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EMPIRE AND INVENTION: THE ELDER PLINY'S HEUREMATOGRAPHY (*Nat.* VII 191-215)

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Abstract: This paper focuses on the catalog of inventions and inventors that concludes book VII of Pliny the Elder's *Naturalis Historia* (*Nat.* VII 191-215). While the list is certainly a fundamental source for the largely lost tradition of Greek invention-catalogs, the literary, rhetorical, and intellectual-historical importance of Pliny's heurematography has, to date, rarely been appreciated for its own merits. I argue that, in spite of the seemingly irregular and heterogeneous character of the catalog, the underlying rhetorical strategy of Pliny's heurematography allows the list to become a teleological narrative. As I argue, Pliny's main goal is to show the Romans' historical merit in unifying the whole Mediterranean world through the appropriation of its cultural and technological patrimony.

Keywords: Pliny the Elder; invention; heurematography; empire; teleology

Devoted to humankind as a whole, book VII of Pliny the Elder's *Natural History* (= *Nat.*) is concluded by a catalog of inventions and inventors. In keeping with Pliny's encyclopedic ambition, the list aims at completeness and reliability, constituting a repository of the most important achievements performed by the human species in any field of knowledge and action. No wonder, in this connection, that Italo Calvino compared Pliny's catalog to the *Guinness Book of World Records*.[1] Yet the literary and intellectual-historical relevance of Pliny's heurematography has, to date, rarely been appreciated in its own right. Although Plinian specialists have subjected it to careful scrutiny of the sources or taken it as a springboard for studying Pliny's relationship with ancient technology and material culture, the finale of *Nat.* VII still awaits full scholarly treatment *qua* heurematistic literature.

To be sure, lists of inventions and inventors were not new to Pliny's time. As a genre, heurematography had been widespread throughout the Greek-speaking world at least since the fourth century BCE, particularly thanks to the Peripatetic

[1] Calvino 1982.

school. Its origins can, however, be traced back even further. An early-sixth-century poem, the *Phoronis*, contains the first explicit reference to *πρῶτοι εὑρεταί* in attested Greek. The poem's eponymous hero, Phoroneus, was said to have been the father of the human race, the earliest Greek king, and the discoverer of fire. In an extensive fragment, the poet mentions the Idaean Dactyls, crediting them with the invention of mining and iron-working (*Phoronis*, fr. 2 [= *schol.* Ap. Rh. I 1126-1131b], with which cf. Plin., *Nat.* VII 197).[2]

Since then, the Greek obsession with 'primacy' and 'first discovery' (often fueled by local pride) had done the rest: catalogic literature on *πρῶτοι εὑρεταί* had continued to proliferate and thrive, under the fundamental assumption that virtually anything – from the greatest cultural and technological improvements to the seemingly most insignificant implements of everyday life – could be called an 'invention'. And yet, one might ask, why should a catalog of inventions be part of the *Natural History*?

Consentaneum videtur, priusquam digrediamur a natura hominum, indicare quae cuiusque inventa sint. emere ac vendere <Mercurius, vindemiare> instituit Liber pater; idem diadema, regium insigne, et triumphum invenit; Ceres frumenta, cum antea glande vescerentur, eadem molere et conficere in Attica, ut ali<i>, in Sicilia, ob id dea iudicata. eadem prima leges dedit, ut alii putavere, Rhadamantus. (Plin., *Nat.* VII 191)

Before we leave the subject of man's nature, it seems appropriate to append a list of inventions and inventors. Mercury started the practice of buying and selling, Father Liber the harvesting of the vintage. The latter was also responsible for the introduction of the royal emblem of the diadem and the triumph. Ceres introduced corn (men had previously lived on acorns) and the art of grinding it into flour in Attica, or, according to other sources, in Sicily. Because of this, she was regarded as a goddess. She or, as others think, Rhadamantus, was the first to give laws.[3]

Why does Pliny say (*Nat.* VII 191) that it seems *consentaneum* to bring the treatment of human nature to a close with a list of inventions and inventors? The reason could be that, rather than a 'postscript', the catalog functions as the culmination of Pliny's overview of the human species. The list is, in a sense, a showcase of human inventiveness, a record of the feats accomplished by the human race throughout the history of its creativity. As such, the catalog fits well into the context of *Nat.* VII, which defines itself as an 'anthology of humankind,' *flos hominum* (*Nat.* VII 123). In fact, the whole book 'on the human animal,' like the

[2] See further Zhmud 2006, 24. Since the *Suda*'s reference to Simonides the Younger (the poet's grandson) as the author of a work entitled *εὑρήματα* is dubious (cf. Fowler 2000, xxxvi n. 21), the birth of comprehensive catalogs *Περὶ εὑρημάτων* must in all probability be ascribed to the fourth century: Scamon of Mytilene may be considered as one of the earliest writers in the genre (Athen. XIV 637b; *FGrHist* 476 F4).

[3] Translations of Pliny's text from Beagon 2005.

rest of the *Natural History*, is replete with considerations regarding a variety of prodigious feats and 'extreme' points attained by nature and humanity in any given domain: anyone or anything marking a peak of excellence in any field is worthy of being recorded in Pliny's encyclopedia (cf., for instance, *Nat.* VII 120-121: *vir optimus ... pudicissima femina ... pietatis exempla ...*).[4]

Considered in its globality, the human species is an ambivalent and paradoxical phenomenon within the animal kingdom,[5] and ought to be accounted for as such. Yet, Pliny seems to ask, is it possible to treat humankind as a 'scientific' object of observation, without any trace of the subjectivity inherent to the human condition creeping in? One method for investigating the nature of the human race, in Pliny's view, is to explore its boundaries and define its limits. By inventing things, Pliny appears to say, man is able to push forward the limits imposed by nature itself and add further layers of complexity to his own natural constitution. The 'book on man,' which started out on a quasi-Lucretian note of humility (*Nat.* VII 2-3, with which cf. notably Lucr. II 167-181 and V 195-234), comes to a triumphant end on the accomplishments of human inventiveness. Let us therefore formulate the following working hypothesis: for Pliny, creativity and inventiveness are ultimately a crucial part of what characterizes human nature as such.[6]

A major problem, nevertheless, remains. The reader of Pliny's catalog of inventors is immediately struck by its disorganized and heterogeneous appearance. As a result, the whole final section of *Nat.* VII has often been regarded by scholars as little more than a shabby compilation of various sources, some of which are cited by Pliny while some are not. However, it is my contention that, despite the seeming confusion and irregularity of the list of inventions, structure and order can be detected in Pliny's heurematography. In fact, as I am going to argue, such an order is crucial to the rhetorical strategy underlying Pliny's list, since it allows the enumeration to become a teleological narrative. At a macrostructural level, Pliny's catalog is divided into four uneven parts:[7] the first devoted to divine inventions (*Nat.* VII 191); the second to the invention of writing (*Nat.* VII 192-193); the third to a long list of artisanal crafts and other cornerstones of human civilization (*Nat.* VII 194-209); the fourth to the alphabet, the use of barbers and time-measuring devices, three inventions universally adopted throughout the

[4] On Pliny as an encyclopedist, see further Naas 2002 and 2008; Healy 1999.

[5] Cf. Beagon 2005, 107.

[6] Technical creation, for Pliny, allows human beings to overcome the original fear of nature and wild animals (see *Nat.* VII 2-3), and to gather in society.

[7] Cole 1967, 49 n. 6, notes how Pliny is no exception to the heurematistic trend of arranging catalogs according to thematic criteria: his grouping includes "(1) divine inventors, (2) writing, (3) architecture, (4) clothing, (5) medicine, (6) metallurgy, (7) agriculture, (8) government, (9) warfare, (10) *mantikê*, (11) music, (12) literature, (13) games, (14) painting, (15) seafaring, (16) animal sacrifices". For a different arrangement, see Kremmer 1890, 97-98.

Greco-Roman world (*Nat.* VII 210-215).

At a closer look, the lengthy third section can be further subdivided into fairly well-delimited subgroups of crafts and crafted objects: for example, metallurgy (*Nat.* VII 197-198), ballistic devices (*Nat.* VII 201), divination (*Nat.* VII 203), and so on. The transitions between different subsections are often significant in their own right: at *Nat.* VII 199-200, for instance, Pliny moves from agricultural and arboricultural crafts to the art of government, thereby suggesting that the invention of the latter was triggered by the emergence of sedentary, farming communities. In sum, there seems to be good reason to think that Pliny's heurematography is governed by an inner structural logic after all.

Further recurring elements can be identified in the catalog: I shall now examine three of them. Firstly, Pliny's heurematography is pervaded by an emphasis on cultural and technological progress from the more rudimentary to the more sophisticated. At a linguistic level, such progress is highlighted by the frequent use of temporal markers such as the adverb *antea* ('before', 'previously'): Ceres taught humans how to cultivate and feed themselves on corn, while *antea* they lived on acorns (*Nat.* VII 191). Before (*antea*) 300 BCE, when P. Titinius Mena introduced barbers to Rome, long hair and beards were the norm among Roman men (*Nat.* VII 211). Similarly, Euryalus and Hyperbius were the first to build houses using bricks, whereas *antea* people had lived in caves.

laterarias ac domus constituerunt primi Euryalus et Hyperbius fratres Athenis; antea specus erant pro domibus. Gellio Toxius Caeli filius lutei aedificii inventor placet, exemplo sumpto ab hirundinum nidis. (Plin., *Nat.* VII 194)

The Athenian brothers Euryalus and Hyperbius were the first to introduce brick-kilns and houses. Before that, men had lived in caves. According to Gellius, Toxius son of Caelus invented building with clay, taking swallows' nests as his model.

The significance of temporality in the development of human civilization is doubtless shared by Pliny's catalog with many semi-historical accounts of the origin and prehistory of human society (*Kulturentstehung*), of the sort that became widespread in Greek literature at least since the sophistic age (particularly thanks to figures like Prodicus and Democritus). However, such an interest in the temporal dimension was most probably not a typical feature of Greek heurematistic catalogs of the Classical and Hellenistic period, which appeared in the form of bare enumerations, as far as can be inferred from the limited material still

extant.[8] At any rate, in the context of Pliny's seventh book, markers of temporality lend a character of narrativity to the topic of inventions, turning the heurematistic section into something more than a mere list of names and things.

Secondly, besides showing linear progressions from the basic to the more complex, Pliny's catalog shows traces of ring-composition. Certain inventions, and most notably writing technologies, are given preeminence by being mentioned both at the outset and at the end of the list (*Nat.* VII 192 and 210), thus conveying the idea that the narrative has come full circle. The importance of the alphabet, which Pliny thinks always existed (*Nat.* VII 193: *aeternus litterarum usus*), is tied to its being a universal technology in the Mediterranean world and, more specifically, an intellectual tool crucial to the spreading of knowledge (for a similar conception of the importance of literacy for the progress of civilization, cf. Diod. XII 13 1).[9] In a rhetorically loaded sense, it is the fundamental presupposition of the very possibility of the *Natural History*: knowledge cannot be collected into an encyclopedic work unless it can be recorded in written form.

litteras semper arbitror Assyrias fuisse, sed alii apud Aegyptios a Mercurio, ut Gellius, alii apud Syros repertas volunt, utrique in Graeciam attulisse e Phoenice Cadmum sedecim numero, quibus Troiano bello Palameden adiecisse quattuor hac figura HΥΦΧ, totidem post eum Simoniden melicum ΨΞΩΘ, quarum omnium vis in nostris recognoscitur. Aristoteles decem et octo priscas fuisse et duas ab Epicharmo additas XZ quam a Palamede mavult. Anticlides in Aegypto invenisse quendam nomine Men<e>n tradit, XV annorum ante Phoronea, antiquissimum Graeciae regem, idque monumentis adprobare conatur. e diverso Epigenes apud Babylonios DCCXX annorum observationes siderum coctilibus laterculis inscriptas docet, gravis auctor in primis; qui minumum, <B>erosus et Critodemus, CCCCXC. ex quo apparet aeternus litterarum usus. in Latium eas attulerunt Pelasgi. (Plin., *Nat.* VII 192)

In my opinion, the Assyrians have always had writing, but some authorities, such as Gellius, prefer to see it as instituted by Mercury in Aegypt, while others again assign its origins to Syria. Both schools of thought agree that Cadmus brought sixteen letters to Greece from Phoenicia, to which Palamedes added four at the beginning of the Trojan war. These were H, Y, Φ, and X. After him, Simonides the lyric poet added another four, Ψ, Ξ, Ω, and Θ, the sounds of which are recognized in our own alphabet. Aristotle prefers an original total of eighteen letters, with the two letters Φ and X added by Epicharmus rather than Palamedes. Anticleides says that writing was invented in Aegypt by a man called Menon, 15,000 years before Phoroneus, the most ancient of the Greek kings, and he attempts to prove this by reference to records. On the other hand, Epigenes, a first-rate authority, tells us that the Babylonians had astronomical observations inscribed on baked bricks going back 720,000 years, while Berosus and Critodemus, who quote the shortest length of time, make it 490,000 years. This suggests that writing has always been in use. It was brought to Latium by the Pelasgi.

[8] Apart from a few parallels, there is hardly any connection between heurematistic catalogs and full-fledged, narratives or anthropogonic reconstructions concerning the primitive state of man: cf. Cole 1967, 49; see, however, Zhmud 2006, 43.

[9] The invention of the Greek alphabet was a matter of debate among historians even before the birth of heurematography as a genre (cf. *FGrHist* 1 F20).

Pliny's narrative concerning the invention and development of the alphabet exemplifies his tendency to allow for a plurality of discoverers to contribute variously to the same, larger, historical enterprise. Whereas a widespread structural pattern of Greek heurematistic catalogs is the practice of focusing on one inventor at a time and attributing a wide array of discoveries to a single figure (or group),[10] Pliny seems to proceed in the opposite direction, by giving preeminence to one invention and listing a number of different (or successive) inventors associated with it. Even though this pattern may be said to be a result of the author's incorporation of multiple – and often contrasting – sources into a single account, its rhetorical effect is to emphasize the totalizing and all-encompassing ambition of Pliny's heurematography. In fact, the centralizing approach of Greek heurematographers, often meant to boost local pride through the praise of a particular inventor or culture-hero,[11] is replaced in Pliny's catalog with Rome's universalism.

Thirdly, Pliny's catalog displays a recurring alternation of conceptually polar opposites. We have already seen, for instance, a structural distinction between divine and human inventors. To the first group Pliny dedicates a separate treatment at the beginning of the catalog (*Nat.* VII 191). Certain gods are traditionally regarded as culture-bringers, especially in the Euhemerist tradition: thus, Mercury institutes commerce;[12] Bacchus starts the practice of harvesting;[13] and so on (*instituere* and *dare* are here used alongside *invenire*:[14] the gods' merits need not be 'inventions' in the modern sense of the term, but can also be practices or tech-

[10] Cf. Zhmud 2006, 13. Often, however, the Greek catalogs accumulated heterogeneous material without attempting to reconcile or decide between mutually contrasting versions, so that multiple inventors of the same item could coexist alongside one another: see Zhmud 2006, 26.

[11] See further Kleingünther 1976; Thraede 1962; Spoerri 1959.

[12] Caesar reports that the Gauls venerate Mercury (or, rather, his local counterpart) as the inventor of all arts, and of commerce in particular (*Gal.* VI, 17): *deum maxime Mercurium colunt: huius sunt plurima simulacra; hunc omnium inventorem artium ferunt, hunc viarum atque itinerum ducem, hunc ad quaestus pecuniae mercaturasque habere vim maximam arbitrantur*. In antiquity, the notion of divine inventions is often intertwined with the idea that human inventors became deified benefactors: cf. Moatti 2015, 68.

[13] For the treatment of Bacchus as a culture-bringer in Latin literature, cf. e.g. Ov., *Fast.* III 729-733 and III 761-762; *Met.* III 732-733.

[14] Thus, Pliny does not establish a sharp distinction between 'inventing' something *ex nihilo* and 'introducing' it into the cultural landscape of a certain group of people, or even humankind as a whole (as culture-bringers do); contrast e.g. Tert., *Apol*. 11, where a sharp distinction is made between *invenisse* and *instituisse*. In Pliny, the verb *invenire* is often close to the idea of 'discovering', but does not mean 'to create' in the same sense in which the natural productive activity of *natura* is 'creation'. At *Nat.* XVIII 2, for instance, poison is said to have been generated by nature (*genuit*) but discovered (*invenit*) by man (see further Tanner 2006, 239 and n. 107). At *Nat.* XVII 101, Pliny names *natura* and *casus* as teachers of arts to humankind.

niques 'introduced' by them among mortal communities). Pliny, however, attributes most inventions to human individuals or groups: thus, in his book on the 'human animal,' cultural progress confirms its eminently human character.

Moreover, Pliny's list carefully alternates between peace and war: certain objects or crafts are mostly used during conflict-free times, or can be seen as fostering peace, whereas others contribute to war or are clearly typical of warfare. For instance, the long section concerning boats and warships at *Nat.* VII 206-209 is preceded by a discussion of scientific and artistic inventions (*Nat.* VII 203-205). What both sections have in common is an emphasis on the inventors' competition for ever more refined and complex artifacts, obtained through the progressive addition of cumulative components (strings in the case of the lyre, rowers in the case of the warship) and the consequent increase in size and scale.

citharam Amphion, ut alii, Orpheus, ut alii, Linus. septem chordis primum cecinit III ad IIII primas addidit Terpander, octavam Simonides addidit, nonam Timotheus. cithara sine voce cecinit Thamyris primus, cum cantu Amphion, ut alii, Linus. (Plin., *Nat.* VII 204)

The lyre was invented by Amphion, though others say Orpheus and others again Linus. Terpander was the first to play a seven-stringed lyre, having added three strings to the original four. Simonides added an eighth, Timotheus a ninth. Thamyris was the first to play the lyre without vocal accompaniment while Amphion or, according to others, Linus, was the first to combine the lyre with singing.

longa nave Iasonem primum navigasse Philostephanus auctor est […] *biremem Damastes Erythraeos fecisse, triremem Thucydides Aminoclen Corinthium, quadriremem Aristoteles Carthaginienses, quiqueremem Mnesigiton Salaminios, sex ordinum Xenagoras Syracusios, ab ea ad decemremem Mnesigiton Alexandrum Magnum, ad duodecim ordines Philostephanus Ptolemaeum Soterem, ad quindecim Demetrium Antigoni, ad XXX Ptolemaeum Philadelphum ...* (Plin., *Nat.* VII 207-208)

According to Philostephanus, Jason was the first to sail in a long warship […], the bireme was invented by the Erythraeans. Thucydides attributes the trireme to Ameinocles of Corinth, Aristotle the quadrireme to the Carthaginians, and Mnesigiton the quinquereme to the Salaminians. According to Xenagoras, the Syracusans introduced vessels with six rows, while Mnesigiton says Alexander the Great increased this to ten and Philostephanus that Ptolemy Soter further increased this to twelve, Demetrius son of Antigonus to fifteen, Ptolemy Philadelphus to thirty ...

A significant opposition to which Pliny frequently resorts is that between Greek and non-Greek inventors. As in traditional heurematography, an invention or discovery may be attributed to a single individual, a city, or even an entire popula-

tion or ethnic group. In Greek heurematistic catalogs, it was already commonplace to attribute certain inventions to Near Eastern neighbors:[15] this tendency – operating in the Greek tradition alongside the opposite drive to praise local heroes as culture-bringers – has been the object of much debate, but it seems likely that it responds to two contrasting impulses simultaneously.

On the one hand, in fact, ascribing an invention to barbarians can serve the purpose of justifying its appropriation by the entire Hellenic community (thus ruling out any regional claims to primacy, and neutralizing potential threats posed by the 'other' by incorporating it into a collective identity). On the other hand, the 'foreignization' of inventions may reflect a need for distancing the Greek community from objects or practices perceived as a source of danger and anxieties, which inventions – with their character of unfamiliar newness and their potential for disruption of well-established patterns – can often be, as is testified to by the treatment of writing in Plato's *Phaedrus*[16] (in other words, the perceived foreignness of inventions and discoveries may often be due to what Gell calls the "enchantment of technology").[17]

In his own heurematography, Pliny seems mostly to follow Greek practice in attributing inventions to Easterners: thus, the Phrygians are credited with the invention of the four-wheeled vehicle (*Nat.* VII 199), the Egyptians are said to have instituted monarchic government (*Nat.* VII 200), a Lydian king is called the inventor of the ball game (*Nat.* VII 205), and so forth. Far from being hostile to Greek science, as is sometimes claimed,[18] Pliny frequently cites Greek (especially Peripatetic) sources for his *εὑρήματα*. In fact, from his eminently Roman perspective, Greek authorities can perform the same 'outsourcing' and 'foreignizing' function that Eastern traditions had performed for the Greek heurematographers themselves. Thus, besides not being mutually contradictory, Pliny's conscious foreignization of a number of inventions and his incorporation of Greek source material into his heurematography go hand in hand, since both traits are functional to the rhetorical strategy of the catalog.

In this regard, it may come as no surprise that Pliny does not mention any Roman *primi inventores*: this could be read as the result of his use of Greek heu-

[15] Cf. e.g. Hellanikos, *FGrHist* 4 F 178b, 189; Scamon, *FGrHist* 476 T 3 (but the idea predates the heurematistic genre: Herod. II frequently attributes cultural discoveries to the Egyptians). See further Zhmud 2006, 14.

[16] See further Vasunia 2001. In late antiquity, Christian polemists will exploit the 'foreignizing' tendency of Greek heurematography in order to prove the Greeks' cultural dependence on barbarian peoples: cf. e.g. Clem. Alex., *Strom.* I 16, 74-76.

[17] Gell 1992, 44.

[18] Wallace-Hadrill 1990. Note especially *Nat.* VII 8: *modo ne sit fastidio Graecos sequi, tanto maiore eorum diligentia vel cura vetustiore.*

rematistic sources. Nevertheless, the rest of Pliny's seventh book is full of Romans, and it is striking that Roman inventors are absent from the final catalog, in a work so Romanocentric as the *Natural History*, where Rome's power functions as the main structural and ideological unifier of the encyclopedic material.[19] Hence the paradox: an encyclopedia of the Roman world, written by a Roman intellectual, which only mentions non-Roman figures as inventors.[20] I would rather argue that the Romans, in Pliny's heurematography, are not primarily portrayed as first discoverers because the role Pliny assigns them is an altogether different one.

Rather than inventors, the Romans are users, developers, and above all organizers of knowledge and its applications. In fact, throughout the 'book on man,' the account of an invention is often not complete until we get to know when it was first used or seen at Rome, and who brought it there (see, for instance, *Nat.* VII 193), showing the constant flow of objects and ideas from the periphery to the center of the empire. Thus, the younger Africanus is said to have first introduced daily shaving into Roman society (*Nat.* VII 211), and Scipio Nasica was the first Roman to use a water-clock (*Nat.* VII 215). Correspondingly, the catalog of *Nat.* VII ends with a parade of the first Roman users of universally available technologies: writing, barbers, and time-measuring devices.

More than 'inventions,' these are 'tacit agreements among all nations' (*Nat.* VII 210), which significantly contribute to the advancement of civilization (the role of barbers can readily be understood if one thinks of widespread iconographic depictions of barbarians with long beards and hair, e.g. on Trajan's column). Besides enjoying cross-cultural universality, these achievements of human progress – especially writing and time-keeping – prove to be crucial to the administration of the empire. By associating the first Roman sundials with such landmarks of military history as the Pyrrhic and Punic wars (*Nat.* VII 213-214), Pliny explicitly connects the importing of discoveries into Rome with the expansion of the empire itself. Therefore, within the rhetorical framework of Pliny's heurematography, the Romans are assigned a primarily dominating and pacifying role with respect to the Mediterranean world and its cultural patrimony: the underlying sentiment is not dissimilar to that found in the best-known lines of

[19] Murphy 2004, 50. For the Plinian idea of imperialism as "the conquest of knowledge", see notably Naas 2011, 64.

[20] Such a paradoxical trait has been observed, in the case of Cn. Gellius (one of Pliny's main Roman sources), by Chassignet 1999, 87. Cn. Gellius' strategy is probably to prove the antiquity of Italian civilization by showing its direct kinship to the cultures of the Near East and Greece (see Novara 1982, 127, where the author rightly underscores that the characterization of the Romans as 'imitators', or *ζηλωταί*, is far from having an inherently pejorative connotation). As I intend to show, the thrust of Pliny's heurematography is somewhat different, in that he stresses Rome's 'lateness' (rather than its precocity) in assimilating foreign knowledge.

Anchises' speech in the sixth book of Virgil's *Aeneid* (VI, 847-853).[21] The Romans' prerogative, in other words, is defined simultaneously in terms of differentiation from, and synthesis of, the cultural material of the conquered peoples.

*M. Varro primum statutum [*scil. *horologium] in publico secundum rostra in columna tradit bello Punico primo a M' Valerio Messalla cos. Catina capta in Sicilia, deportatum inde post XXX annos quam de Papiriano horologio traditur, anno Vrbis CCCCLXXXXI. nec congruebant ad horas eius lineae, paruerunt tamen ei annis undecentum, donec Q. Marcius Philippus, qui cum L. Paulo fuit censor, diligentius ordinatum iuxta posuit idque munus inter censoria opera gratissima acceptum est. etiam tum tamen nubilo incertae fuere horae usque ad proximum lustrum. tunc Scipio Nasica collega Laenati primus aqua divisit horas aeque noctium ac dierum idque horologium sub tecto dicavit anno Vrbis DXCV. tam diu populo Romano indiscreta lux fuit!* (Plin., *Nat.* VII 214-215)

Marcus Varro records that the first sundial in a public place was set up by the consul M' Valerius Messalla, on a pillar beside the Rostra, after the capture of Catania in Sicily during the first Punic war; and that it was imported from Sicily thirty years after the traditional date of Papirius' sundial, in 263 BC. The lines of this sundial did not agree with the hours, but they were followed for 99 years, until Q. Marcius Philippus, who was censor with L. Paulus, placed a more precisely constructed one next to it; a gift which was the most appreciated action of his censorship. Even then, however, the hours remained uncertain on cloudy days until the next *lustrum*. Then, Scipio Nasica, the colleague of Laenas, was the first to use a water-clock to mark the equal hourly divisions of night as well as day. He dedicated this clock, which was installed under cover, in 159 BC. For so long had the Roman people been without a means of dividing their day!

To be sure, Romans are 'latecomers' (*Nat.* VII 212: *serius*);[22] and yet, they have surpassed their Greek and Near Eastern predecessors in the arts of both war and peace,[23] finally globalizing the known world through a shared technological and cultural platform. Pliny's universal catalog puts an end to the local particularism of the 'battle of nations' that had characterized much of Hellenistic Greek heurematography, since it shows how all inventions are now part of one and the same cultural system. Pliny's account of human inventiveness and acculturation is a teleological narrative insofar as it culminates both in the most complex state of

[21] The idea that Roman civilization springs from the importing of foreign culture dates back to at least the second century BCE: cf. most notably Cn. Gell. fr. 7 Peter (= Solin. I 7); see further Moatti 2015, 291. Foreign inventions imported by the Romans are also referred to by Varro in his *De gente populi Romani* (which ostensibly dealt with *quid a quaque traxerint gente per imitationem*, according to Serv., *ad A*. VII 176; cf. also August., *C. D.* XVIII 3).

[22] Note also the disenchanted exclamation that ends the catalog (*Nat.* VII 215): *tam diu populo Romano indiscreta lux fuit!*

[23] The dichotomy between the 'twin arts of war and peace' is a major conceptual tool for the categorization of history in the Roman historiographical tradition, as is exemplified by Livy's account of Rome's monarchical period in the first book of his *Ab urbe condita*, where 'warlike' and 'peaceful' kings appear alternately (cf. Liv. I 21, 6: *cum valida tum temperata et belli et pacis artibus erat civitas*).

technology and in the unification of Mediterranean culture thanks to Rome's empire. Through a progressive expansion of the Roman dominion over lands and cultural heritages, the empire is made to coincide with humankind as a whole.[24]

No wonder, in this connection, that the latest historical figure mentioned in the Roman section of the catalog is *Divus Augustus* (*Nat.* VII 211): for Pliny, it seems, Rome's appropriation of all inventions and the growth of the Roman empire have reached their pinnacle at the same time.[25] After its rather pessimistic opening on a Lucretian note, Pliny's 'book on man' comes full circle by intimating that the *cacumen* of human inventiveness has been reached (as Lucretius himself already asserted: see Lucr. V 1448-1457).[26] From an anthropological point of view, such a rhetorical structure suggests that, for Pliny, human beings are inherently defective in their natural state, and consequently need creativity, inventiveness, and technology in order to supplement the intrinsic flaws of their

[24] Murphy 2004, 175 notes that, in a work markedly concerned with boundaries such as the *Natural History*, Rome's empire is "coextensive with the *habitable* world," i.e. with the *orbis terrarum* bordered by the uninhabitable Ocean. According to him, "it is when Pliny's encyclopedia ventures into the margins of knowledge, that is, into descriptions of freaks of nature, distant peoples, and the fringes of geography, that the political dimensions of this ancient reference book are most easily seen": Murphy 2004, 18.

[25] Does this imply that, in Pliny's view, no further inventions or discoveries are possible? As a matter of fact, Pliny is not only concerned with inventions in *Nat.* VII, even though the heurematistic catalog is his most extensive treatment of the theme. At *Nat.* XVIII 317, for instance, Pliny gives an account of the recent invention – around 30 BCE – of a new wine-press. At *Nat.* XVII 118-119, Pliny's narrative of the discovery and development of grafting techniques conveys the idea that the art of grafting by scutcheons has a long (specifically Greek) history and that, after being introduced by Cato into Roman arboriculture, it continues to be improved to the present day. However, Pliny adds, the success of human experimentation inevitably falls short of a perfect imitation of nature (*Nat.* XVII 120: *nec tamen omnia experimentis adsequi in natura possumus*). Art, for Pliny, strives to actualize a form given in nature. Thus, his account of innovations in the domain of the fine arts (*Nat.* XXXV 15-16 and XXXV 56-111) seems to be dominated by a preoccupation with increasing naturalism: cf. Tanner 2006, 241. For Pliny, who is here most probably influenced by teleological and classicizing assumptions of Aristotelian descent, further innovation ceases when all the technical means necessary to a wholly naturalistic depiction of the world of gods and humans in the domain of the visual arts have been discovered. In Pliny's view, artistic or technical inventiveness – like all human phenomena – is intrinsically finite.

[26] In *Nat.* VII, Pliny does not seem to share the sceptical or moralizing attitude often displayed by earlier Latin authors towards inventiveness and technical progress (cf. e.g. Hor., *Carm*. I 3, 25-26). Elsewhere, however (*Nat.* XIV 2-4), Pliny complains that the moral and intellectual inertia of his contemporaries has made it more difficult to access the knowledge and discoveries of the past (*quae invenerant prisci*), despite the progress of cultural exchange and intercommunication made possible by the *pax Romana*.

nature.[27] From a historical perspective, the narrative trajectory of Pliny's heurematography, starting with the mythical prehistory of humankind and culminating in universal 'agreements among all nations,' confirms that the ethnic specificity of inventions and discoveries comes to be practically irrelevant within the Roman ecumene.[28]

The center of the empire has absorbed the totality of the knowledge discovered and accumulated in the periphery. As a result, Pliny's catalog of inventions comes to overcome the strictly 'ethnic' or 'national' criteria, which prevailed in traditional Greek heurematography, in favor of a universalist, 'anthropological' approach focusing on the precarious, fragile, and yet wondrous features of human nature. Rather than a 'postscript' or an 'afterthought,'[29] Pliny's catalog is thus wholly functional to the epistemic, rhetorical, and political framework shaping the encyclopedic project of the *Natural History*. As I have shown, Pliny's heurematography is a literary synthesis of Rome's ambition to 'domesticate' foreign knowledge and extend the limits of the empire until they come to overlap with those of the human species. In conclusion, by exploring the boundaries of human inventiveness, Pliny grounds the authority of Rome's imperial civilization and that of his own totalizing endeavor at once.

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[27] The idea has, of course, a long-standing tradition (cf., for instance, Plato, *Protag*. 320d-322d). The Aristotelian natural science, however, tends to see nature and craft as cooperative (rather than conflicting) forces: cf. e.g. Aristot., *Phys*. II 8, 99a9-19. Similarly, Cicero, in *N. D.* II 152, asserts that man fashions his own *alteram naturam* thanks to his hands, which are nonetheless provided by nature itself (cf. *N. D.* II 150: *quam vero aptas quamque multarum artium ministras manus natura homini dedit*): for Cicero, in other words, there is no fundamental contrast between nature and human inventiveness.

[28] Note especially Cuomo 2011, 328: "Technical writing is about texts – words that explore, dissect and, within their own reality, create or represent an ideal of order, control, and victory, appropriate for a young empire." According to Pliny (*Nat.* III 39-42), Roman universalism is also manifest in the domain of language and law: by unifying the world under its dominion, for Moatti 2015, 314, "Rome espouses the fundamental aspiration of human nature; it reconstitutes the unity of mankind."

[29] Beagon 2005, 416.

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