

Aristotle on Plants

There are only a handful of references to a separate study of plants in the Aristotelian corpus. A few (but not all) have been discussed in this book. I collect them here to offer a synoptic view of how Aristotle refers to the study of plants in his extant works. To give the reader an idea of what prompted these references, I provide some textual context for each of them.

Gustav Senn offered an extensive review of these references in an old but still useful article.¹ He reached three main conclusions. The first is that not all of them can be dismissed as later additions. On the contrary, a few are part and parcel of the fabric of the text, so they are to be regarded as authentic. While not trivial, this conclusion is not especially controversial. By contrast, his second conclusion raises a few eyebrows. According to Senn, all the cross-references to plants in the Aristotelian corpus are references to the extant works on plants by Theophrastus. Senn argues that Aristotle did not write on plants but delegated this task to Theophrastus. Last but not least, Senn saw an especially close relation between these references and *CP*.² Crucial for this third conclusion are two passages from *HA* V 1 and *GA* I 1. They are printed below as texts [A] and [B]. In both passages, Aristotle is concerned with the modes of generation in plants, with a focus on parasitic plants – that is, plants that grow on other plants. In the second passage, he explicitly mentions the mistletoe. For Senn, this can only be a reference to *CP* II 17, where Theophrastus offers an extensive discussion of the mistletoe.

¹ SENN 1930: 113–140.

² According to Senn, Theophrastus wrote *CP* before *HP* when he was still working under the shadow of Aristotle. By his lights, Theophrastus attempted to break free from Aristotle only in *HP*. I will not try to review the putative evidence for this suggestion. Let me only say that chronological claims of this sort do not withstand scrutiny. What Senn takes to be evidence in *HP* that Theophrastus attempted to mark a distance from Aristotle is best understood as a reminder that the study of plants cannot be fully assimilated to the study of animals. As such, these remarks are compatible with the Aristotelian requirement that scientific progress is possible only if we pay due attention to what is specific to the object of study. See Chapter 4, Section 2.

Otto Regenbogen responded to Senn.³ He argued that Aristotle could not be referring to *CP* II 17 in texts [A] and [B] because Aristotle and Theophrastus offer alternative accounts of how the mistletoe grows in their extant writings. While Aristotle believes that the mistletoe is generated spontaneously from some rotten part of the host plant, Theophrastus thinks that the mistletoe always grows from seed.⁴ Moreover, *CP* II 17 contains an implicit correction of Aristotle's account of how the mistletoe is generated.⁵ When Aristotle refers to an investigation of plants in text [A], and refers to it as an investigation that is already in place when he writes *HA* V, he can only be referring to his own lost work on plants.

What do we learn from this scholarly controversy? At the very least, that we should be very careful when we try to establish a connection between the corpora of writings written by Aristotle and Theophrastus. The putative cross-references between their works are self-consciously crafted in impersonal terms. As for the reference to the investigation of plants in text [A], we cannot be sure that this is a reference to a lost work by Aristotle. But we cannot rule it out either.⁶

A similar point can be made in connection with the cross-reference in text [C]. Aristotle signals that the study of flavors offered in *Sens.* 4 is to be integrated with what is said on the same topic in the part of the study of nature that deals with plants. Scholars read into this passage a reference to the discussion of flavored juices and odors transmitted as *CP* VI. In this scenario, the cross-reference to the study of plants in the Aristotelian corpus would match the impersonal reference to the study of animals found at the outset of *CP* VI, where we are told that "the nature of flavored juice and odor has been defined elsewhere."⁷ By reading the passage in this way, we find some support for a division of labor within the early Peripatos on the topic of plants and animals. While Aristotle would have concerned himself with animals, Theophrastus would have concentrated his attention on plants. What is especially interesting is that neither Aristotle nor Theophrastus takes ownership of the study of either animals or plants.

³ REGENBOGEN 1937: 469–475.

⁴ For Theophrastus, the mistletoe grows from seed when birds eat the fruit of the mistletoe and let their droppings fall on the host plant. See Theophrastus, *CP* II 17.5.

⁵ Suzanne Amigues agrees that Theophrastus is implicitly correcting the account of the mistletoe (AMIGUES 2012: 221).

⁶ Robert Mayhew has recently returned to the account of the mistletoe offered in *CP* II 17 (MAYHEW 2021: 463–475). He argues that here Theophrastus is relying on data presented by Aristotle in *HA* VIII (IX). I do not think that we can establish this conclusion beyond any reasonable doubt. I offered my reasons in Chapter 4, Section 2.

⁷ Theophrastus, *CP* VI 1.1.

Rather, they regard their works on animals and plants as separate yet coordinated contributions to a single shared research program.

This conclusion comes very close to the position I defended in this book, except that I do not see a rigid division of labor between Aristotle (animals) and Theophrastus (plants). I refer the reader to Appendix II for the evidence that Theophrastus wrote on animals. What is important here is that both *Aristotle and Theophrastus agree that animals and plants are to be studied separately*. Consider text [D], which marks the beginning of Aristotle's study of the non-uniform parts in *PA II* 10.⁸ Aristotle argues that two parts are the most indispensable for animals: the part for taking in nourishment and the part for discharging useless residue as it is not possible to grow without nourishment. Since nutrition is common to all living beings, the part for taking in nourishment is also found in plants. But plants do not have a part for the elimination of the useless residue. Aristotle's explanation for this absence is that plants take in concocted nourishment from the soil.⁹ But this also means that plants do not have the part dedicated to receiving and processing unconcocted nourishment (the stomach). This stretch of text is interesting because Aristotle is engaged in a unified study of perishable living beings. And yet there is not much else Aristotle is able, or willing, to say on the topic of plants and animals insofar as they are both living beings. Rather than building a bridge between the study of animals and that of plants, he ends up arguing for their separation.

Notwithstanding the fact that Aristotle envisions separate studies of animals and plants, he offers scattered remarks on the topic of plants. While these remarks do not constitute a systematic study of plants, they show that Aristotle is knowledgeable about plants. It is not my goal in this appendix to discuss all the passages where Aristotle mentions plants.¹⁰ Here I call attention to the stretch of text printed in [F]. Aristotle remains persuaded that the phenomenon of plant propagation requires a separate discussion. He makes this point, explicitly and unequivocally, in text [B]. His view is that there cannot be such a thing as a common treatment of generation in animals and plants. Nonetheless, he develops scientific concepts that can be employed in the separate treatments of animals and plants. One of them is "κῦημα" (imperfectly rendered here as "fetus"). It refers to the first mixture of the generative contributions coming from the male and the female. Aristotle is willing to apply this concept beyond the narrow boundaries of his theory of sexual generation. In text [F], he tells us

⁸ I discuss this text in Chapter 2, Section 5. ⁹ Compare Aristotle, *PA II* 3, 650a20–23.

¹⁰ A reasoned collection of all these passages can be found in WIMMER 1838.

that what we call seed in plants is the equivalent of the first mixture of the male and the female. This term is also employed in the account of plant propagation Theophrastus offers in *CP*.¹¹

Texts

- [A] [Certain modes of reproduction] happen to be common to animals and plants. Some plants are generated from the seed of other plants, while others are generated spontaneously when some seed-like source [of generation] is formed. Among spontaneously generated plants, some take their nourishment from the earth, while others are generated in other plants, *as we stated in the study of plants* [ὡς περ εἴρηται ἐν τῇ θεωρίᾳ τῇ περὶ φυτῶν]. Likewise with animals: some are generated from animals whose form is of the same kind, while others are generated spontaneously and not from animals of a common kind. Among the spontaneously generated animals, some are generated from rotting earth and plants, which is the case in many insects, while others [are generated] in the animals themselves out of the residues in their parts. (Aristotle, *HA* V I, 539a15–25)
- [B] Animals that are not capable of locomotion, as for instance the hard-shelled animals and those that live by growing attached [to something else], are similar in substance to plants: just as in the latter so also in these animals there is no female and male. However, they have come to be called female and male in virtue of a similarity or analogy, since they have some such small differentiation. Indeed, among plants too, there are trees in the same kind that bear fruit and trees that do not do so but contribute to the concocting in those that bear, as occurs with the fig and the caprifig. It is the same with plants, since some plants are generated from seed, while others as though by nature acting spontaneously. The latter happens either when the earth is rotting or when some parts in the plants are; for some plants are not constituted separately by themselves but are generated on other trees (e.g., the mistletoe). *But plants ought to be investigated separately by themselves* [περὶ μὲν οὖν φυτῶν αὐτὰ καθ' αὐτὰ χωρὶς ἐπισκεπτέον]. (Aristotle, *GA* I I, 715a16–716a2)
- [C] We have spoken about flavors and tastes; *the other attributes of flavors are the specific object of research in the part of the study of nature that is*

¹¹ More on this in Chapter 5, Section 2.2.

concerned with plants [τὰ γὰρ ἄλλα πάθη τῶν χυμῶν οἰκείαν ἔχει τὴν σκέψιν ἐν τῇ φυσιολογίᾳ τῇ περὶ τῶν φυτῶν]. (Aristotle, *Sens.* 4, 442b24–26)

- [D] Let us now make, as it were, a fresh start again, beginning first from what is first. Two parts are the most necessary in all animals that are complete: that by which nourishment is taking in that by which the residue is discharged. Plants – we say that they too are alive – have no place for the useless residue because they take their nourishment concocted from the earth, and instead of this they yield seeds and fruit. A third part, present in all animals, is between these two, in which is the source of life. The nature of plants, being stationary, does not have many kinds of uniform parts. The reason is that their use of the organs is for fewer activities. *This is the reason why the visible character of plants ought to be studied separately* [διὸ θεωρητέον καθ'αὐτὰ περὶ τῆς ιδέας αὐτῶν]. (Aristotle, *PA II 10*, 655b28–656a3)
- [E] The same happens in the case of animals and plants. In plants, males live for the most part longer [than females]. Their upper body is larger than their lower body (the male is more dwarf-like than the female), and the heat is in the upper part while the cold is in the lower part. Among plants, too, those that have a large head live longer. Such are those that are not annual but are like a tree: their upper part – namely their head – are the roots, and the plants that are annual grow downward toward their fruit. *But this topic will be determined separately in the works in which plants are discussed by themselves* [ἄλλὰ περὶ μὲν τούτων καὶ καθ'αὐτὰ ἐν τοῖς περὶ φυτῶν διορισθήσεται]. For the time being, the cause of the length and shortness of life in the other animals is stated. There remains for us to study youth and old age, as well as life and death. When these topics are determined, the investigation into animals will have reached its conclusion. (Aristotle, *Long.* 6, 467a30–b9)
- [F] Thus, in all the animals that are capable of locomotion, the female is separate from the male, and one animal is female and another male, although in form they are the same (e.g., both are a human being or a horse). By contrast, these capacities are mixed in plants and the female is not separated from the male. That is why plants generate out of themselves and emit not semen but rather a fetus [κῆμα] – what we call seeds [σπέρματα]. Empedocles says this well, poetizing: “*In this way tall trees bear eggs: first olive-trees.*” The reason is that the egg is a fetus [κῆμα], and from some of it the animal is produced, while the remainder is nutriment, and the growing plant is produced

from a part of the seed, while the remainder becomes nutriment for the shoot and the first root. In a way, the same thing happens also in the animals that have the female and the male separated. When they need to generate, they become unseparated, as in plants, and their nature wants to become one. This thing is evident to sight when they unite and couple: a single animal comes to be from both. And the animals that do not emit semen remain naturally connected for a long time, until the fetus [κύημα] is being constituted, like the insects that couple; but others until one of their inserted parts send forth that which will constitute the fetus in a certain amount of time, as in the case of blooded animals. The former animals remain connected for a part of the day, while the semen in the latter animals takes several days to constitute the fetus, but they detach themselves once they have emitted this sort of thing. And animals seem just like divided plants, as if someone, when plants produce seed, were to tear them apart and separate them into the female and male that is present in them. Moreover, nature crafts all this reasonably. The reason is that there is no function or action in the being of plants other than the coming to be of the seed, so that since this comes about by means of the coupling of the female and the male, nature has arranged them with each other by mixing them. *That is why in plants the female and the male are unseparated; however, it was investigated about plants elsewhere* [διὸ ἐν τοῖς φυτοῖς ἀχώριστον τὸ θῆλυ καὶ τὸ ἄρρεν· ἀλλὰ περὶ μὲν τούτων ἐν ἑτέροις ἐπέσκεπται].¹² By contrast, the animal's function is not only generating (this is in fact common to all living things), but all animals participate in some form of cognition – some more, some less, and some very little indeed. (Aristotle, *GA I* 23, 730b33–731a33)

- [G] The source of the nutritive soul is [located] in the middle of the three parts,¹³ and is evident by perceptual observation and by rational argument. Many animals, whenever either one of the two parts (the one that is called head and the one that receives the nourishment) is cut off, go on living with the part in the middle. This is clear in the case of insects such as wasps and bees. Moreover, many animals that are not insects can continue to live when cut off due

¹² Aristotle tends to look ahead to the study of plants as a study that follows in the order of exposition the study of animals. But here he refers to a study that is already in place. See text [A] for another such case.

¹³ The three parts are that by which the animals receive nourishment, that by which they discharge the residues, and the part located midway between the two. Compare text [A].

to their nutritive capacity. While it is one in actuality, such a part is potentially more than one. [These animals] are formed in the same way as a plant. Plants, when they are cut off, go on living separately and become many trees from a single origin. *The reason why some plants cannot go on living when cut up, whereas other plants grow from cuttings, will be the object of another study* [δι' ἣν δ' αἰτίαν τὰ μὲν οὐ δύναται διαιρούμενα ζῆν, τὰ δ' ἀποφυτεύεται τῶν φυτῶν ἕτερος ἔσται λόγος]. (Aristotle, *Juv.* 2, 468a20–b1)

- [H] Among animals, evidently humans go bald most of all. Still, such a condition is something general. Among plants, some are evergreen while others are deciduous, and birds that hibernate shed their feathers. Such is baldness in those humans to whom such a condition occurs. Leaves are partially shed in plants, and so are feathers and hair in those animals that have them. However, when the condition occurs all at once, it is described by the name mentioned: it is called “going bald” and “falling of the leaves.” The cause of this condition is the lack of hot moisture. Among fluids, fat has it most of all. This is the reason why oily plants tend to be evergreen. *But, with regard to these plants, the cause is to be discussed elsewhere, for other causes too contribute to this condition in their case* [ἀλλὰ περὶ μὲν τούτων ἐν ἄλλοις τὸ αἴτιον λεκτέον· καὶ γὰρ ἄλλα συναίτια τούτου τοῦ πάθους αὐτοῖς]. (Aristotle, *GA V* 3, 783b8–22)