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Subaltern technologies and early modernity in the Atlantic World

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How did technology shape the Atlantic World? A familiar if partially discredited answer would be that Europeans’ guns, steel, ships, alphabetic writing, and perhaps animal domesticates, aided and abetted by ‘germs,’ inevitably led them to rule in the Americas and Africa. But what if we asked that question with a more suitably generous definition of technology, a definition that would allow for the inclusion of cultivated or even foraged plants as well as prepared foods, one that also allows for communication devices and literacies, auditory and kinesthetic arts like music, dance and prey stalking, and building and furniture technologies such as thatching and hammocks (Figures 1 and 2)? The answers to this question need not nor should not conflict with accounts of (eventual) European and settler-colonial domination, or indigenous adoption of European-originating technologies. These answers will produce histories that recognize ‘entanglement,’ by which I mean the interconnectedness of various kinds of agency in an interdependent world, and foreground the perspectives and experiences of the subaltern actors who formed a majority of the population of early modern Latin America.

The first part of this essay considers the obstacles to writing entangled histories of the Atlantic World. Some of these obstacles emerge from the persistence of a historiography that conceives of Atlantic (or global) history as the history of competing empires and/or settler colonial societies. Other obstacles derive from essentialist approaches to culture (and related concepts such as ontology and epistemology), which have obscured the degree to which, post-1492, many ‘European’ and ‘Native American’ phenomena were entangled. In the second part of the essay I propose that the analytic category of ‘technologies,’ capaciously defined, can help bridge the gap between (or better entangle) diverse historiographic traditions of early modern intellectual history, environmental history, ethnohistory, and contemporary anthropology. This essay is informed by theoretical work about technology and recent empirical work by scholars specializing in the Black and Red Atlantics, as well as further reflections on chocolate and iegue (the Carib term for a tamed being), areas of my own research. Attending to ‘technology’ is certainly not the only way to write entangled history (see Introduction to this special issue), but as an analytic category, it has a number of distinct benefits. Chief among these is the potential for reconciling approaches that foreground subaltern agency and ‘new materialism’; allowing a sharper view of the intertwined processes of imperial and colonial dependence and denigration of subaltern groups; highlighting processes common to seemingly disparate cultural phenomena ranging from hammocks to hurricanes and mining to medicine; and, foregrounding the possibility of permeability, rather than only incommensurability, in the encounter between different ontologies, epistemologies, and other cultural systems.
In this essay, I use the term ‘subaltern’ to designate but not conflate the heterogeneous groups of non-white subjects of colonialism in the European-controlled Atlantic system in the Americas, Africa, and Europe. ‘Subaltern’ peoples in Latin America ranged from indigenous elites such as those who worked with Bernardino de Sahagún and Francisco Hernández and black slave owners, to enslaved indigenous and black men and women.

Figure 1. Bohio (a housing technology typical of Circum-Caribbean), featuring roof thatching. Oviedo, *Historia general*, 1547, f. 58v. Courtesy of the John Carter Brown Library at Brown University.

Figure 2. Hammock. Oviedo, *Historia general*, 1547, f. 47v. Courtesy of the John Carter Brown Library at Brown University.
working on and in lethal sugar plantations and mines, to those of mixed descent, labeled mestizo and mulatto, whose place in the social system varied significantly over time and place. The range of experiences and possibilities available to this enormous population was immensely varied, and often the interests of members of this heterogeneous population did not align. So, for instance, Mesoamerican indigenous elites continued to extract tribute and labor from native commoners in the colonial period, even as they became subject to European hegemony. Yet from the perspective of both metropolitan Iberians and white creoles, members of these communities were seen and treated as subordinate, and they have too often been neglected in the scholarship concerning modernity. European peasantry, artisans, and even elite women can be subaltern actors in many contexts, but my emphasis here will on non-European cultures and subaltern actors.4

‘Modernity’ is itself a term bound up with Eurocentric narratives since it is a concept that has privileged a set of developments—capitalist modes of production, rationalization, experimental science, nation-state, or disciplinary regimes—that are usually thought to have first emerged among Europeans in Europe and/or in their overseas settler-colonial societies. If I nevertheless use the phrase ‘early modern’ in this essay, I do so in order to insist on the importance of two other developments in the history of modernity. First, it refers to a time period, 1492–1800, defined by a particular form of globalization, marked most dramatically by the annihilation of millions of Native Americas and the forcible and often lethal deportation of approximately 12.5 million people from Africa. Second, I suggest that early modernity was marked by elite, male Europeans’ dependence upon subaltern technologies and their ‘disavowal’ of this dependence.5 A focus on European actors invested in colonial systems will reproduce the effacement of native and black actors unless there is also sustained attention to the dialectical relationship between Spanish and creole learned men’s actual dependence on and appropriation of subaltern knowledge.

Attending to technologies, I will argue, can reveal both this dependence and its disavowal. Histories that consider all manner of technologies (not only those associated with European innovations) reveal an entangled early modern world in which Europeans and settler-colonists were dependent on subaltern actors not only as laborers but also as knowledge producers. These histories can reveal, if not repair, the blindspots of scholarship found in both the Atlantic World and European intellectual history written (often unknowingly) from the point of view of imperial agents and settler-colonials, and, which, accordingly, has ignored or even erased non-European and subaltern agency and perspectives.

**Going beyond the ‘Old World and the New’**

In a 2009 essay, Amy Turner Bushnell pointed out that Atlantic history has never made much room for indigenous peoples, that ‘American Indians like Africans, enter that world laterally, as adjuncts or obstacles to the work of colonization and improvement.’ She laments that ‘had Spanish America been included in the original Atlantic World’ as it was theorized early on, the omission of native peoples may have been avoided, considering that historians of Spanish America have long attended to ‘incorporated’ and even ‘enslaved’ Indians (191). But given the ‘intrinsic’ Eurocentrism that, in her view, renders Atlantic history beyond repair, she advocates a ‘hemispheric’ perspective (191,
While I am less sanguine than is Bushnell about traditional Iberian-world historiography’s inclusiveness, I am also more optimistic about the potential of Atlantic history to overcome its legacy of Eurocentrism. But before we can begin to envision concretely a more integrative approach to Atlantic history, it is necessary to understand some of the underlying obstacles to writing entangled history.

Although some may think that J. H. Elliott’s slim volume, *The Old World and the New: 1492–1650*, first published in 1970 and reissued in the 1992 quincentenary, reflects a historiographic era long since gone, many of its underlying assumptions still frame current scholarship. In asking about ‘the impact of the overseas expansion on Europe itself’ (4), Elliott, along with a few other scholars of European intellectual history, such as Margaret Hogden (1964) and Antonello Gerbi (1973 [1955]), was on the forefront of making European history less insular. In fact, Elliott deserves credit for opening a door (to borrow his metaphor) toward writing entangled histories of native America and Europe (15–16). So it bears asking: why did Elliott’s history that purports to consider the encounter between Europe and America not, in fact, consider indigenous or black perspectives, practices, or participants? At the most basic level the answer to this question corresponds to a faulty premise that lies at the heart of *The Old World and the New* (and much more recent scholarship): the notion that ‘ethnohistory’ of indigenous cultures is a separate endeavor than the history of ‘ideas, attitudes, and perceptions which made up the mental baggage of Early Modern Europeans.’ Despite recognizing that the sources that allowed him to write about Europeans’ ‘mental baggage’ were also ‘the essential material for “ethnohistory”’, Elliott assumed that the history of ‘European response to the non-European world’ could be separated from the history of indigenous peoples in the Americas (1992, 5–6). This assumption persists until the present, informing approaches that leave ‘Spanish colonists to their own historians and Indians to the ethnohistorians’ (Bushnell 2009, 191).

Proceeding from this premise, Elliott developed an interpretation that consists of three main parts. First, Europeans were mentally overwhelmed by the encounter with the Americas; it was ‘as if, at a certain point, the mental shutters come down; as if, with so much to see and absorb and understand, the effort suddenly becomes too much for them’ (1992, 14). Secondly, this caused Europeans ‘to retreat to the half-light of their traditional mental world,’ which, along with a sometimes ‘slavish’ ‘veneration of antiquity,’ led to a ‘reluctance […] to incorporate into their work the new information made available to them by the discovery of America,’ and a ‘time-lag between the discovery of America and Europe’s assimilation of that discovery’ (1992, 8, 14–15). Third, and finally, Elliott put forth the thesis of the ‘blunted impact’ of the New World on the Old. He argued that, in the realm of thought and culture, the encounters with the Americas were not catalysts for the emergence of European modernity, at least not until the seventeenth century when the traditional heroes of the ‘Scientific Revolution’ such as Francis Bacon got to work. In the 1990s, influential scholarship in European intellectual and literary history extended this ‘blunted’ impact thesis into a paradigm (Ryan 1981; Grafton 1992; Grevenblatt 1992; Pagden 1994). While Elliott’s work may have opened a door away towards ‘provincializing’ Europe *avant la lettre* by taking a global view and moving away from insular perspectives then characteristic of European historiography, it also may be responsible for ‘closing’ avenues of inquiry.
In many respects, the ‘Old World and the New’ framework has been superseded. Post-colonial theorists, building on the work of anthropologists and ethnohistorians, have shown that the very notion of modernity is related to evolutionary—and therefore Eurocentric—views of culture (e.g. Mignolo 1995). In the realm of intellectual and economic history, European expansion—and, in the case of history of science, particularly precious Iberian colonial projects—has been shown to be a major factor in the emergence of modernity. Yet, in other respects recent scholarship still contains assumptions that hinder the emergence of narratives that adequately recognize subalterns. These issues emerge primarily from two sources: first, modernization frameworks continue to render subaltern agents largely invisible. And second, ethnohistory of indigenous America, on the one hand, and European history of ‘ideas, attitudes, and perceptions’ are seen as separate and unconnected fields of study.

Teleologies of modernization, and their close cousins, evolutionary accounts of culture, continue to undergird many varieties of Atlantic history, whether guided by the end-point of ‘modern’ economies, science, the nation-state, or even animal domestication (for relevant critiques, see Mignolo 1995; Wolfe 1998; Chakrabarty 2000; Bray 2012; Hunt 2015; Norton 2015). Lynn Hunt, for instance, has demonstrated that much that gets labeled new ‘global history’ is more similar than not to older accounts of Eurocentric modernization and encourages historians to move away from the question of ‘why some nation-states succeed and others failed on the march toward modernization’ (2015). There is a long and still persistent tradition of viewing indigenous cultures as the ‘past’ of the European or Euro-colonial present (Wolf 1982; Wolfe 1998). Despite vigorous critiques of these and other scholars, many Atlantic World histories are still written which exclude subaltern experiences because they do not appear relevant to the given end-point of modernity. Elliott’s 2007 Empires of the Atlantic World: Britain and Spain in America 1492–1830 illustrates how teleologies of modernization underlie a still dominant model of Atlantic history and lead to an over-identification with settler-colonists and their objectives. In seeking to compare the success and failures of Spanish and British empires in the Americas, Elliott wrote a history from the point of view of imperial agents and creoles, leading him to assign Spain the ‘role of the pioneer,’ the ‘first’ who had to ‘confront, subdue, and convert large populations’; the first who had to ‘exploit human and natural resources’ (406, my emphasis). Accordingly, though he recognizes that ‘some of the most exciting scholarship in recent years has been devoted to the topic of African slavery in the Atlantic world, and to the recovery of the past of the indigenous peoples of Americas,’ his work attends exclusively to ‘the development of the settler societies and their relationship with their mother countries’ (xviii).

I see several inter-related problems here. First, the modernization end point—which empire will be the winner?—results in an over-identification with the small group of historical actors who stood to benefit from the imperial project, and to exclude the subaltern majorities, other than in their capacity as ‘human resources.’ But even putting aside the ethical and political implications of such a choice, is it really possible to understand the ‘development of the settler societies’ without also centering the histories of subalterns among whom the settlers lived? In fact, much of the ‘exciting scholarship’ on slavery and indigenous history to which Elliott refers puts creoles and Europeans themselves in a different light than in histories that neglect subaltern communities (Farriss 1984). A second issue, intertwined with this first one, is the powerful legacy of the nature/culture
divide in modern Western ontology, recent critiques (Latour 1993; Descola 2013) notwithstanding. Since the early Enlightenment, with important precursors in preceding eras, there has been a determining discourse that indigenous people lived (and live) in a ‘state of nature.’ This notion informed modern anthropology and history, leading to such critiques as Eric Wolf’s *Europe and the People without History* (1982). Yet even while many scholars working today in the history of the Atlantic World would be quick to distance themselves from this idea, the ‘state of nature’ paradigm endures when technologies and other cultural artifacts are ‘naturalized.’ This notion is evidenced in disparate fields of scholarship, ranging from economic history (Pomeranz 2000), intellectual and political history (Elliott 1992, 2007) and the history of science. In the latter, a focus on natural resources inevitably makes the chief historical protagonists Europeans—the missionaries, royal officials, naturalists, and merchants seeking to exploit resources. If, in recent and influential histories of science, agency, innovation, modernity itself is mainly attributed to Europeans and settler-colonists (in the forms of ‘experiments’ and ‘empirical observation’) and not subaltern actors, this is due in part to this conceptualization of ‘nature.’ The fallacy is to not recognize that metallurgical, gastronomical, and pharmacological ‘resources’ were as much products of the cultural as of the natural worlds. These ‘resources’—plants, foods, minerals, and in some cases, animals—were in many instances already, in other words, technologies. The view that early modern Europeans encountered American ‘nature’ without mediation from native communities and practices suggests an over-identification with European actors by taking on their ideologies as historical truth, leading to the continued erasure of subaltern agency.

A final impediment to writing entangled history is related to the cleavage Elliott presumed could be sustained between indigenous ‘ethnohistory,’ on the one hand, and European ‘ideas, attitudes, and perceptions,’ on the other. In this he was reflecting assumptions that have long characterized—and in many respects still characterize—the study of indigenous and European cultures. A seminal work that brings together these traditions is *Beyond Nature and Culture* (2013 [2005]), by the French ethnographer and theorist Philippe Descola. He argues that four ontological systems govern cultures of the world—animism (Siberia, greater Amazonia), totemism (parts of native America, Australia), analogism (indigenous Mesoamerica, certain parts of Africa), and naturalism (Europe and Euro-colonial regions). His object is to show that ‘the opposition between nature and culture is not as universal it is claimed to be’ (xiii) and, moreover, this opposition makes little sense to anyone except those reared within the ontology of Western thought as it emerged in the late seventeenth century and persists into the present. In his analysis, he pointedly emphasizes the ‘great divide’ between European naturalism and other governing ontologies (ch. 3). Yet there is a core paradox at the heart of his work that goes unaddressed: the historical period that sees the birth of this ontology within Europe is the same period marked by Europe’s most intense engagement with parts of the world in which other ontologies governed. Part of the reason he is able to sidestep this paradox relates to his treatment of time, or rather, history. He acknowledges that what he intends ‘by the “present” [...] will be often ad hoc and diverse [...] more of an ethnographic present than a contemporary one’ (xix). He further explains that he prioritizes ‘a combinatory analysis of the modes of relations between existing entities’ and so is ‘obliged to defer any study of their evolution’ (xviii). By this he means that a structural analysis must precede a consideration of change over time, except, ironically, in the case of
Europe, for which he provides a historical account. Yet, by prioritizing the synchronic account over the diachronic history, Descola discounts the possibility that the ‘Amerindian thought’ (11) reflected in colonial or contemporary ethnographic sources was affected by decades, if not centuries, of colonialism, and that likewise the possibility that European thought since the fifteenth century was shaped by the encounter with non-Western ontologies.

Leaving aside the issue of the influence of European expansion on indigenous ontologies, there is good reason to take seriously the possibility that the West’s engagement with the ‘rest’ played a role in the emergence of naturalism. Following Bruno Latour (1993), Descola concedes that though the seventeenth-century Europe saw the emergence of nature/culture duality, in fact, this was in many ways a mirage. He glosses Latour, explaining that ‘scientific and technical activity has never ceased to create mixtures of nature and culture in networks of increasingly complex structure in which objects and humans [ … ] co-exist in a situation of mutual “translation”’ (2013, 86). But, along with this proliferation there was a ‘parallel endeavor’ of ‘purification’—which might also be called a ‘disavowal’—that guaranteed the ‘separation of humans and nonhumans into two hermetically sealed ontological regions’ (86). As I will argue below, a focus on subaltern technologies suggests that these co-mingled processes, of the proliferation of nature-culture along with its disavowal, might be better understood within the context of an entangled modernity. Along with Latour, Descola relies on Michel Foucault and his notion of ‘episteme,’ which brings with it an approach—as with Elliot’s ‘cultural framework’—that privileges structure over the data or content, and, with regard to intellectual or philosophical cross-cultural encounters, the tendency has been to presume incommensurability rather than entanglement. And though more recent histories of science have challenged Foucault’s rather rigid periodization and proposed less-disjunctural approaches to the history of knowledge, their methods are likewise not equipped to consider the knowledge and objects from non-European areas that were incorporated into ‘European’ natural histories, despite their very frequent testimony to their dependence on native informants and collaborators (Daston and Gallison 2007).

A number of studies in the history of science, however, have been pointing to interconnectedness as a key feature of early modern science. These scholars are ‘moving away from histories focused on seemingly isolated metropolitan knowers, such as the paradigmatic gentlemanly natural philosopher, and preoccupations with alterity and the textual erasure of indigenous presence.’ Instead these scholars, write James Delbourgo and Nicholas Dew, are moving toward a social history of the interconnections between the radically different peoples that made and circulated early modern knowledge (2007, 12). There is an emergent interpretation of early modern ‘global science’ that describes simultaneous dependence and disavowal of all variety of subalterns (ranging from European artisans and peasants to blacks and indigenous people around the globe). This feature of early modern science produced (and was produced by) an ideology that credits European and Euro-American actors and that effaced dependence on peoples of indigenous, African and/or mixed descent. It was already apparent in 1535, when the conquistador-turned-chronicler Gonzalo Fernández de Oviedo y Valdés published his Historia general. The chronicler simultaneously scorned indigenous people in the Americas as ‘barbarians’ but recognized that with the death of ‘old Indians’ in the Caribbean there was a loss of ‘knowledge of these properties and secrets of nature.’ This notion
received a fuller expression in the work of the Sevillan physician Nicholas Monardes (1493–1588) and was further developed by figures such as Francisco Hernández and the creole physician Juan de Cárdenas. The development of this ideology is tied particularly to Monardes’s efforts to square his admiration for tobacco with his awareness of its imbrication in indigenous practices he considered idolatrous. As a result, he elaborated the model that accommodated both Spanish colonizers’ dependence on Native knowledge of healing practices and pharmacopeia and their investment in a colonial ideology tied to assumptions of European superiority. In multiple editions of his work on American materia, Monardes beseeched colonists in New Spain to investigate ‘all of the kinds of the medicines such as are sold by the Indians in their markets […] which the Indians proclaim and manifest with the great experience that they have among themselves’ (quoted in Norton 2008, 122, my translation). Though his texts lay bare this dependence frequently, they also interpolate and heroize the figure of the European naturalist—himself—whose labor was comparable to that of the classical Greek physician Dioscorides. Thus emerged an early version of the still extant framework in which a European (or Euro-American) is credited as the knowledge producer (in Monardes’s case as the one who compiled and classified materia medica), and which erases the contributions of indigenous knowledge producers (in Monardes’s texts not an entirely successful endeavor).

It may be that this discourse, which disguised dependence with denigration of native actors and glorification of European intellectuals, provided the model for the many iterations that followed. It may be also worth emphasizing that the circulation of technology, knowledge, and people across ethnic and political boundaries is the norm rather than the exception across time (Dean and Leibsohn 2003). In other historical periods, one community’s appropriation of the technologies of another was not always accompanied by an effort to hide that fact. For instance, learned Christian Europeans made no secret of their envy and admiration for the learning and technologies of the Muslim world during the Middle Ages. This ideology of ‘disavowal’ was an extremely powerful construct that might be considered a core feature of modernity.

**The uses of technology**

It may seem counter-intuitive to choose ‘technology’ as a key concept given its associations with historical narratives that celebrate progress such as the ones critiqued above. However, I want to suggest that its complex socio-etymological history makes it a highly productive lens through which to consider entangled histories in which subalterns are involved. ‘Technology’ descends from the ancient Greek technē. As Pamela Smith and Pamela Long have each discussed, since at least Aristotle technē was used invidiously by elites to refer to ‘the lowly knowledge of how to make things or produce effects, practiced by animals, slaves, and craftspeople’ and in contrast with prestigious episteme of ‘learned’ men invested in abstractions (Smith 2004, 17; Long 2001). In fact, the denigration of subaltern actors shares much in common with the way, according to Smith, that ‘new philosophers of the seventeenth century appropriated to themselves the artisanal expertise about the processes and powers of nature’ but ‘excluded the practitioners and artisans themselves.’ This is likely more than coincidence and Smith implies a connection when she reminds us that ‘the hierarchy of cognition and knowledge emerged’ in part from ‘colonialist views of primitive societies’ (148). Given this history—and the fact that its
recuperation among Europeans occurred simultaneously with European expansion into the Americas and Africa—technology is particularly salient and potent for thinking about encounters and integration of subaltern and elite cultures in Atlantic world.

Of course, ‘technology’ now has a distinctive and very different valence, one associated with superiority and progress rather than inferiority. But this history too is useful and entangled with the ones discussed here. In the words of anthropologist Francesca Bray, ‘for [the last] two hundred years Western nations have used technological difference to determine human hierarchies’ (1998, 13). In the old ‘standard view,’ according to her, ‘technology progresses constantly, generating changes that eventually disrupt modes of production and propel societies into new eras’ leading to studies of ‘premodern technologies’ that ‘trace the lineages of the modern world’ and ‘focus […] on the domains that from our perspective seem most significant because they came to shape the world of industrial capitalism’ (2008, 322).\footnote{12} Deploying the term in its more capacious sense assists in moving away from cultural-evolutionary assumptions and approaching hegemonic and subaltern cultures without judgments about hierarchies of values. This deployment encourages the recognition that all technologies have different advantages and disadvantages depending on goal and context: for instance, while engineered seeds produced by Monsanto might seem like a ‘better’ or more ‘advanced’ technology than traditional farming technologies such as inter-cropping because of higher yields, inter-cropping might be more sustainable in the long term because it causes less environmental degradation than monoculture and supports local communities’ prosperity more effectively.

So what is technology? Technology is at once process and product. As defined by anthropologist Alfred Gell, ‘technology, in the widest sense, is those forms of social relationships which make it socially necessary to produce, distribute and consume goods and services using “technical” processes’ (1988, 6). He further explains that “‘technical” does not, I think, indicate an either/or distinction between production processes which do, or do not, make use of artefacts called “tools”.’ Consequently, ‘technology […] not only consists of the artefacts which are employed as tools, but also includes the sum total of the kinds of knowledge which make possible the invention, making and use of tools and this “Knowledge” does not exist except in a certain social context’ (6). I follow Gell in viewing technology as a set of practices and processes designed to transform matter (matter can include the body as well as exogenous elements) as well as the transformed matter itself. Though Gell distinguishes between ‘techniques’ and ‘technologies’ (1988; see also Bray 2008), I find it more useful to aggregate these under the sole rubric of ‘technology'; all technologies are modular, so that any one ‘technology’ or technique is reliant on others, e.g. the technology of print is dependent on technology of moveable type or woodblocks, and moveable type on that of metallurgical technologies and woodblocks on timber technologies, and so on.

I would argue that our approaches might well be informed by the way Joyce Chaplin, Evonne Levy and Ken Mills, and Vera Candiani use ‘technology’ in trans-Atlantic and trans-cultural contexts. Chaplin, in her pioneering Subject Matter: Technology, the Body, and Science on the Anglo-American Frontier, 1500–1676 (2001), investigated the paradox of English colonists’ admiration for native technologies and scorn of Native American ‘bodies.’ Levy and Mills, focusing on Europe-to-Americas vectors, put ‘technologies at the heart of the subject-forming project of transatlantic cultural transfer’ (2013, 3). Candiani has pointed out that ‘technologies’ can provide an alternative to the problems
posed by the often essentializing concepts of transculturation, mestizaje and hybridity, pointing out that multiple ‘technologies’—Muslim, Iberian, and Roman, as well as indigenous ones—were implicated in the desagüe (the colonial drainage project of Lake Texcoco), where ‘not two cultures but many cultures confront one another’ (2014, 7–8).

In earlier work I approached chocolate as a ‘cultural artifact,’ and recognized that the transformation of a conglomeration of plant, mineral, animal extracts into a potable substance encased in ritual paraphernalia was predicated on multiple ‘technologies.’ I now want to consider how thinking about chocolate as a technology can also usefully concretize the analytic utility of this category. The transformed matter of chocolate and closely related cacao beverages, as they existed in late post-classic Mesoamerica, was one that aggregated hundreds of other technologies of varying time depths. These include the domestication of Theobroma cacao, as well as the discovery that its seeds could be processed to produce a beverage, processes now thought to have first occurred no less than 5500 years ago in Upper Amazonia (Zorilla 2015); the discovery of numerous plant extracts (e.g. vanilla, mecoxochitl, xochinacaztli, achiote) that have desirable therapeutic as well as sensory effects when combined with cacao; techniques of locating and using wild honeycombs; the development of the grinding technology of the metate, and those essential for producing the ceramic and lacquered gourd vessels requisite for drinking chocolate; and the processes that produced the delectable foamy froth required of the beverage. Within late post-classic Mesoamerica chocolate was rooted in particular and mutually reinforcing aesthetic, ritual, therapeutic, symbolic, and ontological contexts that resulted in it being a liquid food and technology of enormous prestige, valued for its social, spiritual, and bodily efficacy.

Chocolate is only one of many technologies that originated in non-European societies and that was dispersed because of its location within Atlantic world subaltern communities. The majority of the scholarship mentioned below does not deploy ‘technology’ as a conceptual category. My argument is not that scholars should jettison other terminology—practices, habitus, skills, science, ways of knowing, matter, things, etc. These and other terms and concepts are useful and often complementary with ‘technology.’ Yet ‘technology,’ I contend, offers unique advantages in thinking about subaltern groups, particularly in the context of an integrated Atlantic world in which enormous disparities in power frequently structured relationships between individuals and groups. Read through the lens of technology, scholarly sub-fields normally kept separate (e.g. mining, cartography and food history) can be put into entangled and comparative relationships. In aggregate, they show definitively that the impact of (native) Americ(ans) and Afric(ans) on Europe was significant. Among those technologies rooted in Native American and/or black communities were those related to food, pharmacopoeia, and healing, including those adopted by Europeans (e.g. quinine, tobacco), and those less so or not at all (peacock flower, peyote). More generally, there were those related to animals and agriculture. There were those needed for the imperial extractive endeavors such as mining, pearl fisheries and timber harvesting. There were those associated with environmental management, including water resources, and hurricanes. There were those intertwined with textiles, expressive arts, and literacies. Technologies of the body include Central and West-African originating martial forms, Native American sign language, and tattooing and other forms of corporeal ornamentation.
A major benefit that accrues to approaching these phenomena as ‘technologies’ concerns subaltern agency. First, ‘technology’ can help to foreground individuals and groups whose agency is often difficult to discern because of the nature of extant sources, as well as the ideological efforts of those with imperial and colonial privilege, such as Oviedo and Monardes, who intentionally attempted to minimize or erase it. There is the agency of the actors on whom Europeans depended: the indigenous, African and mestizo guides, go-betweens, farmers, hunters, cooks, divers, miners, loggers, healers, water management specialists—among many others—on whom colonists depended. Technology—as opposed to terms such as ‘habitus’ or even practices—contains within it a notion of intentionality that is important within the context of ideologies that denigrate certain groups of people as unthinking animals. Technology changes the narrative from ‘European discoveries’ to ‘introductions’ by Native Americans, and other non-Europeans.

Moreover, these subaltern experts knew the value of their knowledge—and whenever possible used their expertise to negotiate better labor and material conditions for themselves, or to secure their freedom and autonomy. For instance, Molly Warsh has revealed ‘indigenous divers’ critical role in exploiting and caring for the oyster banks’ in the pearl fisheries off the coast of Tierra Firme. Though working in an oppressive and exploitative labor regime, the divers were conceded rest days because the Spaniards recognized their dependence on the divers’ skills and technologies (2014, 534). In some instances, subaltern technologies were an essential ingredient for freedom itself, such as in the Brazilian maroon communities where enslaved people escaped bondage. In the words of Judith Carney and Richard Nicholas Rosomoff, ‘The remarkable application of African agropastoral farming techniques was crucial for maroon survival’ (2009, 87). Importantly, a focus on technology allows scholars to more easily recognize the agency of women. Sophisticated embodied knowledge is a prerequisite for various technologies related to healing practices, food preparation and textile production (e.g. Tedlock and Tedlock 1985; Davis 1995; Schiebinger 2004; Norton 2006, 2008). Women also played significant roles in technological endeavors wrongly seen as exclusively male, such as colonial mining (Bigelow 2016a).

A second kind of agency highlighted stems from recognition that many of the technologies fundamental to the Atlantic world originated in indigenous and African cultures. There has been understandable push-back in search for ‘origins’ and ‘survivals’ both because of the tendency to reify and essentialize groups, and because of the intrinsically mobile nature of technology circulation. Yet, in the context of the Atlantic world, where erasure and denial of non-European origins of technology and knowledge were part of the colonial ideology that has had long-lasting impact on contemporary academic thought, it is crucial to recognize this kind of agency as well, as well as the relationship of these technologies to the non-European cultural systems from which they emerged, as discussed below.

Deploying a capacious understanding of ‘technology’ is a necessary corrective to Eurocentric narratives, in the way that contrapos ing ‘vernacular science’ or ‘indigenous ways of knowing,’ for instance, is not. For this reason, it is particularly important that historians get out of the habit of using ‘technology’ exclusively for more recent innovations associated with instrumentation and late(r) capitalism. In Dreaming of Dry Land: Environmental Transformation in Colonial Mexico City (2014), Vera Candiani effectively analyzes...
'hydraulic and soil management practices' that pre-Hispanic central Mexicans 'developed over centuries that depended on land becoming water and then land again, leaving both enriched with nutrients that sustained domesticated and wild plants and animal used for food and manufacture,' including both 'major hydraulic engineering works' and agricultural techniques such as chinampas (39), and the Spanish technologies (e.g. large-scale drainage project) associated with desire to transplant a familiar pastoral economy to New Spain. Likewise, Stuart Schwartz, in *Sea of Storms: A History of Hurricanes in the Greater Caribbean from Columbus to Katrina* (2015), mentions a variety of indigenous technologies associated with environmental management—from hurricane-resistant crops to ways of detecting the onset of severe weather events—many of which were appreciated and even appropriated by European colonists.

Related to its advantages in revealing subaltern agency in general is the way that a focus on technologies brings to light the spaces in which indigenous and black individuals and groups exchanged technologies and attendant beliefs, and in doing so created new cultures in the Americas. For instance, Pablo Gómez, whose studies of the ‘particularities of the Spanish Caribbean allow us to acknowledge the activities of black communities in the Caribbean as essential components in the crafting of a history of knowledge production about the body and the natural world in the early modern Atlantic,’ discusses Juan Ingles, a free black born in Cartagena, who during his time in the Caribbean Islands learned 'some cures for snake bites that Indians had taught him’ (2013, 386–93; see also Carney and Rosomoff 2009). Oviedo himself revealed that it was an enslaved black woman who taught him that the fats of the cacao were curative for wounds (Norton, 2008).

Though efficacious for foregrounding agency of subaltern individuals and groups, technology, importantly, is also a concept that aligns well with the scholarship of 'new materialism' associated with theorists such as Bruno Latour (1993). The nature-culture binary is itself a particular epistemological formation of European derivation that, as has been argued above, has been mobilized to subsume indigenous technologies and knowledge into non-human ‘nature.’ A clear understanding of the cultural systems and social networks from which derive many indigenous, African, and European technologies is dependent on rejecting the nature/culture binary. For instance, in some indigenous communities, women treated the bodies of both human infants and adopted baby animals with *bija* (*Bixa orellano*, also known as achiote and annatto) in order to ensure their well-being and even personhood. In fact, Eduardo Viveiros de Castro (2014) shows the (under-acknowledged, once again) debt that European theorists of the new materialism owe to Amazonian and other indigenous ontologies. In *Cannibal Metaphysics*, Viveiros de Castro traces an intellectual history that begins with Amazonian informants and proceeds to Levi-Strauss’s writings and to those of Gilles Deleuze and Félix Guattari, and Latour, among others.

As emphasized in the definitions offered by Gell (1988) and Bray (2008, 2012), a technology-oriented approach does not preclude, and in fact demands, attention to broader systems of epistemology, ontology, cosmology and/or ‘culture’ itself. Following Carlo Ginzburg (2013), emic categories can provide a pathway to thinking about the relationship between technology and ontology. For instance, by attending to *huayrachina*, the Quechua term for ‘a traditional refining oven in the Andes,’ Allison Bigelow brought into view an Andean ontology that drew connections between the human womb and metallurgical processes (Bigelow 2016b, 2). And by pointing out that in the colonial Andes the term
survived in the shortened form guayra, she raises the possibility that the endurance of the technology brought with it traditional ontological elements. Likewise, focusing on the Carib-language term iegue has helped me understand that European notions of human-animal boundaries did not apply in lowland South America and that animal taming technologies need to be understood in the context of child rearing and treatment of war captives.

With attention to technologies, it becomes a question, rather than a presumption, when (if not also how and why) certain epistemic, ontological, aesthetic, sensory, and ritual facets move and when they don’t. In the case of chocolate, the driver for the movement of the technology was Spaniards’ imbrication in Mesoamerican rites of healing, status, and, most of all, sociability before and after conquest, which in turn shifted their aesthetic sensibilities and imparted to them a taste for chocolate. The movement of African crops technologies to the Americas presents some interesting parallels to that of chocolate. Carney and Rosomoff demonstrate that part of the reason that crops of African origin, such as okra, black-eyed peas, and guinea pepper, were cultivated by forced African migrants and their descendants was because of their importance in African-inflected spiritual practices such as candomblé (Brazil) and orisha supplications (Cuba) (2009). In contrast, with the importation of exotic animals—or in indigenous terms iegue—the transfer of this technology brought with it new ideas about affective relationships between humans and other animals that helped give rise to the modern ‘pet’ (Norton 2012, 2015).

Technology can be a powerful, sometimes sneaky, bot that can carry with it cosmological, ontological, and epistemological elements. It has often been assumed that these facets of indigenous or subaltern culture did not migrate to colonists or metropolitan actors, that the latter could appropriate ‘resources’ and leave behind the cultural baggage. And, at a first glance sources will often seem to confirm this view, because imperial agents were, indeed, fearful of ‘going native,’ and themselves wary about infiltration of foreign—particularly ‘idolatrous’—elements. But the authors of such sources (Monardes, etc.) do protest too much. The assumption that creoles could control which elements of indigenous and black cultures they wanted to appropriate and which ones they wanted to avoid needs to be scrutinized; sources need to be read against the grain. Chocolate may have been one of the sneakiest of bots. Though its enmeshment in Mesoamerican rites of sociability and healing therapies helped ensure the movement of the technology across time and space, chocolate itself brought with it a variety of other facets of the late post-classic Mesoamerican culture. These include aesthetic values, sensory inclinations, taxonomic ideas, and even ontological notions about matter as a potent, generative force. Chocolate was not only a causal force but it was itself changed in the course of time (among indigenous communities who suffered dislocations caused or precipitated by Spanish invasions) and space (among mostly but not exclusively Spaniards and creoles). The technology was modified with additions of new ingredients (themselves technologies), such as sugar and cinnamon, and new instruments, such as the copper chocolatera. This is to be expected: the nature of technologies is for them to change, so what was new after 1492 was an augmentation in the kind and rate of changes precipitated by the entanglement of European and indigenous technologies, not the fact of change itself.

The particular ways that technologies and their related ontological, ritual, and/or aesthetic facets do and don’t move will always depend on the particular contexts of transmission, and these particulars are what, in part, the historian of technologies seeks (or
should seek) to discover. The linguistic fates of Native American and African signifiers are revealing about the range of possible transmission histories, ranging from those categories and signifiers that became loan words in Spanish and other European languages—cassava, cacao, chocolate, hurricane, hammock, *jícara*, *vodou*, to name only a few—to those that have disappeared. If chocolate sits at one end of the spectrum in terms of entangled histories of subaltern technologies, the peacock flower, as studied by Londa Schiebinger, sits at the other end (2004). This botanical abortifacient played a key role in the ability of indigenous and black women in the Circum-Caribbean to manage their reproduction, yet despite its utility it did not migrate across the Atlantic because of European gender structures. Therefore, a consideration of technologies accommodates histories of agnotology, such as that of the peacock flower and that of peyote, which, unlike other hallucinogenic plants, did not appear in European natural histories (Morales Sarabia 2014). If some technologies did not move because of contingencies or structures such as gender, others were lost to annihilating ‘saltwater slavery’ and genocidal conquests (Smallwood 2007). A consideration of technologies can bring into view histories of unfathomable loss as well as survival, transmission and appropriation.

**Conclusion**

By way of conclusion, let me return to Oviedo and—more importantly—the indigenous technologies that he admired and the native and black agents whom he excoriated. Work on Oviedo has been dominated by views such as that of Anthony Pagden, who argued that the chronicler fell into a ‘conceptual trap’ of attempting to ‘assimilate the unknown to the known’ (1994, 24; Elliott 1992). Yet this reading is mistaken because it only recognizes Oviedo’s deployment of a model of natural history found in the classical texts of Pliny. Among the technologies described in the *Historia general* (1535, 1547) are the red body paste made of *bija* (achiote or *Bixa orellano*), tobacco, pineapples and many other identifiable and unidentifiable botanical extracts used for food, healing, and ornamentation, as well as agricultural and food processing techniques such as sowing maize and preparing cassava; fishing, hunting and taming instruments and methods; hammocks, henequen, thatching methods, and other technologies of the built environment; canoes, musical instruments, and weaponry. Many of these technologies greatly impressed the colonist, and he often found homologous European technologies wanting by comparison: thatching used in Circum-Caribbean houses he commended as superior to thatch of lowlands, and even more water-tight than tile roofing in Spain, and he envisioned a Europe where hammocks would prevent soldiers’ deaths from freezing and miasmatic conditions. His appreciation for native technologies reflected the fact that creole survival depended on them, as he plainly stated concerning canoes (‘no podemos servirnos de las heredades que están en las costas de la mar y de los ríos grandes, sin estas canoas’), as well as bohios, hammocks, turtles, tobacco and many other indigenous technologies.17 He was also prescient, since some of these technologies would figure prominently in colonial economies—and in many cases still are a prominent part of south American material culture among indigenous and creole communities.

Oviedo not only attempted to explain these and many other technologies to a European audience, he (often inadvertently) revealed that they brought with them transformative sensory experiences and sometimes even ontological effects to European- and African-
born people in his midst. His body knew what it felt like to sleep in a hammock under a tree (he noted how it felt different than sleeping on the flat surface of a bed), to have his body feel ‘a tamed animal’ (e.g. iegue) nestled in the folds of his clothing, to have all senses overcome by a pineapple, to experience the mouth-feel of cassava as paper-like, to react with fear to the fragrance and sight of bija covering bodies of warriors preparing for war, to smell the smoke of tobacco, even if he didn’t himself inhale. That some of these technologies discomfited him—tobacco, drums, bija—was related to the fact that he understood all too well their relationship to indigenous belief, ritual and warfare, and that there was no clear way to divide technology, sensory experience, and ontology. Oviedo’s texts reflect the experience of a European coming to terms not only with a multitude of cultural phenomena rooted in native societies of the Circum-Caribbean but also with the sensory and even cognitive transformations they precipitated in the conquistador himself.

Viewing these material artifacts and the techniques that made them possible as technologies leads us towards writing entangled, rather than Eurocentric, histories of globalization. Oviedo’s reflections reveal that for sixteenth-century Europeans the loathing and loathsome denigrations of the unnamed Circum-Caribbean Indians and blacks was not incompatible with the appreciation and appropriation of their technologies. His texts remind us that indigenous technologies had trajectories that ranged from extinction (a process well under way at the time he lived and which he lamented) to persistence in indigenous and settler-colonial America, and to migration to Europe and other parts of the globe, as was the case with tobacco. And it reveals Europeans who adopted indigenous technologies often did incorporate aspects of the sensory, epistemological and ontological systems from which they originated.

Yet even though Oviedo helped form colonialist, proto-racialist discourse, his worldview did not include the evolutionary thinking that would later emerge. His admiration for hammock and thatching technologies is stated explicitly on the page, and he saw them as germane, even central to the political and intellectual history that he wrote about in his Historia. We see then that biases of Eurocentrism—and more particularly evolutionary models of culture—not only distort our ability to recognize the centrality of subaltern histories to Atlantic and global history but also occlude our ability to understand the political and intellectual history of Europe itself, since Oviedo’s texts are of course as European as the writings of Martin Luther. But for that, they are no less of the native Circum-Caribbean. It is not only that we need to ‘provincialize’ Europe—it is that we need to see that Europe was always an entangled entity. In addition to expanding the field of entanglement exponentially, what was new after 1492 were the origins of modernity as disavowal, visible in the process of simultaneous appropriation of technologies and denigrations of those who produced them.

Notes
1. For guns and steel, see Diamond (1997), for domesticated animals, see Anderson (2004). For re-appraisals of conquest that de-emphasize European weaponry, see Restall (2004) and Matthew (2012). More recent scholarship has answered that question by looking at how indigenous peoples appropriated some of these very same European technologies, e.g. Bushnell 2009.
2. See the introduction to this special issue for a discussion of the history and an extended analysis of this term.

3. The ‘problems’ and ‘solutions’ outlined in this essay are intended to encompass all parts of the Atlantic world, including regions in Africa, Latin America, and Europe. I offer examples that include all of these but there will be a preponderance of attention to Mesoamerica and the Circum-Caribbean/Lowland South America due to my areas of expertise. Much of this model also applies to trans-Pacific entanglements in Latin America and beyond but the relationship of Asia and the Americas in the early modern period has distinct features that make it beyond the scope of this essay.

4. Subaltern and non-European, however, are not synonymous since European soldiers, merchants and missionarities, etc. often encountered Africans and Native Americans as equals or even more powerful agents in myriad Atlantic world contexts.

5. The notion of ‘disavowal’ is at the center of Sibylle Fischer’s Modernity Disavowed: Haiti and the Cultures of Slavery in the Age of Revolution (2004).

6. Elliott does not name any of the scholars he had in mind, but the prior decade had seen the publication of several seminal ethnohistorical works (e.g. Aguirre Beltrán 1963, Gibson 1964).


8. In their landmark histories of sciences, Antonio Barrera (2006) and Jorge Cañizares-Esguerra (2001, 2006) were among the first U.S.-based scholars to make the case that Ibero-American actors were on the forefront of the Scientific Revolution, revising a ‘core narrative’ that focuses exclusively on the ‘British as precocious harbingers of modernity’ and in which Spanish scientists and intellectuals ‘remain invisible’ (Cañizares-Esguerra 2007, 1430-31). Initially, however, increasing the visibility of Ibero-European and creoles did not necessarily lead to increased visibility of subalterns. In his early work, for example, Cañizares-Esguerra wrote, for instance, that ‘formal systems of science created by the Aztecs, Maya, and Inca seem to have evaporated into thin air in the wake of the Spanish conquest’ and so ‘the history of science in colonial Latin America, by and large, does not belong in the “non-Western world.” The scientific practices and ideas that became dominant were those brought by Europeans as they strove to create stable, viable colonial societies’ (2006, 46-47). More recently, however, Cañizares-Esguerra, as well as many of his students, have emphasized the importance of non-European actors in the Atlantic world (e.g. Cañizares-Esguerra and Breen 2013).

9. I find most convincing his account of longue durée of animist ontology of native Amazonia and Siberia (Norton 2015), but less so his arguments concerning governing ontologies in Mesoamerica. This may be related to his reliance on scholarship for Mesoamerica that does not reflect recent work showing that many of the colonial documents used to reconstruct pre-Hispanic ‘cosmovision’ are themselves significantly marked by colonial/European conceptions (e.g. Burkhart 1989).

10. For examples encompassing a range of places and periods, see Davis 1995; Chaplin 2001; Bauer 2003; Schiebinger 2004; Smith 2004; Parrish 2006; and Safier 2008, 2010.


13. I chose tobacco and chocolate as the topic of my dissertation (Norton 2000) in part as a response to readings, on the one hand, that argued that indigenous agency shaped the formation of institutions, religion, and colonial society and culture generally in colonial society, and to those, on the other hand, that claimed that the ‘encounter’ with the New World left Europe largely unchanged. The fact of tobacco and chocolate seemed, on the face of it, to belie the latter claims, and offered a way to bridge these two historiographical traditions. In my book (Norton 2008), I described tobacco and chocolate as ‘cultural artifacts’.
whose existence was predicated on ‘knowledge and techniques developed over millennia in the western hemisphere’ as a way to revisit the question of the impact of the New World on the Old and to foreground the way that colonists and later Spaniards were transformed by their interactions with indigenous people and/or their material culture (4). As a result, my book attended closely to both the materiality of things and embodied experience and their effects on phenomena ranging from science to statecraft.

14. In addition to those discussed below, examples of subaltern technologies include plants (Radding 2012), pharmacopeia (Crawford 2016; Breen 2017), food (Earle 2014), martial arts (Desch-Obi 2008), sign language (Carayon 2016), and body ornamentation (Odle 2016).

15. There was a long tradition of viewing tool-making as a distinguishing feature of hominids in comparison to other animals (e.g. Gell 1988). As with Aristotle (see above), I see no reason to view ‘technology’ as an attribute exclusively possessed by *homo sapiens*. For instance, nests could be considered an avian technology, and tracking abilities of dogs, a canine one.

16. For fascinating and suggestive research along these lines in other contexts, Pamela Smith proposes that commonalities between Chinese and Arabic (and later Christian European) alchemical theories in the first millennia likely ‘will not be found in texts, but rather in the movement of materials’—e.g. technology—such as ammonium chloride, and for that reason one should also ‘not be astounded, then, at the similar powers with which the material cinnabar, quicksilver, vermilion, and lizards were endowed at opposite ends of Eurasia’ (Smith 2014, 127); see also Bevilacqua and Pfeifer 2013.

17. Oviedo (1547) wrote of canoes that ‘los cristianos que por acá vivimos, no podemos servirnos de las heredades que están en las costas de la mar y de los ríos grandes, sin estas canoas’ (bk. 6, chp. 4), and that hammocks were ‘buenas camas e limpias […] en los ejércitos no serían poco provechosas, en España e Italia e otras partes, porque no adoloscerían ni morirían tantos por dormir en tierra en los inviernos e tiempos tempestuosos’ (bk. 5, chp. 2).

18. He wrote that pineapples were ‘una de las más hermosas fructas que yo he visto en todo lo que del mundo he andado’ (bk 7, ch.14), cassava was ‘bueno e de buen mantenimiento […] delgado como obleas é tan blanco como un papel’ (bk 7, ch. 2).

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