

Hares and Lions: A Hippocratic reading and commentary on Herodotus III. 108

Lebres e leões: uma leitura hipocrática e comentário de Heródoto III. 108

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Abstract: The main objective of this paper is to analyze a well-known passage found in Herodotus (III. 108) regarding the fecundity of hares and lions. We think that the text provides an interesting reflection on the natural balance between the animal species and the natural environment they live in. We discuss the information supplied by Herodotus and we reestablish the intellectual context underpinning these ideas by analyzing the *Corpus Hippocraticum*.

Keywords: Herodotus; Ancient Ecology; Hippocratic Corpus.

I

Herodotus' work is thematically diverse and addresses several present-day fields of knowledge such as history, geography, ethnography, religion, medicine, zoology, among others². The passage that we analyse in the present paper fits this variety and fits the description of the geography, ethnography and the wonders of the Persian Empire and its eastern boundaries³. After describing India, Herodotus focuses his argument in Arabia which is the southernmost region of the empire, famous for the production of aromatic spices - incense, myrrh, cinnamon, white cedar, etc. The historian specially explains how the Arabians obtained the incense by overcoming many dangers, stressing the presence of "flying snakes" which

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² This approach was inherited from the Ionian logography and it makes more complex the work of Herodotus which reflects several fields of Greek knowledge. In order to simplify the bibliography on this topic we suggest a few basic references such as LEGRAND (1966) 37-57, MEISTER (1998) 471 and HARTOG 2000.

³ Specifically India (Hdt. III. 98-106). On the ethnographic and geographic perception of the edges of the earth in Herodotus see KARTTUNEN (2002), with selected bibliography.

watched over the trees that produced the incense (Hdt. III. 107. 2)⁴. Following the Arabs' version, Herodotus explains that the female snake devours the male during the mating, just as vipers do. This fact prevents snakes from being prolific and thus from invading the whole Earth (Hdt. III. 108. 1 and 109. 1). Among all these wonders (θωμαστά) information that describes the laws of the natural world can also be found. Specifically, the historian assesses the relationship between the living creatures and the nature in which the snakes live through their fertility⁵. Nevertheless, in order to argue why some animal species are more prolific than others, Herodotus points out an interesting reflection about the natural balance. The analysis is based on the relationship between the prey and the predator, using the hare and the lion as an example. We think that it is convenient to quote the whole chapter:

It would be seen that the wisdom of divine Providence (as it is but reasonable) has made all creatures prolific that are timid and fit to eat, that they be not diminished from the earth by being eaten up, whereas but few young are born to creatures cruel and baneful. The hare is so prolific, for that it is the prey of every beast and bird and man; alone of all creatures it conceives in pregnancy; some of the unborn are hairy, some still naked, some are still forming in the womb while others are just conceived. But whereas this is so with the hare, the lioness, a very strong and bold beast, bears offspring but once in her life, and then but one cub; for the uterus comes out with the cub in the act of birth. This is the reason of it: - when the cub first begins to stir in the mother, its claws, much sharper than those of any other creature, tear the uterus, and as it grows, much more does it scratch and tear, so that when the hour of birth is near seldom is any of the uterus left whole. Hdt. III. 108⁶

Modern scholars have proposed at least two interpretations of this passage: one religious and another one naturalistic. The most widespread is

⁴ Greeks knew these aromatic plants like the incense (λίβανωτός) thanks to the Phoenicians (ASHERI/LLOYD/CORCELLA (2007) 501), who invented these tales aiming to increase the value of their goods (Paus. IX. 28. 2; HOW/WELLS (1967) 290-292). Notice the parallelism with the Indian gold, kept by giant ants (Hdt. III. 102; analyzed by GÓMEZ ESPELOSÍN (2000) 101 and SIERRA (2015)). The ethnographic information in combination with the fantastic tales is a common feature in the Herodotean description of ecumenical borders regions. See PAJÓN LEIRA (2011) 179 and PRIESTLEY (2014) 80.

⁵ On Herodotus and Natural World see THOMAS (2000) 135-167; ROMM (2006) and GARCÍA GONZÁLEZ (2007) 296 ss.

⁶ Translated by GODLEY, A. D. (1971) (originally 1921-1922): *Herodotus. With an English Translation*. vol. II. London, William Heinemann.

doubtlessly the religious one which is focused in the intervention of the divine providence (τοῦ θείου ἢ προνοίᾳ). For instance, Thomas Harrison suggests that Herodotus brought up this abstract idea as the supreme force of ecological equilibrium. In this way, it would be responsible for the balance of power among animals that prevented their extinction⁷. This line of thinking is followed by other scholars such as Jon Mikalson and it is also followed by the main historical commentaries on Herodotus⁸. Paul Demont is the one who has studied the passage more extensively and has connected it with the Protagoras myth (Pl. *Prot.* 321a)⁹. In this well-known myth it is explained how Prometheus and Epimetheus organized life from its beginning¹⁰. In the dialogue, Protagoras holds that Epimetheus shared up the properties among the animal kingdom for the sake of keeping a balance; some were made fast in order to be able to escape, others were made strong so as to defend themselves of attack, the smallest were able to hide easily, whereas the defense of those who were big depended on their size. Finally, he concluded that: “And he dealt with all the other properties on this plan of compensation. In contriving all this he was taking precaution that no kind should be extinguished” (Pl. *Prot.* 321a)¹¹. In the same way, Epimetheus attributed physical properties for the adaptation of the species to the weather and seasons: fur as protection from the cold, skins resistant to the inclemency of the weather, etc. Probably the most eloquent passage related to the relationship between both theories, Herodotus’ and Plato’s Protagoras, is the following one: “[...] to some he attached a paucity in breeding, and to others, which were being consumed by these, a plenteous brood, and so procured survival of their kind.” (Pl. *Prot.* 321 b). Following Demont, we think that

⁷ HARRISON (2000) 177 and 239.

⁸ MIKALSON (2003) 138 and in the same way ROMM (1997) 79 and MYRES (1999) 57. The Historical commentary of HOW/WELLS (1967) 291 does not add any more information; on the other hand, ASHERI/LLOYD/CORCELLA (2007) 501, suggest a link among Xenophanes, Herodotus and Plato’s Protagoras.

⁹ On this topic we recommend the analysis proposed by DEMONT (1994 and 2011).

¹⁰ We are dealing with the well know myth of Prometheus modified by Plato on his *Protagoras*.

¹¹ Henceforth we quote the translation of LAMB, W. R. M. (1967) (originally 1914-1929): *Plato. Plato in twelve volumes*. London, William Heinemann.

there is an obvious link to the hare and the lion example, considering Herodotus' account as a precedent¹². Both approaches coincide on the divine control over the ecological equilibrium or, in other words, they affirm that there is a divine power that prevents the world from falling into chaos. The divine wisdom (σοφική) would explain the balance among the species; in addition, Herodotus refers to the nature (φύσις) as an explanation of the reason why the animals of prey are not so prolific. Thus, by means of the observation and the interpretation of nature, proposals are put forward in an attempt to describe and predict the natural behaviour of animals¹³. Doubtlessly, this is a feature that distinguishes Herodotus' account from Plato's *Protagoras*¹⁴. Nevertheless, we are not going more deeply into this connection that Paul Demont has studied so well and we shall attend to the naturalistic interpretation of the work.

As Rosalind Thomas has stated, the use of the technical terminology in the explanation of the high or low fertility of the species is surprising. In that sense, the use of the term "prolific" (πολύγονος) stands out. This term defines the reproductive cycle of the cowardly species whereas predators have less offspring and that is defined by the term ὀλιγόγονος; Hdt. III. 108. 2¹⁵.

The authors that have analyzed this passage have correctly connected this concept to the *Corpus hippocraticum* and, specifically, to the *On the Nature of the Child* (= *Nat.Puer.*) and *Airs, waters and places* (= *Aër.*)¹⁶. The analysis assesses the biological explanation about how the phenomenon of the superfetation can take place by means of an analogy from the animal world. Concretely, on *Nat.Puer.* the twins' birth is explained. The author claims that:

twins are born from one intercourse since the womb has many sinuous bags, located at different distances from the vulva. Therefore, prolific animals have more bags than the less fertile ones. The same applies to cattle, wild animals and birds.
Nat.Puer. 31.

¹² DEMONT 1994: 147.

¹³ FALUS (1977) 371.

¹⁴ Very well pointed out by DEMONT (2011) 75.

¹⁵ THOMAS (2000) 142 also DEMONT (2011) 72, who properly quotes precedent works.

¹⁶ FALUS (1977) 372; THOMAS (2000) 142-143, who connects the term πολύγονος with Aeschylus *Supp.* 692 and also DEMONT (2011) 72.

The author continues the text highlighting that the female dog, the sow and the rest of the animals have several offspring from one intercourse. This argument would be comparable to humans by analogy. This analogy means that part of the medical thought accepts that the physiological principles that rule the human body also rule the animals¹⁷. Both of them are comparable but not equal physiological models¹⁸. In some Hippocratic treatises more explanations about the superfetation can be found. They have been also analyzed by Rosalind Thomas (*Vict.* I. 31; *Superf.* 1)¹⁹. In that sense, modern scholars stress Aristotle's knowledge about the phenomenon that is analyzed in the present work. Specifically, in the *On the Generation of Animals* he claims that the hare is an animal which experiences superfetation (*GA* 774 a 30)²⁰. In any case, we want to point out one detail. It is our view that the analysis of the religious notion has been excessively emphasized. It can be deduced from the text (τοῦ θείου ἡ προνοίη) and from the technical terms (πολύγονος/ὀλιγόγονος) contrasted with the "scientific" literature written after Herodotus' work. The book *Nat.Puer* dated around the latest V or beginning of the IV century BC and is not far away chronologically from Herodotus, unlike Aristotle's' biological works²¹. On the other hand, the

¹⁷ We are not going deeper into the physiological explanation of the human body developed by ancient Greek medicine. See LAÍN-ENTRALGO (1970) 33-34 and NUTTON (2004) 47-48.

¹⁸ AYACHE (1997) 62.

¹⁹ THOMAS (2000) 146.

²⁰ It does not mean that Aristotle agrees with Herodotus who is not mentioned in the text. Aristotle knew quite well Herodotus' naturalistic observations but he usually disagreed: with the black color of the Ethiopian sperm (*Hdt.* III. 101) which was corrected on *GA* 736 a 10, with the reproduction and copulation of fish (*Hdt.* III. 93 contra *GA* 756 a 5), with mistaken description of the camel anatomy (*Hdt.* III. 103 contra *Arist. HA* 499 a 20-21) and with the only-begotten litter of lions (*Hdt.* III. 108. 4) contra *Arist. HA* 579b 2-4. These criticisms are not usually constructive due to the bad acceptance of Herodotus in antiquity (cf. PRIESTLEY (2014) 74 and SIERRA (2014b)).

²¹ After Emilie Littré's research agreement has been reached that *On the Nature of the Child*, *On Generation* and *Diseases IV* are treatises from the same author in spite of having a different manuscript tradition, see JOLY (1970) 9-10. Robert Joly defined a chronological gap for these works from latest V Century BC to the beginning of the IV (JOLY (1977) 143). Aristotle's biological works such as *de Generatione Animalium*, *Historia*

relationship between the animals and the environment, which is an issue that belongs to the modern ecology, has not been thoroughly taken into account²². There are more subjects of study related to animal behavior in Herodotus' work apart from the Arabian snakes or from the hares and lions. In the second book, an interesting description about the Nile crocodile's living cycle can be found. Its hibernation period, its lay, its eating habits are described, and its growth is even compared with that of other oviparous:

No mortal creature known to us grows from so small a beginning to such bigness; for its eggs are not much bigger than goose eggs, and the young crocodile is of a bigness answering thereto, but it grows to a length of seventeen cubits and more.
Hdt. II. 68. 2²³

The beginning of the passage is very interesting (πάντων δὲ τῶν ἡμεῖς ἴδμεν θνητῶν / No mortal creature among those we know) since it assumes a wide dimension of the animal world, a claim to universal knowledge that we can also see in the case of the hares and lions²⁴. In the case at hand, we clearly appreciate the definition of a primitive food chain where preys and predators hold a natural balance²⁵. There is no defined taxonomy in Herodotus' work, only isolated observations of animal behaviour with special attention to species exotic to the Greeks²⁶. We suggest that this 'ecological' data is valuable for the appreciation of natural world knowledge of the period. Nevertheless, the truly 'ecologic' studies in the ancient Greece begin in the IV century BC with Aristotle's work and, even more specific,

Animalium and the writings of *Parva Naturalia* are chronologically far from Herodotus, although they are linked to the *Corpus hippocraticum* (BYL (1977) and BOURGEY (1980)).

²² The term ecology was coined in Germany in the XIXth Century by Ernst Haeckel, a disciple of Charles Darwin. Cf. SALLARES (2009) 164 and AMIGUES (2011) 161.

²³ Translation, with a small correction, by GODLEY.

²⁴ Herodotus' description of the way of life and the physiology of the Nile crocodile is followed by interesting observations on the species with which they live. Especially the symbiotic relation to the ibis, a bird that helps crocodile to get rid of its parasites, stands out (Hdt. II. 68. 4). See commentary and more examples in ROMM (2006) 181 and ASHERI/LLOYD/CORCELLA (2007) 284, that also relate Herodotus' data to Aristotle *HA* 503 a 1-14.

²⁵ A balance guaranteed by divine providence.

²⁶ See a catalogue of animals that appear in Herodotus' work in GARCÍA GONZÁLEZ (2007) 322-334.

with Theophrastus' research²⁷. From our point of view there are precedents in the Herodotus' period, or a little later, that would help us to define an intellectual context prior to the Aristotle's school. In that sense, the "scientific" curiosity of Herodotus and his capability of observation make him a unique author for understanding the natural world knowledge before Aristotle²⁸. The line of research started by Rosalind Thomas seems intriguing and correct to us comparing Herodotus' text to the *Nat.Puer.*; although we think that the analysis may have included the relation between the animal world and the environment. From this point, our objective will be to continue exploring the *Corpus hippocraticum* (= CH) aiming to measure up the knowledge of the pre-Aristotelian "scientific" literature with ancient ecology²⁹. Before, we might advise that we cannot treat the whole CH for, in fact, it consists of a collection of more than sixty medical texts from different authors and ages, from the V century BC to the II century AD³⁰. Therefore, we have to be careful when comparing the ideas of the CH to Herodotus' text since we could easily fall into an anachronistic analysis. Taking into account that, Herodotus died around the 425, we must consult the information contained in *On Regimen* (= *Vict.*), *Airs, Waters and Places* (= *Aër.*), *On Ancient Medicine* (= *VM*), *Breaths* (= *Flat.*), *On sevens* (= *Hebd.*) in addition to the data already discussed from *Nat. Puer.*³¹

²⁷ WESTRA (1997); GARCÍA GONZÁLEZ (2007) 301; AMIGUES (2011) 161-162.

²⁸ ROMM (2006) 180-181.

²⁹ Proof that on this subject little account has been taken on the role of 'scientific' work before Aristotle's is Laura Westras's work and the little attention Herodotus and the *Corpus hippocraticum* deserve in a chapter entitled "The Roots of Ecological Science" by Donald Hughes (HUGHES (1994)62-63).

³⁰ The *Corpus Hippocraticum* took shape at the Alexandrian library (beginnings of III BC), see LAÍN ENTRALGO (1976) 35. We recommend Jacques Jouanna's work which describes, enumerates, dates and organizes the Hippocratic treatises, JOUANNA (1999) 373-416. On the heterogeneity of the *Corpus hippocraticum* see LLOYD (1991) 208-220.

³¹ Some of the treatises that will be analyzed were not written by physicians, such as *VM* (ca. 420-410; JOUANNA (2003) 84-859 and *Flat.* (from the last quarter of the V century: JOUANNA (1998) 49-49). Others form part of writings related to Hippocrates himself, such as *Aër.*(ca. 430; JOUANNA (1996) 81-82) and finally, *Vict.*, which dates at the end of the V century (JOLY (1967) XIV-XV). This is not the place to consider the complexity of the debate about the chronology of each and every piece in the *Corpus*. This is especially the case of

II

Animals and plants are quite present in the *CH* as food for humans or as a term of comparison to interpret the human body³². For example, the dissection of sick animals is used in some Hippocratic treatises in order to extrapolate the experience to humans. Maybe one of the most famous cases is found in *Morb. Sacr.* which locates the origin of the named “sacred disease” in the brain. The text states that the brain is double in humans and animals (*Morb.Sacr.* 3³³) and, later on, the author maintains that the sick human brain is wet and cold, something the author knows after dissecting animals that have suffered the same illness, such as a goat (*Morb.Sacr.* 11. 3)³⁴. This is a clear example of the use of analogy between animal and human in medicine as a tool to investigate human physiology. Moreover, in *VM* we can find interesting data about the link between the animal world (including mankind) and the environment. In an odd retrospection looking for the origin of medicine, the author holds that it was discovered by necessity (*ἀνάγκη*) rather than by research (*VM* 3). In this text it is said that the key to understand humans was to take notice that the diet of sick people differed from that of the healthy and the author adds:

To trace the matter yet further back, I hold that not even the mode of living and nourishment enjoyed at the present time by men in health would have been discovered, had a man been satisfied with the same food and drink as satisfy an ox, a horse, and every animal save man, for example the products of the earth – fruits, wood and grass. For on these they are nourished, grow, and live without pain, having no need at all of any other kind of living. VM 3³⁵

Hebd., whose authorship and chronology are very problematic. It may belong to the first half of the V century (de la VILLA (2003) 457-458). However, in each we recur to the preliminary studies of the editions which, to us, are the best and most comprehensive. Of course, we have analyzed works written in the ‘foundational’ phase of the *CH*, such as *On the sacred disease (Morb. Sacr.)* or *On the Art of Medicine (= de Arte)* but we have not found any relevant information.

³² AYACHE (1997) 55-56.

³³ We are following JOUANNA’s edition (CUF).

³⁴ This passage is important in the history of dissection, see JOLY (1966) 214 and SIERRA (2014a).

³⁵ Translated by JONES, W. H. S. (1972) (originally 1923): *Hippocrates. With an English Translation.* vol. I, London, William Heinemann.

The main idea is that humans were not adaptable to the environment as animals are. At the beginning, humans feed as animals, but the strength of low balanced foodstuff brought them pain, illness and death which can be only resisted by the strongest (*VM* 3. 4)³⁶. The approach defines the human being as a part of the animal world but with a considerable inability to adapt to the environment. This inability is overcome due to the collective intelligence which brings humans to discover diet and food cooking³⁷. According to the author, this discovery amounts to medicine (*VM* 3. 6). Probably the most relevant detail in *VM* is that there is no divine contribution to this idea of human progress. In Plato's *Protagoras*, for example, Epimetheus and Prometheus distributed the animal qualities, but in *VM* it is research, not divine providence, that suggests humans the best diet. It might be also mentioned that the Hippocratic medicine was not lay as we know this concept nowadays, but it often offered alternative treatments to those of the Greek religious tradition³⁸.

On the other hand, *Aër.* has another contribution to the study of the influence of the environment on human and animals bodies³⁹. The weather theory that is exposed in *Aër.* is supposed to explain how weather affects directly the whole biodiversity and not specifically humans⁴⁰. Indeed, in the

³⁶ They were following a typical regime (δίαίτα) of animals with fatal consequences, AYACHE (1997) 67.

³⁷ The studies of the effect of food properties (δυνάμεις) on the human body is one of the pillars of the Hippocratic regime, see DI BENEDETTO (1986) 209 and WILKINS/HALL (2006) 69 ss.

³⁸ The idea of the role of religion in classical medicine depends on each author and it is a complex issue in the *CH*. Normally the medics did not abandon the idea of divine intervention in diseases, but they claimed that sickness could be studied and assessed by human intelligence. Among the large amount of works related to this issue we recommend JOUANNA (1989); van der EIJK (1991) and BYL (2011) 33-50.

³⁹ Nowadays the authorship of *Aër.* is undefined. In fact, around the middle of *Aër.* there is a paradigm turnpoint to ethnological topics, see LÓPEZ FÉREZ (1984). In any case, the intellectual connection between *Aër.* and Herodotus has been stressed by common cases of study such as the Scythian sterility (*Hdt.* I. 105 y *Aër.* 22), see JOUANNA (1996) 58-60 and WEST (1999).

⁴⁰ Usually, only the influence of weather conditions on nature and the mental and intellectual qualities on human being like seasons, water and wind changes is considered

introduction of the treatment of differences between Asia and Europe, the text states: “I hold that Asia differs very widely from Europe in the nature of all its inhabitants and of all its vegetation (*Aër.* 12. 1)⁴¹”. Thus, the climatic theory not only affects the character, the physic resistance of mankind’s intelligence, but also the diversity of the species (*διαφορά*). This diversity is not the same in each region because not all species have the same features and, in consequence, animal species and vegetation differ. Specifically, in the most temperate zones the animals are big and the ground offers better fruits and trees (*Aër.* 12. 2). The way of thinking adopted in *Aër.* suggests that biodiversity occurs as the consequence of the changing weather conditions of the Earth. Therefore, animals and plants adapt to their ecological niches and it is the cause of the observables differences among the species on different territories. A good example of how the climate and the habitat influence animal morphology is shown in the description of Scythia. *Aër.*’s author remarks that the Scythians live in the north, in a region with no mountains, frequent fog and scant sunshine and they are also affected by the Boreas wind:

The wild animals too that are found there are not large, but such as can find shelter under ground. They are stunted owing to the severe climate and the bareness of the land, where there is neither warmth nor shelter. Aër. 19. 3⁴²

The text stresses the adaptation of species to the environment and to seasons which modify their physical appearance⁴³. The observation that winter affected growth can trace also in *Hebd.* 17, where it is explained how the seasons affect the physiology of animals and plants. Humours move to the internal heat because of the cold and they become encapsulated therein.

(JOUANNA (1996) 24-46). We think that it may be conceived with more comprehensive views.

⁴¹ Translation by JONES.

⁴² Translated by JONES.

⁴³ Besides the environment, costume (*νόμος*) is another factor that could change the nature (*φύσις*) of the animals. See for example the case of the macrocephalus (*Aër.* 14; LAÍN ENTRALGO (1970) 52-54).

During the spring, the contrary effect occurs and blooming takes place⁴⁴. Likewise, the season changes cause the migration of some species in summer and in winter to temperate and warm regions, respectively (*Hebd.* 21).

Doubtless, there are more speculative proposals in the *CH* which affirm that the biological diversity exists because of the different composition and proportion of the internal features⁴⁵. For example, *Vict.* 4 defends the idea that natural diversity is caused by the presence of fire and water (dryness/wetness) that are combined in different proportions generating the different species. In addition, in the second book of this text the following opinion about the southern regions is proposed:

*The races of men and plants in these countries must of necessity be drier, hotter and stronger than those which are in the opposite countries. For example, compare the Libyan race with the Pontic, and also the races nearest to each. Vict. 37.1*⁴⁶

This notion links to the theory exposed in *Aër.* and *Hebd.* which suggests an idea quite generalized in the medical literature of the V century BC. The argument is completed by the description of the habitat of the swampy regions, where plants are wet and consequently moisten the human bodies after consuming them. Other Hippocratic texts also treat about animal and human nutrition. For example, the authors of *Flat.* maintain that living beings are nourished by three elements: solids, liquids and breaths (*πνεῦματα*; *Flat.* 3. 1)⁴⁷. In other words, solid food, liquid food and breath are the basic elements for animal nutrition. Later, the text points out that all animals take part in the breathing including the aquatic ones which obtain

⁴⁴ A similar idea can be found in Xenophon (*Cvn.* 5. 1) where it is said that rime covers the prey's heat and smell.

⁴⁵ We are referring to the dynamic theory according to which, the human body possesses a balance of qualities expressed as opposite pairs (*ἐναντίωσις*). This balance determines the human health, and when the predominance of one of these qualities dominates the others the disease comes up, this is the well known theory proposed by Alcmaeon of Crotona (ca. 500; Aecio V. 30. 1; Plu. *de Placitis* 911A; DK 24 B4). See on this topic LAÍN ENTRALGO (1970) 72 ss.; VINTRÓ (1972) 98 ss.; GRMEK (1993) 329 and MARTÍNEZ (2004).

⁴⁶ Translated by JONES.

⁴⁷ The terminology that is used on *Flat.* to designate the air is often confused but it can be summarized as follows: *πνεῦμα* means breath, *φύσα*, breath inside the body and *ἀήρ*, the external air. See LÓPEZ FÉREZ (1988) 34 and FRIXIONE (2013) 6-7.

the air from the water (*Flat.* 3. 3)⁴⁸. As we see, occasionally the argument started from a general reflection about the living beings and lead to the description of a particular ecological context. The objective of these observations can be either didactic or rhetorical but it also demonstrates the interest of the thinkers in this matter.

Summarizing, the seasons, the weather and the diet are, in the *CH*, the cause of life's variability and the link between the animal world and mankind. All animals partake of and live in balance with their ecological context. From our point of view, the medical literature included the human being in the natural world and it studied humans as biological subject. Because of that, the *CH* authors frequently do not exclude the observation of animals from their analysis because these observations can be used as analogy to explain the operation of the human being.

III

We think that the aforementioned data helps to provide a context for the curious case about the breeding of hares and lions that Herodotus recounts. Nevertheless, Herodotus was not the only one that noticed these zoological peculiarities. We are going to analyse more examples in classical historiography in order to show that the account made in *Hdt.* III. 108 is no isolated case. At the beginning of the Peloponnesian war, when the epidemic ravaged Athens (430/29 BC), Thucydides explains an interesting detail in his description of the illness:

Indeed the character of the disease proved such that it baffles description, the violence of the attack being in each case too great for human nature to endure, while in one way in particular it showed plainly that it was different from any of the familiar diseases: the birds, namely, and the fourfooted animals, which usually feed upon human bodies, either would not now come near them, though many lay unburied, or died if they tasted of them. The evidence for this is that birds of this kind became noticeably scarce, and they were no longer to be seen either about the bodies or

⁴⁸ An interesting observation in tune with Herodotus: if all the animals breathe, how do the fishes breathe? They necessarily have to obtain the air from the water. This kind of information is not anecdotic but show intellectual interest in the natural world.

anywhere else; while the dogs gave a still better opportunity to observe what happened, because they live with man. Th. II. 50⁴⁹

Thucydides was not much interested in nature, but this description provides us with interesting information. As we know, the link between Thucydides and medicine was close and the observation of the effects of the illness on animals shows a human/animal analogy that we have seen in *CH*⁵⁰. It can be observed that the plague was peculiar because it affected animals, that is to say, it was a zoonosis⁵¹. Thucydides' purpose was to make a diagnosis, to describe the illness in order to provide information needed to identify it in the future⁵². Thus, we may understand the data related to the effects of the illness on animals such as a nosological peculiarity that forms part of the diagnostic performed by Thucydides. Nevertheless, Thucydides indirectly sets out a specific ecological situation. Because of the zoonosis, the animals which feed on carrion were unusually reduced. The pressing need to bury the corpses before their being devoured disappeared because the illness had decimated both humans and animals. It was a break of the natural cycle, the last link of the food chain, the animals which fed on carrion, disappeared⁵³.

⁴⁹ Translated by *Smith*, Ch. F. (1980) (originally 1919-1923) *Thucydides. With an English Translation*. vol. I, London, William Heinemann.

⁵⁰ On the medical knowledge of Thucydides see DEMONT (1983), SWAIN (1994) and THOMAS (2006).

⁵¹ Once again the naturalist observation had deserved little attention from the main historical commentaries; see GOMME (1956) 156-157 and more deeply developed in HORNBLLOWER (1991) 323.

⁵² In the medicine of that age, diagnosis consisted in knowing and recognizing (γνῶναι καὶ διαγνῶναι) the nature of the patient and that of the illness by means of the art of medicine (τέχνη ἰατρική) with a special attention to the minute observation of the external signs that the illness produced in the patient, see LAÍN ENTRALGO (1970) 227.

⁵³ Nevertheless, Thucydides does not explain the reason why some animals refrain from eating infected corpses. Those which tasted the infected meat died, but some of them would approach the corpses (ἢ οὐ προσυήει ἢ γευνάμενα διεφθείρετο; Th. II. 50. 1). How can we understand this fact? In analogy with Herodotus' case, it would seem that the divine providence kept away enough animals which fed on carrion from corpses in order to prevent their extinction. However, this fact is not explained by Thucydides who was not a religious man, see FURLEY (2006).

Xenophon is another interesting author that describes the context of this kind of “ecology” developed in the classical age, specifically in *On hunting* (= *Cvn*)⁵⁴. The description of the hunter’s activity provides us with valuable observations of the animal world and its relation to the environment. An explicit case, once again, has the hare as an object, for it was the most commonly hunted prey, and one so fertile that it is always in reproductive cycle (*Cvn*. 5. 13). Xenophon compares the number and size of the hares from both the continent and the islands:

The smaller ones are found in most of the islands, both desert and inhabited. They are more plentiful in the islands than on the mainland, for in the majority of these there are no foxes to attack and carry off the hares and their young; nor eagles, for they haunt big mountains rather than small, and the mountains in the islands, generally speaking, are rather small. Hunters seldom visit the desert islands, and there are few people in the inhabited ones, and most of them are not sportsmen; and if an island is consecrated, one may not even take dogs into it. Since, then, but few of the old hares and the leverets that they produce are exterminated by hunting, they are bound to be abundant. Cvn. 5. 24-25⁵⁵

The text could be a natural continuation of Herodotus’ argument but it adds a peculiarity: mankind is incorporated as a predator in the food chain. Otherwise, Xenophon presents elements that we have already discussed such as the adaptation of the animal species to specific ecological niches, such as the island⁵⁶. The conclusion that can be drawn from the text is that the islands must be overpopulated by prey, the food shortage being the only limiting factor for the number of hares⁵⁷. As in Herodotus’ work, both prey and predator are part of a balance that is also limited by the food quantity that

⁵⁴ Dated around the 391/90 BC and with considerable doubts on its authorship, see DELEBECQUE (1970) 33-35 and L’ALLIER (2012) 479-481.

⁵⁵ Slightly modified translation by MARCHANT, E. C. 1925: Xenophon. *Scripta minora. With an English Translation*. London, William Heinemann.

⁵⁶ He also adds that the hare could be more or less fast depending on the environment (*Cvn*. 5. 17).

⁵⁷ *On hunting* the dog is another agent. The text gives several details such as the quality and the properties of each breed, the reproduction and the care of the puppies. We are not going into this issue; we just want to confirm that interesting biological data can be obtained from this work, although the main objective of Xenophon was ludic (or military; *Cvn*. 13. 12).

can be produced by the ecological context. As in the *CH*, the regions of habitual habitat of predators, such as eagles, or even the hunting habits of humans, are described. Xenophon's analysis shows that human beings act as a regulator of these species by means of the hunting activity which is a voluntary and playful action, not a surviving instinct.

Conclusions

Hesiod said to his brother Perses that justice makes the difference between beasts and humans (*Th.* 275-280)⁵⁸, but men do not stop being animals and are subjected to the same environmental conditions. The "scientific" literature of that age starts from this premise and it studies human beings as a biological subject. Taking this into account, we think that, behind the account of hares and lions (Hdt. III. 108), there is an interest in the study of the relationship between the animal world and the environment. Therefore, it is not only a text that helps to understand Herodotus' religion but also an observation of nature attuned to the "scientific" literature of its period. This can be appreciated in the *CH* by accounts such as *VM* which considers that humans are not adapted to the environment in the same way as animals are. The text introduces the idea of a natural inability to adapt that is compensated by the ability to discover and to research and, in short, to use the knowledge for their own benefit. Other Hippocratic treatises, such as *Aër.* or *Hebd.*, have as an objective the study of the environmental effects on the living beings and, specifically, on mankind. We can infer from these treatises that biodiversity is determined by the climatic variability of the Earth. In short, climates determined the ecological niches to which all species has to adapt. The case of Scythia is clear regarding this reasoning. Taking into account the aforementioned, we aim to show that the analysis of Hdt. III. 108 can lead beyond such terms as *πολύγονος* and *ὀλιγόγονος* to place the text within a global interpretation of the natural world. In the same way, we must consider the data provided by other historians such as Thucydides and Xenophon. Regarding Thucydides, we consider interesting his data about animals which close the natural food cycle and that, within the context of the Athenian epidemic, were also affected by the illness. Regarding Xenophon,

⁵⁸ Analyzed by DEMONT (1994) 145-146.

he adapts this analysis to the hunting field, explaining the high fertility of hares and their adaptation to different ecological contexts such as the islands.

In conclusion, among the several wonders and exotic data that Herodotus describes about the inhabited world, we find interesting observations of the natural world. They are not isolated data but developed thoughts and investigations that preceded ancient biology as founded by Aristotle.

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Resumo: O objetivo principal deste artigo é analisar a conhecida passagem de Heródoto (III. 108) em relação à fecundidade das lebres e dos leões. Pensamos que o texto oferece uma reflexão interessante sobre o equilíbrio natural entre as espécies animais e o ambiente em que habitam. Analisamos e reconstruímos o contexto intelectual da informação proporcionada por Heródoto, centrando-nos no *Corpus Hippocraticum*.

Palavras-chave: Heródoto; ecologia antiga; *Corpus Hippocraticum*.

Resumen: El principal objetivo de este artículo es analizar el conocido pasaje de Herodoto (III. 108) en relación a la fecundidad de las liebres y los leones. Pensamos que el texto ofrece una reflexión interesante sobre el equilibrio natural entre las especies animales y el entorno en el que habitan. Analizamos y reconstruimos el contexto intelectual de la información que proporciona Herodoto centrándonos en el *Corpus Hippocraticum*.

Palabras clave: Herodoto; ecología antigua; *Corpus Hippocraticum*.

Résumé : L'objectif principal de cet article est d'analyser le fameux passage d'Hérodote (III. 108), en ce qui concerne la fécondité des lièvres et des lions. Nous considérons que le texte propose une réflexion intéressante au sujet de l'équilibre naturel entre les espèces animales et l'environnement où elles habitent. Nous analysons et reconstruisons le contexte intellectuel de l'information fournie para Hérodote, en nous centrant sur le *Corpus Hippocraticum*.

Mots-clés : Hérodote ; écologie ancienne ; *Corpus Hippocraticum*.