 50 m (more than previously thought) into the ocean to catch their pray. They can delve even deeper (~70 m) and travel farther offshore if needed, which shows their relative feeding versatility (Zavalaga and Paredes 1999:254–7).

An adult guanay, with a mean body weight around 2 kg, consumes about 200 to 430 g of fish every day (Cushman 2014:172; Vogt 1942:75). Although it is known that the guanay ingests at least 53 species of fish, along with some crustaceans and mollusks, the anchoveta (*E. ringens*), the Peruvian silverside (*O. regia*), and the mote sculpin (*N. crockeri*) account for more than 90 percent of its diet (Goya 2000:128; Jahncke and Goya 1997:29; Zavalaga and Paredes 1999:255).[35] In particular, in non-El Niño years, *E. ringens* accounts for at least half of the guanay's diet, sometimes reaching more than 80% (*Ibid*.). Conversely, during extreme El Niño years, due to the foregoing ecological regime shifts it entails, guanayes (along with piqueros, pelicans, and other birds) have died from starvation by the millions, experiencing population decimations of as much as 85 % (Bakun 1996:95; Cushman 2014:172; Hutchinson 1950:19).

For its part, the second most important and abundant seabird of Peru –which has occupied the first place in some seasons–[36] is the piquero (Spanish for "lancer") , *S. variegata*,

[35] Other important fishes in the guanay's diet are the cabizna grunt (*I. conceptionis*), the longnose anchovy (*Anchoa nasus*), and the lorna drum (*S. deliciosa*), among others (*cf.* Jahncke and Goya 1997:29 for a full list of species).

[36] As, for instance, in 1919, according to Coker (1919:466) and Murphy (1925:69, 1936:840) (*cf.* Vogt 1942:115, too). This seems to have also been the case, at least around Isla Mazorca by 1977-78 (Duffy 1983), and also in 1853 (especially in the Chincha Islands), when the guano rush was close to reaching its peak (Hutchinson 1950:21). It is well known that both the guanay and the piquero occurred throughout Peru's coast in the 18th and 19th centuries, as they do today (Hutchinson 1950:66). It seems that, prior to 1825, the guanay was the most important guano bird, although other species were certainly present. Between 1825-50, however, guanay populations declined in the Chinchas and elsewhere, which was accompanied by an increased presence of other species like the piquero and the Inca tern (*L. inca*), the latter apparently being the commonest bird on the Chinchas in 1853 (*Ibid.*:21,61). These dynamics were a combination of ENSO and human perturbations, together with interspecific interactions among the bird species. This perhaps explains "one of the enigmas of biological literature" (Vogt 1942:27), namely, the lack of any mention of great flocks of birds off Peru by Darwin, who, as noted, visited the region in 1835. Darwin was "too keen a naturalist" –says Vogt– "to have missed the phenomenon of such numbers or to have failed to appreciate their significance" (*Ibid*.). Apparently, there was a severe El Niño in 1834, which probably decimated the bird populations during the next few years. Moreover, says Vogt, "[b]y an extraordinary coincidence, Van Tschudi,

bearing a scientific name coined by Swiss naturalist J.J. von Tschudi (1843), who also drew on Brisson's (1760) work (Cushman 2014:172; Murphy 1936:839). This beautiful booby bears a lot of ecological resemblances to the guanay, although it has some interesting differences too. For instance, the piquero is smaller (~1.2-1.5 kg) and less gregarious than the guanay, forming less extensive colonies, and can even be found by itself from time to time. In feeding, piqueros form small flocks (or fish alone), plunging from greater heights (~40 m) and reaching higher speeds (of almost 140 km h^{-1}), but shallower waters (<10 m), than guanayes, and are also able to travel farther offshore (Angier 2017; Ludynia, Garthe, and Luna-Jorquera 2010:106; Zavalaga *et al.* 2010:266). They have buoyant air sacs around the skull and other parts of their bodies, protecting them from such high-speed impacts into the water, but also hampering them to dive deeper (Angier 2017; Cushman 2014:172). The anchoveta is also the piquero's main prey –particularly off Peru– although it appears that these birds are less dependent on it than the guanay (Hutchinson 1950:19–21; Ludynia *et al.* 2010:108; Vogt 1942:15–17). At least as of late, apart from anchoveta, silversides, and mote sculpins, piqueros also feed on sardines (*S. sagax*), jack mackerels (*T. murphyi*), and the saury *Scomberesox saurus*, three species that are commonly scarce in the diet of the guanay (Goya 2000:128; Ludyinia *et al.* 2010:108; Zavalaga *et al.* 2010:260).

Finally, the Peruvian pelican, *P. thagus* –a scientific name coined by Chilean naturalist Juan Ignacio de Molina (1782:240)–, is the largest (5-7 kg), less abundant, shyest, and most solitary of the three chief seabird species endemic to the HCS (del Hoyo *et al.* 2020; Murphy 1925:278; Vogt 1942:130). Opposite to the guanay, this pelican is of tropical origin (which may explain its higher tolerance to heat if compared to the foregoing birds), and diverged from its more northern relative, the brown pelican (*P. occidentalis*), about 750,000 years ago (Hutchinson 1950:21; Jeyasingham *et al.* 2013:299; Vogt 1942:129). Unlike the guanay and the piquero, Peruvian pelicans are able to forage both by day *and at night*, which they often do alone and farther offshore (>40 km from the coast) than the former species (Hutchinson 1950:21; Vogt 1942:130–34; Zavalaga *et al.* 2011). This species' nocturnal habits may be a strategy to avoid

Raimondi, Darwin, Lucas, Forbes, Bowman, Murphy and I worked on this coast in years, in accordance with [ENSO's apparent] seven-year cycle, characterized by depressions in the bird population. Van Tschudi studied the islands in 1842…Raimondi was in the islands in 1855 [actually it was 1853], also probably a year of failure. It is possible that the seven-year cycle explains why von Tschudi, in the words of Murphy…"failed to recognize the peerless position of the guanay," and why Raimondi wrote [that:] It appears that cormorants do not contribute much to the production of guano."

competition with other birds and/or an adjustment to the circadian vertical movement of the anchoveta within the water column (Zavalaga *et al*. 2011:5). *P. thagus* also primarily consumes anchoveta, along with other fishes such as sardine and horse mackerel, which they capture through shallow dives (≤2 m) (Zavalaga *et al*. 2011). Figure 1.5 summarizes some of the population and predator-prey dynamics among the foregoing three birds and the anchoveta.

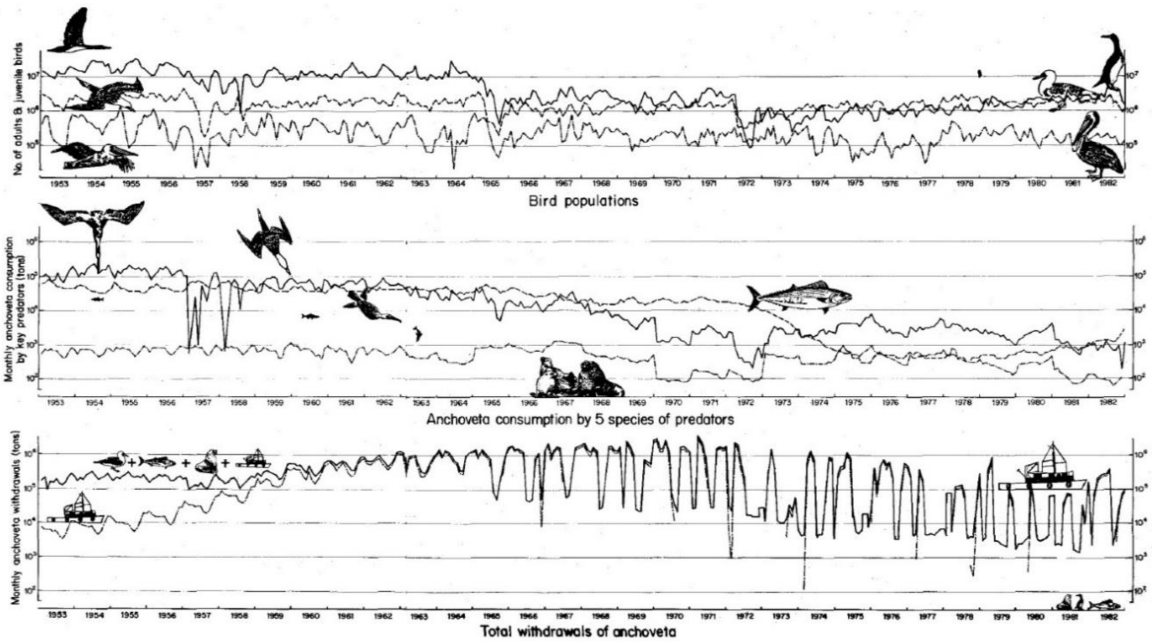


Figure 1.5. Population and predator-prey dynamics among the anchoveta, guanay, piquero, and Peruvian pelican at 4 to 14°S from 1953 to 1982. Taken from Pauly (1987:327).

1.3.5.2. Breeding ecology and the production of nests

Though seemingly secondary, the nesting process of the foregoing seabirds is central to this story, as it explains why most of their dung is excreted and accumulated on the Peruvian islands. The total nesting area of the guano birds off Peru amounts to 81.2 km^2 (González in Duffy 1994:69) which, if considered in relation to this country's insular surface (as noted, ~95 km^2), occupies about 85% of their extension. Importantly, these birds reproduce only when their feeding conditions are fulfilled (Jahncke and Paz-Soldán 1998:64), and hence the breeding and nesting processes are deeply related to fish abundance, in turn associated with plankton availability and upwelling within the HCS. Thus, as Murphy (1925:265) stated, the very existence of the guano birds "ultimately hangs…upon a delicate balance of geographic and meteorological conditions." As is the case with other living beings, the feeding of these seabirds is hence not only deeply related to their immediate production, but also to their reproduction.

The breeding process of the guanay, piquero, and Peruvian pelican may occur year-round, although it commonly begins in the austral spring, around October, when marine organisms are most accessible to the birds (Cushman 2014:169). For any given pair of guanayes, it lasts about four months: the first one is occupied by nest site selection and courtship; the second by egg laying and incubation; and the third and fourth by rearing the young (Hutchinson 1950:17). Specifically, a male guanay chooses a nesting site in a place exposed to cooling winds, usually in more regular, bare grounds (Hutchinson 1950:15; Nelson 2005:468–7; Vogt 1942:53). Yet, the reasons underlying this selection are not totally understood. The first males to pick sites create a nesting nucleus, from which a breeding colony grows outwards progressively. This formation seems to protect the colony's core –and future eggs and young– from predators (and disease) such as the Andean condor (*Vultur gryphus*), the peregrine falcon (*Falco peregrinus*), gulls (*Larus belcheri* and *L. dominicanus*), and vultures (*Cathartes aura*), all the way to ticks (*Ornithodoros amblus*) and feather lice (Mallophaga) (in turn devoured by lizards *Tropidurus peruvianus*, scorpions *Hadruroides lunatus*, and spiders *Dysdera murphyi* and *Loxosceles nesophila*), or the fungus *Aspergillus* (Cushman 2014:174; Hutchinson 1950:18; Murphy 1925:88, 243–5; Nelson 2005:468; Vogt 1942:61).[37]

Then, through definite sounds and behaviors, males announce the election of their site –which they guard and only leave for feeding– to other nearby males. These calls and conducts also attract females. As is common in birds, the female sexually selects its preferred male after a series of courtship acts, and a couple remains together for the remainder of the breeding season. From this moment, the nest is seldom left unattended, being protected by either of the two while the other feeds or fetches nesting materials. Males primarily gather these materials –pebbles, detritus, molted feathers, algae– which females then arrange, although they, too, collect some (Vogt 1942:53–8). Importantly, *these birds also use lumps of guano –both old and recent, proper and alien– to cement their nests*, which attain a distinctive cylindrical, concave up form, of some 30 cm in diameter and 17 cm in height (Hutchinson 1950:17; Nelson 2005:468) (Figure 1.6). Cushman (2014:5) remarks that these raised, circular nests "are made from pure excrement and shine white in the sun; but in the light of the full moon, they glow silver." Thus, guano is the main material in guanayes' nests, of which a colony will build about 3.1, on average, per square

[37] According to Vogt (1942:125), solitary piqueros have a predator that does not forage on either guanayes or pelicans: a large bird known as Chilean skua (*Catharacta chilensis*).

meter, which indicates the presence of roughly 6.2 adults per m^2 at the start of the nesting season (Vogt 1942:53–8). Lastly, guanay females, who seek copulation more than males do, eventually succeed in the consummation of this deed, an event that occurs through cloacal[38]contact sometime between the first days and a month after the pair-bonding event. Guanay females will then typically lay three eggs –whose incubation, lasting around 27 days, is equally shared by both parents– of which only two broods will be raised every year (Baran and Harvey 2020).

Figure 1.6. Piquero (*S. variegata*) guano nests. Note the shape and the close spacing. The pair of piqueros (upper right) is incubating an egg. Pictures taken by author, South Chincha Island, 25 September 2021. See Murphy 1936, vol II., plate 55 and Nelson (2005:387), respectively, for excellent photographs of the guanay (*P. bougainvillii*) and piquero's nests.

When the chicks are born, they "instinctively defecate outside the nest once they are able to stand, which gradually forms [its] distinctive crater-shaped ring of guano" (Cushman 2014:171). In addition, the nestlings' remarkably small size and vulnerability prolong their stay in the nest (to about eight weeks), a time in which they keep depositing guano (Cushman 2014:170; Nelson 2005:469). During this period, "[t]he sound grows deafening as a million hopeful baby birds call out to their returning mothers and fathers, eager to fill their bellies with

[38] The cloaca is a posterior chamber and orifice in birds (and monotreme mammals, reptiles, amphibians, and elasmobranch fishes) that receives feces from the intestine, urine from the kidneys, sperm from the testes, and eggs during laying, through which all these materials are excreted or expelled.

the latest catch. Many stick their tails over the edge of their disklike nests and defecate in anticipation" (Cushman 2014:167). If and how do nestlings –wonders Vogt (1942:133)– "know their parents, and the parents, their nestlings? No one knows." Adult birds also tend to defecate in the nest's vicinity and on takeoff (rather than over the sea) –a behavior that results from the need to produce a nest of some kind in an area devoid of other materials– which gradually forms guano walls that prevent the broods from falling off the islands into their death (Cushman 2014:199; Nelson 1978: 615). In addition, a hypothesis was advanced that the release of excrement on land by species fishing by sight is beneficial because defecation over the ocean would render the waters opaque (Alexander in Hutchinson 1950:367).

The piquero and Peruvian pelican exhibit similar breeding and nesting behaviors, although the piquero's cycle is slightly longer (~6 months, with an incubating period of about 42 days, carried out slightly more by the male, in periods of about 6 hours) (Nelson 1978:650, 2005:49). Piqueros can also nest in more rugged terrain and cliff ledges, as well as in warmer and less windy areas. They are also very noisy, less tolerant of other "intruder" birds, and their nests are less densely packed (~1.6 m^2) than the guanay's (Nelson 1978:578, 2005:49; Vogt 1942:115–20).[39] They are known to nest in at least 84 islands, countless offshore rocks, and many coastal headlands off Peru (Nelson 2005:380). The piquero's nest is a "[s]tructurally significant mound of guano and detritus," about 15 cm high, also composed of feathers and stones (Nelson 2005:385). Piqueros continue to bring pebbles to their nests after egg laying, a display that, following Vogt (1942:119), appears to serve symbolic rather than nest-structural ends. As Vogt (*Ibid*.:119–20) himself observed on the North Chincha Island in the spring of 1941:

> The male was very persistent in bringing pebbles to the nest [he] returned, composed himself, and deposited before the female, with great delicacy, and it appeared considerable excitement, the stone that he had brought in his beak. After this had happened several times, the female left the nest and her mate and returned with a pebble that she also placed before him. The male immediately showed intense excitement, contorting his neck and emitting a sharp whistle.

As for the Peruvian pelican, most foregoing trends also hold, although this species tolerates even warmer sites to nest, far from windswept areas and in deep gullies (thus not

[39] Before guano was exploited, piqueros might have preferred the islands' safer flat areas to nest. Human intrusion made flat areas less suitable for nesting piqueros and, given the guanay is more tolerant of disturbance, their populations may have expanded at the expense of the Peruvian boobies' (Vogt 1942:124).

competing for space with the other two birds). Their breeding cycle is slightly longer than the guanay's but shorter than the piquero's (*i.e*. ~4.5 months) (Nelson 2005:49; Vogt 1942:129). Studies on the pelican's nest density are extremely difficult due to this species' shyness, but it may range between 2-2.75 per m^2 (Vogt 1942:132). At any rate, the pelican also excretes an important amount of guano, although in much smaller quantities –and of a lower N concentration– than the guanay (which as noted, has historically produced over 90% of this substance off Peru) or the piquero (Hutchinson 1950: 14; Vogt 1942: 128). Together, these three species (accounting for about 93% of the avian population of Peru) have, during recent millennia, produced virtually all the guano in the region, although another 18 species such as the camanay or blue-footed booby (*Sula nebouxii*) –which can nest in niches, rock hollows, or burrows and is particularly abundant on the Lobos Islands–, the Humboldt penguin (*S. humboldti*), Inca tern (*L. inca*), potoyunco (*P. garnotii*), and sooty shearwater (*Puffinus griseus*) also produce some (Cushman 2014:173; Duffy 1983:801; Hutchinson 1950:21). Importantly, not all colonial seabirds produce guano, which suggests that this is a distinctive feature of relatively few highly-social, evolutionary-related species *vis-à-vis* nest construction, which occurs under very specific geophysical and ecological conditions (Hutchinson 1950:5, 365). These unique conditions have intertwined to allow for the accumulation and persistence of guano off Peru, a substance to which we now turn our attention.

1.3.5.3. Guano and metabolism: "Excretion is as basic to existence as eating"

The word guano (or huano) originates from the Quechua *huanu* (or *wuanu*), meaning 'dung,' and refers to the *accumulated* excreta and egesta of birds or bats, having been first applied to describe the vast deposits of bird droppings off Peru (Hutchinson 1950:3). According to Cushman (2014:3), this term was first introduced to the English language by José de Acosta in his 1604's *Natural and Moral History of the Indies*. Today –continues Cushman (*Ibid*.:*xiii*)– the fact that Spanish and English speakers (along with those of many other languages) use a Quechua word to refer to bird and bat feces is testimony to the historical importance of this substance. Dung is, of course, a product of the metabolic process of excretion, the counterpart of feeding, which "is as basic to existence as eating" (Cushman 2014:9). Yet, as noted, dung is not synonymous to guano. For guano to form, feces have to be excreted systematically over land by highly- and densely-populated, gregarious organisms, and allowed to accumulate under extremely arid conditions, so that they are not watered down by moisture or washed away by rain.[40]This is why, globally, rich bird guano accumulates only on islands found on major coastal upwelling regions –which simultaneously create both dry atmospheric conditions and cold, fertile waters– like those off California, the Canary Islands, southwestern Africa, and Peru-northern Chile. Yet, it is Peru's guano –for the unique set of geophysical and ecological features described above– that stands alone as the world's richest dung.

Before examining the properties of Peruvian guano, a clarifying note is in order. Guano can be classified either as *nitrogenous* guano, which contains a large proportion of the N organic matter of the fresh excreta, or *phosphatic* guano, in which the organic nitrogen has been lost, leaving a substance that usually consists of calcium phosphate minerals (Hutchinson 1950:3). In turn, there is a specific type of low-nutritional phosphatic guano termed *leached* guano –which is particularly abundant on some Pacific Ocean atolls– occurring when the former is created by percolating water (*Ibid*.:3,160). Thus, it is nitrogenous guano that exhibits the highest nutrient concentrations, and its best-quality deposits worldwide lie off Peru.

Environmentally, as noted, bird nitrogenous guano is produced only under a series of unique ecological and geophysical conditions. In fact, dialectically, as uttered by Hutchinson (1950:4): "the same factors that make the regions of the richest guaneras arid also provide that the adjacent seas be unusually fertile, permitting an extraordinary quantitative development of the marine biota and extraordinary populations of marine birds." Relatedly, Chapman (1925:*vii*) contented that "[t]he existence of both deserts and birds is due to the same cause," and Murphy asserted (1925:43) that "[t]he same conditions which made the lands naturally arid has also conserved to them the best of agricultural aids in Peruvian guano." He (*Ibid*.:74) also observed that:

> The islets of the Humboldt Current, which are most thickly distributed along the northerly two-thirds of Peru, partake of the same desert character as the opposite continental mainland. This climatic fact is the secret of the guanay's economic importance, for the excrement of sea birds is preserved on the nesting grounds without loss of fertilizing efficacy such as would be caused by moisture (*Ibid*.:74).

Internally, within the "hidden abode" of avian metabolism, Murphy (1925:51) showed that:

[40] In the case of bats, most species feed on insects (while others eat fruit, seeds, pollen, nectar, and a few even blood), and their guano consists largely of undigested insect skeletons, made of chitin and arthropodin, along with urea derived from urine, that accumulates in caves. On the other hand, fish-eating birds defecate primarily uric acid that amasses on islands (Hutchinson 1950:462).

> Guano owes its value to the peculiar manner in which its components are united, by the alchemy of the bird's intestinal tract, into a compound more easily absorbed by plants from the soil to which it is applied than any fertilizer synthetically composed…if the value of fertilizer be calculated according to nitrogen content, the best Peruvian guano is more than thirty-three times as effective as farmyard manure.

Unlike most mammals and aquatic animals, birds (and reptiles) are *uricotelic* organisms, which means that they excrete N mainly in the form of uric acid, a semi-solid and relatively stable and insoluble substance, in contrast to the other organisms' liquid and unstable urea (Hutchinson 1950:4; Nelson and Cox 2013:704).This –contends Hutchinson (1950:4)– entails "a peculiar biochemical advantage over mammals as guano producers."

The chemical composition of the nitrogenous guanos off Peru obviously reveals very high values of nitrogen (9-25%), which, as noted, is primarily in the form of uric acid (~70%), followed by ammonia (~25%), purines (~1-5%), proteins (*e.g.* α-keratin) (~0.1%), and nitrate (~0.1%). In addition, nitrogenous guano is about 4% phosphorus (P_2O_5) and 2% potassium (K_2O) (Cancino 1959:41; Hutchinson 1950:71–88; Lindeboom 1984; Szpak et al. 2012). Moreover, guano contains several other elements in the next approximate and variable proportions: organic carbon (~8%), calcium (~7.5%), oxalates[41] (4.5%), sodium (3.5%), silicon (2%), iron (1%), fats (1%), aluminum (0.8%), chloride (0.8%), magnesium (0.5%), sulfur (0.3%), fluorine (0.2%), and water (~20%) (*Ibid*.) (Table 1.2). Interestingly, the relationship between N and P in Peruvian guano can be described by the equation $f(N) = 28.18 - 1.64\, P$, calculated by Hutchinson (1950:78) from Popp and Marxen's analyses (1931). This relation suggests that, in Peruvian guano, a 1.64% *decrease* in N concentration is associated with a one-percentage-point *increase* in P content, on average. Moreover, fresh guano is a slightly acidic substance, with a *p*H of about 6.5.[42]

[41] Oxalates are the most characteristic minerals present in nitrogenous guano. The well-established oxalate composing Peruvian guano is the salt oxammite, $(NH_4 \cdot OOC)_2 \cdot H_2O$ (Hutchinson 1950:462).

[42] *p*H is a logarithmic scale used to measure acidity and basicity in a solution. Mathematically, *p* is an operator that denotes the negative of the base 10 logarithm of the proton (H^+) concentration in a solution, *i.e.* *p*H = -log[H+].

Table 1.2. Approximate abundance percentage of different elements in nitrogenous guano

Element	*Approximate %*
N	9-25
P	4-12
K	2-3
Other elements:	
Water	20
Ca	10
C (organic)	8-10
Oxalates	4.5-8
Na	3.5
Fats	1-3
Si	1-2.5
Fe	0.85
Al	0.85
Cl	0.8
Mg	0.5
S	0.3
F	0.05-0.2

Made with data from: Cancino 1959; Hutchinson 1950; Lindeboom 1984; and Szpak *et al*. 2012.

In addition, following Hutchinson (1950:71), the proportion of N to P in bird guano should correspond to that present in its prey. By comparing guano production to the birds' food intake (based on data indicated by Vinogradov, the foregoing Soviet scientist), Hutchinson (*Ibid*.:86) asserts that, in clupeoids (such as *E. ringens*), N and P correspond, respectively, to about 3% and 0.3% of their live weight (*i.e*. a N:P ratio of 10:1). This is reasonably coherent with, for instance, the results of Coker's analyses of *P. thagus's* fresh guano, which showed a 11.5:1 N to P ratio (21.66% N, 1.88% P) (*Ibid*.). Thus, we can ascertain that nitrogenous guano exhibits a 3-11:1 N to P ratio. Off Peru, the N content tends to be higher (~15-16%) on the drier, southern islands, and lower (~11-13%) on the damper, northern islands (Hutchinson 1950:76). Likewise, following Popp and Marxen analyses (*cf. Ibid*.:74) the total C:N ratio in Peruvian guano is, on average, 1.2:1.

According to Hutchinson (1950:379), the rich guano deposits off Peru are very recent, having formed 4,000 to 5,000 years ago. Before this time –argues Hutchinson– "the meteorological Equator lay slightly south of its present…mean position," rendering warmer and moister conditions off Peru which were unfavorable to the accumulation of guano

(*Ibid*.:375,481). Thus, this region accrued immense guano deposits –reaching in some islands maximum heights shy of 50 m– because they formed under peculiarly favorable conditions, rather than because they accumulated for a long geological time (*Ibid*.:364). Prior to their unrestrained, voracious exploitation starting in the 1840s –as will be later discussed– these deposits looked like a huge stratified mass, reddish-brown to yellow and loose and friable at the surface, whiter and more compact the closer to the underlying sandstone, according to several visitors to the islands such as Rivero (1827), Tschudi (1846), Peck (1854a), Faraguet (1854), the Peruvian Official Commission appointed to measure guano (led by Castañón *et al.* in 1854), Raimondi (1856), Kinahan (1856), and Radiguet (1856), among others (*cf*. Hutchinson 1950:34–7). For instance, U.S. writer, editor, and music critic George Washington Peck (1854a:167,197-8), described by Hutchinson (1950:60) as "an admirable observer whose lack of scientific training was more than balanced by a sensitive and lively intelligence," visited the Chincha Island in October and November 1853. He described them and their guano in the following way:

> Guano…. lies upon the islands in the form of high, smooth, rounded hills, and covers nearly every part of all of them, following the inequalities of the underlying rock. At a distance it makes them all seem to be islands of rock….covered with reddish yellow sand, but little lighter in color than the volcanic sand….Where it has been cut away it is lighter still, being of an undecided mixture of red, white, yellow and gray –a sort of subochre, or…about the color of white and red ashes of anthracite coal, mingled in equal proportions…The guano where exposed to the air, is of a reddish brown, yellow color, darker than that of its general substance, where it is cut away. It of course colors the whole of the islands, the rock on which it rests being only visible round the shores. As it is like light dry earth, and full of holes, it is difficult to walk upon, there being no certainty that every other footstep will not sink in nearly to the knee. If one hurries he is almost sure to fall, or rather to get into it all over…A few feet below the surface it becomes compact, and from thence through its whole thickness is of nearly the consistence of Castile soap. Its odor is strongly ammonical, though this is not perceived, or but faintly, in walking over the islands where they have not been dug upon.

In addition, Peck (1854a:198) remarks that guano "abounds with the remains" of birds and seals: eggs, wing bones, and canine teeth of sea lions decaying into ammonia. Likewise, Hutchinson (1950:34) talks of German author Ernst Middendorf portraying guano under exploitation in the 1870s as a huge yellow cheese being cut, and Nelson (1978:615) describes it as a "hard grey substance." Moreover, several of the foregoing authors describe guano as being "riddled with the burrows of birds, mainly *Pelecanoides garnotii*" (Hutchinson 1950:37).

In terms of the amount of guano excreted and the material flows from the fish into the birds, following Vogt (1942:2), each guanay ingests about 78 to 115 kg of anchoveta a year, producing almost 16 kg of guano in the same period (or, what is the same, ~43.5 g of guano a day). This means that each ton of guano deposited by an adult guanay on an island requires the consumption of about 5 to 7.3 tons of fish (*Ibid*.:77–78), and that a population of 10 million guanayes would produce over 150,000 tons of guano a year.[43] Experiments have also shown that guano bird broods can efficiently convert anchoveta to guano at a ratio as high as 4.46:1 (Cushman 2014:297). Relatedly, according to Tschudi's experiments, the piquero produces 12 to 19 kg of guano per year, a figure well in line with Vogt's numbers calculated almost 100 years later for the guanay (Hutchinson 1950:20). Hutchinson also mentions (*Ibid*.:379) that, during the 1950s, the annual rate of guano deposition in the best sites off Peru was 9.6 g cm^{-2}, producing a total of about 200,000 tons of guano every (non-El Niño) year. As noted, among the best nesting areas off Peru are the Chincha Islands, which held the finest and most abundant nitrogenous guano deposits of Peru, and, consequently, of planet Earth.

1.3.5.4. The Chincha Islands

The Chincha Islands (or simply, the Chinchas) (13°39'S, 76°24'W) are located 21 km northwest off Pisco, in the extremely arid desert of southern Peru, and their name derives from the Chincha Culture. As Hutchinson (1950:33) succinctly described them, these:

> [t]hree islands, with a few outlying rocks…provided more and better old guano during the middle years of the nineteenth century than did any of the other Peruvian islands. The three islands, known as North, Central, and South Chincha, were the guano islands *par excellence*, and where no specific locality is given in any document mentioning Peruvian guano and dating from the 1850's it is probably safe to conclude that the material in question is from the Chincha Islands.

In the same vein, Murphy (1925:51,95) brilliantly stated that these

> three tiny, bare, splintered granite rocks, which had evidently been a single island at some time in the remote past…formerly contained the most notable deposits of Peruvian guano, not only because of the great quantity of the valuable substance which had accumulated here, but also because ancient Chincha guano had retained a higher percentage of nitrogen, the chief fertilizing element, than the guano of the Lobos Islands in the somewhat less arid region of northern Peru…their share in making fortunes and abetting calamities, in debauching men and demoralizing administrations, and in serving as the inanimate cause of greed, cruelty, extravagance, economic ruin and war has given them a historic place quite out of proportion to their size.

[43] It appears that here either Vogt (1942:31) or his translator, D.C. Duffy, made a mistake in reporting this number, as it is claimed that 9,810,126 birds would produce 15,000 (as opposed to 150,000) tons of guano.

The surface of these islands also reminded Peck (1854a:173) of the structure of “an old-fashioned tough-crusted type apple pie.” Despite their relatively small size (North Chincha being about 1.2 km long and 1 km wide, rising 34 m above sea level; Central Chincha being 1.3 km long, and South Chincha 880 m long) upon these islands thus accumulated not only the best-quality guano on Earth, but also some of the most abundant (Hutchinson 1950:34). The foregoing Official Commission led by Castañón conservatively estimated that, in 1854, there were almost 11.4 million tons of guano on the Chinchas, a set of mounds so vast that they reached heights of almost 50 m and mean depths of about 15 m (Figure 1.7) (*Ibid*.:40–1). Relatedly, in Chapter 5 several photographs depicting the Chinchas *c*.1865 can be observed. Likewise, Figure 1.8 and 1.9 below show the Chinchas in their current state. Along with the Chinchas, other important guano islands off Peru include the two Lobos group Islands, Mazorca, and the two Guañapes, the latter being “from immemorial times…second in fame only to the Chinchas” (Murphy 1925:300–301; Nelson 1978:580).

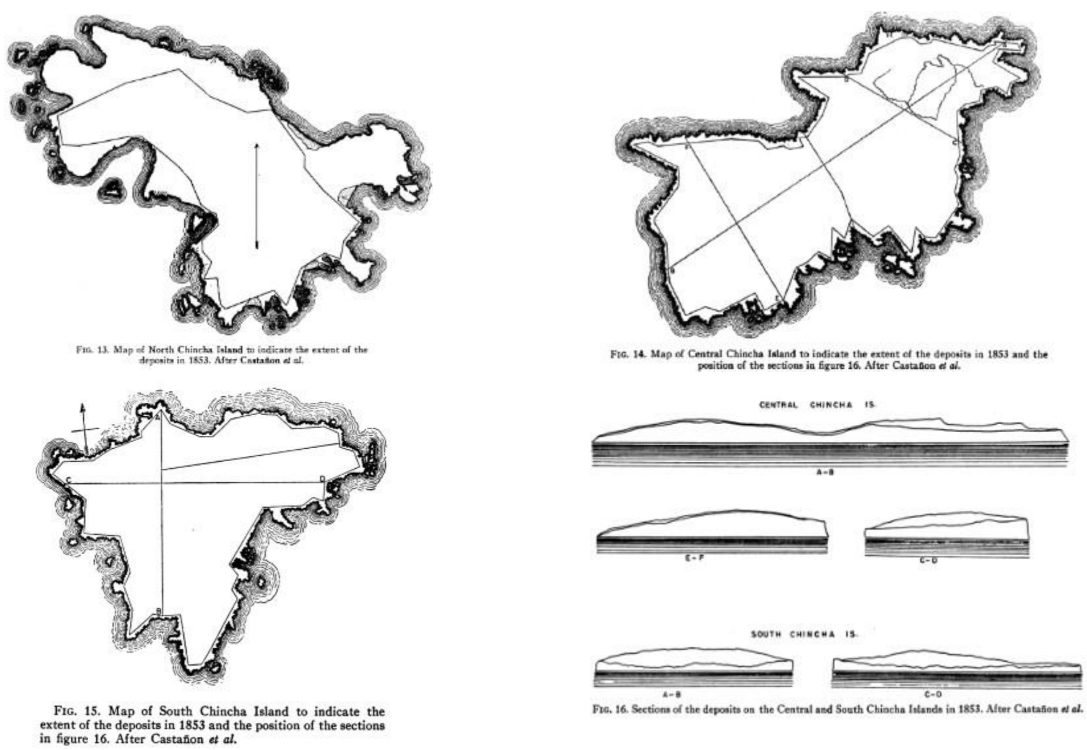


Figure 1.7. Extent of guano deposits on the Chincha Islands in 1853 according to Castañón’s survey. Taken from Hutchinson (1950:35–37).

Figure 1.8. The Chincha Islands today. (**a**) Panoramic of Central Chincha. (**b**) Arriving at Central Chincha. (**c**) South Chincha's dock. (**d**) Flock of piqueros, South Chincha. (**e**) Barren South Chincha and a colony of guanayes. (**f**) Colony of guanayes and guano forming, Central Chincha. Pictures taken by author, 25 September 2021.

Figure 1.9. "South Island, Chincha Islands" 1865 (left); South Island, 2021 (Betancourt, 2021). Picture on the left taken by H. Moulton (negative). Positive by A. Gardner. Taken from: Gardener, Alexander, and Henry De Witt Moulton (photographer). 1865. *Rays of Sunlight from South America*. Washington, D.C.: Philip & Solomons. Picture on the right taken by author, 25 September 2021.

As noted, after his visit in 1919-20, Murphy (1925:50–1) described how he "saw the three Chincha Islands a mile or so ahead…The endless, undulating and interlacing files of guanayes were flying overhead across the strait; gannets and zarcilllos were fishing up and down the green waterways; a gray fulmar floated lightly near by; penguins loafed at the surface; and lobos were wallowing and jumping clear out of water. The prospects were everything that a naturalist could desire." This intricate ecosystem, started off by the energy of the sun, that sets in motion the winds and waters of our rotating planet, where some volcanic islands formed during the last 90 million years, and upwelling brings high concentrations of nutrients to the ocean's surface under the influence of ENSO, allowing for plankton and fish to thrive, which in turn sustains bird populations, who defecate and utilize part of their refuse to reproduce their existence, was entirely transfigured and disrupted by its clash with human societies under capitalism; societies who carelessly dismantled the foregoing beauty, annihilating the "sense of wonder" this unique biogeocoenose evoked, for the sake of trade, business, and profit brought by the "juggernaut of capital." It is to this contradiction between the natural and the social, between what requires millions of years to form and a few decades to destroy, between the *ecological longue durée* and the greedy shortsightedness of the rate of accumulation of profit, that we now turn our attention.

CHAPTER 2. THE FIRST AGRICULTURAL REVOLUTION AND THE BIRTH OF THE BRITISH EMPIRE: A LONG METABOLIC RIFT

> The basic problem in analyzing capitalist development in agriculture is the confusion between *farming* and *agriculture*. Farming is the process of turning seed, fertilizer, pesticides, and water into cattle, potatoes, corn, and cotton by using land, machinery, and human labor on the farm. Agriculture includes farming, but it also includes all those processes that go into making, transporting, and selling the seed, machinery, and chemicals used by the farmer and all of the transportation, food processing, and selling that go on from the moment a potato leaves the farm until the moment it enters the consumer's mouth as a potato chip. Farming is growing peanuts; agriculture is turning petroleum into peanut butter.
>
> – Richard Levins & Richard Lewontin, *The Dialectical Biologist*

Moving east across South America and further northeast across the Atlantic, we reach the European continent, the main region –along with the United States– where South American guano ultimately came to be applied as a fertilizer on a vast scale in the latter half of the nineteenth century. Yet, before analyzing this episode proper, it is necessary to examine why Britain and other European countries plus the United States entered the search for substances with fertilizing properties, which was to result in the exploitation and commercialization of guano and other materials such as bones and nitrates. These materials, I argue, were among the "treasures captured outside Europe by undisguised looting, enslavement and murder [which] flowed back to the mother-country and were turned into capital there" that Marx (1992:918) referred to in *Capital*. To understand when, how, and why Europe –and especially Britain– resorted to guano (and other substances from abroad) to fertilize its soils, it is important to study the evolution of agriculture in this continent and its ties to the genesis and development of capitalism. This is precisely the aim of this chapter. I will confine myself to the study of British, and especially English, agriculture and colonialism, given that this was the chief country that developed, managed, and controlled the guano trade from the outset, and also for space constraints. Yet, the roles of nations such as Spain, Portugal, Holland, France, Germany, and the United States, among others, *vis-à-vis* this trade and other imperial projects are certainly relevant, so I will also refer to them where appropriate. It is also important to emphasize that the agricultural changes within Britain (or any of the above nations) cannot be understood in isolation and only by looking inwards, to what was occurring in the field. It is as important to consider Britain's imperial affairs beyond its borders and their relationship to its domestic agriculture. Thus, below I will follow the entwined historical unfolding of Britain from within as well as without.

In addition, for practical purposes, our starting point will be feudal agriculture in Britain, as this allows for an understanding of the manifold changes this activity underwent with the advent of the capitalist mode of production (*cf.* Hobsbawm 1996:2). As German political scientist Michael Heinrich (2019:337–39) importantly observes, the recount of any historical episode –no matter how thorough and despite the meticulous analysis of sources– necessarily omits some facts and emphasizes others, given an author's historical circumstances, the availability of research materials, and her or his own perspective, interests, and limitations. One way of dealing with such limitations is to draw on a wide range of studies, while structuring one's analysis around a clearly defined path of inquiry. In providing an overview of the general historical, social, and environmental conditions that led to the emergence of the guano trade, we will therefore focus on what is essential in explaining the causal forces at work–in particular the first and second Agricultural Revolutions in England.

2.1. An overview of feudal agriculture in Britain

As Rowland E. Prothero (Lord Ernle) explained in his exhaustive *English Farming, Past and Present* (1912) the oldest form of agriculture in Britain since the Neolithic Revolution (the human economic transition from hunting-gathering to farming in early post-glacial times) up to the beginning of the Middle Ages (*c.* 500 CE) was "wild field-grass" husbandry. This approach was roughly characterized by joint occupation and tillage of the land, wherein tracts of grass were successively converted into arable land by being ploughed and tilled for grains until the soil became exhausted, at which point it was reverted to pasture (Fowler 1983; Prothero 1912:2). Wild field-grass husbandry was later permanently replaced by the separation of arable from pasture land, a practice probably introduced by the Romans or the Anglo-Saxons –both of whom came from drier climates– when settling in Britain around the first and fifth centuries, respectively. Then, after the Norman conquest of England following the Battle of Hastings (1066 CE) the manorial system of agriculture, which may have shown elements of the Roman *villas*, was introduced or reinforced. It was upon this initially alien system that separated arable from pasture land that British medieval agriculture was based on up until the early 14th century, although some of its features persisted until the 20th century.

Following Prothero, an 11th-13th century English manorial estate was generally comprised of four parts: a demesne (the smallest portion) reserved for the lords' personal use and surrounding his house; "free land," occupied by freemen who paid rent in kind or in money; "unfree land," inhabited by bonded peasants producing rents in kind; and common pastures and untilled waste lands, where tenants and cottage occupiers fed their livestock. The demesne was farmed by bonded peasants, whereas the other three areas were worked by village farmers. The main crops grown within these manors were cereals such as wheat and barley (which had long been introduced to Britain from the Middle East, the Mediterranean, or Ethiopia), rye,[44] and oats; legumes like fava beans, peas, and vetches; and other plants such as flax, hemp, and saffron, which, unlike the former, were not mainly used for food or drink, but as fiber (Cole 1961:8; Kloppenburg 2004:48; Prothero 1912). Apples, pears, and plums were also consumed as food (or as cider). Some manors grew grapes for making wine, and oils were extracted from various nuts such as acorns. Others also sold timber, for which landlords usually received money rents. Importantly, roots, clovers, and foreign grasses –which would prove so important later– were still unknown.

Several animals also roamed the manorial lands. Cows were the source of milk, cheese, and butter, obtained by the labor of "dairywomen." These foodstuffs were for the most part locally consumed, and any remaining surplus was sold in local markets. Pigs were kept to obtain lard and bacon; horses and oxen, to plough the land; and sheep –which at this point were valued not for their mutton, hides, or dairy– for their wool (which was already a commodity in England and Flanders) and also for their manure, which was used to fertilize the soil. Rabbits were also a source of food, and beehives were kept for honey (then and for centuries to come the chief sweetener and also a medicine) and wax for the candles of the wealthy. Some of these manors also possessed birds such as hens, geese, fowls, peacocks, and swans, which were a source of profit for the lord. Very importantly, too, Prothero (1912:18) indicates that "[p]rodigious numbers of pigeons were kept; not only were they eaten, but *their dung was prized as the most valuable of manures* [emphasis added]." That is, at least as early as the 12th century, peasants in Britain were aware of the remarkable fertilizing properties of bird excreta, not unlike their indigenous counterparts in Peru, over 10,000 km away. Other manuring substances sometimes

[44] Rye was the chief crop grown on tenants' land and it was the basis of the exploited peasants' food. The flour of rye and wheat were mixed together to form a bread called 'maslin' (Prothero 1912:8).

used, in addition to sheep (the “manure carriers”) and bird excreta, were lime and the costly marl (especially on heavy clay soils), soot, sea sand (if near the coast), and even street refuse.

In addition, demesnes were commonly divided into two or three fields: one for winter seeds (wheat and rye), one for spring seeds (*e.g.* oats, barley, fava beans), and maybe another one for flax and hemp. They were ploughed three times a year. The land was cultivated without rotations, and the fertility of the soil restored by fallowing –that long “Sunday given to the land”– a third or half of the year’s arable land. The yield of wheat was about 2 to 10 bushels per acre (*i.e.* 0.13-0.67 tons per hectare);[45] that of oats and barley around 4 bsh/ac; that of rye and beans was closer to 2 bsh/ac; and that of legumes about 6-12 bsh/ac. According to British agrarian historians Jonathan D. Chambers and Gordon E. Mingay (1966:5) a medieval harvest yield of 4 to 1 of seed was highly satisfactory.

The serfs or peasants lived in the village outside the manor, close to the open (hedge-less, unenclosed) arable fields that were collectively cultivated by them also by means of the foregoing two- or three-field system, consisting of one field laying fallow and the other one or two being under tillage for grain. In turn, these three fields were subdivided into several flats of about 10 acres (~4.05 ha). Besides these open fields and meadows, there were common pastures bordering untilled, wild “waste lands.” These pastures were an “integral and essential part of the village farm” (Prothero 1912:27) and were often the sole grasses peasants could use for their livestock.

The three-field system would predominate in Britain for about 700 years, until the early 19th century. The central feature of this system was that it was self-sufficing (or sufficient). That is, despite feudalism’s deep socioeconomic inequalities and class antagonisms, the agricultural products grown under this system within each manor were intended for *consumption* and satisfying human needs, not for profit. Only a small number of products was exchanged for money at very local markets. However, this mode of agricultural production would be progressively turned into a “commercial system of farming for profit” (Prothero 1912:8). Roughly speaking and up to the late 19th century, this transformation underwent two phases: a first, gradual, and *formal* “agricultural revolution” beginning in the late 15th century and extending to the late 18th century, and a swift, vertiginous, and *real* “second agricultural revolution” in the 19th century (Thompson 1968). The latter was part of a broader revolution so

[45] 1 t h^{-1} = 14.87 bsh ac^{-1}; 1 ac = 0.405 ha.

deep that it "left no aspect of human life unchanged" (Hobsbawm 1996:296). It is to the first of these revolutions that we now turn our attention.

2.2 The first (long) agricultural revolution and the genesis of the British Empire

2.2.1. The origin of expropriation: the first enclosures of common land

Already in the 13th century we start witnessing the first slight changes that gradually started reorienting agriculture in Britain from a self-sufficing into a profit-making activity. As noted, most land in Britain was then held in common by free peasants, which made it difficult for manorial lords to extend the arable land under their control and to lease it for a money rent, an activity that began to prove profitable in a setting of increasing commercial and monetary activities. That is, *the existence of common land was an obstacle to profiting from agriculture*. Thus, in 1235, during Henry III's reign, the Parliament of England (then limited to what from next century on would be called the House of Lords) passed the Statute of Merton, which among other things gave manor lords (*i.e.* Members of Parliament themselves) the right to enclose common and waste lands, provided that sufficient pasture land remained available for their tenants. Forty years later, the first Statute of Westminster (1275) extended the lord's right to enclose pasture lands, so long as the former condition was fulfilled (Prothero 1912:38). This process marks the first instances of the long process expropriation of people from the land; that is, of primary accumulation (or original expropriation) –as Marx thoroughly discussed in the last sections of *Capital's* first volume– which would ensue through different forms and intensity well into the 19th century. This enclosure was "nothing else than the historical process of divorcing the producer from the means of production" (Marx 1992:875).

During the 14th century we come across the first traces of capitalism. In 1349, in Edward III's reign, following the Black Death and during the initial stages of the Hundred Years' War, the House of Commons passed the first Statute of Laborers, Britain's earliest legislation on wage labor (Marx 1992:900). Three years later, demesnes were divided into separate farms and let on money rents, a change that proceeded faster in the south and southwest than elsewhere (Prothero 1912:44). Thus, around this time, serfdom had practically disappeared. For instance, old bailiffs –lords' employees that collected rents and managed the demesne– gave way to free *farmers, i.e.* agricultural wage-laborers who worked both on the estates and on their own arable lands, and could also access the common lands (Marx 1992:877). Farmers were similar to peasants but could also exploit wage labor themselves. The late 1300s also saw the emergence of yeomen, a class of peasants that would take hold of the demesnes and arable fields and turn them into sheep-walks, and ended up owning vast shares of land until their disappearance in the mid-18th century (Chambers and Mingay 1966:6–7; Marx 1992:883). Another statute in 1360 allowed masters to use corporal punishment to extort labor from the expropriated wage laborers, in what constitutes but one example in a long list of "bloody legislation against the expropriated" that would ensue for centuries (Marx 1992:901). Not surprisingly, a peasants' revolt –named after Wat Tyler, one of its leaders, in an epoch where the fictitious Robin Hood started appearing– broke out towards the end of the spring of 1381, following the tense situation in Britain caused by the bubonic plague, the war, and the internal class struggle (Prothero 1912:42). As money and commerce grew and the produce of the soil was being sold in new markets, feudalism began to "crumble to powder" both from within and from without (*Ibid*.:34).

Further socioeconomic changes ensued in 15th-century Britain. As stated by Prothero (1912:48), at this time, "agriculture reorganised itself on a money basis, and two classes emerge into prominence–capitalist tenant-farmers and free but landless laborers." While enclosure continued through the voluntary or forced commutation of rights of commons in the 1430s, Portuguese pirates (1441) –and Spaniards would follow suit (1470)– were starting to abduct people from Africa for sale, in what marks the genesis of the infamous African slave trade that would persist for more than 400 years (Horne 2018:31–32).[46] Importantly, too, in the last decades of the 15th century, what Marx (1992:878) referred to as "the prelude to the revolution that laid the foundation of the capitalist mode of production," namely, the dissolution of the bands of feudal retainers (or servants), took place, which would proceed until round 1520, leaving behind a mass of "free"[47]laborers (*cf.* Prothero 1912:67). These bands were dissolved by the new nobility to defy the king and Parliament and gain control over the common lands, an action that was propelled by the growth of wool manufacture in Flanders and the consequent rise in this fiber's price in England (Marx 1992:878–79). The aim of this new nobility –continues

[46] Yet, the abduction of enslaved Africans precedes this trade. In fact, from the 9th to the 15th centuries, it is estimated that about 3.5 million to 10 million Africans taken from Africa to the Middle East and some European cities (Velázquez and Iturralde Nieto 2012:39–40).

[47] Free in the double sense of being able to dispose of their own labor-power as a commodity, and free from having means of production, *i.e.* the objects necessary for the realization of their labor-power (Marx 1992:272–73, 874).

Marx– was the transformation of arable land into pastures, or sheep-walks, in order to profit from wool production. Hence, the counterpart of this shift in land use was the forcible usurpation of even more people from the soil, which was again accompanied by new bloody legislation against vagabonds (who were created by this very process), beginning in the reign of Henry VII (the first Tudor monarch), and marking the end of the Middle Ages in England. With the dawn of this period –argues Prothero (1912:55)– began the gradual movement that transformed England into a mercantile *country*. In addition, the fall of Byzantium (1453) would close off Europe's commerce with the Orient, which triggered the search for alternative trade routes with it via the west, resulting in the arrival of Italian navigator Christopher Columbus to the Caribbean just 39 years later, and all of what this episode entailed (*cf. v.gr.* Galeano 1997; O'Gorman 2006).

2.2.2. Revolution within, colonialism without: sheep-walks, slavery, and sugar

Importantly, in Europe, this period also represents the start of the "agricultural revolution which began in the last third of the fifteenth century, and continued during the bulk of the sixteenth" (Marx 1992:906). The first act of this revolution –continues Marx– was to remove the huts at the farm, which forced laborers to migrate into the towns (*Ibid*.: 865). This first agricultural revolution was mainly characterized by the change of arable into pasture land, the use of more tools, and the economy of labor, in a process that enriched farmers (and landlords) as quickly as it impoverished peasants. Yeomen[48] also utilized new farming techniques such as increasing the fodder supply for the winter livestock, or the use of temporary leys alternating with arable cultivation (Chambers and Mingay 1966:8). Yet, this revolution did not occur without resistance exerted by the decrepit old order, as evidenced for instance by complaints against the spread of capitalist farming and the annihilation of the peasantry, or even by Acts like that of 1489, which forbade the conversion of arable land into pasture and the destruction of houses of husbandry, and also sought to reverse enclosures, the restoration of tillage, and limit the possession of sheep (Marx 1992:880; Prothero 1912:60). All of this ultimately proved fruitless, however, and the penetration of capitalism into the countryside ensued.

The capitalist era proper dates from the 16th century (Marx 1992:876). Throughout this period, in Britain, the enclosure of the commons and the individual use of land, its conversion

[48] As, for instance, the family in Lincolnshire into which Isaac Newton would eventually be born in 1642 (*cf.* Westfall 1996).

from arable into pasture, sheep-farming, the formation of large farms, capital investments in the land, increasing rents, and agricultural wage-labor, among other processes, continued their course. That is, the logic of food production kept shifting from a relatively rational self-sufficing activity (albeit relying on the exploitation of the serfs) into an irrational, *i.e*. profit-oriented enterprise, which also relied on another form of exploitation: wage labor. Thus, the "contradiction between the private ownership of land and a rational agriculture" (Marx 1993a:948) kept widening. By this time, landlords had become receivers of rent through wage laborers (Prothero 1912:55). As Prothero (*Ibid*.:58) argues, "Tudor farmers despised self-sufficing agriculture; they aspired to be sellers and not consumers only, to raise from their land profits as well as food." Land was now seen as a commercial asset. In the final parts of *Capital* (III), Marx (1993a:937) offers a rich overview of this situation:

> This entry of capital into agriculture as an independent and leading power does not take place everywhere all at once, but rather gradually and in particular branches of production. At first it does not take hold of agriculture proper, but rather branches of production such as stock-raising and particularly sheep-farming, whose main product, wool, offers at first a market price permanently in excess of its price of production, in conditions of the rise of industry; this is not equalized until later on. That was the case in England during the sixteenth century.

The maxim that "the foot of the sheep turns sand into gold" was being pursued, and common lands –given their physical characteristics and their collective character– were incompatible with that end (Prothero 1912:59). Thus, sheep farming to supply wool for trade continued under Henry VIII's reign (1509-47) as also did gardening which around this time "began to creep out of Holland into England" (*Ibid*.:102). During the 14th and 15th centuries, the proportion of pasture to arable land in England was about 1:2-4; whereas by the mid-16th century it had shifted to 1:1, and later to 2:1, until eventually reaching 3:1 (Eden in Marx 1992:889). Of course, this usually occurred through violent means. Interestingly, Thomas More's *Utopia* (1516) denounced the process of enclosure provoked by the creation of these sheep-walks, by reflecting on some of the grievances of the rural population and their transfiguration into vagabonds (Prothero 1912:75).

During this time, the Reformation (1517) provided a powerful impulse for the expropriation of more people from the soil, as the "colossal spoliation" of Catholic church property –which amounted to a significant portion of English land– was carried out (Marx 1992:881). From 1536 to 1542, monasteries in England were suppressed, which besides depopulating the countryside, dealt a powerful blow to honey (and candles) production (Mintz 1986:136; Prothero 1912:67). Consequently, both within and without Britain, new legislation against vagabondage followed suit, an episode "written in the annals of mankind in letters of blood and fire" (Marx 1992:875), wherein people in many instances were "forcibly expropriated from the soil, driven from their homes, turned into vagabonds, and then whipped, branded and tortured by grotesquely terroristic laws into accepting the discipline necessary for the system of wage-labour" (*Ibid.*:899). In England, for instance, during the reign of Elizabeth I (1558-1603) – the last Tudor monarch– an Act for the Punishment of Vagabonds and several others were passed (Marx 1992:897). As Marx (*Ibid.*:926) argued: "capital comes dripping from head to toe, from every pore, with blood and dirt." This violence, of course, was legitimized and enforced by the State.

The Elizabethan period saw an increase in gardening, horticulture, and agricultural literature, and crops such as carrots, turnips, clover, onions, garlic, rapeseed, cabbages, leeks, hops, and potatoes, among others, were already cultivated in rich people's gardens (Prothero 1912:101–2). Interestingly, by this time potatoes (*Solanum tuberosum*) –another legacy of present-day Peru to the world (along with cinchona bark[49], guano, and unrivaled anchoveta schools)– which had been introduced in Europe by Spaniards (and then by the British and others) around the 1560s, and which would become a staple food of British and Irish workers and peasants 200 years later, were still marginally grown in selected gardens of the wealthy. So was the case with turnips (*Brassica rapa*), which would later become a central element of the first agricultural revolution, and whose cultivation in open fields was first suggested in England by poet Barnabe Googe in *Fovre Bookes of Hufbandry* (1577), in his translation from German of a work by Conrad Heresbach (Prothero 1912:100). Thus, as Prothero (*Ibid.*:102) reminds us, in Shakespeare's day potatoes "rained from the sky," and Anne Page (from *Merry Wives of Windsor*, published in 1602) would "rather be set quick i'th' earth/And bowled to death with turnips" than marry Dr. Caius. Interestingly, according to Prothero (*Ibid.*), another Elizabethan writer, Hugh Plat, in his *Jewell House of Art and Nature* (1594), talked of restoring the fertility

[49] From the bark of this tree of the genus *Cinchona*, native to Peru, Ecuador, and other regions in South America, quinine (and other medicinal alkaloids) is produced. This substance proved essential to treat malaria, and thus to, among other things, reinforce the colonialist and imperialist projects of European powers and the U.S. in the tropics.

of the soil by means of farm-yard dung, marl, street refuse, salt, ashes, weeds, hair, fish remains, blood, and other substances.

Importantly, around this time perhaps the first words on Peruvian guano by a European chronicler were printed in the "Old World" by José de Acosta (1540-1600), a Spanish Jesuit that had travelled across Peru in the 1570s.[50] In his *Natural and Moral History of the Indies* [*Historia natural y moral de las Indias*] (1590), published originally in Latin in 1589 and translated into Spanish (1590), French (1598) and English (1604), de Acosta recalls that:

> In some Ilands and headlands, which are ioyning to the coast of Peru, wee see the toppes of the mountaines all white, and to sight you would take it for snow, or for some white land, but they are heapes of dung of sea fowle which go continually thither : and there is so great aboundance, as it riseth many elles, yea, many launces in height, which seemes but a fable. They go with boates to these Ilands onely for the dung, for there is no other profit in them. And this dung is so commodious and profitable as it makes the earth yeelde great aboundance of fruite. They cal this dung Guano, whereof the valley hath taken the name, which they call Lunahuana in the valleys of Peru, where they vse this dung, and it is the most fertile of all that countrie. The quinces, poungranets, and other fruits there, exceede all other in bountie and greatnes ; and they say the reason is, for that the water wherewith they water it passeth by a land compassed with this dung, which causeth the beautie of this fruite. So as these birdes have not only the flesh to serve for meate, their singing for recreation, their feathers for ornament and beautie, but also their dung serves to fatten the ground (de Acosta 1880:281–82; Walton 1844:614).[51]

[50] Spanish conquistador and chronicler Pedro Cieza de León, in the first part of his vast *Chronicle of Peru* [*Crónicas del Perú*] (1553) referred to guano, although he did not explicitly use that name: "Más adelante están los ricos valles de Tarapacá. Cerca del mar en la comarca de estos valles hay algunas islas bien pobladas de lobos marinos. Los naturales van a ellas en balsas: y de las rocas que están en sus altos traen gran cantidad de estiércol de las aves para sembrar sus maizales y mantenimientos: y hállanlo tan provechoso que la tierra se para con ello muy gruesa y fructífera: siendo en la parte que lo siembran estéril: porque si dejan de echar este estiércol, cogen poco maíz. Y no podrían sustentarse, si las aves posándose en aquellas rocas de las islas de susodichas no dejasen lo que después de cogido se tiene por estimado, y como tal contractan con ello como cosa preciada unos con otros" (Cieza de León 1553:*f.rcj*). [With modernized Spanish spelling by the author]. Yet, in this piece Cieza de León also incorrectly described the guano heaps on the Chinchas as "sand hills" [*arenales*] (Kubler 1948:39).

[51] The original Spanish is slightly different, and reads: "Algunas Islas, o Farellones que eftan junto a la cofta del Piru fe veen de lexos vnos cerros todos blancos: dira quien les viere, que fon de nieue, o que toda es tierra blanca, y fon montones de eftiercol de paxaros Marinos, que va alli contino a eftercolar. Y es efta cofa tanta, que fube varas, y aun lanças en alto que parece cofa fabulofa. A eftas Islas van barcas, a folo cargar defte eftiercol, porq otro fruto pequeño, ni grande en ellas no fe da, y es tan eficaz, y tan commodo, que la tierra eftercolada con el da el grano, y la fruta, co grandes ventajas. Llama Guano el dicho eftierco, de done fe tomo el nombre del valle que dizen de Lunaguana en los valles del Piru donde fe aprovechan de aquel eftiercol: y es el mas fertil que ay por alla. Los membrillos, y granadas, y otras frutas en grandeza, y bondad excede mucho, y dizen fer la caufa, que el agua con que riegan eftos arboles, paffa por tierra eftercolada, y da aquella belleza de fruta. De manera que de los paxaros no folo la carne para comer, y el canto para el deleyte, y la pluma para ornato y gala, fino el mifmo eftiercol es también para el beneficio de la tierra…" (de Acosta 1591:f.186v).

De Acosta thus shows that, as in Incan and pre-Incan times, the nascent Viceroyalty of Peru knew that the birds "have not only flesh to eat, their singing for delight, the feather for beauty, but also their dung to nourish the land," something they undoubtedly learned from the Incas and which was essential for colonizing Peru, for it allowed the Spaniards to grow food amid that arid landscape. Without guano and Incan knowledge, the Spanish conquest of Peru would probably have inexorably failed.

The 16th century was also the century when European colonialism took off. Following in the footsteps of Columbus (who died believing he had reached Asia), the Spaniards and Portuguese scrambled for pieces of land in what would be called America (or "The Americas" in English, after the United States, centuries later, appropriated the term "America" to refer only to themselves), as evidenced by the Treaty of Tordesillas (1494). (These two empires also established colonies in southeast Asia, including Macao, seized by the Portuguese in 1557, which will be a central location later in our story.) At the turn of the 16th century, gold and silver started pouring from the "New World" into the old one, which among other things caused a fall in the value of "precious metals" (*i.e.* of money). This actually enlarged the profit of farmers, since the prices of all agricultural products increased, while it lowered the wages they had to pay their workers, as well as the ground rents they had to pay the landlords, which had been contracted for on the basis of old money values (Marx 1992:906). In addition, it is essential to underscore, with Marx (1992:915,925), that:

> The discovery of gold and silver in America, the extirpation, enslavement and entombment in mines of the indigenous population of that continent, the beginnings of the conquest and plunder of India, and the conversion of Africa into a preserve for the commercial hunting of blackskins, are all things which characterize the dawn of the era of capitalist production…In fact the veiled slavery of the wage-labourers in Europe needed the unqualified slavery of the New World as its pedestal.

For instance, the Taínos, Kalingo (or Caribs), and Arawaks –the indigenous people of the Caribbean (Dunbar-Ortiz 2015:23)– were importantly decimated; the first of millions of African slaves were brought by Spain into the Caribbean in 1503; the Aztecs in Tenochtitlan would fall in 1521, followed by the Incas in Cuzco 1533. In addition to looting "precious metals," Spain and Portugal –and the French, Dutch, and British would rapidly follow suit– introduced new crops into the Americas, which were as or more important than the former. These alien crops were cultivated for profit through enslaved labor, upon lands stolen from the indigenes and from other non-human inhabitants. The first and most important of these foodstuffs was sugar cane (*Saccharum officinarum*), a plant originally domesticated in New Guinea about 10,000 years ago, which was then carried into Philippines, India, and Persia, and eventually marginally introduced in Europe by the Arabs around the 11th century, until Columbus first carried it to the "New World" in 1493 during his second voyage (Galeano 1997:83; Mintz 1986).[52] "It was Spain,"–argues Mintz (1986:32)– "that pioneered sugar cane, sugar making, African slave labor, and the plantation form in the Americas." However, Britain was to become within a century the western world's chief sugar (sucrose) grower and exporter (*Ibid*.:35). In all, two million Africans were deported to the Americas in the 17th century. Before 1641, Spanish and Portuguese ships accounted for 97% of the total abductions and, after that, England, France, and the Dutch would predominate (Horne 2018:86–7). In all, as Galeano (1997:59–60) succinctly put it:

> For almost three centuries after the discovery of America no agricultural product had more importance for European commerce than American sugar. Canefields were planted in the warm, damp littoral of Northeast Brazil; then in the Caribbean islands –Barbados, Jamaica, Haiti, Santo Domingo, Guadeloupe, Cuba, Puerto Rico– and in Veracruz and the Peruvian coast, which proved to be ideal terrain for the "white gold." Legions of slaves came from Africa to provide King Sugar with the prodigal, wageless labor force he required: human fuel for the burning. The land was devastated by this selfish plant which invaded the New World, felling forests, squandering natural fertility, and destroying accumulated soil humus. The long sugar cycle generated a prosperity as mortal as the prosperity generated by the silver and gold of Potosí, Ouro Prêto, Zacatecas, and Guanajuato. At the same time, directly or indirectly but decisively, it spurred the growth of Dutch, French, English, and U.S. industry.[53]

The English actually arrived late in the Atlantic –which they would soon dominate– unsuccessfully attempting to settle in the Americas in 1583 and again in 1595. Yet, they had gained solid experience in colonizing and subduing in Ireland, which would prove very useful (Horne 2018:34; Pagden 2001:34). Relatedly, several English companies seeking to obtain monopoly trading rights such as the Muscovy Company (1555), Merchant Adventures (1564), Eastland Company (1579), and Levant Company (1592), among several others, were charted

[52] Before being brought to the Americas, sugar cane was grown by Portugal through enslaved African labor in the recently seized São Tomé, Madeira and other islands, while Spain did the same in its new African colony, the Canary Islands. It was first cultivated in the Americas in Spanish Santo Domingo, being shipped back to Europe around 1516; 10 years later, Portuguese Brazil was *en route* to becoming the world's main sugar exporter (Mintz 1986:31–32).

[53] Naturally, this would also be the story of cacao, rubber, dozens of fruits (*e.g.* banana, originally from present-day Indonesia and Malaysia), coffee (Ethiopia), minerals, and, of course, cotton, among many other products.

around these years, roughly corresponding to the Elizabethan period (Prothero 1912:79). In addition, Britain went to war with Spain (1585-1604) over the control of the Caribbean (Beckles 2001:218).

As argued by U.S. historian Gerald Horne (2018:7), the 17th century –roughly corresponding to the Stuart period (1603-1714)– was perhaps the most decisive in English history. At its onset, Britain was a "second-class power," lagging behind Spain, Portugal, France, and especially the Dutch. Yet, by the early 1700s, Britain had become in many ways "the planet's reigning superpower." "Like a seesaw" –continues Horne (*Ibid*.:11)– "as London rose Africa and the Americas fell." Let us briefly see why. For example, following its foregoing attempts to plunder Spain's colonies and to attain exclusive trading rights, the English East India Company (EIC) –which would be central to the drain of India's wealth (*cf.* Patnaik and Patnaik 2021)– was founded in 1600 (Horne 2018:42; Prothero 1912:79). As Marx (1992:917) would state: "The English East India Company…received apart from political control of India, the exclusive monopoly of the tea trade, as well as of the Chinese trade in general, and the transport of goods [salt, opium, betel, saltpeter, etc.] to and from Europe." The Dutch chartered their own EIC two years later, one of what eventually became 16 such rival companies: French, Prussian, Danish, Spanish, Swedish, etc. (Mintz 1986:112).

Within a few years, in 1607, Jamestown, Virginia became finally the first English colony in the New World. Again, the Dutch would establish their first settlement in the Americas just eight years later in Fort Nassau (located in present-day Albany, New York). In fact, the 17th century was a period of constant confrontations between the nascent Dutch and British empires, wherein the latter ultimately prevailed. In 1624, the English established in Saint Kitts. Three years later, in the midst of the Thirty Years' War (1618-48) (at around the same time that for instance Francis Bacon was publishing his *Novum Organum* back home), they settled in Barbados, which catapulted their eventual domination of the sugar trade (Mintz 1986:37). In 1628, England took hold of one more of the Lesser Antilles, Nevis, and by 1632 they would also have seized Antigua and Monserrat (Sheridan 1998:394). Seven years later, the city of Chennai would be taken by the English EIC, "in the face of stiff resistance" (Horne 2018:59). Then, in 1651, a month after the end of the English Civil War (1642-51), a year before the first of three 17th-century Anglo-Dutch wars broke out, and three years before the Anglo-Spanish war (1654-60) erupted, in a period of high tension, a Parliament led by Oliver Cromwell passed the first of a long series of Navigation Acts, which ordered that only English ships could import goods to England, and that the North American colonies could only export merchandise (*e.g*. tobacco and sugar) to that island. These acts would prove crucial for the growth of Britain's hegemony.

After 1654, England had acquired naval superiority over the Dutch (Israel 2001:423), which they would then effectively use, for instance, to seize Jamaica from Spain in 1655, during the Commonwealth of Cromwell, a "proto-imperialist" who also devastated Ireland, opining about the Irish: "put them all to the sword" (Horne 2018:68–69).[54] Importantly, five years after taking hold of Jamaica and following the Stuarts' Restoration (1660), while it was founding the Royal Society of London at home, England chartered the Company of Royal Adventurers, which was granted *a one-thousand-year monopoly of trade* to Africa by Charles II. In 1672, this firm would become the Royal African Company, soon the world's undisputed leader in the African slave trade (Richardson 1998:445). This was –argues Horne (2018:35)– "a hinge moment in the history of capitalism, slavery, and white supremacy alike." In addition –he continues (*Ibid*.:135)– "capitalism not only meant slavery and white supremacy but also the ethos of the gangster," given this trade was also heavily managed by pirates. Around the same time, England would snatch Manhattan from the Dutch (1664) –which the latter had in turn seized from Lenape indigenes in 1624– and name it after the Duke of York. Then, in the last decades of the 17th century, two more Anglo-Dutch wars (1665-67, this time won by the Dutch; and 1672-74, where England avenged its loss) would erupt, together with a Nine Year's War –where England sided with the Dutch– against France (1688-97), and the establishment of new settlements in India–in Bombay (1668) and Calcutta (1690). In fact, at the turn of the century, a second East India Company would be chartered by England. Importantly, Horne (2018:148) observes that, around this time (1690s), the term "white" began to replace "Christian" and "free," in what constitutes another example of the inextricable links between capitalism, slavery, and white supremacy.

Relatedly, the late 1650s mark the time when four exotic, stimulating substances (which, together with tobacco and rum, can be classified as drugs, though different in effects and addictiveness) came into scene in England: sugar, coffee, chocolate, and tea, the latter still being Britain's foremost nonalcoholic beverage (Mintz 1986:108). Hitherto exclusive for the wealthiest and in small amounts, these substances began to become popular. Four substances that came

[54] It is no wonder that Theodore Roosevelt, U.S. president from 1901 to 1909 and architect of the "Big stick" foreign policy towards Latin America (and beyond), was a fervent admirer of Cromwell (*cf*. Horne 2018:65).

from three different continents were being brought home by the British Empire. And this was just the beginning.[55]

We have seen some of the main events that catapulted England to global preeminence by the end of the 17th century, most of which took place overseas. At the turn of the 18th century, the British Empire had grasped several territories in the Americas and Asia (more so than its rivals) and, overtaking the Spanish, French, and Dutch, had also become the "king of sugar," the substance "whose sweetness has created more human bitterness than any other" (Horne 2018:97; Mintz 1986:31). In fact, Britain's sugar colonies added more than £3 million a year to its wealth (Young in Beckles 2001:218). As stated by Sheridan (1998:395), "[p]rior to the nineteenth century, the plantation islands of the Caribbean were the most-valued possessions in the overseas Imperial world. Most valuable by far were the sugar plantations…" In addition, around this time England had also begun to dominate the African slave trade; that is, the control over the labor-power by means of which sugar and many other elements of nature were transformed into commodities. In other words, by 1700 England's power over nature, capital, and labor overseas was strong and on the rise. As Mintz (1986:38) asserted: "England fought the most, conquered the most colonies, imported the most slaves…and went furthest and fastest in creating a plantation system." It is now time to turn to the *internal* processes England was experiencing throughout the 1600s *vis-à-vis* the ensuing agricultural revolution, which by then had been gradually in the making for more than 100 years.

2.2.3. Into the British field: legumes, rotations, and further privatization of the land

Ongoing for over 360 years, the piecemeal process of enclosure of the commons continued into the 1600s,[56] while dairying and the growing of new crops, such as the foregoing vegetables, extended. It is estimated that between 1455 and 1637, some 750,000 acres (*i.e.* over 300,000 ha) of land were enclosed in England, which entailed the expropriation of some 35,000 people from

[55] For instance, as Mintz (*Ibid*.:110) shows us, Catherine of Braganza (wife of Charles II), was "England's first tea-drinking queen" (1662-1685). In 1659 –seven years after London's likely first coffee house was opened– a London newspaper reported that: "Theire ware also att this time a turkish drink to bee sould, almost in every street, called Coffee, and another drink called Tee, and also a drink called Chocolate, which was a very harty drink." (*Ibid*.:111). And the rest is history.

[56] Among those who resisted enclosure was none other than William Shakespeare, who in late 1614 opposed the enclosure of land he owned in Stratford-upon-Avon, following a proposal made by his neighbor William Combe. Shakespeare eventually conceded, but the courts did not, so the land remained unenclosed (Prothero 1912:68).

the soil (Prothero 1912:66). At the same time, enclosure and the extension of pastures upon former arable land to produce wool created the conditions for the demise of this very industry, as the quality of wool decreased due to changes in the sheep's diets (*i.e*. richer fodder), which coarsened the fibers (Chambers and Mingay 1966:66). This was partly solved by the export of English cloth via the newly found trading companies (Prothero 1912:81). Moreover, the conversion of arable to pasture land –which had been so pervasive in the time of the Tudors– was stopped, as agriculture began to become profitable through the application of new or revived manuring, drainage, ploughing, sowing, and irrigation techniques (*e.g.* water meadows), which were still very local and modest, and many of which were patented (*Ibid.*:103).

Notably, in 1609 (less than 80 years after the fall of Cuzco), *Royal Commentaries of the Incas* [*Comentarios Reales de los Incas*] written by Peruvian-born author Inca Garcilaso de la Vega (1539-1616),[57]was published in Lisbon. Within this extensive and influential work, there is a very relevant passage, which –asserts Hutchinson (1950:45)– is "quoted by almost every author considering guano":

> By the Sea-coast, from below *Arequepa*, as far as *Tarapaca*, which is above two hundred Leagues, they use no other Dung, but such as comes from the Sea-birds, of which there are great numbers, and incredible flocks on the Coast of *Peru*; they breed in little Islands, which lie in the Sea, and are unpeopled, where they lay such heaps of Dung, that at a distance they seem to be Hills of Snow. In the times of the *Incas*, who were Kings, great care was taken of these Birds in the season of their Breeding; for then on pain of Death no Man was to enter on those Islands, left they should disturb the Birds, or spoil their Nests; nor was it lawful to take or kill them at any time, either off or upon the Island…they [the Incas] then weighed and shared out to every Man the quantity [of guano] he was to receive; and it was felony for any man to take more than what belonged to him, or to rob or steal it…for…that every man had as much as was necessary for his own Lands, the taking a greater quantity than what belonged to him, was judged a Crime, and a high offence; for that this sort of Birds dung was esteemed precious, being the best improvement and manure for Land in the World.[58]

[57] Not to confuse with Spanish poet and solider Garcilaso de la Vega (1501-1536).

[58] The phrase quoted in English comes from Rycaut's (1688) edition. The original in Spanish (with modernized spelling by the author) reads: «En la costa de la mar desde más abajo de Arequipa hasta Tarapacá, que son más de doscientas leguas de costa, no echan otro estiércol sino el de los pájaros marinos, que los hay en toda la costa del Perú grandes, y chicos, y andan en bandas tan grandes, que son increíbles si no se ven: crían en unos islotes despoblados que hay por aquella costa, y es tanto el estiércol que en ellos dejan, que también es increíble, de lejos parecen los montones del estiércol puntas de alguna sierra nevada. En tiempo de los Reyes Incas había tanta vigilancia en guardar aquellas aves, que al tiempo de la cría, a nadie era lícito entrar en las islas so pena de la vida: porque no las asombrasen, y echasen de sus nidos. Tan poco era lícito matarlas en ningún tiempo, dentro ni fuera de las islas so la misma pena… [los Incas] daban con el mismo límite a cada pueblo su parte [de guano], y a cada vecino…y so pena de muerte no podía el vecino de un pueblo tomar el estiércol del término ajeno: porque era hurto, ni de su mismo término podía sacar más, de la cantidad que le estaba tasada conforme a sus tierras, que le era bastante, y la demasía le castigaban por el desacato. Ahora en estos tiempos se gasta de otra manera. Es aquel

Back in the day, de la Vega's book became very popular, and was soon translated into French (by Jean Baudoin in 1633) and English (by Sir-to-be Paul Rycaut in 1688), and then into other languages like German and Italian. In addition, Prothero (1912:104) asserts that de la Vega discussed "the merits of Peruvian guano" in Lisbon even earlier, in 1602, though he does not offer further evidence. Thus, it is reasonable to assume that as early as the 17th century (and perhaps even earlier, *cf.* de Acosta 1591), the remarkable fertilizing properties of Peruvian guano –long known among several indigenous groups in Peru– were already talked about in Europe.

In addition, the use of clover (*Trifolium* spp) –which had spread from Italy to Holland in the previous century– was beginning to reach England too (Chambers and Mingay 1966:8). Clover, which fixes atmospheric nitrogen in the soil –a chemical process that would remain unknown to science until Hellriegel and Wilfarth (1888) and Winogradsky (1890) discovered it (Brock 1997:147, 182)– was usually sown either under a cereal in arable rotation, as fodder, or to feed livestock in the winter (Prothero 1912:54–9). As noted, this legume was already grown in a few gardens in England but, by 1620, clover seeds were being regularly exported to this country (Chambers and Mingay 1966:8). Together with turnips and grasses, clover would revolutionize English farming, but it would be more than a century before their use became generalized, though they were already grown on some light soils, hitherto suitable only for grazing (Chambers and Mingay 1966:8; Prothero 1912:108).

These crops, along with flax, gained, some popularity after Sir-to-be Richard Weston –a canal builder who learned agricultural techniques in Flanders while in exile from the English Civil War– incorporated them into his crop rotations in Surrey. Weston published *Discours of the Husbandrie used in Brabant and Flanders* in 1645, which became a very influential work for English farmers throughout the latter half of the 17th century (Prothero 1912:108). Six years later, Samuel Hartlib wrote *Legacie* (1651) –the same year that Thomas Hobbes published his *Leviathan* and two years after Charles I was beheaded– where the condition of 17th-century English farming is described, and in which 21 substances are suggested as manures, including lime, marl, chalk, ashes, blood, and, interestingly, pigeons' dung, among others (*Ibid*.:109–10). (Let us remember that some 500 years earlier, manorial peasants also relied partly on the

estiércol de los pájaros de mucha fertilidad» (1609:103). The last sentences are different in the English edition; probably they were Rycaut's own modifications (the French edition is closer to the Spanish one here).

fertilizing properties of pigeons' droppings). Then, in 1664 –around a time when the wild boar and the wolf became extinct in England due to changes in land use– agriculturist John Forster published *England's happiness increased, or, A sure and easie remedy against all succeeding dear years by a plantation of the roots called potatoes*. Forster's advice, though, would not be largely followed until the Napoleonic period (*Ibid*.:152). Later, in 1669, agriculturalist John Worlidge gathered and summarized the farming practical knowledge of the first 60 years of the 17th century in his *Systema Agriculturae,* which would remain influential for some time (*Ibid*.:130). In the last two decades of the 17th century, John Houghton made the first attempt to publish an agricultural paper using his *Collection of Letters for the Improvement of Husbandry and Trade* (*Ibid*.:133). These are but five of the prominent works on agricultural improvements that were produced and circulated in England in the 17th century, even if their advice took a longer time to spread.

The late 17th century also saw the development of a central farming method in Britain: the "Norfolk system," also known as four-course rotation. In this system –wherein legumes and cover crops replaced fallow fields– wheat was grown in the first year, followed by turnips in the second, barley –with clover and ryegrass under-sown– in the third, and clover and/or ryegrass in the fourth. (Chambers and Mingay 1966:59; Foster 2016:10). The adoption of this system spurred the enclosure of more common lands and open fields, and –following Chambers and Mingay (1966:40,54)– its implementation on light (*i.e*. sandy), well-drained soils in Norfolk (and also in East Anglia, Hertfordshire, and Essex), together with that of ley-farming (which did not use root breaks) on heavier soils, "represented the real breakthrough in farming techniques" associated with the first agricultural revolution.[59]The soil under this system was subsequently marled and manured (*Ibid*.:62). In the following century, around the 1730s, Lord Townshend would fervently popularize the Norfolk rotation, to the extent that he would be known as "Turnip Townshend" and identified as the initiator of this system (Prothero 1912:174). Moreover, this system –whose object was to maximize output through the intensification of agricultural production– was incompatible with the common ownership of the land, as the latter was based on

[59] Chambers and Mingay (1966) contend that there was only one agricultural revolution in England, occurring from 1750 to 1880. Against this, Thompson (1968), Overton (1996), and Collins (2000b), among others, argue that there were two agricultural revolutions in England prior to the 20th century (*cf*. also Kerridge 1967; Overton 2006).

consensual decision-making by the producers on what and how to grow, which hindered its implementation if just a few peasants were reluctant to embrace it (*Ibid*.:108,132).

Lastly, at the turn of the 18th century, the "Glorious Revolution" of 1688 (occurring one year after Newton's *Principia* was published): "brought into power, along with William of Orange, the landed and capitalist profit-grubbers [who] inaugurated the new era by practising on a colossal scale the thefts of state lands which had hitherto been managed more modestly" (Marx 1992:884). Marx even notes the rumor that, in 1695, this king granted large lands in Ireland to his mistress, Lady Orkney, because of her fellatio "services." Around this time, too, capitalism received another spur, as the Bank of England was finally founded (by Scot William Paterson) in 1694, three quarters of a century after the Banks of Amsterdam (1609) and Hamburg (1619) were established (Marx 1992:920, 1993a:739).

2.2.4. The heyday of the first agricultural revolution and the expansion the British Empire

For its part, the 18th century was the time when the first agricultural revolution peaked, which in turn partly laid the foundations for a second, real agricultural revolution. The 1700s were an epoch of significant agricultural changes, not so much *vis-à-vis* the agricultural forces of production –that is, the means of production (instruments and objects of labor such as tools, raw materials, and technology) and labor-power– as in the *relations of production*, *i.e.*, the social relationships agricultural workers entered (or were deprived from) to produce and reproduce their existence. That is, this changes "were achieved by social rather than technological transformation" as Hobsbawm (1996:48) clearly put it. In particular, the enclosure of common land –which since the 13th century, as noted, had been a gradual and piecemeal process– would reach enormous, unprecedented proportions from 1760 on. Another difference with past enclosures (*e.g.* those under Henry VIII) is that, while those movements sought to convert arable land to pasture to raise sheep instead of grain, and thus supply wool for trade, the enclosure acts of the 18th and early-19th centuries (in George III of Hanover's reign [1760-1820]) pursued breeding sheep for their mutton. Hence, farms became "factories of bread and meat" aimed at supplying the emergent and growing manufacturing cities (Prothero 1912:57,161). In addition, this wave of enclosure –unlike that of the 16th century– was supported and encouraged by Parliament (*Ibid*.:56). Moreover "the usurpation of the common lands and the accompanying revolution in agriculture had such an acute effect on the agricultural labourers that…their wages began to fall below the minimum between 1765 and 1780" and had to be supplemented by Poor Law relief (Marx 1992:888). Indeed, Marx observed that the late-18th century saw "the last trace of the common land of the agricultural labourer" (*Ibid*.:883). Thus,

> instead of a conscious and rational treatment of the land as permanent communal property, as the inalienable condition for the existence and reproduction of the chain of human generations, we have the exploitation and the squandering of the powers of the earth (Marx 1993a:948–49).

At the same time, these agricultural wage-laborers became the largest group of workers in England from 1790 to 1830, even at the time of the Industrial Revolution (Thompson 1976:213). In all, as argued by Prothero (1912:148), "the change between 1700 and 1800 was astonishing." However, even this transition would be "dwarfed into insignificance" by the magnitude and scope of future agricultural transformations. Yet, this astonishing change was nothing other than a qualitative leap in the magnitude of the rift in the social metabolism with the rest of nature, which has continued to widen ever since.

Thus, 1760 was a watershed in the first agricultural revolution. The years between 1760 to 1820 were, as noted, the years of wholesale enclosure (Thompson 1976:198). In particular, there were two waves of enclosure: one from 1760 to 1780, wherein some 900 Enclosure Acts were passed (in contrast to approximately 70 during the century prior to 1760), and a second one from 1793 to 1815, when more than 2,000 such acts were promoted, in addition to all of those enclosures that were agreed on by proprietors without an act (Chambers and Mingay 1966:77). In all, over 4,000 acts of enclosure were passed between 1760 and 1850, effectively privatizing at least 6 million acres (2.43 million ha) of land (about a quarter of the total cultivated area in England), and expropriating thousands of more laborers from it, especially in grain-growing districts in Northamptonshire, Yorkshire, and Lincolnshire (Chambers and Mingay 1966:35,77; Prothero 1912:163). This represented more than an eightfold increase in enclosed land relative to 1450s-1650s levels (Figure 2.1).

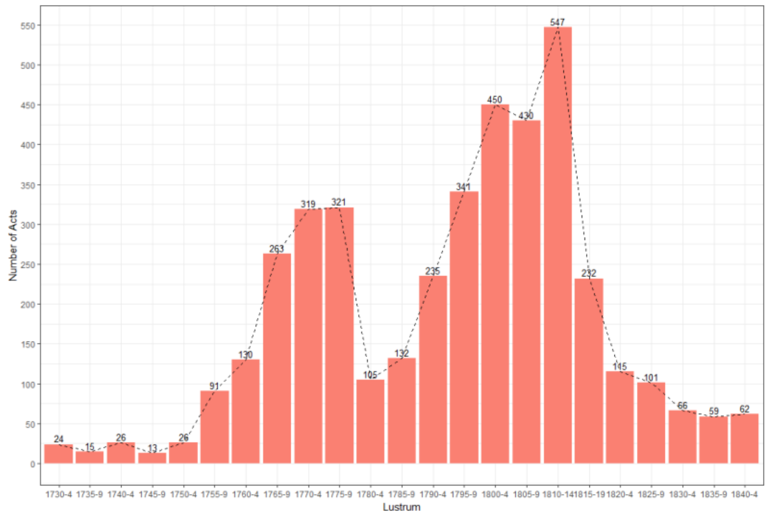


Figure 2.1. Chronology of Parliamentary enclosure in England in open-field arable, common, and waste land, 1730-1844. Made with data from Mingay (*ed.*) 1989, *AHEW*, vol. VI, p. 1115.

The ultimate object behind enclosure was, of course, profit, sought by the creation of more efficient (*i.e*. more compact, larger, and easier to work) farms, the increase in arable land, and the removal of tithes (Chambers and Mingay 1966:79–80). In turn, this kept creating a surplus population that had no remedy but to migrate to the emerging manufacturing centers to sell their labor-power, spurring both more enclosures and the rise of manufacture (Hammond and Hammond 1920; Marx 1992). On one hand, argues Marx (1992:637), this process "concentrates the historical motive power of society; on the other hand, it disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing," thus widening the foregoing metabolic rift. Thus, as he also showed:

> Large-scale industry and industrially pursued large-scale agriculture…are originally distinguished by the fact that the former lays waste and ruins labour-power and thus the natural power of man, whereas the latter does the same to the natural power of the soil, they link up in the later course of development, since the industrial system applied to agriculture also enervates the workers there, while industry and trade for their part provide agriculture with the means of exhausting the soil (Marx 1993a:950).

In fact, in the last third of the 18th century in England, the people who had grown up in semi-feudal societies considered this separation of agriculture and industry as "a foolhardy social venture, and incomprehensibly risky mode of existence" (Marx 1993a:922). This is because:

> It is not the *unity* of living and active humanity with the natural, inorganic conditions of their metabolic exchange with nature, and hence their appropriation of nature, which requires

explanation or is the result of a historic process, but rather the *separation* between these inorganic conditions of human existence and this active existence, a separation which is completely posited only in the relation of wage labour and capital (Marx 1993b:489).

Enclosure was thus associated with an increase in agricultural output, prices, and land rents. Throughout the 18th century, estimates suggest that output increased by 43% by means of both a rise in yield (production per area) of more than 10% and an upsurge in sown area of about 25% (Chambers and Mingay 1966:34–35). Yet, the yield of wheat would not exceed a ceiling of about 18 bushels per acre (1.21 t ha^{-1}) until the 19th century. Thus, between 1700 and 1800 England became, in the words of M. Léonce de Lavergne (characterized by Marx as a "a blind admirer of England"), the "granary of Europe," a prelude to becoming the "workshop of the world" (Marx 1992:670; in Prothero 1912:148). However, from 1765 on, England ceased to be a grain-exporting country, and thereafter became an importer, which became an unequivocal trend from 1792 on (Prothero 1912:264). On the other hand, after slightly and steadily decreasing during the first half of the 18th century, the mean price of grains (wheat, rye, barley, oats, peas, and fava beans) in 1793 (4.33 *s*. per bushel) had almost doubled relative to that of 1760 (2.26 *s*./bu.), and would become about 2.5 as large by 1820.[60] For their part, by 1820 rents had almost tripled (reaching prices of 10 to 20 *s.* per acre or more) relative to pre-1760 levels, once the land became privatized (Chambers and Mingay 1966:85,167). Moreover, the size of England 's population –which barely exceeded 5 million in the seventeenth century– skyrocketed from the mid-18th century on, reaching more than 10 million at the beginning of the 19th century, and 30 million by the beginning of the 20th. This vertiginous population growth was associated with the concentration of people in the rapidly-emerging urban centers, and made possible partly by the foregoing increase in food output, although the diets of the abundant poor –as is the case today– were extremely meager and nutrient-deficient (Engels 2009:201,214; Foster 2016; Foster and Clark 2018b; Holt-Giménez 2017; Marx 1992:359,749).

In the field, the main agricultural changes in 18th-century England were the spread of more flexible crop rotations across the country; improved cultivation methods; the use of roots, legumes, and improved grasses which provided more fodder and, in turn, more livestock (which then enriched the soil with their manure); drainage experiments; increased transportation infrastructure such as canals and roads; soil treatment with chalk, bones, and other substances;

[60] Calculated with data provided by Clark (2004) in Table 1 of his Appendix.

and the selective breeding of livestock (which became a tradition in itself) (Chambers and Mingay 1966:54; Prothero 1912:149). It is no wonder that more than a century later, in his *On the Origin of Species* (1859), Charles Darwin would introduce the notion of evolution by natural selection by means of an analogy with artificial selection,[61] a well-understood and practiced tradition in Britain whereby livestock was physically modified according to the breeders' desires (*i.e.* bigger, heavier, and fleshier varieties). Breeders sought to create the animal "which was the best *machine* [emphasis added] for turning food into money" (Prothero 1912:185). The most renowned breeder in England was Robert Bakewell (1725-95), a Leicestershire farmer, though there were other innovators of artificial selection such as Webster of Canley, Joseph Allom, and Fowler of Rollright (Chambers and Mingay 1966:66–67; Prothero 1912:176). As for the farmers' tools throughout the 18th century, they were still very basic, made of wood and wrought iron, and did not undergo any major improvements until well into the 19th century (in contrast to enclosures and "improved" livestock, which proceeded very swiftly through the 1700s). For instance, the iron plough replaced wooden ones just at the turn of the 19th century, at the time Robert Ransome (1780) introduced his own self-sharpening ploughs and threshing machines were being developed (Chambers and Mingay 1966:69–70). In addition, four-wheel wagons started replacing two-wheel carts (*Ibid*.:72). As Chambers and Mingay summarize:

> …farmers gradually improved their tools, transport and mechanical devices along with their improved rotations and livestock [Yet this was] supplementary and secondary to the changes in the fields; they were aids to efficiency and higher production rather than prime causes of agricultural change, and until well into the nineteenth century it could not be said that the agricultural revolution depended to any significant extent on machinery (*Ibid*.:73).

Another important agricultural technique introduced in the eighteenth century was the use of lineseed (flax) cakes in 1716 (which in the 17th century were marginally used as fuel) as cattle feed in Northamptonshire, followed by their use as *manure* nine years later in Lincolnshire (Thompson 1968:66). Oilseed cakes (commonly made of flax or rapeseed) are derived from the residue after the seeds are crushed to produce oils. Their use as imported manure would

[61] In addition, Darwin would –as is well known– rely on Malthus's (and others') theses to develop his theory of natural selection. As he said in *Origin* (1859:5): "This is the doctrine of Malthus, applied to the whole animal and vegetable kingdoms. As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected." Interestingly, he also refers twice to Bakewell and his experiments in *Origin* (p.35–36).

importantly increase thereafter, and they would even coexist with guano and other substances in the 19th century (*Ibid*.:67). As for influential agricultural texts, in 1733, Jethro Tull[62] published his *Horse-Hoeing Husbandry*, where the first useful drill for grain-sowing was described (Chambers and Mingay 1966:2). In 1770 Arthur Young –a very popular author who Marx (1992:828) would describe as a "careful observer though a superficial thinker," and also as a "fanatical advocate of the surplus product [and an] uncritical writer whose reputation is inversely related to his merits," an "unspeakable statistical prattler," or as "the Polonius[63] of political economy" (*Ibid*.:386)– published his *Rural Economy*, which would also be widely read. These practices or ideas, together with Townshend's foregoing four-course rotation and his use of turnips, and Thomas Coke of Norfolk's improvements in grasses and husbandry, were among the main agricultural techniques at the time. At the beginning of the 19th century, it was to Norfolk and Leicestershire that farmers had begun to look for emulating their agricultural techniques, even if "the country as a whole had made no general advance on the agriculture of the thirteenth century" yet (Prothero 1912:194–5).

On the other hand, overseas, the 18th century was a time when the British Empire's power grew stronger yet, while that of former empires, especially the Dutch and Spain, dwindled. As Marx (1992:924) noted: "Liverpool grew fat on the basis of the slave trade" throughout the 18th century. By 1730, Liverpool employed 15 ships in the slave trade, followed by 53 in 1751; 74 in 1760; 96 in 1770; and 132 in 1792, representing almost a ninefold increase relative to 1730 levels (Aikin 1795:369; Marx 1992:925). This port may have controlled up to 85% of Britain's slave trade, which constituted about 25% of its total shipping at the turn of the 19th century (Beckert 2015:213). In all, it is estimated that from 1662 to 1807 (when the British slave trade was abolished by Parliament) at least 10,000 British ships abducted people from Africa (Richardson 1998:440).

Relatedly, at the Peace of Utrecht (1713-15) –Marx (1992:924) argues– "England extorted from the Spaniards, by the Asiento Treaty, the privilege of being allowed to ply the slave trade, not only between Africa and the English West Indies, which it had done until then, but also between Africa and Spanish America." Thus, between 1662 and 1807, England abducted

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[62] Not to confuse with the British rock band of the same name that emerged in the 1960s, whose name actually comes from this 18th-century agriculturalist.

[63] A comical elderly character in Shakespeare's *Hamlet*, who is usually wrong despite believing to be right.

over 3.4 million people from Africa –mainly from enclaves all along its western coast from Senegambia to northern Angola, and especially from the Bight of Biafra– which were transported to the Americas to cultivate sugar and other cash crops such as tobacco (in places like Maryland and Virginia), rice (as in South Carolina), and indigo (in the Caribbean) (Richardson 1998:441–3). Overall, during the 145 years when the British abducted and enslaved Africans, it seems that they shipped as many people to the Americas as all other nations involved in this trade combined (Richardson 1998:440). African slaves outnumbered "whites" in the British Caribbean by about six to one in 1748, and 12 to one in 1815 (Ward 1998:432). The French and Dutch Caribbean exhibited similar trends of, respectively, 14:1 and 23:1 slaves to free people (Brougham in Marx 1992:925). Throughout the first half of the 18th century, sugar was still the chief agricultural commodity entering England (and Europe in general) from the Americas, almost doubling in volume around 1750 (to over 40,000 t) relative to 1700's levels, and still increasing thereafter, exhibiting an eightfold surge by 1815 of almost 165,000 t (Sheridan 1998:399–401; Ward 1998:421). In the second half of the century, the "West Indies" achieved their greatest economic importance within Britain (Ward 1998:415).

In addition, the British Empire –a concept that started being popularized by people such as William Pitt (the Elder)– expanded over new territories in North America beyond the Chesapeake and New England such as Pennsylvania, North and South Carolina, Georgia, and Florida, as well as Quebec and Nova Scotia. The British also planted their boots in zones of Asia and Oceania around this time, in what has been called the "swing to the East," settling along eastern and southern India and the Ganges valley (ruling over 30 million Indians by the end of the century), Ceylon, Penang (1786), and Australia (1788), and they also enlarged their trade with China via Canton by means of the EIC's monopoly on tea trade, by far the most profitable commodity dealt by this house (Marshall 1998b:2–5; Mintz 1986:112). For instance, in 1766, the British East India Company carried away almost 6 million pounds (3 thousand tons) of tea from China (plus probably a similar amount that was illegally smuggled into England) (Mintz 1986:113). By 1800, this number would reach 25 million lbs. (*i.e.* almost 11,340 t) (Marshall 1998a:582–83). By the end of the century, Britain's fleets and armies were deployed all over the world, while the empire's core siphoned cash crops and other natural wealth from Chesapeake to Brazil, India and China, and had increased its imports sixfold relative to 1700 levels (Marshall 1998b:14, 1998c:*x*).

However, the independence of the Thirteen British Colonies (1776-83), during a period where Britain was heavily indebted following the Seven Years' War (1756-63), and corresponding to the date when Adam Smith published *The Wealth of Nations* (1776), practically halted the North American trade (including the slave trade), and put Britain on the defensive in the Caribbean (Ward 1998:419–22). Yet, the Britain rapidly recovered –and in fact expanded– its markets in the nascent United States (Marshall 1998a:585). In addition, just as many settlers in North America had taken "themselves out of the Empire…millions of Indians were being incorporated into it" (*Ibid*.:599). It is worth briefly reflecting on the emergence of this Empire-to-be through the prophetic words of the Count of Aranda, a Spanish representative who signed the Peace of Paris in 1783, recognizing the independence of the U.S. colonies. In a private letter to King Charles III of Spain, the Count said:

> …and the love I have for my country, compels me to communicate you an idea to which I give the greatest importance in the present circumstances. I have just done and signed, under your orders and powers, a peace treaty with England...The independence of the English colonies has been recognized and this is for me a reason for pain and fear. France has few possessions in America, but should have considered that Spain, her close ally, has many, which hereafter remain exposed to terrible convulsions...I will limit myself to the [consideration] that occupies us, the fear of being exposed to the dangers that threaten us from the new power that we have just recognized, in a country where there is none other able to contain its progress. This federal Republic was born a pygmy...and needed the support and strength of two powers as strong as Spain and France, to achieve its independence. The day will come when it will be a giant, a fearsome colossus in those regions. It will then forget the benefits it has received from these two powers, and will not think in anything but its own aggrandizement. The freedom of conscience, the ease for establishing new populations on vast lands, as well as the advantages brought by the new government, will attract farmers and artisans of all nations, because men always run after fortune, and in some years we will see with great pain the threatening existence of the colossus of which I speak.

During the 18th century, amid the foregoing imperial struggles, several insightful remarks on South American guano were made by different European explorers. For instance, in May 1710, during his sojourn off Peru, Frenchman Louis É. Feuillée (1600-1732) wrote of the "insupportable smell of the dung of this immense number of birds," which caused "extraordinary headaches" to people not used to it (Feuillée 1714:599–600). Three months later, Feuillée registered seeing llamas being used by the Spaniards in the Peruvian mainland to transport coastal guano by means of sacs called *Sforcas* (Feuillée 1725:147). For his part, another French traveler, Amédée-François Frézier (1682-1773), who explored the "South Sea" and toured the

Peruvian coast from 1712 to 1714, reasserted Feuillée's claims regarding guano's stench and also discussed its remarkable fertilizing properties (Frézier 1717:149; Walton 1844:618). Revealingly, ha also noticed that: "The Island of *Iquique* is also inhabited by *Indians* and Blacks, who are there employ'd to gather *Guana*, being a yellowish Earth thought to be the Dung of Birds" (Frézier 1717:147).[64] Frézier also stated that, for the last 100 years, 10 to 12 ships would reach Peru's islands and gather guano to fertilize the vineyards and ploughed lands of Tarapacá, Pica, and their environs. That is, according to this author's testimony, at least as early as the beginning of the seventeenth century, Spaniards in Peru were using slave labor and coercing local indigenes to extract guano to fertilize the mainland estates.

Relatedly, the Spanish explorer Antonio de Ulloa (1716-1795), as part of an important expedition ordered by the Spanish Crown to carry out some astronomic measurements to determine the Earth's size more precisely, traveled across Peru from 1736 to 1744 (*cf*. Safier 2008). Along with his countryman Jorge Juan y Santacilia (1713-1773), Ulloa made the following remarks about guano:

> The lands of the Chancay Jurisdiction are heated, as they also do in other parts of the Coasts of Peru, with the dung of Maritime Birds, which here abound in extreme, called *Guanaes*, and their dung Guano: a general name of the language of the Indians, which means dung. The Birds after they have been fishing all day in the Sea, go to sleep in all those Islands near the Coasts, and their numbers being so large that they cover the Land, the dung that they leave on them is proportionally large: with the heat from the Sun a scab is formed, which increases daily, and since its abundance is so great, although much is removed, it is never exhausted, because in a short time it is considerably replenished...I was in the same Islands at the same time some Boats were being loaded with it, and the bad smell that it exhaled became unbearable, and left no doubt of what it was...This manure is used in the *Maize* Fields and greatly increases the Harvests...but generally it is also good for other sown species, with the exception of Wheat and Barley, and for this reason its consumption is very large (Santacilia and Ulloa 1748:127–28).[65]

[64] The original French (in today's spelling) reads : « L'Isle de Iquique est aussi habitée par des Indiens & des Noirs, qu'on y occupe à tirer la *Guana*, qui est une terre jaunâtre qu'on croit être de la fiente d'oiseaux » (Frézier 1716:133).

[65] The original Spanish (in modernized spelling) reads: "Calientan las tierras de la Jurisdicción de Chancay, como también lo hacen en otras partes de las Costas del *Perú*, con el estiércol de unos Pájaros Marítimos, que abundan con extremo en ella, y llaman *Guanaes*, y a su estiércol Guano: nombre general de la lengua de los *Indios*, que significa excremento en común. Ellos Pájaros después que han estado pescando todo el día en el Mar, van a hacer su dormida en todas aquellas Islas cercanas a las Costas, y siendo tanta su muchedumbre que cubren el Terreno, es a proporción el estiércol que dejan en ellas: con el calor del *Sol* se forma una costra, que se aumenta diariamente, y como es tanta su abundancia, aunque es mucho lo que se saca, nunca se apura, porque en corto tiempo se vuelve a reponer considerablemente….Yo he estado en las mismas Islas al tiempo que cargaban de él algunos Barcos, y el mal olor que exhalaba, se hacía insoportable, y no dejaba duda en lo que era…Este estiércol le emplean en los Sembrados de

Lastly, a native of Tacna in southern Peru, Pedro Bartolomé de Ureta y Peralta (1753-1809), observed in 1792 that "a lot of *huano*" was extracted from the Chincha Islands and Iquique, to be consumed in Chancay and other neighboring valleys (de Ureta y Peralta 1792:220). In all, these four testimonies evidence the local use of guano throughout the 18th century in the Viceroyalty of Peru, a practice that apparently extended back in time at least 100 years in the colonial period, and most of them also emphasize the "insupportable smell" of this substance.

2.2.5. The Industrial Revolution and the second "white gold": A transformation not seen since the Neolithic

In the last two decades of the 18th century, Europe began experiencing a series of changes that would eventually spread and transform most aspects of human life and our relationship to the rest of nature, both locally and ultimately abroad: the Industrial and French Revolutions, two processes that joined hands in what Hobsbawm (1996) called "the dual revolution." The Industrial Revolution –a term coined in the 1820s by English and French socialists by analogy with the French Revolution, and used by Engels as early as 1844– refers to a period haphazardly starting in England in the 1760s, wherein "for the first time in human history, the shackles were taken off the productive power of human societies" (Bernal 1969:520; Engels 2009; Hobsbawm 1996). Thus, this was a revolution concerning both the forces and relations of production, and was precipitated by a plant, or, more precisely, by the creation of techniques to transform a plant, a shrub whose varieties had been independently domesticated and cultivated in four different regions –South America, Mexico, India, and northern Africa–[66] from time immemorial, which was used as fiber, and which would overtake and eclipse sugar as the most coveted agricultural commodity in Europe: cotton (*Gossypium* spp.) (Beckert 2015).

Cotton, a plant that first reached Europe, like so many other products (including sugar) via the Arabs (as its name *qatn* evidences), had been known in this continent for centuries (Beckert 2015:22). By the 18th century, it was an expensive commodity mostly imported from India in a relatively small amount and consumed by the wealthy. Britain's initial cotton trade,

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Maíz, y con su beneficio aumenta en gran manera las Cosechas…pero generalmente es bueno para otras especies de sembrados, a excepción del Trigo, y Cebada, y por ello es muy grande su consumo."

[66] Curiously, one of the reasons why Columbus wrongly thought he had reached India was that he encountered cotton plants in the Caribbean (Beckert 2015:9). Also, this plant is not native to China, but came there from India.

like all others, emerged from colonialism, and first revolved around fustian (a mixture of cotton and linen) and Indian calicoes, which Europeans tried to imitate (Hobsbawm 1996:33). Yet, in the second half of the 18th century (amid the foregoing soar in Enclosure Acts), a series of very modest technical inventions, developed not by highly educated "men of science"[67] but by skilled English merchants and entrepreneurs in workshops, "whose only law was to buy in the cheapest markets and sell without restriction in the dearest," living in a country where private profit and wealth had been embraced as chief aims, sought new ways to expand the cotton trade (Beckert 2015; Hobsbawm 1996:52). As Hobsbawm (1996:52) put it in reference to England: "[t]he gods and kings of the past were powerless before the businessmen and steam-engines of the present." Thus, in Lancashire, weaver James Hargreaves's spinning jenny (1764), barber Richard Arkwright's spinning throstle (1767), Samuel Crompton's mule (1785), and Edmund Cartwright's power loom (1785), together with Samuel Greg's (an owner of slave plantations in Dominica and employer of child labor at home in Manchester) water mill (1784), and U.S. Eli Whitney's cotton gin in Georgia (1793), dramatically increased the productivity of labor (*i.e.* output per unit of input) *vis-à-vis* cotton production, lowering the value and prices of this commodity (while increasing the traders' surplus-value) and augmenting its cultivation area, as it became increasingly affordable and demanded (Beckert 2015:180–88; Bernal 1969:522; Engels 2009:17–20; Hobsbawm 1996:56). This initially unplanned and empirical industrialization process would then receive a spur from the application of Scot James Watt's steam engine (1776) (itself an improvement on Thomas Newcomen's model), a technology first used for mining in Cornwall.

The following figures give an idea of the magnitude of this revolution in production. In 1790 Britain, 50,000 hours were needed to spin 100 pounds of raw cotton, compared to just 150 hours in 1825. That is, productivity increased 370 times within three decades (Beckert 2015:66–67). By 1781, Britain spun some 5.1 million pounds (about 2,313 t) of cotton, a figure just 2.5 higher than that at the beginning of the century. Yet, just nine years later, the amount of spun cotton had increased sixfold (to some 30 million pounds), and elevenfold (56 millions) by 1800

[67] In fact, science proper did not come of age until the 19th century and, "[w]hatever the British advance was due to, it was not scientific and technological superiority. In the natural sciences the French were almost certainly ahead of the British; an advantage which the French Revolution accentuated very sharply" (Hobsbawm 1996:29). As for the term 'scientist', it was coined by William Whewell in 1833 in response to a challenge by the romantic poet Samuel T. Coleridge, by analogy with 'artist' (Snyder 2012:3).

(*Ibid*.:86). By the 1860s, Britain consumed so much cotton that 416,081 acres of land overseas (equivalent to 37% of its total arable land) were needed to cultivate it (Beckert 2015:95). Between 1780 and 1800, the output of cotton textiles grew at an almost 11% annual rate, and British cloths swiftly replaced Indian ones on world markets, thus capturing the global trade of this fiber. British cotton exports increased almost 200 times from 1780 to 1800 (*Ibid*.:74). This is why, in terms of sales, Hobsbawm (1996:34) described the Industrial Revolution as "the triumph of the export market over the home." Indeed, for the first time in history Europe started exporting more to the rest of the world than it imported, a relationship "hitherto kept in balance by a mixture of bullion exports and robbery" (*Ibid*.:51). Relatedly, newly or soon-to-be "independent" Latin American countries became almost exclusively dependent on British imports during the Napoleonic Wars (1803-1815) and thereafter, while in turn Britain drained much of their natural wealth. In all, from 1785 to 1850, the amount of raw cotton imported by Britain rose from 11 million to 588 million pounds, and the output of cloth from 40 million to 2 billion yards (1.83 million km), constituting about half of the country's yearly declared total value of exports, the reminder coming from agriculture (*Ibid*.:38). At the same time, cotton magnates took hold of Parliament at home (Beckert 2015:77).

The soaring demand for cotton in England in the 1780s rendered the two markets hitherto supplying this fiber –Turkey and India– insufficient. Britain and the rest of Europe were ruled out as sites for large-scale cotton cultivation due to their cold and wet climate (and for potential political tensions). At this point, India was also discarded by Britain, as this –argued the British East India Company– would undermine manufacturing in India and thus hurt the company's revenues (Beckert 2015:87–88). Arkwright himself, for instance, had unsuccessfully sought to obtain cotton from Africa by creating the Sierra Leone Company along with merchant William Rathbone. Cotton magnates therefore turned to the Americas, and in particular to the sugar growers who, "unlike growers in Africa, Anatolia, and India, had nearly two centuries of experience growing crops for European[s]" (*Ibid*.:88). Thus commenced the era of plantations devoted to the second "white gold," as the cultivation of sugar –the first crop bestowed with that fetishistic name– declined. As might be expected, the existence of this trade also depended on African enslaved laborers, who "were put in shackles, forced into the holds of ships…transported to remote farms, and then forced to clear the land and hoe, sow, prune, and harvest the white gold" in increasing numbers (*Ibid*.:91). Thus, as Beckert (*Ibid.*) argues: "Slavery…was as essential to the new empire of cotton as proper climate and good soil." Furthermore, the growing of cotton in the Caribbean and elsewhere produced soil exhaustion, spurring the clearing of ever more lands and the fetching of ever more slaves.

Cotton exports to Britain from the Americas thus exploded, increasing two- to elevenfold from 1770 to 1791 in sites like Brazil, Jamaica, Grenada, Dominica, Barbados, Tobago, Bahamas, and, above all, in French Saint-Domingue, which produced more cotton than all British islands combined (*cf.* Galeano 1997:94). Yet, in 1791 Saint-Domingue slaves led by Toussaint Louverture started a revolt –the largest slave uprising in history– that culminated in the creation of Haiti (1804), the first independent country in Latin America and also the first nation to abolish slavery in the modern era.[68] Because of this event and seeking to sustain increasing cotton production, British cotton merchants turned to another new country in the 1790s: the United States, where slaves in the South would now start to cultivate this plant on land expropriated from Native Americans (Beckert 2015:85).[69] The first ship with commercial U.S. cotton (from Sea Island, off Georgia, and not seized by British customs as had occurred 10 years earlier) anchored in Liverpool in 1795 (just 46 years prior to the arrival of the first commercial Peruvian guano load) (Beckert 2015:103).The U.S. South would become the chief source of cotton that fed the Industrial Revolution in Lancashire up until the Civil War (1861-65) broke out–at a time when the English cotton industry and British industrial prosperity peaked (Engels 2009:316; Marx 1992:560). Throughout these decades, over 39 billion pounds (~17.8 million t) of cotton were produced in the United States alone (U.S. 1949:109).[70] Thus, as Marx (1992:925) put it: "While the cotton industry introduced child-slavery into England, in the United States it gave the impulse for the transformation of the earlier, more or less patriarchal slavery into a system of commercial exploitation." Due to the US. Civil War, first India and then Egypt were to replace the United States as the main source of British cotton imports.

Thus, cotton manufacturing was the spearhead of industrial capitalism (Malm 2013:20). This process invented factories, first textile and then laid the foundations for those that would

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[68] As José Dolores –a former slave character in Gillo Pontecorvo's movie *Burn!* (1969)–states: "They [Europeans] may know how to sell the sugar but we are the ones who cut the cane! We must cut heads instead of cane."

[69] The number of enslaved Africans in the U.S. rose from 700,000 in 1790 to 2,500,000 in 1840, and 3,200,000 in 1850 (Hobsbawm 1996:299).

[70] This calculation assumes that 1 bale of cotton equals 500 pounds.

follow: coal, pottery, iron, hardware, steel, etc., all of which evolved from “domestic” or “putting-out” systems (where labor was performed at home), to “mills,” and then to factories proper, once machines were developed (Hobsabawm 1996:36–37). Consequently, it also centralized and concentrated labor-power (which had been expropriated form the countryside) thus creating the proletariat, an associated mass of workers –initially composed mainly by women and children[71]– that started identifying as a class (and who dialectically, as Marx and Engels argued, held the potential to destroy capital if they struggled against it together).[72]

This was revolutionary. The world, as Beckert (2015:178–79) put it, “had never seen a sea of humanity organizing every aspect of their lives around the rhythms of machine production…Today we take this system for granted.” Only the Neolithic Revolution –ventures Harold Perkin (in Collins 2000a:1)– had had effects as profound in relation to human economic and social organization. Likewise, Hobsbawm (1996:29) argued that “[b]y any reckoning this was probably the most important event in world history.” The Industrial Revolution also increased urbanization, exacerbating the rural-town antagonism and thus widening the metabolic rift and ecological degradation (Marx 1992:637–38). In addition, it was the starting point for a fossil economy, as coal (a substance embodying energy accumulated for millions of years, which since Elizabethan times had been a source for domestic heating) became a *mean of production*, a “necessary material substratum for the production of surplus-value,” rotatory motion to sustain economic growth and enlarged reproduction (Malm 2013:51, 2016; York and Bell 2019). This would gradually cause manifold ecological problems, which today, more than two centuries later, imperil the very survival of our species and countless others with whom we inhabit the

[71] That is, as stated by Beckert (2015:*xviii*): “Women’s labor largely created the empire of cotton.” From 1834-47, out of all workers employed in cotton mills, over 50% were “abominably paid” women and girls, and only about a quarter were adult men (Hobsbawm 1996:50). In addition, Engels (2009:152) shows that, in 1839, out of 419,560 factory operatives in Britain, 242,296 (*i.e*. 57.8%) were women, of which more than 25% were under 18 years old. “In the cotton factories” –continues Engels (*Ibid*.)– 56.5%; in the woolen mills 69.5%; in the silk mills, 70.5%; in the flax-spinning mills, 70.5% of all operatives are of the female sex (*cf*. Foster and Clark 2018b).

[72] It is no wonder that in 1811-12, Luddites in Britain (and France) destroyed hundreds of cotton spinning machines. As Marx (1992:554–55) said: “It took both time and experience before the workers learnt to distinguish between machinery and its employment by capital, and therefore to transfer their attacks from the material instruments of production to the form of society which utilizes those instruments.”

Earth. In short, the world brought about by the Industrial Revolution is pretty much the world we still live in.[73]As Engels (2009:28–29) summarized in 1844:

> Such, in brief, is the history of English industrial development in the past sixty years, a history which has no counterpart in the annals of humanity. Sixty, eighty years ago, England was a country like every other, with small towns…and a thin but *proportionally* large agricultural population. Today it is a country like *no* other, with a capital of two and a half million inhabitants; with vast manufacturing cities; with an industry that supplies the world, and produces almost everything by means of the most complex machinery…The industrial revolution is of the same importance for England as the political revolution for France, and the philosophical revolution for Germany; and the difference between England in 1760 and in 1844 is at least as great as that between France, under the *ancien régime* and during the revolution of July. But the mightiest result of this industrial transformation is the English proletariat.

Along with the Industrial Revolution, the economic triumph of the bourgeoisie, the French Revolution (1789-99) represented its *political* vanguard, whereby bourgeois ideals, laws, and values –same which are still embraced, defended, and seen as the *non plus ultra* by the West today– began to emulated by or imposed on societies across the globe (Godechot 1988; Hobsbawm 1996). For space restrictions, I will not deal with the French Revolution (nor the ensuing 19th-century political revolutions in Europe) which nonetheless remains an essential element of the historical circumstance wherein the second agricultural revolution, to which we now turn our attention, was embedded.

[73] As Hobsbawm (1996:29) importantly clarifies: "The Industrial Revolution was not indeed an episode with a beginning and an end. To ask when it was 'complete' is senseless, for its essence was that henceforth revolutionary change became the norm. It is still going on…" Yet, for practical purposes, several scholars agree that it ended in the 1840s with the construction of the railway and massive heavy industry in England.

CHAPTER 3. THE SECOND AGRICULTURAL REVOLUTION: THE ROBBERY OF THE SOIL AND THE COMMODIFICATION OF GUANO

> …if agriculture rests on scientific activities –if it requires machinery, chemical fertilizer acquired through exchange, seeds from distant countries, etc…then the machine-making factory, external trade, crafts, etc. appear as *needs* for agriculture…agriculture no longer finds the natural conditions of its own production within itself, naturally, arisen, spontaneous, and ready to hand, but these exist as an independent industry separate from it and, with this separateness the whole complex set of interconnections in which this industry exists is drawn into the sphere of the conditions of agricultural production.
>
> – Karl Marx, *Grundrisse* (Notebook V)

> Apart from the daily more threatening advance of the working-class movement, the limiting of factory labour was dictated by the same necessity as forced the manuring of English fields with guano. The same blind desire for profit that in the one case exhausted the soil had in the other case seized hold of the vital force of the nation at its roots.
>
> – Karl Marx, *Capital* (I)

The second agricultural revolution in Britain (1815-80) was part of the broader economic-political, dual revolution which dealt the final blow to the remnants of feudalism and marked the accession of capitalism to power in Europe and the United States. There is no better way to define this time than as an *age of revolution*, as Hobsbawm (1996) succinctly did, for this was truly an epoch of unprecedented changes in the economy, politics, philosophy, the arts, the sciences, our metabolism with the rest of nature, and virtually any other aspect of life which, as noted, dwarfed any other transformation since Neolithic times.[74] As Heinrich (2019:17–19) interestingly notes:

> Let's imagine that an educated person from France or England in the year 1710 woke up 150 years later…This person would not only marvel at the many changes, but it would be difficult to explain to him or her what, for example, a telegraph or a steam engine is...It would be an entirely different case…if we would take a similarly educated person from the Western Europe of 1860 and transport him or her 150 years later to the year 2010.This person would also find himself or herself in an initially foreign and surprising world, but would have far fewer problems understanding contemporary conditions…Whereas for the person transported from 1710 to 1860 the changes would constitute a deep break with pretty much everything he or she previously regarded as obvious and immutable…It's not an exaggeration to see in the economic and political upheavals that took place between 1780 and 1860 [initially in Europe and the U.S.] and epochal rupture in the history of humanity.

[74] One can also read the first part of Marx and Engels's *Manifesto of the Communist Party* (1848) to examine both the changes these revolutions brought about and how they were being perceived as they were occurring.

3.1. The real subsumption of agriculture under capital and the first scientific analyses of guano

As discussed, the first agricultural revolution roughly corresponds to the 300-year period spanning from *c.* 1485 to the advent of the Industrial Revolution in the 1780s. That is, it was a part of the genesis and development of merchant capitalism and its transition into industrial capitalism. As noted, the first agricultural revolution was primarily characterized by social rather than technological changes in relation to the land. Its transformations were those of enclosures and increased farm size; a shift from self-sufficient to profit-making agriculture; the creation of sheep-walks from arable land; the trade in wool; the introduction of crop rotations such as the four-course (or "Norfolk") system –or variations of it– via the use of turnips, clover, and grasses; the reduction of fallowing so as to maximize crop production; the use of manures such as marl, lime, farmyard refuse, ashes, and oilseed cakes (towards the late 18th century), among others; modest and generally isolated technical improvements in drainage, irrigation, and cultivation; and the overall expansion of both arable and pasture land. This period also coincided with the existence of yeomanry. Yet, as important as it was, the first agricultural revolution represented only –building on Marx's originally unpublished draft of Chapter 6 of *Capital*– the *formal* subsumption of agriculture under capital. That is, throughout this period, capitalism spontaneously took over a labor process (agriculture) already existing before the emergence of capitalist relations, which it rendered just formally distinct from those earlier modes of agricultural production through the creation of profit-oriented farming. The process was based on small, isolated capitalist enterprise and, technologically, unfolded pretty much as before, except that it was now subordinated to capital (Marx 1992:1026–27). Likewise, it was only capable of creating *absolute* surplus-value, that is, a form whereby the agricultural producers accumulated unpaid labor resulted from the *extension* of work time and land, without profoundly affecting their intensity.

Conversely, as we shall see, the second agricultural revolution (1815-1880), which arose upon the material foundations laid out by the first and would not have been possible without it, was an event characterized by the *conscious* and *widespread* application of scientific knowledge[75] (especially from 1840 on) to the soil, so as to maximize yield and profit; the transformation of the countryside into a factory dependent on machinery and ever more external inputs (such as fast-acting artificial fertilizers); intensive mixed farming (where grain growing and meat production were combined); and a significant growth in livestock production. That is, this was a revolution concerning both the *forces* and *relations* of agricultural production, and even agriculture's role in the world-economy, as Britain's food supply web became global, ultimately creating what several authors –including Marx– have called the new regime or "first food regime" [76]in the latter half of the 19th century (*cf*. Foster 2016; Friedmann 1987; Holt-Giménez 2017; McMichael 2009; Overton 1996). Under this new set of relations "agriculture rests on scientific activities [so] the machine-making factory, external trade…appear as *needs* for agriculture [which] no longer finds the natural conditions of its own production within itself," as Marx (1993b:527) put it in the *Grundrisse*.

That is, the second agricultural revolution represented the *real* subsumption of agriculture under capital, a qualitative leap with respect to the first one, which had just appropriated a pre-existing mode of production. Here, capital sums had grown to such a scale that they took hold of production in its entirety, and the real nature of the agricultural process as a whole was revolutionized, giving rise to a specifically capitalist agriculture (Marx 1992:1024–27). Likewise, the process was no longer guided by small-scale, isolated merchants, but by massively socialized labor controlled by industrial capitalists, completely and constantly revolutionizing technology, productivity, and workers' relations both among themselves and with the capitalist class. In addition, agricultural production as an end in itself (which already existed in formal subsumption) could be fully realized, and indeed became indispensable (*Ibid*.:1037). Furthermore, surplus-value could now be extracted from agricultural workers not only in absolute terms (*i.e.* by augmenting the length of the working day and arable area), but also in *relative* ones, that is, through an increase in productivity and/or intensity of agricultural labor,

[75] "…for it is only socialized labour that is capable of applying the *general* products of human development, such as mathematics, to the immediate process of production; and, conversely, progress in these sciences presupposes a certain level of material production" (Marx 1992:1024).

[76] Holt-Giménez (2017:32) defines a food regime as: "All of the institutions, treaties, and regulations shaping and governing food on a global scale." Relatedly, McMichael (2009:141) states that "the *first food regime* (1870-1930s) combined colonial tropical imports to Europe with basic grains and livestock imports from settler colonies, provisioning emerging European industrial classes, and underwriting the British 'workshop of the world'." For Marx, this regime emerged earlier, *c.* 1845 (Foster 2016; Slater 2018b).

even within the same plot (from 1700-1850, agricultural output increased 2.75 times while farmed area rose 1.3 times) (Overton 1996:7). Let us thus analyze how this second agricultural revolution unfolded.

At the turn of the 19th century, several agricultural institutions such as the Odiham Society (1783), the Canterbury Agricultural Society (1793), the Board of Agriculture and Internal Improvement (1793), and the Smithfield Club (1798), where agricultural innovations and other cutting-edge topics were discussed, were founded (Moore-Colyer 1989:335; Russell 1966:55). In addition, in 1798 the Parson and soon-to-be professor of the East India Company's college at Haileybury, Thomas R. Malthus (1766-1834), anonymously published *An Essay on the Principle of Population*, of which there would be five further editions from 1803 to 1826 (Foster 2000:87–88). Roughly, this famous –albeit commonly distorted– book was a justification for the existence of social classes (and hence misery and even the expropriation of the rural poor) via the empirically flimsy argument that human population, when unchecked, tends to increase in proportion to its size (*i.e.* exponentially) while food supply augments, at best, at a linear rate. As we shall see, this *Essay* at the "ideological service [of] the prevailing interests" (*Ibid.*:102) would become very influential not only in the realm of British agriculture, but also more generally in politics, economics, and even the natural sciences, and in fact remains so to some extent today. Two years later, physician, natural philosopher, and poet Erasmus Darwin (Charles Darwin's paternal grandfather, his maternal one being pottery entrepreneur Josiah Wedgwood) carried out studies on plant nutrition in works like *Phytologia: Or, the Philosophy of Agriculture and Gardening* (1800) (Russell 1966:62). As British soil chemist E. John Russell –director of Rothamsted Experimental Station (1912-43) and president of the British Association for the Advancement of Science (BAAS) (1948-49)– put it, Erasmus Darwin's work contained "the earliest statement by a British scientist I have seen that nitrogen and phosphate are essential for the growth of plants" (*Ibid*.:63).

Around this time, too, Prussian scientist Alexander von Humboldt, along with his expedition partner, the French botanist Aimé Bonpland, traveled through northern South America, the Caribbean, central Mexico, and the eastern U.S., between June 1799 and August

1804. As stated in his travel diaries,[77] Humboldt spent the period between 23 October and 24 December 1802 in Lima, also traveling to the nearby port of Callao in November where, besides observing the transit of Mercury across the disk of the sun in 9 November, he encountered small boats loaded with guano (Cushman 2014:25; Núñez and Petersen G. 1971:71). It appears that Humboldt first saw heaps of this substance, whose strong ammonia stench made him sneeze, in Chancay (north of Lima) ready to be spread over coastal agricultural fields, and learned from conversations with locals that some 50 to 100 boats called *guaneros* sailed somewhat often to the Chincha Islands farther south (which Humboldt himself never visited) to collect it (Cushman 2014:25; Hutchinson 1950:43). As Humboldt recalled in his diary:

> Guano is found in greatest abundance in the southern sea, on the Chincha Islands, near Pisco; but it also exists on the more southern coasts and islets, in Ilo, Iza, and Arica. The inhabitants of Chancay, who trade guano, come and go from the islands of Chincha in twenty days. Each boat has a load of 1,500 to 2,000 cubic feet. In Chancay, a vanéga is worth 4 pounds, in Arica, 15 tours pounds (quoted in Fourcroy and Vauquelin 1806:369–70).[78]

Humboldt brought a small sample of guano with him on his return to Europe in August 1804, which he sent right away to his close friend in Paris, the eminent chemist Louis Nicolas Vauquelin (famous for distinguishing beryllium and chromium as new elements, and who had analyzed the chemical composition of bird dung before). According to Cushman (2014:26), Vauquelin, together with his colleague Antoine F. Fourcroy, presented the results of the chemical analyses of guano before the "leading scientific institution of Napoleonic France"[79] on 26 November of that year, which were then published in January 1806 (*cf.* Fourcroy and Vauquelin 1806). This piece –the first scientific analysis of guano– concluded that this "fawn yellow pulverulent material" contains about a quarter of uric acid, a remarkably high proportion, and the main product –it will be remembered– of avian nitrogen excretion (Fourcroy and Vauquelin 1806:370). In addition, these authors, following Humboldt, agreed that guano probably had an

[77] Humboldt's travel through Peru can be found in his journals VII bb/c (1801-02) and VIII (1802-04). These and his other American journals, which were mainly written in French, can be accessed at: https://humboldt.staatsbibliothek-berlin.de/work/?lang=en.

[78] Humboldt's orignal in French reads: « Le guano se trouve dans la plus grande abondance dans la mer du sud, aux îles de Chinche, près de Pisco ; mais il existe aussi sur les côtes et îlots plus méridionaux, à Ilo, Iza et Arica. Les habitants de Chancay, qui font le commerce du guano, vont et viennent des îles de Chinche en vingt jours. Chaque bateau en charge 1500 à 2000 pieds cubes. Un vanéga vaut à Chancay 4 livres, à Arica 15 livres tournois. »

[79] Cushman does not provide any further information on this presentation.

animal –chiefly avian– origin (*Ibid.*:381), something known in Peru since time immemorial, but that Spanish colonizers doubted given the vastness of the deposits. Humboldt then "followed this up with a report in which he credited Peru's indigenous peoples for guano's discovery and posited that Peru's guano reserves had formed over eons of geological time" (Cushman 2014:26).[80]

In addition, Humboldt also sent a portion of his Peruvian guano sample to Prussia's then leading chemist, Martin Heinrich Klaproth (1743-1817), who published his own content analysis in 1806. Klaproth's physical description of guano was pretty similar to Fourcroy and Vauquelin's (although the chemical one varied importantly), and this author, who cites Humboldt's diaries *in extenso*, also acknowledged that Peruvians had used it as a fertilizer for centuries (Klaproth 1806:299). Another character who obtained and examined the guano brought by Humboldt, in 1805, was none other than Sir Humphry Davy (1778-1829), one of Britain's foremost (electro)chemists at the Board of Agriculture.

Davy would become the most influential scientist in early-19th century Britain (Brassley 2000a:598; Golinski 2016:2; Knight 1998; Russell 1966:67–69). In 1802 –the same year Humboldt encountered guano in Peru, and the United States became Britain's chief cotton supplier– the foregoing novel Board of Agriculture arranged that Davy delivered a series of public annual lectures on "the connection of chemistry with vegetable physiology" aimed at improving farming practices and increasing output (Beckert 2015:104; Brock 1997:145; Prothero 1912:216; Russell 1966:67). Prothero (1912:216) described these popular and influential lectures, which commenced on 10 May 1803 and would continue until 1812, and where according to Russell (1966:67) the term "agricultural chemistry" was first used in England (having emerged 10 years earlier in Germany),[81] as the first steps towards the combination of farming practical experience and scientific knowledge (*cf.* also Engels 2009:27). In these lectures, Davy gathered and discussed manifold scientific discoveries and considered them in relationship to one another. Specifically, he discussed issues such as Priestley's pneumatic chemistry and Lavoisier's elaborations on it; Ingenhousz, Senebier, and de Saussure's notion of

[80] Cushman does not offer any more information about this document either. In addition, Humboldt was mistaken about the time required for the formation of the guano deposits off Peru (*c.* 4000 years), and also about the birds originating them, a process he attributed to flamingos and herons (Hutchinson 1950:43).

[81] According to Russell (1966:67) this concept first appeared in Berlin Professor S.F. Hermbstadt's new journal, *Archiv der Agriculturchemie*, in 1803.

photosynthesis and the role of oxygen, carbon dioxide, light, minerals, and water on plant growth; Gay-Lussac and Thaer's views on the debates regarding soil humus and vitalism *vs* minerals, materialism, and manures, among many other topics (Brassley 2000a:598; Brock 1997:146). Importantly, in 1813 Davy published the material from these lectures and parts of his own research in *Elements of Agricultural Chemistry*, which rapidly became very popular in both Britain and the U.S., was translated into various European languages, and would be well in demand into the 1840s (Golinski 2016:136; Knight 1998:47). Davy devoted some paragraphs of this book to discussing guano:

> Amongst excrementitious solid substances used as manures, one of the most powerful is the *dung* of *birds* that feed on *animal food*, particularly the dung of sea birds. The *guano*, which is used to a great extent in South America, and which is the manure that fertilizes the sterile plains of Peru, is a production of this kind. It exists abundantly, as we are informed by M. Humboldt…It is used a[s] manure only in very small quantities; and particularly for crops of maize. I made some experiments on specimens of guano sent from South America to the Board of Agriculture in 1805. It is easy to explain its fertilizing properties: from its composition it might be supposed to be a very powerful manure…The dung of sea birds has, I believe, never been used as a manure in this country; but it is probable, that even the soil of the small islands on our coast much frequented by them, would fertilize [although the] rains in our climate must tend very much to injure this species of manure (Davy 1815:263–65).

Thus began Europe's –end especially Britain's– interest in guano (a substance that hitherto had been intermittently seen just as a curious, remote, and exotic material) as a fertilizer that could potentially be brought to the Old World to maximize agricultural yields and replenish soils.

Davy himself examined cormorant dung he collected in Cornwall, which the rain and humidity had made too diluted to retain fertilizing properties (Cushman 2014:29). Later, the first successful field experiments with guano outside South America took place in July 1808 in the remote mid-Atlantic island of Saint Helena, an important port held by the East India Company that had been ecologically degraded by Dutch and British colonialism, and where the British would send Napoleon just seven years later (where he would eventually die in 1821) (Cushman 2014:30; Schnug, Jacobs, and Stöven 2018:90). Here, Scottish engineer Alexander Beatson (1750-1830),[82] who became St. Helena's governor for the British East India Company, sent a

[82] According to William Walton (1844:635), Beatson became aware of guano through a conversation with naturalist Sir Joseph Banks, then president of the Royal Society (1778-1820) and a central figure in the development of the Royal Botanic Gardens at Kew. Banks had circumnavigated the global South while taking part in James Cook's "first great voyage" (1768-71). Cushman (2014:30) observes that it was Banks who requested Beatson to send a local naturalist to collect Egg Island guano. Relatedly, Walton (*Ibid*.:593) recalls how "in 1810, I repeatedly

local naturalist to collect guano from sooty terns (*Sterna fuscata*) in the neighboring Egg Island, which he sent to Europe for analysis and then, in 1809, compared *in situ* with horse and pig manure when applied to mangolds and potatoes (Beatson 1816; Cushman 2014:30; Schnug *et al.* 2018:90). "Guano" –argues Cushman (2014:31–32)– "significantly outperformed these other manures and control plots," and thus these results, which Beatson sent to the Board of Agriculture, became widely cited.

Yet, these experiments, along with Humboldt's (and others') chronicles, did not in themselves lead to the widespread use of guano as a fertilizer in Europe because, at this point, manures such as "night soil" (latrine content), together with the foregoing substances, were cheap and readily available, while the costs, time, and logistics involved in the transport of Peruvian guano made it unfeasible for this enterprise to be profitable. For instance, about eight months had to pass between the placement of an order of a South American commodity in Britain and its arrival (Schnug *et al.* 2018:90). In addition, the Viceroyalty of Peru was still under Spanish domination, and it was only after Peru emancipated from Spain in 1824 that the newly independent government sought –and had– to establish commercial ties with Britain. Peru had to pay Spain a compensation price under the treaty of Ayacucho (1824) so that it recognized Peru's independence. Partly to pay this "debt" to the very country that had been pillaging its wealth for three centuries, the nascent Peruvian government requested a loan to Britain, thus contracting another debt.[83] Peru, like other Latin American (and other erstwhile colonial) nation states, came into being already in debt, and would be now inexorably tied to the British Empire (*cf.* Gootenberg 1989; Levin 1960:45). For their part, the British rejoiced in this prospect and revealed their true intentions, as evidenced by the 1824 words uttered by George Canning, Britain's Secretary of State for Foreign Affairs (1822-1827) and later Prime Minister of the United Kingdom (1827): "Spanish America is free and if we do not mismanage our affairs sadly, she is English" (quoted in Knight 2009:122).

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mentioned the subject [the history of guano and its uses among the Peruvians] to persons of influence in the metropolis, among whom were the late Sir Joseph Banks and the late Lord Sheffield."

[83] In fact, this debt was contracted even before the independence triumphed: "In the early 1820's the embryo republican government of Peru floated three loans, totaling £1,816,000 in the London market, for the purchase of munitions and others supplies" (Levin 1960:44–45). This massive loan was equivalent to roughly five times the government's annual revenue at the time (*Ibid*.:45).

In the first years of the 19th century, amid the Napoleonic Wars (1803-15), Britain saw a continuous raise in grain prices, land rents, land under cultivation, agricultural output, and population (Marx 1993a:798–99). At this time, following Thompson (1968:65), the first agricultural revolution had been completed, as the wave of enclosures under George III (who used the sobriquet "Farmer George") was coming to an end (*cf.* Prothero 1912:207). However, enclosure would ensue through the "clearing of estates," *i.e.* the "last great process of expropriation of the agricultural population from the soil," once there were no more independent peasants to "get rid of" (Marx 1992:889). Thus, the highland clearances were extended. Notably, between 1814 and 1820 the Duchess of Sutherland (a close friend of to-be Queen Victoria) "hunted and rooted out" the remaining 15,000 Gael peasants, even burning and old woman to death, to appropriate 794,000 acres of land that she turned into 29 large sheep farms, which would be, in turn, converted into deer preserves (*Ibid*.:891–92). Enclosure would not be completed until the 1880s, *about 650 years after it started*, following legislation such as the General Inclosure of Act of 1845, among several others (Holderness 2000:888; Prothero 1912:252).

As noted, the beginning of the second agricultural revolution also corresponded to the end of the Napoleonic Wars, which shook Europe's geopolitical scenario dramatically (a topic beyond our scope). In Britain, the Corn Laws of 1815-1846 constituted protectionist measures enacted by a Parliament dominated by landlords that sought profitable prices for English grain producers by maintaining high duties on imports. These laws kept the price of bread higher than elsewhere in Europe, thus raising wages, which in turn made competition with other manufacturing countries, with cheaper bread (and hence wages) difficult (Engels 2009:284).

In addition, around this time, as noted, farming was gradually turned into a manufacturing industry. The goal was to maximize profits through the most efficient and productive route possible. To do so, British landowners experimented with economic, physical, and technical changes (Thompson 1968:64). The first involved an increase in cultivation intensity through successive capital investments in the field (which was mostly carried out by the farmers themselves, thus augmenting the landlords' pocketing of differential rent II[84]), together

[84] Rent theory is crucial to wholly understand the history of British agriculture. Rent was the chief mechanism whereby landlords enriched themselves in the countryside, as it was the main form in which surplus-value existed prior to the 19th century. Yet, for space constraints I will only mention some basic remarks here. The modern theory of rent was advanced by Scottish farmer and political economist James Anderson (1777). In addition, Adam Smith

with a rise in agricultural laborers, which first dwindled and then resurged, reaching a peak *c.* 1850 (Porter 1989:863; Thompson 1968:64). For their part, physical changes were largely associated with field drainage –which increased the amount of land that could be sown, reduced cultivation costs, and allowed for the replacement of fallows for fodder crops (Brassley 2000b:520–21)– and the construction of farm buildings (Thompson 1968:64). So important was drainage (a procedure whose practice peaked around 1840-70, corresponding to the years where steam power grew in agriculture)—especially in a country where rainwater exceeds evaporation for nine months of the year—that it became a necessary precondition for profitable manuring (Prothero 1912:364). Lastly, technical changes involved the use and search for manures, which –under the narrow factory-like conception of farming– were but an instrumental external input for augmenting the productivity of the soil. In short, all these improvements correspond to what Marx (1993a:756) called *"la terre-capital*," that is, the increase of land as capital without adding

(1776) and David Ricardo (1819) among others, published important insights on the topic. Ricardo is usually (and mistakenly) credited with having invented rent theory. It was, however, Karl Marx who, both drawing on and critiquing Anderson and Ricardo, developed what remains the most thorough theory on rent (Marx 1993a:751–950). In fact, some of Marx's deepest ecological insights are to be found along these pages. Ground-rent, whether in labor, in kind, or in money, is a fixed sum that a farmer pays a landowner for the permission to employ his tools and/or capital on the landowner's land. It thus presupposes the private property over the land (a legal fiction) by some individuals, and is indeed the form in which landed property is economically realized (valorized). Specifically, Marx discusses three types of rent: Differential Rent I, Differential Rent II, and Absolute Rent. Roughly, Differential Rent I refers to the emergence of unequal products obtained with equal amounts of capital applied to different lands of the same area, which is caused by differences in the *fertility* and/or *location* of these lands. For instance, a fertile soil of a given size will produce a larger output per unit of input than a less fertile one of the same area. Its precondition is thus the existence of unequal soil quality in a given region. As for location, for example, Michigan "was one of the first Western states to export corn. Its soil on the whole is poor. But its proximity to the state of New York and its water routes via the Great Lakes and the Erie Canal gave it…an initial advantage over the states further west, though these were more fertile by nature" (*Ibid*.:808). Differential Rent II surges, both logically and historically, from Differential Rent I, and arises from successive capital investments on the same land (*e.g.* incorporating irrigation technology, drainage, manure, and/or buildings at a given field). Importantly, on this point Marx (*Ibid*.:878) argued that "Liebig should be consulted on the declining productivity of the soil when successive capital investments are made" (*cf*. Saitō 2017:158–59). Lastly, the concept of absolute rent is Marx's most powerful contribution to the subject. Either form of differential rent is based on the assumption that only if the individual production price of a given soil's product is below the market's production price, it creates a rent (*i.e*. that the worst land pays no ground-rent). Yet this is not the case empirically. Absolute rent is independent of differences in fertility, location, or successive capital investments, and arises from landed property itself. Its essence, states Marx (*Ibid*.:906) is that "equally large capitals produce different amounts of surplus-value in different spheres of production according to their differing average composition, given an equal rate of surplus-value or equal exploitation of labour." That is, absolute rent is closely tied to unequal exchange. Ultimately, it occurs because a given individual "owns" a piece of the Earth, because "[t]he landowner is always ready to draw a rent, i.e. to receive something for nothing" (*Ibid*.:906). Yet, as Marx (*Ibid*.:911) clarified: no one owns the Earth, we "are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations, as *boni patres familias*." (*cf*. also Jaramillo 2009; Piketty 2014).

anything to land as matter ("*terre-matière*"), a crucial ecological insight *vis-à-vis* the contradiction between ecological and money flows.

Thus, along with the soil draining process, a search for novel manures began in order to keep augmenting agricultural output rates. Despite several manures were in use at the time, such as night soil, pigeon's dung, oxblood, soot, farmyard manure, and bones, among others (Chambers and Mingay 1966:63; Davy 1815:265–69), there was in Norfolk, and even more so in other light-soiled areas that relied on intensive crop rotations, a "shortage of manure to build up the fertility of the soil" (Brown and Beecham 1989:281). Bones, which are rich in calcium phosphate (and contain a small amount of nitrogen) could be crushed or grounded to a fine dust, and were the first of such novel manures that were avidly sought for in larger amounts. It seems that they were first introduced into Lincolnshire and Yorkshire around 1800 by a bone merchant of Hull that hitherto had apparently supplied them to the glue industry (Thompson 1968:66). By 1815, some 8,000 tons of bones were imported to Britain from continental Europe (and later also from South America and Russia), an amount that would double by the late 1820s and grow almost sixfold *c.*1840 (*Ibid*.) (Figure 3.1). Correspondingly, the overall price of this new commodity soared from £14,395 in 1823 to £254,600 (a 1669% increase) by 1837 (Russell 1966:91). The newly independent Argentina and Uruguay, to this day importantly dependent on the cattle and meat industries, would supply tallow and bones for export prior to the era of meat refrigeration (Russell 1966:91; Thompson 1968:69). Overall, Britain imported some 800,000 tons of bones throughout the 19th century.

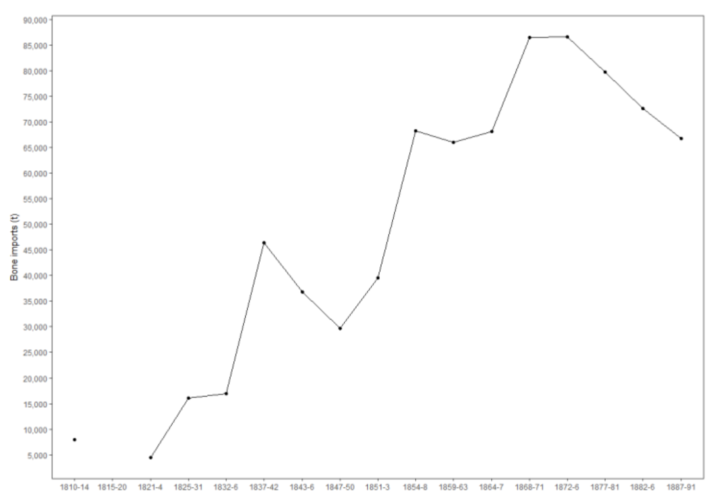

Figure 3.1. Bones imported by Britain, 1810-91.
With data from Thompson (1968:75). (Value of 1815-20 not known).

While bones were effective in increasing the yield of turnips, especially on dry sands (*i.e.* light, drained soils) they proved unsuccessful on clays (heavy soils) and strong loams, and did not have enough nitrogen for cereal crops (Mathew 1970a:112; Thompson 2000:1020). Thus, the range of soils and crops to which they could be applied was limited (chiefly to eastern England and the pastures of Cheshire) (*cf.* Johnson 1836). Moreover, calcium phosphate is an inert compound that is activated and solubilized (and thus made available for plant intake) only after contact with an acid (Russell 1966:95; Thompson 2000:1020). By itself, an acid soil can produce this reaction, but, upon a basic one, bones need to first be treated in acid, of which sulfuric acid (H_2SO_4) was the cheapest and most readily available. This process began to be adopted in Britain. Sulfuric acid was manufactured in this country from sulfur (pyrite), of which a little amount was mined at home, but the bulk was imported, especially from Spain (Thompson 2000:1022–23).

Thus started the industry of superphosphates, on 23 May 1842, when English landowner John Bennet Lawes of Rothamsted obtained a patent for chemically decomposing substances containing phosphoric acid by means of sulfuric acid for purposes of manure (Brock 1997:121; Russell 1966; Thompson 2000:1019). Interestingly, Lawes himself did not invent this chemical reaction, which had been pioneered by the German chemists Heinrich Köhler (1831) and Gotthold Escher (1835), and Justus von Liebig had likewise suggested it in 1840 (Haber 1958; Russell 1966:96). Yet, it appears that Lawes tried it in 1839, and it was him who successfully patented the process in Britain, which would remain an essential pillar of the British fertilizer industry until the early 20th century. In 1843, Lawes started a factory of superphosphates (for sale at the costly price of £7 per ton) at Deptford Creek on the River Thames in London (Brassley 2000a:611). From the profits he accrued, he set up the Rothamsted Experimental Station in Hertfordshire that same year, where he –together with John H. Gilbert (a chemist who had studied with Liebig at Giessen in 1840)– worked until his death in 1900, publishing 174 scientific papers and 300 other publications, most of them on crop nutrition (*Ibid.*:600). This research center, one of the first of its kind in the world, would remain a pillar of British agricultural science throughout the 19th century and even in the 20th.

There were other scientific breakthroughs directly or indirectly related to agriculture in the first half of the 19th century in Britain. In 1828, in an epoch where railway construction was starting to take off, German chemist Friedrich Whöler synthesized the first organic compound, urea, from an inorganic one, ammonium cyanate, giving an impulse to the mineral (materialist) theory of plant nutrition. In late September 1831, the British Association for the Advancement of Science (BAAS) was founded in York[85] by a group of young, British scientists led by Charles Babbage, Vernon Harcourt, and David Brewster, among others, who were dissatisfied with the government and the Royal Society's (its chief and oldest scientific institution, among whose presidents had been Newton, Joseph Banks, and Humphry Davy) failure to react to "new needs" (Hobsbawm 1996:279; Morrell and Thackray 1981; Prothero 1912:549). The BAAS was modelled after Lorenz Oken's *Deutscher Naturforscher* in Germany, and its aim was to acquire, spread, and further science.

In addition, in 1836, the Tithe Commutation Act replaced tithes in kind with money payments, ending this archaic, less profitable form of rent and seeking more profit from the soil (*cf*. Marx 1993a:924). The next year, on 20 June 1837, Victoria of Hanover became Queen of the United Kingdom, a position she would hold until her death in 1901, in an era that represented the pinnacle of the British Empire (*cf*. Porter 2009). Also in 1837, after the election of a weak Whig government, free trade began to run strongly in English politics, which would have consequences *vis-à-vis* the repeal of the Corn Laws in the next decade (Chambers and Mingay 1966:150). This year also marked an almost twentyfold increase in oilcake consumption as manure relative to 1810s levels, a tendency that would prevail until later in the century (Thompson 1968:68). Importantly, all of this occurred while the British were colonizing Irish soil through rack-renting and middlemen (Slater 2018b).

3.2. Justus Liebig and the Second Agricultural Revolution

In 1837, too, Thomas Thomson,[86] chemistry professor at the University of Glasgow, had the idea of inviting the eminent German chemist Justus von Liebig (1803-73) –whose laboratory at Giessen they sought to emulate– to England, to address the seventh annual meeting of the BAAS in Liverpool (Brock 1997:95–96; Morrell and Thackray 1981:379). Liebig accepted this invitation and headed off to Hull in August 1837, in what would be the first of six visits to

[85] The election of this city was no coincidence, it was a deliberate attempt that symbolically sought to bring England, Ireland, and Scotland together by choosing "the most centrical city for the three kingdoms" (Morrell and Thackray 1981:63).

[86] Thomson's son –like Gilbert and Lyon Playfair, among others– had also been a pupil of Liebig at Giessen.

Britain between 1837 and 1855, and marking the beginning of a symbiosis between the two (Brock 1997:114). From Hull, he traveled to Manchester by stagecoach, and later recalled in a letter to his wife that "[t]he district between Leeds and Manchester is one big smoking chimney…everywhere there are…coal mines on the streets [and Manchester] looks like an inferno"[87] (Morrell and Thackray 1981:2). On 7 September, in Liverpool, Michael Faraday –that year's president of the BAAS's chemical section (B)– read a paper by Liebig (at Liebig's own request given his English was not excellent yet) titled "On the Products of the Decomposition by Uric Acid," the result of a joint work with Wöhler (BAAS 1838:38–41; Brock and Stark 1990:135). Liebig's text was acclaimed and widely celebrated, impressing the attendants and making Liebig "the lion of the evening" (Brock 1997:151). So enthralled was the BAAS's general committee by Liebig that he (along with French chemist Jean-Baptiste Dumas) "was requested to prepare a REPORT on the present state of our knowledge in regard to Isomeric Bodies. He was also requested to prepare a REPORT on the state of Organic Chemistry and Organic Analysis" (BAAS 1838:*xix*). The former request was never accomplished, while the second was fulfilled, as we shall see, in a peculiar way (*cf.* Brock 1997:151).

One year later, on 9 May 1838, the successor of the Board of Agriculture, the Royal Agricultural Society of England (RASE), which sought to utilize the potential of agricultural science to raise productivity, was founded by a group of entrepreneurial landowners, journalists, and agriculturalists, like Philip Pusey (Chambers and Mingay 1966:170; Goddard 2000:653; Prothero 1912:217). The RASE would eventually have a membership fluctuating between 8,000 and 11,000 from 1870 to 1900, primarily composed of "enthusiastic landowners and tenants" (Goddard 2000:652, 681). Its famous and revealing motto, "Practice with Science," was inspired by Davy's work (Collins 2000a:11; Goddard 2000:653; Prothero 1912:217). For Prothero (1912:359–60) the RASE was so impactful that, in hindsight, he argued: "Without exaggeration, the standard of excellence to which farming has attained throughout the kingdom has been to a considerable extent the work of the Royal Agricultural Society. For more than seventy years it has been the heart and brain of agriculture [in Britain]." The next year, the RASE founded its medium for publication, the *Journal of the Royal Agricultural Society of England* (*JRASE*),

[87] Other contemporary testimonies describe the atmosphere quite similarly. For instance, cotton manufacturer Thomas Ashton referred to a "land of long chimneys" in 1837, and, in 1835, Alexis de Tocqueville observed a "sort of black smoke [that] covers the city [of Manchester]. The sun seen through it is a disk without rays. Under this half daylight 300,000 human beings are ceaselessly at work" (in Beckert 2015:80–801).

whose first editor was Pusey, and wherein research, essays, and reports on farming and agriculture, aimed at the educated farmer and landowners, were published (Goddard 2000:657). According to Prothero (1912:359): "In its pages will be found the truest picture of the history of farming in the reign of Queen Victoria." Importantly, articles on fertilizers and manures constituted over 15 percent of all *JRASE's* publications before the mid-1860s, which reflects the central role this institution had in fostering the use of artificial fertilizers to increase yields (Collins 2000b:127; Goddard 2000:657).

The 1840s were absolutely crucial in the history of British agriculture and imperial policies alike. On 2 April 1840, Liebig's *Treatise on Organic Chemistry* [*Traité de chimie organique*], with an introduction titled "Applications of the principles of organic chemistry to plant physiology and agriculture" ["*Applications des principes de la chimie organique à la physiologie végétale et à l'agriculture*"] was published in Paris. This introduction was then republished in German as *Agricultural Chemistry* on 1 August, and translated into English by Lyon Playfair as *Organic Chemistry in its Applications to Agriculture and Physiology*, which was published in London on 17 September 1840, strategically the very day the 10th meeting of the BAAS opened in Glasgow (Brock 1997:151–52). The English edition of this text was dedicated to the BAAS (*cf.* Liebig 1840:*v*) (while the *Traité* was dedicated to Liebig's former teacher, Gay-Lussac, and the German one to Humboldt). Liebig got his Scottish pupil, William Gregory, to persuade the BAAS committee that *Organic Chemistry* (commonly known as *Agricultural Chemistry*) was the report it had commissioned in 1837 (Brock 1997:153; Brock and Stark 1990).

At any rate, the fact is that Liebig's *Agricultural Chemistry*, which go undergo seven editions from 1840 to 1862, became a turning point in the application of science to agriculture (Brock 1997:180; Collins 2000a:11; Prothero 1912:365–66). In fact, it was Liebig's book that replaced Davy's *Elements* (1813) as the leading, best-selling, and fundamental work on agricultural chemistry, a position the latter had held, it will be remembered, since its publication. Indeed, Liebig's provocative work had such an impact among landowners and farmers in Britain that, in his next visit to this island in 1842, he was greeted as if in a Royal Progress (Brock 1997:98). In 1901, Prothero would argue that: "It is to…Liebig that modern agriculture owes the origin of its most striking development" (quoted in Brassley 2000a:598). In the same vein, Russell (1966:97) asserted that Liebig's *Agricultural Chemistry* "can fairly claim to be the most important book ever published on the subject." Just as Charles Darwin was not the originator of evolutionary theories, but it was him who –as stated by Stephen Jay Gould (2002:98)– "made evolution accessible to science," Liebig did not invent the subject of agricultural chemistry, but rather put the subject within the reach of science, in what represented, as Hobsbawm (1996:48) argued, its "coming of age." It is no wonder that, years later, British banker, farmer, and silversmith John Mechi would refer to Liebig as "the Isaac Newton of agricultural science" (Brock 1997:258).

The first edition of *Agricultural Chemistry* is composed of two parts. The first one deals with "the chemical processes in the nutrition of vegetables," and the second one with "the chemical processes of fermentation, decay, and putrefaction." Its overall aim was to "elucidate the chemical processes engaged in the nutrition of vegetables" (Liebig 1840:2). In the Preface, Liebig (1840:*viii–ix*) states that "[s]ince the time of the immortal author of the 'Agricultural Chemistry,' no chemist has occupied himself in studying the applications of chemical principles to the growth of vegetables, and to organic processes. I have endeavoured to follow the path marked out by Sir Humphry Davy…" Liebig probably also learned from Davy, who in his *Elements* had stated that "[t]he Chinese…have more practical knowledge of the use and application of manures than any other people existing" (1815:265), that "[t]he agriculture of their country is the most perfect in the world" (Liebig 1840:196). Liebig's most important argument in the first edition of *Agricultural Chemistry* –which was to influence countless agriculturalists, scientists, and other thinkers, including Marx (*cf*. Foster 1999, 2000, 2011; Saitō 2014, 2017)– is that:

> "[t]he fertility of a soil cannot remain unimpaired, unless we replace in it all those substances of which it has been thus deprived…that which has been abstracted from the soil…must be restored to it, if the land is to be kept in a permanent condition of fertility…Now this is effected by *manure* (Liebig 1840:174–75).

Later in the text, Liebig (1840:182,188) argued that:

> We could keep our fields in a constant state of fertility by replacing every year as much as we remove from them in the form of produce; but an increase of fertility, and consequent increase of crop, can only be obtained when we add more to them than we take away…It must be admitted as a principle of agriculture, that those substances which have been removed from a soil must be completely restored to it, and whether this restoration be effected by means of excrements, ashes, or bones, is in a great measure a matter of indifference.

That is, fertility –argued Liebig– is not an immutable, inexhaustible, and vital (in the sense of vitalism) property of the soil, but a condition that must be actively attained through the systematic and rational restoration of the material nutrients agriculture –and especially manufacture-oriented agriculture under capitalism– removes from it. Liebig deduced this mainly from his chemical analyses of the elements found in the ashes of specific crops (Brock 1997:121). Following Liebig's work, manures thus began to be understood not only as inputs required to maximize agricultural productivity –a view already present during the late first agricultural revolution and the early stages of the second– but as the *very foundations which made productivity, and the soil fertility upon which it was based, possible*. Liebig thus advanced one of the central early developments in ecology, namely, the recycling of soil nutrients, and brought to the forefront a notion that had been first advanced by Scottish farmer and political economist James Anderson, "the true discoverer of the modern theory of rent" (Marx 1993a:757): the existence and very possibility of historical changes in soil fertility through human action (Foster 2000:144–47).

The first edition of *Agricultural Chemistry* thus also rejected the specific humus theory –associated with Thaer and positing that a black, insoluble, and organic decay product of vegetation was absorbed by plants and transformed via a vital force into lime and other nutrients. Instead, it advanced the law of the minimum and the mineral theory of plant nutrition (first suggested a little earlier by Carl Sprengel) which assert that plant growth is limited by the element present in the soil in the least amount (Brock 1997:146–7).[88]Liebig (1840:139–40) also indicated that agriculture's aim was to produce certain parts or organs of particular plants in an optimal way, which could only be achieved by the application of those substances that are indispensable to their development. He also mentioned that, despite excrement had been used from time immemorial to increase soil fertility, agriculture had "hitherto never sought aid from chemical principles, based on the knowledge of those substances which plants extract from the soil on which they grow, and of those restored to the soil by means of manure" (*Ibid*.:161). This change was the distinctive feature of the novel, scientific agricultural chemistry. Here, Liebig

[88] Today, it is known that humus, the fraction of the soil organic matter that remains after the portions of added plant and animal residues have decomposed, is not a plant nutrient *per se*, but contains nutrients and is essential for maintaining soil fertility. In addition, these organic compounds provide an environment for microorganisms in healthy soils, contributing to their structure and other properties. Thus, aspects of both "humus theory" (when removed of its metaphysical tints) and "mineral theory" are actually correct and coexist (Brady and Weil 2010:548; Brock 1997:181; Scharrer 1949).

(*Ibid*.:181) also mentioned a crucial idea that Marx (1992:637, 1993a:949) would later elaborate on to develop his notion of a rift in the process of social metabolism: “the soil of a field will alter but little, if we collect and distribute the dung carefully; a certain portion of the phosphates, however, must be lost every year, being removed from the land with the corn and cattle, and…will accumulate in the neighbourhood of large towns.” Thus, this second agricultural revolution, as was the case with the first one, also entailed a metabolic rift. Lastly, Liebig (1840:82,199) made some interesting remarks about guano in this first edition:

> The barren soil on the coast of Peru is rendered fertile by means of a manure called Guano, which is collected from several islands on the South Sea. It is sufficient to add a small quantity of guano to a soil, which consists only of sand and clay, in order to procure the richest crop of maize…The sterile soils of the South American coast are manured with a substance called guano…by the use of which a luxuriant vegetation and the richest crops are obtained.

Following his second visit to England in 1842, Liebig wrote in a letter to Robert Peel, then prime minister of Britain, that:

> In the course of a Journey through England last year I have become convinced that all the fields of that country are in such a state [of soil exhaustion]The reasons of my writing this letter is to acquaint you with the fact that there exist in England players of fossil guano in a quantity sufficient to provide her with the phosphates for centuries to come (Liebig quoted in Brock 1997:120–21).

That same year he wrote that: “the farmer [would] be able to keep an exact record of the produce of his fields…like the account book of a well-regulated manufactory; and then…determine precisely the substances he must supply to each field, and the quantity of these, in order to restore their fertility” (in *Ibid*.:180). Also in 1843, the third edition of *Agricultural Chemistry* was published, wherein Liebig changed his view and now affirmed that cultivated plants receive enough nitrogen from the atmosphere for the purposes of agriculture, in what would be part of a long controversy with Lawes and his former pupil Gilbert at Rothamsted (*cf*. Brock 1997:166). Roughly, from 1846 to the late 1850s, following the failure of his own fertilizer (he was above all a theoretical experimental scientist and not a farmer) Liebig left his agricultural works relatively dormant, safe for his discussions of the English sewage, and instead dedicated himself to mirror manufacture, food chemistry, quinine commerce, and studies on animal metabolism, among other activities (*cf*. Brock 1997). He returned to explicitly agricultural matters after he had visited Britain for the last time in 1855 and was now working at Munich, after having leaved Giessen in 1852.

At this time, he started conceiving and denouncing modern agriculture as a system of plunder or robbery in works such as his *Letters on Modern Agriculture*, published in 1859 (the same year Darwin's *Origin* appeared). In this text, Liebig criticized the so-called period of "high-farming" (1850-75) (alternatively "high feeding" for Pusey, one of its main advocates) (Brassley 2000b:534; Collins 2000b; Foster 2016). In most recounts of British agriculture, the high-farming period –characterized by higher inputs to offset falling grain prices (following the repeal of the Corn Laws in 1846) and larger inputs of root and fodder crops supplemented by purchased feeds (Collins 2000b:93)– is portrayed as a "golden age" that represented the most brilliant stage of the second agricultural revolution. Yet, Liebig (1859:183) provokingly conceived it as a system of disguised robbery:

> The European system of cultivation, called *high farming,* is not that open system of robbery of the American farmer, followed by the utter exhaustion of the soil; but it is a more refined species of spoliation, which at a first glance does not look like robbery. It is spoliation accompanied by self-deception, veiled under a system of teaching, the very basis of which is erroneous…Our high farmer…makes the (rich) clover disgorge as if it were dollars which it has extracted penny by penny from the (poor) field; and he fancies this system of robbery will last for ever, as his instructors have taught him that his land possesses the property of sweating penny pieces.

This was not to deny that the initial advances attained by high farming: drainage, new methods of stall-feeding, mechanical manuring apparatuses, new treatment of clay soils, increased use of mineral manures, the use of the steam-engine, and an increase in cultivated area –as Marx (1992:831) succinctly summarized– at first produced great results. Rather, Liebig's critique was aimed at high-farming's overall irrationality and underlying robbery, and at the shortsightedness of its promoters. Thus, Liebig implicitly revealed *a chief contradiction of capitalist agriculture*: it is irrational and rational at the same time; irrational insofar as its primary aim is profit and depends on the private property over the land, and rational in that it is based on the systematic application of scientific knowledge to the soil.

In a letter to Mechi on 17 November 1859 (which was a response to a letter Mechi had published in *The Times* a week earlier, where he criticized the "suicidal practice [of] the gradual but sure exhaustion of the soil of Great Britain by our new sanitary arrangements which permit the excrements…of 15,000,000 people…to flow wastefully into the rivers"), Liebig stated: "Of all the elements of the fields…in their products in the shape of corn and meat, are carried into the cities and there consumed [and] nothing, or as good as nothing, returns to the fields" (in Angus 2018a:140). In this letter, Liebig also observed that the farmer learns that the "system of stall or home-made manures is a true and genuine robbing system [where] his restoring in the guano and bones [of] but a small portion of the very same elements of seeds and of fodder which had been withdrawn from his fields" takes place (*Ibid*.:141). He likewise mentioned the "immense loss of fertility which the German fields have sustained by the exportation of the many hundred thousand tons of bones which have gone from Germany to England" and rhetorically asked: "what will be the condition of England when the supply of guano and bones is exhausted?" (*Ibid*.:142–43). Lastly, he concluded that "if the British people do not take the pains to secure the natural conditions of the permanent fertility of their land, if they allow these conditions as hitherto to be squandered, their fields will at no distant day cease to yield their returns of corn and meat" (*Ibid*.:145).

Finally, in 1862 Liebig published the seventh and last edition of his *Agricultural Chemistry*, in which he had been working since 1855, and which was as famous (and controversial) as the original one 22 years before (Saitō 2017:178). This version featured another harsh critique of English high farming, to the point that Walton, Liebig's publisher in Britain, declared it "libelous" and destroyed his copy, and hence it was never published in English (Foster in Liebig 2018:146). However, in 1863, Maria Gilbert, Joseph Gilbert's wife, translated the preface and introduction, even though they were not published either. In the preface, Liebig (2018:149) stated, for instance, that he had "been reproached on many sides for describing modern Agriculture as a system of Plunder/Robbery (*Raubwirthschaft*)," and that "the future history of the German beetroot sugar manufacture, may perhaps still prove to many of our contemporaries that in many parts of north Germany a mischievous robbery of the land is perpetrated" (*Ibid*.). Relatedly, in a famous passage –that was amply reproduced in British newspapers– Liebig harshly asserted:

> Great Britain deprives all countries of the conditions of their fertility. It has raked up the battle-fields of Leipsic, Waterloo, and the Crimea; it has consumed the bones of many generations accumulated in the catacombs of Sicily; and now annually destroys the food for a future generation of three millions and a half of people. Like a vampire it hangs on the breast of Europe, and even the world, sucking its lifeblood without any real necessity or permanent gain for itself (in Brock 1997:178).

Despite the debates ignited by this piece, Liebig's *Raubbau* became widely influential, as evidenced by the 1863 Congress of German Farmers and Foresters, where it was the first topic on the agenda (Finlay 1991:159).

Thus, it should not be hard to see how crucial were Liebig's ideas on Marx's later works, to the extent that, in a letter to Engels in 1866, he said he "had to plough through the new agricultural chemistry in Germany, in particular Liebig and Schönbein,[89] which is more important for this matter [his critique of ground rent] than all the economists put together" (in Foster 2000:155; Saitō 2017:195–97). In addition, Marx (1992:638) famously said that: "To have developed from the point of view of natural science the negative, i.e. destructive side of modern agriculture, is one of Liebig's immortal merits."[90]Marx was also influenced by Liebig's use of the notion of metabolism (*Stoffwechsel*), a concept he first got from his friend, the communist physician Ronald Daniels (Foster and Clark 2018a:6; Saitō 2017:72–74). This topic, whose analysis lies beyond the scope of our work and has already been started by Foster (1999, 2000; and Foster and Clark 2016, 2020) and Saito (2014, 2017), allows for an understanding of the concrete historical circumstance where specifically capitalist agriculture first developed and unfolded. It is no coincidence that this was precisely the period when guano began to be imported by Britain, a process to which we now turn.

3.3. Setting the stage for the guano trade

As noted, following Humboldt's remarks on Peruvian guano; the chemical analyses of his sample in Europe –carried out in France, Germany, and Britain; Beatson's field experiments with Egg Island guano in Saint Helena; high-farming's resolute search for fertilizing substances and the shortage of sufficient manures so as to maximize yield; Malthus's theses; Victorian England's increasing control of global trade routes and imperial power; Latin America's (and particularly Peru's) independence from Spain; the existence of incipient British, French, and U.S. commerce with colonial Peru and Chile around sugar, cotton, silver, flour, coal, whale oil, and

[89] German-Swiss chemist Friedrich Schönbein was a friend of Liebig, with whom he shared correspondence since they first met in Munich in 1853 (Brock 1997:306).

[90] It is known that Marx first read Liebig (the fourth edition of *Agricultural Chemistry*) in July 1851, and then exhaustively again in the 1860s, when he made extensive excerpts from the seventh edition (Saitō 2017:157).

saltpeter, among other products, carried out through several trading houses;[91] and Liebig's contributions to mineral theory and the law of the minimum—all contributed to Britain's closing in on Peru's guano deposits. In addition to the foregoing sugar and cotton trades, whaling and the commerce around saltpeter deserve particular attention in the years preceding the guano trade.

The hunting of whales and seals around Cape Horn and the South American Pacific –an enterprise pioneered by the U.S. (followed by Norway and Britain) at the turn of the 19th century– entailed the creation of new navigation routes among South and North America and Europe. As Ishmael, Melville's central character in *Moby-Dick* (1851:121) put it:

> Until the whale fishery rounded Cape Horn, no commerce but colonial, scarcely any intercourse but colonial, was carried on between Europe and the long line of the opulent Spanish provinces on the Pacific coast. It was the whaleman who first broke through the jealous policy of the Spanish crown, touching those colonies; and, if space permitted, it might be distinctly shown how from those whalemen at last eventuated the liberation of Peru, Chili, and Bolivia from the yoke of Old Spain, and the establishment of the eternal democracy in those parts [*sic*].

Along with Antarctica and the North Pacific, it is no wonder, given the geophysical and ecological processes described in Chapter 1, that the waters off Chile and Peru –particularly the latter's– exhibit large numbers of whales and seals, which have been caught in enormous numbers (Tønnessen and Johnsen 1982:651). For the most part, this trade revolved around the killing of sperm whales (*Physeter macrocephalus*), whose beautiful heads contain spermaceti, a waxy substance used as a lubricant (of cotton looms, for instance), light source (in lamp fuels or candles), soap, and even as fertilizer, among other purposes (Brassley 2000b:540; Cushman 2014:40; York 2017:3). Groups of nursing females and their calves, who rest and feed off Peru (and other regions) in their way towards and from the Arctic, were initially targeted in the early 1800s by ships from New Bedford and Nantucket, Massachusetts, which resulted in the killing of some 5,000 sperm whales (and the offloading of about 100 million liters of whale oil) per year (Cushman 2014:40). The guano trade –argues Cushman (*Ibid.*:45–46)– would be part of this

[91] The financial burden of the Independence war obliged Spain to tolerate a degree of trade with Britain. By 1818, while Peru and Chile still remained Spanish colonies, British merchant ships were allowed to enter Callao and sell their cargos (Hollett 2008:92). In fact, building on foundations laid as early as 1806, by 1818-20, the Gibbs trading house of London had already 14 clients outside Europe, 11 of whom were in Lima. In 1819, "Callao was officially opened to British trade for a period of two years and British merchants permitted to settle there" (Mathew 1981:9). In 1821, a British chamber of commerce constituted by 13 members was founded in Lima (Gibbs in Levin 1960:43). Then, on 1 January 1822, the branch for the South American firm Gibbs, Crawley, Moens & Co., subsidiary of Antony Gibbs & Sons, which more than 20 years later would be in control of the guano trade, was established in Lima (Wetzel in Witt 2016:XX–XXI).

growing commerce with the Pacific Basin, and in fact would follow in the navigation routes laid down by U.S. whalers and sealers.

For its part, the extraction by Europe, and especially Britain, of a substance known as saltpeter (*salitre* in Spanish), located in large amounts in southern Peru and northern Chile, also paved the way for the extraction of guano. In fact, this story importantly parallels and intertwines with that of the guano trade, and indeed a competition between these two fertilizers would arise in the European markets around the mid-1800s. In this episode, as Peruvian historian Emilio Romero (1949:380) succinctly put it: "guano opens a whole big epoch in the history of Peru and saltpeter closes it."[92] Yet, as important and relevant as this event was, its analysis would require a study of its own, which lies beyond the scope of the present work. Thus, saltpeter will be addressed only in relation to the guano trade.[93]

In short, saltpeter is a generic word that is commonly applied to both potassium nitrate (KNO_3) and sodium nitrate ($NaNO_3$). The former compound has been used since time immemorial for gunpowder production, for instance by the Chinese and Arabs, and later on by Europeans from the 14th century on, also for gunpowder, weapons, and explosives manufacture (Bermúdez 1963:25). It was mainly extracted from caves, and the British Empire's stock was obtained from India via the East India Company (Bermúdez 1963:96). On the other hand, sodium nitrate had been used as a *fertilizer* (although also as an explosive) by the Incas (Bermúdez 1963:41; Romero 1949:380). It was also utilized as an explosive by the Spaniards in the silver mines of Tarapacá, then the southernmost province of Peru, which would in fact be annexed by Chile following the War of the Pacific (1879-83), a conflict ignited, as we shall see, by the scramble over the sodium nitrate deposits, where Chile (backed by Britain) prevailed (Bermúdez 1963:25).[94]The first saltpeter shipment to Liverpool from South America's coasts –probably Tarapacá's sodium nitrate transformed into potassium nitrate by means of a reaction devised by Bohemian botanist Thaddeus Haenke *c.*1809– took place in 1820, at a time when this compound was being manufactured in excess in Peru amid the independence war (Bermúdez 1963:87).

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[92] The original reads: "El guano abre toda una gran época en la historia del Perú y le salitre la clausura."

[93] *Cf.* Bermúdez (1963) and Hernández C. (1930) for histories of the exploitation of this substance.

[94] Peru also lost Arica, Parinacota, and some important southern guano islands. For its part, Bolivia lost the territory of Antofagasta and thus its access to the Pacific Ocean (which today it still claims), as well as what remains the largest open pit copper mine on Earth: Chuquicamata.

However, it was thrown into the sea when reaching Britain, after not arousing the interest of any buyer (Bermúdez 1963:101; Hernández C. 1930:5).

The next year, in Madrid, Pedro Fuentes, a Peruvian industrial from Tarapacá, gave his countryman from Arequipa, Mariano Eduardo de Rivero –a prominent scientist who had been studying in Europe under none other than Humphry Davy in England (and also under Gay-Lussac in France, among others)– a sample of sodium nitrate from his hometown (Bermúdez 1963:99; Cushman 2014:33). After sending some of it to French mineralogist René Just Haüy for analysis, de Rivero would become the first person attempting to make sodium nitrate known in Europe and foresee its commercial importance (Bermúdez 1963:99–100). In 1828, Peruvian industrial Juan Alma (also spelled Alba) asked his government for authorization to export sodium nitrate from Tarapacá, same which was granted on 28 May of that year (Bermúdez 1963:103; Hernández C. 1930:26).

Then, in 1830, a ship from Peter Aikman's Commercial Society in Glasgow (a house operating since 1825) brought home some sodium nitrate from Tarapacá, which was objected by customs at Liverpool on the grounds of being "an explosive material." It appears that Aikman himself examined the substance and took 10 sacs, the remainder being thrown overboard. Back in Glasgow, Aikman's chemist suggested to distribute this substance among farmers in the locality. This marks, argues Bermúdez (1963:105) "the first time that Tarapacá's nitrate of soda was used, purely incidentally, in Europe's agriculture." Yet, it would be 20 years until sodium nitrate was consciously and significantly applied for that purpose.

In July of that year, the Tarapacá's sodium nitrate trade was formally established with Europe, marked by the arrival of 18,700 Spanish quintals[95] (about 840 t) that were used for nitric acid (HNO_3) synthesis (in turn employed for warfare purposes) and other industrial and medical applications (Hernández C. 1930:5).Through Aikman's house, Germany would receive its first shipment of Tarapacá's sodium nitrate in 1834 (and import it directly from 1839 on) (Bermúdez 1963:105). This incipient trade increased the tensions between Peru and Chile. Valparaíso, through which sodium nitrate was exported, was reached by European ships (which had to

[95] In his *Geological Observations*, Charles Darwin (1876:306) states that the amount exported throughout that whole year was 17,300 quintals (and clarifies for the reader that the Spanish quintal nearly equals 100 English pounds). The passage also reads: "From an official document, shown me by Mr. Belford Wilson [who resided in Lima as Peru's British General Consul], it appears that the first export of nitrate of soda to Europe was in July, 1830, on French account, in a British ship."

navigate round Cape Horn in the years prior to the opening of the Panama Canal in 1914) before Peru (Bermúdez 1963:118). On 20 January 1835, both nations signed a Treaty where they mutually conceded the other country was favored by navigation, foreshadowing a series of clashes that would culminate in the War of the Pacific. In fact, the period *c.*1826-1845 would be characterized by several disputes –and even wars– among the nascent Peru, Bolivia, Chile, Ecuador, and Colombia over territorial claims and the access to strategic sites favored by commerce with Europe and the U.S. (Basadre 1948; Gootenberg 1989).

By 1840, a little over 10,000 tons of Tarapacá's sodium nitrate were exported, representing a twelve-fold increase relative to 1830 levels (Hernández C. 1930:37). Throughout the 1840s, the increased importation by Europe (especially Britain) of this substance would ensue, to be utilized mainly for industrial and warfare processes, and to a lesser extent for agriculture. It was until the last years of this decade, and especially from 1850 on, that sodium nitrate was extensively and primarily imported as a *fertilizer* by Britain, Germany, France, and the U.S., rivaling guano exports (Bermúdez 1963:120; Thompson 1968:70). Yet, in all, the continuous and increasing Tarapacá's sodium nitrate trade from 1830 on, even if initially for warfare and industrial purposes, also paved the way for the extraction of guano through the establishment of navigation routes, trade houses, acquaintances, knowledge, and technology. In turn, from *c.*1850 on guano would spur the extraction of sodium nitrate

In addition, throughout the 1820s and early 1830s, there were other characters who kept bringing guano into the focus of Europe. In 1820, Medellín-born botanist Francisco Antonio Zea –Simón Bolívar's deputy in the independence wars across northern South America– hired two former pupils of Humboldt to help organize the Gran Colombia: the foregoing Mariano de Rivero and the eminent French chemist Jean-Baptiste Boussingault (Cushman 2014:32–36). In 1826 de Rivero, along with the Irish scientist Joseph B. Pentland, made a journey to some of Peru's guano islands as part of an expedition seeking to extend Humboldt's scientific program in Peru (*Ibid*.:33). De Rivero would describe this experience in his *Memory on Peru's guano birds* [*Memoria sobre el guano de pájaros del Perú*] (1827), published the following year in Brussels. Specifically, and similar to what he had been doing in relation to sodium nitrate for the last six years, de Rivero discussed the fertilizing properties of guano and its then current agricultural use in Peru. In this work –like his teacher Davy had done and Liebig would do– he praised Chinese agriculture; designated what he termed the three varieties of guano: red, brownish, and white;

described guano's smell (ammoniacal) and taste (salty and spicy); noted how birds were absent from some islands due to the noise of ship cannons and increased navigation; and remarked how guano was locally used to fertilize all crops except sugar cane. Interestingly, de Rivero also observed that the port of Mollendo (in southern Peru) had six small ships involved in the guano commerce with Peru's mainland, which carried out nine annual trips to the islands, extracting some 35,000 Spanish fanegas[96] (about 2,000 t) per year (de Rivero 1827:171).

In April 1830, French naturalist Alcide d'Orbigny traveled along the coast off northern Chile, southern Peru, and Bolivia. D'Orbigny published his observations of this part of the journey in the second volume of *Travel through South America* [*Voyage dans l'Amerique méridionale*], where he made remarks on the exceptional fertilizing properties of guano (d'Orbigny 1839:347, 356; Schnug *et al.* 2018:90). Two years later Boussingault, a central figure –along with Liebig– in the development of the notion that nitrogen is the substance that most contributes to soil fertility (and more generally *vis-à-vis* the nitrogen cycle), was also on the Peruvian coast, in the booming whaling port of Paita, and learned about the fertilizing properties of guano, which he would thereafter discuss in several works (Boussingault 1844; Cushman 2014:36; Hutchinson 1950:59; Potter 1842:11). In the 1820s and early 1830s, these naturalists thus contributed to support Europe's theoretical interest in guano as a fertilizer, although they did not start its commercialization.

In addition to these expeditions and publications, several magazines and journals in Europe and the U.S. were already dedicating some important words to guano in the years prior to its commodification. For instance, as early as 1830, Revd. William Buckland –a Geology and Mineralogy Professor at Oxford that had taken Darwin's specimens of Galapagos iguanas upon his return to Britain– discussed Peruvian guano in relation to fossilized coprolites in England (Buckland 1830:26). He even suggested calling guano "*Ornitho-coprus*." Building on this article, an 1831-32 piece in the *Edinburgh New Philosophical Journal* also compared England's fossilized coprolites with Peru's guano, "a modern coprolite," which, according to the author, was far more astonishing than the fossilized strata. This text also mentioned de Rivero's expedition off Peru and the Incan use of guano (Anon 1832). In Germany, an 1832 number of *Liebig's Annalen* (a journal co-founded by Liebig in 1832), quoted a fragment of the foregoing

[96] The Spanish fanega, or Spanish bushel, is a unit of volume equivalent to approximately 55.5 liters. To simplify, the above transformation assumes that guano has a density of 1 g cm^{-3}.

article on the "modern coprolite" (Brandes, Geiger, and Liebig 1832:304). Relatedly, in 1834 Thomas A. Knight, then President of the Horticultural Society of London, acknowledged in an article that "the exhausted state of the greater part of the tillage of England now precludes the possibility" of farmers increasing their produce or grain considerably through "a little increase of industry" (Knight 1834:49). This passage is very relevant because it acknowledges a fact that several British agriculturalists and agrarian historians –both past and contemporary– minimize or altogether omit in their accounts of the "high farming" era: the profound problem of soil exhaustion that Britain was experiencing at the time. It also enhances our understanding of the circumstance in which guano and other fertilizing materials were avidly sought.

For their part, several U.S. farmers in places like Virginia, Maryland, and Baltimore were also aware of guano's fertilizing properties. For instance, an 1838 number of the *Farmer's Register* (a magazine founded and edited by Edmund Ruffin, a slaveholder who would commit suicide after the Confederate defeat) quotes Davy's 1813 lecture VI, where guano and its properties are discussed. Likewise, back in Britain, in an 1839 article reproduced in London's *Farmer's Magazine*, Henry R. Madden of Edinburgh refers to guano as being "a most valuable manure, which occurs in the South Sea islands [and consists] chiefly of the debris of fishes, mixed up with the ordinary constituents of the dung of birds" (Madden 1839:368). Yet, probably the most important piece mentioning guano just before its commercialization was written by none other than Charles Sprengel –the foregoing originator of the law of the minimum and mineral theory which Liebig would expand– in 1838, of which an English translation was published in the very first volume of the *JRASE* in 1839. In this piece, titled "On Animal Manures," Sprengel (1839:494) writes that guano "is used in Peru with the most striking effects in manuring the maize-fields." This number is also important because its opening article, and ode to improvement written by *JRASE's* editor Philip Pusey, provides an insightful overview "of the state of agriculture as a science in England." In sum, some farmers, landowners, and scientists in both Europe and the U.S. were –along with the naturalists and explorers– interested in guano (and other substances such as nitrates[97]) before it was commercialized. Yet, they did not start the trade either. As was the case with the Industrial Revolution (see above), the guano trade was launched by men of commerce, as shown below.

[97] Many of the foregoing journals also mention the potential of saltpeter as a fertilizer, a topic which was also discussed in several Farmer Clubs of the day.

3.3.1. The prelude of the guano trade: *experimental* samples for field trials

Amid the foregoing interest in guano and relying on the extant trade routes, the 1820s saw some shipments of *experimental* (*i.e.* non-commercial) South American guano to Britain and the United States. Interestingly, the U.S. received what appears to be its first shipment of guano –a substance which would remain negligible until the 1840s– in 1824, as described by a 24 December article of that year in the *American Farmer*, a Baltimore paper devoted to rural economy founded and edited by John S. Skinner. In this article, "Guano –A celebrated Manure used in South America" (Anon 1824) we are told that a certain Theodoric F. Bland, Midshipman onboard the *U.S.S. Franklin*, brought to Baltimore a small specimen of guano from the port of Molienda, Chancay, north of Lima (coincidentally close to where Humboldt probably first became acquainted with this substance). Skinner handed this sample to agricultural chemistry Professor Julius T. Ducatel of the Maryland Agricultural Society, who described it and opined that "it is easy to conclude its fertilizing properties, and it must be judged to be a powerful manure" (Ducatel in *Ibid*.:317). Ducatel likewise mentioned that, at the time, in France, it was proposed to use bat guano, of which immense deposits were found in caves in the department of Yonne. Then, according to a report by J. Randolph Clay (1854:23), the U.S. *Chargé d'affaires* at Lima (1847-53), "a first" sample of experimental guano reached England in 1826, although "it did not become *a commodity* [emphasis added] of regular commerce until 1839."[98] This was probably the first shipment of Peruvian guano to Europe since, as noted, Humboldt carried back a sample in August 1804.

The 1830s would see many actions and legislations aimed at increasing Peru's domestic consumption of guano, an endeavor culminating, as we shall see, with the first international and *commercial* shipment of this dung to Britain in 1841. As Peru, now an "independent" country, left behind its status as a Spanish colony and sought to enter the world of "free trade," the government understood the centrality of guano for its national agricultural production, a legacy from time immemorial (*cf.* de Rivero 1827). To this end, in 23 July 1830 the Peruvian

[98] Schnug *et al.* (2018:90) also argue, citing Clay, that in 1826 "a large amount of Guano was sent to England for initial field trials, but the attempts were unsuccessful." Yet, Clay's report does not mention anything about the size of the shipment nor about the results it produced. Regardless, the fact is that a sample of Peruvian guano for trials did reach Britain by 1826.

government declared (domestic) guano extraction as duty free, so as to favor national agriculture (Basadre 1968:150).

In 1832, according to Schnug *et al.* (2018:90) and Kanter (2005:74), further field trials were carried out in England with guano imported from Peru, which were fruitless given the lack of knowledge on the proper application of this powerful substance. Throughout this year, too, efforts were made by private merchants, and not the Peruvian government, to introduce guano in Europe (*Informe Circunstanciado* 1872:*xv*; Levin 1960:48). In 1833, perhaps as a result of these efforts, Achille Allier, a French entrepreneur in Peru, claims to have sent, along with a friend, a sample of Peruvian guano to Europe for trials that ultimately were unsuccessful (Allier 1841:8).[99] He then affirms to have sent another small load to William Joseph Myers (?-1879), a Liverpool merchant with farming interests that was enthusiastic about guano's potential, and owner of the firm William Joseph Myers & Co. (Mathew 1981:25). Then, in 1834, the Chincha Islands were leased, argues Hernández C. (1930:31), to a Chilean, Cipriano Román, who exploited them for local Peruvian-Chilean consumption and would later sublet them to a wealthy Peruvian landowner, Domingo Elías. Around this time, another French merchant, Charles François Barroilhet (1804-61),[100] in Chile, according to his own recount (Barroilhet 1857:11), eventually succeeded in sending "a few sacs of guano" to England for trial, after overcoming the reluctance "from several ship captains to receive [it] due to its stench." Barroilhet (1857:10) had the conviction that guano "could very well turn into the purest gold." He received notice from England that these "stinky sacs" had to be thrown overboard, as the costs of importing them could not compete with the cheapness of local dungs (*Ibid*.). In 1835, Barroilhet thus claimed to have contacted his countryman, merchant Michel Montané –who years later would hold the guano monopoly for the French (and French colonial) market– and asked him to send a few guano bags to France. According to Barroilhet (1857:11), Montané did not seem very interested

[99] Allier wrote this piece in 1841, and argues that eight years before he sent a guano sample from Lima to England: "…for eight years now, through one of the first and most respectable English houses in Lima, I sent, with a friend, a sample of huano to Europe so that tests could be done there" (Allier 1841:8). Given that this text is a direct response to an accusation by another French merchant, Alexandre Cochet, who himself claimed to had been the discoverer of the commercial value of guano in European markets (*cf.* Cochet 1861), it is possible that, in hindsight, Allier exaggerated the initial early date when he allegedly first sent guano to Europe.

[100] After accumulating vast wealth by plundering Chile and Peru, in 1849 Barroilhet would travel California, amid the "gold rush." In 1853 he would return to France, where he died eight years later, being buried in Père Lachaise (Anon 2013).

in guano at this point and such request was never fulfilled (*cf.* also Faivre 1959:117–18; Middendorf 1894:179).

Then, in 1836, while in Peru, Barroilhet (1857:11) –who called himself a "guano-maniac"–claims to have sent a small new load of guano to Europe (along with detailed instructions on how to use it) through a trade house that seemed interested, probably W.J. Myers & Co. This guano –continues Barroilhet– was then handed to a British farmer, who however "burned" his crops by applying this substance in excess. Yet, it appears that Barroilhet (1857:18) kept insisting on introducing guano to Europe, hoping it would be applied just as "Iquique's saltpeter was used as manure in England." Thus, around 1837-38, Barroilhet, along with Allier, asked Horace Bland, an English merchant in Valparaíso and an associate of Myers, to send another guano sample to the latter in Liverpool, who at this time had been testing guano for one or two years (Allier 1841:8; Barroilhet 1857:18; Mathew 1981:25). Myers also distributed this sample among local farmers, among which was a certain landowner, Mr. Smith, who was struck by guano's fertilizing properties (Barroilhet 1857:18). This inclined Myers to request another trial sample to Allier and Barroilhet, which he wanted to test again before fully committing to a commercial operation, and same which reached Myers in 1838 or 1839, just around the time that, as noted, the RASE was founded in England. Barroilhet argues this sample was equally successful, which prompted Myers to start seeking a partnership for the rights on the exclusive exportation of guano, as his eyes probably lit up by his (ultimately mistaken) calculations that it could be sold in England for about £24 per ton. Also in 1838, claims Peruvian economist Pedro Emilio Dancuart (1903a:23), a guano sample reached England which again "burned" the crops it was applied to. Be at as it may, a few guano samples for trial kept reaching England at this time.

Sometime between March and July of 1839 (in the same year that *JRASE* was founded) General Ramón Castilla, Minister of Finance (and later president) of Peru under the presidency of Agustín Gamarra, made a request for searching guano deposits alike those of the Chinchas (Basadre 1968:150; Valdivia 1874:236). Then, on 23 July 1839, according to *Gore's Directory of Liverpool* (1845:71), 30 bags of South American guano were "first imported"[101] from

[101] T.J. Hutchinson, in his thorough *Two Years in Peru* (1873:109), mistakenly claims that this occurred in 1836, which has been then suggested by other authors (*cf.* Hollett 2008:82). In addition, the *Gore's* designation of this guano as being the "first [one] imported" to England is problematic, too. As noted, it seems that at least seven South American guano samples had reached England (in 1826, 1832, 1833, 1835, 1836, 1837, and 1838) prior to the arrival of the load brought on the *Heroine*, although some were thrown into the water before any tests were carried out.

Valparaíso onboard the *Heroine* and consigned to W.J. Myers & Co., after which they were "given away to parties for trial" (*cf.* also Baines and Herford 1870:317). Later, Alexandre Cochet, yet another French merchant, who had established in Tarapacá in 1836 and would claim to have been the discoverer of a cheap method to extract the ammonia from guano (and also of mulberry, *Morus* sp., and silk worms in Peru) stated that in 1839 and 1840, Allier, allegedly propelled by Cochet's own advice, hastened to send "several ships" loaded with guano to England (Cochet 1861:6–8; Dancuart 1903a:41).[102] This would eventually provoke a dispute among the Frenchmen Allier, Barroilhet, and Cochet around who was "the true discoverer" of guano's commercial value as a fertilizer, which would even be taken to Peru's justice, and in which Allier (and Barriolhet, his partner), as we shall see, would prevail. Afterwards, Cuthbert W. Johnson –one of Britain's leading authorities on the subject of manures (Cushman 2014:44)– recalls in his book *On Guano as a Fertilizer* (1843a:11) that, on June 1840, W.J. Myers & Co. of Liverpool imported about 20 casks of guano (*cf.* also Bartlett 1845:20n). Table 3.1 summarizes the 14 known experimental South American guano samples that reached Europe and the U.S. prior to its commodification in late 1840.

Table 3.1. Summary of known registers of South American guano imports by Europe and the U.S. for chemical analyses or field trials prior to its commercialization.*

Date	Amount imported	Exporter/ Carrier	Receiver/Importer	Outcome	Source
1804	a sample	Humboldt	Vauquelin, Klaproth, and Davy	Chemical analyses	Fourcroy and Vauquelin 1806; Klaproth 1806; Davy 1815
1824	"a specimen"	T.F. Bland	J.S. Skinner and Maryland Agricultural Society, U.S.	Chemical analysis	*American Farmer* 1824:316–17
1826	a sample of experimental guano	?	"to England"	Experiments	Clay 1854:23
1832	Possibly a small sample	?	"to England"	Unsuccessful trial	Schnug *et al.* 2018:90; Kanter 2005:74
1833	"a sample"	Allier and "a friend" (possibly Barroilhet)	"to Europe"	Unsuccessful trial	Allier 1841:8

[102] In turn, Allier (1841:5–7) would deny this, claiming to have met Cochet because he bought 1,070 quintales of sodium carbonate from him, which he accepted out of kindness. In addition, Allier argues that it was him who made Cochet know the latter that he had a sample of guano at home, which he showed to Allier thinking it was ammonium sulfate, at a time when Allier claims to have already been thinking about the guano business for almost seven years. Moreover, Allier argues that Cochet actually never introduced silkworms to Peru. This was indeed proven to be the case by the Peruvian government, who thus nullified its contract with Cochet on this issue and gave that privilege to Argentine merchant Juan José Sarratea (Dancuart 1903a:41). Barroilhet (1857:12) also argued that Cochet did not say anything new to Allier when they met. Interestingly, too, Cochet's heir, "his illegitimate Peruvian son" (Levin 1960:49), under an 1833 Peruvian law which awarded one-third of any unknown state property to its discoverer, would unsuccessfully claim a third of Peru's guano deposits.

Table 3.1., continued					
Date	**Amount imported**	**Exporter/ Carrier**	**Receiver/Importer**	**Outcome**	**Source**
1833?	"a sample"	Allier and "a friend"?	W.J. Myers & Co. of Liverpool	?	Allier 1841:8.
1834?	"a few sacs"	Barroilhet	"to England"	Thrown overboard	Barroilhet 1857:11
1836	"a small load"	Barroilhet	Possibly W.J. Myers & Co.	Burned crops	Barriholet 1857:11
1837-38	"a sample"	H. Bland at request of Allier & Barroilhet	W.J. Myers & Co.	Successful trials	Allier 1841:8; Barroilhet 1857:18
1838?	"s sample"	Juan José Sarratea	William Gibbs	?	MS 11047
1838	"a sample"	Possibly Allier & Barroilhet	Probably W.J. Myers & Co.	Burned crops	Dancuart 1903a:23.
1838-39	"a sample"	Allier & Barroilhet	W.J. Myers & Co.	Successful trials	Barroilhet 1857:18
23 July 1839	"30 bags"	Possibly Allier & Barroilhet	W.J. Myers & Co.	?	*Gore's Directory* 1845:71
June 1840	"about 20 casks"	Possibly Allier & Barroilhet	W.J. Myers & Co.	?	Johnson 1843a:11; Muspratt 1869:559
First guano contract beteween F. Quirós and the Peruvian government, 10 November 1840					

* The veracity and overall accuracy of several of these claims cannot be ascertained due to lack of data issues.

3.3.2. The indigenous (and national) use of guano in Peru

In contrast to the commodifying, money-oriented, and narrow-minded perspective of the guano merchants, who, as we shall see, would seek to maximize their revenue by selling the largest amount of guano at the highest possible price, many indigenous groups in Peru had been sustainably utilizing this substance as manure for at least 2,500 years. A thorough analysis of this fundamental matter would require a study of its own, but here I will at least provide a basic overview of the topic, to show the stark difference with the merchants' approach. For instance, the Paracas civilization (*c.* 900-400 B.C.E.) prospered in the extremely arid Peruvian desert almost 3,000 years ago by using guano as fertilizer (Rodrigues and Micael 2021:286). Likewise, there is evidence that the Mochica culture (*c.* 100-600 C.E.) in northern Peru frequented the Chincha (and other) Islands to obtain guano, which they would then transport back to their mainland settlements. This has been inferred from Mochica pottery that was found buried within a guano heap at the Chinchas (at a striking depth of 19.8 m), revealing Mochica presence at the islands around the 8th-9th centuries C.E. (Kubler 1948:39–41). Relatedly, young Mochica women –wearing their best dresses and jewelry– were taken to the Lobos, Macabí, and Guañape Islands, where they were beheaded in honor of the moon and the sea gods. Inhabitants from Huacho and other coastal towns thought that souls depart from the guano islands and were carried by sea lions (Tantaleán Arbulú 2011:52). It appears that the Wari, Tiwanaku (300-1150 C.E.), and

Chimor (850-1470 C.E.) civilizations also used guano as fertilizer (Rodrigues and Micael 2021:286).

Furthermore, a fascinating new study examining fossil crop (especially maize) nitrogen isotope (δ15N) values in southern Peru and northern Chile has shown that seabird guano supported “a substantial population in an otherwise extreme environment” from 900 C.E. on (Santana-Sagredo *et al.* 2021). This piece also ascertains that seabird guano was transported in large amounts (by llama caravans and/or people) from the coast to towns over 90 km away, under exceptionally strenuous desert conditions, for at least 400 years before the Inca culture developed (*Ibid.*:154–56). In the same vein, it is known that the Incas (1450-1531) –the largest civilization in pre-Columbian America– not only fundamentally relied on guano to fertilize their crops and sustain over 8 million people, but also, as noted, established severely strict laws and measures to protect the seabirds and the deposits, “on pain of Death” (de la Vega 1609:103; Rodrigues and Micael 2021). What is more, according to Rodrigues and Micael (2021:288), the Incas seem to have implemented the first ever conservation measures, at least in South America, “to protect animal species and their natural habitats, based on the importance of species protection for human activities–one of the current premises for the implementation of national parks” (*cf.* also Brain 2011; Dhanesha 2020). Guano was also worshiped by the Incas so that agriculture was fertile, and they associated the Chinchas with the “moon’s vagina” or “silver vagina” (Cushman 2014:5; Tantaleán Arbulú 2011:52).

On the other hand, as noted, the Spanish settlers in Peru learned from the indigenes to use guano as a fertilizer during their roughly 300-year occupation of this territory (Santana-Sagredo 2021:154). In fact, it is unlikely that the Viceroyalty of Peru could have sustained itself had it not been for their local use of guano to fertilize their crops along the deserts. It is no wonder, then, that the nascent Peruvian republic would emphasize in every foreign contract –as we shall see– that local guano use should remain unhindered. Finally, it is important to note that seabird guano is still used in Peru to this day, as we shall see. Thus, the domestic consumption of this manure has remained uninterrupted for some 3,000 years, and yet it was only in the 40 years of the guano rush (1840-80) that these deposits were exhausted. More importantly, all this shows that, although the indigenous extraction of guano did probably have a marginal ecological impact on the seabird populations, it remained a rational and sustainable enterprise that allowed for the satisfaction of these cultures' needs, all while allowing the birds to thrive. Conversely, it was only under capitalism that a rift in the metabolism of guano production was caused.

3.3.3. The first guano contract and the first *commercial* shipment: the birth of a commodity

In the fall of 1840 –around the time when, as noted, the first English edition of Liebig's *Agricultural Chemistry* was published– Myers was finally authorized in Lima to approach the Peruvian government to secure exclusive trading rights to import guano, which he did in a sly way. Monopolies had been an important source of income for the Peruvian state and were being generously granted at the time –chiefly to Peruvian nationals– by Gamarra's government (Dancuart 1903a:40–43; Mathew 1972:601, 1981:25). Thus, another person who contacted the Peruvian government at this time, also with an application for the exclusive rights to export guano from Peru's islands, was Francisco Quirós (also spelled Quiroz) (1798-1867). Quirós, the Peruvian-born son to a Spanish father and a Peruvian-born mother, was a wealthy entrepreneur and president of the Lima Chamber of Commerce (he would later become Peru's vice president). He was familiar with European ways of commerce and finance, having traveled in 1822 to England to enlist British capital in the "Compañía Pasco Peruana" to work mines formerly operated by the Spanish, and his family resided in France (Faivre 1959:118; Levin 1960:49–50; Mazzeo 2004). Importantly, Quirós also was –observe Schnug *et al.* (2018:90)– Myers's "local Peruvian business partner and companion."

Probably, Myers and the foregoing French merchants knew that, at the time –that is, in the immediate years after the independence following 300 years of Spanish domination and amid sensitive tensions with its neighboring nations– there prevailed in Peru a patriotic feeling of nationalism and rejection towards certain foreigners, as is evidenced in several dispatches by Belford H. Wilson –Britain's *Chargé d'affaires* in Lima– throughout the 1830s (Mathew 1972:601). For instance, Wilson stated that the practice of granting monopolies was "part of a series of ridiculous attempts…by the Government of General Gamarra to exclude Foreigners from any participation in the benefits that may be deserved from the Speculations in Peruvian Native Productions" (Wilson in Mathew 1972:601). In addition, Peruvian historian Heraclio Bonilla (in *Ibid*.:602) argues that conditions in Peru then were "not propitious for direct dealings between the Peruvian government and foreign merchants...A direct concession for the working of the guano deposits would have incurred public hostility. Prudence and cool calculation made it seem advisable for them to shelter behind a 'national': Francisco de Quiroz." Thus "prudence" and "cool calculation" made the British and French merchants closing in on Peru's guano deposits use a Peruvian "straw man" –as Faivre (1959:118) put it– to maximize their chances of securing a contractual monopoly with the government. Either "by good fortune or design" (Mathew 1972:601) the local bourgeois Quirós fulfilled such a role. In addition, Barroilhet (1857:18) claims that Quirós negotiated with Peru's government on Allier's behalf. Moreover, according to Schnug *et al.* (2018:90), it was Myers who had instigated Quirós[103] to propose a treaty on the monopoly of overseas guano extraction from Peru's islands. Such a treaty was accepted by the Peruvian government on Tuesday 10 November 1840. This document is now known as *the first guano contract* and was made in Quirós's name alone (*cf.* Dancuart 1903a:103–6; Levin 1960:50; Mathew 1981:26).

This transfiguration of guano from raw material, to use-value (a combination of labor and nature aimed at satisfying a human need), to commodity (a product aimed at being exchanged in the market for a profit), achieved by this contractual relation, was massive. As was clearly stated by British engineer and writer Alexander J. Duffield (1877:72):

> Guano ceased to be the servant or helper of the native soil; it became the master of the people who occupy it, the Peruvian people…No disgrace or ignominy need have come upon Peru for selling its guano and getting drunk on the proceeds, if it had not trampled its own soil into sand, and killed not only the corn, the trees, and flowers which grow upon it, but also the men who cultivate those beautiful and necessary things.

Relatedly and echoing Marx (1992:909), the guano looked "exactly as it did before. Not a fibre of it is changed, but a new social soul has entered into its body." This was the aim and successful accomplishment of the contract.

Specifically, this contract, "Huano–Supreme resolution accepting the proposal of D. Francisco Quiroz for the export of said article,"[104]emerged from a negotiation in Lima between Quirós, on one hand, and Ramón Castilla (the aforementioned Minister of Finance), the Minister Agustín Guillermo Charún, and colonel José Félix Iguaín, on the other. Remarkably, it appears

[103] Levin (1960:50) contends that it is unclear whether Myers approached Quirós or vice versa, and that both options seem plausible. Yet, as stated by Schnug *et al.* (2018) and suggested by Faivre (1959) and Mathew (1972; 1981), it is more likely that Myers took the initiative, as it was him, together with the French merchants, who masterminded this operation.

[104] See Appendix for a transcription of the whole article. Also, *cf.* Dancuart (1903a:103–6).

that Castilla was not even aware of the uses guano would have in Europe, which he asked to Quirós, to which the latter answered that it would be imported as a fertilizer (Allier 1841:8). For their part, according to Allier (*Ibid*.:15), Charún and Iguaín "were scandalized with D. Francisco Quirós for advancing so much money for something worthless."

The contract was a short text composed of eight articles, along with five additional modifications introduced by Castilla. In brief, this document stated that, from that date on, Quirós would be leased, for a term of six years, the guano islands that were known and discovered along Peru's coast. In exchange for this monopoly, he would pay the State 60,000 pesos (about £12,000) as follows: 40,000 pesos in advance; 10,000 pesos after the first year; and the remaining 10,000 after the second. In turn, just 1,500 pesos of the 40,000-peso advance would be paid in money, the remaining 38,500 being issued in pending credits (depreciated debt certificates which Allier had been holding) at the Mint of Lima (*cf*. Mathew 1981:26). In addition, it was agreed that Peru's *domestic* guano extraction and use would not be hindered in any way by Quirós's operations, that Peruvian ships would "continue in the possession of extracting the huano, to supply the farms and farmers of the country," that Quirós would have exclusive rights only for guano exports overseas, and that any building or construction erected by Quirós, as well as any machinery and tools used for guano extraction, would remain property of the State after the contract expired. Lastly and revealingly, this contract mentioned that "[h]uano is not a known export branch, nor is considered in the Republic's regulations and tariffs." That is, this substance was still viewed in Peru as a use-value and not as a commodity.[105]

On 4 December 1840 –just 24 days after the contract was signed– Quirós and Castilla issued a complement to this treaty, whereby they agreed to extend their deal for three more optional years (after the six mandatory ones) if Quirós paid Peru's Treasury 30,000 pesos during that lapse. That is, Gamarra's government was charging a total of only 90,000 pesos (£18,000) for granting an almost 10-year monopoly over the overseas trading rights of Peruvian guano, which was estimated could be sold at £24 per ton (Mahtew 1981:26). In addition, this amendment specified that the Lagarto and San Félix (or Punquisa) islands belong to Peru, and

[105] The first mention of guano as an export product is to be found in a 10 February 1841 cover letter by Jean Blanchard, the French consular agent at Valparaíso (Faivre 1959:118; *Le Cultivateur* 1841:468; *Société Royale d'Horticulture* 1841:115–16). In this letter, Blanchard also praises this new fertilizer, and points at its capacity for improving the French light and sandy soils. He also indicates that France's National Society of Horticulture [*Société nationale d'horticulture de France*] had chartered four ships, destined for London and Liverpool, and ordered its correspondents in England to send sample to various houses in France for testing.

their guano could thus be extracted by Quirós for foreign markets (*cf.* Dancuart 1903a:126). Then, less than two weeks later, on 17 December, a second amendment was added to the 10 November contract, in anticipation by Quirós and his masters Allier, Barroilhet, and Myers, of potential difficulties that could arise. Here, following the advice of Modesto Herce –a Peruvian merchant that would become Huancayo's first Mayor– it was clarified that *all* places holding guano deposits in Peru (*e.g.* peninsulas, coasts, beaches, and capes) and not only *islands*, as was hitherto stated, could be exploited by Quirós, on the condition that he "must comply punctually and exactly" with the 10 November article stating that he should not hamper domestic guano extraction (Allier 1841:15; Dancuart 1903a:127).[106]

In all, one issue is particularly remarkable about this contract and its two amendments: at this point, the Peruvian government was indifferent about guano extraction for foreign markets and their chief interest was to protect local extraction for national agriculture purposes. In addition, form-wise, this was a quite common contract, similar to others awarded by the Peruvian government in the 1830s (*e.g.* for cochineal cultivation, mirror manufacture, and machinery operations) so as to encourage commercial activities through granting exclusive rights for domestic production (Dancuart 1903a:40–43; Levin 1960:50–51). These two facts show that, by the end of 1840, Peru's government was not aware of the vast potential profitability that an international trade around guano could entail. Of course, "[n]o effort was made to enlighten them as to the success of Myers's experiments" (Mathew 1981:27). Conversely, Allier (and his associate Barroilhet) and Myers, the latter being who provided the initial capital to start the business, were keenly conscious of this tantalizingly lucrative enterprise they themselves devised. As Mathew (1972:602) put it: "The bulk of any profits…was to go to the French merchants, and the management of the enterprise was placed almost entirely in their hands."

In particular –argues Faivre (1959:118)– through a notarized contract of 30 December, it was agreed that Allier, Barroilhet, and Jean Ulysse Dutey (another French merchant, who had founded the trade house "Casa Dutey" in Lima in 1826) would acquire 54.5% of the profits accrued by the guano trade, and that their firm, Quirós, Allier & Co., would be officially constituted. In addition, it was agreed that the consignee of guano abroad would be W.J. Myers & Co., authorized by this Franco-Peruvian house to enter contracts on its behalf up to a limit of 10,000 tons per year, and to charge £5 for any barrel not delivered or refused by buyers

[106] See Appendix for transcripts of these two amendments. Also, *cf.* Dancuart (1903a:126–27).

(*Ibid*.:119). Barroilhet and Bland had also obtained permission from the Bolivian government to send a guano load to Britain.[107] Therefore, the guano trade was an enterprise launched by French merchants in Peru, Bolivia, and Chile, and a British consignee –who was himself a merchant and had farming interests– relying on a national pawn that belonged to Peru's oligarchy (*cf*. Faivre 1959:132; Mathew 1972). Thus were taken the first major steps towards the commodification of guano: the first contract and the constitution of Quirós, Allier & Co.

This way, on 25 September 1840 the *Charles Eyes* –a British 256-ton ship with a crew of 14, owned by Chapman and captained by William Moss (as well as immortalized by Joseph Heard in a famous 1835 painting)– entered the southern Peruvian port of Islay from Valparaíso, in ballast (FO 177/22 1841; *Lloyd's Register* 1840; M.H.C. O.L. 279 1840). On 9 October, it set course for the guano deposits in Paquica (then belonging to Bolivia and today a part of Chile) (M.H.C. O.L. 279 1840). Exactly two months later, on 9 December, the *Charles Eyes* anchored in Peru's port of Arica with a cargo of 327 tons of Paquica guano, consigned to W.J. Myers & Co. under Quirós's new contract (FO 177/17 1841). This vessel reported back to Islay for final clearance on 25 December, from where it finally set sail for Liverpool, in a journey that would take almost six months (*Gore's Directory* 1845:71; Peacock 1854:106). The *Charles Eyes* was thus the first ship ever to transport commodified guano and initiate the trade.

Relatedly, on 1 January 1841, amid the First Opium War (1839-42), the First Anglo-Afghan War (1839-42), David Livingstone's first incursion into the heart of Africa (1841-56), the British annexation of New Zealand (1840), and the emergence of steam navigation, a small, wooden, 176-ton, and three-masted schooner manufactured in 1830 and owned by the British firm Thomas & John Brocklebank,[108] with a crew of 10 that was captained by Joseph Benn, arrived in Callao from Liverpool (Gibson 1953:237; Hollett 2008:18,84-86,269; *Lloyd's Register* 1840:66; Pakenham 2010). Its name was *Bonanza* and it had brought "General Cargo" to Peru, after a roughly 100-day-long journey round the tempestuous waters of Cape Horn, as David Hollett (2008:85), great-grandson of one of the captains working for T&J Brocklebanks, insightfully shares. After staying in Callao for three weeks, on 22 January the *Bonanza* set course

[107] This shipment refers to that of the *Charles Eyes*, as we shall see (*Gore's Directory* 1845:71; *Lloyd's Register* 1840; Peacock 1854:106).

[108] This 85'6'' (~26 m) in length, 21'8'' (~6.6 m) in beam, and 13'2'' (~4 m) in drought Cumbrian ship made its first travel to the port of Veracruz, Mexico, in 1830, under captain Storrs. It would be sold in 1856 after having made several trips to Valparaíso and Callao, to transport guano and other products (Gibson 1953:114,237).

for the Chincha Islands, about 193 km further south along the coast, in ballast and ready to collect cargo. It remained at the Chinchas for about two weeks, being loaded with guano from the North Chincha, probably by means of the labor of a few natives from Pisco and nearby towns (Hollett 2008:76; M.H.C. O.L. 318 1846). On 14 February, it reported back to Callao for final clearance, as all ships had to do, and stayed there until 11 March.[109] That day, the *Bonanza* –well it deserved that foreshadowing name– set sail for Liverpool with a few hundred tons of guano and other products, consigned to W.J. Myers & Co. under Quirós's contract (FO 61/87 1842:54; Hollett 2008:85). The *Bonanza* was hence the first of thousands of vessels that would carry *Peruvian* guano to practically every corner of the world.

The *Charles Eyes* and the *Bonanza* were the forerunners of at least 13,000 ships that would anchor around the Chinchas and dozens of other islands, rocks, keys, and bays off Peru, Bolivia, and northern Chile (and hundreds of others worldwide in southwestern Africa, the Pacific, and the Caribbean), removing some 13 million metric tons of guano from Peru alone. Throughout this rush, the Peruvian deposits that had been building up for at the very least four millennia would thus be exhausted within just four decades. The commodification of guano had been realized. The guano trade had begun.

[109] Mathew (1981:27) mistakenly asserts the *Bonanza* left Callao on March 3rd, confusing it with the departure date from the Chinchas of the ship *Europa*.

CHAPTER 4. THE EARLY GUANO TRADE (1840-49): CONTRACTS, GUANO FEVER, AND THE AFRICAN TRADE

"If ever a philosopher's stone, the elixir of life, the infallible Catholicism, the universal solvent, or the perpetual motion were discovered, it is the application of guano in agriculture."

– *Farmer's Magazine*, April 1854

4.1. The first guano contracts: the further commodification of nature

"Guano…was shown at the agricultural meeting last week, by Mr. Shirring. It is likely to become a considerable article of commerce…and is said to be the most powerful and concentrated of all manures…it is likely to have a great effect on English agriculture," read a foretelling passage in the *Liverpool Times* in July 1841 (quoted in *The Times* 1841),[110] just a few weeks after the *Charles Eyes* (15 June) and the *Bonanza* (early July) had unloaded their shipments of this novel South American commodity (MS 11047). Guano was immediately deemed a success in most British papers and agricultural journals. For instance, on 11 September 1841, a certain Manuel Winterfeldt writing for London's *Bell's Weekly Messenger* –one of Britain's leading newspapers discussing agricultural issues (Brake *et al.* 2009:47)– described Peruvian guano and its uses as he saw them on a recent trip to South America. He mentioned that "[i]n many parts of [South] America…no produce would be obtained without guano," and that the highest-quality dung was being sold in Peru at about £3 per ton (Winterfeldt 1841:298). Winterfeld also observed that already at this early stage, birds had deserted the inlets adjacent to a port in Islay and that guano deposits near Iquique had been exhausted after 25 years of local consumption.

In the same vein, agricultural chemist and Professor at Durham James F.W. Johnston –whom Marx was to call "the English Liebig" (though a Scot) in a letter to Engels on 13 October 1851– wrote, on 20 October 1841, a piece for the second volume of the *Journal of the Royal Agricultural Society of England* (*JRASE*). In this article, titled "On Guano," Johnston refers to Winterfeldt piece, describes how, in Peru, guano was applied to all crops except sugar cane, recalls how the Incas considered it a "capital offence" to kill the young birds on the guano islands, and also how, of late, "the increase of traffic on the coasts has disturbed or driven away the birds" (Johnston 1841:302). More importantly, Johnston observed that guano had

[110] Both Mathew (1981:27) and Hollett (2008:99,279) state to have taken this quote from the 30 July 1841 *Times*. I could not find this reference there, although I did find it in the 18 August 1841 issue of the *Glasgow Herald*.

“recently…been imported in large quantities into this country [Britain] and has already been tried upon various crops and soils, with highly satisfactory results” (*Ibid*.:303). He also noted that this substance was now offered for sale in England, and that he ignored how it was shipped into it (*Ibid*.:308).

In addition, Johnston insightfully referred to the most important field experiments on guano that had been carried out in Britain during the four months since it had been commercially imported. In July 1841, Philip Pusey, co-founder of the RASE and editor of *JRASE* (as noted, the leading farming institution during the Victorian “high-firming” era), first applied guano to turnips, and initially obtained discouraging results when compared to those produced by bones, night-soil, and other manures. However, by November, he observed that “the piece dressed with guano now…appears to be superior to all the other plots excepting that which was dressed with dung” (Pusey in Johnston 1841:303). Secondly, a certain Mr. Lore of Castle Farm applied guano to rape and turnips and opined: “I have no doubt of its being a very powerful manure” (quoted in *Ibid*.:304). Mr. Westcar, of Burnwood, Surrey, tried guano upon land drilled in with barley and clover and compared its effect on yield with that of dung, with guano outperforming the latter manure. Mr. Smith, of Gunton Park –perhaps the same character that, it will be remembered, received some of the experimental samples obtained by W.J. Myers in 1838-39– compared guano with bone dust when applied to wheat, with guano yielding more output than bones. Lastly, Johnston talked of the experiments by Mr. Skirving, at the Walton Nurseries, near Liverpool. This farmer tried out guano on Italian rye-grass upon poor, light soils in late May, and it outperformed both sodium nitrate and farmyard manure. Skirving also mentioned: “I have tried the guano on several other crops, in different proportions, and all prove very much in favour of its being a most valuable manure” (in *Ibid*.:305). Johnston himself carried out his own tests. All of these trials, he argued (1841:305), “are sufficient to show–that in the climate and on the soils of England the guano is fitted to promote vegetable growth nearly as much as on the arid plains of Peru.” Johnston (*Ibid*.:321) closed this piece by stating that:

> it is the interest of Peru to prohibit the exportation of the guano; but the introduction of it into this country [Britain] in the mean time will prove a great national service…*to supply the lack of farm-yard manure* [emphasis added], and thereby to raise a great amount of food than we should otherwise be able to do.

These would be the first of dozens of articles and books on guano that would abound across Britain’s agricultural literature, and also in that of continental Europe and the United

States (*cf.* Antony Gibbs & Sons 1843; Bartlett 1845; Johnson 1843a, 1843b; Napier 1843; Potter 1842a; Way 1849).[111] In addition, let us remember that around this time, Liebig was working on the second edition of his *Agricultural Chemistry*, where he referred to guano, and also published a chemical analysis of guano made by Voelckel in his journal in 1841 (Brock 1997:164). Let us examine some other early depictions of guano's fertilizing properties in Britain. In August 1842, John Horncastle, near Tickhill, remarked that: "The present appearance of the crop (Swedes) where the Guano has been applied, is highly pleasing, the plants being strong, and of a dark healthy green colour," and that "[t]he Guano-tilled turnips came up three or four days before the others, *grew much faster*, and are now *most decidedly superior; so much so as to be easily distinguishable by a stranger in walking past* (in Napier 1843:184). This same month, a certain Benjamin Swaffield mentioned he had "applied...Guano on an acre of eddish as soon as the hay was got, and the *improvement in the eddish is wonderful*" (in *Ibid*.:185). Also in August, Thomas Staniforth, near Sheffield, asserted that "[t]he plants where the Guano was applied, are looking *better than those dressed with bones*, and judging from present appearances, will, I think, produce a greater weight of turnips" (*Ibid*.:185).

Around the same time, Samuel Linley from Hackenthorpe, South Yorkshire, opined that: "The plants where the Guano was used, are looking *much better and healthier than those manured with bones*, and will, I doubt not, produce a much more abundant crop" (*Ibid*.). George Woodhead, from Birley, stated that "[t]he turnips dressed with Guano, *came up a full week before the others*," and were not affected by the wireworm (*Ibid*.:186). Woodhead also said he would "be glad to show the crop to any one who may wish to see the great benefit derived from the use of the Guano manure" (*Ibid*.). Also at this time, in Hackenthorpe, James Napier contended that "[i]n a very few days after this dressing, the effect [of guano] was surprisingly visible. The barley is now so much improved," and that guano was very useful "in retaining moisture in the soil" (*Ibid*.:186). A correspondent of the *Gardener's Chronicle* mentioned that: "Our cauliflowers have this year been *very fine*, and *free from the pest*; whereas last year they were *literally devoured*; and I attribute it *entirely to Guano having been used this year instead of other manure*" (*Ibid*.:187). In the same vein, a writer for the *Cumberland Pacquet* asserted that:

[111] Mathew (1981:28) observes that the article "On Guano" by Cuthbert W. Johnson (not to be confused with James F.W. Johnston) in the *Farmer's Magazine* was published in October 1841, when in actuality it appears in this magazine's volume 7(3) of 1843 (*cf.* Johnson 1843b).

"With respect to the *qualities of the soils* on which Guano has been tried in this district, I may at once state that they consist of *every variety*, in consequence of the application having been so extensive, and I have not heard of *one single failure on any kind of soil*" (*Ibid*.:187). This newspaper contained another entry where it was said that: "Guano *is so tenacious of its fertilizing powers*, that it does not, like some other manures, *lose them in one season at least*; for I know a gentleman in this neighbourhood, who tried the effect of Guano in 1841 with success and *this year its productive qualities have exhibited themselves on the same soil without any fresh application, and with undiminished effect*" (*Ibid*.:187). Lastly, an October 1842 piece in the *Liverpool Albion* stated that, in the gardens, "[g]uano has...surpassed every manure yet discovered," and that "even the exotic heaths, to which manure of any kind has been considered injurious, seem to flourish beyond all precedent when watered with it" (*Ibid*.:187).

Thus, guano proved an incredibly versatile and effective manure. About 2 to 4 cwt per acre (~0.25-0.5 t ha^{-1}) of it would be applied to all kinds of crops (vegetables, clover, grasses, potatoes, fruits, and even "exotic plants") in all sorts of soils (sandy or clay), either mixed with wood ashes or by itself, in a dry or a liquid state, and sometimes spread out of a hopper (*cf.* Johnston 1841; Napier 1843). Throughout the 1840s, it was extensively used for turnips, "the great improving crop in British agriculture" (Mathew 1981:177). In addition, guano seemed to produce faster results, healthier crops, larger outputs, retain soil moisture, and have an enduring effect, all while minimizing the deleterious impact of herbivory caused by organisms such as the wireworm (the larvae of Elateridae beetles). What else could British farmers ask for? At the opposite pole, the success of guano in the core of the British Empire would translate into "the initial fragment of the mournful story of Peru's lost wealth," as Peruvian economist Pedro Emilio Dancuart (1903a:22) put it.[112] This because, echoing Galeano's (1997:61) words, the more a product is desired by the world market, the greater the misery it creates where it is extracted from.

4.1.1. The early days of the guano trade and the end of the first contract: A "second Potosí"?

During the first year of the guano trade (January-November1841), 24 vessels were dispatched from Peru, transporting a total of about 8,602 tons of Peruvian (and Bolivian) guano to

[112] The original Spanish reads: «el fragmento inicial de la luctuosa historia de las perdídas [*sic*] riquezas del Perú».

Europe.[113] Twenty-two of them (92%) were headed for Britain, the remainder being bound for France and Belgium (FO 61/81 1841:152). (Table 4.1). Except for the *Charles Eyes* and the *Mary Muir*, which sailed from Peru's southern port of Islay carrying some 600 tons Bolivian guano, all other ships departed from Callao, loaded with guano from the Chincha Islands. Most vessels were owned by British (particularly Scouser) firms, and several these 24 shipments sailed for Europe in October and November, as the merchants controlling the trade started foreseeing that their lucrative first contract could be annulled. And rightly so.

Table 4.1. Ships transporting Peruvian (and Bolivian*) guano to Europe in 1841, under Quirós's (first) contract.

Vessel	Flag	Owner	To/from Chinchas	Tons	Crew	Headed for
*Charles Eyes**	British	Chapman (Liv)	–	255	14	Britain
*Mary Muir**	British	Dowie & Co. (Liv)	–	332	–	Britain
Bonanza	British	Brocklebank (Liv)	22 January	176	10	Britain
Europa	British	Bruce (Peterhead)	3 March	224	11	Britain
Royal Tar	British	W. Ash (Exeter)	13 March	315	22	Britain
Forager	British	J. Somes (London)	15 March	250	15	Britain
Maypo	British	Brocklebank (Liv)	2 April	174	10	Britain
Heroine	British	Ravenscroft (Liv)	28 April	375	15	Britain
Mary Worrall	British	Worrall (Liv)	19 May	228	–	Britain
Haidée	British	Greenfild (Belfast)	17 July	335	–	Britain
Nautilus	British	Hesking (Scilly)	17 July	232	15	Britain
Atkinson	British	Gthd (Newcastle)	19 July	307	14	Britain
Colombia	British	Davison (London)	7 August	276	–	Britain
Actæon	British	W. Lockett (Liv)	8 August	561	18	Britain
Ann Bridson	British	W. Prouse (Liv)	28 August	358	20	Britain
Dorothea	British	Laidman (Liv)	20 September	305	–	Britain
Elizabeth Radcliffe	British	W. Prouse (Liv)	6 October	222	–	Britain
Oberon	British	Brocklebank (Liv)	13 October	150	10	Britain
Kestrel	British	Smith (Newcastle)	20 October	320	12	Britain
Earl of Lonsdale	British	J. Piele (Whitehaven)	25 October	350	–	Britain
Phillips	British	Worrall (Liv)	25 November	244	–	Britain
Josephine	Hamburg	–	–	300	–	Britain
National	Belgian	–	–	300	–	Belgium
Salamandre	French	–	–	160	–	France

Made with data from FO 61/81 1841:152; the *Lloyd's Register* (1840); and Hollett (2008:86).

[113] Mathew (1981:27) states that 22 ships were dispatched, while Hollett (2008:86) argues that they were 23. In FO 61/81:151, the figure of 24 vessels (which includes 22 ships carrying Peruvian guano and two ships laden with Bolivian one, which sailed from Peru), which we are using here, is given. In addition, in FO 61/81, consul Belford Wilson gives a figure of a total of 8,602 tons, including data on at two ships sailing from a Peruvian port (Islay) with Bolivian guano, and adding about 0.25% of weight to the registered tonnage of the vessels, "as all vessels can carry more dead weight than the amount of tonnage stated in their register" (p.152). Likewise, Hunt (1973:57) offers a guano tonnage of 8,085 for 1841, a figure that is repeated in Cosmalón *et al.* (2020). J.M. Rodríguez calculated that 2,062 tons of guano were exported from Peru in 1841 (in Hunt 1973a:42). According to Dancuart (1903a:24), Quirós had shipped 6,125 tons of guano in 23 ships, figures that Levin (1960:52) cites. Regardless of the actual number of vessels and tons, the scale of guano exports was, at this time, in the few thousand tons, and the enterprise relied on a couple dozen vessels. This is a negligible scale relative to the almost 100-fold volume increase the guano trade would experience in ensuing decades, as we shall see.

Although the guano market was still small, this substance was being sold at a very high price in Britain. For instance, the *Bonanza's* load was sold for up to £16 per ton, and testimonies of the day show that it reached prices as high as £28 a ton, with a mean wholesale price closer to £18 (Mathew 1981:28). That is, the price of guano was very high, considerably above that of bones, coprolites, and farmyard dung (Mathew 1970a:120). On the other hand, the costs of all operations associated to guano extraction (digging and loading, ~11s. 6d. per ton; freights, ~£4 17s; and warehousing, insurance, and sales commissions, ~11s. 6d.) amounted to about £6 per ton (Mathew 1981:29). Thus, the merchants amassed a profit of £12-22 per ton of guano sold. This means that, by selling only about 20 tons of guano –*i.e*. less than 10% of the load of any of the first 24 ships– Francisco Quirós (and Allier and Myers) had already offset his initial cash advance of 1,500 pesos (£300). Likewise, it suggests that the sale of just 1,000-1,200 tons of guano (the load of four or five of the initial 24 vessels) had produced, in just a few months, a profit equivalent to what the Peruvian state would have accrued in almost 10 years under the terms of the contract with Quirós (£18,000). Thus, it is no wonder that, according to British vice-consul in Islay, Thomas Crompton, Peruvians started sensing that guano "would prove a second Potosí" (quoted in Mathew 1981:29), a shrewd and suggestive comparison.[114]

The first guano contract between Quirós and the Peruvian government, ratified on 10 November 1840 and amended in December of that year (see chapter 3), which in principle would be valid for up to nine years, was in fact quite short-lived. At least as early as 1 September 1841 –a mere eight months through the life of the contract– Peru's State Council [*Consejo de Estado*][115] advised President Agustín Gamarra to derogate it, so as to seek a more beneficial deal

[114] The association of guano with Potosí, a city in present-day Bolivia that held the vastest silver deposits on Earth, and which were ransacked for three centuries by the Spanish crown, was no coincidence. Following Frank, Galeano (1997:31–32) argued that "the regions now most underdeveloped and poverty-stricken are those which in the past had had the closest links with the metropolis and had enjoyed periods of boom. Having once been the biggest producers of goods exported to Europe, or later to the United States...they were abandoned by the metropolis when for this or that reason business sagged. Potosí is the outstanding example of this descent into the vacuum." Potosí is "[t]he city which has given most to the world and has the least," once said an aged Potosían woman to Galeano in that city (*Ibid*.:32). Potosí's Cerro Rico, south of the city, "consumed eight million lives" of indigenous women, men, and children that worked in the silver extraction business. In addition, there was a 70% mortality rate for those traveling to Cerro Rico across the freezing plains (*Ibid*.:39). Moreover, "Potosí remains an open wound of the colonial system in America" (*Ibid*.:32), not only because of the horrors it entailed and the consequences it still bears, but because the infamous working conditions in the mines –these "mouths of hell" as they were called– are pretty much identical today.

[115] The State Council was a legislative body created by Peru's 1828 Constitution and kept in those of 1834 and 1838. It was comprised by 10 senators that were elected by Congress and presided by the vice president of the Republic (Basadre 1968a:279).

(Mathew 1981:30) This occurred as, for several reasons, Peru's government started realizing how profitable the guano could be. First, having seen over 20 vessels laden with guano leaving Callao for Liverpool must have caught the attention of Peru's officials. Secondly, the arrival of other ships from Britain and of steamships from Valparaíso and Cobija (then Bolivia's chief port), which travelled faster than sailing vessels, may have brought notice of guano's success in Britain (Mathew 1981:29–30). Thus, it is no wonder that around this time Peru's Finance Minister, Ramón Castilla, stated that he had just discovered "an unexpected resource to address the needs of the public Treasury" (Dancuart 1903a:23).

Third, in November of that year, the foregoing Alexandre Cochet announced himself before Peru's government as the discoverer of guano's fertilizing properties, and requested the nullification of Quirós's contract (Cochet 1861:10; Dancuart 1903a:22–23). In fact, as early as 18 February 1841 –while the *Bonanza* was, it will be remembered, docked in Callao and about to set sail for Liverpool with Peru's first commercial guano load– Cochet claims to have addressed Peru's State Council via a first memoir he had written,[116] in which he discussed the fertilizing properties of guano and demanded the annulation of the foregoing contract on the grounds that it was detrimental to the State (Cochet 1861:10). On 2 November Cochet published another brochure on guano, of which he states that he had provided several copies to Britain's *Charge d'affaires* in Lima, B.H. Wilson (and also to France's consul), so that they would be sent to Europe (*Ibid*.:14).[117] According to Cochet, this second account was "a revelation" that showed how Quirós and Allier had fraudulently obtained a concession that was unfavorable for Peru's government. In exchange for this information, Cochet, based on Peru's 1839 Constitution, demanded 5,000 tons of guano as a reward, a proposal Peru's government eventually accepted on 30 September 1849, on the condition that Cochet disclosed any other potential properties of guano that would increase its value. Cochet (*Ibid*.:16–17) accepted this deal and demanded a further 100,000 pesos (£20,000) as a "supplemental reward." Thus, around mid-November 1841,

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[116] According to Allier (1841:8), in February 1841, Cochet had shown up to Quirós's house to complain that Allier had stolen his secret on guano and to demand compensation, or else he would submit a text to the Council, which he did.

[117] Cochet (1861:14) also asserts that, following this publication, "Juan Haim" (John Hayne), head of Gibbs Crawley & Co., as well as a certain Miguel Winder, Pedro Candamo, Michel Montané, and Poumaroux, among others, approached him and became "convinced of the agricultural and industrial value of Guano."

Gibbs Crawley & Co. –the subsidiary branch in Lima, founded in 1822, of London's firm Antony Gibbs & Sons– remarked that guano was "becoming very important" and that annulment of the Quirós contract was being seriously discussed in Peru's high political circles (Mathew 1981:30).

Fourth, amid this tense situation and in a period of political instability in the region, wherein South American nation-states were just beginning to emerge, Peruvian troops invaded Bolivian territory in a failed attempt to annex that country, which resulted in the killing in action of President Gamarra, and the capture of Minister Castilla, on 18 November, during the 50-minute-long Battle of Ingavi (Basadre 1948:194, 1968b:226–27). Consequently, that same day, Manuel Menéndez –an agriculturalist who was then vice president of Peru and president of the State Council– became President of this republic (until 16 August 1842), inaugurating a period that is known as that of "military anarchy" (1841-45) (Basadre 1968b:244).[118] Among other things, this political succession opened the possibility for the guano merchants and the Peruvian state to discuss the trade on new terms. More importantly, given that Peru would be desperate to obtain money to finance the war against Bolivia, guano started to be seen as a silver bullet to meet this end. In addition, Peru needed liquidity to pay its external debt to Britain. Thus, on 24 November, the Gibbs Crawley firm again reported that some radical contractual change was imminent, as the State Council reiterated their suggestion to cancel the contract with Quirós to the new President Menéndez, who favored the idea of modifying the deal (Mathew 1981:30). The Council also suggested that the only legal way to exploit "natural assets" was through public sales and not by means of loan contracts (*Ibid*.).

Fifth and perhaps most important, on 26 November 1841 the *Dyson*,[119] a 267-ton ship carrying a load of coal, which was owned by Liverpool's Tyrer & Company and captained by a certain F. Stewart, docked in Callao (Allier 1841:16; Hollett 2008:86–87; *Lloyd's Register* 1840; Mathew 1981:29). So did the 244-ton *Minstrel Boy* owned by London's R. Harvey and captained by W. Moyse (Hollett 2008:86; *Lloyd's Register* 1840; Mathew 1981:29).[120] Both vessels came

[118] More generally, from 1821-45, there were 53 governments in Peru (with presidencies lasting an average of five months and 13 days per president), as well as five political constitutions (Tantaleán Arbulú 2011:139).

[119] Dancuart (1903a:24) mistakenly calls this ship the *Dyron*, an error that Levin (1960:52) repeats.

[120] Mathew (1981:29) states that the *Enchantress* also docked in Callao that same day, bringing similar news, something that is not mentioned neither in the *Lloyd's Register* (1840) nor in Hollet's (2008:86) table of 1841 guano ships.

from Liverpool and it appears they were the first ships to reach Callao from Britain after the first guano cargoes had been unloaded and sold there (Mathew 1981:29). More important than their cargo, they brought word that guano was being sold in England at prices as high as £28 per ton. This information unleashed a "furious explosion" –in the words of Allier (1841:16)– amongst Peru's officials, as if a diamond had been presented as glass. Similarly, Barroilhet (1857:19) recalled this news produced an "electric commotion" that was discussed in all diaries (also *cf.* Mathew 1981:30). This episode was the straw that broke the camel's back (Allier 1841:16; Hollett 2008:87; Mathew 1981:29). In fact, it was the excessively abusive terms for the Peruvian government of the first contract, together with the potential they saw in guano, that would tighten Peru's resolve for considering this substance exclusive property of this country (FO 61/323 1879:115). The very next day, 27 November, Peru's government cancelled their contract with Quirós and made a call for new guano trade offers. That same day, Peru also *officially* declared war on Bolivia, a conflict that had in fact begun in early October (Basadre 1968b:224; Levin 1960:52; Mathew 1981:30).

4.1.2. The second guano contract (8 December 1841–19 February 1842): An ephemeral deal between Peru's oligarchy and the European merchants

The annulment of Quirós's contract was made, said consul Wilson, "on the plea warranted by Spanish Law, of enormous Lesion to the State; the Government at the time of granting the Monopoly not having been aware of the Value of 'Huano' as a Return" (quoted in Mathew 1981:31). The request for new proposals by the Peruvian state was made "on the condition that, within Eight days after the celebration of the Contract, a Sum of Money shall be paid in to the Treasury sufficient to defray the urgent Expenses of the State" (Wilson in *Ibid*.). On the other hand, Wilson also told a Peruvian foreign minister that guano was "about to be made use of for waging a War against a neighbouring Republic" (*Ibid*.). Around this time, Gibbs Crawley & Co. reported: "Government want all their revenues for military purposes" (*Ibid*.).

The second contract would also be awarded to Quirós (and this time explicitly to Allier too). Levin (1960:52–53) mistakenly argues that this was the case because no other firms or merchants presented a proposal, when in fact two other offers were made to the government (Mathew 1972:605). The first firm to make a proposal to the government was the British trading house McLean, Rowe & Co., which offered to take the guano business on consignment at a 2.5%

commission and to advance 20 pesos (£4) per ton before shipment (Mathew 1981:31; MS11047 1841). This proposal was rejected by the government, who sought a more profitable deal and started to search for partners itself. In particular, the government wished Gibbs Crawley & Co. – as noted, a somewhat wealthy and cautious London house whose trade in Peru since 1822 had revolved around products such wool, textiles, sodium nitrate, coal, copper, bullion, and (illegally) silver (Mathew 1981:11; Wetzel 2016:XXII)– would take it, as John Hayne, its head in Lima, wrote in December 1841 (in Mathew 1981:31). Yet, the government asked this firm for an advance of 125,000 pesos (£25,000) plus 50,000 (£10,000) a month. Hayne rejected this proposal, as Gibbs Crawley & Co. was not, at this point, in a position to meet such a request. It was at this time that Quirós, Allier & Co. –constituted by Quirós, Allier, Barroilhet, Duetz, and Bland– made their offer to the government: an 87,000-pesos (£17,400) advance, plus a monthly payment of 50,000 pesos (£10,000) for four months (a total of 287,000 pesos) all of it in cash (Mathew 1981:32). Despite the appeal of this proposal, Peru's government granted it only conditional acceptance, reserving the right to consult it with Pedro González Candamo, a Chilean merchant in Lima with whom the Gibbs firm had already been engaged in join-account ventures, and who would become one of the richest people in the region, even getting the sobriquet of "Rothschild of Chile and Peru" (Mathew 1981:189; Witt 2016:3).

On 8 December (11 days after the first contract was scrapped), the government published the second contract with Quirós, Allier & Co.[121] This contract, which was considerably longer than the first one, emerged from a discussion between Quirós and President Menéndez, Allier and General Antonio Gutiérrez de la Fuente, and both of them with the Finance Minister, Luciano María Cano (Mathew 1981:33). It specifies, among other things, that it would grant exclusive privilege to export guano only to Europe; and that the proceeds would be distributed in the following way: 64% to the state and 36% to Quirós Allier & Co. during first, mandatory year, and 66% for the state and 33% Quirós and his associates during the next four optional years. It is also mentioned that the agreement included ships that at the time of signing were already in –or on their way to– Peru to load guano.

In addition, Quirós and his associates were required to disclose to the government all data and knowledge on contracts and guano sales and expenditures, "so that the Government can form

[121] See Appendix for a transcript of this second contract. Also *cf.* Dancuart (1903a:153–55).

an exact idea of the business." Quirós and his associates were even obliged to provide the Presidency with all the correspondence between them and the European agents, and also to keep them informed about the results of each cargo of guano. Likewise, it stipulated that guano extraction was only allowed at the North Chincha Island until a reconnaissance trip within Peru determined all locations where guano was found. Besides, the government reserved the right to send crews to inspect the guano extraction process, to avoid any smuggling. Additionally, it stipulated that all tools, vessels, and articles required for guano extraction, which Quirós had inventoried, would become property of the state after the contract expired, without compensation.

Moreover, Quirós and his associates were required to bring to Callao, within 12 months, two warship steamers of over 400 tons each with a 36-caliber rotating cannon, to defend the islands from "clandestine guano extraction." These ships were to be paid out of the guano proceeds and would also become Peruvian state property once the contract expired. Quirós and his associates were also required to pay 287,000 pesos to the General Treasury. In compensation, the government would give Quirós, Allier & Co. the guano being loaded either in the *Rosa* or the *Escandinavia*. Importantly, this contract, as was the case with the first one, stipulated that domestic guano extraction should be unhindered and remain unaltered. Lastly, Quirós and Allier agreed to mortgage their assets, both those they had in possession or any potential ones, to this contract, while the Peruvian state also mortgaged the guano of the North Chincha.

Later that month, Allier wrote a pamphlet where he complained of the continuing uncertainty around the guano contract, and warned that its annulment would be detrimental for Peru given that Quirós, Allier & Co. also held a monopoly on Bolivian guano, which –he claimed– could potentially compete with Peruvian one if Peru's government rejected Quirós and his colleagues (Allier 1841:19). Thus, Peru's government retained their partnership with Quirós, Allier & Co., but also remained in conversations with Gibbs Crawley & Co. To complicate things, on 23 December, Gibbs Crawley & Co. reported that Puimirol, Poumaroux et Cie., the French house with whom they had associated in their bid for the second contract, had just been granted the monopoly to export guano to the United States (*Ibid*). Furthermore, on 29 December, Peru's government published a proposal it had just received for a 150,000-pesos loan in exchange for guano exporting rights after the first stipulated year of the Quirós, Allier & Co. contract expired (Mathew 1981:36). Thus, Quirós and Allier (1845:9) recalled

> Meeting a request to be present at seven in the evening at the house of the President…we were informed by His Excellency, in the company of his Ministers, of the Government's decision to make use of the four voluntary years of our contract, and that we and the other houses with whom it wished to do business were to come together and work out the terms of an agreement…we knew that there remained to us now no way of holding our position, save through union with our opponents.

Quirós, Allier & Co. were particularly concerned that, if the contract lasted for only one year, they could have been unable to ship and sell enough guano to even cover their advances (Mathew 1981:36). Thus, a *third guano contract*, involving a fusion of Quirós Allier & Co., Gibbs Crawley & Co., and Puimirol, Poumaroux et Cie. was agreed on with the Peruvian government, as we shall see below.

Relatedly, Britain was looking closely at the potential of the guano proceeds to finally collect the £1,816,000 debt (plus interest) that Peru had contracted with them to finance its emancipation from Spain (Vizcarra 2009:362). Thus, British consul general Wilson lost no time in reopening the issue of the London bondholders' claim to the Peruvian government. Peru had defaulted in 1825 due to its "complete inability to pay" this debt (Levin 1960:54). On 15 January 1842, Wilson obtained a pledge from the Peruvian government,[122] signed by President Menéndez and Foreign Minister Agustín G. Charún, whereby they agreed to "deposit in the Bank of England one-half of the net proceeds" from the guano trade (*cf.* Dancuart 1903a:155). It was also agreed that the Peruvian consul in London would carry out this operation, and that he was required to inform the bondholders of the dispatch to London of "a commission duly empowered to arrange with them the mode and conditions of the liquidations of the whole debt" (Dancuart 1903a:155; *cf.* Levin 1960:54–55). Yet, as we shall see, that commission would not arrive in London for the next six years, given Peru prioritized addressing other issues, such as their war with Bolivia. This frustrated Britain. For instance, on 1 December 1841, in a letter to Lord Palmerston,[123] Wilson referred to "the recklessness and Bad Faith of this Government upon the subject of this debt" which, invoking "the Goodness of an All-Bountiful Providence, his very gifts…have been bestowed to facilitate to that Government and Nation the means of inflicting upon a Sister State the Scourge of a Fratricidal war" (FO 61/81 1841:78). In all, despite the

[122] See Appendix.

[123] Interestingly, Marx (1853) described Palmerston as the person "responsible for the whole foreign policy England has pursued from the revolution of 1830 to December, 1851" and as someone who "knows how to conciliate a democratic phraseology with oligarchic views."

seemingly more favorable terms of the second guano contract for the Peruvian government, in fact, under them, it would receive only about a third of the total guano proceeds, whereas Europe (and chiefly Britain) would, in one way or another, siphon the remaining two-thirds via the control of two money flows: the one stipulated by the second contract (about 35% of the sales), plus half of the government's remaining share.

4.1.3. The third guano contract (19 February 1842 – 17 December 1847): A risky partnership for Peru

Realizing, again, that guano could be even more profitable than what they thought when devising the second contract, the Peruvian government modified the rules around guano extraction once more. Thus, like the first contract, the second one was also very short-lived, and even more so: although intended to last up to five years, it only existed for 73 days. This was not the case of the third contract, under which Peruvian guano extraction was carried out for almost six years. The essence of this contract is that it established the formation of a partnership (a *sociedad*) between the Peruvian State and the foregoing three contractors: Quirós, Allier & Co., Puimirol, Poumaroux et Cie., and Gibbs Crawley & Co. The idea behind this "partnership" is that the Peruvian State would contribute the guano "as its capital," while the contractors would place "their industry and labor" as theirs (FO 61/88 1842:7).[124]

Yet, in actuality the new contract entailed the sale of Peru's guano on a commission scheme (quite common at the time), wherein the contractors –who had to pay for the labor, shipping, storage, and promotion of guano, along with the agents' sales commissions– would partake in the profits only if Peru's government earned at least 30 pesos (£6) per ton (Levin 1960:56,65). If profits did accrue to the contractors, two-thirds would go to Quirós, Allier & Co., and one-third to the other houses (Mathew 1981:37–38). Thus, betting on a future boom in the guano market and promoting its "vital interest to maintain the [Peruvian] army" in the war against Bolivia, Peru's government took on this riskier enterprise that sought to maximize their revenue (FO 61/88 1842; Levin 1960:56; Mathew 1981:37).

[124] The details of this contract were made public on 29 January 1842. By law, Peru's government gave a nine-day window when it could receive better offers. At this time, Malcom Rowe and Hegan Hall & Co. made a proposal to the government, but could not better the tripartite fusion (Dancuart 1903a:156; Mathew 1981:37).

Grosso modo, this contract,[125] which was composed of 29 articles and was to be obligatory for the term of five years (on 6 February 1846 it was extended for an additional year), stipulated that 120,000 tons of guano would be exported by Peru: 40,000 the first year, and 20,000 during each of the remaining four years. Should guano consumption in foreign markets be even larger, the government would allow contractors to export more under a new agreement. In addition, the price of guano was set at 30 pesos (£6) per ton and would be paid half in cash (silver) and half in accepted bills upon the National Treasury. Likewise, it was agreed that 75% of the profits would go to the State, and 25% to the contractors, which also had to advance to the government, on account of the guano shipped since 17 December 1841, 487,000 pesos (£97,400), of which they had already paid 237,000 (£47,400). Regarding the consignments to Europe, two-thirds of the guano would go to Myers in Liverpool, and the remaining third to Gibbs in London. This distribution was changed shortly after (along with the merchant profit sharing) to half each (Mathew 1981:38). Moreover, in this contract Peru's oligarchy made their desire to build a railway from Lima to Callao explicit for the first time, a responsibility that also fell on the contractors. As we shall see, the railway construction business in Peru would be closely tied to the guano profits almost three decades later (*cf.* Stewart 1968). Lastly, as was the case with the second contract, guano extraction for foreign markets was only allowed, for the time being, at the North Chincha Island, and extraction for domestic agriculture would also continue "perfectly free," both at the North Chincha and the Pabellón de Pica only (FO 61/88 1842:280). It is also worth noting, given our ecological focus, that a month after this contract was signed, on 21 March 1842, President Menéndez decreed several measures to deter the smuggling of guano, including the following: "It is forbidden to hunt or kill birds in the huano islands, or take their nests or chicks, and whoever does so will be penalized one peso in favor of the complainant for each bird, egg, or chick that they take or kill" (FO 61/88 1842:281).

Importantly, the third guano contract marks the entry of the Gibbs house into the guano trade. As we shall see, this house would dominate the business until the early 1860s. Gibbs Crawley & Co. was hesitant to enter the risky guano trade at first, and their participation in this contract seems to have entailed a considerable expense of their liquid assets (Mathew 1981:38). In addition, this contract represented a substantial setback both for the contractors and the British

[125] See Appendix for a transcription of the third contract. See also Dancuart (1903a:155–59) and FO 61/88 (1842:5–15) for an English version.

bondholders. As noted, the contractors would only amass profits if guano sales exceeded a threshold, and they would receive a smaller percentage of the proceeds than they did under the second contract. For their part, instead of receiving half the government's guano proceeds (as the 15 January pledge stated), the bondholders would receive income from a debt that "would now be retired by the contractors at the low market price and turned in to the government at face value toward an inflated government share of the guano-sales proceeds" (Levin 1960:57). Importantly, the terms of this contract were possible because Peru's oligarchy took advantage of the monopoly rent they claimed over the "free gift of nature" of guano with which they were endowed (Marx 1993a).

Peruvian guano sales did not fare well in Britain during the initial years of this contract. For instance, a certain MacDonald bought 7,000 tons –including the shipments of the *Charles Eyes* and the *Bonanza*– on the condition that he could resell it, which he could not (MS11047 1841). Thus, Quirós, Allier & Co. had to suspend their payment to Myers & Co., who eventually covered the bills, slowing down the business (Witt 2016:554). In addition, despite its initial success and encouraging appraisal in the papers and journals of the day, selling larger amounts of an expensive and still largely unknown manure proved difficult, especially amid a challenging time for farmers in Britain, caused by the decrease in wheat prices (Mathew 1981:43). Besides, even if fertilizer competitors were still scarce at this point, sodium nitrate, bones, and other substances were in use, and it was around this time that, it will be remembered (*cf.* Chapter 3) John B. Lawes obtained a patent to manufacture superphosphates (23 May 1842). Moreover, Gibbs Crawley & Co. was dubious about Peru's government keeping their word, as it had already modified its deals with Quirós and Allier twice.

Thus, in May 1842, Gibbs wrote of an agreement with Myers to immediately stop guano shipments, as the market in Britain was overstocked (Mathew 1981:51). Britain imported 2,062 tons of guano in 1841, followed by 14,123 in 1842, and just 1,589 in 1843, its lowest value throughout the whole guano trade (1841-80) (Mathew 1981:252). Furthermore, at this point Britain was the only market for guano, which was unsalable in France, Germany, Italy, and the United States, with only a small sale reported in Trieste (*Ibid.*:54). For example, the U.S. would not receive its first shipment of commercial Peruvian guano until late 1845, brought to Baltimore on the *Orpheus* for the agent of a London house, Samuel K. George, and to New York onboard the *George and Henry*, where it was received by Edwin Bartlett (*American Farmer* 1845:160;

Bartlett 1845:6,28). Moreover, there was also a disagreement between Gibbs and Myers, the former seeking to lower the prices of guano (whose price was set by them at £10 to £12 per ton depending on the amount bought), and the latter striving for higher prices (Mathew 1981:52).[126] Thus, the guano that was being initially sold at £25-28 per ton in the market could not be marketed at even £12 in October 1842 (Levin 1960:58). Among other things, all these facts fostered a worldwide search for guano by Britain, and a new, closer, and cheaper deposit was indeed found.

4.1.4. Ichaboe: The African Guano Trade (1843-48)

To make matters even worse for Peru's government and its three European partners, the British started shifting their attention towards a guano deposit they located off the southwestern coast of Africa, near the Orange River Delta, upon the island of Ichaboe (formerly named by the Portuguese). It lies beyond the scope of this work to examine this episode in detail, which would require a study of its own. Suffice it to offer a brief socioecological overview of the short-lived African guano trade, and of how it impacted Peru's.

Along with Hollamsbird, Mercury, Seal, Penguin, Halifax, Long, Possession, Albatross, Pomona, Plumpudding, and Sinclair, Ichaboe is one of twelve volcanic islands located off the coast of present-day southern Namibia, between Walvis Bay and the Orange River Delta. It is a small (6.5 ha), circular islet situated 1.4 km off the mainland, where it lies at the center of the Benguela Current System (BCS), which –it will be remembered (see Chapter 1)– is the most primary-productive ecosystem on Earth (Carr 2001). In fact, this upwelling system is remarkably similar in geophysical, biological, and ecological terms to that off Peru (as well as to those off the Canary Islands and California). It is no wonder, then, that this ecosystem exhibits very close convergences with that off Peru. For instance, the BCS is also inhabited by its own species of anchovy (*Engraulis capensis*), sardine (*Sardinops ocellatus*), jack mackerel (*Trachurus trachurus*), mackerel (*Scomber japonicus*), hake (*Merluccius capensis*), and bonito (*Sarda sarda*) (Bakun 1985:35). Remarkably, the islands along this current also exhibit striking similarities with those off Peru in terms of bird genera and populations, possessing their own species of cormorants (*Phalacrocorax capensis, P. neglectus*, *P. coronatus*) and penguin

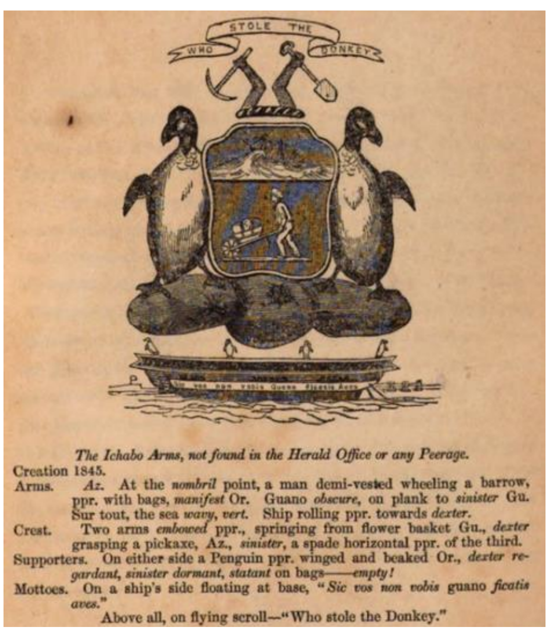
[126] In relation to this discussion, Barroilhet (1857:23) would refer to Gibbs as "the most inaccessible to reason and stubborn man in the United Kingdom."

(*Spheniscus demersus*), among others, which are important guano producers in the region (BirdLife International 2022). Thus, it is fascinating that both ecosystems share some of the same genera of fishes and birds. Similarly, it very seldom rains upon these islands, even though the fog usually envelops them. Thus, the islands off the Namibian southern coast are also among the world's exclusive regions where guano –and especially nitrogenous guano– accumulates, even if in smaller amounts than in the Chinchas, and having a lower nitrogen content (given the environment is slightly more humid off Namibia) (FO 61/121 1849:42; Levin 1960:58; Mathew 1981:57).

As noted, the African guano trade arose from the Peruvian one. In 1842, Andrew Livingstone, a retired master-mariner from Liverpool that was curious about the guano just arriving from Peru into his hometown, read *A Narrative of Four Voyages to the South Sea* (1832), by U.S. sealing captain Benjamin Morrell. Morrell had visited Ichaboe Island onboard the schooner *Wasp* in October 1828, where he hunted seals and recalled that "[t]he surface of this island is covered with birds' manure to the depth of twenty-five feet" (Morrell 1832:294). Influenced by this work and by the guano arriving from Peru, Livingstone persuaded John Rae, a Liverpool shipowner and merchant, as well as his son James, to retrieve guano from Ichaboe, which they pursued by chartering three vessels to that island in late 1842 (Craig 2003:88). This journey was to be carried out in the "utmost secrecy, and their sealed orders were only to be opened when their voyage had reached a certain specific point" (*Ibid*.). Only one of these three ships, the *Ann* (a 163-ton brig from Bristol captained by Francis Farr), arrived in Ichaboe, which occurred on the second half of February 1843, thanks to the fortuitous guidance of a U.S. sealer captain they encountered at Table Bay, near Cape Town (*Ibid*.:90). After a challenging process of guano-loading –given the rocky shores of the island, the tempestuous waters, and the strong winds– the *Ann* finally arrived in Dumfries, Scotland on 1 July 1843, where it unloaded about 121.5 of its 175 tons of guano, which were sold to local farmers at £9 per ton. The remainder 53 tons 7 cwt., which found no more buyers in Dumfries, were transported to Liverpool onboard the *Mary Ann Craik*, where they arrived on 22 July and were consigned to Roscow, Arnold, and Leete (*Gore's Directory* 1847:42). This marks the beginning of the ephemeral but influential African guano trade.

In order to seize control of the Ichaboe guano deposits, a group of at least 20 British ship captains organized themselves into the "Committee of Shipmasters and Others," and even adopted a coat of arms (Snyders 2016:11). The motto of this coat of arms, *Sic vos non vobis nidificatis aves* ("Not for yourselves, ye birds, your guano nests ye build"), was taken from a poem by Virgil, and there even exists a poem about this trade itself (Figure 4.1). Both were reproduced in what seems to be the first contemporary account –an anonymous article for the *Nautical Magazine*– of the Ichaboe guano trade (Ex-member of the Committee 1845:617). This Committee appointed captain Benjamin Wade, master of the *Douglas*, as allocator of guano pits, together with other positions. On 11 November 1843, Wade declared (without a legal mandate) British sovereignty over Ichaboe, claiming he was protecting Britain's commercial interests (Snyders 2016:11).

The word spread among merchants and shipowners that a cheaper guano source was found. The distance from Britain to Ichaboe (~12,500 km) was about 30% shorter than that to the Chinchas, thus reducing costs and the time to obtain the cargoes. In addition, shipowners were avid to find employment in a time of severe depression in the shipping industry (Mathew 1981:57). By the end of September 1843, nine more vessels had set sail from Britain for Ichaboe (Craig 2003:91). Two months later, on 29 December, there were 15 ships around this island waiting to load, and by the end of April 1844, there were 37 (*Ibid*.:92). Importantly, the *Levenside* and the *Star of the West* arrived back in Britain on 19 February 1844.



There's an island that lies on West Africa's shore,
Where penguins have lived since the flood or before,
And raised up a hill there, a mile high or more.
This hill is all guano, and lately 'tis shown,
That finer potatoes and turnips are grown
By means of this compost, than ever were known;
And the peach and the nectarine, the apple, the pear,
Attain such a size, that the gardeners stare,
And cry, "Well I never saw fruit like that 'ere!"
One cabbage thus reared, as a paper maintains,
Weighed twenty-one stone, thirteen pounds and six grains,
So no wonder Guano celebrity gains.

Figure 4.1. The Ichaboe Coat of Arms (left). Stanza of an anonymous poem on African guano (right). Taken from: Ex-member of the Committee (1845).

"It was the well-publicized…of these two…vessels" –argues Craig (*Ibid*.:94)– "that did much to stimulate the subsequent rush of shipping to Ichaboe." In May 1884, there were 46 ships; followed by some 100 in August, 300 in September, and a historical maximum of 460 in December 1844, a little less than two years after the *Ann* first reached Ichaboe (Table 4.2).

Table 4.2. Number of ships loading guano at Ichaboe.

Date	*Number of vessels*	*% Δ relative to Dec 1843*
February 1843	1 (*Ann*)	–
29 December 1843	15	–
30 April 1844	37	147
26 May 1844	46	207
19 July 1844	100	567
30 August 1844	244	1,527
28 September 1844	300	1900
2 December 1844	460	2,967

Made with data from Craig (2003:94–96).

The Ichaboe guano trade was an overwhelmingly British enterprise, with only a few foreign vessels partaking in the trade. In fact, for a time, Ichaboe found more employment for British shipping than India (its chief possession) and China together (*The Times* 1851:7). As for non-British vessels, the *Emeline* –which seems to formerly have been a whaler ship– appears to be the first U.S. vessel to engage in the Ichaboe trade, landing her guano cargo in Barbados on 25 May 1844 (Craig 2003:95). Likewise, there were some French ships on the Namibian coast in late 1844, "but there is little evidence to suggest that foreign shipping made a notable contribution" (*Ibid*.).

The approximate duration of the voyage from Britain to Ichaboe was two months, plus six weeks of loading at the islands, and two more months on the way back, together with two weeks for discharging, making this trade a six-month round-trip enterprise (Craig 2003:120). Interestingly, many of the initial guano shipments from Ichaboe were not bound for Britain, but for its colonial possessions in the West Indies, where it was applied to the sugar plantations (*Ibid*.:94). This situation caused concern among the guano Peruvian contractors. For instance, on 14 October 1843, Gibbs referred to the "alarming prospects of African competition" in a letter to Lima, and, on 17 February 1844, he wrote that so much guano was being extracted from Ichaboe that they would have to "give up all hopes of *Monopoly*" of Peruvian guano (Mathew 1981:57–58). Moreover, Ichaboe's guano was selling in Britain at some £6-9 per ton, a price at least 20%

lower than Peru's (Craig 2003:110; *The Times* 1844:8). This massive, unprecedented trade around guano "came as a powerful body blow to the Peruvian traders, just as they were beginning to overcome some of their initial troubles" (Mathew 1981:58). Yet, the peak of the Ichaboe guano trade, during the autumn of 1844, also meant the beginning of its end, following the extraction of more than 200,000 tons that would arrive in Britain during 1845. By February 1845, argues Mathew, Ichaboe's guano had been considerably exhausted. In 1846, only 5,309 tons of Ichaboe guano were imported by Britain, followed by 1,146 tons in 1847, and just 950 in 1848.

The following Figure (4.2) shows the amount and proportion of Ichaboe guano that was imported by Britain from 1841-57, relative to all their other guano imports. According to official statistics of the day (Fisher 1859:182), Britain imported a total of 305,817 tons of guano from Ichaboe (together with a small amount from its neighboring islands, which was of lower quality) during this period, the bulk of which occurred in 1844 and 1845 (93% of the total). In addition, about three-quarters of Britain's guano came from Ichaboe during these two years, with Peru only contributing between 5-16% of the manure during that period. On the other hand, Britain imported a total of 1,666,862 tons of guano from Peru during 1841-57, representing a little over 70% of the total guano they siphoned into their territory throughout this timespan.

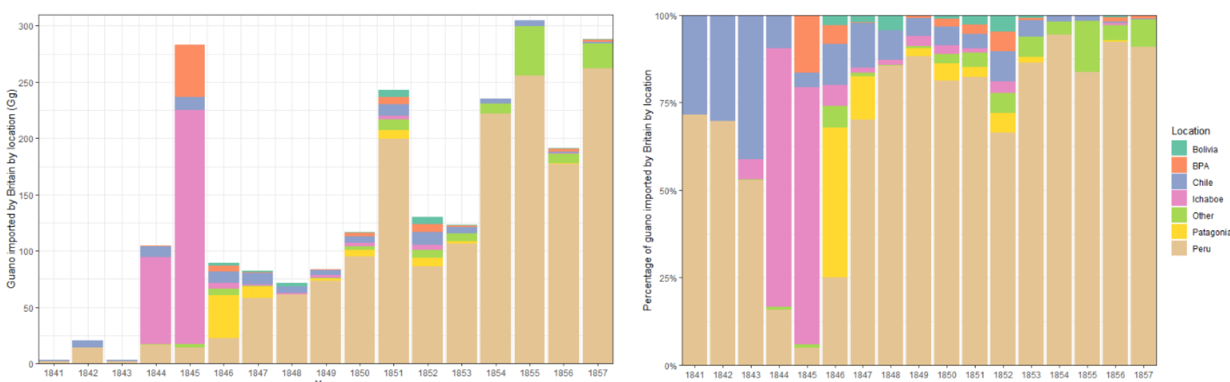


Figure 4.2. Amount (left) and proportion (right) of guano imported by Britain by location, 1841-57. BPA = British Possessions in Southern Africa. 1 Gg = 1,000 t. Made by author with data from Fisher (1859:182).

It is also interesting to note the enormous magnitude of the short-lived British guano imports from Ichaboe, relative to those from Peru throughout the whole guano trade (1841-80) (Figure 4.3). As can be seen, Ichaboe guano imports attained unparalleled proportions around 1845, which would not be surpassed by Peruvian ones until 1854, at the heyday of the guano trade, as we shall see. Moreover, the fever around Ichaboe, as well as the ecological rift it entailed, were not without critiques. As was eloquently expressed in *The Times* (1844:5) by satirical character John Bull: “[In Britain] we do…empty our native manure into our rivers, and send to Ichaboe for birds’-dung.”

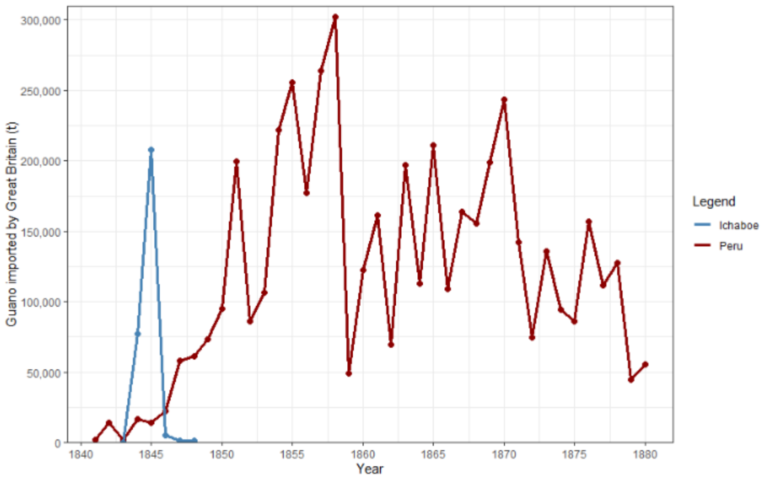


Figure 4.3. Guano imported by Britain from Ichaboe and Peru, 1840-80.
Made by author with data from Fisher (1859:182) and Mathew (1981:252).

There is one last essential point to be made about the African guano trade. As is the case with its ecological aspect –and even more so– the nature of the labor-power that was employed by Britain to remove the bird droppings from the islands is rarely mentioned, let alone analyzed. This lack of information is, in itself, a valuable source of it, as it reveals how little importance, in general, the governments, merchants, diplomats, and writers gave to the guano workers back in the day and thereafter, something that still holds true today. It is only a few primary and secondary sources (both contemporary and historical) that address this issue explicitly. In the case of Ichaboe, at least at the beginning of the trade, the British sailors themselves were the chief source of labor for guano-loading (Snyders and Swart 2013:55). These workers were complemented by *contracted* non-seamen from Britain, who were lured among the unemployed or deserters, or, what is the same, from the relative surplus population created by capital through the reduction of its demand for labor in Britain (Marx 1992:788). Many of these laborers were ignorant of what the guano-loading work entailed and of the living conditions they would experience at Ichaboe.

At the peak of the African guano rush (October 1844), “there were altogether present at Ichaboe about 6,000 seamen and labourers. At least three-fourths of these were located on shore” (Ex-member of the Committee 1845:636). This provoked, among other things, the likely forced migration of Ichaboe birds (such as Cape gannets) to Possession Island (Crawford *et al.* 1983:155). As we will address pertaining to the Peruvian case, the guano laborers at Ichaboe worked under infamous conditions, ingested deplorable diets, had a scarce supply of water, inhaled guano dust, lived in small, packed tents, and risked (or lost) their lives while performing their dangerous duties. In return, they received miserable wages, if at all, even if there were contracted (Snyders and Swart 2013:55). So harsh were the conditions on Ichaboe that in March and April 1844, the sailors revolted, "established a guano republic," and even named a "King of Ichaboe" in July (*Ibid*.:58). This insurrection was quickly suppressed by Britain via the *H.M.S. Thunderbolt*, which arrested the leading rioters and supervised the final removal of Ichaboe's guano. The ephemeral African guano fever would damage Peru's guano trade while simultaneously spurring it, as it helped promote and spread guano use in Britain. As Peru's Finance Minister, Manuel del Río, put it on 27 August 1847: "The discovery of guano on the coast of Africa brought about an inevitable paralysis in the sale of our own. But the many speculations that arose, effectively contributed to spreading the use of this manure, providing it for farmers at very low prices, thereby…bringing guano into consumption and giving it a positive commercial value" (Dancuart 1903b:107). Since the African source was exhausted within a few years, and given Ichaboe's guano was of a lower quality (*i.e.* had a lower nitrogen content) than Peru's, the guano entrepreneurs turned their eyes to Peru once again.

4.1.5. Back to Peru: The rise of the consignment system (1843-47)

While Ichaboe's guano trade was on the rise and seeking to promote his business, Antony Gibbs produced a pamphlet titled *Guano: Its Analysis and Effects; Illustrated by the Latest Experiments* (1843), where he praised the agricultural results of Peruvian guano in Britain, France, and the West Indies. In addition, on 24 March 1843, along with Myers, Gibbs wrote a letter to Lord Aberdeen, Britain's Secretary of State for Foreign Affairs, where they stated that the guano trade was central for "our...Establishments on the West Coast of South America and in which British interests are to a very considerable extent involved" (FO 61/101 1843:28). Relatedly, Gibbs and Myer expressed that the guano "business...is not only of paramount importance to ourselves, but...if properly developed & followed up hereafter, promises to be of the very greatest importance to the agricultural interests of Great Britain at large" (*Ibid*.:29).

A few years after it became commodified, guano became the chief fertilizing manure in Britain, replacing bones (Caird 1852:385; Mathew 1981:53). For instance, for the period 1843-46, Britain imported 36,860 tons of bones, compared to 54,575 tons of Peruvian guano, and over 290,000 tons of Ichaboe guano (Mathew 1981:282; Thompson 1968:75). Nonetheless, the Peruvian guano business was struggling. In January 1843, Gibbs Crawley & Co. approached the Peruvian government with a request to extend the third guano contract, as they assessed it would be unlikely they would sell the stipulated 120,000 tons of guano in five years. Peru's government rejected this proposal (Mathew 1981:56). In addition, the depression of the second year of the Peruvian guano trade, together with the draining of Ichaboe's guano, provoked great economic losses for Peru's government, given the risky terms of the third contract (Levin 1960:59). Peru had to survive by obtaining further advances of money against future guano proceeds. Ichaboe's burden also fell upon the contractors, who had to lend ever greater sums to Peru (*Ibid*.).

In addition, there were other sorts of troubles. For instance, on 14 April 1842, Peru's government confiscated the 400 tons of guano onboard the British vessel *Thomas Fielden*, captained by John H. Smith, which had been extracted at Paquica, then belonging to Bolivia, but claimed by Peru as part of their territory during the war between these two countries (today, this portion of the Earth "belongs" to Chile). This cargo was given to Quirós, Allier & Co. for export to Europe (FO 61/89 1842). Similarly, in October 1843, the British ship *Vitula* was tried and condemned by Peru for proceeding from Valparaíso (Chile) to load at the Chinchas, without license from the Peruvian government (FO 61/99 1843).

By June 1843, a time that marked the end of the guano selling season following the sowing of turnip, the Peruvian guano business started to slowly take off again. At this point, Gibbs suggested to gradually renew the shipments back to Britain (Mathew 1981:55). By early autumn, he had charted 7,500 tons of Peruvian guano, while Myers had obtained 2,597 (*Ibid*.). In September 1843, the contractors approached the government again with a request to extend the third contract for three years. This time around, Peru's government, now momentarily led by self-proclaimed "Supreme Director" Manuel Ignacio de Vivanco (an agriculturalist and liberal caudillo with a free-trade mindset) did agree to the extension on 16 September 1843. In fact, under Vivanco's rule, British vice-consul in Islay, Crompton, expressed that "the aspect of political affairs in Peru [was] as unpromising as ever" (FO 61/105 1844:34). This extension would, however, be derogated months later following Menéndez and Ramón Castilla's reseizure of political power on 7 October 1844, during a turbulent period of internal struggles (Basadre 1968b:64; Gootenberg 1989:27; Mathew 1981:56,69). Around this time, Britain kept searching for guano deposits worldwide, coming across some in places like the Arabian coast, Latham Island, and Malagas, among others, which nonetheless were not deemed worthwhile for the Empire neither in quality nor in quantity terms (Mathew 1981:59).

The year 1845, was quiet and also a very dry one in Britain, so there is not much information about it *vis-à-vis* the guano trade (Dancuart 1903b:109; Mathew 1981:75). Yet, as noted, on 6 February 1846 and in exchange for a 300,000 (£60,000) pesos advancement, Peru's government finally did grant a one-year extension on the "third contract," which, it will be remembered, was set to expire on 17 December 1846. This time around, Candamo & Co., as well as Michel Montané (*cf.* Chapter 3), in conjunction with Puimirol, joined the third contract venture (Dancuart 1903a:22). Yet, at this time, the sales of guano declined again, which led to the decision of once again suspending further shipments, which they would renew later that year (Mathew 1981:65). By 1846, the contractors had paid the Peruvian government 1,164,586 (~£232,900) pesos in advances, although they had sold less than 30,000 of the 120,000 tons stipulated in the contract (Levin 1960:60). Relatedly, as early as 1844 and once again in 1847, Myers made explicit his desires to leave the guano business (Mathew 1981:67). For example, on 25 October 1847, in a letter to Gibbs, Myers wrote: "I take my leave of guano…for *I* will take no future contract; and if you like it at all, I shall by very glad to see it in your hands" (quoted in Mathew 1981:68,78).

4.1.6. Novel contracts and new export logic: from commission sales to consignment (1847-49)

During 1847, year at whose end the "third contract" was set to expire (17 December), and as the effects of the Ichaboe trade were felt by the Peruvian State (Levin 1960:60), a novel series of maneuvers carried out by the guano contractors and the Peruvians took place. Back in Europe, this period corresponds with the Great Irish Famine of 1846-47 resulting from the potato blight, in turn an outcome of soil exhaustion and English rule in Ireland (Slater 2018b). This spurred the 1846 repeal of the Corn Laws, which among other things made Britain's agriculture even more intensive (Marx 1993a:818). Around this time, in Peru, five new guano deals were signed between February and December 1847 (guano would still arrive in Britain under the third contract terms until early 1848).[127] Peru was exporting guano at increasing rates, but had already been paid for it by the European contractors, and thus its financial situation was desperate (Levin 1960:60). Therefore, the government granted *two guano-export concessions* as payments (using the same commission sale basis as hitherto, whereby all profits after expenses and commissions were to be credited to the payment of Peru's debt), together with *three guano contracts* in exchange for loans. Let us outline these deals chronologically.

First, on 6 February 1847, the Peruvian government signed a contract with a Genovese merchant settled in Peru, Giuseppe (Hispanicized as 'José') Canevaro (1803-1883). Peru's government had the urgency to buy the Austrian sailing ship *Jiovanna* amid concerns regarding Juan José Flores's[128] preparations in Europe for an incursion against Ecuador which, if successful, could help reestablish Spanish influence in the region (Dancuart 1903b:23; Mathew 1981:80). Canevaro had offered the government a loan for 72,000 pesos (£14,400), half in cash, half in credits against the internal debt, at a 1% interest rate, in exchange for guano exporting rights under the same terms of the "third contract," once it expired (Dancuart 1903b:23). Under this deal, Canevaro ended up exporting 5,134 register tons (~6,845 effective tons)[129] of Peruvian guano in 17 ships, from 10 February 1848 to 27 February 1849, when it expired (*Ibid*.). Moreover, Canevaro received assistance from the Gibbs house for this venture. As John Hayne told William Gibbs in August 1847: "You are to Charter for Canevaro, and act for him as for us" (quoted in Mathew 1981:82).

Secondly, on 16 March 1847, near St James' Court in London, Juan Manuel Iturregui, Minister Plenipotentiary of Peru, on one hand, and merchants Cotesworth, Powell, and Prior (friends of Myer) on the other, together with London contractors John Schneider & Co., convened a *payment in guano contract* (Dancuart 1903b:24). This contract entailed a £500,000 loan, including a £20,000 advance, in exchange for 200,000 tons of guano from the Chinchas.

[127] A full transcript of these contracts can be found on Dancuart (1903b:23–33).

[128] Juan José Flores (1800-1864), a Venezuelan-born general who became Ecuador's first president in 1830, sought, in the 1840s, to establish one or several monarchies in Ecuador, Peru, and Bolivia with rulers from the Spanish Crown (Basadre 1968b:116).

[129] The register ton, a *volume* unit, was the official measure ships used to quantify their freights (Faivre 1959). One register ton is defined as 100 ft^3. On the other hand, the effective ton is a *mass* unit. The ratio of effective tons to register tons is approximately 4:3; that is, effective tons are roughly 25% to one-third larger than register tones (Faivre 1959; FO 61/99 1843:289). Unless otherwise indicated, the guano quantities discussed in this work are expressed in effective tons.

Guano extraction was set to start on 18 December 1847 (just one day after the expiration of the "third contract") and ensue until the stipulated amount was covered. Importantly, as had been the case hitherto, this contract also reserved guano from the Chinchas for domestic agriculture purposes. Yet, this deal was disapproved by Peru's government on 10 May 1849 on the grounds that it was inopportune and unfavorable for the country (*cf.* Dancuart 1903b:27). By 1 June 1849, 9,133 register tons (~12,177 effective tons) of guano had been exported under this contract, which created more than enough revenue to pay Cotesworth *et al.* the £20,000 advanced.

Third, a second *payment in guano contract* (and third deal overall in this series) was signed with Pedro Blanco & Co. of New York on 10 June 1847. This deal involved paying Blanco 57,516 pesos, in the form of guano, for the purchase of the steamship *Rimac*. Guano extraction under this contract started three days later, and it amounted to 5,000 tons dispatched in 12 vessels, covering more than enough to pay the price of the *Rimac* (Dancuart 1903b:28).

Fourth, on 13 July 1847, the Peruvian government celebrated a new contract with their well-known partners, the Quirós, Gibbs (now renamed in Lima as William Gibbs & Company), and Montané houses, "taking into account the urgency with which the Government needs sufficient funds to pay the large amounts owed" (Dancuart 1903b:28). For instance, in a speech before Peru's Congress on 6 August 1847, President Ramón Castilla would refer to "the foreign debt that weighs so heavily on Peru since the first days of its Independence" (FO 61/115 1847:200). Through this deal, proposed by Montané, the Peruvian government would obtain 700,000 pesos (£140,000) in exchange for 40,000 register tons (~53,300 effective tons) of guano. Specifically, this contract had two components: on one hand it involved a 600,000-pesos loan in cash, together with a 100,000-pesos loan in credits, agreed on with Montané over a one-year period, and in charge of the Quirós and Gibbs houses. On the other hand, it gave the 40,000 tons, *in consignment*, to Quirós and Gibbs's houses, who would have to sell it on order to pay Montané (Dancuart 1903b:28; Mathew 1981:81). Importantly, this deal marks the beginning of a *shift from commission sales contracts to consignment ones*, that is, to agreements whereby Peru's government would retain the ownership of the guano until final sale and the trading houses would sell it on a percentage commission basis (Levin 1960:64–65).[130] Throughout 1848, the

[130] In fact, the foregoing 16 March 1847 contract between Iturregui and Cotesworth, Powell, and Prior had been the first attempt to shift from a commission basis into a consignment one. Yet, as noted, this contract was rejected.

export of the 40,000 (in fact, 40,286) register tons was completed onboard vessels such as the *Corsair*, *Sir Charles Napier*, *Helena*, *Jane Augusto*, and *North Pole*, 7,220 of which were sold that same year, providing Peru with 131,887 pesos (Dancuart 1903b:29; FO 61/122 1849:133).

Importantly, around this time some important diplomatic cables were written that show the profound importance Britain gave to guano for maintaining its overall hegemony over Peru and beyond. For example, in a letter to Lord Palmerston written in Trujillo (northern Peru) on 4 April 1847, diplomat William Sheen discussed the importance of guano for the British empire in terms of its power to create enormous sums of money, pay the bondholders, enhance the shipping business, promote commercial interests in return for investment, "and to British agricultural interest in this general adopted preferred specie of manure to the soil" (FO 61/116 1847:226–27). Similarly, from the heart of the cloud forest in Chachapoyas, amid the Amazon in northeastern Peru –which, unlike the dry coast, was a region full of vanilla, cinchona, coffee, cacao, cotton, and resins–, consul William Mathew[131] also wrote to Palmerston, on 10 November 1847:

> By possessing this very fertile country England would never be obliged to be beholden to other States of North and South America for their produce, and have to pay prices that hardly enable the manufacturers to maintain the preponderance that they ought to possess over those other countries...I leave it to Your Lordship's judgment to adopt the means best adapted for making Great Britain possessor of this most fertile region.

This revealing imperial passage cannot but remind us of Marx's (1992:860) analysis of Britain's parallel drain of wealth from Irish lands, of which he stated: "for a century and a half England has indirectly exported the soil of Ireland, without even allowing its cultivators the means for replacing the constituents of the exhausted soil" (*cf.* also Slater 2018b).

Lastly, the fifth guano contract during this period was signed in Lima on 22 December 1847, when the government still desperately needed money and had no choice but to "submit to the conditions which the contractors might think proper to impose" (Witt 2016:144). This contract, which was unanimously approved by the Senate, "was violently discussed in the Chamber of Deputies," recalls Heinrich Witt (2016:143), a Merchant from Altona (Hamburg) working for Gibbs in Lima, who left behind over 11,000 pages of journal entries. It was, unlike

[131] Not to be confused with 20th-century British historian William Mathew, a specialist in the guano trade (especially regarding trading monopolies and contract-government relations) whose work we have consulted extensively.

the 13 July deal, a commission sales agreement proposed by the Gibbs and Montané houses to Peru's government, involving an 850,000-pesos loan (which was required to pay salaries), in exchange for the monopoly to sell 130,000 effective tons of guano in Britain and France, to be extracted within 18 months starting on 18 June 1848, and without undermining any rights granted by prior valid contracts (Dancuart 1903b:29; FO 61/118 1848:88). Of this amount, 85,000 tons were designated for Britain (Mathew 1981:84). This deal also specified that guano could only be exported under the foregoing four contracts, together with this one. Interestingly, this contract also seems to be the first to *explicitly authorize the extraction of guano not only from the North Chincha Island, but also from the Middle One*, showing an expansion of the trade (extraction at the South Chincha would not begin but until around 1855) (Anon 1854:398; Dancuart 1903b:32). In addition, this contract was negotiated in the company of Candamo, who would get 33% of the shares, while Montané would take 25%, and Gibbs the remaining 42% (Mathew 1981:84). As for the loan, the deal stipulated an advance of 400,000 pesos down and 450,000 through nine monthly instalments, at a monthly 1% interest (Dancuart 1903b:30; Mathew 1981:84). Moreover, commission rates were to be 5% in aggregate, and the proceeds to the government were to be paid 75% in cash and 25% in debt paper (Dancuart 1903b:31). That is, as in previous contracts, the government accepted to receive part of its proceeds as public debt instruments, which this time would constitute, as noted, just 25% of the income (as opposed to 50% in the 1842 contract).

This would be, however, the last contract "under which the Peruvian government and its guano contractors retired public debt instruments at the depreciated market prices" (Levin 1960:61). As noted by Mathew (1981:238), from 1847 on, contracts removed the rights of merchants to claim even a small share of the profits; every peso of profit would go to the Peruvian government. All told, as of June 1849, some 31,560 effective tons of guano had been dispatched under this contract, in 56 ships such as the *Alfred*, *Lucy Right*, *Tetis*, *Jane Gassen*, and *Melissa* (Dancuart 1903b:33; FO 61/122 1849:137). The following Table (4.3) summarizes the basic features of the eight guano contracts that were developed in Peru since this substance was commodified in late 1840 and until the end of that decade.

Table 4.3. Summary of all guano contracts between the Peruvian government and trading houses, 1840-49.

Contractor	**Start date**	**Actual end date**	**Key points**	**Estimated register tons dispatched**	**Estimated number of ships**
Quirós (1st guano contract)	10 Nov 1840	27 Nov 1841	Quirós granted export rights for six years in exchange for £12,000	8,085	24
Quirós, Allier & Co. (2nd guano contract)	8 Dec 1841	19 Feb 1842	One-year export rights for Europe (with possibility of 4-year extension) in exchange for £57,400. 64% of proceeds would go to Peru; 36% to contractor	~ 2,000	~6
Quirós Allier & Co., Gibbs Crawley & Co., and Puimirol, Poumaroux et Cie (3rd guano contract)	19 Feb 1842	17 Dec 1847	Five-year "partnership" through which $1.2x10^5$ tons would be exported in exchange for £97,400. 75% of profits would go to Peru; 25% to contractors	~124,500	~350
José Canevaro	6 Feb 1847	28 Feb 1849	£14,400 loan at a 1% interest rate for Peru to buy the *Jiovanna*	5,134	17
Juan Manuel Iturregi and Colesworth, Powel, & Prior (London)	16 Mar 1847 (to start 18 Dec 1847)	10 May 1849	Payment in guano contract: £500,000 loan in exchange for 200,000 tons of guano. Cancelled on 10 May 1849	9,133	~25
Pedro Blanco & Co. (New York)	10 June 1847 (to start 13 June 1849)	–	Payment in guano contract: Peru paid £11,503 for steam *Rimac*	5,000	12
Quirós Allier & Co., Gibbs, and Montané	13 July 1847	–	£140,000 loan in exchange for 40,000 tons, in *consignment*	40,286	~125
Gibbs & Co, Montané et Cie	22 Dec 1847	18 Dec 1849	£170,000 loan (for salaries) at a monthly 1% interest in exchange of 100,000 tons of guano. 75% of proceeds paid to Peru in cash; 25% in debt paper	23,700 (by June 1849)	56

~ = Estimated by author from rates of other years for which there is available information.
Made with data from Dancuart (1903a:103–5, 153–59, 1903b:23–33); Levin (1960:61); and Mathew (1981:84).
Note: see Hunt (1973b:62) for a summary of all contracts throughout the whole guano trade.

The year 1848 did not see much change in relation to the guano business, although Peru's Ministry of Finance recognized it was traversing a "disastrous time due to the…monetary crisis that wreaked so much havoc in the year 1847, as well as to the various revolutions that have broken out... on the European continent," especially in France (FO 61/122 1849:121). This positioned the United States, after Britain, as possibly the best market for Peruvian guano (*Ibid*.).

In addition, Britain was getting increasingly frustrated about Peru's failure to pay their independence debt to the bondholders. In a letter to Palmerston on 10 September 1848, British consul in Callao John Barton referred to "the great injustice under which many British Subjects are suffering by the Default of the Peruvian Government in regard to the Payment of the Interest due to the British Bondholders," despite Peru's relationship with Bolivia had improved (FO 61/118 1848:45).

Thus, on 4 and 31 January 1849, yet another new contract, whose form would define the Peruvian guano trade for the next 20 years, was agreed on in London (Levin 1960:65). This guano *consignment* contract, which also sought the conversion of external debt bonds, was an agreement between Peru's new Minister Plenipotentiary, Joaquín José de Osma (Iturregui's successor), and the Antony Gibbs & Sons house of London. Ever since Iturregui's and Cotesworth *et al.'s* deal was cancelled, the demands of British bondholders became ever more pressing (Dancuart 1903b:33). As noted, Britain had again started pressuring Peru, "with the British fleet never far in the background," to pay its independence debt as early as 15 January 1842, just after the second guano contract had been signed (Levin 1960:62). Peru sent Osma – together with Felipe Barreda, who would later become an important guano contractor for the U.S. market– to pursue the mission of settling this debt, which was kept secret so all insiders could purchase the bonds, which were then selling at 36.5%, and afterwards rose to 53% (Levin 1960:62; Mathew 1981:102). Osma arrived in London on 12 November 1848 and met with Lord Palmerston five days later.

On 4 January, there was a general meeting and debate on a tavern in Bishopsgate Street, presided by George R. Robinson and J.D. Powles, the president and secretary of the Bondholders Committee, respectively. Regarding the bonds, this contract stated, among other things, that the bonds of the 1822 and 1825 loans would be turned into new ones, at a 4% interest rate from 1 April 1849 on, and would increase 0.5% per year until they reached 6%. In addition, it stated new bonds would me emitted on the expired interest rates of those old ones, representing 75% of their value. Peru also agreed to create a sinking fund for the gradual redemption of bonds, which could be converted into internal debt papers. The new debt assumed by Peru amounted to £3,776,000 (£1,816,000 for the capital of the earlier loan plus £1,960,000 of unpaid interest) (Levin 1960:63). "The great significance of the agreement with the bondholders" –states Levin– "lay in the fact that it brought the market-price retirement of Peruvian bonds to an end." Now, half the net proceeds of all guano sales in Britain would be received by the bondholders in cash. Thus, the British bondholders became chief partners in the Peruvian guano trade. The Peruvian government also hypothecated half of its net guano proceeds exported to Britain and Ireland, after loading, shipping, storage, and commission costs were covered. This guano would be sold only *through consignment*. Moreover, Gibbs was required to provide the necessary sums for the bondholders, which he would do twice a year (Dancuart 1903b:33–36).

As for the guano consignments, the deal stipulated that Antony Gibbs & Sons –the parent house in London– would receive all the guano for any European market, except France, from 18 December 1849 to 19 December 1850. In addition, this house would consign the guano at the expense and risk of Peru's government, and make advances to William Gibbs & Co. (as noted, the Lima branch of Antony Gibbs & Sons) to whom the ships would be consigned for the extraction and shipping of guano. Peru would end up exporting 185,724 effective tons of guano that year (more than half the contract's estimate), of which 95,083 (51.2%) would end up in Britain. Besides, Antony Gibbs & Sons would charge the following commissions: 4% for sales and guarantees; 1% for brokerage; 2.5% on the chartered imports; and 5% annual interests on advances in expenses and freight. Moreover, Antony Gibbs & Sons would have Peru's agents at their disposal to secure the payment of the interests of the new bonds, namely, half the guano revenue of 1850. The other half would belong to Peru. Lastly, Antony Gibbs & Sons committed to give £36,000 to the Peruvian government to fulfill the first payment to the British bondholders. This deal was signed on 31 January 1849 (Dancuart 1903b:36). This was a one-year contract, but by agreeing to provide funds for bond payments in October 1849 and April 1850 Gibbs was granted a two-year run (Mathew 1981:100).

On 12 October 1849, British consul-general in Lima, William Pitt Adams, briefed Palmerston on the most recent events around the guano trade. For instance, Adams clarified that Peru owned the guano deposits and Gibbs, who had "secured profits through advancing loans…on very advantageous terms," was their agent. Adams also said guano was being sold in Britain at £9 a ton, which created an overall balance for Peru of £2 18s 5d per ton. Importantly, Adams also claimed to be "[d]eeply impressed with the great importance to British Agriculture of a regular and cheap supply of guano," and that he had "explained to General Castilla Your Lordship's arguments and wishes telling him that the interests of British Agriculture and of the Peruvian Government were identical." Moreover, Adams stated that the "Peruvian management [of Gibbs's house] would be very disastrous both to the British Agriculturalists and to the Bondholders," stressing Britain's desire to remain in control of the trade (FO 61/122 1849:100–115).

Finally, Myers's involvement in the Peruvian guano trade would end after the 40,000 tons under the 13 July 1847 contract were shipped to Europe, which occurred towards the end of 1849.[132] It seems that Myers was to remain active in the Bolivian trade, apparently less overwhelming financially (Mathew 1981:85). And "so departed the men who had begun the trade back in 1840," says Mathew (*Ibid.*:84). Without Myers's support, Quirós, Allier & Co. "could do little else but witness the painful spectacle of guano passing entirely into the hands of those whose incursions they had tried so hard to resist in 1841-2" (*Ibid.*:84–85). Most of the Peruvian guano trade (excepting the French and U.S. markets) had entirely passed to the hands of Antony Gibbs & Sons, who would increasingly control it until late 1861.

[132] In September 1849, he had just "a few hundred ton left," and was not expecting shipments (Mathew 1981:93).

CHAPTER 5. GUANO DIGGERS AND THE "COOLIE" TRADE: A RACIALIZED SYSTEM OF BONDED LABOR

> Labour is *not the source* of all wealth. *Nature* is just as much the source of use values (and it is surely of such that material wealth consists!) as labour, which itself is only the manifestation of a force of nature, human labour power….since from the fact that labour depends on nature it follows precisely that the man who possesses no other property than his labour power must…be the slave of other men who have made themselves the owners of the material conditions of labour. He can only work with their permission, hence live only with their permission.
>
> – Karl Marx, *Critique of the Gotha Programme* (1875)

In addition to the signing of the contract that would define the guano trade for the next 20 years, 1849 also marks the year an essential event took place in Peru which was to profoundly influence its economy, society, and cultural identity thereafter: the arrival of the first bonded workers from China, mainly to work in the sugar and cotton estates in the mainland, as domestic servants, and eventually also in railway construction in the 1870s. In addition, some of these bonded workers were taken to the Chincha Islands (and later to other guano deposits) in Peru, where they were to constitute the primary workforce and foundation of the guano trade thereafter (1849-74). These workers labored under some of harshest and most infamous conditions of exploitation in history. It lies beyond the scope of this work to develop an exhaustive analysis of this form of labor. However, it is crucial for our holistic outlook to examine its genesis, development, and characteristics since, together with the ecology, Chinese bonded labor lies at the often-neglected basis of the guano trade. That said, what follows is not a study of Chinese bonded labor in general; not even of Chinese bonded labor in Peru, but rather an analysis of Chinese bonded labor specifically pertaining to the guano trade, particularly on the Chincha Islands, which was small in numbers (relative to their allocation in other branches of the economy) but absolutely essential as the chief basis of the guano business. As stated by Peruvian historian Carlos Aguirre (1987:47) all the guano extraction and exploitation system "rested –literally– upon the backs of about a thousand workers, in the most deplorable working conditions, health, housing, food, life, sexual, etc." Although this number is low considering the attrition of the workforce, particularly due to the extremely high rates of morality, and relates simply to the approximate size of the workforce at any given time.

Below, I will add to the study of "coolie"[133] labor *vis-à-vis* the Peruvian guano trade through the analysis of unpublished materials held at the National General Archive in Lima and the National Archives at Kew, some of which, to my knowledge, had only been examined by Peruvian historian Cecilia Méndez in her excellent works (Méndez 1987a, 1987b). Besides Méndez (and Mathew (1977a)), some of the main scholars that have studied Chinese bonded labor in Peru, more generally, are: Stewart (1951), Derpich (1976), Rodríguez Pastor (1979, 1989, 2017) –who is considered the leading expert in the field–, Hu-DeHart (1993, 2002, 2005), Gonzales (1989), Narvaez (2010), Melillo (2012), Lowe (2015), Trazegnies Granda (2016), and Loustaunau *et al.* (2021). What follows is seeks to be a contribution to these works.

5.1. The emergence of Chinese bonded labor: a British creation

The thorough work of two scholars named Lisa –Lisa Yun (2008) and Lisa Lowe (2015)– represents an excellent starting point for understanding the genesis of Chinese bonded labor. The idea of abducting people from China (and from other regions in the world such as Celebes) to perform labor, was conceived by the Dutch in the 17th century, who at the time were also active in enslaving Africans (*cf.* Chapter 2). As shown by Yun (2008:5), during the 1620s, Jan Pieterzoon Coen, governor of the Dutch East Indies (in Indonesia) claimed that "[n]o people in the world can do us better service than the Chinese [let us] send another fleet to visit the coast of China and take prisoners as many men, women, and children as possible." In 1662, Jan van Riebeeck, founder of "Cape Colony" in present-day South Africa, also requested that Chinese labor be sent (*Ibid*.). Relatedly, Marx (1992:916) stated about Dutch colonialism that:

> Nothing is more characteristic than their system of stealing men in Celebes, in order to get slaves for Java. Man-stealers were trained for this purpose. The thief, the interpreter and the seller were the chief agents in this trade, the native princes were the chief sellers. The young people thus stolen were hidden in secret dungeons on Celebes, until they were ready for sending to the slave-ships. An official report says: 'This one town of Macassar, for example,

[133] The word "coolie" is used to refer to both Chinese and South Asian workers who were taken to the Caribbean, Peru, Brazil, Australia, California, Hawaii, Mauritius, South Africa, and Fiji. Coolies "were never a people or a legal category. Rather coolies were a conglomeration of racial imaginings that emerged worldwide in the era of slave emancipation, a product of the imaginers rather than the imagined" (Jung quoted in Lowe 2015:25). There is no clear origin of the term, which is possibly Tamil, Chinese, or Portuguese. It may come from Tamil *kuli*, meaning wage, hire, or a payment for sporadic menial work; from Gujarati *Koli*; or from Portuguese *cule* or *quli* (*i.e.* local hired laborer) (Bahadur 2014:*xx*; Lowe 2015:202). The term became increasingly associated with slavery, and English speakers, especially in the U.S., began using it pejoratively (Narvaez 2010:37). Bahadur (2014) offers a genealogy of the term. See also Stewart (1951:16).

> is full of secret prisons, one more horrible than the other, crammed with unfortunates, victims of greed and tyranny fettered in chains, forcibly torn from their families.’

It would be the British, however, who launched the trafficking of people from China to labor in their colonial possessions. As importantly noted by (Lowe 2015:21–22), in a “Secret Memorandum from the British Colonial Office to the Chairman of the Court of Directors of the East India Company,” written in 1803, towards the end of the Haitian Revolution, colonial administrator John Sullivan established the basis for introducing Chinese bonded workers into the British island of Trinidad, in the West Indies. This shocking document, which is worth citing, reads:

> The events which have recently happened at St. Domingo necessarily awakes all those apprehensions which the establishment of a Negro government in that land gave rise to some years ago, and render it indispensable that every practicable measure of precaution should be adopted to guard the British possessions in the West Indies....no measure would so effectually tend to provide a security against this danger, as that of introducing a free race of cultivators into our islands, who, from habits and feelings could be kept distinct from the Negroes, and who from interest would be inseparably attached to the European proprietors…The Chinese people…unite the qualities which constitute this double recommendation (quoted in Lowe 2015:22–23).

That is, Britain’s intention to rely on another form of labor different from African slavery was explicitly racialized; conceived as a way to suppress any potential Black slave revolt in its colonies; and as a means to expand capitalist production (Lowe 2015:23,75). Thus, in 1807, “as Britain passed the Slave Trade Act to abolish the transatlantic African slave trade in the empire, Secretary of State Lord Hobart secretly dispatched Kenneth MacQueen to captain [the] *Fortitude* from Bengal bound for Trinidad, carrying a cargo of Chinese workers and East India Company goods” (*Ibid*.:43). This journey took place via the Sunda Strait, Batavia, the Cape of Good Hope, St. Helena (where the *Fortitude* reloaded fresh water), Ascension, Cayenne, and Barbados (Helly 1993:21). The arrival of Chinese in Trinidad –192 people out of the 200 that had been embarked in Macao and Penang (147) and Calcutta (53)– marks the beginning of Chinese bonded labor in the Americas (Rodríguez Pastor 2017:71; Yun 2008:6). The experiment in Trinidad was explicitly racialized: Black workers would carry out the fieldwork at the sugarcane plantations, while the Chinese, who performed *legally* free but bonded labor, would grind, refine, and crystallize the sugar (Lowe 2015:25). Importantly, too, this aspect of the material shift from merchant capitalism to industrial one was accompanied by a discourse of “an alleged transition from slavery to freedom" (*Ibid*.:24). "Free labor" and "free trade" thus went hand in hand (*Ibid*.:109).

In the 1810s, hundreds of Chinese were taken to Portuguese Brazil to grow tea, although this forced migration never consolidated there (Rodríguez Pastor 2017:71; Yun 2008:6). The importation of Chinese workers into the Caribbean "began in earnest" in 1834 and would reach its peak in 1853-66 (Lowe 2015:25). Yun (2008:6) marks 1838 as the year this British experiment took shape. As had been the case with enslaved Africans in the 18th century, the British soon became the leaders of abducting Chinese (and Indian) people. "While mobilizing to abolish the transatlantic slave trade" –argues Yun (2008:6)– "the British were establishing themselves as dominant traffickers of Indian and Chinese coolies." Ultimately, the British would dominate the Indian coolie trade, and U.S., French, Spanish, and Portuguese vessels would control the Chinese one (*Ibid*.:8). Interestingly, the six chief shippers of Chinese coolies, namely, Britain, France, Spain, the U.S., Portugal, and the Netherlands, were also the leading African abductors (*Ibid*.:18). Yet, coolies were not necessarily a substitute for enslaved Africans. In places like Cuba, Chinese coolies and enslaved Africans coexisted. In fact, their importation of enslaved Africans grew during the coolie period (1847-74), "complicating any argument that the increased need for contract labor is predicated upon the absence of slave labor" (*Ibid*.:7). This shows that, in several cases, the Chinese bonded workers constituted a labor *addition* rather than a *transition* (from African slavery) amid an ever-expanding process of capitalist agricultural production.[134]

Most imported Chinese *bonded* workers to the Americas ended up in Cuba and Peru, although many others reached destinations such as Brazil, Costa Rica, Guyana, Jamaica, Mexico, Panama, and Trinidad (*Ibid*.:6).[135]From 1840 to 1874, some one million Chinese left Kwangtung

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[134] The thesis that, under capitalism, *additions* (*e.g.* of energy or food sources) have occurred instead of *transitions*, has been a powerful contribution to environmental sociology recently. The work of Richard York has been crucial in this regard. For example, he showed that despite fossil fuel consumption has increased historically, this did not translate into a decrease in the use of whale oil, which in fact also increased (York 2017). Likewise, he has shown that, today, renewable energy sources are not replacing fossil fuels, and that both sources continue to grow, despite rapid growth in renewables (York and Bell 2019). York (2021) has also shown that the growth in consumption of lower-impact meats has not suppressed other meat sources. An analogous phenomenon occurred with coolie labor in places like Cuba and to a lesser extent Peru (and elsewhere) during the 19th century, wherein Chinese bonded workers did not replace enslaved Africans, whose numbers sometimes, in fact, increased, despite the presence of Chinese workers.

[135] "Those who went to the United States went much more willingly, did not sign long-term contracts that limited their mobility to the same degree, and did not experience the same level of physical abuse. The labeling of Chinese

(or Guangdong) province alone as part of Western labor traffic, with about a quarter million going to Cuba and Peru (*Ibid*.:14). Let us analyze why, when, and how the Chinese bonded workers arrived in Peru.

5.2. Chinese bonded workers in Peru (1849-74)

On early October 1849, the Danish ship *Frederick Wilhelm*, captained by G. Paulfin (or Paulsen, or Paulsan) arrived in Callao, bringing merchandise and 75 Chinese bonded workers from the port of Cumsingmoon (Hong Kong) –from which it had departed on 7 June last– possibly via the Indian and Atlantic Oceans (Rodríguez Pastor 2017:70). These coolies were the first among some 100,000 Chinese that would reach Peru between 1849 and 1874, when, as we shall see, this traffic ceased. Chinese bonded workers first reached Peru under an immigration law retroactively approved on 17 November 1849, in what constitutes a clear example of how economic needs determine the judicial apparatus of a society. This law[136] signed by President Castilla (1845-51), the Senate's president, and the vice-president of the Chamber of Deputies, sought to promote foreign immigration into Peru given "the degree of prostration that the country's agriculture is in due to the lack of labor" (*cf.* Dancuart 1903b:175). That is, the government's chief rationale behind the importation of Chinese bonded workers was to increase labor-power *vis-à-vis* agricultural production. Specifically, this law would award any introducer of foreigners a premium of 30 pesos (taken from the guano proceeds) per individual of any sex brought into Peru, provided that at least 50 were imported, and that their ages ranged from 10 (*i.e.* children) to 40 years old. This law gave Domingo Elías[137] –one of Peru's wealthiest landowners and a personal friend of Quirós (FO 177/68 1855)– and Juan Rodríguez the "exclusive privilege for a term of 4 years, with the foregoing 30-pesos premium, for each settler from China that they

immigrants in the United States as "coolies" had much more to do with a racist desire to degrade these immigrants and exclude them from the country, since slavery was ending by the 1860s and white Americans seriously had to entertain the thought of integrating non-white people" (Narvaez 2010:41). Also, see Campbell (1923) for a study of Chinese coolie emigration to countries within the British Empire.

[136] See Appendix for a whole transcription of this law, officially known as "China General and Special Immigration Law" or, more commonly, as "China Law." See also Dancuart (1903b:175–76).

[137] Domingo Elías (1805-67), the son of a Spanish official and a Peruvian mother, was born in Ica, Peru, and studied in Spain and France. "He was purportedly the first in Peru to raise cotton commercially on a large scale, and to make wine in the European manner…he was the first serious…civilian candidate for the presidency. He led the revolution of 1854 against Echenique, became finance minister in the new revolutionary government, and later served as ambassador to France" (Levin 1960:87).

introduced in the Departments of Lima and La Libertad." That is, initially, Chinese bonded workers were to be destined to the cotton, sugar, and Elías's wine coastal estates in Lima and La Libertad. This law would be valid until 19 November 1853, when President Rufino Echenique derogated it (Dancuart 1903b:176; Rodríguez Pastor 2017:64).

Importantly, Méndez (1987a:51) and others have challenged the "lack of labor" explanation of why Peru imported Chinese bonded workers, as it reinforces the perspective of Peru's oligarchy at the moment. While there was, indeed, a shortage of labor-power at the Peruvian littoral –despite African enslaved labor still existed and would persist until 1854– the chief problem for Peru's ruling class was the lack of *cheap* and/or *disposable* labor (Méndez 1987a:52). In fact, according to data in Yun (2008:17), Chinese coolies were, on average, roughly 40% cheaper than enslaved Africans in the period between 1847 and 1875. "In crude terms" –continues Yun (2008:17)– "coolies were easier to procure and cheaper to purchase, making them… enormously profitable commodities." In addition, landowners were unsuccessful in recruiting indigenous peasants from the remote Andean regions, as these resisted being "proletarianized." Landowners were unwilling to assume the high costs unfree workers entailed (Méndez 1987a:66). Conversely, coolie contracted labor was very cheap, since the social reproduction of this workforce was not an issue. Indeed, the workers were used up and replaced quickly (they had a lifetime of only a few years), and bonded labor did not allow for their reproduction. Since these bonded migrant workers could be tied for a fixed period to a productive unit without the ability to leave it, their labor productivity could be intensified through physical violence and other means, and they lacked any external social bonds and rights (Loustaunau *et al.* 2021:9). As Peruvian politician and scholar Eugenio Larrabure revealingly put it back then: "there is no way to sufficiently compensate the security of being able to have a man at the moment he is required, no matter the time or the day...What is paid for and beyond price in the settler [*sic*] from China is not the labor but that security" (quoted in Macera 1977:192).

Most of the coolies that were taken to Peru (and Cuba) were members of the Cantonese society and resided in the vicinities of the Pearl River Delta, in the agrarian province of Kwangtung (or Guangdong) (Helly 1993:17). Here, land was collectively owned by clans and, during the mid-19th century, peasants were seeking to cultivate productive and profitable crops such as cotton, tea, and silkworm mulberry (*Ibid*.:19). This region had been lately experiencing a series of internal crises that were aggravated by the penetration of western nations, chiefly

Britain (*Ibid*.). The growing towns in the region became increasingly inhabited by peasants, beggars, discharged soldiers, artisans, and ruined petty merchants, and misery and instability prevailed. For instance, many Chinese in Hong Kong, a British colony, were criminalized by English law, creating a considerable surplus population that became a source for the coolie trade (Lowe 2015:110). British, French, Spanish, and United States merchants profited from recruiting these people as cheap and disposable migrant labor. Most men that left Kwangtung in the 19th century were the "first of their line to emigrate," and did so typically alone, leaving their families, language, culture, and homes behind (*Ibid*.:20). They were primarily males between 20 and 30 years of age, who "had in no way imagined that they were renouncing their condition as free men when they agreed to work in some distant, unknown land" (*Ibid*.:21).

5.2.1. Abduction or deception: the barracks and the contract

Roughly, the process of procuring Chinese labor-power unfolded in the following way. First, a captain or agent of a Peruvian "dealer" would contact a local labor agent, to which he would pay between 60 and 80 pesos per person recruited. This local agent (who may or may have not been Chinese) furnished a designated number of coolies to the captain. If the actual figure was below the target, the local captor would send out his subagents, known as "runners" or "crimps" (who were always Chinese), to search for more people to abduct. These "crimps" usually looked for the poorest and hungriest of Chinese, and would charge between 3 and 10 pesos for their service (Stewart 1951:33–38). After being abducted or deceived by the "crimps," the Cantonese along the Pearl Delta were locked up in barracoons in Macao (and to a lesser extent in other ports such as Amoy, Swatow, Hong Kong, Canton, Whampoa, and even Annan and Manila) (*Cuba Commission Report* 1993:38; Narvaez 2010:96; Rodríguez Pastor 2017:51; Stewart 1951:38–39).[138]The overwhelming majority (>99%) of them were male, in a deliberate aim by the traffickers to create a mass of cheap, disposable, and migrant labor that would not settle and

[138] Humberto Rodríguez Pastor (2017:55), the leading scholar on the Chinese in Peru, opines that when the *Cuba Commission Report* (1993) makes statements about Cuba or Havana, "they may well be substituted for Peru and Callao or Lima [since the] similarities in the coolie traffic and agricultural work and domestic servitude in these two countries are two drops of water in their characteristics and similarities." In addition, some of the same ships were used for the traffic of Chinese to both countries, part of which had been in turn used for the African slave trade (Narvaez 2010:108; Yun 2008:18). Yet, Chinese bonded labor in both societies also exhibited differences. For instance, in Peru's case, it existed within a nascent republic where slavery was banned in 1854, whereas, in Cuba it developed in a Spanish colony where African slave labor would persist until 1886.

socially reproduce overseas (Narvaez 2010:80; Rodríguez Pastor 1989:68).[139] In addition, most of the decoyed Chinese were well under 30 years of age (Rodríguez Pastor 2017:125). In fact, some of them were just 11, 12, or 16 years old (*Cuba Commission Report* 1993:40). In the barracks, the Chinese were forced to sign contracts –which they did not understand, as they were written in Spanish and at two thirds of them were illiterate (Stewart 1951:44)– to then embark on a long and most likely one-way journey to Peru or Cuba. As was stated by Yeh Fu-chün and 52 other Chinese:

> After entering [the barracks], the gates were closed by a foreigner, and as all exit was prevented we perceived how we had been betrayed, but there was no remedy; in the same chambers were more than 100 others, most of whom passed their days and nights in tears, whilst some were dripping with blood, –the result of chastisements inflicted on account of a suspected intention of escape (*Cuba Commission Report* 1993:39).

Sometimes the captured Cantonese were also misled at this stage by being told they were signing the contracts on behalf of someone else, that Annan or Singapore would be their destinations, or that they could always come back if the place to which they were journeying was not of their liking (*Cuba Commission Report* 1993:40–41). Importantly, it was the *contract* –and the *wage* it entailed– that legally and formally distinguished this form of labor from others, even though, in actuality, its oppressive conditions were extremely harsh.[140]

Framed under the bourgeois illusion of "equal exchange" (of labor-power for a wage, taking a legal form), these contracts[141] stipulated that the Chinese "freely and spontaneously" agreed to work exclusively for a given Peruvian employer for a period of eight years in exchange for a salary of four pesos a month. The contracts also included clauses on sick leave, clothing,

[139] According to Peru's national census of 1876, the total number of Chinese men and women in the region in the provinces of Pacasmayo, Trujillo, Chiclayo, and Lambayeque, was 12,849 and 15, respectively (*i.e.* 99.88% and 0.11%, respectively). At a national level, in 1876, there were, according to the census, 49,668 Chinese men (99.37%, and 311 (0.63%) Chinese women (Rodríguez Pastor 1989:68).

[140] It lies beyond the scope of this research to delve into the debate of whether Chinese coolie labor constituted a form of slavery, semi-slavery, or "free" labor (Narvaez 2010:16–22). Narvaez (2010) argues that coolie labor was neither slave nor free labor, although it showed certain features of both. Rather, it was a distinct and unique emergent labor relation that was not reducible to either. Yet, Narvaez's assumption that there exists a gradient between slavery at one pole, and free labor at the opposite one, is problematic.

[141] See Appendix for the full transcription of an 1860 Coolie contract for Peru. See also Rodríguez Pastor (1989:298–301). Stewart (1951:42–44) also offers a transcription of an 1868 contract. Likewise, Trazegnies Granda (2016:138) includes a copy of an 1869 contract in his thorough work. *Cf.* also FO 61/134 (1852:88–91) for a transcript of a 25 January 1852 coolie contract with Elías, whereby the worker agrees to embark onboard the *Susannah* and labor at an estate in Arica or Islay.

the deduction of one monthly peso until travel expenses to Peru were recovered by the employer, one daily hour of rest for each of their two meals, and the agreement on three days of leisure a year to celebrate religious rites. Importantly, at least as early as 1860, the contracts included a clause stating that the coolie would engage in any kind of labor "that may be demanded of me…But not in the work of extracting guano in the Islands." "It was the truly infernal conditions under which labor was performed in the guano beds" –argues Stewart (1951:84)– "that led to the insertion of the prohibitory clause," a result of the British anti-slavery movement against the coolie trade (Loustaunau *et al.* 2021:18–19). Yet, in fact this clause would be seldom enforced. Moreover, the contracts stated they had been repeatedly "read in a loud voice, and slowly" to the coolies, and were signed by four people: the coolie's future employer, the ship's captain, a Peruvian or Portuguese consul, and the coolie himself (*cf.* Rodríguez Pastor 1989:298–301). These documents are revealing in another way. As Trazegnies Granda (2016) has shown, the coolie contracts were verbatim translations of 16^{th}- and 17^{th}-century North American indenture servitude contracts. In the coolie contracts and most Peruvian official documents and media, Chinese bonded workers were called *colonos asiáticos*, which in English means "Asian settlers." Yet, Chinese bonded and migrant workers were never considered settlers either in Peru or in Cuba (Loustaunau *et al.* 2021:16; Narvaez 2010:3).

The barracks where these contracts were signed were guarded by armed men, and if the Chinese refused to sign them they were punished, tortured, or even executed (Helly 1993:21). Some of the coercive methods applied included being threatened with imprisonment, beaten, or confined inside privies. It was not uncommon that the guards would also cut off the Cantonese's' braids, which seems to have caused them a deep sense of humiliation and identity loss, partly because they symbolized loyalty to the Chinese government (*Cuba Commission Report* 1993:40; Narvaez 2010:1; Yun 2008:141). Although some Chinese might have willingly embarked on the journey to the Americas (though with little idea what they were in for, some thinking, for instance, they were bound for the Californian gold), 80% of those taken to Cuba "declared that they had been kidnapped or decoyed" (*Cuba Commission Report* 1993:33). A piece in the newspaper *La Patria* reached the same conclusion for the Peruvian case (*cf.* Stewart 1951:38). "We are sinking in a strange place and living in a hell on earth," read a group petition of coolies descending into a "hellish system of bondage" (Yun 2008:36). Once the contracts were signed, the crammed coolies were taken to the ships, with Westerners with guns and swords standing by as they boarded. And yet their nightmare –claims Narvaez (2010:1)– was just beginning.

5.2.2. On board the "devil-ships": the one-way journey

Once on board the "devil-ships," as the Chinese called them (Helly 1993:21), things did not get any better. As Li Chao-ch'un and 165 others narrate (*Cuba Commission Report* 1993:42):

> when quitting Macao, we proceeded to sea, we were confined in the hold below; some were even shut up in bamboo cages, or chained to iron posts, and a few were indiscriminately selected and flogged as a means of intimidating all others; whilst we cannot estimate the deaths that, in all, took place, from sickness, blows, hunger, thirst, or from suicide or by leaping into the sea.

The flogging of the Chinese during their journey to the Americas was illustrated in an 1864 article for the *Harper's New Monthly Magazine*, accompanied by a hideous title (*cf.* Holden 1864:5) (Figure 5.1).

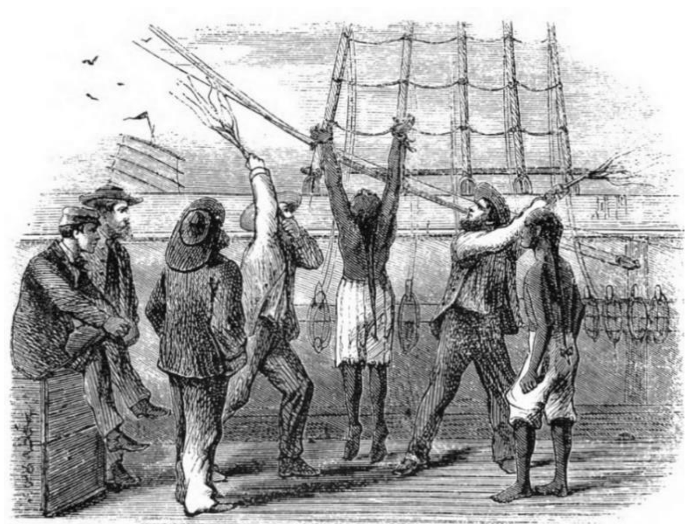

Figure 5.1. "Preserving the peace." The flogging of a coolie. Taken from Holden (1864:5). See also Stewart (1951:67).

Several other Chinese remarked that "there was no water issued [and] it had to be bought…for a dollar. The hatchway only allowed one man at a time to come down or go up, and the stench below from the crowd was most offensive" (*Ibid.*:42). The mortality rate in these ships was commonly high.[142] For instance, nine months after the arrival of the *Frederick Wilhelm*, the

[142] See Stewart (1951:67) for a recount of some journeys of exceptional mortality.

second vessel transporting Chinese for Elías (and Rodríguez) anchored in Callao on 27 June 1850. It was the 763-ton British ship *Lady Montague* captained by J. Wells, which had left Cumsingmoon (Hong Kong) on 17 February last, carrying 416 bonded Cantonese, of which 215 (~52%) perished during the 5-month journey, due to a disease (which also affected the crew), and the ingestion of rotten fish and "unfit water" (*Annual Register* 1853:120; Rodríguez Pastor 2017:75). Only 201 coolies made it to Callao, who were then delivered to Elías as if they were merchandise (*Ibid.*:66). Although the number of deceased onboard the *Lady Montague* was exceptionally high, the fact of the matter is that, in most ships that transported coolies to Peru, deaths ensued, given the infamous conditions (of hunger, thirst, and/or disease) in which they were kept, because they were beaten to death, or because they committed suicide, commonly by jumping overboard and drowning, hanging themselves below deck, smoking too much opium, or even setting the ships (and thus themselves) on fire (Narvaez 2010:123; Stewart 1951:72).[143] It appears that by committing suicide, for instance, some coolies believed they would resurrect back in China (*cf.* Macera 1977:222; Rodríguez Pastor 2017:171).

Importantly, the coolies exerted profound resistance in practically all the journeys to Peru (and Cuba). As was stated by an 1871 editorial in Peru's paper *El Comercio*: "it can be established in an almost absolute manner, and without possibility of denial, but for one or another very rare exception, that there is not a boat that arrives in Callao with Chinese immigrants, on which there has not been one or more uprisings, or threats of uprisings, at least, during the voyage" (quoted in Stewart 1951:69–70). Interestingly, too, sometimes the Chinese would be allowed to practice several forms of entertainment such as playing music, dancing, acting, weaving, and gambling (with dominoes) to make their journey more endurable (Narvaez 2010:115; Stewart 1951:61). It seems that musical instruments such as violins, flutes, tambourines, and drums were sometimes provided to the Chinese (Stewart 1951:61).

During the first years of the coolie trafficking to Peru, the route followed by vessels was not across the Pacific Ocean (over 18,000 km), but, as noted, through the Indian and Atlantic Oceans, as was the case with the ships bound for Cuba. This passage (of roughly 26,000 km) took about five months to complete, as opposed to the three to four months from Macao to

[143] Rodríguez Pastor (2017:38) offers a list of selected known mutinies that occurred onboard the ships, including cases of fires such as those in the *Napoleon Canevaro* (1866), *Uncowah* (1869), and *Don Juan* (1869). The *Dolores Ugarte* would also be set on fire (1871) (Narvaez 2010:3). For instance, in March 1866, the Italian *Napoleon Canevaro* "was burnt with nearly all coolies on board" (*cf.* FO 61/233 1866:365–70).

Callao via the Pacific (Rodríguez Pastor 2017:51; Stewart 1951:18). The coolies' daily food supply consisted, in principle, of about 1.5 pounds of rice, 0.3-0.6 pounds of meat (pork, beef, or fish), 0.5 pounds of vegetables, 0.3 ounces of tea, one gallon of water, and firewood for cooking (Stewart 1951:64). All told, about 100,000 Chinese embarked for Peru onboard 254 ships between 1849 and 1874, with some 10,000 (~10%) perishing throughout the journey (Martinet 1878:32; Renoz 1897:206; Rodríguez Pastor 2017:36,105).[144]

Figure 5.2 shows the number of coolies that embarked in China and arrived in Peru between 1849 and 1874, also displaying the proportion that perished during the journey. As can be noted, this traffic occurred in two waves: first from 1849 to 1856, and then between 1861 and 1874. Some 13,000 bonded Chinese arrived in Peru between 1849 and 1860 (representing only about 14% of all coolies that made it to this nation while this traffic lasted). On the other hand, more than 73,500 coolies (86% of the total) reached Peru from 1861-74, with more than 80% of them doing so during the last 10 years of the trade (1864-74), during the presidency of José Balta (1868-72). While slowly growing since 1849, this traffic fell in 1854, to again augment in 1855, following the abolition of slavery in Peru, proclaimed in Huancayo by President Castilla on 3 December 1854 (Rodríguez Pastor 2017:104). Then, from 1856-61, as shown in Figure 5.2, the number of Chinese reaching Peru decreased considerably, with only 621 cases from 1857-58. This occurred because, on 5 March 1856, Castilla abrogated the coolie trade on the grounds that it did "not suit the country" and had "occasioned repeated catastrophes," and thus they could not "authorize an abuse as repugnant" (Stewart 1951:21–22). Yet, almost 3,000 coolies (~3% of the total) still reached Peru from late 1856 to 1861, 700 of which would work in the construction of a short railway from Lima to Chorrillos, for which Peru's government made a deal with Candamo & Co. (Costa y Laurent 1908:45–46; Stewart 1951:22–23).

Between March 1856 and July 1857 alone, amid the prohibition, nine vessels transporting coolies (*e.g.* the *Isabel Quintana*), and then the U.S. *Nightingale* (in April 1860) and the *West Ward Ho* the following month, would transport Chinese to Peru (Rodríguez Pastor 2017:53–54). Yet, on 14 March 1861, although opposing it, Castilla himself would approve –under the pressure of local cotton landowners– the reintroduction of coolies into Peru, arguing that

[144] As for Cuba, some 142,000 coolies were sent to this nation aboard 342 vessels (30% of French flag, ~23% of Spanish flag, ~10% of British flag, and ~10% of U.S. flag, the reminder being mostly Dutch and Portuguese) in the period from 1847 to 1874, with more than 16,000 (~12%) dying during the voyage (*Cuba Commission Report* 1993:42; Yun 2008:7,19).

“agriculture was essential to every society” and that there was a labor shortage following the abolition of slavery in the country (Dancuart 1904:213; Maude 1986:2; Stewart 1951:113). The trade would then attain unprecedented proportions and not stop until its final demise in 1874.

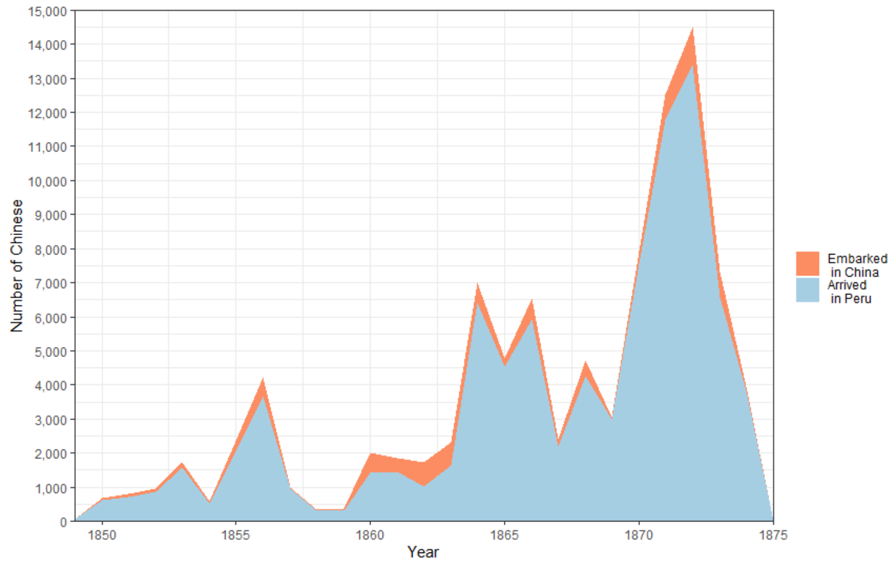

Figure 5.2. Number of coolies that embarked in China and arrived in Peru, 1849-74. Made with data from Martinet (1878:32); Renoz (1897:206); and Rodríguez Pastor (2017:36,105). Mortality rate from 1850-54 estimated by the author at 10% (the rough average of the entire time span) due to missing data.

As Figure 5.2 also shows, from 1860-63, the mortality rate of the Chinese during the voyage was extremely high, reaching an average value of 30.8%, despite several measures were allegedly taken to assure their well-being on the ships, such as not embarking more than one coolie per register ton.[145] As Stewart (1951:62) succinctly put it: “What a ghastly sacrifice of human life for monetary gain!” In addition, scandals such as that of “the branded 48” (apparently on 4 May 1868, in Lambayeque, a landowner branded a “C” with a hot iron in the neck of 48 coolies that had just arrived to his estate) resulting in a temporary suspension of the trade from 18 November 1868 to the middle of 1869 (*El Comercio* 1868, 1869; *cf.* also Stewart 1951:148–50).

Lastly, as was the case with the guano, the Chinese, treated as commodities, would also be consigned to over a dozen trading houses; especially to Canevaro & Co. which, as noted, in

[145] Then, on 9 October 1864, a regulatory decree was published in Peru, which sought to improve the conditions of the journeying Chinese. It included clauses on food, personal space, clothing, rest, health and medicines, and consular responsibilities. An additional decree issued in 1868 further reduced the number of allowed passengers to one per two tons of registry (*cf.* Stewart 1951:63).

fact also made a guano contract with the Peruvian government in 1847 (see above). Throughout the whole coolie traffic to Peru (1849-74), Canevaro & Co. introduced and sold 20,556 people, more than 20% of the 100,000 Chinese that entered the country, which occurred only within the last 15 years of the trade (Rodríguez Pastor 2017:111). Importantly, many of the ships experiencing the highest mortality rates were consigned to this house (*cf.* Stewart 1951:67). The *Compañía Marítima del Perú* (Maritime Company of Peru) also introduced some 14,000 (~16%) of Peru's coolies. Other important consignees were Juan Ugarte, Juan Figari and Sons, Candamo, García & Co., J. Sevilla y Zaracondegui, Alejandro Estienne & Co., W.M. Robinet, Muro, Bianchi & Co., León Bollé, Dimaly Filgueira, the Comapañía Nacional, and, of course, Domingo Elías, among others (Rodríguez Pastor 2017:115; Stewart 1951:83).

5.2.3. Arrival in Peru: humiliation, exploitation, and bondage

Following a long and dreadful journey, more misery awaited the coolies that had survived the passage. After disembarking, within 48 hours after they were brought to port, "Cubans and Peruvians stripped the Chinese down to nothing so that sellers and potential buyers could physically examine them and establish prices as if they were buying and selling beasts of burden" (Narvaez 2010:126). "Thin and wan enough they look –said contemporary critiques– "even the stoutest of them are, sometimes, mere 'bags of bones'" (in Stewart 1951:79). A prospective buyer, usually joined by an "expert in sizing up a man's strength and character," would examine the Chinese and make his selections (Stewart 1951:81). An 1873 text in the *South Pacific Times* stated that: "It seems to be the correct thing to squeeze the coolie's *biceps*, give him a pinch or two in the region of the ribs, and then twist him around like a top so as to get a good glance at his *physique* generally" (quoted in *Ibid*.). Yeh fu-chün and 52 other Chinese stated that "when offered for sale in the men-market we were divided into three classes –1st, 2nd, and 3rd, and were forced to remove all our clothes, so that our persons might be examined and the price fixed. This covered us with shame" (*Cuba Commission Report* 1993:48). Another 159 Chinese observed that they were "all naked when we were examined by buyers," and others remarked that their braided hair was cut off, as also occurred in the barracks (in Yun 2008:141).

The Chinese who were perceived as most robust would be bought for some 350 to 500 pesos (£70-100) (Narvaez 2010:127). Over a period of eight years, the buyers would annually spend between 200 and 300 pesos in the manutention of a Chinese, considering their initial disbursement, together with wages and food, clothes, housing, and medicine costs, among others (Renoz 1897:204; Rodríguez Pastor 1989:27). Once the coolies were bought as merchandise,

> the cargo is disposed of. The newly acquired laborers, in charge of an overseer, are marched off for their new scene of labor through the streets of Callao and Lima where the ever-present ragamuffins entertain themselves by shouting at [them] the phrase "Chino Macao!" The ship that brought them is readied for a new voyage, and the dealer turns to a new *negocio* [business] (Stewart 1951:82).

Most of the Chinese would be taken to work at a cotton or sugar (and less commonly alfalfa) coastal estate in the departments of La Libertad and Lambayeque, although several were also taken from Callao to nearby Lima to perform domestic labor (Rodríguez Pastor 1989:39). Yet, perhaps the most unfortunate would be taken to the Chincha Islands to dig up the guano. As stated by Stewart (1951:95): "All evidence indicates that the worst type of labor to which the coolie in Peru was condemned was that of the guano beds." Importantly, Méndez (1987a:63) argues that, although the living conditions of the Chinese at the Chinchas were indeed extremely cruel, they were not very different from those at the plantations. The estates were seldom visited by either domestic or foreign witnesses, unlike the Chinchas, which were continuously frequented by international crews, travelers, journalists, and merchants. Thus, even less testimonies of the living conditions of the Chinese at the estates prevail. Her point is not to downplay the agony experienced by the Chinese at the guano islands but, rather, to emphasize that their suffering also extended beyond them, into the concealed Peruvian countryside. Yet, being stranded in a remote, barren island, with the skin cracked by a hot sun, and constantly inhaling the foul dust of guano, all while being chastised and harshly exploited makes the guano islands a uniquely infamous setting. Let us, thus, briefly examine coolie labor in these "slaughterhouses."

5.2.4. The Chincha Islands: "The slaughterhouse of men"

We thus reach the essence of the guano trade: the expropriation of nature and the exploitation of labor at the Chinchas. Unfortunately and revealingly, there is scarce firsthand information about how the ecology and labor entwined at the Chinchas during 1840 to 1880, especially regarding the earliest years. Little is known and said about the sorrows, joys, and concrete circumstances that transpired upon these rocks, and even less so about the ecological perturbations at the heart of this episode. Yet, let us analyze it through the few sources that do exist, and shed light on the concrete and intriguing daily life upon these rocks. Importantly, as Méndez (1987a:28) reminds us: "The chronicle of life on the islands becomes a chronicle of violence on the islands."

As noted, since the guano trade started (following the signing of Quirós's contract on late 1840) and up to 1849, the foregoing contractors had taken care of supplying the capital, tools, and labor necessary to extract the guano from the Chinchas. Tellingly, no contract makes any explicit mention of the nature of this labor, which shows how little importance the contractors and the Peruvian rulers gave to these subjects, except as disposable arms used to dig up and load the guano. In order to manage guano extraction, the contractors would subcontract the services of local traders, principally those of Chilean Cipriano Román (*cf*. Chapter 3). Although Barroilhet and Duetz seem to have handled the process in the early 1840s, throughout this decade, it was chiefly Román who would oversee handling the labor, tools, and supplies that made guano extraction possible (Mathew 1977a:37). He would recruit the first guano laborers from Pisco, a small coastal town of some 3,000 residents, roughly 20 km southeast (about two hours) of the Chinchas. Thus, the guano workers throughout the 1840s were chiefly natives from Pisco and nearby towns such as Ica, Cañete, and Chincha, in addition to some foreigners (probably Chileans and Ecuadorians) (Méndez 1987a:12,43,66; M.H.C. O.L. 318 1846).

At this stage, there may also have been a few enslaved Africans, and perhaps a small number of Peruvian inmates, although there is no evidence to support those claims.[146] As we shall see, the workforce composition would change entirely from the 1850s on. The coastal natives were procured by Román and his "Guano Company" through a debt system known as *enganche* (hook) –also common in plantations and mines– and consisting in giving the workers 8 to 10 pesos that would then be discounted from their wages. Most of these workers were temporal. Between 1840 and 1854, only 13 of them –including for example Melchor Arredondo and Juan de Ríos Carpio– would have settled at the Chinchas (Méndez 1987a:20). Román would also be in charge of providing all the goods to supply the islands, and it seems that he took advantage of this monopoly by, among other things, making the workers buy more supplies than they needed or asked for (Méndez 1987a:12; M.H.C. O.L. 318 1846).

[146]Levin (1960:86) states that most guano laborers throughout the 1840s were convicts and army deserters, "supplemented with a few slaves," and hired Peruvian and Chilean workers. Mathew (1977:40) endorses this view. But neither Méndez (1987a, 1987b) nor me have found any evidence supporting this. It seems that Levin extrapolated workforce data from the 1850s, cited in Castañón *et al.* (1854), to the 1840s.

There exists some information about the conditions of these local workers at the Chinchas. A certain Francisco y Guerra, who on 15 September 1846 visited the islands along with Román and others, referred to the "excessive and arduous work" carried out by them (M.H.C. O.L. 318 1846). Nine days later, in a letter to Manuel Frías, governor of Pisco, a certain Diego Echeverría remarked that there were no less than 200 workers at the islands, that their weekly salary was four *reales* (two shillings) in cash, and that they were required to fill and carry 20 bags of guano, of about 50 kg (~110 lbs.) each (*i.e.* one ton total), per day (*Ibid*.).[147] Another contemporary observer –an anonymous British sailor– recalls, in a detailed piece written for Charles Dickens's weekly magazine *Household Words* (a title inspired by Shakespeare) that the workers, oftentimes naked, "carry the whole of the guano down their backs, taking about eighty pounds at each journey," and that "they toil very hard…when relieved [they are] thoroughly exhausted and streaming with perspiration" (Anon 1852:45,46). This onlooker also remarked that the laborers "work in the night and smoke or sleep all day," and that those who loaded the guano into the ships would wear only a "bunch of oakum tied firmly over the mouth and nostrils so as to admit air and exclude the dust" (*Ibid*.:44,46). How these workers "contrive to exist at all in such an atmosphere is a matter of astonishment," said a contemporary Canadian agriculturalist who visited the islands (Anon 1854:399).

To avoid any fraud, the workers would be given a copper coin for every bag of guano they filled and carried, and then a bigger coin once they reached their daily 20-bag goal, which they would in turn give to Román in exchange for their weekly wage (M.H.C. O.L. 318 1846). In addition, Echeverría states that they could get an additional daily piecemeal wage of 12 to 24 *reales*, proportional to the amount dug up. They would apparently get this money at Pisco or Ica, where they would spend it in "rum and ale" during weekly or fortnightly visits (*cf.* also Anon 1852:44). As for their diets, the workers ate charqui (a Quechua word for jerky), beans, rice, some vegetables, fruit, and sometimes fresh meat, twice a day. Román oversaw this distribution. Moreover, the workers would sleep

> on a small space cleared of guano [consisting] of twenty or thirty miserable shanties, each formed by four slender posts driven into the ground, with a flat roof of grass matting and pieces of the same material stretched on three sides, the other side being left open. Scarcely an article of furniture do these town residences contain, except a few rude benches, two or

[147] It was also known that the loading process was not very efficient, and that there were considerable amounts of guano being lost to the ocean. There were also other sorts of guano loses. For instance, in the morning of 4 October 1846, 200 tons from the North Chincha sank after a container holding them cracked (M.H.C. O.L. 318 1846.).

> three cooking-pans, and some tin pots…The beds are simply thin mats, and only a few of the inhabitants possess the usual red blanket of the Peruvian (Anon 1852:44).

Alcohol consumption (mainly of a local brandy called Pisco, like the town) was also prevalent at the islands and seems to have incited several disruptions. Lastly, Echeverría also claims to have contained, "with my presence…the movement of the peons that work [in the islands], by the rise made in one of them of one real on top of the four that were assigned to them" (M.H.C. O.L. 318 1846). Interestingly, around the time Engels (2009) was denouncing the condition of the working class in England, we encounter not too different exploitation conditions at the Chinchas, over 10,000 km away.

In 1849, an important change in the guano workforce started to develop. As noted, this year, at the contractual level, the guano trade shifted from relying on commission contracts to consignment ones. There was a parallel change at its material basis: as the Peruvian government vainly sought to have a more direct control of the trade and to expand extraction, on 18 December 1849, it signed a contract with Domingo Elías who would, for a period of six years, be in charge of handling guano *extraction*, receiving 12 *reales* (6 shillings) per ton in the process, while Antony Gibbs & Sons, as noted (*cf.* the 4 January 1849 contract above) would take care of *selling* it on consignment (Mathew 1977a:37; Piérola 1853:169). For the first time since the trade had begun and hereafter, guano extraction and selling ceased to be a single enterprise (Méndez 1987a:12).

Not accidentally, this period coincided with an under-supplied guano market in Britain, apparently due to loading delays at the Chinchas (Mathew 1981:88). Thus, within a month (17 November to 18 December, 1849), "Elías had secured two distinctly profitable privileges: the right to import labourers and claim a subsidy for doing so, and the right to remove guano from the Chincha islands. The two fused when he decided to make use of the Chinese for guano digging" (Mathew 1977a:41). Thus, it was Elías who was responsible for introducing the Chinese bonded workers into the guano islands. And, in fact, it was also him who, authorized by the Peruvian government, systematically brought prisoners (including political prisoners), army deserters and conscripts, and some of his mainland slaves, to the Chinchas during the early 1850s (Mathew 1977a:41; Méndez 1987a:59; Piérola 1853:166).[148] The British approved of (and in fact

[148] Today, some streets across Peru in cities like Lima bear the name of this gentleman that exploited so many people.

conceived) this enterprise. As British consul in Arica George H. Nugent said to Peru's British consul general, W.P. Adams, in an 20 August 1852 letter: "[it seems] the Chinese would become a valuable acquisition, where labourers are scarce, and where a tropical sun, which does not affect them, almost incapacitates Europeans from devoting their greater muscular powers to the cultivation of the soil" (FO 61/134 1852:82).

The exact date when coolies first reached the Chinchas is not known, although it certainly occurred sometime between 1850 and the end of 1852. Our foregoing sailor, who visited the Chinchas around 1850, observed that there were roughly 280 workers on the Islands (probably an underestimate); 200 on the North Chincha, and some 80 on the Middle one (Anon 1852:44; Méndez 1987a:46). "These people" –continues the mariner– "are nearly all Indians…everything about them, eatables included, is impregnated with guano" (*Ibid*.). Méndez (1987a:46) also observes that they were eating charqui, a staple food in the diets of the indigenes around Pisco. These testimonies strongly suggest that there were still no Chinese (or African, or convict) workers at the Chinchas around 1850, and probably even by early 1852 (*cf.* FO 61/134).[149]

Yet, we know for a fact that there were already almost 600 Chinese at the Chinchas in 1853. Nicolás Fernández de Piérola (1853:166), then Peru's Minister of Finance, offers a figure of 599 coolies, and Méndez (1987a:46), based on official information from the Chinchas Governor's Office, of 588, out of a total of 840 or 960 guano workers, respectively. That means that between 61 to 71% of the workers at the Chinchas in 1853 were Chinese, thus already constituting the chief guano workforce.[150] Moreover, according to data by Castro de Mendoza, 4,228 coolies had arrived in Peru between the beginning of this traffic in late 1849 and the end of 1853 (quoted in Rodríguez Pastor 2017:105). This means that roughly 14% of all the coolies that had reached Peru by the end 1853 were employed in the guano business. This proportion would decrease throughout the years, as the number of coolies working at the islands stabilized, while their presence in the estates and in Lima would keep augmenting. All told, over 90% of all the

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[149] Interestingly, Giuseppe Garibaldi (1807-82), the foremost figure of Italian unification, visited the Chincha Islands on 11 November 1851 onboard the *Carmen*. Garibaldi left the Chinchas on 10 January 1852 with a cargo of guano bound for China. Unfortunately, he did not leave any testimony of the workforce at the islands. Garibaldi then returned to Peru on 28 January 1853 with a shipment of coolies destined for the mainland estates (Garibaldi 1889:64; Rodríguez Pastor 2017:60).

[150] Similarly, on the mainland, "probably at no time were there less than 80 per cent of the Chinese on the plantations" (Stewart 1951:89).

coolies that arrived in Peru were destined for the estates (Stewart 1951:89). Table 5.1 shows the composition of the workforce at the Chincha Islands in 1853, and Figure 5.3 shows the proportion of workers by origin at the North Island for the same year. In addition, Table 5.2 shows the number of Chinese workers at the islands for the years there is available data between 1853-67. As can be seen, the number of Chinese workers seems to not have varied greatly during these 14 years, with a minimum of about 500 and a maximum of 750 or 800. Taking all these numbers together, there was an approximate average of 633±116 coolies at the Chinchas between 1853 and 1867.

Table 5.1. Composition of the workforce at the Chincha Islands, 1853.

Island	*Origin*	*Number*	
North	Chinese	262	
	Prisoners	209	
	Free workers	130	
	African slaves	39	
		(North total)	640
Middle	Chinese	326	
Both Islands		**Total**	966

Data from A.G.N O.L. 386, 442-491 (1854) quoted in Méndez (1987a:46).

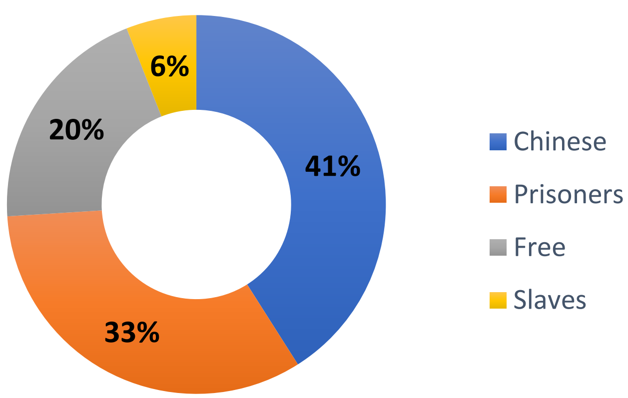

Figure 5.3. Proportion of the workforce at North Chincha Island, 1853. With data from Méndez (1987b:46).

Table 5.2. Number of Chinese workers at the Chincha Islands, 1853-67.

Year	*No. of workers*	*Δ% relative to 1853's value**
1853	588 (or 599)	–
1854	509	-13.5%
1855	600	+2%
1857	500 (or 800)	-15% (or +36%)
1866	683	+16.2%
1867	750	+27.6%

Made with data from Méndez (1987a:48). *Δ% calculated relative to the 1853 value of 588 workers.

Furthermore, 1853 marks the year when Peru's president Echenique appointed the first governor of the Chincha Islands: General Carlos Lagomarsino, who stationed at the North Island in December of that year (AHM 1962:3; Méndez 1987a:15). In addition to a workforce of 966 (or 978) people at both the North and Middle islands, Lagomarsino encountered another 286 inhabitants upon these rocks, 273 of which lived on the North Island. This means that roughly 77-78% of the islands' residents were *directly* involved in guano extraction. As for the non-guano workers, most of them were salesmen (40), although there were also 13 carpenters and caulkers, five tailors, four cobblers and, notably, 42 women –who were the wives of the free workers and salesmen– in addition to their 114 children. There were also two enslaved African women at the North Chincha (Méndez 1987a:16). This information is very important, as it shows a more complete picture of how life at the Chinchas looked like in the 1850s, which includes learning about the presence of women and children at the islands. This fact challenges an implicit prevailing view of the Chinchas as being an exclusively male environment. In addition, this sheds light on the social reproduction at the basis of the guano trade, since probably these women –except for the case of the Chinese and perhaps other bonded workers– carried out all the domestic and other social reproduction labor at the islands (*cf.* Bhattacharya 2017; Federici 2020).[151]

Moreover, the swiftness with which entire towns were built upon the islands –it goes without saying, driving away hundreds of thousands of birds and harming the ecosystem's metabolism– is remarkable. As our anonymous sailor put it: "Our appearance disturbs thousands of the web-footed natives; these thousands count with the old hands as nothing, for they tell us that the shipping have driven all the birds away"(Anon 1852:44). He also remarked that one

[151] Further studies should examine this essential aspect of the guano trade, which lies beyond the scope of this work.

could “scarcely put a foot on any part of the islands without sinking to the knee and being tickled with the sense of a hard beak digging into your unprotected ankles” (*Ibid*.). Likewise, the foregoing Canadian agriculturalist observed that: “it is deemed almost impossible to set foot upon the untouched surface of the island without sinking to the knee in some feathered lady’s nursery, and neither smashing her eggs or mutilating her half-fledged progeny” (Anon 1854:399). He was equally struck by the fact that “not a blade of grass, nor even a particle of moss, exists upon [the Chinchas] and yet they possess sufficient fertilizing power to transform a barren desert into a fruitful garden” (*Ibid*.). Relatedly, Frenchman Sylvestre (Jean-Pierre) Guiroy, captain of a merchant vessel and bookkeeper for Gibbs (Witt 2016:198), wrote in January 1859 about the “emigration of the birds from the Chinchas, since the extraction of guano began [they] have gone south, and it is very likely that they have taken refuge in the Independencia Bay”[152] (F12/6860 1859).

During the 1860s, in just a few years, there would be, standing upon the islands, 19 taverns, two hotels, brothels, a church, three butcher shops, four pool halls and cafes, four stores, markets, three bakeries, three laundries, a hospital, rudimentary street lighting, and even two elementary schools, “where the many existing children here, lacking such a great benefit, may be educated” (Méndez 1987a:20; M.H.C. H-4 383 1865:77). Thus, importantly, the Chinchas were not only a sort of labor camp, but also a “hive of offenders of the neighboring coast and other more distant places that, fleeing from justice, have no other place to hide,” as Chinchas governor Manuel Beingolea put it in a letter on 1 September 1868 (quoted in Méndez 1987a:24). In short, these small, remote, desert, and barren rocks were at the same time towns bustling with life and death (both human and non-human).

It is also known that in 1855, Elías came over to the Chinchas and “carried off forty-five of the best hands to his plantations on the mainland” (Mathew 1977a:42). Importantly, some of the most shocking testimonies of the conditions of the workers at the Chinchas date from 1853-55, although they were not by any means reduced to these years. As disturbing as these testimonies are, it is important to mention some of them, as this helps to unveil and denounce the brutality at the basis of the guano trade, as well as how ecological degradation, human exploitation, and the corporeal rift went hand in hand during this episode.

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[152] « L’émigration des oiseaux des Iles de Chinchas, depuis qu’on y a commencé l'extraction du huano...s’est portée dans le sud, et il est plus que probable qu'ils se sont réfugiés dans la baie de l'Indépendance ».

For example, in a 13 January 1854 letter to Peru's Minister of State, Lagomarsino, the foregoing governor of the Chinchas, referred to a "horrible disorder [caused by] the Chinese and prisoners, driven by hunger" (M.H.C. O.L. 386-446 1854). Likewise, on 20 February next this governor wrote: "At the end of last December [1853], thirty Chinese belonging to Don Domingo Elías escaped from these islands…nine of them have been sent back to me" (M.H.C. O.L. 386g 1854). Moreover, in another missive on 2 March, Lagomarsino referred to "the resistance that I have noticed on the part of the workers belonging to Don Domingo Elías…Last night, after having being told by the guards to turn the lights off and remain silent…I had to personally go to their rooms and found them in a gathering of some prisoners and their women. All people of African color, drinking and dancing familiarly" (M.H.C. O.L. 386g 1854).

Additionally, the general correspondence from the Chinchas at the time discussed topics such as the request by Chincha's physician, Dr. Gallagher (an Irishman), to prohibit liquor at the islands following the intoxication of 26 workers, and his appeal to build a lazaretto to take care of the sick. Notably, there is also a request by a certain Roberto H. Beddy to completely "prohibit the sale of alcoholic liquors…and remove all the women from the Islands, two hundred of whom are daily consuming a large quantity of water," and thus enhance the guano loading process (*Ibid*.). In fact, Echenique himself would ban the introduction of alcohol into the islands (*Ibid*.). Lastly, in other letters, Lagomarsino sought to, for instance, implement several measures to stop the Chinese from fleeing the Chinchas, such as using a guard to surveil them on their way back from the ocean after bathing, or making the ship captains remove their anchored boats at night. This since, from January to July 1854 alone, over 40 coolies broke out from the islands, oftentimes in group, in an organized act of struggling against the oppressive conditions imposed upon them (M.H.C. O.L. 386g 1854).

In the same vein, on 15 July 1854 Stephen Henry Sulivan, British Consul General in Peru, wrote that: "Her Majesty's Government learns with deep regret that by British agency and under the British Flag these Chinese Labourers have been brought to the Chincha Islands and placed in a state of slavery more horrible than any yet recorded" (FO 61/144 1854:70). Around this time, too, as noted (*cf.* Chapter 1), U.S. author, editor, and music critic George Washington Peck (1817-59) traveled to Australia and Peru (Hayes 2000), visiting the Chincha Islands in late 1853, which he reached onboard the U.S. vessel *Albus* on October 1853 (Peck 1854b:213). Peck would publish a detailed recollection of his sojourn in *Melbourne, and the Chincha Islands: with* *sketches of Lima, and a voyage round the world* (1854a). Here, he provided some of the most appalling testimonies of life at the Chinchas. For instance, on Sunday 2 October 1853, Peck (1854a:206–7) recalled that:

> There are about three hundred coolies at work on the middle island, and seven or eight hundred on the north. It is said that they are brought here under contracts made with them at home…It is said, also, that they are induced to come by being made to believe they are going to labor in gold mines…Whatever their contracts may be…the coolies…become, in effect, absolutely slaves. They are condemned to be diggers of guano…they have no liberty days, no protecting laws, no power to obtain even the pittance said to be paid them, no proper seasons of rest. Most of them go nearly naked…they live and feed like dogs…near at hand hundreds of ships coming and going, filled with men like them, only free! They, too, have been free; they were not born in slavery…but [are] slaves without any title.[153]

Similarly, Peck (1854a:211–12) would confirm that many vessels involved in the trafficking of Chinese were British: "[t]he Coolies who dig the guano are brought here in English vessels–the fact is notorious. I have often conversed with English captains who spoke freely of having been engaged in the traffic…" Peck would then recall meeting "Carlos" Kossuth, a Hungarian overseer and self-proclaimed governor of the Middle Island that settled there in 1851 to "make some money" (Mathew 1977a:40; Peck 1854a:208, 1854b:213). Kossuth was described by Peck (1854a:162–63) as a shrewd "youngish individual with quick gray eyes," and his name seems to have been a soubriquet either "from his frequent boast of having served under that chief" (FO 61/148 1854:39) or because this character –who could very well have come out of a Joseph Conrad novel– claimed to be Lajos Kossuth's[154] brother (Peck 1854b:213; *cf.* Piérola 1853:174). Kossuth claimed to have been one of the first Hungarians to settle in New York, from where he left for New Orleans, then to Mexico, San Francisco, and from there to Peru as part of Flores's expedition. He was said to be extremely cruel in his treatment of the Chinese (FO 61/148 1854:39; FO 61/155 1855:35), to the extent that he would, according to Piérola (1853:174), "subject…them to the whip until their bones are exposed, for whose harsh treatment

[153] At the same time, in the works cited, Peck refers to both Black and Chinese people in various racist ways.

[154] Lajos Kossuth (1802-1894) was a political leader of the Hungarian Revolution of 1848. Interestingly, in a 13 January 1849 article for the *Neue Rheinische Zeitung*, Engels would express: "For the first time in the revolutionary movements of 1848 [or] since 1793, a nation surrounded by superior counterrevolutionary forces dares to counter the cowardly counterrevolutionary fury by revolutionary passion…For the first time after a long period we meet with a truly revolutionary figure, a man who in the name of his people dares to accept the challenge of desperate struggle, who for his nation is Danton and Carnot in one person–*Lajos Kossuth*." Yet, after the Hungarian War of Independence, "Marx and Engels tended increasingly to regard Kossuth as a charlatan" (Komlos 1979:65).

hardly a day goes by without someone hanging himself or throwing himself down the rocks." At the "miserable hospital" of the Middle Island, Kossuth also seems to have been the one who "declared who was sick and who was not, in opposition to the medical inspector, whose opinions were not listened to" (Shipmaster's Memorial quoted in Mathew 1977a:46). In a stroll with Kossuth on the Middle Island, Peck (1854a:165) would recall the following:

> As we walked along the edge of the cove behind and within a few rods of Kossuth's house, we saw the Chinese coolies digging and wheeling…A little back were the miserable cane huts where they sleep, and not far from this…we were shocked by coming upon the dead body of one lying almost naked in the sun, with the face covered with flies. It was one…who had been drowned that morning, whether accidentally or not, nobody knew–or cared.

Relatedly, Peck (*Ibid*.:204) remarked that, at the North Island: "Almost every week some of [the Chinese] commit suicide by throwing themselves from the cliff…more than sixty had killed themselves this way in…two years…One was driven over the cliff or jumped off, and was dashed to pieces, to escape the lash of a black driver, who chased him to the verge in sight of a captain of an American ship" (*Ibid.*:208). Lastly, Peck (*Ibid*.:204) reflected:

> …when I think of the system that is maintained there, the hard fate of the poor wretches who dig the guano, and all the circumstances of obtaining cargoes, the islands seem to me to be a kind of human *abattoir*, or slaughter-house of men; and I feel a relief in being away from them, as one feels who has escaped out of some gloomy dream.

A U.S. mariner who also visited the Chinchas in late 1853 or 1854 wrote:

> there are…about 300 Chinamen from the Celestial Empire…and here they are slaves for life. They [have] a pile of guano before them which will last the next ten years; and long before it is exhausted the majority of them will be dead…In the month of November [1853 or 1854], I have heard, fifty of the boldest of them joined hands and jumped from the precipice into the sea. In December there were twenty-three suicides; this is from one in authority; in January quite a number, but I have not learned how many. I was a few days since on the South island, and there saw two of the most miserable starved creatures. They had swam across on their wheelbarrows, and fully determined to die (Anon 1855:20–21).

A joint statement by nine English shipmasters on 27 June 1854 stated: "two dozen lashes makes them [the Chinese] breathless, and when released after thirty-nine lashes, they seem slowly to stagger over, reeled and fell, and were carried off to the hospital–in most cases, if they recovered, committing suicide" (quoted in Stewart 1951:97). In the realm of literature, as Hunt (1987:58–59) tells us, a guano island becomes Joseph Conrad's metaphor for hell on earth. Conard clearly had the Chinchas and coolies in mind when, in *Lord Jim* (1900), he devised a character "perched on a shadowless rock, up to his knees in guano, with the screams of sea-birds in his ears, the incandescent ball of the sun above his head; the empty sky and the empty ocean all a-quiver, simmering together in the heat as far as the eye could reach."[155]

It was said that the conditions of the Chinese at the islands improved following the ghastly period of Elías, Lagomarsino, and Kossuth (FO 61/148 1854; FO 61/155 1855; Mathew 1977a:45–46). Samuel Went –head of the Gibbs house in Lima and successor of Hayne– claims to have been behind this initiative, which entailed, along with allegedly securing better living conditions for the Chinese, a rise in wages (FO 61/148 1854). In fact, on 15 September 1854, President Echenique ordered that the Chinese at the Chinchas would now receive eight pesos (32 shillings) a month "and should be well treated" (*Ibid*.). Importantly, this outcome was also the result of the constant and active struggle of the Chinese for their liberation which, among other things, arose international awareness and pressure (Méndez 1987a; Narvaez 2010; Rodríguez Pastor 1979, 1989, 2017). However, while the living conditions of the Chinese and other bonded workers at the islands may have improved after 1854, their exploitation and oppression were not by any means thing of the past. For instance, in 1856, a British correspondent for the *Nautical Magazine*, who had recently visited Peru, wrote:

> Most people have heard of the fertilising virtues of guano…but few probably are aware that the acquisition of this deposit, which enriches our lands and fills the purses of our traders, entails an amount of misery and suffering on a portion of our fellow creatures, the relation of which, if not respectably attested, would be treated as a fiction…The Chinese, who, under specious promises, are inveigled to the islands…seldom live to complete the term of their slavery…Whilst we were at the islands a poor Chinaman threw himself off the rocks and was dashed to pieces rather than submit to the tortures that awaited him for having accidentally broken some tackle he was using in his course of labour; and we can form a good notion of the severity of the punishment they are subjected to by the horrible howling constantly heard on the islands (Anon 1856:182).

This writer also described some of the punishments the Chinese suffered at the Chinchas, "under the eyes of Englishmen," such as their hanging with ropes and chains around the waist "from sunrise to sunset," and without food, for one or several days, or their strapping to half-tide buoys in the cold ocean waters under the sun. He states there were even instruments of torture at

[155] *Lord Jim* is not the only work where Conrad refers to the guano trade. In his novella *Typhoon* (1902), Conard refers to a "regular little hell" that unfolds when the crew of the *S.S. Nan-Shan* is simultaneously battling a storm and 200 coolies they are transporting below deck, who are attempting to flee the vessel's hold they are locked in. Yun (2008:229–30) argues Conrad's perspective on the coolies is dehumanizing. Nigerian novelist Chinua Achebe, who according to Book Scrolling wrote the best book about colonialism and imperialism, *Things Fall Apart* would also criticize Conrad's perspective of Africa and African people (Achebe 2017; Book Scrolling 2022).

the islands. “These punishments” –he continues– “we saw inflicted on several instances” (*Ibid*.). Relatedly, Thomas Reilly, pilot of the *Mercedes A. de Wholey*, who had owned an eating-house in the Chinchas, recalled before the Criminal Court in Papeete on March 1863 that, at the islands, the Chinese were given rice “of the worst quality”; that as punishment their legs were chained together and they were prevented from resting by an iron collar; that their corpses were thrown into holes dugged in the guano; and, as several others, stated that many committed suicide by throwing themselves from the top of the cliffs (*cf.* Maude 1986:136). Some 60 years later after these infamous tragedies occurred, renowned U.S. ornithologist Robert Cushman Murphy (1925:96) would visit the Chinchas (see Chapter 1) and observe:

> The plateau of North Island…was in the middle of the 19th century the site of a town of hundreds, if not thousands, of inhabitants [today] Neither wood, nor metal, nor stone remain, and its only traces are the corpses of coolies, mummified by the guano, wrapped in their blankets, and with coins beneath their tongues. Even these gloomy reminders will soon be gone, for the present workmen pile up the old bodies when they uncover them, sprinkle them with kerosene, and burn them to ashes.

Throughout the 1860s, it appears that some working conditions of the Chinese at the Chinchas (and the mainland estates) had indeed improved, while others remained the same. For instance, in a letter dated 13 September 1866, consul Barton wrote to Lord Stanley that he was aware of a petition wherein “[t]he Chinese complain of the bad treatment they receive, particularly on the Estates...undergoing flagellation and being placed in irons” (FO 61/233 1866:366). He also stated that a certain Lionel Bonar had lately visited the Chinchas for 10 days, “with the express purpose of seeing personally what was the treatment of these men...in Mr. Bonar’s opinion the coolies in this employ, at least are not badly treated” (*Ibid*.:369). Importantly, Bonar also opined (and rightly so) that “at the present rate of exploitation the huano on the Chincha Islands would not last more than two or three years.” He also mentioned that there were some 680 coolies on the Chinchas (in September 1866), that their task consisted of retrieving two tons of guano per day (*i.e.* about 1,360 total) during a working day of six hours, that they toiled in squads of ten men and were done at 2 p.m. (when they dropped off and bathed in groups), and that “[t]hey are mostly young men from 20 to 26 [who] work naked, except round the middle” (*Ibid*.: 374–75). Bonar also observed that the diets of the Chinese at the Chinchas consisted of two pounds of rice with lard per day, meat twice a week, and other days fish. He also mentioned that “they live in suitable barracks and huts,” that they kept much to themselves and were opium smokers amongst them, and that some possibly had sex with the women at the islands. Importantly, Bonar also mentions that there was a hospital at the Chinchas under charge of an Englishman, Dr. Watson, where some 40 men were being treated, although many of them for "trivial maladies" (*Ibid*.).

On the other hand, the prisoners at the Chinchas also continued living under atrocious conditions. For example, as is stated in a ledger from the Chincha's Governor's Office dated 5 February 1863:

> The convicts who have been sent to those islands... are treated too inhumanely, for they are kept locked up in a narrow room deprived of ventilation, in which due to its small space, they sleep in contact with each other, and what is worse, crammed the healthy with the sick, and sometimes even with the corpses (M.H.C. H-4 385 1863:56).

Many of these inmates (some of them political, as noted) were recruited from Callao's "Casas Matas" penitentiary, oftentimes in a hasty manner, without even giving them time to gather their belongings. Between 48 and 61% of them had been charged with murder, their second most common crime being robbery (Méndez 1987a:62). They were also swiftly replaced when ill, clearly exemplifying a reserve army of labor in operation (Marx 1992:781; Méndez 1987a:59). For their part, the Chinese kept enduring harsh conditions, even towards the end of the guano trade in the 1870s, once the Chinchas had been exhausted (around 1870) and other lower-quality deposits in southern Peru, such as the Pabellón de Pica, Punta de Lobos, and Huanillos (located in Iquique, which today belongs to Chile) were being exploited. As was stated in 1875 by Edward March, British consul in Peru:

> Many of these Chinamen are engaged in the guano deposits, and from personal knowledge I can state that their lot in these dreary spots is a most unhappy one. Besides being worked almost to death, they have neither sufficient food nor passably wholesome water. Their rations consist of two pounds of rice and about half a pound of meat. This is generally served out to them between ten and eleven in the morning, by which time they have got through six hours' work. Each man is compelled to clear from four to five tons of guano a day. During the last quarter of 1875, it is reported that there were 355 Chinamen employed at Pabellon [*sic*] de Pica alone, of whom no less than 98 were in hospital. The general sickness is swelled legs, caused, it is supposed, by drinking condensed water not sufficiently cooled, and by a lack of vegetable diet. The features of this disease are not unlike those of scurvy or purpura (quoted in Loustaunau *et al.* 2021:12).[156]

[156] See Stewart (1951:96–98) for more testimonies depicting the condition of the Chinese workers in Peru in the 1870s.

Likewise, in the 1870s, British writer Alexander J. Duffield (1821-90),[157] while in Peru, also visited the Pabellón de Pica. About the coolies working here he mentioned:

> No hell has ever been conceived by the Hebrew, the Irish, the Italian, or even the Scotch mind for appeasing the anger and satisfying the vengeance of their awful gods, than can be equalled in the fierceness of its heat, the horror of its stink, and the damnation of those compelled to labour there, to a deposit of Peruvian guano when being shovelled [*sic*] into ships. The Chinese who have gone through it, and had the delightful opportunity of helping themselves to a sufficiency of opium to carry them back to their homes, as some believed, or to heaven, as fondly hoped others, must have had a superior idea of the Almighty, than have any of the money-making nations mentioned above, who still cling to an immortality of fire and brimstone (Duffield 1877:77–78).

Moreover, in the late 1870s, towards the end of the guano trade, an improvised bridge collapsed at the Pabellón de Pica, "instantly killing 15 workers and injuring 22" (Méndez 1987a:57).

Finally, a piece published on 10 March 1882 in *The Times* suggests that, throughout the 1850s, the Chinese guano workers who did not flee the Chinchas may have experienced an *absolute mortality rate*: "In 1860 it was believed that not one of the four thousand Chinese coolies who had been shipped to those islands since the trade began…had survived, all those who had not died of exhaustion had put themselves voluntarily to death" (*The Times 1882*:9). Guano diggers were thus exclusively arms, personified labor-time used up in eight (or less) years, and who later were buried on the islands or at sea. Regardless of whether, in fact, all or most of the Chinese at the Chinchas died, this corporeal rift at the heart of the guano trade, which emerged to address the metabolic rift in European agriculture, can be classified as a case of "social murder" (Loustaunau *et al.* 2021:14). Engels (2009:106–7), who borrowed this concept from the Chartist literature of the time, conceptualized "social murder" as a state wherein society knowingly forces individuals to remain in conditions such that death follows:

> When one individual inflicts bodily injury upon another, such injury that death results, we call the deed manslaughter; when the assailant knew in advance that the injury would be fatal, we call his deed murder. But when society places hundreds of proletarians in such a position that they inevitably meet a too early and an unnatural death…when it deprives thousands of the necessaries of life, places them under conditions in which they *cannot* live – forces them, through the strong arm of the law, to remain in such conditions until that death

[157] Duffield, who was sent to Peru to estimate how much guano still existed and where, denounced the arrogance of the British Empire and stated that "the Peruvians have suffered the greatest indignities at the hands of successive British Governments" (Duffield 1877:32). He also condemned the condition of the Chinese bonded workers and was interested in Peruvian culture and the Spanish language. He even produced a translation of Cervantes's *Don Quixote* in 1881.

> ensues which is the inevitable consequence– knows that these thousands of victims must perish, and yet permits these conditions to remain, its deed is murder just as surely as the deed of the single individual; disguised, malicious murder, murder against which none can defend himself, which does not seem what it is, because no man sees the murderer, because the death of the victim seems a natural one, since the offence is more one of omission than of commission. But murder it remains.

Thus, what transpired at the Chinchas (and other guano deposits) between 1840 and 1870 was social murder, perpetrated by the world powers involved in the guano trade in conjunction with Peru's oligarchy. In fact, in several instances, the racialized system of bonded labor at the Chinchas was harsher than social murder since –as the above testimonies show– many of the deaths that ensued were the product of torture, and no attempt was even made to disguise them as being "natural" events.

As for some of the ecological conditions on and around the Chinchas, in 1854, the aforementioned Canadian farmer who visited them remarked that "[T]he birds still frequent the island in vast numbers, though they are said to bear no comparison to the myriads that formerly held sole and undisturbed possession of them" (Anon 1854: 399). Similarly, Peck (1854b:214) observed that "Mackerel are very abundant, and whales come among us daily...The rocks are bristling with pelicans, and the divers and guano birds are 'too numerous to be mentioned.'" Two years before, a British sailor talked about how "whales often come gambolling between the islands, rolling and playing in the sun, and sometimes leaping clean out of the water, into which their huge bodies descend again with a crash that seems to shake the sea itself" (Anon 1852:45) Yet by 1869, a visitor to these islands said that "there were surprisingly few birds not only on the islands, but also around them" (in Méndez 1987a:6). Thus, it appears that, within 15 years, the Chinchas ecosystem was importantly damaged by the guano trade, although this particular 1869 observation may have also coincided with an important ENSO event (see Chapter 1) in 1867-69 (Couper-Johnston 2000). In the same vein, somewhere around 1876 Duffield (1877:89) mentioned:

> …we passed close to the Chincha islands. When I first saw them twenty years ago, they were bold, brown heads, tall, and erect, standing out of the sea…reflecting the light of heaven, or forming soft and tender shadows of the tropical sun on a blue sea. Now these same islands looked like creatures whose heads had been cut off, or like vas sarcophagi, like anything in short that reminds one of death and the grave.

5.2.5. The working day of a "coolie" at the Chinchas

A day in the life of a typical Chinese worker at the Chinchas during the 1850s –assuming no flogging or other form of explicit torture occurred– probably looked something like this. He would wake up at five in the morning and proceed to a guano heap to load into a cart the excrement he had dug up and loosened the evening before. After five or six hours of work, he would stop at around 10 or 11 in the morning to eat something: commonly two pounds of rice and half a pound of meat (Méndez 1987a:62). At least at the estates, and perhaps also at the Chinchas, the Chinese would have to individually cook these ingredients for themselves (Rodríguez Pastor 1989:126). Then, he would resume work until dusk, under an inclement sun burning everything in its path. The afternoons were commonly devoted to digging up the guano with picks, shovels, and crowbars. After another eight or nine hours of strenuous labor, he would sometimes be allowed to bathe in the cold ocean –under the vigilant eye of a guard– and then cook dinner (probably the same meal he had for lunch). Later, he would proceed to his frail hut, where sometimes he and his countrymen would carry out activities such as playing, gambling, smoking opium, and at times having sex, among others (Narvaez 2010:295; Rodríguez Pastor 2017:258). Afterwards, he would go to sleep on a thin mat and wake up some hours later, only to begin the whole cycle again, and again, and again…He would have to work for six days a week, or even for the whole seven days if at the Middle Island, under Kossuth's whip (Mathew 1977a:47; Peck 1854a:214).

It is important to note that many of the overseers of the Chinese, both at the Chinchas and at the mainland estates, were Black. They had formerly been enslaved and, since 1854, were legally free. They were turned into foremen by the (white) rulers of the guano trade (Méndez 1987a:62; Peck 1854a:215). These overseers–says Peruvian writer Paz Soldán (quoted in Méndez 1987a:63)– would now brandish "over another body the same whip that had once macerated their own flesh so many times." The use of Black overseers to supervise Chinese labor at the Chinchas was not casual, and responded both to economic interests and to an attempt to avoid the potential emergence of any form of solidarity between these two racially oppressed groups of people against their common enemy: the Peruvian oligarchy and the European and U.S. guano magnates (Méndez 1987a:28).[158]

[158] This very important topic (beyond the scope of this work) has varied cross-nationally and in time. As Yun (2008:163) states about the Cuban case: "Unlike Rodney's history of the working people of Guyana, in which he

Regarding the specificities of guano labor, from heap digging to ship loading, Piérola (1853:155–59) offers a very detailed description of the whole process. In short, extraction started at the highest point of the guano heaps –sometimes reaching some 30 meters (~90 feet) of height– and proceeded towards their center from top to bottom. Guano, which was quite hardened, was, as noted, sliced with picks, shovels, and crowbars. In fact, sometimes gunpowder (and sporadically also a clumsy steam engine) was used to loosen it. Here, the workers –mostly Chinese– were distributed in different parallel portions throughout a given heap. As noted, they would chop the guano in the evenings and deliver it in the mornings into some big carts. Once the cars were filled, the guano would be moved through a railway or by mules,[159] until it reached a big pile where it was concentrated. It was then unloaded by at least 12 men and emptied via wheelbarrows into a hopper which could hold up to 1,000 tons. Every worker was required to deliver a daily full car (about 4 tons), or 80 wheelbarrows or sacks of guano, into the hopper. Different estimates of the day state that workers were compelled to deliver between two and five daily tons of guano (*cf.* Mathew 1977a:44). Yet oftentimes they could not achieve this excessive goal. For this grueling task, the Chinese would receive a wage of some 3.5 pesos a month, which from 1855 on was increased to 8 pesos (32 shillings) (Mathew 1877:47–48). Up to two-thirds of their wage was spent in food alone (Piérola 1853:157).

Once the hoppers were full, other workers known as *mangueros* ("hosemen") would pass the guano through canvas shoots, of which there were four (two large and two small) in the 1850s (Mathew 1977a:48). "This operation"–stated Piérola (*Ibid*.:158)– "is undoubtedly extremely disgraceful" both given the danger workers experienced of being buried alive in guano, and due to the imminent risk of being swallowed down the shoot and onto the deck of the loading ships. In fact, several workers suffered this accident, and some died as a result (*Ibid*.). As another contemporary account reads: "Birds are frequently carried down into the ship's hold [and a worker] accidentally slipping in, was forced through the shute, and taken out at the other end quite dead" (Anon 1852:45). In addition, these workers were enveloped in a dense cloud of guano dust, whose inhalation they tried to avoid by using a face mask made from a roll of rags.

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recounted Asian-African conflicts as not characterized by fatalities, the micro-history before and during the solidarity between Asian and African people in Cuba was raw and brutal, of fatal intensity and human cost."

[159] There were 65 mules at the Chinchas in 1859, which were brought by Elías from the estates in the mainland to carry guano and water around the islands. Like the humans, many would die from malnutrition, mistreatment, and exhaustion at these islands (Méndez 1987a:31; M.H.C. H-4 377 1859).

Interestingly, this extremely dangerous job was only to be performed by free workers, so that the overseers would not have to bear any responsibility (and accrue labor-power losses) in case accidents occurred. For this work, the "hosemen" received a wage of 12 *reales* (6 shillings) a day; that is, at least 5.6 times more pay than the Chinese.

Subsequently, the guano came out of the 50 meter (~150 feet) shoots with great force, and would be received by the vessels, either through smaller boats (there were six of them) or directly. In the former case the boats would collect the guano while attaching to a firm buoy. From there, they would take it to the ships, in whose holds the vessels' sailors introduced it through the hatches or through the lateral gates. In the latter case, the mouths of the two shoots would be fixed to the ship to receive the guano. "In a few minutes" –wrote a mariner– "down came the shower, and eyes, mouth, and nose were filed with the pungent dust which continued to pour in until the boat was loaded" (Anon 1852:46). This way, "[t]he ship is covered from truck to kelson; the guano penetrates into the captain's cabin and the cook's coppers–not a cranny escapes; the very rats are set a-sneezing" (*Ibid*.). Likewise, as Peck (1854b:213) would also observe at the time, the ships were "all covered with guano, you would hardly recognize some of the finest clippers, that before they left New York or Boston were praised in the papers, visited by ladies, and, instead of guano, had their cabins perfumed by champagne"(*cf.* also Mathew 1977a:50).

Once the guano was inside the ships, the *abarrotadores* ("stuffers") would spread it out and distribute it throughout the cargo hold. "It seems impossible" –continues Piérola (1853:159)– "that there are men that are employed on this operation, as the dust and the heat overwhelm them so much that they cannot bear it but for up to six minutes and then have to go on deck, drenched in sweat and covered in dust." These workers were paid between 13 and 17 pesos per 100 tons of guano distributed inside the ships by their captains (*Ibid*.). As Méndez (1987a:60) summarizes, in this crucible of Chinese bonded workers, African slaves (or, after 1854, ex-slaves), Peruvian convicts, and also "free" Peruvian, Chilean, and Ecuadorian laborers:

> …the level of exploitation...of the guano workers was directly proportional to the level of coercion exerted upon their labor-power, the Asians being placed at the economically and humanly more degraded plane; in second ascending place, the convicts, who although as the Chinese were deprived of their freedom, unlike them they had certain open official channels to file complaints and denounce mistreatment [at least they spoke the language], and finally there were the [free] volunteer workers.

Lastly, it is also important to note that the guano extraction process was very inefficient (and the demand extremely large), not only in terms of the guano that was wasted into the ocean (between 5-20% of the total dug up or even more), but also regarding the ships' average loading time (about 40 days), as well as the frequent delays in the freighting process, with vessels experiencing waiting times to begin loading of up to four months (Anon 1855:20; Duffield 1877:80; Mathew 1977a:49; Méndez 1987a:16; Moresby 1853:259). U.S. crews would complain the most about these delays. Relatedly, the Peruvian bureaucracy did not contribute to making this process less cumbersome, commonly requiring guano vessels to navigate several times alongside the Chinchas (given their geographical location south of Callao) before being cleared to sail back home. As stated by a British mariner (1852:42–43):

> Every guano ship is compelled to enter inwards and outwards at Callao...then...beating the hundred and fifty miles back again to Pisco...Here she anchors...remaining sometimes two or three days. Then she sails back again nine or ten miles to the islands, where she loads and afterwards returns to Pisco. Then she goes back to Callao, and finally passes the islands for the fifth, and happily, the last time, on her homeward passage. Over all this battledore duty a ship often wastes nearly a month, besides generally losing some of her hands from desertion in Callao.

Let us keep in mind that, in late 1853, when the guano trade was on track to reaching its zenith in terms of exports, there were some 200 vessels anchored around the Chinchas, "all but three or four English or American" (Peck 1854b:213), and representing temporary offshore community of some 3,500 or 4,000 people (Mathew 1977a:55). Relatedly, throughout 1857, for instance, 620 vessels loaded guano at the Chinchas (an average of 52 per month), with a peak of 68 ships both in October and December. Of this total, 487 vessels (78.5%) were consigned to Gibbs for Britain, most of continental Europe, Australia, and the Caribbean; 84 (13.5%) to Montané for the French (and French colonial) market; and 49 (8%) to Barreda, bound for the United States. The 626,584 tons they extracted that year reached their markets in roughly the same proportions, averaging a cargo of a little over 1,000 tons per ship (F/12 6860).

Interestingly, around this time Irish-U.S. citizen William Russell Grace (1832-1904) – who had fled Ireland escaping the 1846 potato famine, was to become mayor of New York City in 1880, founded the chemical business W.R. Grace & Co., and, for instance, officially received the Statue of Liberty from France– made his fortune by running a store on the North Chincha Island, providing the huge fleets waiting to load guano (Grace 1953:12–13; Hollett 2008:19; Levin 1960:120). Most articles provided to these vessels and the islands were brought from the neighboring Pisco, some 21 km southeast of the Chinchas (Anon 1854:399). Figures 5.4, 5.5, and 5.6 offer a glimpse of how life at the Chinchas looked like circa 1865, through a series of pictures taken by U.S. photographer Henry Moulton.[160]

Figure 5.4. Guano extraction at the Chinchas, 1865. (**a**) "North Island, Chincha Islands, With Part of Fleet Waiting For Guano." (**b**) "Strata of guano, Chincha Islands." (**c**) "Shoots for loading the lighters with guano, Chincha Islands." (**d**) "View of the Great Pier, With Shipping Waiting For Guano." (**e**) "Loading cars with guano at the great heap, Chincha Islands." (**f**) "Emptying Cars of Guano into the Shoot." All pictures by H. Moulton (negative). Positive by A. Gardner. All pictures taken from: Gardener, Alexander, and Henry De Witt Moulton (photographer). 1865. *Rays of Sunlight from South America*. Washington, D.C.: Philip & Solomons.

In sum, through this extremely rudimentary division of labor of diggers, "hosemen," and "stuffers," a chiefly unfree workforce averaging some 1,000 men, primarily constituted by Chinese bonded peons relying on picks, shovels, and crowbars (with the sporadic "aid" of an inefficient and cumbersome steam engine), would extract 3.4 million tons of guano from the Chinchas between 1850 and 1859 (some 340,000 t per year), and 4,230,021 tons from 1860

[160] In his thorough *Oceanic Birds of South America* (1936), Murphy includes some of the pictures shown here and attributes them to U.S. Captain Charles S. Merriman, of Brunswick, Maine, and his crew, sometime in 1860, in what seems to be a mistake.

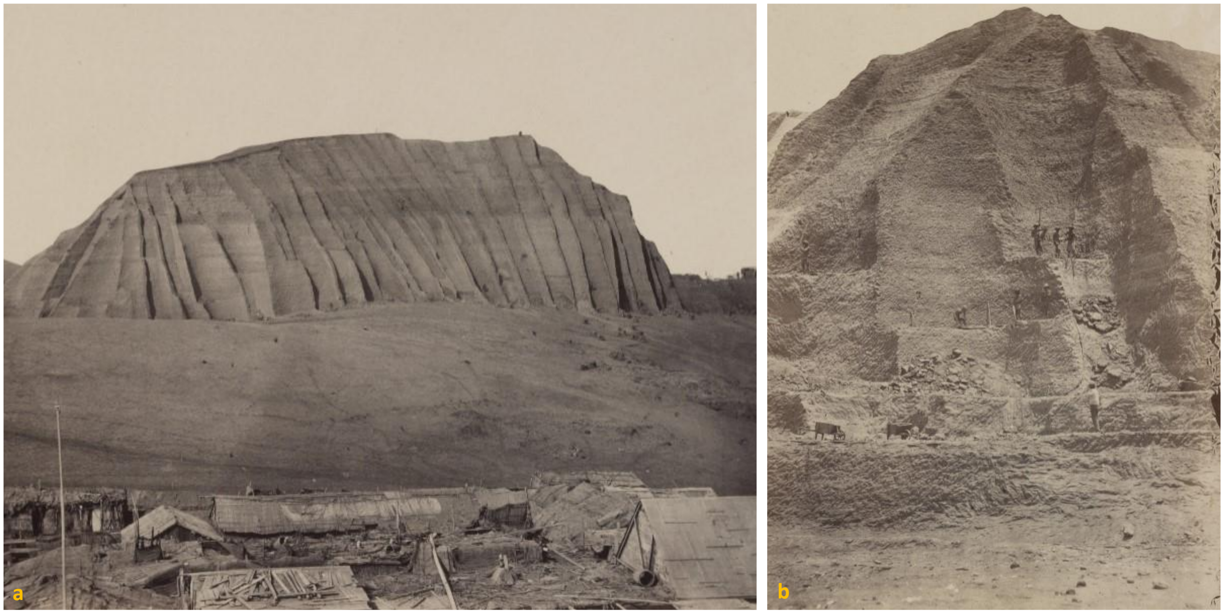

Figure 5.5. The Guano Heap at the North Chincha, 1865. (**a**) “The Great Heap –2,000,000 tons of guano– Chincha Islands.” (**b**) “Chinamen Working Guano –Great Heap– Chincha Islands.” All pictures by H. Moulton. Taken from: Gardener, Alexander, and Henry De Witt Moulton (photographer). 1865. *Rays of Sunlight from South America*. Washington, D.C.: Philip & Solomons.

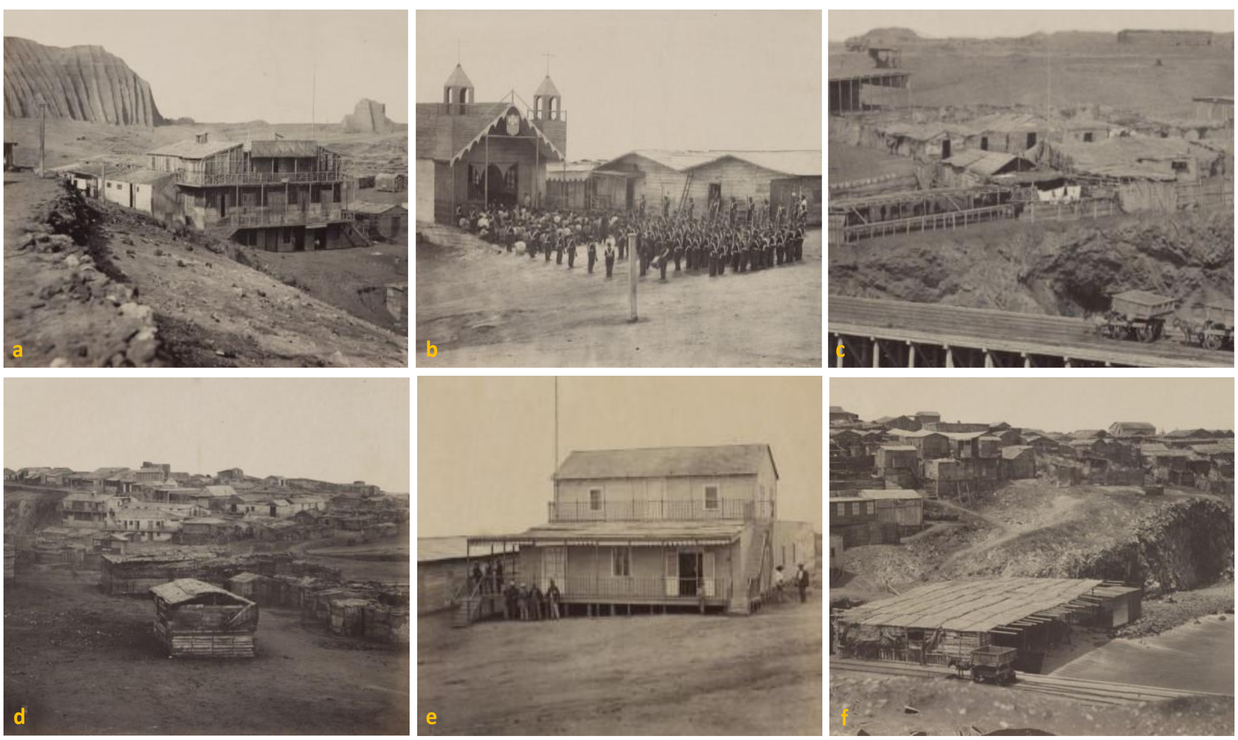

Figure 5.6. Life at the North Chincha, 1865. (**a**) “The Hotel, Chincha Islands.” (**b**) “Prisoners Saying Mass – Sunday Morning– Chincha Islands.” (**c**) “Shoot Manufactory, Cabins of the Chinamen, and Portion of Great Pier, Chincha Islands.” (**d**) “View of the town, North Island, Chincha Islands.” (**e**) “Governor’s House, Chincha Islands.” (**f**) “Panorama of the Town, North Island, Chincha Islands.” All pictures by H. Moulton. Taken from: Gardener, Alexander, and Henry De Witt Moulton (photographer). 1865. *Rays of Sunlight from South America*. Washington, D.C.: Philip & Solomons.

to 1869 (~423,000 t per year) (Hunt 1973a:57–58; Mathew 1981:252; Méndez 1987a:50; Piérola 1853:157–58). This means that about 1,045 tons of guano (a mass roughly equivalent to that of 10 to 12 adult blue whales) were extracted *every day* from the Chinchas, on average, in the twenty years from 1850 to 1869. By 1870, virtually all the guano at the Chinchas (at least some 9 million tons) had been exhausted, within only 30 years, and other deposits (such as foregoing Pabellón de Pica) were exploited during the last decade of the trade. Figure 5.7 shows the mass of guano exported by Peru per decade during the whole guano trade (1840-80) and up to 1890.

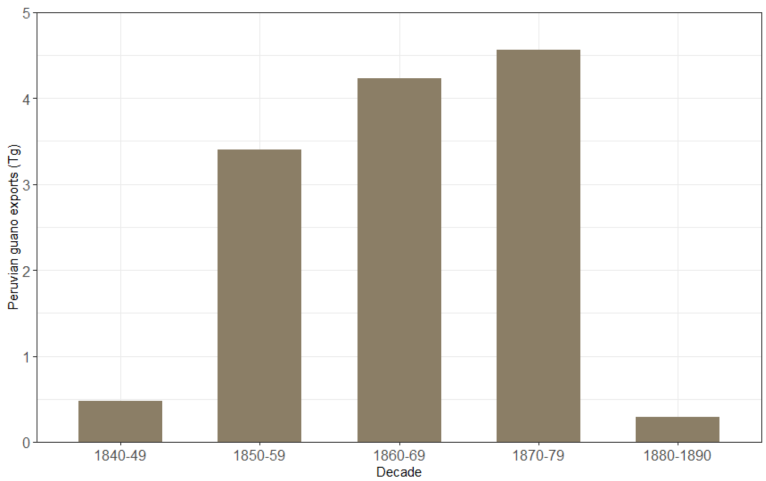

Figure 5.7. Amount of Peruvian guano exported per decade, 1840-90.
1 Tg = 1×10^6 t. Made with data from Hunt (1973a:57–58).

Of the 7,630,858 tons removed from Peru alone during 1850-69 (not considering the 700,000 tons or so lost the ocean), 3,259,350 of them (~43%) were siphoned into the small island of Great Britain, a land smaller (by about 18%) than, for instance, the state of Oregon in the United States. Relatedly, in 1854-57, for instance, seven different contractors were shipping Peruvian guano to several world markets. A total of 1,506,930 tons were exported in that period, 969,524 (64.3%) of which were dispatched by Gibbs (Mathew 1981:98). For their part, the U.S. imported at least 886,753 tons of guano from Peru between 1850 and 1869 (roughly 12% of the total), to spread it over the cotton and tobacco fields in Virginia and North and South Carolina, and also in the plantations of places like Baltimore, Philadelphia, New York, Oregon, and Washington (*Quarterly Reports* 1876; *Report of the Secretary of the Treasury* 1845). The remaining 45% of the Peruvian guano extracted from 1850-69 ended up in France, Belgium, Holland, Germany, Italy, and Spain, as well as in some of these countries' dependencies in the Caribbean and elsewhere, and even in the more remote fields of China and Australia.

Due to lack of data, it is unfortunately impossible to follow the guano more precisely, but the fact of the matter is that it ended up fertilizing the soils (and thus feeding countless people and other animals) on practically every continent on Earth, with the obvious exception of Antarctica. This immense drain of guano was only possible because of the unique geophysical and ecological conditions off Peru, and, again citing Aguirre (1987:47), because it "rested –literally– upon the backs of about a thousand workers, in the most deplorable working conditions." This way, *nature*, the material foundation and source of wealth, and *labor*, a concrete human manifestation of nature, were simultaneously and respectively expropriated and exploited by capital to siphon the Chinchas's nutrients into the soils of the affluent world and its colonial possessions.

5.3. The end of Chinese bonded labor in Peru (and beyond)

The shipment of Chinese bonded laborers to Peru (and elsewhere) officially ended on 27 December 1873, when Portugal closed its Macao colony to the trade. This measure would be effective from 27 March 1874 on (FO 61/287 1874; Helly 1993:12; Stewart 1951:204). The last ship trafficking coolies from Macao to Peru was the *Lola*, which arrived in Callao on 2 July 1874, with 369 Chinese on board (Renoz 1897:207). It lies beyond the scope of the present work to analyze how and why this form of labor ended. Suffice it to say that its demise was the result of various interrelated factors: (1) the constant, active struggle of the Chinese for their own liberation (in Peru, Cuba, and beyond); (2) the diplomatic pressure exerted against Portugal, especially by Britain (who had formerly supported –indeed invented– the trade), the U.S., and China (Stewart 1951:159);[161](3) the continuous mediatic condemnation of the trade in the works

[161] For instance, in 1855, the British (or Chinese) Passenger Act closed British Hong Kong to the coolie trade, shifting it entirely to Portuguese Macao. This ended the participation of British vessels in the trade (Lowe 2015:130; Stewart 1951:56). Britain also started withdrawing from coolie trafficking to Cuba in 1858 (Yun 2008:14). Yet, there were cases still reported in Hong Kong "of kidnapping Chinese for slavery on the Chin Cha [*sic*] or Guano Islands off Lima," according to a certain W.J. Mercer in a 21 December 1863 letter to the Duke of Newcastle (FO 61/222 1864:309). For their part, the U.S. Congress –amid diplomatic discussions with China and heated domestic debates during the Civil War– enacted the Prohibition of the Coolie Trade Act in 1862, which forbade the importation of Chinese contract labor into the U.S. and banned the use of U.S. vessels for the trade (Stewart 1951:56; Yun 2008:22). Up to that point, U.S. ships "had taken the lead in Chinese coolie shipping, surpassing the British, Spanish, French, and Portuguese in number of ships and coolies in the trade" (Yun 2008:22). Thus, with the passage of years, Peruvian ships started to take over the trade, especially from 1870-74.

of writers, journalists, and sailors;[162](4) the *María Luz* affair (1872) and other scandals such as that of "the branded 48" (1868) and the abuse in the Chancay estates (*cf.* Stewart 1951:151–59); (5) the diplomatic mission in China of Peru's Minister Plenipotentiary, Aurelio García y García (*Ibid*:.174–205); (6) and the Official Mission sent by China to investigate the living conditions of their nationals in Cuba (1873) (*Cuba Commission Report* 1993).[163]Another outcome of these events is that José Maria de Eça de Queiroz (1845-1900), a young anarchist and writer serving as Portugal's consul in Havana in 1873, succeeded in granting the Chinese bounded for Cuba Portuguese citizenship, thus giving them some protection (Helly 1993:12).

Yet, after this infamous trade officially ended, Peru still sought to bring Chinese bonded workers from California. In early 1877, the British house Pacific Steam Navigation Company, together with their agents in San Francisco, Williams, Blanchard & Co., showed interest in this enterprise, as did San Francisco's Chinese house Lee Yam & Co. (Stewart 1951:214 –215). It would be, however, the U.S. Grace Brothers & Co. (co-founded by former Chinchas chandler W.R. Grace) which, in 1878, brought 23 Californian Chinese to Peru onboard the *Islay*, which were placed in the estate of a certain Guillermo Alzamora in Chicama. At least one more ship chartered by this company would bring Chinese from California before the War of the Pacific (1879-83) halted the movement and the guano trade as a whole (Stewart 1951:216–17). In addition, on 19 October 1874, a certain Isaac Lanton proposed a deal to the Peruvian government for the introduction of bonded laborers from British India to Peru, which seems to have never consolidated (FO 61/287 1874:203). In all, as George Orwell eloquently put it in his 1942 essay

[162] As part of this critique, back then there was a prevalent expression among some members of the British anti-slavery movement, members of Parliament, writers (including for instance Karl Marx), Peruvian and foreign newspapers, and politicians (both Peruvian and foreign) that coolie labor was "worse than slavery." Even if comparing these two forms of institutionalized oppression is out of place, in that context it contributed to ending the coolie trade.

[163] On U.S. initiative (for various geopolitical reasons), the Chinese court sanctioned an investigation into the conditions of their countrymen in Cuba in September 1873. A tripartite commission was constituted by the co-commissioner of the first Chinese Educational Mission to the United States, Chen Lan Pin (who lead it), British Customs Commissioner at Hankou, A. Macpherson, and French Customs Commissioner at Tianjin, A. Huber (along with 10 assistants) (*Cuba Commission Report* 1993:32–34; Yun 2008:39–40). After a visit to the White House, Chen and the commission arrived in Cuba on 17 March 1873 onboard the German vessel *Strassburg*. They would return to the U.S. on 8 May, after gathering 1,176 depositions and 85 petitions from the Chinese workers. Interestingly, it is little known that a "much smaller and unofficial (without imperial sanction) investigation of coolie traffic to Peru also took place via Yung Wing (Rong Hong), the co-commissioner of the Chinese Educational Commission, at the personal request of the Chinese viceroy. Yung, along with two Americans…Reverend Twichell, and…Dr. Kellogg, traveled to Peru for a short investigation in September of 1874" (Yun 2008:39).

“Rudyard Kipling”: “We all live by robbing Asiatic coolies, and those of us who are ‘enlightened’ all maintain that those coolies ought to be set free; but our standard of living, and hence our ‘enlightenment’ demands that the robbery shall continue” (quoted in Yun 2008:*xv*).

Finally, given our focus on nature and labor and that this topic is less known, let us only briefly mention the Chinese resistance aspect. As noted, the Chinese in Peru (and elsewhere) permanently fought against their bondage, all the way from the barracks in Macao to the Chincha Islands or the mainland estates. At the islands and the estates, these class struggles took on several forms, both individual and social, both spontaneous and planned. The most common acts of resistance were breakouts, suicides, and insurrections. Since we have briefly addressed the first two forms, let us focus on the insurrections. For instance, at the Chinchas, there were at least three mutinies, all of them in the Middle Island, where, as noted, almost all the workers were Chinese (Méndez 1987a:63). The primary targets of these uprisings were the foremen. The first uprising occurred on 25 January 1866, representing the first known massive Chinese rebellion in all of Peru. The result: four foremen were slain and guards from the North Island quelled the insurrection at dawn. Mr. Arguedas, the superintendent reporting on this event, stated the coolies “took this serious step…exasperated by the tremendous mistreatment they suffer…especially pertaining to the food and other essential life needs” (quoted in Méndez 1987a:63). A few days later, a second revolt broke out, wherein the Chinese seem to have also attacked the few free workers at the Middle and South Islands (*Ibid*.). The third mutiny occurred almost a year later, on 17 January 1867, and was very similar to the first one. Interestingly, no insurrections were known to have occurred at the Chinchas before –not even in Kossuth’s time– and these three transpired already 15 years after the first Chinese set foot on the islands.

Relatedly, the first of at least eight mass rebellions in the mainland estates erupted on 13 August 1866, just seven months after the first insurrection at the Chinchas (Narvaez 2010:373). In the Chicama Valley, near the northern city of Trujillo, in the sugar estate Cajanleque, some 85 coolies armed with tools murdered the landowner Antonio Larco, after he slapped one disturbed Chinese in the face (Narvaez 2010:374–76). Later, on 10 February 1869, in the Lurín Valley south of Lima, some 100 coolies “armed with clubs and knives, forced release of some of their fellows who had been locked up for fighting” (Stewart 1951:120). There also seem to be large uprisings in the valleys of Chao and Guadalupe around this time (Narvaez 2010:373). The next year, the largest and most well-known rebellion occurred: on Sunday 4 September 1870, at around 5 in the afternoon, between 1,200 and 1,500 Chinese from various estates in the Pativilca Valley north of Lima, including Araya Grande, Arguay, las Huertas, las Monjas, and Upacá, painted their faces blue and red "destroyed everything in their path and murdered several administrators, *hacendados*, and their families. The coolies attempted to take the towns of Pativilca and Barranca, but failed" (Narvaez 2010:317,385; Rodríguez Pastor 1979:53). Within 14 hours, some 175 military repelled the Chinese, killing, according to official reports, 150 of them, but probably some 300 or even 600 (Narvaez 2010:386; Rodríguez Pastor 1979:93; Stewart 1951:123). "The military could have killed more" –argues Narvaez (2010:386)– "but refrained at the behest of the *hacendados*. They did not want to lose more of their investments." For their part, the Chinese seem to have killed 16 people, and wounded seven others (Stewart 1951:123). Rodríguez Pastor thoroughly examines this important episode in his *Rebelión de los rostros pintados* (1979). Following this "rebellion of the painted countenances," on 7 July 1873, 140 Chinese mutinied on the Carapongo estate, followed by uprisings in Huacho (1875), and in the estates in the vicinity of Trujillo in early 1876 (Méndez 1987a:77; Narvaez 2010:391). All these class struggles contributed to the banning of the Chinese trafficking and deterred any potential renewal of it.

On the other hand, to make the coolies' nightmare even worse (though this must have been rare on the Chincha islands), sometimes outliving their eight-year contracts awaited harsher conditions. If at this time they were caught by Peruvian (or Cuban) authorities without a certificate (*boleta*)[164] issued by their former employers stating that they were now free, and sometimes even while having these certificates, they would be forced to "enter the dépôt…and either…work in irons and without wages, or [be] hired out to labour…a servitude without limit and which may last till death" (*Cuba Commission Report* 1993:117; Rodríguez Pastor 2017:417). In this sense, the Chinese were also doubly maltreated: on one hand as wage laborers, and on the other hand as unfree racialized workers, thus experiencing an oppression that combined some of the harshest aspects of merchant and industrial capitalism (Helly 1993:22). Very few coolies in Peru (and Cuba) returned home ever again. For instance, between 1865 and 1874, only 2,000 Chinese in Cuba managed to return to China (Helly 1993:25). Thus occurred the rise and fall of

[164] It seems that the Chinese guarded this document with great zeal. "[E]ven when they committed suicide" –says Rodríguez Pastor (2017:417)– "the certificate was placed in their pocket or in a bag." Apparently, they did the same with their contracts (*Ibid*.:117).

Chinese bonded labor to in the 19th century, which involved some of the harshest conditions of exploitation in history, and was importantly related to the guano trade. As a poignant poem by Wang Ping (1998:66–73) evokes (*cf.* also Yun 2008:232):

"…pigs chickens dogs snakes,
whatever it was they called us.
Our bodies not ours,
sold to 'snakeheads' for the trip…
On the boat
we were close,
hundreds of us in the hold
jammed in and in.
Here we live even closer,
six bodies in one hole,
the earth sifting into
our common grave…
Please, oh please
call out our names…
even if you can't say them right…
even if you don't know
our origin or age…
Please, oh please
call us...
Do not let us fade…"

5.4. The Polynesian trade (1862-63): Another racialized system of bonded labor in Peru?

It is important to note that, in addition to Chinese bonded labor, Peru sought additional cheap bodies elsewhere, chiefly in an attempt to expand cotton and rice production amid the U.S. Civil War (Maude 1986:2). Thus, in the seven months between 22 September 1862 and 3 April 1863, by means of 38 voyages in 33 vessels (27 of which were Peruvian), and stopping at all 51 inhabited islands in Polynesia with the exception of Hawaii, Peru introduced 2,116 bonded workers from Polynesia, Easter Island, and Micronesia into its territory (out of 3,634 that were kidnapped or deceived and transported in atrocious conditions not unlike those of the Chinese coolies) (Maude 1986:*xxi*,188). This whole enterprise was launched by an Irish-French newcomer to Peru, Joseph Charles Byrne, who sought to bring bonded agricultural and domestic workers of both sexes, for a term of five years, at four monthly pesos (*Ibid*.:5). This traffic was to exactly follow the procedures of the coolie trade. In fact, the Islanders' contracts "were in all essential points similar to those signed by the Chinese coolies, on which they were no doubt based" (*Ibid*.:122–23). Moreover, as was the case with the Chinese trade, in several instances the Polynesian, Easter Island, and Micronesian bonded workers were consigned in advance, for instance to Juan Manuel Ugarte who was, as noted, also a Chinese coolie trafficker, as well as guano entrepreneur. The brief but impactful Polynesian trade was extremely devastating for these islanders: 3,215 died for reasons directly attributable to the Peruvian recruits (either in the journey, while in Peru, or during repatriation), and only 148 of them were repatriated, although in most cases not to the islands they had been kidnapped from (*Ibid*.:167). Moreover, the population of several islands was decimated. For instance, in the coral atoll of Tongareva (Cook Islands), *472 of all its 570 inhabitants* (almost 83% of the population) were recruited for Peru, leaving only 98 people behind (FO 61/222 1864:396; Maude 1986:192). This ephemeral trade was shut off in April 1863, following international pressure, especially fostered by Edmond de Lesseps, the French *Chargé d'Affaires* in Lima (*Ibid*.:148).

Several writers, both back then and since, have stated that some, or even all, the abducted Polynesians (and other islanders) were procured to extract guano at the Chincha Islands (*cf.* Levin 1960:89–90; Maude 1986:135; Méndez 1987a:67). While it is true that on 4 and 7 October 1862, 151 Polynesians from the Tuamotu atolls (*e.g.* Fakarava, Katiu, Motu Tunga) and Tahiti (Papeete) were captured and destined for the Chinchas onboard the *Mercedes A. de Wholey* (piloted by the foregoing Thomas Reilly) and the *Barbara Gomez*, in consignment to Peruvian guano contractor Andrés Álvarez Calderón, according to the exhaustive work of British historian Henry E. Maude (1986:136), "neither ship succeeded in landing a single recruit in Peru, and no further attempts were made…to obtain [guano] labourers from Polynesia." This attempt never capitalized because both Tuamotu and Tahiti were part –and indeed remain so today– of the French Polynesia, and the French Empire's steamers rapidly halted this operation, charging the Peruvian crew of the *Mercedes* with the crime of *séquestrasion* (seizing possession) of French protected subjects. Thus, no firsthand testimony suggests that Polynesians ever worked in guano extraction in Peru. Moreover, neither Méndez (1987a, 1987b) nor the present author found any archival evidence supporting such a claim.

CHAPTER 6. THE MIDDLE AND LATE GUANO TRADE (1850-80): THE GIBBS AND DREYFUS MONOPOLIES, IMPERIALISM, AND THE WAR OF THE PACIFIC

6.1. A new era: consignments and the Antony Gibbs & Sons monopoly

Now that we have examined the concrete labor relations that made the guano trade possible –the real flesh and historical concreteness at the center of this episode– let us briefly examine how the remaining years of this enterprise unfolded, including Gibb's dominance of the business (1849-62), the guano contracts made with Peruvian nationals, and the Dreyfus monopoly towards the final stages of the trade. In addition, we will address some imperial incursions to get hold of the guano, such as the British and U.S. efforts to claim Peru's Lobos Islands (1852), the passing of the U.S. Guano Islands Act in 1856, and Spain's seizure of the Chincha Islands in 1864-66, in an attempt to recover its erstwhile dominance over Peru.

While Elías was introducing Chinese bonded laborers to work at the mainland estates (and soon also at the Chinchas), several changes were occurring around the guano trade at the contractual level. On 10 November 1849, the Peruvian Congress passed a resolution that sought more competitive guano deals, better terms for Peru, and gave priority to Peruvian contractors (Dancuart 1904:199). This was possible because at this point Peruvian oligarchs were better suited to challenge foreign merchants, since they had acquired experience and had also received enormous amounts of money from the guano trade (Mathew 1981:189). Thus on 4 October 1850, the first of 15 contracts made between 1850 and 1859, awarded to Peruvians for the export of guano to the United States, Central America, Asia, Cuba, and Puerto Rico, was signed (Bonilla 1984:134; Dancuart 1903b:23; Tantaleán Arbulú 2011:78). Peruvian contractors also founded the *Sociedad Consignataria del Huano* [Guano Consignment Company] (Levin 1960:79). For example, Barreda (the foregoing companion of J.J. Osma in London in 1848-9) would be given the sales monopoly of Peruvian guano to the United States for five years (Wilste 2018).[165] Later, in 1866, Barreda, together with Canevaro, Pardo, Carlos Delgado, Felipe Gordillo, and Clemente de Villate, would hire the British firm Thomson Bonar & Co. as their guano consignees in Britain (28 AQ 2, 1 1862; *Comisión de delegados fiscales* 1872; Mathew 1981:186). It lies

[165] In turn, Barreda would commonly draw "quite heavily" on the Anglo-Spanish firm Cristóbal Murrieta & Co. of London (Mathew 1981:191).

beyond the scope of this work to examine these deals in detail, which nonetheless remain an important component of the guano trade.

Significantly, too, on 16 March 1850, under Castilla's presidency, the Consolidation of Debt law (*i.e.* the conversion of more than half of Peru's internal debt into external debt) was passed by the Peruvian Congress, which declared all claims against Peru since 1820 as eligible for conversion into new negotiable 6% bonds (Dancuart 1903b:45; Levin 1960:80). A couple of years later, under Echenique's presidency, this law would launch a "gold rush" in Peru (Levin 1960:80). Peru's internal debt soon rocketed from less than 4 million pesos (£800,000) in 1849, to over 23.2 in 1853 (Dancuart 1903b:45–46). Table 6.1 shows the evolution of the Peruvian internal and external debt from 1830 to 1870.

Table 6.1. Peru's debt in million soles, 1830-70.

Date	*Internal*	*External*	*Total Debt*
1830	17.8	2.4	20.2
1850	8.2	22.9	31.0
1859	9.6	33.6	43.2
1870	5.9	45.7	51.6

Based on data provided by Renoz (1897:100–105) (1sol ~ then-U.S. $1).

As can be seen, overall, Peru's total debt had augmented by 54% in 1850, by 114% in 1859, and by 156% in 1870, relative to 1830 levels. What is more, it was not only capital that was siphoned from Peru into the core of the British empire: guano –the pivotal material basis of this value flow– followed the very same path: everything went out, little came back. Amid this state of affairs, Peru's wealth generated its poverty.

The government turned into cash 13 million soles of this internal debt, a process that culminated in the revolution of 1854 which overthrew Echenique, abolished slavery and the Indian poll tax (the mainstay of the internal tax structure), and wiped out a considerable portion of the tax system (Levin 1960:81,93). In short, what the Peruvian government did is to put borrowed foreign capital into the hands of Peruvian oligarchs (*Ibid*.:82–83). This is why, during the 1860s, the Peruvian ruling class came to hold large shares of the guano export contracts. "Thanks to internal debt bonds" –argues Yepes (1972:68)– "a capitalist group was formed in Lima which, little by little, as the old contracts expired, appropriated the new ones." However and yet again, this did not translate into a better economic situation for Peru, whose financial position remained in a critical state in the late 1850s. For instance, between 1854 and 1862, guano proceeds in Peru amounted to 100 million pesos (£20,000,000), but the 1854 revolution costed some 13 million pesos, and that of 1856 (see below), 41 millions, meaning that over half of the revenue generated by guano sales was lost in these internal conflicts, in addition to the amounts spent to finance the conflicts with Peru's neighboring republics (Bonilla 1984:146; Mathew 1981:111).

Concurrently, in 1852 Manuel de Mendiburu, Peruvian minister plenipotentiary of Peru, arrived in London with instructions from his government to increase sales in Europe. Despite the guano trade was thriving in Britain, guano was still scarcely used in continental Europe, in particular in Germany and Russia, "whose exhausted lands are much in need of guano, but where up to now it is entirely unknown" (de Rivero quoted in Mathew 1981:132). In Britain, guano occupied a central position in the fertilizer market, and "was widely acknowledged to have become a vital element in British agricultural advance" (*Farmer's Magazine* 1852; Mathew 1981:135). As leading Scottish agriculturalist James Caird (1816-92)[166] put it in 1853: guano had "become like a necessary of life to us, with our narrow boundaries and worn-out cornfields, with no tracts of rich unbroken soil for our increasing population to fall back upon" (quoted in *Ibid.*:135–36). In the field, Caird also identified some of guano's practical benefits: "The introduction of guano has greatly lessened the cost of the potato crop" (Caird 1852:300). Likewise, in his classic work *Talpa, or, The chronicles of a clay farm*, one of the most influential pieces on agriculture of the Victorian era, British landowner and agriculturalist Chandos Wren-Hoskyns referred to both guano and the birds that produce it as the "Wizards of the Pacific" (Hoskyns 1854:80–90). Blinded by the guano fever, Lewis F. Allen, editor of this book in the U.S., mentioned: "Of all manures yet applied to the soil, none have been found in which the stimulating elements are so highly concentrated as guano. Nor the supply is scanty...millions of tons lie in readiness for the hungry soils of distant countries to receive it. The guano deposits will last for centuries" (quoted in *Ibid.*:90). Guano also came to be widely known around this time as the "white gold," becoming yet the third substance (following sugar and cotton, also closely linked to the British Empire, *cf.* Chapter 2) fetishized under that name (*cf.* Santana-Sagredo *et al.* 2021).

[166] Interestingly, Caird would be buried in Highgate Cemetery in London, not far away from Marx's, Hobsbawm's, and Herbert Spencer's graves.

Relatedly, on 14 February 1854, Sir James Graham, First Lord of the Admiralty, while addressing the House of Commons, mentioned: “there is no matter upon which the agricultural interest of the United Kingdom is more dependent than an enlargement in the supply of guano, the great source of which is at the present moment a monopoly in the hands of the Peruvian Government” (Mathew 1981:98). On 19 September 1854, British consul Sulivan wrote to José Luis Gómez Sánchez, Peru’s Foreign Minister, that guano was “an article so essential to agriculture” (FO 61/148 1854:79). In the same vein, Montané –who held the French sales monopoly– referred to guano in a 10 September 1853 letter to Théodore Ducos, France’s Minister of the Navy and the Colonies, as an “essential article” (« *un article de première nécessité* ») (F12/6860 1853). Thus, we can see the exceptionally high and special status that guano was given in Britain, France, and the United States at that time.

For its part, in Peru, in 1853 Finance Minister Piérola uttered about guano: “Our current credit, we can say, originates from this substance, which Providence wanted to make us their only depositaries; and the amortization of our debt and the payment of its interests would be an unbearable burden for the Republic, if it did not have the guano to face them” (quoted in Renoz 1897:101–2). Note how –following Marx (1993:451)– guano, an element of external nature, was being treated here as a “free gift to capital.” Relatedly, in the period from January 1854 to December 1856, there was an important rise in the price of guano in Britain, from £9.5 to £13 per ton, which, according to Mathew (1981:137), was in many regards the most important feature of the trade throughout the decade (MS11047 1841). This increase was due to increased supply, limited competition, and rising food prices (following the Crimean war and a fall in British wheat imports). Later, on 20 April 1855, the Peruvian government issued one of the “most significant documents of the guano trade” (Mathew 1981:142). This was a circular by Elías, then Finance Minister of President Castilla, where he sought to increase the net product accruing to Peru from guano from 20 to 30 pesos per ton. Interestingly, during this period the exhaustibility of this substance was not conceived as an issue. In 1856, it was claimed that over 26 million tons of guano would last until the year 2112 (Mathew 1981:146).

Importantly, too, 1858 marked the peak of Peruvian guano imports in Britain (302,207 tons) followed by an abrupt (84%) drop the following year, from which the trade in Britain never recovered, despite a brief spike in 1870 reaching roughly 80% of the 1858 value (*cf.* Mathew 1981:252). The average weight of guano-laden vessels arriving from Peru was 714 tons, most of which came to London (*Ibid*.:128). Relatedly, in 1856, possibly the pinnacle of guano sales in Britain and continental Europe (especially in Belgium), Gibbs sold 211,647 t of guano, compared with 110,490 t (*i.e.* a 47.8% decrease) the following year. Never –states Mathew (*Ibid*.:165)– had there been "such a reverse in the history of the trade." It became harder to sell this manure. For instance, in December 1858, 459,805 t of guano lay unsold in Gibbs's several deposits around the world, 315,962 t (68.7%) of which were in England (*Ibid*.:171). The brief occupation of the Chinchas by the forces of ex-president Vivanco towards the end of 1856 was not relevant to explain such a state of affairs (*Ibid*.:168).

Rather, the main reason explaining this decline –argues Mathew (1981:182)– was the loss of a large portion of the extremely important turnip market to superphosphate of lime. Curiously, even if turnips were better suited for phosphatic fertilizers, Peruvian (nitrogenous) guano also worked for them, as it too contains phosphate (*Ibid*.:179). Grain crops, which covered over 50% of England and Wales's arable land, also received guano, as did some clay soils (to overcome the deficiencies of farmyard manure), and also turnips in heavy soils, where superphosphate was less effective, or in the north, where more N was required (Mathew 1981:184). Guano remained the favorite fertilizer in Britain for the potato and meadow lands. Relatedly, the use of guano in southeast England was practically negligible (*Ibid*.:128). Yet, superphosphate of lime, the loss of guano's leading position in the roots market, the War of the Pacific, the irregularity of supply, quality, and its high cost, all dealt a final blow to the guano trade in the 1870s (*Ibid.*:184).

Back in Peru, it was also in 1858 that Manuel Ortiz de Zevallos, Peru's Minister of Finance, declared about guano: "So great is the value of this branch of the national riches, that without exaggeration it may be affirmed that on its estimation and good handling depend the subsistence of the State, the maintenance of its credit, the future of its increase, and the preservation of public order" (quoted in Duffield 1877:71). Relatedly, *i*n 1862 Pedro Gálvez, the new Minister of Finance, asserted that:

> to cope with this ever increasing and devastating deficit…the government has resolved to negotiate a loan in Europe…Given the financial system that governs in the Republic for some time, guano is the providence of the treasure. It is with what it produces that we cope with almost all the numerous requirements of our budget and it is the starting point for all the formulated projects to bring the nation into a broad avenue of positive ameliorations (quoted in Renoz 1897:103).

Thus, as important, coveted, and publicized as Peruvian guano was as a substance exhibiting remarkable fertilizing properties, for Britain it also was, at the end of the day, simply another fertilizer, ready to be immediately and opportunistically substituted for at the first sign that other substance, either natural or synthetic, could do the trick. Yet, for the nascent Peruvian nation-state, guano was its very backbone, upon which it chiefly depended economically from 1840 to the late 1870s, as the above discourses by three different Ministers of Finance attest. This in itself shows the inequality and power asymmetry of this alleged free-trade relation, reproduced time and again between the empires and their dependencies. Hence British merchants and farmers, "by displaying such an interest in guano…were giving Peru the rope to hang herself with" (Mathew 1981:147). Many of the foregoing contracts and affairs occurred during the period Gibbs dominated the trade. Let us examine some key issues unfolding in this period, as well as how Gibbs left the guano trade after almost 20 years in the business.

6.1.1. The rise and fall of Gibbs

As noted, Gibbs –the most important and powerful merchant of the guano trade– had entered this business in February 1842 (under the third contract); took control of most of the trade in 1849; and would officially depart it on 18 December 1861, although they would still sell their stock throughout 1862, and reported having some 30,000 tons of guano left by late 1863 (Mathew 1981:98). All told, Gibbs signed five contracts with the Peruvian government (1842, July 1847, August 1847, 1849, and 1850); the first three shared with other houses, the last two by themselves (Mathew 1977b:342). Overall, they exported over 1.8 million tons of Peruvian guano in more than 3,050 vessels, generating a profit of £1,282,671 (Mathew 1977b:366, 1981:249). This firm operated at the heyday of the guano trade, controlling the highest-quality and most abundant guano deposits on Earth (the Chinchas), all while competition from other sources of fertilizers was still scant.

In 1853, Gibbs, who, as noted, on consignment, remitted the guano minus a commission for their services, achieved their most important victory yet. On 21 May, through a series of secret negotiations, they were granted a six-year extension on their 1850 contract which stretched its expiration date from 18 December 1855 to the end of 1861 (Dancuart 1903c:42–43; Mathew

1981:105–7).[167] In 1854 their influence enlarged even further as they signed a guano contract for Australia and another one for the British West Indies, although Gibbs were still barred from the French, Spanish, and U.S. markets (Mathew 1981:107–8). Around this time, too, Gibbs agreed to become the financial agent of the Peruvian government, despite earlier hesitation (*Ibid*.:102). On 26 January 1858, Gibbs was finally awarded the French (and French colonial) markets, as Montané lost his deal with the Peruvian government after the latter accused him of malpractice (accounting to Peru for guano sold at wholesale prices while secretly cashing in on sales at higher prices, in addition to having dealings with guano adulterators) (F12/6860 1859; Mathew 1981:109–10).[168] Thus, by the late 1850s, the Gibbs company had control over almost all the European market (including France and Spain), the West Indies, Africa, the Indian Ocean, and Australia, and the only areas outside their control were the United States, Central America, and Mauritius, most of which were supplied by Peruvian contractors (Mathew 1981:98–99,111).

Yet, on 24 October 1860, the Peruvian government took an important step that would mark the beginning of the end of Gibbs's guano monopoly. It awarded six new four-year guano contracts to different individuals: (1) Julián de Zaracondegui was given Britain, the British Empire, and the United States (Gibbs competed for this niche again but lost); (2) Thomas Lachambre took the French trade; (3) Heinrich Witt (as noted, former employee of Gibbs in Lima) and Christoph Wilhelm Schutte were awarded the German market; (4) S. Valdeavellano was granted Belgium; (5) Canevaro, Pardo (who would later become Peru's president), and Barrón kept Holland; (6) and L. Patrone obtained the Italian consignment (28 AQ 2, 1 1862; 65 CCC 1 1854; Dancuart 1904:49; F12/6336 1858; F12/6860 1859). Then, on 27 August 1860, the Peruvian Congress resolved that guano contracts should be framed following their resolution of 10 November 1849, which, as noted, sought more competitive guano deals, better terms for Peru, and prioritized Peruvian contractors (Dancuart 1904:199). At this point, Peruvian oligarchs were better suited to challenge foreign merchants, as they had acquired experience, and Castilla and Echenique's governments had placed enormous amounts of money in their hands throughout the 1850s (Mathew 1981:189). José Casimiro Ulloa, Peru's Secretary of the Fiscal Commission in

[167] A copy of this contract does not seem to exist, although it is mentioned by Piérola (Dancuart 1903c:42–43). Likewise, President Echenique did not mention it in either of his two messages to Congress in 1853 (Mathew 1981:107).

[168] Guano adulteration, in addition to its price and variable composition, was an important problem faced by this trade all throughout (*cf. Farmer's Magazine* 1852; Potter 1842a).

France (and its colonies), together with diplomat Luis Mesones, was one of the main voices advocating for Gibbs's departure from the guano business (*cf.* Mathew 1981; Ulloa 1859) Thus, if Gibbs wanted to keep partaking in the trade, they would have to deliver a better contract, and would not be able to carry out any more secret deals, as had been the case in the past (Mathew 1981:188).

Gibbs were not happy about this policy. Four months after their 12-year-old contract was set to expire, in a 14 August 1861 letter to his uncle William, Henry G. Gibbs stated: "if the [Peruvian] government think they can manage the business better than we can....we should hit them pretty sharply for the distrust of us implied...then, if we could rub their noses in the guano bags…it might do them good" (MS11021/019 1861:23). Yet, six months later, their perspective became more nuanced. As H.G. Gibbs wrote in another letter to his uncle, on 1 February 1862: "The best news I have to give you is that Barreda has expressed his willingness to take the English Contract. It is not quite settled, but I have great hopes it will be, and that we shall be free" (in Mathew 1981:219). By March 1862, Gibbs were out of the guano trade (*Ibid*.). Thereafter, this trading house lived from the fortunes they made from selling bird excrement and by entering the world of merchant banking, where they engaged in stock exchange investment and financial speculation, chiefly in relation to railway and steam navigation companies (*Ibid*.:223). There would be a saying in London's *City* that went: "The House of Gibbs that made their dibs, by selling turds of foreign birds" (*Ibid*.:226). Gibbs would close its Lima branch (as noted, opened in 1822) in 1880. Interestingly, as we shall see, they also partook in the Peruvian nitrate business, partly owning the Tarapacá Nitrate Company, and would briefly engage in the guano trade again in 1881-83, when Chile, with British backing, took over the enterprise amid the War of the Pacific (Greenhill and Miller 1973:111; Mathew 1981:226).

Around this time, yet again, Peru's financial situation remained desperate and dependent on foreign capital. On 25 August 1862, the Peruvian government contracted a £5.5 million loan to finance its external debt. This was a deal between Mariano José Sanz, Minister Plenipotentiary of Peru in Britain, on one hand, and London bankers Heywood, Kennards & Co. on the other. It entailed a 1.5% annual interest rate, to be paid at Gibbs's office, and whereby bonds of £2,000, £1,000, £500, £150, and £100 were issued. Peru also committed to mortgage all its guano to be exported to Britain, its colonies, and Belgium (28 AQ 4, 5 1862). Lastly, the 1850s and 1860s correspond to the years when some of the chief imperial attempts by Europe and the United

States to seize Peru's guano deposits took place, which in turn catapulted a worldwide scramble for guano. Let us briefly overview these episodes.

6.2. The scramble for the Lobos Islands: Buller and Webster's failed annexation of Peruvian territory (April 1851 – November 1852)

Even if the British held the monopoly of guano sales, the Peruvian government "owned"[169] the guano deposits. Ultimately the proceeds from guano were a *monopoly rent*, derived from the unique geophysical and ecological conditions off Peru, and which were chiefly divided between Peru's government and the British Empire. As Marx (1993a:971) put it:

> Wherever natural forces can be monopolized and give the industrialist who makes use of them a surplus profit, whether a waterfall, a rich mine, fishing grounds or a well-situated building site, the person indicated as the owner of these natural objects, by virtue of his title to a portion of the earth, seizes this surplus profit from the functioning capital in the form of rent.

This was exactly what occurred with Peruvian guano. Thus, despite Britain grew rich on guano sales, they still sought to break Peru's more basic monopoly of guano "ownership," and hence obtain more bird dung at lower prices. To do so, on one hand, Britain searched for and seized new guano deposits throughout the globe (*cf.* the Ichaboe case above), and, on the other, developed synthetic fertilizers (*e.g.* superphosphates) and got hold of other substances with fertilizing properties (*e.g.* bones, nitrates, potash, oilseed cakes). Yet, Ichaboe had not been the only British alternative source of guano that sought to circumvent Peru's monopoly. From April 1851 to June 1852, a heated debate arose in Britain, concerning their potential annexation of the Lobos Islands (whose name in English would roughly translate as "Sea Lion Islands"), off Lambayeque in northern Peru, some 575 km northwest of the Chinchas and containing some two million tons of guano, although of a lower nitrogen content, given the less arid conditions at that latitude.

Grosso modo, as narrated by Mathew (1981:150), in the spring of 1851, Thomas Wentworth Buller –a former Navy commander and then governor of RASE with strong

[169] As Marx (1993a:911) succinctly and famously said over 150 years ago: "From the standpoint of a higher socioeconomic formation, the private property of particular individuals in the earth will appear just as absurd as the private property of one man in other men. Even an entire society, a nation, or all simultaneously existing societies taken together, are not the owners of the earth. They are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations, as *boni patres familias* [good heads of the household]."

protectionist views– visited the library of the Royal Geographical Society. Interestingly, there he examined the very book that had spurred Livingstone's attempt to create a guano enterprise in Ichaboe: Morrell's *Narrative*. Just as Morrell had visited Ichaboe in 1828, five years earlier, in September 1823, he had stopped at the Lobos Islands. Morell observed the Lobos were "…covered with sand, rocks, and the dung of aquatic birds: the latter sufficient to load thousands of ships, having been accumulating for untold ages. It is called guannar [*sic*] by the Spaniards, and is probably the richest manure in the world" (Morrell 1832:121). As had been the case with Livingstone, this work exerted a very profound influence on Buller who, on 18 April 1851, wrote to Lord Palmerston suggesting that Peru could hardly have any legitimate claims over such "desert islands," well off its coast (Lobos de Tierra being situated 19 km from the mainland, and Lobos Afuera, 93 km away) (Mathew 1981:150). Morrell also requested that a warship be sent to enquire if these islands were indeed unoccupied. However, Palmerston directed his under-secretary, Lord Stanley, to inform Buller that there was "no ground upon which the British Government would be justified in claiming for British subjects the right to appropriate at their pleasure the guano to be found on those islands" (*Ibid*.:151).

The issue reached Parliament a month later, and several discussions ensued throughout the summer and fall of 1851. For instance, on 20 November, Consul General Adams wrote to Palmerston:

> I have used the arguments with which Your Lordship has supplied me in favour of the diminution of the price of Guano on every occasion but am generally remined of the irresistible law of supply and demand which England has so amply developed, and I have little reason to think Peru will ever be persuaded to forego *the full advantage of the monopoly with which Nature has endowed her* [emphasis added] except in obedience to that law and by open competition with such other discoveries or inventions as may supplant her in the Market (in *Ibid*.:152).

In March 1852, Buller wrote to Lord Malmesbury, Britain's new Foreign Secretary, hoping he would be more receptive than Palmerston about the Lobos Islands issue. Yet, Malmesbury's position was in line with Palmerston's. Thus, on 17 April, Buller made the discussion public by writing a piece for *The Times*. Here, he insisted that Britain should "take possession of the [Lobos] islands, and, under the protection of the British flag, make the export of guano free to the ships of all nations" (Buller 1852:8). His chief argument was that "these islands were not enumerated among the dependencies of Peru at the time when Peru declared its independence," and –following 18th-century international Prussian jurist Emer de Vattel– that "all mankind have an equal right to things which have not yet fallen into the possession of any one; and those things belong to the person who first takes possession of them" (*Ibid*.). In addition, Buller wrote: "I fearlessly assert, that according to the law of nations, the Peruvian Government can have no claim to these islands" as well as that "the monopoly of guano now maintained by the Peruvian Government is injurious to the whole civilized world" (*Ibid*.). Moreover, he stated: "I have myself used about 400 tons of guano as manure, and I speak from experience when I say that such are its extraordinary powers, and such the advantages of its light carriage, that...there is scarcely any land in England so barren that it might not be cultivated with advantage," and that "[g]uano is an article (perhaps the only one which can be mentioned) in which the whole cost is the freight and loading." In sum, in this revealing short piece Buller gave a masterclass of imperial arrogance, racism, and contempt for the guano diggers, let alone for the environment.

The Peruvian response did not wait. Five days later, *The Times* published a short text by Emilio de Althaus, first Attaché to Peru's Legation and vice-consul. Althaus stated that the Lobos Islands "have been known ever since the discovery [*sic*] of the west coast of South America by the Spaniards, to whom they belonged"; that these and other islands such as the Guañapes and coastal Malabrigo "are purposely kept uninhabited and unfrequented by order of the Government, in order that the birds may be left undisturbed and thus a constant increase of the deposits be promoted"; that "[f]rom time immemorial the fishermen of Lambayeque have been accustomed to inhabit the Lobos…but for some years past the Peruvian Government have prohibited their so doing [due to] their destroying of thousands of birds and bringing away boat-loads of eggs"; that since the guano trade began "all the deposits belonging to…Peru have been surveyed and measured…and amongst these are enumerated the Lobos"; and that, in order to protect the birds (and thus the guano), Peru would seize any vessels, both foreign or national, loading guano in any part of its territory, unless they had the proper license (Althaus 1852:6). Through this official response, Peru's government both rebutted Buller's claims and showed its disregard for the indigenous use of guano in Peru, the latter by not allowing the locals to visit the islands, as they had done for millennia. In addition to Althaus's response, the Peruvian government also sent some official documents to Malmesbury to support its claims (FO 61/136 1852; Mathew 1981:154).

Yet, Peru's defense had little effect among certain protectionist sectors in Britain, particularly in Scotland. On 4 May, John Rae, a merchant from Aberdeen, requested the British admiralty to provide him with naval protection for some vessels he intended to send to Lobos (Mathew 1981:154). Around these days, several shipowners and farmers also supported the idea of seizing the Lobos. For instance, on 7 May, the first of several meetings of farmers demanding action to break Peru's monopoly and claim the Lobos convened in Inverness (the famous setting of *Macbeth*) (FO 61/137 1852:209; Mathew 1981:155). However, new information would shift the discussion in Peru's favor. On 28 May, consul Rivero informed Malmesbury that, on 6 September 1833, Peru's government had prohibited foreign ships from sealing at the Lobos, and Belford Wilson (it will be remembered, then Britain's consul general in Peru), had accepted this assertion of sovereignty (*Ibid*.:157). Wilson, now minister in Venezuela, was contacted, and confirmed this had occurred. Wilson also sent Malmesbury extracts from 18th-century materials citing the Lobos Islands as part of the Spanish vice-royalty of Peru (Mathew 1981:158).

This sparked outrage among several British farmers and landowners. On 7 June 1852, a note in the *Glasgow Herald* stated that even if the Lobos Islands belonged to Peru, "it is never to be conceived that the Government of that country is to be allowed to keep under lock and key deposits of such immense importance to the universal human family" (in FO 61/137 1852). Four days later, Buller, representing RASE, the Duke of Buccleuch (Britain's largest landowner), representing the Highland and Agricultural Society of Scotland, and the Duke of Richmond, among several others, met with Britain's Prime Minister, Lord Derby, "for the purpose of impressing upon the Government the great importance of using every possible means to obtain a cheap and abundant supply of guano" (*The Times* 1852:8). Buller, who has the first to speak, believed that Peru was "at the mercy" of Britain, "it being more for their interest to sell than for us to buy" (*Ibid*.). For his part, the Duke of Buccleuch reinforced the point of obtaining a larger and cheaper supply of guano, as "the use of this manure was increasing to a very great degree in the north" (*Ibid*.). The Duke of Richmond presented a memorial from Banff, signed by 870 farmers, stating that if they could get guano at £6 per ton (as opposed to its actual price over £9), its use would double in England and Scotland.

Yet, Lord Derby replied that the Peruvian government had absolute sovereignty over the Lobos Islands, as had been ascertained by British diplomats in the 1830s. Thus, in order to lower guano prices and increase supply, Derby instead proposed to find other guano deposits (a goal that led Britain to seize, for instance, the Khurīyā Murīyā islands off present-day Oman in 1854) (Caird 1853:6; Mathew 1981:64–65). The foregoing deputation hence withdrew, “apparently a good deal disappointed with the result of the interview” (Caird 1853:6). Buller’s furious response was immediate: “There is in fact no law of nations. The laws of nations are decided by three or four of the most powerful statesmen of the three or four most powerful nations in the world…they give laws to the rest, and when they differ, the question is submitted to the arbitration of the sword” (Buller 1852:30; *cf.* also Mathew 1981:161). Buller suddenly died on 30 October 1852 after a short illness, and thus the British prospect of annexing the Lobos Islands lost their most fervent advocate (*The Times* 1852:6). For his part, Gibbs, who had the monopoly of guano in Britain at the time, was not really concerned about the real or alleged identification of other guano deposits around the globe. In 1855, he said: I don’t think much think much of the new discoveries. I hear of none where the rain does not fall – and as long as *their* Rain continues our Reign will also. So we will sing ‘Long to rain over them!’” (in Mathew 1981:176).

Importantly, some years later, during 1856-58, a civil war erupted in Peru, which would have implications *vis-à-vis* the guano trade in Britain, France, and the U.S.’s imperial policies. In short, on 31 October 1856, a rebellion against Castilla’s regime arose in Peru’s southern city of Arequipa, led by none other than Vivanco (a result of ongoing tensions existing since the early 1840s). The imperial powers felt uneasy about this. On 9 December, consul Sulivan wrote Gibbs that “steps should be taken for the protection of British Interests in the Chincha Islands” (FO 61/165 1856:264). Two days later, according to Sulivan, Peru’s Foreign Minister uttered that “the Chincha Islands should be guarded and guaranteed both for the advantage of British and French interests” (*Ibid*.:270). Yet, as part of this insurrection, on 28 December a group of Vivanco’s naval forces, commanded by Lizardo Montero (future president of Peru) and Miguel Grau, seized the Chinchas onboard the *Apurímac, Tumbes,* and *Loa*, and began selling guano (chiefly to Vivanco’s friends in Valparaíso) without seeking to disrupt the international guano trade (Basadre 1968b:160–61). Yet, some of the foreign business was indeed affected, as can be seen by the brief suspension of Barreda’s U.S. contract in early 1857 (Mathew 1981:191). In addition, the *Loa* even ventured to board the British steam *New Granada* on 15 March (*Ibid*.:165). Yet, this short uprising was squashed by British intervention, and on 22 May 1857, the rebels had left the Chinchas (Lesher 2008:124). This brief but important episode sheds light on Britain’s imperial resolve to protect Peru’s coveted guano deposits to their advantage.

6.2.1. The United States Empire and guano

The scramble for the Lobos Islands did not end with Britain's abandonment of the enterprise. In fact, just as Peru was settling the issue with Britain in the summer of 1852, the United States revealed their intention to claim these guano-laden rocks, in an even more aggressive tone. What is more, this episode not only threatened to sever U.S. ties with Peru, "but almost resulted in outright war" (O'Donnell 2008:38). Interestingly, the U.S. attempt to claim the Lobos Islands (June-November 1852), as we shall see, paralleled Britain's in many regards, although there were also important differences. In short, on 2 June 1852, James C. Jewett, a guano enthusiast (along with his silent partner, Alfred G. Benson, a Brooklyn merchant involved in the California gold rush) who had followed the British debate around the Lobos and was captain of the U.S. vessel *Philomela*, sent an artfully confectioned letter to U.S. Secretary of State, farmer, and guano user[170] Daniel Webster (1782-1852), inquiring whether U.S. citizens could take guano from the "unhabited [*sic*]" Lobos Islands (Cushman 2014:81; Jewett 1852; Manning 1938:248). Three days later, Webster wrote a determined reply (in Manning 1938:248–49; *New York Herald* 1852:1):

> This Department…is not aware that the Lobos Islands were either discovered or occupied by Spain or by Peru, or that the guano on them has ever been used for manure…it is quite probable that Benjamin Morrell…who…visited those Islands in…1823, may justly claim to have been their discoverer…Under these circumstances it may be considered the duty of this government to protect citizens of the United States who may visit the Lobos Islands for the purpose of obtaining guano…I shall consequently communicate a copy of this letter to the Secretary of the Navy and suggest that a vessel of war be ordered to repair to the Lobos Islands, for the purpose of protecting from molestation any of our citizens who may wish to take guano from there.

Moreover, Webster included a little-known postscript in this reply: "It is considered important that this letter should not be made public at present."[171]That same day, Webster indeed also wrote Secretary of Navy, William A. Graham, suggesting to station a "vessel of competent force" at the Lobos Islands (Shewmaker 1977:326–27). Graham issued the corresponding order on 16 June (Wiltse 2018). Emboldened by this, Jewett and Benson started preparing vessels,

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[170] Webster had an estate in Marshfield, Massachusetts, where he applied Peruvian guano to his turnips, potatoes, oats, beets, hay, corn, and other crops (Remini 1997:348).

[171] Webster claimed not to recall writing this postscript, which does not appear on either of the two copies of the letter in the files of the Department of State, but is present in the copy Jewett published in the *New York Herald* on 11 August 1852 (*cf. New York Herald* 1852:1; and also Shewmaker 1977 footnote 26).

weapons, and other equipment for the expedition to the Lobos, and also recruited mariners through advertisements in the Boston (J.H. Cheney & Co.) and New York (R.G. Trundy) newspapers. They conceived a first dispatch of up to 60 ships, bound to occupy the Lobos de Afuera for one or two years with 100 men (Clay in Manning 1938:602; Shewmaker 1977:327; Wiltse 2018).

The Peruvian government and U.S. diplomats in Peru quickly learned about this plot through these newspaper accounts and became incredibly alarmed. On 24 June 1852, John Randolph Clay, the U.S. *Chargé d'Affaires* in Lima, wrote to Webster that "the right of property in them [the Lobos Islands] is incontestibly [*sic*] vested in the Peruvian Nation" (a view in line with Malmesbury's and Palmerston's *vis-à-vis* the British case), and that, if the U.S. recognized the Lobos Islands as Peruvian, "the guarantee given by the United States would carry with it a moral force, which no nation would be inclined to put to a test" (Clay 1852). This dispatch appears to have reached Webster as late as 2 August. For their part, according to a 25 June letter from British consul Adams to Malmesbury, José J. de Osma (the older brother of Juan Ygnacio de Osma and foregoing Minister Plenipotentiary), Peru's *Chargé d'Affaires* in Washington, on his own initiative sent a note to Secretary Webster urging the U.S. government to take measures to prevent "this direct attack on Peruvian property" (FO 61/133 1852:319). Having received no reply, consul Juan Ygnacio de Osma succeeded in obtaining an interview with Webster on 2 July. As he began to explain the grounds upon which Peru defended their possession of the Lobos Islands, including the fact that the British had already recognized it, he was interrupted by Webster: "The Lobos Islands do not belong to you. The guano on them was discovered by Morrell. The Government of the United States will protect her citizens in carrying it away" (*Ibid*.). By 14 July, 14 U.S. vessels had already been freighted for this enterprise, and the commander-in-chief of the U.S. squadron in the Pacific, Commodore C.S. McCauley, was standing by in neighboring waters. The Peruvian government immediately contacted consul Clay to address the situation. Clay replied that he had received no instructions from his government on the subject and that he had reported fully on Peru's rights upon the Lobos Islands (Shewmaker 1977:321).

On 2 August, following a request by President Echenique, in secret session and after two days of deliberation, Peru's Council of State gave the government full powers to purchase steamers, increase the army, and raise a loan to defray military expenses to face the likely U.S.

invasion (Clay 1852:605). On 9 August, Juan Y. de Osma formally protested against the U.S. plan by sending a letter to Webster, which stated that the U.S. intended annexation of the Lobos Islands "is a clear violation of the most sound principles of International Law," and that 17th- and 18th- century documents[172] described the Lobos as part of Peru, and thus their alleged "discovery" [*sic*] "neither Captain Morrell himself [could have] pretended nor could pretend to attribute to himself" (de Osma 1852). De Osma also claimed that "The English Govt., much more interested than that of the U.S. in the acquisition of Huano…found nothing in the title by which Peru holds said Islands which could create a doubt to dispute it" (*Ibid*.). Moreover, he uttered that: "Peru relying on her right and her laws, is prepared to resist so unjustifiable an aggression, without paying any consideration to the superiority of material force upon which the authors of it calculate" (*Ibid*.). On 12 August, the *New York Times* published a list of 20 U.S. vessels dispatched to the Lobos Islands, such as the *Manchester*, *Sea King*, *Margaret*, *Berlin*, and *Philomela*, most of which departed from New York and Philadelphia (*New-York Daily Times* 1852:1).

To further escalate the situation, on 16 August, captain Jewett wrote Webster stating he had "recently [seen] in the public papers a statement that the Government of Peru had taken armed possession of these Lobos Islands," and that "American vessels to the number of thirty, and over four hundred of our countrymen are soon to be at these Lobos Islands…and…on the fifth day of September next I shall leave New York for the Lobos Islands" (Jewett 1852). At this point, and partly as a consequence of Jewett's letter and also of U.S. President Millard Fillmore's view –not unlike Palmerston's *vis-à-vis* Britain– that Peru had a valid title over the Lobos (*cf.* Fillmore 1852), on 21 August, Webster reversed course. While some 40 U.S. vessels were *en route* to the Lobos Islands with the aim, at best, of taking control of guano extraction and, at worse, of annexing them (Wiltse 2018), Webster (1852) wrote Jewett that:

> …it is expected that the vessels which have proceeded thither under your auspices will not make use of the arms with which it appears from your letter of the 16th instant, they are provided for the purpose of forcibly resisting the Peruvian authorities. You must be aware that such a resistance would be an act of private war, which can never receive any countenance from this Government. The naval Commander of the United States in the Pacific will also…be directed to abstain from protecting any vessels of the United States which may visit these Islands…Some of the statements contained in your letter of the 2d of June last had a tendency to mislead us, and as intimated above…have done so.

[172] Antonio de Alcedo, *Diccionario geográfico-histórico de las Indias Occidentales ó América* (Madrid, 1786–89); John Ogilby, *America* (London, 1671).

Yet, this same day Webster wrote a letter to de Osma expressing that even if the U.S. Navy was instructed to avoid any confrontation with the Peruvians, the issue of the Lobos Islands sovereignty had yet to be resolved. He argued that Morrell had discovered guano on the islands, invoked the cannon-shot rule (*i.e.* that the Lobos laid well beyond the three-nautical mile limit, equivalent to the distance of a cannon shot from the shore, which was the criterion used by western nations to claim coastal water territories), and that the U.S. had a stronger claim to the Lobos than Peru given the frequent presence of U.S. sealers around them since 1793. He said the Lobos were "mere barren rocks in the sea, uninhabited and uninhabitable. Fisheries, and the pursuit of amphibious animals, especially the seal, have long been carried on around their shores [by U.S. citizens] if Peru held and possessed full sovereignty over these islands, this fishing near the shore, and this pursuit and killing of amphibious animals upon the land, was as much an invasion of that sovereignty as is the taking of guano from them now." Webster concluded this long letter by stating that "[t]he Government of the United States, however, is prepared to give due consideration to all facts tending to show possession or occupancy of the Lobos Islands by Peru" (Webster 1852).

During the next weeks, dozens of arguments from Peruvian diplomats, consul Clay, and even private U.S. citizens (*e.g.* William Miles), reached the U.S. Department of State, refuting "Webster's fragile contentions" (Wiltse 2018). Britain also "vociferously objected" the U.S. claim of the Lobos (Cushman 2014:81). Amid this state of affairs, and in spite of the reversal in U.S. foreign policy *vis-à-vis* the Lobos, on 19 September President Fillmore wrote Webster "in some haste," stating "it will be almost a miracle" to avert war with Peru, hesitant that the orders to the U.S. fleet countermanding those issued in June would reach commander McCauley in time (Fillmore 1852). These new orders must have reached the Pacific squadron, given the war never broke out. In addition, two days later, Charles M. Conrad, the acting Secretary of State (Webster had stepped aside following health complications –cirrhosis and subdural hematoma– and would shortly die the next 24 October) (Remini 1997:761),[173] informed Clay of Fillmore's presumption of Peruvian sovereignty upon the Lobos:

[173] Coincidentally, Adams, the British *Chargé D'Affaires* in Lima, would also die around this time (1 September), following a paralytic seizure contracted on 18 August (FO 61/133 1852:344). Thus, Buller, Webster, and Adams, three key figures in the early stages of the guano trade –and the Lobos affair in particular– died within months of each other. In fact, Buller and Webster died the same week.

> since the communications heretofore made to that Government [Peru's] further information has been obtained…and although [it] is not considered sufficient to establish conclusively the title of Peru to these islands, it does, nevertheless, when taken in connexion [*sic*] with her actual possession of and exercise of jurisdiction over them create in her favor such a presumption of title as this government is bound to respect…this Department therefore acted somewhat hastily in assuming that the Lobos Islands were waste and unappropriated land from which the citizens of the United States had a right to take guano in common with those of Peru (Conrad 1852).

On 25 September, Clay wrote Webster and told him that the latter's 5 June leaked note to Jewett, published in the *New York Herald*, *New York Times*, and elsewhere, provoked outrage in Peru, and "produced several Articles, in which the United States were attacked in the most gross and vituperative terms. One…called upon the people, to rise and 'exterminate the hated race': 'to seize their property and kill, before Peruvians should be killed'" (Clay 1852:616). In addition, on 7 October, Joaquín José de Osma officially replied to Webster's note of 21 August, "with a devastating critique" (Wiltse 2018). Then, on 16 October, Clay was able to brief commander McCauley, who sailed from Callao to the Lobos Islands to "prevent any attempt being made by vessels belonging to citizens of the United States, to take away huano, forcibly from those Islands" (Clay in Manning 1938:642).

Finally, after the death of Webster, the U.S. affair with the Lobos was settled on 16 November, when his successor, Edward Everett, wrote J.J. de Osma that Fillmore "has dismissed all doubt from his mind as to the title of Peru to the Lobos Islands. He perceives no longer any reason to question her rightful sovereignty over those Islands, and he makes this avowal with the greater readiness, in consequence of the unintentional injustice done to Peru" (Everett 1852). Everett also stated to have "been directed by the President to withdraw, unreservedly, all the objections taken by the late Secretary of State, in his communications with Mr. J.Y. de Osma to the sovereignty of Peru over the Lobos Islands and the other guano Islands on the coast of Peru" (*Ibid*.). Moreover, the Peruvian government, on its own account, offered to freight the U.S. ships that had been chartered for the Lobos Islands (including Jewett's) to take guano to the U.S. or Britain, at the stipulated rates (*Ibid*.). Thus, in less than two years concluded the British and U.S. failed attempts to annex the Lobos Islands of Peru, an episode that revealed the nature of their imperial agendas.

6.2.1.1. The U.S. scramble for guano continues: The Pacific, the Caribbean, and the Guano Islands Act (GIA) of 1856

The United States interest in seizing guano deposits did not by any means cease following their recognition of Peru's sovereignty over the Lobos. After this episode was settled, the U.S. –just as Britain– would soon start a global search for guano islands to break Peru's monopoly rent, maximize supply, and lower its price. Eventually, on 18 August 1856, the U.S. Congress would pass the Guano Islands Act (GIA), under which the United States would ultimately claim 103 islands, rocks, and keys in Oceania and the Caribbean (as well as one, the Îles du Connétable, in the Atlantic) 10 of which are still possessions of the United States today (Skaggs 1994:230–36).[174] Moreover, guano in general, and the GIA in particular, precipitated the United States first overseas expansion (Lê 2016b; Levin 1960:75). Before briefly examining this Act, a short background of the conditions that gestated it is in order.

As noted, the U.S. received its first commercial shipment of Peruvian guano in late 1845. In 1848, the year it annexed 55% of Mexico's territory, the U.S. imported 869 tons of Peruvian guano, compared to 11,740 t in 1850, representing a thirteen-fold increase in two years *(Report of the Secretary of the Treasury* 1845). From 1845 to 1854, "a guano mania spread across the South Atlantic states" (Wiltse 2018). Guano was extensively employed on the exhausted tobacco fields of Delaware, Maryland, and Virginia. Maryland was the biggest guano consumer, and Virginia, Delaware, North Carolina, New York, and Massachusetts were also large importers (O'Donnell 2008:37). Figure 6.1 shows the amount of guano imported by the U.S. from 1845 to 1880, for the years there is available data. As can be seen, the peak of imports occurred in 1854 (163,662 t) and 1855 (155,046 t). Most of the guano until 1856 came form Peru, a country that remained an important guano source all along. In addition, with the advent of the U.S. Civil War and the ensuing disruption of southern agriculture, the U.S. ceased to be a large guano market (Levin 1960:75).

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[174] The insular areas claimed by the U.S. under this act are now classified as unincorporated and unorganized territories of the U.S. An unincorporated territory in the U.S. is defined as: "A United States insular area in which the United States Congress has determined that only selected parts of the United States Constitution apply." On the other hand, an unorganized territory is "An unincorporated United States insular area for which the United States Congress has not enacted an organic act" (U.S. Department of the Interior 2022). The 10 territories still possessed by the U.S., seized under the 1856 Guano Islands Act, are: Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, Navassa Island (claimed by Haiti), Bajo Nuevo Bank (claimed by Colombia), Serranilla Bank (*Idem*.), and Swains Island (part of American Samoa). The U.S. has also claimed incorporated, unorganized territory (the Palmyra Atoll), as well as unincorporated, organized territory (Puerto Rico, Guam, Northern Mariana Islands, and the U.S. Virgin Islands).

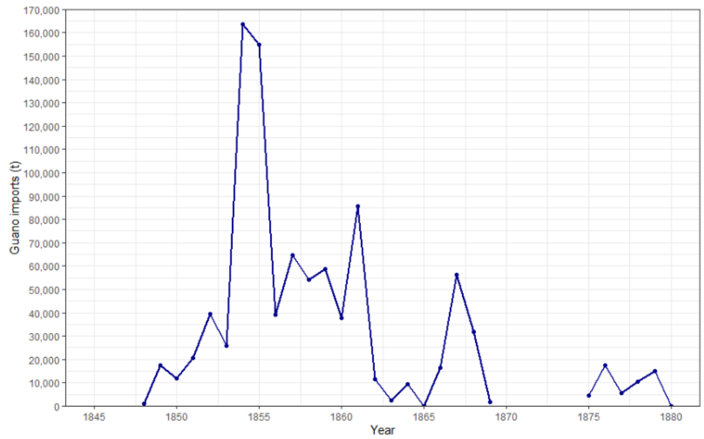

Figure 6.1. United States guano imports, 1845-80.
Made with data from *Report of the Secretary of the Treasury* (1845-70) and the *Quarterly Reports* (1876).

In the early 1850s, U.S. farmers were desperate to procure this powerful fertilizer, which led to prevalent complaints regarding a short supply, irregular deliveries, and high prices (O'Donnell 2008:37; Wiltse 2018). Around this time, guano costed between 45 and 60 dollars a ton (a price roughly 15% lower than that in Britain) (Mathew 1981:169–70, 1970a:120). Yet, lowering the price of this costly commodity was not easy. On 5 June 1850, in reply to free-trade petitions from the State Agricultural Society of Maryland, U.S. Secretary of State John M. Clayton (Webster's predecessor), who on 19 April last had signed the Clayton-Bulwer treaty assuring U.S. and British rights over the Isthmus of Panama, wrote that:

> the principal item in the high cost of Peruvian guano in this country, is the freight by the long and perilous passage around Cape Horn. This must remain as a burden upon the consumers of the article of the United States, until an inter-oceanic communication across the isthmus which joins North and South America shall be in successful operation….the President has by no means lost sight of the advantages which the agriculturalists of the Atlantic States of the Union will be sure thereby to gain…in the cheapening of guano, which is, perhaps, indispensable to a profitable cultivation of the soil… (Clayton 1850:59; *cf.* also Levin 1960:74).

This revealing and crucial note shows how the Panama Canal (which, upon foundations laid by French diplomat Ferdinand de Lesseps was ultimately completed and controlled by the U.S. in 1914, until ceded to Panama in 1977 under the Torrijos-Carter Treaty), one of the chief paradigmatic symbols and artifacts of U.S. imperialism ever built, was largely spurred by the Peruvian guano trade. In addition, it indicates that guano was conceived as a vital fertilizer that, together with enslaved labor, created a huge portion of the wealth the U.S. propertied class accumulated.

On 13 July, ten days before Webster took office, Clayton and José Manuel Tirado, Peru's Minister of Foreign Affairs, "signed a treaty of commerce that provided prospectively for a guarantee of most-favored-nation treatment with respect to guano if Lima should alter the consignment system in the future" (*cf.* Miller 1937:1042–43; Wiltse 2018). Later that year, Clay wrote Webster that, given Peru's colossal debts to Britain, Ecuador, and Venezuela, its solvency relied largely on guano sales, so any price reduction was unfeasible (O'Donnelll 2008:38). Importantly, on 2 December 1850, President Fillmore delivered his First Annual Message to Congress, where he mentioned: "Peruvian guano has become so desirable an article to the agricultural interest of the United States that it is the duty of the Government to employ all the means properly in its power for the purpose of causing that article to be imported into the country at a reasonable price" (Fillmore in Richardson 1902:83). Revealingly, he also provided the following shocking remarks, which speak for themselves:

> A convention was negotiated between the United States and Great Britain in April last for facilitating and protecting the construction of a ship canal between the Atlantic and Pacific oceans… Citizens of the United States have undertaken the connection of the two oceans by means of a railroad across the Isthmus of Tehuantepec, under grants of the Mexican Government to a citizen of that Republic… Every effort has been made to protect our frontier and that of the adjoining Mexican States from the incursions of the Indian tribes…With the exception of some partial outbreaks in California and Oregon…the inroads of the Indians have been effectually restrained [I recommended further legislation] for authorizing an additional regiment of mounted men for the defense of our frontiers against the Indians…We live in an age of progress, and ours is emphatically a country of progress. Within the last half century the number of States in this Union has nearly doubled, the population has almost quadrupled, and our boundaries have been extended from the Mississippi to the Pacific. Our territory is checkered over with railroads and furrowed with canals (*Ibid*.:81–94).

By the end of the next year, on 8 October 1851, as noted, Barreda was given the monopoly of exporting guano to the United States for five years (Wilste 2018). Then, on 24 June 1852, as the foregoing Lobos affair (two million tons of guano worth some 40 million dollars) was beginning to unfold, Clay told Webster that "[t]he consumption of Huano in the United States has increased so greatly, within the last two years, that they are interested in receiving a supply regularly and at the lowest rate that the article can be delivered in the country. Its producing qualities are so remarkable, that no other manure can vie with it as to the given quantity produced" (Clay in Manning 1938:591). Likewise, on 16 August, a note in

Connecticut's *Daily Palladium* characterized guano as "equal to gold in value, because it will bring gold in market" (in Wiltse 2018).

Following the failed annexation of the Lobos Islands, U.S. guano policy, as noted, focused importantly on seeking cheaper supplies for domestic consumption. During the next four years, the United States guano rush continued relentlessly in the Galápagos Islands, the Caribbean, and the vast Pacific Ocean, not without provoking sensitive diplomatic incidents with the parties involved (O'Donnell 2008:49). In fact, as with the Lobos, the U.S. also tried to seize or purchase Ecuador's Galápagos Islands–those legendary volcanic rocks renowned not for their guano, like the Chinchas, but for Charles Darwin's 36-day stay in them in late 1835, during which he gathered plants, seashells, insects, fishes, tortoises, iguanas, mockingbirds, and finches, which decades later would prove crucial for the development of his theory of evolution by means of natural selection (*cf.* Desmond and Moore 1994). On 1 March 1853, Courtland Cushing, U.S. *Chargé d'Affaires* in Ecuador, wrote Secretary Everett that "[t]he Government of Ecuador is too helpless to take care of the Gallapagos [*sic*] Islands, and…might be disposed to cede them to the United States upon reasonable terms…I have seen private papers recently stating that guano has been discovered on one of the islands" (Cushing in Manning 1935:301–2). This guano, however, as all other, was of lower nitrogen content, and considerably less abundant, than that of the Chinchas.

The next year, just three weeks before the Gadsden Purchase, on 16 May 1854, during the first session of the 33rd Congress, former Secretary (and now senator from Delaware) J.M. Clayton presented a petition of some 2,000 citizens of Delaware to devise a "constitutional... arrangement by which Peru shall...either cede to the United States one of her guano islands, or permit American vessels to take guano without stint" (Clayton 1854:1194). By 22 November, in a confidential dispatch, Philo White, a U.S. minister in Ecuador, told Secretary William L. Marcy (Everett's successor) that, after months of negotiation, he had just secured "important privileges for our citizens in the trade in *huano* at the Galápagos Islands" (White in Manning 1935:336). White also mentioned that Ecuador refused the U.S. offer to purchase the Galápagos. Under these privileges, agreed on in the Galápagos Guano Treaty, the U.S. reserved the right to protect the Galápagos and U.S. citizens extracting guano from them, and it also allowed U.S. sailors to dig and load guano themselves when Ecuadorian labor-power proved insufficient, all in exchange for a loan (White in Manning 1935:338).

This Treaty provoked "intense opposition" from Spain, Peru, France, and Britain who, amid the "balance of power" following the Napoleonic Wars, feared that this U.S. outpost could lay the bases for an isthmian canal (White in Manning 1935:339–40; O'Donnell 2008:41). For instance, the French consul objected that "the Government of Ecuador would seek the protection of a nation whose ambitious views and unscrupulous desire of extending its territories were notorious; and which were shown by the annexation of Texas, California, and designs with respect to the Sandwich Islands and Cuba" (quoted in O'Donnell 2008:41).[175] Interestingly, according to a 27 October 1858 note by Clay, later it would be Ecuador who offered the Galápagos to the U.S.: "the government of Ecuador has proposed to the United States, the purchase of the Galapagos Islands…they would serve to counterbalance the evident progress of British and French influence in the Republics of this Coast" (Clay in Manning 1938:806). Yet, this purchase never materialized, possibly in part because by that time, as we shall see, the U.S. had already seized several phosphatic guano islands.

In September 1855, at a time when settler colonialism in the U.S. was reaching the Pacific Northwest, Benson (the foregoing Brooklyn gold merchant that, along with Jewett, lured Webster into seizing the Lobos Islands) formed the American Guano Company (AGC) in New York, with a capital of 10 million dollars, "for the purpose of purchasing and taking possession of, importing and disposing of Guano" from the Line and Phoenix Islands in the Pacific (AGC 1857:3; Cushman 2014:83; Maude 1968:322–27). By 1859, the AGC would expand and establish its Pacific headquarters in Honolulu (Fisher 1859:189). As was the case with the guano routes, New England whalers had aided Benson in locating these and other Pacific guano deposits, and missionary Gerrit P. Judd and his son Charles –two key figures in the U.S. colonization of Hawaii– recruited indigenous Hawaiians to dig the guano, and would also release rabbits on the islands to diversify their meat supply (Cushman 2014:83).

Later that year, on 2 December, the U.S. schooner *Kaluna* sailed in a secret mission from San Francisco for Jarvis and Baker Islands, two small equatorial coral atolls in the mid-Pacific Ocean inhabited by abundant birds.[176] The former had been sighted in 1821 by the British ship

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[175] I could not find this statement by the French *Chargé* myself in the dispatch O'Donnell (2008:41) cites. It could have been omitted from the version I consulted.

[176] There are both migratory and seabirds on these islands. Some of the most conspicuous genera include: *Sula* (as is the case on the Chinchas and Ichaboe), *Fregata*, *Ardenna*, *Pterodroma*, *Phaethon*, *Pluvialis*, *Anous*, and *Onychoprion*, among others (Lepage 2022).

Eliza Francis, owned by three Jarvis brothers (Williams 2022:444–45). The latter was visited by U.S. whaler, Elisha Folger, in 1818, and in 1825, 1831, 1835, 1839, 1844, 1845, and 1851 by Massachusetts captain Michael Baker (AGC 1857:19). On board the *Kaluna* were two agents of the AGC, as well as a guano expert (probably James Duncan Hague)[177] whose role was "to examine and pronounce upon the quality of the guano which might be found" (*Ibid*.:9). The *Kaluna* was followed by two other ships, the *Corea* and *Independence*, which sailed for the same atolls in January 1856. The *Kaluna* arrived at Jarvis Island on 22 December (20 days after it had left San Francisco). Five days later, Edward W. Turner, one of the AGC agents on board, "under the flag of the United States, took possession thereof and the guano thereon as the property of this Company" (*Ibid*.). Turner also estimated the island's amount of guano, took some samples, and erected a house. On 19 February 1856, the captain of and AGC agent onboard the *Corea*, Thomas D. Lucas, "took possession of the island in the name of the United States of America and the American Guano Company, and deposited in the house erected by...Turner, a written statement to that effect" (*Ibid*.:10). These islands would soon officially become the first United States overseas possessions.

Soon after, back in the U.S., on 18 March 1856, an Act to authorize the formation of corporations to mine, import, and export guano and other fertilizers was passed in the Senate (*Ibid*.:34). Then, on 16 April, during the first session of the 34th Congress, a resolution attending the "discovery and occupation" of the Pacific guano islands was introduced into the Senate by New York (Auburn) senator William H. Seward (1801-72), a Whig whaler urged by the AGC who would later be involved in the Alaska Purchase as U.S.'s Secretary of State (AGC 1857:1). On 26 May, Seward (1856:1297) obtained, by unanimous consent, authorization to introduce a guano bill (S. No. 339) by pronouncing the following words:

> I present the memorial of the American Guano Company, praying for the adoption of measures for asserting the jurisdiction of the United States over certain guano islands lying in the Pacific ocean, acquired by discovery, purchase, or assignment, and the recognition of the title of the American Guano Company to the same. I ask that the memorial be referred to the Committee on Foreign Relations; and…I enlarge my motion so as to provide for their printing.

[177] Hague (1862) would publish an article where he discusses the physical and chemical analysis of this guano.

This bill was indeed referred to senator James M. Mason of Virginia (Winchester) from the Committee on Foreign Relations, who was also President Pro Tempore of the Senate, as well as a fervent supporter of slavery. For their part, Turner and Lucas reported to the AGC back in New York on 16 June. Turner brought the samples he had taken from Jarvis Island for chemical analysis (AGC 1857:11). Throughout July, the above bill was continuously discussed in the Senate, involving conversations on wording, amendments, and prices, all the way to deeper debates on international law, U.S. jurisdiction, discovery rights, the value and importance of guano, and Peru's monopoly rent over this substance. Together with Seward and Mason, other important figures that partook in the discussion were senators Hamilton Fish from New York, Robert M.T. Hunter from Virginia (Lloyds), the foregoing J.M. Clayton (now senator from Delaware), William Pitt Fessenden from Maine (Portland), John Bell from Tennessee (Nashville), John P. Hale from New Hampshire (Dover), and Robert Toombs from Georgia (Washington), among others. Clayton said about the bill: "I am decidedly in favor of it. Guano has become a very valuable fertilizer. I have seen what purports to be an analysis of some guano from a lately discovered island...different from the Peruvian or Chincha island guano. It is said to contain a great deal of ammonia, but nothing like the proportion of ammonia to be found in the Peruvian guano" (Clayton 1856:1697). Hale and Toombs were hesitant to approve the bill on the grounds that guano islands should not get a special status and that it was not individuals, but rather nations, who can claim territories. Clayton, Seward, and Mason spoke in favor of it: "we consider such discoveries beneficial to the public"; "guano is the best fertilizer that is available which is now known"; "the history of this bill is that in the Pacific ocean...there was [a] discovery of two small islands covered with guano…measures were promptly taken…to enable the discoverers of them to take possession in the presence of an armed ship of the United States" (*Congressional Globe* 1856:1697–1700).

On 24 July the bill was passed and, on 18 August, President Franklin Pierce approved, signed, and turned into law the act "to authorize protection be given to citizens of the United States who may discover deposits of guano" (*Ibid.*: 1743,2227). The Guano Islands Act (GIA) was born. Just as almost three decades later Europe's rapacious scramble for Africa prompted the Berlin Conference (1884-85) (*cf.* Pakenham 2010:239–55) –wherein, let us note in passing, not a single African was present– it was the U.S. seizing of Baker and Jarvis Islands that precipitated the creation of the GIA, and not the other way around. This exemplifies how the material, economic foundations and interests of a society determine the judicial and political apparatus it develops.

The GIA,[178] still part of U.S. law today, is composed of nine sections within the eighth chapter of the forty-eighth title of the U.S. Code (48 U.S.C. 1856 §§ 1411-19). Among other things, the Act states that if a U.S. citizen finds a guano deposit on any given territory, not within the lawful jurisdiction or occupied by citizens of other nation, and claims it thereof, such territory may, at the President's discretion, be considered as appertaining to the U.S. In addition, the "discoverer" is given the exclusive right of occupying this territory and selling and delivering its guano to U.S. citizens, charging a price of no more than eight dollars per ton. Moreover, the Act authorizes the U.S. president to, at will, "employ the land and naval forces of the United States to protect the rights of the discoverer." Lastly, it remarks that nothing obliges the U.S. to retain possession of the territories after the guano upon them has been exhausted.

Under this Act, at least 49 islands were claimed by the U.S. by early 1859, and about 70 by 1885 (Fisher 1859:188; Nichols 1933:506). In addition, between 1869 and 1898, the U.S. would extract 283,871 tons of guano from the islands they had annexed under the GIA (Skaggs 1994:151). The first islands to be claimed were, as noted, Jarvis and Baker Islands, on 28 October 1856 (although the official proclamation would not be issued until 2 March 1861). In 1858, these islands were first occupied for guano extraction, and in 1860, the American Guano Company reported exporting guano from them (Orent and Reinsch 1941:457). Guano would be intermittently extracted from these atolls until about 1880.[179] Then, on 5 February 1857, Benson and C.H. Judd landed on the nearby Howland Island from the Hawaiian schooner *Liholiho*, raised the U.S. flag, and appropriated it (the official claim came on 3 December of the next year) (Bryan 1941:46). Guano would be extracted from Howland until 1878, with a digging peak occurring in 1870-72. Between August and December 1870, for instance seven ships were loaded with 7,600 tons of Howland phosphatic guano (a large amount, but negligible compared to the roughly 700,000 tons dug from Peru in the same months). Remarkably, in addition to Hague (1862), none other than Justus Liebig (see Chapter 3) would also carry out some of the

[178] A facsimile of the Act can be found at: https://americanhistory.si.edu/norie-atlas/guano-islands-act.

[179] Levin (1960:75) wrongly claims that Navassa was the U.S. first overseas possession, claimed on 19 September 1857. In fact, they were Baker and Jarvis Islands, claimed on 28 October 1856.

first chemical analyses of the Pacific phosphatic guano islands claimed by the U.S. under the GIA (*cf.* Hague 1862).

Seven months after seizing Howland Island, on 19 September 1857, U.S. captain Peter Duncan claimed Navassa Island (a raised coral atoll located some 55 km west of Haiti and named in 1493 by Columbus), after sighting unclaimed phosphatic guano deposits on it the previous 1 July (*Jones v. U.S.* 1890:217). In June 1858, the Haitian government, arguing that Navassa was a dependency of St. Domingo that had belonged to Spain and then to France, sent two warships to defend the zone and stop the U.S. guano loading process. On 7 July, U.S. President James Buchanan issued an Executive Order upholding the U.S. claim to Navassa Island, which entailed the potential use of naval action to enforce it (*Ibid*.: 218–19). Next month, Buchanan indeed sent the *U.S.S. Saratoga* to Navassa Island to deter the two Haitian warships (Cushman 2014:82). Then, on 8 December 1859, U.S. Secretary of State Lewis Cass officially recognized Navassa as a U.S. possession (Lawrence 2022; Nichols 1933:508).

To this day, according to the *U.S. Insular Areas Report* (G.A.O. 1997:47), Navassa has also been claimed by Colombia, Cuba, Honduras, Jamaica, and Mexico at some point, and the U.S. has disputed all allegations ever since. Today, in its most recent Constitution (passed in 1987 with 2012 amendments), Haiti recognizes Navassa Island as part of its territory (see Article 8, paragraph *a*). Yet, Navassa remains a U.S. possession. Guano extraction continued at Navassa until the early 20th century, involving serious incidents such as an 1889 revolt by the African American guano diggers "against their cruel white supervisors," resulting in the death of five white foremen and the conviction of 43 U.S. Black citizens in the courts of Baltimore: three of murder and sentenced to hang, 14 of manslaughter, 23 of rioting, and three acquittals (James 2012; Lawrence 2022; Nichols 1933:509). It lies beyond the scope of this research to examine these annexations and guano operations closely, but the above description provides a glimpse of how some of these claims occurred, and how guano extraction looked like. In addition, Table 6.2 provides the dates when the guano islands that are still U.S. possessions today were claimed under the GIA.

Table 6.2. Islands claimed under the U.S. Guano Islands Act (GIA) of 1856 that remain U.S. territory.

Territory	*Date of claim under GIA*	*U.S. citizen who claimed it*	*Has also been claimed by*
Baker Island	28 October 1856	Edward W. Turner	Great Britain
Jarvis Island	28 October 1856	Edward W. Turner *et al.*	Great Britain
Howland Island	5 February 1857	A.G. Benson & C.H. Judd	Great Britain

Table 6.2., continued

Territory	*Date of claim under GIA*	*U.S. citizen who claimed it*	*Has also been claimed by*
Navassa Island	19 September 1857	Peter Duncan	Haiti
Johnston Atoll	19 March 1858	William Parker & R.F. Ryan	Kingdom of Hawaii
Kingman Reef	8 February 1860	A.G. Benson	–
Swains Island	8 February 1860	A.G. Benson	–
Midway Atoll	28 August 1867	William Reynolds	–
Bajo Nuevo Bank	22 November 1869	James W. Jennett	Colombia, Jamaica
Serranilla Bank	8 September 1879	James W. Jennett	Honduras, Jamaica

Made with data from Moore (1906), Nichols (1933), Bryan (1941), Orent and Reinsch (1941), Skaggs (1994), and G.A.O. (1997).

Finally, it is important to note that after the GIA was passed the Pacific Ocean became a sphere of competition between the British and the U.S.; and other powers such as France, would follow suit (Orent and Reinsch 1941). As noted, the GIA represents the beginning of U.S. insular and overseas expansion (including the later the annexation of, or strong influence upon, Alaska, Hawaii, Guam, Philippines, Puerto Rico, and Cuba) once all "contiguous U.S." territories were incorporated to the Union. As shown, all this imperial expansion had a key root in the Peruvian (Chinchas) guano trade in general, and the 1852 failed annexation of the Lobos Islands in particular. As Cushman (2014:82) states: "U.S. claims under the 1856 Guano Islands Act represent an important landmark not only in the history of imperialism but also for the place of remote islands in global geopolitical history…Claiming a guano island became a favored way for a country to assert itself as a colonizing power." In addition to Britain and France, other European countries, amid the tense "balance of power" era, also tried to get their share of bird droppings. For example, in 1864, Spain momentarily seized Peru's Chincha Islands, something that neither Britain nor the U.S. ever ventured to do. Let us give an overview of how this important episode transpired.

6.3. The Chincha Islands War (1864–66): Spain's last-ditch imperial campaign in South America

Even if Peru had declared its independence from Spain in 1821 and consolidated it in late 1824, the Spanish Crown would not recognize it until 14 August 1879. Although a decadent power, in the 1860s Spain possessed the world's fourth-largest navy (Tucker 2010:1431). During this decade, Spain embarked in a series of secret colonial voyages in the South Pacific –disguised as scientific expeditions– in an attempt to regain influence over some of its former possessions

(Hollett 2008:228; Tucker 2010:1431; Woods 2011). As part of this imperial enterprise, in the morning of Thursday 14 April 1864, three Spanish warships –the *Resolución*, *Triunfo*, and *Covadonga*– commanded by admiral Luis H. Pinzón (descendant of the captains who had joined Columbus in his first voyage to the Americas) and Eusebio de Salazar y Mazarredo, a Spanish politician, seized the Chincha Islands and some of Peru's most important ports (367 PO 38 1866; FO 61/217 1864; Tucker 2010:1431).

The excuse employed by Spain to get hold of the Chinchas was the Talambo incident (not unlike Webster's argument that Morrell had discovered the Lobos Islands), although they also sought to enforce a financial claim against Peru for this country's independence (Tucker 2010:1431). In short, on 1 August 1860, Manuel Salcedo, a Peruvian cotton landowner in the Talambo estate in La Libertad's Chilcayo Province, brought 269 Basques (95 men, 49 women, and their 125 children) from Bergara, Gipuzkoa, after promising them land and employment in his estate (Aguado 1988:167). During the next three years, the Basques were not happy at Talambo, where their living conditions turned out to be worse than they had expected. On 4 August 1863, a quarrel between Salcedo's guards and 17 Basques (over the allocation of some farming plots) unfolded at Salcedo's house, resulting in the injury of five Basques and the death of one of them (Juan Miguel Ormázabal) (Aguado 1988:169; Woods 2011). The news of this incident spread over Peru, Europe, and the U.S. As part of the Spanish response, admiral Pinzón who, as noted, was commanding a warship in the South Pacific coast, collected some Basques in Peruvian territory in January 1864, and learned firsthand about their complaints, after Salazar y Mazarredo convinced him of investigating the Talambo incident personally (Woods 2011). Later, on 18 March 1864, Salazar y Mazarredo arrived in Lima as Special Commissioner of Her Catholic Majesty's Government (*Comisario Especial del Gobierno de S.M.C.*). Peru demanded an explanation of this diplomat's official title, which was perceived as colonialist. After 12 days of silence, Salazar y Mazarredo embarked on the *Covadonga*, bound for the Chinchas and leaving a memorandum behind, where he accused Peru of several offenses (Pacheco 1866:2).

In a dispatch written onboard the Flagship in the vicinity of the North Island at around 11:00 am in the morning of 14 April 1864, Pinzón demanded the Chincha Islands Governor, Ramón Valle Riestra, to put the islands at his disposal, or "otherwise I will take them by force." Valle Riestra responded that he "did not have instructions from [his] government" to do such a thing, and therefore that he "cannot proceed in such a serious matter." Valle Riestra added that he would request instructions in the hopes that Pinzón "would give [him] the necessary time to receive them." Pinzón's disdainful reply was clear: Valle Riestra had to "substitute the Peruvian flag with a Spanish one in the non-extendible lapse of fifteen minutes. Otherwise, I will immediately open fire without any sort of consideration, and you will be responsible for any bloodshed and property destruction." Valle Riestra sent back a final answer: "…it is not within my power to surrender [the islands]…but…if the Admiral, making use of the increased forces at his command, carries out the deed he proposes, I will protest, as I do from now…of the violence exerted against Peru by Spanish weapons…and that the Admiral will be responsible for the consequences…as well as for the difficulties that may be caused to foreign vessels currently loading [guano]" (FO 61/217 1864:275). About half past three, Pinzón proceeded by occupying the islands with 400 men (Figure 6.2) and taking Valle Riestra and others as prisoners on board the *Resolución*.[180] He demanded a payment of 3 million pesos for the return of the islands (FO 61/217 1864:249; Woods 2011). Thus, in the blink of an eye, Peru was suddenly deprived of its chief source of revenue.

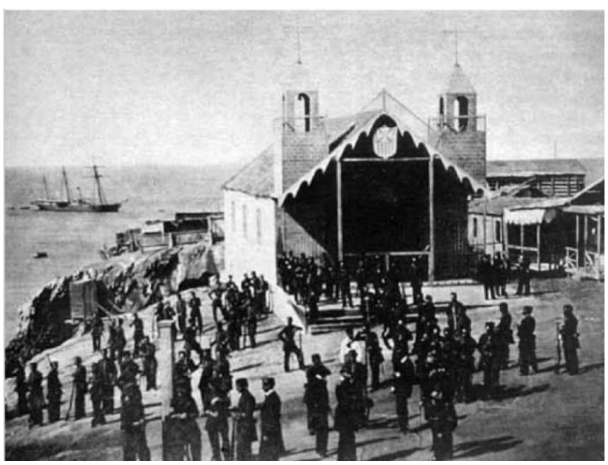

Figure 6.2. "Spanish troops taking possession of the Chincha Islands, during the war of the same name, in 1864." By Spanish Army. Taken from Woods (2011:82). Public domain.

The British, the U.S., and other empires looked at this incident very closely, and with concern, given the strategic importance of guano for their agricultural and financial interests. This can be ascertained, for instance, by the extensive British diplomatic correspondence on the topic (*cf.* FO 61/217 1864; FO 61/219 1864; FO 61/222 1864; FO 61/226 1865; FO 61/233

[180] John Dartnell, British vice-consul at Callao, happened to be at the Chinchas while the Spanish invasion occurred. He wrote an account of the event on 15 April 1864, intended for Consul General Stafford Jerningham (FO 61/217 1864:247–51).

1866). In Peru, the assault on the Chinchas arose an anti-Spanish nationalist sentiment, which also reached the neighboring republics of Chile, Bolivia, Ecuador, and Colombia (FO 61/226 1865). In fact, on 24 March of the following year, these countries, together with Peru, El Salvador, Argentina, and Venezuela, would redact the Treaty of Union and Alliance, whereby they sought to strengthen and smooth their ties (*cf.* FO 61/226 1865:242). For his part, Pinzón assured he would guarantee the security of all property –both foreign and Peruvian– on the Chinchas, and that guano loading would not be affected by his invasion of the islands (FO 61/217 1864:249).

The Chinchas were central for Peru's economy, their guano providing more than 67% of Peru's total revenue in 1866 (Hunt 1973b:71). In fact, after constituting only 8.4% of Peru's total revenue in 1846, guano would contribute almost 80% of it in 1861, and a record high of 83.5% in 1871 (Table 6.3). Guano was also vital for Britain at the time, not only being the country's most important manure and thus indirect food production and consumption source, but also given the massive profits it generated for British trading houses and banks, and because half its proceeds were destined for the payment of the Anglo-Peruvian debt (FO 61/165 1856:341). Figure 6.3 shows the proportion of different manures used by Britain from 1851 to 1896, as well as the percentage of manures consumed by Britain *versus* those produced domestically. As can be seen, guano (most of which came from Peru) was Britain's chief fertilizer from 1851 (indeed, from the mid-1840s) to 1871, representing roughly two-thirds of Britain's total manure consumption for this period, on average.

Table 6.3. Peruvian government revenues by source, 1846-77 (in million pesos)

Year	*Guano*	*Other*	*Total*	*% from guano*
1846	0.5	5.6	6.1	8.4
1851	2.2	5.4	7.6	28.7
1852	3.3	5.4	8.7	37.9
1861	16.9	4.3	21.2	79.6
1862	14	6	20	69.9
1866	13.6	6.6	20.1	67.4
1868	21.3	11.1	32.4	65.7
1869	15.3	26.9	42.2	36.2
1871	42.7	8.5	51.2	83.5
1872	34.6	33.4	68.0	50.8
1873	50	17.7	67.7	73.9
1876	25.4	18.9	44.2	57.3
1877	6.5	16.0	22.5	29.1

Modified from Hunt (1973b:71).

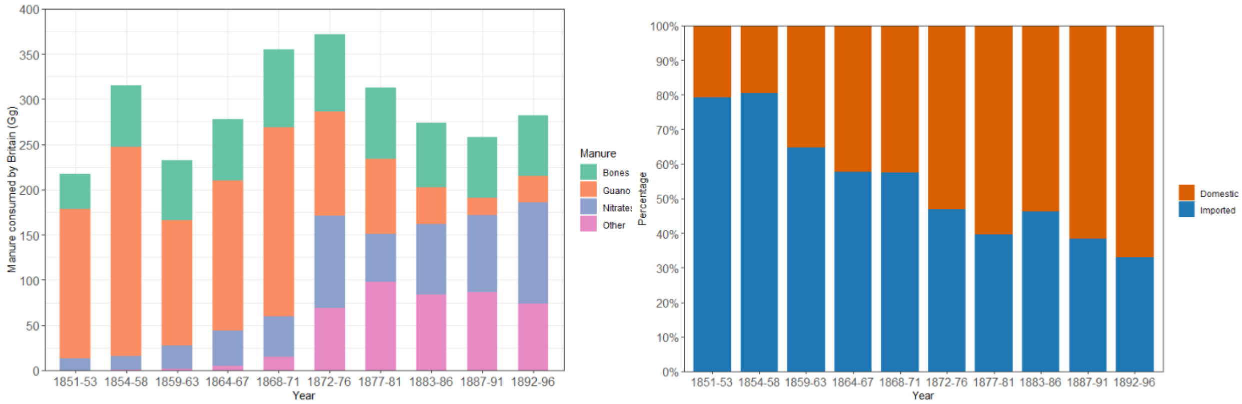

Figure 6.3. Proportion of different manures used by Britain, 1851-96 (left) and percentage of manures imported by Britain *versus* those produced domestically (right). 1Gg = 1,000 t. 'Other' category includes substances such as potash in the form of kainit. Made with data from *AHEW* (2000:1041).

After failed mediations by Britain, France, Chile, Bolivia, and the U.S., the Peruvian Congress authorized the country's president, Juan Antonio Pezet, to declare war on Spain, which he decided to avoid, instead preferring to negotiate (Woods 2011). On the other hand, by the end of 1864, Pinzón was forced out by Madrid, being replaced at the Chinchas by José Manuel Pareja. Following British and U.S. pressure, Spain started disavowing the occupation of the Chinchas. In December 1864, Pezet's negotiator (none other than Vivanco) met with Pareja in search for an agreement, which was reached on 27 January 1865 aboard the *Villa de Madrid*, anchored in Callao, through the singing of the Pareja-Vivanco Treaty (*Ibid*.).[181] Among other things, under this treaty, Peru agreed to pay the 3 million pesos to Spain (yet again another example of colonial arrogance, involving another payment by Peru to the nation that robbed it for three centuries, and which had already been compensated in 1824) and accepted the title and presence of a Special Commissioner from Spain (Melo 1907:231–33). For his part, Pareja agreed to abandon the Chinchas, which he did on early February 1865, after almost ten months of occupation (Woods 2011).

Yet, the Peruvian Congress refused to accept this "insulting treaty" (Tucker 2010:1432), and more problems ensued in the region. When Chile refused to sell Spanish coal for their ships, as a display of solidarity with Peru, Pareja imposed sanctions against Chile, including the blockage of several ports. Chile declared war on Spain on 24 September 1865, beginning the Chincha Islands War, or Guano War (1865-66) (*Ibid*.). On 14 January 1866, Peru, under their

[181] A transcript of the Treaty can be found in Melo (1907:231–33).

new president, Mariano Ignacio Prado, followed suit, "in order to preserve each other and preserve [the] America[s] from the unjust and violent aggressions of Spain" (Melo 1907:239). They were followed by Ecuador on 30 January, and Bolivia on 22 March, closing the South Pacific ports to Spanish warships (*Ibid*.). Spain underestimated Peru's military strength, ironically acquired with the guano proceeds. On 2 May 1866, during a decisive battle, Peruvian forces repelled Spain's attack on Callao, severely damaging five of its best warships, and sinking "Spain's geopolitical pretensions" in the region (Cushman 2014:57). Hostilities ended soon after, although an official armistice was not signed until 1871. Peace treaties were then signed bilaterally between each South American nation and Spain in 1879 (Peru and Bolivia), 1883 (Chile), and 1885 (Ecuador). Thus concluded this imperial episode closely tied to the guano trade.

6.4 The final years of the guano trade (1866-80): Dreyfus, Schroder, and the War of the Pacific

6.4.1. The Dreyfus monopoly (1869-76), Peruvian loans, and J. Henry Schröder & Co.

Following Spain's failed attempt to control the Chinchas, several changes around the guano trade unfolded. In the late 1860s and in less than 30 years, the over 9 million tons guano at the Chinchas were about to be exhausted, and other deposits in Peru began to be exploited at unprecedented rates (under the foregoing national contracts). For instance, in a 4 June 1869 letter to Charles de La Vallette, French Minister of Foreign Affairs, a French consul in Peru informed that "the guano of the three Chincha Islands is practically exhausted, there are currently 158 ships which in a few months will have removed everything" (65 CCC 2 1869:151).[182] In addition, as we shall see, British dominance over the trade would partially give way to the French one, although London bankers would still be involved. Moreover, around this time, in January 1868, U.S. railroad contractor and magnate, Henry Meiggs, arrived in Peru. Throughout the following decade, he would oversee the construction of thousands of miles of Peruvian railways (an enterprise that had sluggishly started before him on 1851) which were financed by the guano proceeds and to a good extent constructed by Chinese bonded workers (*cf*. Stewart 1968).

[182] « Le guano des trois Iles Chinchas est presque entièrement fini, il y a en ce moment 158 navires qui dans quelques mois auront tout enlevé ».

As importantly stated by Peruvian historian Heraclio Bonilla (1984:68), "1869 constitutes one of the crucial dates in the history economy and politics of Peru." On 27 March 1869, the consignment system of guano exports, which, as noted, had regulated the trade since 1847 and fully since 1849, came to an end under the presidency of José Balta, when Peru offered two million tons of guano for sale and sent a commission to Europe to find buyers (Levin 1960:97). Peru had experienced its first fiscal deficit in 1861, which was aggravated by the foregoing war against Spain. It is under these difficult financial circumstances that the Peruvian government decided to cancel the consignment scheme, increase once again its participation in the business, and return to a commission system, in what would be an unsuccessful attempt to improve its desperate economic situation (Bonilla 1984:132). By cancelling the consignment system, Peru sought to "eliminate the two major sources of abuses of the consignees: the arbitrary retentions of remittances and the fraudulent increase in operating expenses" (*Ibid*.:76).

In Europe, the Peruvian commissioners Toribio Sanz and Juan Martín Echenique (son of the foregoing president of Peru) received offers from Emilio Eslanger & Co. and other houses, but it would be the Paris house Dreyfus frères et Cie. (Dreyfus brothers & Co.), which, on 17 August 1869, signed a guano contract with the Peruvian government that would last until 31 October 1876, thus again taking the guano business away from Peruvian contractors (Anon 1869; *Corporation of Foreign Bondholders* 1876:36; Levin 1960:98). Bonilla (1984) has produced an excellent account of Dreyfus's involvement in the guano trade, upon which we will rely here, in addition to using archive materials pertaining to this episode held in Paris, Roubaix, and Nantes. Through these works we will briefly examine Dreyfus's involvement in the trade, a topic which requires a full study of its own. As Bonilla (1984:70) eloquently said about Dreyfus: "what an amazing business career of this man, who from obscure and mediocre shoddy merchant becomes in a flash the absolute master of the finances of Peru!"

Auguste Dreyfus (1827-97), born in Alsace, was already a merchant settled in Lima by November 1858. That year he became partner of Dreyfus frères et Cie, the trading house founded in Paris in 1852 by three of his 11 brothers –Prospère, Jérôme, and Isidore– which specialized on trading fabrics, dyes, and novelties of all kinds on commission (Bonilla 1984:71). In January 1869, Auguste became "absolute master" of this house after the Paris Commercial Court declared his brother and partner León to be in a state of mental and physical incapacity (*Ibid*.:72). Later that year, in Paris, on 5 July, Sanz and Echenique signed an *ad referendum* guano contract with Auguste Dreyfus that would be approved by Peru's Minister of Finance, Nicolás de Piérola (son of the foregoing former Minister of the same name), on 17 August of that year. Relatedly, on 6 July Dreyfus signed a contract with France's General Society (*Société Générale pour Favoriser le Développement du Commerce et de l'Industrie en France*) and Leiden Premsel et Cie., whereby these banks committed to lend money to Dreyfus to finance his deal with Peru, in a partnership that would last until 1888 (28 AQ 7-1 1880; Bonilla 1984:85,92).

In short, the 17 August 1869 contract authorized Dreyfus to take two million tons of guano from the islands and other deposits of Peru, and also, eventually, from the warehouses of European consignees (once their contracts expired on 31 December 1872). Dreyfus would pay Peru 36.5 soles (~£7.3) per ton taken from their guano deposits, and would be granted the exclusive benefit to sell guano in Mauritius and all European markets and their colonies, with the exception of Cuba and Puerto Rico. Additionally, the contract stipulated that the selling price of guano would be £12.5 per ton, and that Dreyfus would obtain 25% of any surplus of guano sold above this price, for which he needed the authorization of the Peruvian state. In turn, Dreyfus committed to pay the Peruvian government 2.4 million soles (about £480,000), and successively 700,000 (~£140,000) monthly soles. Moreover, he agreed to ensure the annual service of the Peruvian external debt (£1,000,000 a year) to amortize the loan Peru had contracted with the guano consignees (~£2,500,000), and to assume all operating expenses during the duration of this contract. Lastly, the Peruvian government mortgaged all its rents to satisfy these advancements in the event export difficulties arose (Bonilla 1984:74–77; Dancuart 1907:29–32; Levin 1960:98). This would be the last major contract of the Peruvian guano of the trade.

Importantly, too, in November 1870, in addition to being a guano merchant, Dreyfus became Peru's chief banker, after being commissioned with the emission of a £11,920,000 loan (28 AQ 14 1870). In July of 1871, he would be requested to emit a second loan (which came to be known as the "Peruvian Government 5 per cent Consolidated Loan of 1872") for £15 million for railroad and other public works, in addition to £21.8 million as bonds to cover the extant foreign debt (totaling £36.8 million) (Bonilla 1984:92; Dancuart 1907:35–43; F12/4835 1880; SH 272 1872). In fact, the scale of this colossal loan required its simultaneous creation in several European financial centers, as well as the formation of an issuing syndicate (an innovation of the late 1860s), composed of Dreyfus Frères (which underwrote 33% of the funds), the *Société*

Générale (25%), B. Premsel of Amsterdam and Stern Bros (22%), and J. Henry Schröder & Co. (20%) (28 AQ 13 1871; Roberts 1992:89).

Henry Schroder,[183] one of the City of London oldest and most prominent merchant bankers (who, let us note in passing, had financed the U.S. Confederates via the Cotton Loan of 1863), became Dreyfus's agent on 7 April 1870, and was in charge of emitting the 1870 and 1872 loans (*cf.* Roberts 1992:63–69; SH 1099 n.d.). These two loans –which were immense by contemporary standards and equate to about £3.7 *billion* (~U.S. $4.5 *billion*) in 2020 money– led Peru into an irremediable bankruptcy, and "exacerbated the country's mounting financial chaos" (Bonilla 1984:93; Roberts 1992:90). Recapitulating Peru's 19th-century history of indebtedness (following three centuries of Spanish pillage), we find that in 1822 it requested Britain a £1.2 million loan at a 6% rate, followed by a £616,000 one at a 6% rate in 1824. By 1848, Peru's nominal debt amounted to £1,816,000, plus £2,564,532 in interest (over £4.38 million). In 1853, Peru contracted a new loan for £2.6 million at a 4.5% interest rate, followed by a £5.5 million one in 1862, at a 1.5% rate. Later, in 1865 a fifth loan, of £10 million (5%), was contracted, followed by a U.S.$10 million one (of which only 2 million, *i.e.* £289,760, were received, at a 7% rate) in 1866. Then, in 1869, Peru requested a 2% £291,000 loan, followed by a £11,920,000 (6%) one in 1870, and finally a £36,800,000 (5%) one in 1872. Table 6.4 summarizes the loans contracted by Peru from 1822-72.

Table 6.4. Loans contracted by the Peruvian state, 1822-72.

Year	*Amount (£)*	*Interest rate (%)*	*Agent (country)*
1822	1,200,000	6	Thomas Kinder (Britain)
1824	616,000	6	Fry and Chapman (Britain)
1853	2,600,000	4.5	Murrieta & Co. And C.J. Hambro & Son (Britain)
1862	5,500,000	1.5	Heywood, Kennard & Co.and Thomson Bonar & Co. (Britain)
1865	10,000,000	5	Thomson Bonar & Co. (Britain)
1866	289,760	7	United States interests
1869	291,000	2	Thomson Bonar & Co. (Britain)
1870	11,920,000	6	Schroder and Dreyfus (Britain, France)
1872	36,800,000	5	Schroder, Stern brothers, and Dreyfus (Britain, France)

Made with data from: 28 AQ 4,5 1862; 28 AQ 14 1870; Mathew (1970b:82); Bonilla (1984:147–49), Quiroz (1995:400), and Vizcarra (2009:362–63).

[183] J. Henry Schröder & Co. was founded by Johann Heinrich Schröder, a native from Hamburg that arrived in London in 1802, amid the Napoleonic wars (Roberts 1992:3). "Dreyfus appointed J. Henry Schröder & Co. as agent for the issue in London of the sterling portion of the loan, other tranches being issued in Paris, Hamburg, Brussels and New York in several currencies" (*Ibid.*:88). Between 1871-78, guano generated a third of all Schröder's revenues, averaging £197,000 per year. Relatedly, in the summer of 1871, Schröders established the Peruvian Department, constituted by 18 wholesale agents that oversaw the distribution of guano in Britain, continental Europe, Australia, and several Atlantic and Pacific Islands. As argued by Roberts, Schröders involvement with the guano trade was "one of the most remarkable episodes in the history of the firm" (*Ibid.*:86–92).

All told, Peru contracted a debt of £69,216,760 in half a century (1822-72), *without considering the interest these loans accrued*. Revealingly, except for Dreyfus and Schroder's 1870 loan –which was chiefly destined to finance Meiggs's railways– all other credits were contracted to pay for prior ones, thus reinforcing this cycle of dependency and indebtedness (a "debt trap") existing since the inception of the Peruvian nation-state after three centuries of colonial domination (*cf.* Magdoff 1986; Sweezy and Magdoff 1984). For instance, the 1853 loan was emitted to convert that of 1849; the 1862 loan was used to cover that of 1853; the 1865 loan paid that of 1862; and more than half of the 1872 loan was used to buy bonds of the 1865, 1866, and 1870 ones (Bonilla 1984:149). Ultimately, these were "speculative operations that were carried out fundamentally in the London market and of which the Peruvian State received a very small benefit" (*Ibid.*). Relatedly, the Peruvian state would receive £9,415,597 for the sale of the two million tons of guano under the Dreyfus contract (a tonnage similar to that Gibbs sold between 1849-61), while Dreyfus and his partners obtained about £5.5 million of declared revenue for this enterprise. In 1876 Peru defaulted on the servicing of its external debt and, by 1877, it would end up owing £3.6 million to Dreyfus, with an external debt amounting to over £35 million (Bonilla 1984:104,108,132).

On the other hand, internal and external factors to Peru also caused important changes in the quantity and quality of guano exported by Dreyfus. In 1870, at the beginning of his period, Peru exported 728,703 tons of guano, its all-time figure during the whole guano trade, representing 5.8% of all guano exported throughout the entirety of this episode (1840-80). Peru also exported an extremely large amount of guano in 1871 (614,668 t), and then experienced a significant drop of over 50% during the years 1872-73, to experience a rise once again to a second-ever highest export value of 701,820 t in 1874. This drop –closely tied to a decrease in guano sales in Europe– was due to several factors: the exhaustion of the Chincha Islands guano and its replacement by inferior-quality deposits like the Macabí and Guañape Islands off northern Peru and the Pabellón de Pica in the south; the competition with other fertilizers in general and Thomson Bonar & Co.'s involvement in the Spanish phosphates business in particular; and the eruption of the Franco-Prussian War in July 1870 (Bonilla 1984:113; Dancuart 1907:30–32; Roberts 1992:88). All this occurred during Dreyfus's era which, as noted, also corresponds to the period Peru introduced the largest amount of Chinese bonded workers into its territory. Figure 6.4 shows the total guano extracted from Peru by year throughout the whole guano trade.

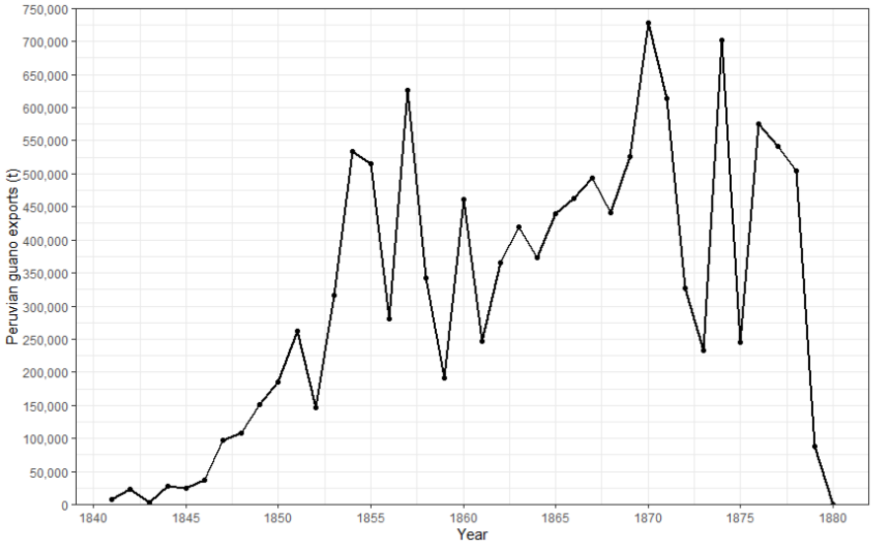

Figure 6.4. Total guano exported by Peru by year throughout the whole guano trade, 1840-80. Made with data from Hunt (1973a:57–58).

As can be seen in Figure 6.4, Peru exported a total of 12,669,190 tons of guano (excluding the estimated 1-2 million tons wasted to the ocean) throughout the whole guano trade, onboard some 12-15 thousand ships. This entailed a sale value (money flow) of some £100 to £150 million (equivalent to roughly U.S. $16-25 billion in 2020) (Cushman 2014:45; Tantaleán Arbulú 2011:68–69). On the other hand, the guano trade generated an ecological (material) flow of some 1.6 million tons of nitrogen and calcium oxide (CaO), 300,000 tons of potash (K_2O), and smaller quantities of iron, manganese, and other essential elements necessary for plant growth (Cushman 2014:45).[184] All these elements present in the guano, it will be remembered (Chapter 1), were upwelled in the southern Pacific Ocean, and then metabolically transferred to the plankton, fishes, and birds off Peru, where they accumulated for millennia until carried away in all directions by our species during the trade. They ended up upon the exhausted soils of distant places such as Britain, continental Europe, the U.S., the Caribbean, China, Australia, and Mauritius, thousands of miles away from the South Pacific.

[184] The analysis of this central ecological flow, at the very heart of the guano trade, will be addressed in a subsequent work under the lens of a Marxian/world-systems approach that draws on Howard T. Odum's systems ecology and unequal ecological exchange (*cf.* Foster and Holleman 2014; Hall and Klitgaard 2012; Odum 1988).

This is a clear example of a global metabolic rift in agriculture, or, what is the same, of the systematic loss of nutrients that are siphoned into distant territories, where they became food for the cities that was ultimately discarded as waste, and did not return to the land (Figure 6.5). As our anonymous British sailor put it circa 1852: "Ships are ever gathering about [the Chinchas] to bear off the fatness covering their ribs; that is to say, the guano, which shall fertilise the overtaxed and wasted fields of distant countries" (Anon 1852:42). Likewise, the foregoing Scottish farmers who sought to seize the Lobos were also aware of the rift at the heart of the guano trade:

> ...the guano deposits, large though they may be, will one day or other be exhausted...and though we are willing to bring manure from the other side of the globe, at the cost of an immense amount of treasure, we yearly allow millions of tons of a far richer fertiliser to poison the waters of the Thames, the Mersey, the Clyde, and indeed every river in Britain (*Glasgow Herald* 1852:5).[185]

In the same vein, Lord Ernle (1912:368) wrote in his classic work on British agriculture that "[j]ust as guano from Peru was turned into English corn, or bones from the Pampas into English roots, so the Syrian locust-pod, the Egyptian bean, the Indian corn, or the Russian linseed were converted into English meat."

Additionally, Figure 6.5 sheds light on the corporeal rift *vis-à-vis* the chief guano diggers: the Chinese bonded laborers. To start with, as noted, about 100,000 of them (~10% of whom would extract guano) were abducted from their homes and trafficked to Peru. The food staple of the coolies was rice, a lot of which was grown in British India and imported all the way to Peru, although some was also produced in Peru's northern estates (Rodríguez Pastor 1989:125). In the same vein, the British introduced opium from India and China (which they themselves had instituted in the latter country) into Peru, to keep the coolies at bay (Macera 1977:221).[186] This figure thus shows the intricate and convoluted maneuvers orchestrated by Britain to exert power, make profit, and fertilize its depleted soils, not without creating two entwined deep ecological rifts.

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[185] This relates to Marx's (1993a:195) important remark that "[t]he natural human waste products…are the refuse of consumption. The latter are of the greatest importance for agriculture. But there is a colossal wastage in the capitalist economy in proportion to their actual use. In London…they can do nothing better with the excrement produced by 4½ million people than pollute the Thames with it, at monstrous expense."

[186] Britain sold roughly 350,000 kg (767,765 lbs.) of opium to Peru between 1853 and 1879 (Macera 1977:223).

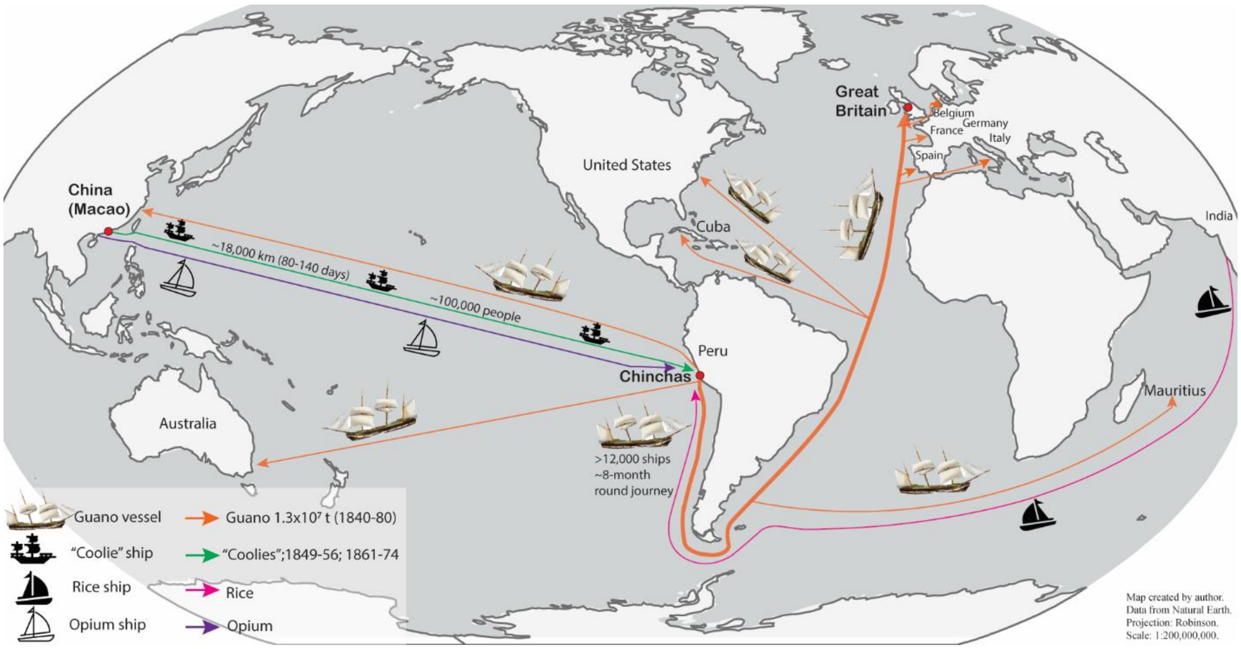

Figure 6.5. The metabolic and corporeal rifts around the guano trade.
(Note: Only selected countries receiving Peruvian guano are displayed. Indian rice probably also reached Peru via the Indian and Pacific Oceans, as well as via the Suez Canal after its inauguration in 1869. Opium from British India also reached Peru).

Specifically, where exactly did all this Peruvian guano end up? As noted, due to missing data, it is impossible to ascertain exactly, although some approximate answers can be given. Overall, Britain imported 4,795,344 tons of Peruvian guano throughout the whole trade, representing 37.85% of all guano siphoned from Peru between 1840 and 1880 (Figures 6.6 and 6.7). The remainder 62.15% was chiefly shipped to France and its colonies (~25%), the United States (~10%), Belgium, and Germany, as well as to several other countries (*e.g.* Cuba, Mauritius, China) in smaller amounts (~27%). This figure shows how the small island of Great Britain –then the world's most powerful empire– was the chief nation that controlled the guano trade from the outset.

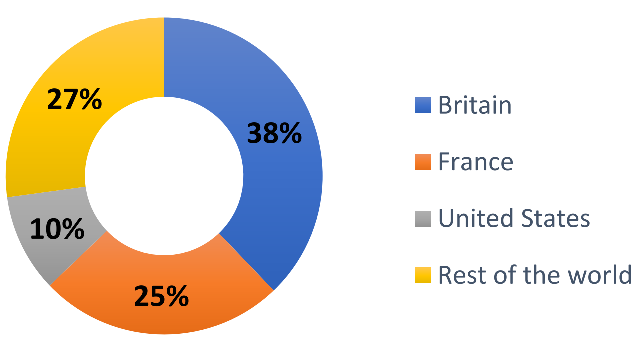

Figure 6.6. Approximate percentage of total Peruvian guano imported by country during the guano trade, 1840-80.
Made with data from: 28 AQ 1–14; F/12 6860; Hunt (1973a:57–58); Mathew (1981:252);
and *Report of the Secretary of the Treasury* (1845-70).

Relatedly, Figure 6.8 displays the percentage of Peruvian guano imported by Britain per year, relative to that of the rest of the world. As can be seen Britain imported, on average, roughly two-thirds of Peru's guano between 1840-49; half from 1850-59 (with a peak of 88% in 1858, corresponding, as noted, to the import peak this country); a little over a third between 1860-69; and 31% from 1870-79. The two years when Britain imported the smallest proportions of Peruvian guano relative to the rest of the world were 1874 (13.4%), during the Dreyfus period, and 1862 (18%), following the demise of Gibbs.

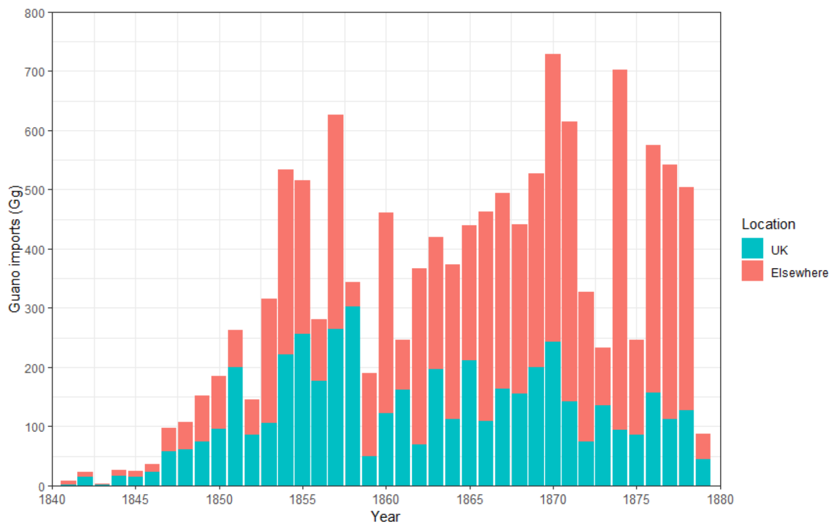

Figure 6.7. Amount of Peruvian guano imported by the United Kingdom (UK) *vs* that imported by the rest of the world (aggregated), 1840-80. 1 Gg = 1,000 t.
Made with data from Hunt (1973a:57–58) and Mathew (1981:252).

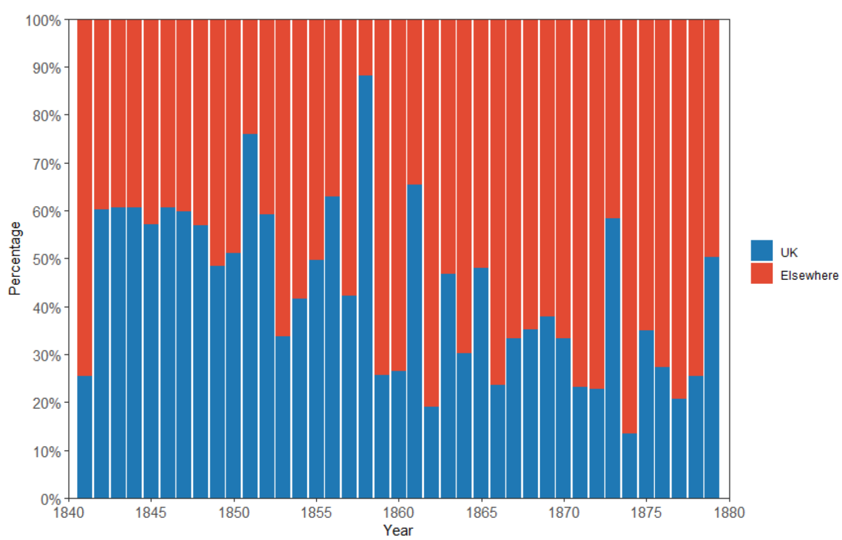

Figure 6.8. Percentage of Peruvian guano imported by the United Kingdom (UK) relative to that by the rest of the world (aggregated), 1840-80.
Made with data from Hunt (1973a:57–58) and Mathew (1981:252).

On the other hand, it is important to examine how the revenue generated by the guano was utilized by the Peruvian state. From the total £100-150 million made by the trade, the Peruvian government received around 60% of those proceeds, that is, between £60-90 million, the remainder being spent on extraction costs (~30%) and in paying the several guano consignees and associate agents (~10%) (Bonilla 1984:133). In turn, Peru utilized 29% of its share for expanding its civil bureaucracy, 24.5% for military spending, 20% for railway construction, 11.5% for payoffs to Peruvian debt holders, 8% for amortizing foreign bondholders, and 7% for abolishing the head tax paid by indigenous peoples (Hunt 1973b:80) (Figure 6.9).

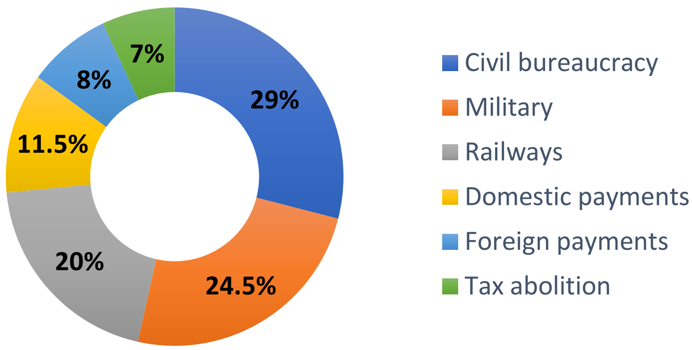

Figure 6.9. Uses of the total guano proceeds by the Peruvian state. Made with data from Hunt (1973b:80).

Thus, despite Peru obtained a massive revenue through its monopoly rent of the world's best guano deposits, most of it was absorbed in (1) funding its State apparatus; (2) financing manifold internal and external wars and conflicts; (3) paying for Meiggs's "modernizing" railway project; (4) and amortizing the external and internal debts. In other words, the guano proceeds always remained in the hands of foreign capitalists and Peruvian oligarchs, and were used to reinforce a debt trap–a cycle of dependency and capital accumulation and expansion. As stated by Mathew (1981:246), the Peruvian government showed a paradoxical combination of power and penury; "[t]he penury dictated the way in which the power was used; and the power…served in the end to aggravate the penury." Accordingly, the ecologically destructive and labor exploitative guano bonanza did not translate into better living conditions for the overwhelming majority of Peruvians. As wittily stated by Galeano (1997:140, 2015:183):

> Lima's oligarchy, arrogant and pretentious like no other, continued enriching itself and amassing symbols of its power in the palaces and Carrara marble mausoleums that the capital erected amid deserts of sand. Formerly, the great Lima families had flourished at the expense of Potosí's silver, and now they began to live off the bird shit and the white, brilliant lumps of the saltpeter fields–more vulgar means to the same elegant ends…Peru believed that it was independent, but England had taken the place of Spain.

Therefore, again echoing Galeano (1997:61), the guano trade exemplifies how the more a product is desired by the world market, the greater is the misery this provokes in the place it is extracted from; the larger the wealth that is generated at one pole, the bigger is also the misery caused at the opposite pole.

On the other hand, it is important to examine another branch of the guano trade that created worldwide implications that still exist today. In Hamburg, Ohlendorff & Co. became Schröder's wholesale agent. This house was funded by credits provided by Schroder in 1871, marking the beginning of Schröder's important relationship with this Hamburg firm during the late stage of the guano trade (Roberts 1992:89). As Roberts (*Ibid*.:90) importantly summarizes:

> Ohlendorff & Co….was established in the 1840s by Baron Albertus Ohlendorff to import guano into central Europe…In the early 1860s, Ohlendorf & Co. developed a process of treating guano with sulphuric acid, producing a product with enhanced fertilising properties, which was known as 'dissolved guano'. In January 1872, Dreyfus Frères, Schröders and Ohlendorff formed a company, also called Ohlendorff & Co., in London to produce dissolved guano in Britain, Belgium and other European countries. It was a substantial manufacturing undertaking with a capital of £500,000, subscribed 50 per cent by Dreyfus Freres and 25 per cent each by Ohlendorff and Schröders.

Ohlendorff & Co. was built on an eight-acre site in West Ham, in the north bank of the Thames near Victoria Docks, at the heart of London's chemical industry (SH 272, 3969-71 1872). Augustus Voelcker, then RASE's leading agricultural chemist (and disciple of Whöler and Liebig), was hired by Ohlendorff & Co., along with an assistant, on 1 January 1873, for £600 a year (~£66,500 in 2020) to provide chemical scientific, manufacturing, agricultural, and literary assistance *vis-à-vis* "dissolved guano" (FO 61/287 1874; SH 272, 3969-71 1872).[187] This firm thrived, although Schröder's shares were sold in 1883, giving birth to London's Anglo Continental Guano Works Company (ACGWC), owned entirely by the Ohlendorff and German capital (Roberts 1992:91). A German citizen, Adolphus Horney, became general manager of this firm until 1900. That year, Herman Voss, a naturalized Englishman, took over the company until 1914, when he resigned to dedicate to phosphate mining and would become President of the Fertilizer Manufacturers Association and the Chemical Manure Manufacturers Association (SH 1099 n.d.). During the First World War (1914-18), the ACGWC would be sequestered as enemy

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[187] See SH 1099 and Roberts (1992:90–91) for a detailed description of the dangerous and unhealthy conditions under which "dissolved guano" was manufactured. This fetid industrial process caused "depression, headache, indisposition for food, nausea, or even fainting" among the workers, according to a report by Dr. Edward Ballard (SH 1099).

(German) property by the British, and ultimately acquired by Fisons in 1937 (Roberts 1992:91; SH 1099 n.d.). Around this time, on 2 July 1909, German chemist Fritz Haber, together with his British assistant Robert Le Rossignol, would devise an energy-intensive chemical reaction whereby atmospheric molecular nitrogen (N_2) is converted to ammonia (NH_3) under high pressure, which later German chemist Carl Bosch would massify. This reaction, known as the Haber-Bosch process, remains the chief method whereby synthetic fertilizer is produced, and has been central for growing enormous amounts of food but also for contributing to the global metabolic rifts in agriculture known as Dust Bowls in the U.S. (and elsewhere) in the 1930s, for the development of the so-called Green Revolution, and for causing many present-day soil erosion problems (*cf.* Holleman 2018; Melillo 2012; Smil 1999).

Relatedly, once the guano trade was over, British capitalists would still exert a heavy influence upon Peru by intervening in their domestic guano sales. For instance, the Peruvian state would contract a £1.25 million, 7.5% interest guano loan with J. Schröder & Co. on 12 December 1922, which among other things hypothecated the revenue derived from the tax of 2.5 soles levied on every 1% of nitrogen contained in 920 kg of all guano sold for consumption in Peru. In addition, the Peruvian government committed to transfer more than 50% of the share capital of Peru's *Compañía Administradora del Guano* (Guano Management Company) to Schröders, operating as trustees for the bondholders "to be held by them with all powers of absolute owners" (SH 272, 3972-73 1907). This shows how, even if the guano trade was a mid-19th-century phenomenon, its legacy was deep and enduring, leaving scars that allow us to understand present-day inequalities between Peru and affluent nations, both economic and ecological.

Finally, on 15 April 1874 and amid a financial crisis, Peru modified the 16th clause of the August 1869 contract with Dreyfus, which banned any person or house from exporting Peruvian guano while Dreyfus's deal was in force (Dancuart 1907:75). As this restriction was lifted, on 28 October 1875 Peru's commissioners Francisco Rojas and Emilio de Althaus (who 22 years before had, as noted, defended Peru's claim upon the Lobos Islands) signed a guano export contract with France's *Société Générale*, whereby they would give that institution 1.9 million tons of guano in exchange for 100 million francs to erect Peru's Guano Company (*Ibid*.:67). Yet, on 19 November, the Peruvian government scrapped this deal they perceived as unfavorable.

Then, in 1876, as noted, Peru defaulted for a second time. On 7 June of that year, in London, the Peruvian government (represented by general Mariano Ignacio Prado), and R. Raphael and sons, Carlos G. Candamo, and Arturo Hereen, formed the Peruvian Guano Company Limited (PGCL), which sought to export 1.9 million tons of Peruvian guano to Europe and pay the state £700,000 a year under the "Raphael Contract" (the last ever guano contract of the trade) (Dancuart 1907:68–73). Figure 6.10 shows the amount of guano extracted from Peru under each set of contracts. As can be seen, Gibbs (and Montané and Barreda) removed over a third of Peru's guano (which was also the best quality one, since it came from the Chinchas), followed by Dreyfus (31.2%), the 15 national contractors from 1862-69 (~23.7%), Raphael and the PGCL (~9%), and the 1840s deals (2.6%). Almost two-thirds of Peru's guano were drained under Gibbs's and Dreyfus's deals alone. After 1876, Dreyfus would have to compete against the PGCL, which in actuality would only export 623,712 tons of guano between 1876 and 1878 (F12/6337 1875; Tantaleán Arbulú 2011:67). Suddenly, around this time, the eruption of the War of the Pacific transformed the guano trade entirely, for instance by halting Dreyfus's commercial career and postponing the arrangement of his deals with the Peruvian government for two decades (Bonilla 1984:103). Let us analyze how this episode, which ended the guano trade, unfolded.

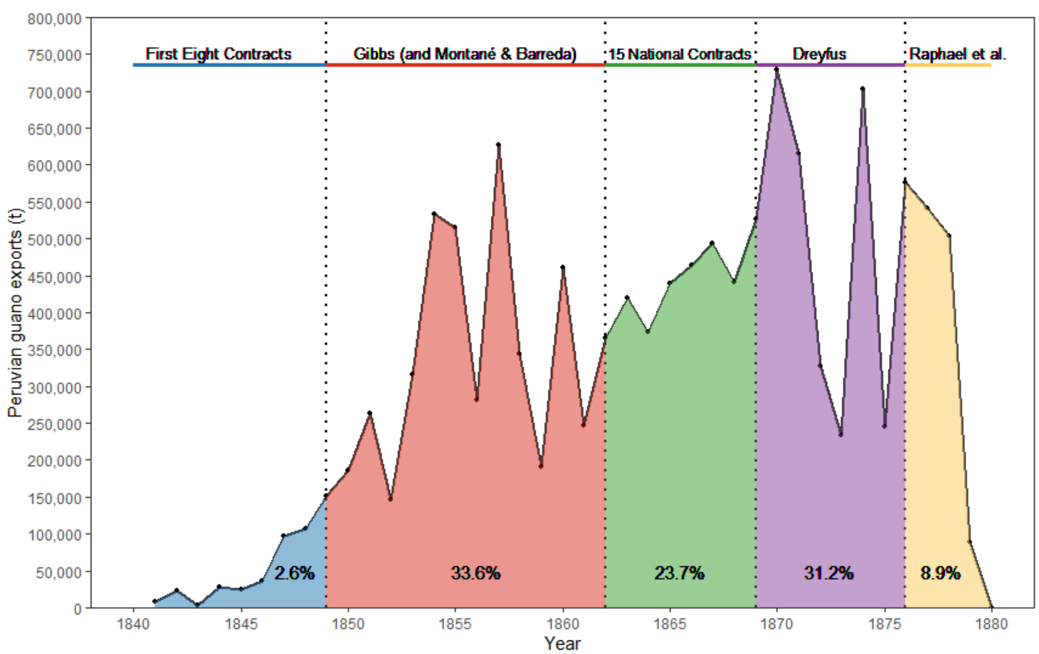

Figure 6.10. Amount of guano extracted from Peru under each contract, 1840-80.
Made with data from Hunt (1973a:57–58;1973b:62).

6.4.2. The demise of the guano trade: nitrates and the War of the Pacific (1879-83)

A thorough analysis of the nitrates trade would require a study of its own, not unlike this one in terms of its complexity and multifaceted nature. Hence, what follows is just a brief overview of the nitrate trade in relation to guano. From 1871 to 1880, with thousands of kilometers of railroads[188] funded by British and U.S. capital being built, guano reserves waning, and debt augmenting, Peru entered, yet again, a profound commercial and financial crisis (Renoz 1897:105). As guano decreased in quantity and quality, and new natural and synthetic substances proved good substitutes, two new agricultural export sectors grew in Peru during the 1870s: sugar (in the north) and sodium nitrate ($NaNO_3$) (in the southernmost province of Tarapacá) (Greenhill and Miller 1973:107). Interestingly and because of the same geophysical reasons (cf. Chapter 1), the two most valued nitrogenous fertilizers of the 19th century were located on Peruvian soil. As noted (*cf.* Chapter 3), the nitrates trade was both a cause and effect of the guano trade, and had been in operation even before 1840. Yet, the nitrates market had been importantly growing in Europe since the 1860s and attained unprecedented proportions in the 1870s (*cf.* Figure 6.3 above). Between 1865 and 1879, Peru exported some 2.5 million tons of nitrates (compared to over 6.9 million tons of guano) of which over a million (~43%) were imported by Britain (Greenhill and Miller 1973:110).

In May 1875, *a* Senate Commission in Peru reported that "nitrate has been slowly invading the field hitherto reserved to guano. It continues this invasion daily and the consequent fall in the consumption of guano [will be] a very heavy blow to the national interest if Peru does not obtain a rise in the price of nitrate or does not lower that of guano" (quoted in *Ibid*.:116). In Britain the perspective was similar. As Caird (1878:286) put it: "The use of nitrate of soda...combined with phosphatic manures, promises to be a more permanent resource to British agriculture than Peruvian guano, which unites the same properties in itself, but seems likely soon to become exhausted." In March 1876, none other than Antony Gibbs & Sons –the foregoing masters of the guano trade from 1849-62– agreed to become consignees of the Peruvian Tarapacá Nitrate Company (Clark and Foster 2009:325; Greenhill and Miller 1973:120). In addition, Gibbs held the original 1868 concession of the Bolivian Antofagasta Nitrate and Railway Company (ANRC) (*Compañía de Salitres y Ferrocarriles de Antofagasta*) until they

[188] Guano, nitrates, and railways constituted Peru's economic triad throughout this decade (Duffield 1877:131).

ceded to Chilean banker Agustín Edwards on a 29% interest (Greenhill and Miller 1973:124). Amid this setting of growing interest in nitrates in the world market, the rulers of Peru, Bolivia, and Chile (the three countries that possessed the most coveted deposits) competed to offer the best nitrate deals to foreign capitalists. As a result of these tensions, Bolivia and Chile signed a treaty in Sucre (Bolivia's constitutional capital) on 6 August 1874 which, besides making clarifications about the territorial limits of the two countries, stipulated that Bolivia would not impose new taxes on Chilean capital and industries in the bordering area shared by them (*Tratado 87* 1875).

Yet, on 14 February 1878, Bolivia's Constituent Assembly passed a law that would tax the nitrates exported from the Bolivian province of Antofagasta with 10 cents per quintal, following their review of an 1873 contract between the government and the now Chilean ANRC (Bermúdez 1963:379). The ANRC refused to pay such tax so, on 11 January of the next year, Bolivia expropriated the company. In retaliation, on 14 February 1879, exactly one year after Bolivia passed their nitrate tax law, Chilean forces occupied the Bolivian territory Antofagasta to never leave it again, initiating the War of the Pacific (Galeano 1997:140). On 1 March, Bolivia officially declared war on Chile and, after Peru refused to remain neutral (it had signed a secret defensive treaty with Bolivia on 6 February 1873), Chile, backed and emboldened by Britain, declared war on Peru on 5 April (Basadre 2005:17,47; FO 61/322 1879). "While Chileans, Peruvians, and Bolivians exchanged bullets on the field of battle" –argues Galeano (1997:141)– "the English bought up the bonds, thanks to credits graciously afforded them by the Bank of Valparaíso and other Chilean banks. The soldiers were fighting for them without knowing it…Not one penny had left England to finance this masterpiece of looting." Additionally, some bonded (and ex-boned) Chinese in Peru, resenting those who had oppressed them so harshly for two decades, fought alongside the Chileans during the war (FO 61/337 1881:151).

Chile's main aims were to seize the nitrate and guano deposits of Antofagasta and Tarapacá, as well as to undermine Peru's economic ability to defend itself. "With its more modern, British-built navy and French-trained army" –state Clark and Foster (2009:326)– "Chile was soon able to seize Bolivia's Atacama province and Peru's Tarapacá–never to leave." Britain also had chief strategic interests in Tarapacá, where they had invested over £1 million in 1879 (Blakemore 1974:17). Thus, backed by Britain's military and economic might and to their satisfaction, Chilean troops took Lima on 17 January 1881. As British minister Spencer St John wrote to Granville on 27 December of that year: "Should the result of the war be to secure to Chile the provinces of Atacama [Antofagasta] and Tarapacá, it will certainly be to the advantage of foreign commerce" (quoted in *Ibid*.:16). In summary, as former U.S. Secretary of State James G. Blaine said before a committee investigating the U.S. diplomatic role during the war, in April 1882:

> [the War of the Pacific is about] the guano and the nitrates…nothing else. It was to get possession of it…The ironclads that destroyed the Peruvian navy were furnished by England, and the Peruvian agent came to this country to see whether they could find a good ship to go out there in anticipation of this war…They said they didn't dare to apply in England to get it, and we were not able to furnish it…It is an English war on Peru, with Chili as the instrument…Chili would never have gone into this war one inch but for her backing by English capital, and there was never anything played out so boldly in the world as when they came to divide the loot and the spoils (quoted in Clark and Foster 2009:326–27).

The outcome of the war was a "resounding victory for Chile," which extended its national territory by a third under the terms of the Treaty of Ancón, signed on 20 October 1883 (Roberts 1992:92). For its part, Peru lost its nitrate province of Tarapacá, as well as its southern guano deposits (*e.g.* the Pabellón de Pica), and Chile held the Lobos Islands until they sold a million tons of guano from them (Levin 1960:111). Likewise, Bolivia lost Antofagasta (and hence its access to the ocean), which to this day they still claim (ICJ 2022:10). In addition, this outcome catapulted the expansion of the Chilean nitrate trade, which among other things provided Schroders with a sequel to their Peruvian guano business and led to the establishment of closer relations with Chile (Roberts 1992:92).

Just a few years later, between 1886 and 1890, Chile's new president, José Manuel Balmaceda, sought to nationalize this country's nitrate deposits and blocked the sale of state-owned nitrate fields to Britain (Frank 1967:73–85; Galeano 1997:142). Civil war broke out in January 1891, with Britain supporting Balmaceda's opponents financially and militarily (Clark and Foster 2009:328–29). For instance, John Thomas North, the British "nitrate king," was said to have given £100,000 to Balmaceda's enemies in the Chilean Congress. Moreover, the British press labeled Balmaceda a "butcher" and a "dictator of the worst stripe," and his presidency as "a communist government" (Clark and Foster 2009:329; Galeano 1997:142). On 19 September, Balmaceda committed suicide after his forces were defeated, and the British rejoiced. As Britain's ambassador in Chile told the Foreign Office: "The British community makes no secret of its satisfaction over the fall of Balmaceda, whose victory, it is thought, would have implied serious harm to British commercial interests” (quoted in Galeano 1997:142–43).

Thus, in Chile, the dependency story of the Peruvian guano trade repeated itself: on the eve of World War I, nitrates provided two-thirds of Chile’s national income (Hernández C. 1930). Chile took Peru’s place as the largest supplier of fertilizer to the European market. Yet, the development of the Haber-Bosch process “decisively displaced Chilean nitrate and sent Chile’s economy into a tailspin. The nitrate crisis was the Chilean crisis, a deep wound, because Chile lived from and for nitrates–and nitrate was in foreign hands” (Galeano 2015:186). Thus culminated the entwined multifaceted tragedies of Peru and Chile, the complicity of national oligarchs with foreign capitalists that provoked so much human exploitation, suffering, and ecological destruction. The guano trade was at the heart of this state of affairs, initiating this fever, and producing so varied geopolitical, agricultural, economic, and technological transformations in the present-day world.

CHAPTER 7. CONCLUSION: ECOLOGICAL IMPERIALISM AND THE DUAL RIFT HISTORICALLY AND TODAY

The aim of this work was to provide a historical, sociological, and theoretical account of ecological imperialism based on a case study of the 19th-century guano trade. In doing so, the theoretical lens for the study was derived from dialectical ecology in the natural sciences and historical materialism in the social sciences, relying for the interface of the two on Karl Marx's concept of the metabolic rift. Methodologically, I carried out a systematic analysis of over 200 archival materials and other primary sources in eight different archives in Europe and Peru, with an emphasis on ecological and social issues. I argued that the ecology is the material foundation at the basis of the guano trade (and by extension, of manifold histories of wealth extraction from peripheral countries carried out by the world's most powerful nations) and thus the chief component that should be at the heart of novel theories of unequal (ecological) exchange and development and imperialism. In Chapter 1, under a materialist conception of nature, I described and explained the unique set of geophysical and ecological conditions that allow for the formation of the most abundant and highest-quality guano deposits on Earth, located off central and southern Peru. In particular, I reconstructed the intricate ecosystem dynamics around guano formation off Peru by means of synthesizing a vast array of scattered scientific studies and considering them in relationship to one another. In addition, Chapter 1 posed the contradiction existing between the *ecological longue durée* of guano formation and the societal shortsighted search for profit and power of the ephemeral guano trade.

In Chapters 2 and 3, under a materialist conception of history, I integrated the foregoing ecological basis to the study of Great Britain's national agricultural revolutions and the genesis and development of the British Empire. In particular, I showed how, when, and why Britain (followed by continental Europe and the United States) resorted to and commodified guano to fertilize its depleted soils. Since under a holistic approach it is impossible to examine Britain's agrarian history without also considering its imperial affairs overseas, I dealt with these two aspects concomitantly. Lastly, in Chapters 4, 5, and 6, I examined the guano trade (1840-80) proper, emphasizing the (1) contractual trade relations (and contradictions) arising from the commodification of this substance; (2) the material, ecological conditions of the chief guano diggers (Chinese bonded workers) *vis-à-vis* the metabolic and corporeal rifts; (3) and the imperial agendas and unequal exchange relations advanced by the world's most powerful nations to seize or control Peru's and other guano deposits.

7.1. Ecology and interrelations: the foundation

We have learned that the ecology lies at the heart of the guano trade for several reasons. First and foremost, it is only because of the unique physical, geological, and biological conditions and interrelations that arise within the Humboldt Current Ecosystem (HCS) that seabird, nitrogenous guano can accumulate off present-day Peru and northern Chile. If any part of this delicate ecosystem is impacted, so is, to varying degrees, guano production, sometimes in ways that are practically impossible to predict. For instance, the dwindling or migration of the fishes' populations of the HCS (especially *E. ringens*) has a profound effect on guano production, given the seabirds' living sites vary as a function of this ocean dynamic, in turn influenced by countless climatic and biological factors (Pauly *et al.* 1989; Pauly and Tsukayama 1987). This cannot but remind us of Engels's (1966:178) dictum that "[i]n nature nothing takes place in isolation [and] Everything affects and is affected by every other thing." In this sense, it crucial to measure the ecological flows at the heart of the guano trade, for which Odum and Scienceman's concept of *emergy* can be used, in order to assess how much real wealth (as opposed to money flows) was extracted from Peru (Foster and Holleman 2014; Odum 1991). In a subsequent study, I intend to carry out this analysis, and thus compare the value (private riches) flows of the guano trade with the ecological (real wealth) flows at its basis, hoping to show that the real wealth siphoned from Peru was even larger than the monetary one. This fundamental question for environmental sociology in general, and unequal exchange theories in particular, remains open. After all, whether acknowledged or not, sociology is ecological and the ecology is, to varying degrees, sociological.

Secondly, ecology formed the material foundation of the guano trade in the sense that the living conditions and human metabolism of the guano diggers –upon whose backs this whole enterprise rested– were also a part of it. Thus, on one hand, we examined the *metabolic rift* provoked by the trade, whereby millions of tons of bird dung were, within just four decades, removed from Peru by the British and other empires, and transported back to their countries and their colonies overseas. On the other hand and at the same time, the masters of this trade abducted thousands of people, chiefly from southern China, and forced them to perform the infamous labor of guano extraction, under extremely harsh conditions of exploitation and mistreatment, forming a *corporeal rift* for these workers. The bonded laborers were removed from their native soil and displaced to remote locations, mostly via one-way journeys. The workers received meager and deplorable food rations, thus further undermining their already precarious living conditions. Moreover, they had outrageous working days and were oftentimes tortured in a variety of ways, as shown by many of the archive materials I examined. Thus, we encounter a dual metabolic rift *vis-à-vis* guano, one pertaining to external nature and its expropriation by the chief world empires, and another one related to human bodily existence and its exploitation by both the foreign and Peruvian guano lords (Loustaunau *et al.* 2021).

Therefore, nature and labor—itself a manifestation of a natural force, defined as the process whereby humans, through their own actions, mediate, regulate, and control their metabolism with external nature—constitute the two sources of real wealth and the fundamental and material ecological bases of the guano trade (Marx 1938, 1992:238). In other words guano and the guano diggers, including their concrete, historical labor relations, together constituted the *structure* (foundation) of the guano trade, on which rose its legal (*e.g.* contractual) and political *superstructure* (scaffolding). Importantly, as suggested by this metaphor, "the upper floors could not 'stay up' (in the air) alone, if they did not rest precisely on their base" (Althusser 2014:53–54). Thus, imperialism has, first and foremost, a material, ecological component at its basis.

Moreover, the guano revenue accrued by Peru, as well as that engulfed by the foreign guano magnates, represents but the tip of the iceberg of the story of Peru's drain of wealth. The real ecological wealth that was removed from Peru was way larger (Foster and Holleman 2014; Odum 1991). Furthermore, despite Britain imported the massive amount of nearly 5 million tons of Peruvian guano from 1840-80 (almost 40% of all guano extracted from Peru in that period), this "still did not suffice to replenish mineral substances in the soil lost by agriculture" (Saitō 2017:204). Given the metabolic rift in the cycle of plant nutrients due to the rural-urban antagonism in Britain (and continental Europe and the U.S.), the consumption of imported manure –argues Saitō (*Ibid*.)– "could not provide a solution to the problem of soil exhaustion, but at best postponed it." In fact, in the end, for this reason "guano imports ultimately intensified the disruption of the metabolism between humans and nature." For example, the U.S., after importing over a million tons of Peruvian guano (in addition to the amounts extracted from their novel possessions in the Pacific and the Caribbean), ended up exporting wheat to Britain, and left their soils in a sate of considerable exhaustion, which would translate into Dust Bowls and other ecological problems during the 20th century and even today (Holleman 2018; Martínez-Allier 1987:41–44; Melillo 2012; Saitō 2017:5).

This shows the blatant contradiction at the center of the guano trade: the squandering of the native manure in Europe and the U.S., and the ensuing sending to Peru (and elsewhere) for birds' dung, which was again squandered when siphoned into the cities, leaving the soils in a worse condition than before. As Liebig put it: "One thus understands that the increase of crops that is aimed at through the improvement of the soil by such means as drainage and dung cannot have durability...A larger amount of crop was achieved not because the nutrient matters in the soil became richer but because it was based on techniques that make them poorer more quickly" (Liebig in Saitō 2017:197). In turn, this is importantly related to the "rifts and shifts" argument advanced by Clark and York (2008), showing that technical fixes to socioecological problems commonly have unintended consequences and fail to address the root of the problems. Instead of tackling the metabolic rift in agriculture provoked by the privatization and intensification of agriculture and the town-country divide at its root (*i.e.* by reversing the countryside-town antagonism and developing a rational agriculture aimed at satisfying human nutritional needs, and not at making profit) (see Chapters 2 and 3), Britain and the capitalist world sought to shift this rift by instead importing massive amounts of guano (and other substances), which they controlled through financial, market, and sometimes military means. At a later stage, synthetic fertilizers were developed, in a further attempt to alleviate the same soil erosion problem. Yet, the root cause at the heart of the guano trade was left untouched and, in fact, as noted, was made even more serious. This problem persists today. Currently, the estimated rate of global soil erosion exceeds its production by some 23 billion tons per year. At this rate, the planet soils will be exhausted in about 100 years (Montgomery 2012). This analysis, set of questions, and systematic perspective (missing in other studies) which, among other things, emphasizes environmental conditions as much as social relations, could be applied in further socioecological analyses.

7.2. Historical and contemporary ecological imperialism: a continuum

There is an apparent paradox at the center of the guano trade's money flows, which has puzzled many scholars dealing with this episode (*cf.* Bonilla 1984; Levin 1960; Mathew 1981). It can be roughly paraphrased in the following way: Why did Peru, despite receiving about 60% of the overall guano trade proceeds (equivalent to some U.S. $10-15 billion in 2020), not “develop and proposer” from this bonanza? Uruguayan writer Eduardo Galeano (1997:2) hits the nail on the head, offering the simplest and at the same time broadest answer, which has eluded some authors:

> Latin America is the region of open veins. Everything, from the discovery [*sic*] until our times, has always been transmuted into European –or later United States– capital, and as such has accumulated in distant centers of power. Everything: the soil, its fruits and its mineral-rich depths, the people…The chain has many more than two links…it also includes the oppression of small countries by their larger neighbors and, within each country’s frontiers, the exploitation by big cities and ports of their internal sources of food and labor…For those who see history as a competition…We lost; others won. But the winners happen to have won thanks to our losing: the history of Latin America’s underdevelopment is…an integral part of the history of world capitalism’s development. *Our defeat was always implicit in the victory of others; our wealth has always generated our poverty by nourishing the prosperity of others–the empires and their native overseers*.

In short, the wealth generated by the guano (as was the case elsewhere with other commodified raw materials) transfigured into Peru’s misery. “The country felt rich” –wrote Peruvian Marxist José Carlos Mariátegui (1894-1930)– “and the state carelessly used up its credit. It squandered and mortgaged its future to British finances. This is roughly the entire history of guano and saltpeter” (Mariátegui 2010:62). Relatedly, Peruvian economist Pedro E. Dancuart (1903a:22) referred to the guano trade, as noted, as the “the mournful story of Peru’s lost wealth.”

Specifically, Peruvian historian Heraclio Bonilla (1984:135) argues that the answer to the above question entails elucidating how the economic asymmetry between Britain and Peru in turn generated an asymmetry in the totality of relations within the latter country. This way, despite the massive revenue generated by the trade, neither the production nor the productivity of the Peruvian economy increased (*Ibid*.:138). In addition, the Peruvian state did not have the strength, solidity, or solvency to impose their own conditions, despite holding the monopoly rent over the guano deposits (*Ibid*.:73). Instead –continues Bonilla– “it was a state thirsty for profit, willing to acquiesce to quench its thirst” (*Ibid*.). Thus, under this irrational system, the guano proceeds in fact intensified the demand of imported goods, perpetrating the conditions of cross-national inequality and dependency heightened by advent of the industrial revolution. Moreover, Bonilla (*Ibid*.:146) asserts that two additional entwined aspects contribute to further explain the “guano paradox”: “the inexistence of a solid internal market, and the peculiar nature of Peru’s economic elite." This especially pretentious and arrogant ruling class also preferred to form an alliance with the vestigial oligarchy of the colonial order, "in fear of the popular classes" (Bonilla 1984:146; Galeano 1997:140). Thus, as noted in Chapters 4 and 6, guano proceeds in Peru stayed always in the hands of its propertied class who, acting as capital personified (*cf.* Marx 1992:423), sought to maximize their profit and make deals with their European and U.S. managers. In the period between Peru's independence from Spain and the War of the Pacific, Britain dominated Peru's commerce and finances and, after the War, their power over Peru grew stronger yet, as they passed to directly control this country's economy via capital investment in its chief productive sectors (Bonilla 1984:12). Thus, former Britain's Foreign Secretary, George Canning, was not very mistaken when, in 1824, uttered as noted: "Spanish America is free and if we do not mismanage our affairs sadly, she is English."

Partly at odds with the foregoing voices emanating from Latin America, British historian William M. Mathew (1981) –whose meticulous archival analysis of exports, trading monopolies, and contractor-government relations during the guano trade (especially during the Gibbs period) is unrivaled– argues that it was the Peruvian state that held a position of power *vis-à-vis* the foreign guano firms. Mathew (1981) challenges the oversimplistic view that depicts Peru simply as a helpless victim at the mercy of Britain and other empires. To do so, he asserts that the guano deposits were the property of the Peruvian state, and thus this nation had the faculty –which it exercised– of scrapping, validating, and setting the terms of the guano contracts. In addition, Mathew (1981:186) argues that Peru even had the power to remove Gibbs from the trade and grant the guano sales monopoly to Peruvian merchants. Lastly, he (*Ibid*.:160–61) claims that Peru won the diplomatic battle over the possession of the Lobos Islands, which Britain had no choice but to acknowledge. However, while it is true that the guano trade was indeed an incredibly multifaceted episode –way more complex than what any superficial account may show– and that the Peruvian state did indeed have some leverage (arising both from its independent republic status and its monopoly rent over the guano deposits) to negotiate with the world's chief empires, it cannot be denied that it was Britain who set up and dominated the guano trade from the outset.

Europe and the United States were indeed forced to admit that Peru "owned" the Chinchas and other guano deposits, a price they had to pay for recognizing its independence from Spain and its affiliation as a nation-state to the bourgeois "free trade" planetary order.

However, although Mathew (1981:245) does mention the occurrence of “pre-existing disparities” in Peru, he is not emphatic enough to acknowledge that this country, like countless others, was systematically robbed for roughly three centuries while it was a Spanish colony. On top of this initial and prolonged pillage (chiefly of metals), the Peruvian Republic came into being already bearing an almost £2 million debt to Britain. This put it, from the outset, in a structural and hardly escapable path of dependency *vis-à-vis* the core capitalist nations. Let us remember that it was French merchants and British capital and infrastructure (*e.g.* vessels, hoses) that launched and sustained the guano trade, even if over half of its proceeds would go to the Peruvian state. Moreover, the revenue obtained by Peru ultimately faded, but the debt –together with the ecological damage and wealth drain wrought by the guano trade– remained. This “debt trap” also constitutes a classic example of the “resource curse” (or paradox), namely, the failure of resource-rich countries or territories to fully benefit from their real wealth (Magdoff 1986; Sweezy and Magdoff 1984). In addition, it was also the British who created the “coolie” trade, even if they would later ban it and give way to Peruvian oligarchs, who could at times handle it in even crueler forms.

The Peruvian guano trade thus illustrates world-system’s main thesis that, rather than developing along the same paths as the core nations before them, peripheral countries are structurally constrained to developmental processes that reproduce their dependent status (Wallerstein 2004). This episode can also be partly elucidated through Emmanuel’s (1972) (economic) unequal exchange theory, which explains the differential development (and divergence) between affluent and poor nations despite (rather, due to) centuries of exchange, no matter what they export or produce, given the existence of structural disadvantages from the outset. Yet, these views leave out the ecological foundation at the basis of the trade. Ecological disadvantages and an “ecological debt” (larger than the economic one) have also been systematically imposed on the periphery. That is, as the guano trade shows, unequal exchange and robbery also occur in use-value (natural-material) categories, when human beings and/or the rest of nature are expropriated without value. Since unequal ecological exchange is undertheorized, in this work I attempted to integrate to it historical, geographical, and ecological flesh and concreteness. Further studies could elaborate on this path, by for instance, as noted, incorporating *emergy* analysis to the measurement of the real wealth drain.

Moreover, it is essential to distinguish that, within Peru, there existed deep economic and social inequalities: domestic oppressors and oppressed. Thus, it was not the country as a whole that had some power over the guano trade, but rather a small group of wealthy Peruvian oligarchs (most of them descendant of Europeans, whose families had amassed their wealth during the colonial period) in partnership –acting as nationality-less capital personified– with their European and U.S. counterparts. This was –recognizes Mathew (1981:243–44)– "a mutually convenient, occasionally rather cosy, relationship between ministers and traders, with the Peruvian nation as a whole largely neglected and ignored." As for the Lobos Islands affair, it is true that Britain and the U.S. recognized them as Peruvian, but this was ultimately because Lord Palmerston (and later Millard Fillmore), *chose not to seize them*. Thus far I have found no record of Peru claiming, for instance, the Hebrides off Scotland, let alone of exercising the luxury of deciding whether to do it.

In all, in addition to arguing that the money Peru (and other global south countries) received from the guano trade in fact deepened its dependency to the world's empires, I show that the guano trade was never a phenomenon developed by and for Peruvians, but rather an unequal business imposed from abroad. In other words, building on Samir Amin's *Unequal development* (1976), Peru was a peripheral (*i.e.* disarticulated) economy, which, even if possessing industrial infrastructure (built with European and U.S. capital), it was developed to ship their resources out. For instance, Peru's railroads went from extraction sites to the ports (*cf.* Stewart 1968). Conversely, Britain, continental Europe, and the U.S., as autocentric economies (*i.e.* connecting production of consumer goods with the production of the production goods destined to produce the former), siphoned these resources into their cores (Amin 1976:73). As Galeano (2006) wittily put it: "A cook gathered [all the] birds… and asked them: –In what sauce do you want to be eaten? A humble hen said: –We do not want to be eaten in any way. The cook clarified: –That is out of the question. This is a metaphor of the world [which is] organized in a way such that we have the right to choose the sauce in which we want to be eaten." Peru was a hen.

Yet, Peru's history of ecological degradation and human exploitation in the 19th century, provoked by the commercial and imperial extraction of its guano, is not by any means a thing of the past, nor a story exclusively pertaining to this country and substance (*cf. e.g.* Amin 1976, 1977; Baran 1957; Beckert 2015; Bunker 1985; Frank 1967; Galeano 1997; Levin 1960;

Magdoff 1978; Mintz 1986; Rodney 1972; Wallerstein 2004). On the eve of the 20th century (around the time British hegemony over Latin America gave way to U.S. one) and to this day, relatively similar stories of entwined expropriation and exploitation involving, for instance, cacao from Venezuela, Brazilian coffee and iron, Chilean copper, Bolivian tin and lithium, bananas from Central America, and oil from Mexico and elsewhere, to name just a few in this continent alone, can be examined (*cf*. Galeano 1997; Lappé and Collins 2015; Malm 2016).

On the other hand, as noted, guano has been continuously used in Peru, to varying degrees, for at least 3,000 years. In short, after the guano trade and during the early 1900s, the Peruvian government hired a group of U.S. and European ecologists[189] to investigate how to protect its seabird populations, in the hope of introducing a sustainable national guano production and consumption industry (Coker 1919; Hutchinson 1950; Murphy 1925; Stucchi 2016; Vogt 1942). The *Compañía Administradora del Guano* (CAG), which existed from 1909 to 1963 and whose capital, as noted, would largely go to none other than Schröders, was created to such end (Stucchi 2016; Tovar, Guillén, and Nakama 1987:208). Under the CAG management, an estimated population of 3-4 million guano birds in the early 20th century, producing some 48,000 tons of guano, increased to about 40 million individuals in 1955 (a 900% rise), generating 255,000 tons that year (Maldonado and Puerta 2011:564; Muck and Pauly 1987:219; Stucchi 2016). However, a worldwide economic shift to heavy fishing that began in the early 1950s, a component of the "Great Acceleration" led by the Global North, contributed to the dissolution of the CAG in 1963 (*cf.* McNeill and Engelke 2014). Thereafter, Peruvian guano production was overseen by the *Corporación Nacional de Fertilizantes* (National Fertilizer Corporation) (CONAFER) (1964-68), the *Servicio Nacional de Fertilizantes* (National Fertilizer Service) (SENAFER) (1970-74), *Pesca Perú Fertilizantes* (Fishing Peru Fertilizers) (1974-97), and *Pro Abonos* (Pro Fertilizers) (1997-2007), a series of state industries and programs (Tovar *et al.* 1987:209–11; Velásquez 2004). Since 2008, guano production and extraction are supervised exclusively by the public program Agro Rural, a branch of Peru's Ministry of Agriculture.

Importantly, in 1972, the HCS anchoveta population (used as raw material for fishmeal and fish oil) suffered a dramatic collapse of about 80%, caused by heavy overfishing during the 1960s (particularly by U.S. vessels) and perhaps also by a strong El Niño that year (Longo, Clausen, and Clark 2015; Muck and Pauly 1987:219). As Galeano (1997:141) put it:

[189] This in itself is revealing, pointing to an issue of intellectual dependence, in addition to the economic one.

> Guano remained the chief fertilizer for Peruvian agriculture until the fishmeal boom wiped out the pelicans and seagulls after 1960. The fishing companies, mostly from the United States, quickly destroyed the anchovy shoals near the coast to feed U.S. and European pigs and poultry with Peruvian fishmeal, and the guano-producing birds took off after the fishermen, ever further out to sea. Without the strength to fly back, they fell in the ocean. Others stayed, so that in 1962 and 1963 one could see flocks of pelicans hunting for food along Lima's main avenue; when they could no longer take wing, they were left dead in the streets.

Peru (this time its rich waters) was feeding, yet again, the affluent world. Despite the fish (and bird) populations have experienced some rebounds since the collapse, they have not fully recovered to pre-1972 levels, and the situation does not seem to be getting any better amid a changing climate (Pauly 1987:327; Rossi and Soares 2017; Tovar *et al.* 1987:216). This has enormously affected the seabird populations' location, survival, and reproduction, undermining guano production.

Yet, Peru still exploits its guano deposits. Today, guano –produced by over 4.1 million birds (~2.5 million guanayes, 1.5 million piqueros, and 120,000 pelicans according to the September 2021 census)– is removed from 22 islands and eight keys along the Peruvian coast (Burga and Valencia 2021:2). Peru expects to extract 40,000 tons of nitrogenous guano throughout 2022, to be sold at 43 different locations across the country, and thus reach some 150,000 small-scale farmers' households (Burga and Valencia 2021:2; Romero 2008). Guano is currently applied to a variety of crops in Peru –chiefly coffee, cacao, quinoa, and banana, among several others– and is promoted by the government as a national, organic, and healthy manure, which is subsidized and sold at 50 soles (~U.S. $13.3) a 50 kg sac (Valencia, personal communication). In addition, in February 2021, Peruvian guano obtained four certifications to be exported to Europe, the U.S., and Japan as an organic manure (Agro Rural 2021). Time will tell whether Peruvian guano reaches the affluent world once more, in what could potentially provoke a second drain and metabolic rift.

Moreover, the present-day guano diggers –for the most part Peruvians recruited from the Andean highlands– labor under extremely harsh and rudimentary conditions, in many regards not unlike those of the 19th century,[190] as can be seen in the photographs by Tomas Munita and Ernesto Benavides, as well as in Dinh Q. Lê's documentary about the Chinchas (*cf.* Benavides

[190] As is also the case, for instance, in the mining sector.

2013; Lê 2016a; Romero 2008). Further studies should examine the conditions of the present-day guano workers in Peru and compare them with those in the 19th century. Such a study would probably show how, in this and other matters, everything changes and yet nothing changes.

Lastly, it is important to underscore that many 19th-century British and United States imperial policies related to the guano trade and their control over South America in general, are still prevalent in today's world in one way or another. For example, as noted, the construction of the Panama Canal had an important foundation in the guano trade, as did the first U.S. overseas expansion. Moreover, we also mentioned that the U.S. still possesses 10 territories claimed under the 1856 Guano Islands Act, many of which have also been claimed by other nations. As for Britain's case, on 2 April 2022, current Prime Minister and Leader of the Conservative Party, Boris Johnson, published on Twitter and other social media accounts that: "On this day forty years ago the Argentine military junta invaded and occupied the Falkland Islands. This spring we will thanks and remember all those who fought and died to liberate these islands and their people. Our commitment to them is as steadfast as it was in 1982."

The Malvinas Islands (Falkland Islands for the British and their allies) are located off the southeastern tip of South America, some 500 km away from the Argentine coast. In 1764, the French settled in the islands, followed by the British in 1766. That year, the French surrendered their claim to Spain, and so did the British in 1774 (White 2012). After gaining independence from Spain in 1818, Argentina tried to retain its influence over the Malvinas, but Britain militarily reasserted hers in 1832, which they maintain to this day (Gustafson 1988:25–26).[191] The Malvinas, along with 13 other territories such as the Cayman Islands and Gibraltar, are classed as a "self-governing British Overseas Territory." On 2 April 1982, the Argentine military occupied the islands in a failed attempt to seize them, giving rise to the ten-week *Guerra de las Malvinas* (Falklands War), won by Britain. So, why is the commitment of a decadent power to these remote islands, geographically so close to Argentina and over 12,000 km from Britain, "as steadfast as it was in 1982"? In short, the chief reason is that the Malvinas are among the British possessions that this country has used, and will potentially keep using, to claim a portion of Antarctica, a continent with vast water, marine, metal, and (possibly) gas deposits, as well as

[191] Interestingly, the *H.M.S. Beagle*, which carried Charles Darwin round the global south during its second voyage (1831-36), would arrive in the Malvinas on 16 March 1833, as part of its mission to survey and map the region (Darwin 1989:185–94; Desmond and Moore 1994:106).

with prospective touristic and other economic activities. Britain and other northern countries (*e.g.* France)[192] have based their territorial claims over Antarctica chiefly on the prolongation of the extreme coordinates (the extreme meridians) of their colonial possessions. This is where the Malvinas, located less than 1,000 miles north of Antarctica, play a strategic role for Britain. That is, the very same old law principle of *uti possidetis iuris* ("as you possess under law") that European powers employed, for instance, to divide up the African continent during the imperialist Berlin Conference of 1884-85, has been applied to the scramble for Antarctica (Mora 2022; Pakenham 2010).

However, the Antarctic Treaty, signed in Washington D.C. on 1 December 1959 by Argentina, Australia, Belgium, Britain, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, and the United States –the twelve countries whose scientists have had an active role in and around Antarctica during the International Geophysical Year (IGY) of 1957-58 amid the Cold War– designated Antarctica as a peaceful territory dedicated to science, and stated that "[n]o new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force" (Antarctic Treaty 1959). The Treaty entered into force in 1961 and was set to expire in 1991. As part of the Treaty (which is constituted by 54 Parties today), on 4 October 1991, the *Protocol of Environmental Protection to the Antarctic Treaty*, which entered into force on 14 January 1998, was signed in Madrid. This Protocol, which is valid for 50 years and will be opened for review in 2048, states, among other things, that Antarctica is "a natural reserve, devoted to peace and science," and that "[a]ny activity relating to mineral resources, other than scientific research, shall be prohibited" (Protocol 1991). That is, the Antarctic Treaty and its resulting Protocol protect the only continent on Earth not permanently inhabited by humans from the colonizing clutches of the world's powers (Mora 2022). Yet, come 2048, Britain (along with Argentina, Australia, Chile, France, New Zealand, Norway, and perhaps the U.S. and Russia) may well try to get "its" share of the Antarctic continent, thus ecologically undermining it. It will be up to our generation to protect the Earth's most vulnerable continent and prevent this scramble from happening. In all, the foregoing issues show that history matters to understand and transcend present-day inequalities across and within nations, and the guano trade helps us to grasp the ecological, social, and unequal development effects of imperialism, both historically and today.

[192] For instance, Nazi Germany also made an Antarctic claim, named New Swabia, in 1939.

7.3. The alternative

As noted throughout this work, ecological imperialism can be understood as the expropriation of the ecological wealth of one country by another. This process, as the guano trade exemplifies, provokes a dual rift: a metabolic rift *vis-à-vis* external nature, and a corporeal rift pertaining to the living conditions of the workers it subjugates (Loustaunau *et al.* 2021). Yet, dialectically, examining the guano trade also sheds lights on how its negation (*i.e.* its opposite) could look like. Namely, food production, along with every other aspect of our existence, would be geared towards satisfying human needs and preserving environmental integrity, not markets and profit. If the ecological and economic domination of one country by another, as well as the inequalities within nations, are to be reversed, it is therefore essential to transform the current profit-oriented system at its root, and substitute it for a different social metabolic order aimed at satisfying needs, that advances human and non-human well-being alike, as well as substantive equality in every realm of life. In this regard, there is much to be learned from many indigenous groups which, for instance, rationally and sustainably utilized guano for thousands of years in what today is Peru. Only by developing and adopting an international system of substantive equality, aimed at the total liberation of humanity and the rest of nature alike, can we avert the present ecological catastrophe.

APPENDIX

SELECTED GUANO AND "COOLIE" LAWS AND CONTRACTS IN PERU

1. First Guano Contract (10 November 1840 – 27 November 1841)

*All contracts are transcribed preserving the original Spanish spelling of the day.

N°. 183. –**Huano**– Resolución suprema aceptando la propuesta de D. Francisco Quiroz para la exportacion [*sic*] de dicho artículo.

EXCMO. SEÑOR:

Francisco Quiroz, de esta vecindad y comercio, ante V.E. parezco y digo: que siendome [*sic*] conveniente tomar en arrendamiento las islas de Huano, situadas en la costa de la República, hago al efecto las proposiciones siguientes.

1ª. –Se darán en arrendamiento al expresado Quiroz, por el término de seis años, que empezarán á [*sic*] correr desde la fecha en que se celebre la presente contrata, las islas de huano que se conocen y descubriesen, situadas en toda la costa de la República.

2ª. –Los buques nacionales que surten de huano á las haciendas, lo sacarán como hasta ahora y sin nuevo gravamen, para llevarlo á las caleta y puntos acostumbrados para el uso y servicio de los hacendados.

3ª. –La extracción para cualquier otro punto, queda exclusivamente reservada al arrendatario, y por lo tanto prohibido el trasbordo ó [*sic*] exportación del huano, que los buques nacionales sacasen en virtud del artículo anterior.

4ª. –Todo buque nacional ó extranjero, que extraiga ó trasborde huano, para fuera de la República, sin consentimiento del arrendatario, caerá en comiso, y su valor se entregará, mitad al denunciante y aprehensor y mitad á los establecimientos de Beneficencia del Departamento en donde fuese aprehendido el buque, y el comiso declarado.

5ª. –Los administradores de la Aduana no darán despacho á ningún buque extranjero para ir á tomar huano en las citadas islas, sin previa autorizacion [*sic*] escrita del arrendatario, y el que allí fuese, sin la respectiva licencia, sufrirá la pena expresada en el artículo anterior, sea cual fuese su pabellón [*sic*].

6ª. –Francisco Quiroz pagará al Estado por los seis años de arrendamiento, la suma de sesenta mil pesos, los que serán satisfechos en la forma siguiente: treinta y ocho mil quinientos pesos, en

créditos pendientes en la Casa de moneda, y mil quinientos pesos al contado: diez mil pesos en doce meses, y los otros diez mil restantes á los dos años de la fecha en que se celebre el contrato.
7ª. –Las infracciones de los artículos 3°, 4° y 5° de la presente contrata, serán juzgadas y sentenciadas, como delito de contrabando, por los tribunales creados al efecto por el reglamento de comercio.
8ª. –Se publicará en el periódico [*sic*] oficial la presente contrata, para conocimiento é [*sic*] inteligencia de todos. En cuya virtud –
A V.E. pido y suplico, se sirva concederme en arrendamiento las indicadas islas, por ser justicia que espero, &.
Francisco Quiroz.
Lima, Noviembre 10 de 1840.

Vistas las propuestas hechas por D. Francisco Quiroz, para tomar en arrendamiento el derecho exclusivo de extraer para el extranjero el producto de las islas, denominado huano, y que se aplica al abono de las tierras, se aprueba el expresado arrendamiento, por el espacio de seis años forzosos de cumplir por ambas partes, en la cantidad de sesenta mil pesos por una vez, pagaderos en la forma siguiente: Treinta y ocho mil quinientos pesos en créditos de la moneda, y mil quinientos pesos en dinero al contado; diez mil pesos á los doce meses, y los diez mil restantes á los dos años de la fecha en que se celebre el contrato, y bajo las condiciones propuestas con las modificaciones siguientes:
1ª. –El presente contrato se entenderá sobre las islas descubiertas de la propiedad del Estado y aquellas por descubrir, y tendrá por solo objeto la exportación del huano para el extranjero, sin que el arrendatario pueda aplicar el privilegio á otras sustancias ó productos conocidos, ni perjudicar en ninguna manera los establecimientos, que para otro género de trabajo existan al presente ó de igual clase se formasen en las enunciadas islas, ni afectar sobre el territorio de ellas ó sus vecinos ninguna especie de derechos señoriales, imponerles gravamen de ninguna especie, ó limitar y perturbar sus actuales trabajos, sino en cuanto tiendan á favorecer el contrabando, en perjuicio del arrendatario.
2ª. – Los buques nacionales continuarán en la posesión de extraer el huano, para proveer á las haciendas y labradores del país, sin que en la extracción, conduccion [*sic*], ni introducción [*sic*] á puertos de la República se les pueda imponer por el arrendatario, ninguna clase de gravamen ó pension [*sic*], ó sujetarlos á ninguna traba en cuanto al modo de extraccion [*sic*] ó empleo de

brazo para ello, y pago de jornaleros; lo cual debe entenderse sin perjuicio de las pensiones fiscales ó municipales, que graven actualmente, ó que el gobierno tuviese á bien imponer al huano que se consume en el país, las que en ningún [*sic*] caso podrán hacerse extensivas al que exportare el arrendamiento, en virtud de la presente contrata.

3ª. –Los individuos habitantes de las islas actualmente conocidas, y los de las que en adelante se descubriesen, así como los individuos nacionales que fueren á poblarlas ó habitarlas, y que hayan emprendido ó emprendiesen la industria de proveer de huano á los buques nacionales para el consumo interior, no podrán ser despojados de su industria por el arrendatario.

4ª. –Toda barraca ó construcción de cualquier género que se fabricase por el arrendatario, y toda máquina y artificio que se emplease por el arrendatario en las islas, á que se refiere esta contrata, quedará á beneficio del Estado, á la conclusión de este arrendamiento.

5ª. –No siendo el huano un ramo de exportacion [*sic*] conocido, ni considerado en los reglamentos y aranceles de la República, y cediendose [*sic*] éste exclusivamente á favor del arrendatario, se declara desde la fecha comiso la extraccion, reembarco ó trasbordo que se haga de este artículo, sin conocimiento y previo permiso escrito del arrendatario, quien tiene acción [*sic*] para perseguir la propiedad mal adquirida en cualquier punto donde se encontrase; pero las condenas fiscales se harán en todo con arreglo á los reglamentos comunes, por los juzgados de Aduana, teniendo por parte en los juicios al arrendatario sin perjuicio de la intervención fiscal para el castigo de los que hubieren tenido parte en el robo; y se admite la cesión que hace de la mitad del valor de los comisos, que se declararen, en favor de los establecimientos de Beneficencia; en la inteligencia de que no podrá el arrendatario hacer transacciones de los pleitos pendientes con este objeto, sin abonar la parte de la Beneficencia.

Pase á los Administradores del Tesoro para que dispongan se extienda la contrata, con las fianzas correspondientes. Regístrese en el Tribunal Mayor de Cuentas y publíquese. — Rúbrica de S.E. –Castilla.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.103–105).

a) *First amendment to the first guano contract of November 10, 1840 (December 4 1840).*

No.186.-Huano.–Resolución suprema prorrogando por tres años el contrato con D. Francisco Quiróz, y declarando comprendidas en él á las islas del Lagarto y San Félix.

Lima, Diciembre 4 de 1840.

Declárase: que el contrato hecho con D. Francisco Quiróz, acerca del derecho exclusivo de extraer para el extranjero [*sic*] el producto de las islas, denominado «huano» segun [*sic*] decreto de 10 de Noviembre próximo pasado, se entenderá por tres años más voluntarios, sobre los seis forzosos, bajo la condición de enterar en la Tesorería General, al comenzar los referidos tres años, quince mil pesos, y á los diez y ocho meses, otros quince mil; y considerando que las islas nombradas del Lagarto y de San Félix ó Punquisa, son de la propiedad del Perú, entiendanse incluidas en el contrato celebrado con el referido Quiróz, relativo á la extracción de huano.

Regístrese donde corresponda y publiquese. — Rúbrica S. E. – Castilla

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.126).

b) *Second amendment to the first guano contract of November 10, 1840 (December 17 1840).*

No.189. –Huano. Resolución suprema declarando que el contrato con D. Francisco Quiróz, comprende en sus efectos a todos los depósitos huaneros del Perú.

Excmo. Señor:

Francisco Quiróz, de esta vecindad, ante V.E. con el debido respeto parezco y digo: que en el decreto que me otorgó el privilegio exclusivo de la exportación del huano, se limita esa facultad á las islas que lo producen, por haberse usado, tanto por mí, en mi solicitud, como por el Supremo Gobierno en su decreto, la palabra *Islas* como los únicos lugares que producen huano, habiendo seguido en esto la denominación general adoptada en el país, que llama *Islas huaneras* los lugares de producción de este artículo, de donde se surten actualmente los hacendados del país. Mas como acabo de instruirme que la Punta de Lobos, el Morro ó Pebellon [*sic*] de Pica y otros lugares que producen huano, no son en realidad islas, sino penínsulas, por hacer parte del continente, se hace preciso aclarar esa denominación equivocadamente usada de *Islas*, expresándose que por ellas se entienden inclusos [*sic*] los lugares arriba referidos, pues la mente del arrendatario al solicitar arrendamiento, y la del Supremo Gobierno al concederlo, ha sido incluir en ella todos los lugares de producción de huano, de la pertenencia de la República, que existan en la costa descubierta ó que se descubriesen, á fin de evitar con esa aclaración dificultades que posteriormente se me podría suscitar, en cuya virtud, á V.E. pido y suplico se sirva declarar que se otorgue la escritura, expresándose en ella, que mi privilegio se extienda á todos los lugares de producción de huano pertenecientes al Estado, por ser así la mente del decreto de Noviembre próximo pasado, lo que espero, &.—Excmo. Señor. – *Francisco Quiróz*. Lima, Diciembre 17 de 1840.

Vista esta solicitud, y no obstante que el Gobierno no la considera arreglada, por cuanto el recurrente en su propuesta se contrajo solamente a las Islas, declárase por gracia: que la Punta de Lobos, el Pabellon ve Pica y demás lugares de la costa del Perú, donde se produce el huano, quedan incluidos en el contrato celebrado por nueve años con D. Francisco Quiróz; bajo la precisa é indispensable calidad de que ha de cumplir puntual y exactamente con la condición segunda del decreto de 10 Noviembre último, relativa á que los buques nacionales han de continuar en la posesión de extraer el huano para proveer á las haciendas y labradores del país, sin que el arrendatario pueda imponerles gravamen ó pension alguna, ni sujetarlos á ninguna, sea la que fuere, pues en el mismo hecho de faltar á esa importante condición, no sólo quedará rescindido el contrato, sino que el Gobierno expedirá con tal motivo, las providencias que correspondan. –Regístrese y publíquese. –Rúbrica de S. E.–Castilla.
Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.127).

2. Second Guano Contract (8 December 1841 – 19 February 1842)

N°. 196. –**Huano**– Resolucion [sic] suprema anulando la contrata celebrada con D. Francisco Quiroz, sobre el arrendamiento de las huaneras en 29 de Diciembre de 1841 [sic, should say 1840].

L*ima, Noviembre 27 de 1841*.

Visto este expediente y atendido: 1° á que el Consejo de Estado ha representado al Gobierno por el contrato celebrado en 29 de Diciembre de 1840 con D. Francisco Quiroz, sobre el arrendamiento de las islas del huano, para que de ellas ce [sic] haga un reconocimiento, por cuanto pudiera ser defectible este abono necesario p [sic] la agricultura del país; y para que el contrato se anule y quede sin efecto alguno áor [sic] ser eminentemente perjudicial á los intereses nacionales, pudiendo el Gobierno selebrar [sic] otro dentro del año, provisionalmente, ó formar alguna especulación a beneficio del erario, en la manera que crea conveniente; y 2° á que remitido el expediente á la Corte Suprema por el conocimiento de la insubsistencia del referido contrato, lo ha devuelto por su auto fecha de ayer; se declara en conformidad de las representaciones del Consejo de Estado y auto citado, sin efecto alguno el contrato que el Gobierno tuvo con D. Francisco Quiroz, otorgado por conducto de los Administradores de la tesorería general, quienes chancelarían [sic] la escritura de su referencia; procédase al reconocimiento de las islas por los peritos que se nombren y admítanse las propuestas que por escrito hagan los que quieran especular sobre el huano. Publíquese con la representación del Consejo y auto de la Corte Suprema y regístrese donde corresponda. –Rúbrica de S.E.–*Cano*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.151–52).

N°. 198. –**Huano**– Resolucion [sic] suprema sobre un nuevo contrato para la exportación [sic] de este abono, celebrado con los señores Quiroz y Allier.

Lima, Diciembre 8 de 1841.

En consideración á [sic] que el contrato celebrado con D. Francisco Quiroz sobre extraccion [sic] del huano de las islas, ha sido declarado sin efecto por decreto de 27 de Noviembre último, por las causales que se indicaron, á consecuencia de las representaciones del Consejo de Estado, resolucion de la Corte Suprema y avenimiento del mismo Quiroz; y á que habiendo demandado el interés del Erario que se solicitasen negociantes para que tomasen el huano en comisión ó [sic] venta, ó de otro modo que fuese útil, segun [sic] los avisos oficiales é [sic] invitaciones que se han hecho por medio de los periódicos, el resultado ha sido que las propuestas presentadas no sean admisibles, por las pocas ventajas que de ellas reportaría el Tesoro Nacional, como se ve en las que se han agregado á este expediente; el Gobierno tiene á bien entrar en contrato con D. Francisco Quiroz y D. Aquiles Allier, en los términos y bajo las condiciones siguientes:

1ª.–Declarado sin efecto alguno el contrato celebrado con el referido Quiroz, éste no tiene derecho á hacer reclamo sobre la cantidad de cuarenta mil pesos que entregó en dinero y créditos de la casa de la moneda, con arreglo á la escritura de 29 de Diciembre de 1840, en atención á que han cedido en su favor los aprovechamientos obtenidos durante el año corrido del mencionado contrato.

2ª.–Desde la fecha el privilegio exclusivo de exportar huano á Europa, se disfrutará por el Estado en sociedad con Quiroz y Allier, y por el término de cinco años, distribuyéndose las utilidades líquidas en esta forma: en el primer año que será forzoso para la Compañía, sesenta y cuatro por ciento al Estado y treinta y seis por ciento á los mencionados; y en los cuatro siguientes, voluntarios, una tercia parte de las utilidades líquidas para éstos, y las dos restantes para el Estado.

3ª.–En consecuencia del artículo precedente, entran en la sociedad los cargamentos de huano que se exporten en los buques que actualmente se hallan en el Callao, con destino á cargar el huano, así como los cargamentos que se extraigan en los demás buques que vengan con este mismo objeto.

4ª.–Quiroz y su compañero son obligados á dar al Gobierno cuantos datos y conocimientos les exijan sobre las contratas y ventas de huano, fletamento de buques, consignaciones y gastos de cualquiera especie, á fin de que el Gobierno pueda formar idea exacta del negocio.

5ª.–Todo buque que cargue huano queda sujeto á tomar su despacho final en la aduana del Callao, y ninguna otra podrá en caso alguno librar dichos despachos.

6ª.–La extracción del huano solo es permitida, por ahora, de la isla del norte de las Chincha, y los buques que van allí á cargar, deberán sacar antes permiso de Quiroz y su compañero, quienes quedan obligados á dar cuenta inmediatamente al Ministerio del despacho de dicha licencia; acompañando el duplicado de la contrata celebrada con el capitán del buque, y cuando salga, remitir uno de los conocimientos que firme el capitán.

7ª.–El Gobierno puede, á costa de la compañía y como lo crea conveniente, enviar personas que inspeccionen el trabajo en el lugar donde se hace la explotación del huano, é impedir el contrabando en las islas, ú otros puntos donde se produce.

8ª.–Todos los útiles, herramientas, embarcaciones y demás artículos que al presente sirven como necesarios para la explotación del huano, y de los que deberán presentar inventario Quiroz y su compañero, quedan desde la fecha por común de la sociedad, sin que por esto puedan pedir cantidad alguna, y al fin del contrato cederán en beneficio del Estado.

9ª.–Son obligados Quiróz y su compañero, á hacer traer al Callao, dentro de doce meses, dos embarcaciones de vapor de más de cuatrocientas toneladas cada una y del poder más conveniente, para precaver con ellas la sustracción clandestina del huano, entendiéndose que la construcción de dichos buques ha de ser apropósito para el servicio de guerra, y que han de traer un cañón giratorio del calibre de treinta y seis, y las carronadas precisas; el valor de estos buques se satisfará de los fondos de la sociedad, y concluida, quedarán en beneficio del Estado, mas si dicha sociedad no pasase del primer año, entonces el valor total de los buques saldrá de solo de la parte del Estado.

10.–Los encargados, agentes ó comisionados para la venta del huano pueden ser amovibles, segun [sic] lo estimare conveniente el Gobierno, acordándolo con Quiróz, más por ahora deben existir los que actualmente han servido en la negociación del huano, mientras no hubiese motivo para relevarlos.

11.–Quiróz y su compañero quedan obligados á pasar al Ministerio del Despacho la correspondencia que dirían á los encargados y agentes en Europa, dándoles instrucciónes para lla venta del huano, y avisar el resultado que tenga cada cargamento, y presentar tambien [sic] la correspondencia original que de ellos reciban.

12.–En vista de los documentos á que se contrae el artículo anterior, se hará anualmente el balance y liquidación de las cuentas de la sociedad, para que el Gobierno pueda disponer de las utilidades que resulten a su favor.

13.–Quedan obligados Quiróz y su compañero á entregar en la Tesorería General, en el término de cuatro días, por cuenta de dichas utilidades, la cantidad de ochenta y siete mil pesos, y cincuenta mil el día ocho de cada uno de los cuatro meses siguientes al presente. El Gobierno en compensación de este adelanto concede á Quiróz y Allier el permiso de cargar con huano de cuenta de éstos, por una sola vez, la fragata «Rosa» ó «Escandinavia», que en la actualidad se encuentra en el puerto del Callao, y va á nacionalizarse por sólo Quiróz.

14.– No pudiendo extraerse el huano de otro punto más que de la isla del norte de las de Chincha, mientras esta sustancia, segun [sic] el acuerdo del Consejo de Estado, de 24 de Noviembre [sic] último y sus referentes, para examinar si ella es ó no consumible, y en qué tiempo, cuya vista de ojos, mensura y cálculo aproximado deberá quedar concluido dentro de un año; es condición, que si resulta de dicho examen, que el huano es defectible en poco tiempo, el presente contrato no podrá extenderse á mas que á la exportación de veinte mil toneladas.

15.–La extracción del huano de cualquier punto donde se encuentre, es libre siendo con destino á la agricultura del país, y seguirá sin alteración alguna como hasta el presente; mas siempre que se descubra que los buques hacen este comercio, trasbordan el huano, ó lo conducen al extranjero, entonces caerán en comiso, y se sujetarán á las demás penas establecidas contra los defraudadores de las rentas nacionales.

16.–Todas las disputas ó incidentes que ocurran sobre el presente contrato, de cualquier modo que procedan ó sean, quedan sujetas á la decisión de la Corte Suprema, segun [sic] su atribución constitucional, y sus fallos serán rigurosa y estrictamente observados.

17.–De las utilidades que de esta negociación resulten en favor del Estado, el Gobierno determinará la parte que deba aplicarse á la deuda extranjera, haciendo antes con sus acreedores los erreglos [sic] necesarios para verificar el pago, sin que en esto Quiróz ni Allier tengan que intervenir, á menos que reciban este encargo del Gobierno.

18.–Don Francisco Quirós y D. Aquiles Allier se obligan con sus bienes habidos y por haber, hipotecándolos expresamente, al cumplimiento de este contrato, y el Estado en razón de los adelantos que recibe de aquellos y de los gastos que hagan en la exportación del huano, les hipoteca así mismo el que existe en la isla donde se hace dicha exportación.

Regístrese en el Tribunal Mayor de Cuentas, pase á la Tesorería General para que disponga el otorgamiento de la respectiva escritura, y fecho vuelva el expediente al Ministerio del Despacho. –Rúbrica de S. E.– *Cano*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.153–55).

N°199. –**Huano.**–Rechazando, por extemporánea, una propuesta de consignación de este abono.

Lima, Diciembre 16 de 1841.

Visto este expediente y de acuerdo con lo opinado por el fiscal de la Corte Suprema, se declara sin lugar la propuesta hecha por la casa de Gibbs Crawley y Cª., D. Pedro Candamo y A. Puymirol Poumaroux y Cª., respecto á que está concluido el contrato celebrado con D. Francisco Quiróz y D. Aquiles Allier sobre exportación del huano. –Rubrica de S.E.–*Cano*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.155).

N°200–**Huano**.–Resolución suprema aplicando una parte del producto de la venta de éste para el pago de la deuda inglesa.

Lima, Enero 15 de 1842.

Habiendo el Gobierno empeñado su fé para cubrir con parte de los productos de la venta del huano en Europa la deuda anglo-peruana.

Decreto:

1º.– El Cónsul del Perú en Londres, á quien se ha autorizado é instruido para intervenir en la seguridad de los intereses del Estado en las ventas de huano que se hagan por cuenta de la sociedad que el Gobierno ha celebrado con D. Francisco Quiróz y D. Aquiles Allier, depositará despues [sic] de que se hayan reintegrado con el saldo de las cuentas en favor del Estado, los adelantos hechos en virtud de esa contrata, según la resolución del 8 de Diciembre último, la mitad de los productos netos que, segun [sic] las proporciones establecidas en la contrata, le corresponden al Estado, en el banco de Inglaterra, con todas las formalidades de costumbre, cuidando de remitir al Gobierno las constancias de quedar asi [sic] verificado en todos los casos en que sucesivamente vaya consignando dichas sumas. La otra mitad quedará disponible por el Gobierno para librar sobre ella ó para los efectos que re reputen oportunos, con arreglo á los fines á que está destinada, debiendo cuidad el mencionado Cónsul, de la seguridad de esos fondos, desde que sean debidos por el balance de las cuentas.

2º.– El Cónsul del Perú deberá avisar á los tenedores de créditos anglo-peruanos, el destino que tiene la mitad de las ganancias depositadas en el banco y prevenirles que el Gobierno mandará muy breve un comisionado que arregle con ellos el mejor modo y calidades de pago de toda la deuda, mediante el capital depositado con ese destino.

Comuníquese á quienes corresponde. –*Manuel Menendez*.– *Agustín G. Charún*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.155).

3. Third Guano Contract (19 Feruary 1842 – 17 December 1847)

N°. 201–Huano–. Resolución suprema autorizando un nuevo contrato para la exportación de este abono con Quiróz Allier y Cª., Puimirol, Poumaroux y Cª. y Gibbs Crawley y Cª.

Excmo. Señor:

Habiendo, á consecuencia del aviso oficial que se registra en el N°.5 de «El Peruano», iniciado una contrata sobre la exportación del huano al extranjero, cuyas bases se han publicado en el N°. 80 de «El Peruano» de 29 de Enero próximo pasado, con el objeto de recibir propuestas, llamándose al efecto licitadores dentro del término perentorio é improrrogable de nueve días y habiéndose extendido por el Supremo Gobierno dicho término, hasta el 15 del presente mes, en que se nos ha citado con los demás postores para oír las propuestas que mejor llenasen los fines que se propone el Gobierno en las actuales circunstancias, nos, los abajo firmados, ofrecemos en virtud de dicha citación, celebrar contrata de sociedad con el Supremo Gobierno, bajo las condiciones siguientes:

Art. 1°.– El Estado establece una sociedad con Quiróz Allier y Cª., Puimirol Poumaroux y y Cª. y Gibbs Crawley y y Cª., que tiene el privilegio exclusivo de exportar al extrangero [sic] el huano de las islas y demás lugares que lo produzcan, descubiertos y por descubrir, por el término de cinco años forzosos para todas las partes contratantes, contados desde el 27 de Diciembre del año 1841.

Art. 2°.– Se señala la cantidad de cuarenta mil toneladas para la extracción del primer año, y veinte mil para la de cada uno de los posteriores, con la facultad de exportar los años siguientes lo que no hubiese podido extraerse en el año á que corresponda; pero en todo caso deberán exportarse las ciento veinte mil toneladas en los cinco años, so pena de perder los contratistas su acción á lo que no hubiesen exportdo.

Art. 3°.– Si el consumo en los mercados extranjeros proporcionase expendio de una cantidad anual mayor que las expresadas en el artículo anterior de la presente contrata, el Gobierno se compromete á permitir á los contratistas la exportación de mayor cantidad, bajo las condiciones que se arreglarán por una nueva estipulación sobre las bases de la actual contrata, pudiendo alterarse el precio y la parte de las utilidades.

Art. 4°.–El Estado pone el huano por capital suyo para la compañía con el valor calculado por ahora de treinta pesos por cada tonelada de registro del buque que lo carge, pagadero la mitad en plata y la otra mitad en créditos reconocidos de la deuda nacional.

Art. 5°.–Los contratistas pondrán por capital suyo su industria y su trabajo, y addelantarán por cuenta de la compañía todos los gastos de la explotación del huano, embargue, seguros, fletes, comisión de fletamento de buques y de venta y demás gastos que cause la negociación, tanto en el Perú como en los mercados de su expendio, y de los que se reembolsarán los contratistas, del producto de las ventas.

Art. 6°. –Del producto de las ventas del huano se deducirán los gastos de embarque, fletes, seguros, comisiones &ª., y el valor del huano, arreglado al artículo 4°., y las utilidades, se dividirán del modo siguiente: tres cuartas parted para el Estado y una cuarta parte para los contratistas.

Art. 7°.–En caso de que el huano no produzca por resultado líquido, los treinta pesos que le señala como valor el artículo 4°., sólo entregarán lo que produzca, mitad en dinero y mitad en créditos; de manera que si el huano solo produce, líqudos, veinte pesos, el Estado recibirá diez pesos en dinero y diez en créditos, y así respectivamente, quedando en tal caso los contratistas sin acción á utilidades y sin responsabilidad por pérdidas.

Art. 8°. –En caso que el producto de las ventas del huano no cubra los fletes, seguros, comisiones y gastos, las pérdidas se dividirán entre el Estado y los contratistas, en la proporción expresada en el artículo 6°.

Art. 9°. –Cuando segun lo previsto en el artículo que precede, el precio de venta no cubra los gastos ni deje producto con que pagar á los contratistas, el Gobierno les pagará lo que resulte deberles por adelantos y su parte de pérdidas, con las rentas de la Aduana y la Casa de Moneda.

Art. 10.–Los contratistas adelantan al Gobierno á cuenta del valor del huano que carguen desde el 17 de Diciembre de 1841, cuatrocientos ochenta y siete mil pesos en la forma siguiente:

Doscientos treinta y siete mil pesos que tienen ya enterados en la Tesorería General; cincuenta mil pesos el veinte del corriente Febrero; cincuenta mil pesos el ocho de Marzo siguiente; cincuenta mil pesos el veinte del mismo; cincuenta mil pesos el ocho de Abril; veinte y cinco mil pesos el veinte del mismo, y veinte y cinco mil pesos el veinte de Mayo.

Art. 11.–Luego que el huano esté embarcado, los conocimientos firmados y la órden dada para el seguro, el Gobierno se obliga á recibir y los contratistas á entregar su valor en la Tesorería General, á saber: la mitad en plata y la otra en créditos reconocidos de la deuda nacional, con arreglo á los artículos 4°. Y 7°., mitad de la deuda interna y mitad de la externa. Los contratistas reembolsarán el valor íntegro de este pago en Inglaterra en dinero [¿efectivo?] del producto líquido de las ventas del huano, quedando por cuenta de los contratistas el beneficio que resultare de la amortización de los créditos mencionados.

Art. 12.– La parte entregable en plata se aplicará por ahora al reembolso de los cuatrocientos ochenta y siete mil pesos adelantados y por los contratistas, según el artículo 10, hasta que sean cubiertos: luego se pagarán de los cien mil pesos que según el artículo 25 deben suplir para el camino de fierro del Callao á Lima y despues harán en Tesorería el entero de la parte pagadera en dinero efectivo sobre valor del huano.

Art. 13.–La parte pagadera en créditos de la deuda nacional externa deberá verificarse al fin de cada año.

Art. 14.–El Gobierno en compensación de los intereses sobre el adelanto expresado en el artículo 10, permitirá desde luego á los contratistas, cargar de huano una sola vez de su cuenta, como propiedad particular de ellos, en dos ó más embarcaciones, mil trescientas toneladas de registro de los buques que las carguen, los que podrán salir cuando quieran los interesados, quedando ellos, desde luego, obligados á comprar dentro de dos meses, dos buques cuyo valor no pase de doce mil pesos, que el Gobierno armará y mantendrá de su cuenta y destinará exclusivamente, como propiedad suya, á la custodia de las islas; si costasen menos de doce mil pesos, la diferencia se aplicará á su habilitación. Los contratistas tendrán la facultad de poner á bordo de dichos buques agentes de su confianza para que vigilen el contrabando.

Art. 15.–Solo es permitida por ahora la extracción del huano de la isla del norte de las de Chincha, y los buques que vayan allí á cargar deberán llevar permiso de la Aduana del Callao, que lo otorgará en vista de la constancia que presenten de los contratistas, los que quedan obligados á dar cuenta al Ministerio del Despacho de Hacienda de la próxima salida del buque, acompañando el duplicado de fletamento que se haya celebrado, y cuando emprenda su viaje, remitir uno de los conocimientos que firme el capitan.

Art. 16.–Los socios en Lima, son obligados á ministrar al Gobierno, y los consignatarios en el extranjero á sus encargados para el objecto, cuantos datos y conocimientos se les exijan sobre las contratas y ventas del huano, fletamento de los buques y gastos de cualquiera especie.

Art. 17.–Los contratistas son obligados tambien á pasar al Ministerio de Hacienda la correspondencia que dirijan á sus encargados y agentes, dándoles instrucciones para la venta del huano, avisar el resultado que tenga cada cargamento y presentar tambien la correspondencia original que de ellos reciban.

Art. 18.–Con presencia de los documentos á que se contrae el artículo anterior, se hará anualmente el balance y liquidación de las cuentas de la sociedad, para que el Gobierno pueda disponer de las utilidades que resulten en su favor, abonar las pérdidas ó devolver los adelantos que haya recibido demás.

Art. 19.–Los contratistas tendrán derecho de nombrar consignatarios en los diferentes mercados á que dirijan el artículo, instruyendo al Gobierno de las personas nombradas, para que por su parte pueda tomar las medidad que crea necesarias para inspeccionar el manejo del negocio; dichos consignatarios no podrán removerse sin justa causa y sin consentimiento de los contratistas y del Gobierno.

Art. 20. –Los contratistas por su parte y de cuenta de la compaía, tomarán todas las medidad que crean necesarias para impedir el contrabando del huano en las islas y el continente, sin perjuicio de que el Gobierno por la suya y á costa del Erario, tome las que crea convenientes.

Art. 21. –Los útiles, herramientas, embarcaciones y demás artículos de que la sociedad se valga para la explotación y embarque del huano, son de cuenta de ella misma y al fin de la contrata quedarán en beneficio del Estado.

Art. 22. –Continúa en libertad absoluta la extracción del huano de cualquier punto donde se encuentre, siempre que sea con destino á la agricultura del país, quedando sujetos los que se ocupen en este tráfico, á las penas que establecen las leyes si cometiesen algun fraude en perjuicio de los intereses del Estado.

Art. 23. –En caso que se encuentre sal de amoniaco formada en algunos lugares de producción de huano, los contratistas la exportarán de cuenta del Estado y partirán de las utilidades netas que deje su venta, en la proporción expresada en el artículo 6°.

Art. 24.–Los contratistas se obligan á presentar al Gobierno las propuestas convenientes para la construcción de un ferro-carril de Lima al Callao, en cuya empresa podrán tomar acciones todas las personas que lo soliciten.

Art. 25.–Con vista del plan para la obra y de los modelos que forme un ingeniero, los contratistas se obligan también á hacer traer los útiles, herramientas, rieles, carros, carruajes y máquinas locomotivas para el ferro-carril, despues de reembolsados los adelantos que expresa el artículo 10, é invertirán de cuenta del Estado, en dichas especies, la cantidad de cien mil pesos, la misma que formará la parte de acciones que le correspondan en la empresa del ferro-carril. Los contratistas se reembolsarán de los cien mil pesos con la parte que deben entregar en Tesorería por valor del huano, según el tenor del artículo 11.

Art. 26. –Siendo la exportación del huano, segun el artículo 1°. de esta contrata, el privilegio exclusivo de esta compañía, el Gobierno se obliga á no disponer en caso alguno de cantidad, sea cual fuese, por via de premio, venta, donación ó de cualquier otro modo, ni permitir su exportación por otra persona alguna que no sea la compañía, durante los cinco años de la contrata.

Art. 27.–En garantía de la fiel ejecución y cumplimiento de todas y cada una de las condiciones arriba expresadas, los contratistas se multan en la cantidad de cincuenta mil pesos á favor del Gobierno, para resarcimiento de los daños y perjuicios que le resultasen, siempre que infrinjan ó ataquen la presente contrata, y el Gobierno por su parte señala la cantidad de diez mil toneladas de huano para que en caso igual por su parte, dispongan de ella los contratistas como propiedad suya, por indemnización de los daños y perjuicios que en su consecuencia les resultase. Las multas arriba expresadas se declaran propiedad de la parte que reclame la que le corresponde, tan luego como la Corte Suprema declare que ha habido ataque ó infracción á la contrata, por la otra parte.

Art. 28. –Las diferencias ó cualquiera incidencia que ocurran sobre la ejecución ó interpretación de la presente contrata entre el Gobierno y los contratistas, quedan sujetas á la decisión de la Corte Suprema, según su atribución constitucional, y sus fallos serán puntualmente observados.

Art. 29. –Queda sin efecto la contrata celebrada con Quiróz y Allier en fecha de 17 de Diciembre de 1841, la que se cancelará por los administradores del Tesoro, respecto á que de comun acuerdo queda incorporada en la presente.

Lima, Febrero 16 de 1842. *Gibbs Crawley y C*ª..–*A. Puimirol Poumaroux y C*ª.. –*Quiroz Allier y C*ª.

Lima, Febrero 19 de 1842.

Habiéndose visto en Consejo de Ministros las propuestas que en Enero último hicieron para la extracción del huano de las islas y demás lugares que lo producen, Quiroz Allier y Cª, Puimirol Poumaroux y Cª y Gibbs Crawley y Cª, entre quienes recíprocamente se discutieron cada uno de los puntos de las bases insertas en «El Peruano» N°. 10 del 29 del citado Enero y cuya publicación se hizo con el objeto allí señalado, para que los que quisiesen proponer otras mejores lo verificasen; y atendiendo á que ninguno de los que las han presentado, y constan de este expediente, ha ofrecido hacer los adelantos que se expresa en el artículo 10; que en las circunstancias actuales de estar invadida la República, son de un interés vital para sostener al ejército; á que las expresadas casas han discutido de nuevo las bases publicadas, haciendo en ellas varias alteraciones en que el Gobierno, en Consejo de Ministros, ha convenido; y á que está, además, por diferentes acuerdos del Consejo de Estado, autorizado extraordinariamente para conseguir dinero del modo que lo juzque conveniente: –se aprueba la redacción contenida en los veinte y nueve artículos de la minuta que precede, presentada por las expresadas casas, con condición de que las instrucciones que para la venta del huano se dirijan á los consignatarios, segun el artículo 17, se presenten anticipadamente al Gobierno.

Publíquese y pase á los administradores de la Tesorería Genral para que procedan al otorgamiento de la escritura respectiva. –Rúbrica de S.E.–*Cano*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; que constituyen la legislación y la historia fiscal de la República*. Vol. III. Lima: Imprenta del Estado. (p.155–59).

4. 17 November 1849. "Chinese law" of immigration that promotes the arrival of Chinese bonded laborers into Peru.

N.°185 –Inmigración – Ley promoviéndola y subvencionándola.

EL CIUDADANO RAMÓN CASTILLA

PRESIDENTE DE LA REPÚBLICA, &.

Por cuanto el Congreso Nacional ha dado la ley siguiente:

El Congreso de la República Peruana.

Considerando:

I. Que en el grado de postración que se halla la agricultura del país por la falta de brazos, es de necesidad remover este mal protegiendo la inmigración extrangera [*sic*];

II. Que la Representación Nacional debe fomentar este nuevo género de industria premiando á los empresarios y con especialidad á los primeros introductores de colonos, en atención á los mayores riesgos á que se hallan expuestos.

Ha dado la ley siguiente:

Art. 1.° Todo introductor de colonos extrangeros [*sic*], de cualquier sexo, cuyo número no baje de cincuenta, y cuyas edades sean de diez á cuarenta años, disfrutará de una prima de 30 pesos por individuo, que pagará el Tesoro nacional al momento de la internación, teniendo á la vista las contratas respectivas autorizadas por los cónsules de la República.

Art. 2°. Se concede á los primeros introductores de colonos, D. Domingo Elías y D. Juan Rodríguez, privilegio exclusivo por el término de 4 años, con las misma prima de 30 pesos señalada en esta ley, por cada colono de la China que introduzcan en los Departamentos de Lima y la Libertad, conforme al artículo anterior, comprendiéndose en esta gracia, los chinos de cuenta de los interesados llegaron al puerto del Callao en el buque Federico Guillermo [Frederick Wilhelm].

Art. 3°. El pago de la prima se hará por el Tesoro nacional, con los derechos que se adeuden las mercaderías internadas en los buques conductores de colonos, y si tales derechos no alcanzasen á cubrir la prima, se completará lo que falte con los pagarées [*sic*] que, por el mismo ramo, otorguen los interesados á favor del Estado, previo el descuento que señala el Reglamento de comercio en ambos casos.

Art. 4°. Los colonos extrangeros [*sic*] que fueren introducidos al país quedarán exentos de contribuciones y de todo servicio militar, por el término de diez años desde el día de su internación.

Art. 5°. El Gobierno por medio de las autoridades de su dependencia, vigilará sobre el puntual cumplimiento de las contratas celebradas entre los colonos y sus patrones.

Art. 6°. Se autoriza al Poder Ejecutivo para que pueda tomar lo necesario de los productos del huano, á fin de cubrir las primas que deban darse por las Tesorerías, á los introductores de colonos, en razón de esta ley,

Comuníquese al Poder Ejecutivo para que disponga lo necesario á su cumplimiento, mandándola imprimir, publicar y circular. –Dado en Lima, á 17 de Noviembre de 1849. –*Antonio G. de la Fuente*, Presidente del Senado. –*Pedro Astete*, Vicepresidente de la Cámara de Diputados. –*Gervasio Álvarez*, Senador Secretario. –*Santos Castañeda*, Diputado Secretario.

Por tanto: mando se imprima publique y circule, y se le dé el debido cumplimiento. –Dado en la casa del Gobierno en Lima, á 17 de Noviembre de 1849. –*Ramón Castilla*. –*Manuel del Mar*.

Taken from: Dancuart, Pedro Emilio. 1903. *Anales de la hacienda pública del Perú. Leyes, decretos, reglamentos y resoluciones; aranceles, presupuestos, cuentas y contratos que constituyen la legislación y la historia fiscal de la República*. Vol. IV. Lima: Imprenta y Encuadernación de Gmo. Stolte. (p. 175-76).

5. Contract (no. 480) of 21-year-old Chinese "coolie" Ong Sy-Tiam, from the province of Yong-Boy, signed on 8 February 1860 in a barracoon in Macao, China, days before embarking on a journey to Callao, Peru

Nº 480

CONVENIO Celebrado en Macao, China, 8 de febrero del Año de Nuestro Señor de 1860 entre... por una parte; y por la otra de ONG Sy-tiam, natural del distrito de Yong-Boy en China, edad de 21 años de oficio...

CONSTE solemnemente en el presente contrato yo... libre y espontáneamente declaro haber convenido con el Señor Dn... embarcarme en el buque... capitán...con el objetivo de trasladarme a aquel país, obligándome desde mi llegada a ponerme a las órdenes del expresado Señor: para llenar cuyo objeto, entraré a servir en clase de cultivador, hortelano, pastor, criado o trabajador en general, por espacio de ocho años, contados desde el día en que entre a servir; durante cuyo período araré los campos, desmontaré terrenos, cuidaré ganados, atenderé a las huertas y en suma haré cualquier otra clase de trabajos, cuando para ellos sea requerido, haciéndome útil además con aquellos conocimientos de mecánico y artesano que pudiera poseer. Menos en el trabajo de las ISLAS HUANERAS.

CONSTE, que convengo de mi libre voluntad, que el mencionado período de ocho años, comenzará a contarse desde el día que entre a servir como se ha dicho, y que tengo perfectamente entendido; que la palabra mes se tomará y se toma, como significado de un mal del calendario y que la palabra años se tomará y se toma como significado de doce de dichos meses. CONSTE que durante el referido período de ocho años no trabajaré para mí ni para ninguna otra persona, sino solo en beneficio del Señor Dn... o al que hubiésemos traspasado este Contrato y que no me ausentaré de la casa de éstos sin un permiso por escrito.

CONSTE así mismo, que convengo se me descuente un peso fuerte todos los meses, del salario que hemos convenido recibir por mi trabajo, hasta el reembolso total de la suma de doce pesos que confieso haber recibido aquí del agente del Señor D. ... como por vía de préstamo adelantado sobre mis salarios.

CONSTE, que sólo tendré una hora para cada una de mis comidas diarias, y que el tiempo y duración de mi trabajo cada día, será el mismo de costumbre del lugar o pueblo a que se me destinare.

CONSTE, finalmente por lo que pudiera haber lugar, que me obligo a la observancia de todos y cada una de las cláusulas arriba expresadas, no sólo con el Señor Dn..., sus herederos, legatarios, apoderados o agentes, sino con todas aquellas personas a quienes fuere traspasado el presente contrato, con arreglo al decreto de 7 de enero de 1859, para lo cual los autorizo desde hoy entera y completamente, sin que después de hecho esto pueda ligarles ninguna responsabilidad hacia mí.

CONSTE ASÍ MISMO POR MI PARTE, como yo el abajo firmado, apoderado en China del Señor Dn... me obligó formalmente en su nombre, a que tan pronto como sea posible después de la llegada a su destino del buque arriba referido, dicho Señor Dn. ... le pagará mensualmente por su trabajo la suma de cuatro pesos fuerte, dándole además alojamiento, suficiente ración de alimento sano, médico, siempre que lo hubiera en el lugar y asistencia y medicinas en toda enfermedad, que no provenga de su mala conducta y donde no hay hospitales públicos.

CONSTE, que el pasaje y manutención de este desde aquí a AMÉRICA, será de cuenta del señor Dn. ... como así mismo cuantos gastos se viere en la necesidad de hacer en el tránsito.

CONSTE, que se concederán al mismo tres días de su año nuevo para cumplir sus funciones religiosas.

Y EN CUMPLIMIENTO DE TODO LO EXPUESTO ARRIBA, declaramos ambas partes que antes de poner nuestra respectiva firma hemos leído por la última vez, clara y detenidamente todos y cada uno de los empeños a que mutuamente nos obligamos, a fin de que en ningún tiempo ni en ninguna circunstancia, pueda argüirse ignorancia en haber lugar a reclamo, excepto en el caso de faltar al cumplimiento de cualquier de las condiciones arriba expresadas con todas y cada una de las cuales estamos en perfecto acuerdo.

En prueba de todo lo cual afirmamos hoy día de la fecha el presente solemne contrato de nuestro propio puño.

(cuatro firmas)

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