

# Empedocles on Mules' Sterility: A Philological and Philosophical Note

Jocelyn GROISARD

## I Introduction

We have only two short testimonies on how the Presocratic philosopher Empedocles explained why mules are sterile. The most ancient one comes from Aristotle's biological treatise *On the generation of animals*, where it is included in the discussion, and refutation, of several theories explaining mules' sterility by their being hybrids; Aristotle, on the contrary, believed that hybrids are usually able to reproduce so that there is no causal link between hybridity and sterility;<sup>1</sup> it is in the context of this debate that Aristotle mentions, in order to contradict it, Empedocles' theory. The second testimony derives from a lost doxographical corpus usually considered to be the work of Aëtius as it is reflected in another doxography known as Pseudo-Plutarch's *Placita philosophorum*; it is included in a short sequence of three opinions about "Why mules are sterile?" (Διὰ τί αἱ ἡμίονοι στέραι;) between those of Alcmaeon and Diocles; the theory attributed here to Empedocles bears no resemblance whatsoever with that mentioned by Aristotle.

## 2 Testimonies

### (a) Aristotle

Empedocles gives as cause (of mules' sterility) the fact that the mixture of both semen gets solid because seminal matter from both parents is soft; indeed, hollow and solid parts fit together and from such soft matters something hard is produced as when copper is mixed with tin.<sup>2</sup>

This testimony is not completely clear and Aristotle may be right in criticizing Empedocles for "speaking unclearly" (747<sup>a</sup>26–27: λέγων οὐ σαφῶς). What is most strange in the view here attributed to Empedocles is that mules' sterility is not related to any physiological features of *mules* themselves, but to the consistence of the seminal mixture at the time of conception: it is because semen from both horse and donkey is soft that the product of the mixture is hard, and

<sup>1</sup> For a general account of Aristotle's views about hybridity, see J. GROISARD, "Hybridity and Sterility in Aristotle's *Generation of Animals*", in D. LEFEBVRE and A. FALCON (eds.), *Aristotle's Philosophy and the Generation of Animals*, Cambridge University Press (forthcoming).

<sup>2</sup> ARISTOTLE, *De generatione animalium*, II 8, 747<sup>a</sup>34–<sup>b</sup>3 [= DK 31 B 92]: Ἐμπεδοκλῆς δ' αἰτιᾶται τὸ μίγμα τὸ τῶν σπερμάτων γίνεσθαι πυκνὸν ἐκ μαλακῆς τῆς γονῆς οὐσης ἐκατέρας· συναρμόττειν γὰρ τὰ κοῖλα τοῖς πυκνοῖς ἀλλήλων, ἐκ δὲ τῶν τοιούτων γίνεσθαι ἐκ μαλακῶν σκληρὸν ὥσπερ τῷ καττιτέρῳ μυχθέντα τὸν χαλκόν.

the offspring developing from this hard mixture will be sterile because of this same hardness. The causal relation between hardness of the seminal mixture from which the embryo will develop and sterility of the full-grown mule developing from it remains completely unaccounted for. One hypothesis could be that proper development of the embryo requires a determinate consistence of the seminal mixture at the start, so that too hard a mixture will imply some deficiencies such as inability to reproduce.

## (b) Aëtius

Empedocles (says that mules' sterility is) because of the uterus being too little, too low and too narrow, its position in the belly being reversed so that the semen misses the target or, if it ever reaches it, the uterus does not receive it.<sup>3</sup>

This second testimony is much easier to understand than the previous one: here sterility is clearly explained by abnormal size, position and form of the uterus in female mules, making it unable to receive the male semen when mating. The lack of any relation between this testimony and Aristotle's more authoritative one has rightly made scholars suspicious about its value as a source about Empedocles' actual theory.<sup>4</sup> Indeed, putting rather obvious explanation under a big name could be an easy way to give them more weight, so here clarity and simplicity are no sign of authenticity. Yet one should also note that there is nothing in Aristotle's testimony to contradict that of Aëtius: maybe Empedocles' explanation included several factors such as the hardness of the semen mixture from which mules develop *and* a deformity of adult mules' genital organs; according to the hypothesis just made above about Aristotle's testimony, one could even suppose that both explanations were originally related since too hard a mixture at the start could have been considered as the mechanical cause of an abnormal development of the fetus resulting in some deficiency of female mules' genital apparatus.

Maybe a stronger philological reason to be suspicious about this second testimony is the strange continuity between the three opinions attributed by the doxographer to Alcmaeon, Empedocles and Diocles. Alcmaeon is reported to have given two explanations of mules' sterility, one for males, namely thinness and coldness of semen, and one for females, which is that the uterus is not "gaping wide upwards" (ἀναχάσκειν);<sup>5</sup> the latter explanation has very close similarities to the view attributed to Empedocles according to which mules' sterility is caused by the uterus being too narrow and too low, i.e., *not* "gaping wide upwards", thus preventing the male's semen from reaching it. A similar continuity can be found with the next testimony, which is explicitly

<sup>3</sup> AËTIUS, V, 14, 2 Diels (PSEUDO-PLUTARCH, *Placita philosophorum*, 907B 5–8) [= DK 31 A 82]: Ἐμπεδοκλῆς διὰ τὴν σμικρότητα καὶ ταπεινότητα καὶ στενότητα τῆς μήτρας, κατεστραμμένως προσπεφυκυίας τῇ γαστρὶ, μήτε τοῦ σπέρματος εὐθυβολούντος εἰς αὐτὴν μήτε, εἰ καὶ φθάσειεν, αὐτῆς ἐκδεχομένης.

<sup>4</sup> H. DIELS, *Doxographi Graeci*, Berlin, 1879, p. 425, refers to S. KARSTEN, *Empedoclis Agrigentini carminum reliquiae*, Amsterdam, 1838, p. 469, n. 241: according to Karsten, the view attributed to Empedocles in Aëtius could just be the continuation of the previous testimony about Alcmaeon, and Empedocles' name could have been introduced in it by derivation from that of Diocles in the next testimony.

<sup>5</sup> AËTIUS, V, 14, 1 Diels (PSEUDO-PLUTARCH, *Placita philosophorum*, 907B 1–4) [= DK 24 B 3]: Ἀλκμαίων τῶν ἡμιόνων τοὺς μὲν ἄρρενας ἀγόνους παρὰ τὴν λεπτότητα τῆς θορῆς ἢ ψυχρότητα· τὰς δὲ θηλείας παρὰ τὸ μὴ ἀναχάσκειν τὰς μήτρας. οὕτω γὰρ αὐτὸς εἴρηκεν.

introduced as a confirmation of Empedocles' view, since Diocles is reported to have mentioned dissections in which he could observe such a disposition of the uterus in female mules.<sup>6</sup> Whereas the view attributed to Empedocles seems to have little relation to what is otherwise known about his physical and biological theories, it has strong connections with its immediate context in Aëtius' report: it could be, if one wants to give some credit to this testimony, that the doxographer made a conscious effort to connect Empedocles' authentic doctrine with the preceding and following ones; but this kind of effort is quite unusual in doxographical literature, where discontinuity between reported opinions is an almost constant rule; so a more probable hypothesis would be that Empedocles' name has been artificially introduced right in the middle of a previous continuous doxographical material.

The introduction of Empedocles' name could have been the result of some kind of forgery at any stage during the constitution of the doxographical material, but there is some ground to think that Empedocles' name was introduced precisely in this text, which originally did not have it. First, as suggested by Karsten, the proximity between the names "Diocles" and "Empedocles" may have played some part in the process of introducing the latter (and more famous) one in a text mentioning the former.<sup>7</sup> Second, the strong continuity between the views attributed to Alcmaeon (A) and Empedocles (A') makes it quite possible that they originally constituted one single entry about Alcmaeon (A + A') and that the "Empedoclean" part was at some stage separated from this original entry about Alcmaeon. Fortunately, there seems to be in the text a quite visible mark of this separation process: part A ends with the short conclusive sentence "For thus he said himself" (οὕτω γὰρ αὐτὸς εἶρηκεν); besides being void of any informative content, which is strange for such an information-oriented genre as doxography, this kind of redundant conclusion is completely unparalleled in the whole doxographical corpus attributed to Aëtius; rather than an awkward conclusion to A, this could be more probably the beginning of A', which was originally either the continuation of A<sup>8</sup> or an alternative version of A added at the end of it; then the name "Empedocles" was added after εἶρηκεν, separating A' from A and making it a spurious testimony on Empedocles' theory about the sterility of mules.

### 3 Aristotle's arguments against Empedocles

Since the text in Aëtius is probably about Alcmaeon and not Empedocles, let us turn back to our first testimony, that coming from Aristotle. Although this short report is not very explicit, as we already mentioned, some light may be shed on it by the way Aristotle tries to refute Empedocles' view. Two arguments are used: the first is an objection to Empedocles' example of copper and tin as a model for the mixture between horse and donkey semen giving birth to mules; the second is an attempt to establish a contradiction between Empedocles' explanation of mules' sterility and the fact that cross-breeding between horse and donkey species can happen either between a stallion and she-ass or a mare and he-ass.

<sup>6</sup> AËTIUS, V, 14, 3, 1–3 Diels (PSEUDO-PLUTARCH, *Placita philosophorum*, 907B 9–10) [fr. 24 ed. van der Eijk]: Διοκλῆς δὲ μαρτυρεῖ αὐτῷ λέγων· ἐν ταῖς ἀνατομαῖς πολλὰκις ἐωράκαμεν τοιαύτην μήτραν τῶν ἡμιόνων.

<sup>7</sup> See n. 4 above.

<sup>8</sup> This was also Karsten's suggestion.

Let us begin with Aristotle's first objection:

Neither does Empedocles correctly say the cause about copper and tin (we have given explanations about them in our *Problems*), nor does he take at all as principles things that are known to us: for how can the combination of hollow and solid parts make the mixture, for example of wine and water? For this is more than what we can say: indeed how we should conceive the hollow parts of wine and water is altogether beyond our perception.<sup>9</sup>

Although this text as a whole is not very explicit, it clearly consists of two different sub-arguments. The first one deals with the physical process of mixture between tin and copper, Aristotle reproaching Empedocles with not properly accounting for it; unfortunately, Aristotle does not explain what the correct account should be and only refers to his own *Problems*, but, unfortunately again, there is nothing in the corpus of Aristotle's *Problems* as transmitted to us that seems to match this reference. There actually is an explanation of tin and copper mixture in the Aristotelian corpus, but it is rather to be found in his treatise *On generation and corruption*: there Aristotle gives a full-fledged account of mixture in general as a symmetrical process of reciprocal division and qualitative assimilation,<sup>10</sup> and the particular case of copper and tin is used to illustrate a type of mixture in which one ingredient, being stronger than the other, almost completely assimilates it:<sup>11</sup> here tin is the weaker ingredient, so that it almost disappears, only leaving its colour in the resulting alloy, as though it were just a quality without its own matter; one consequence of this unbalanced mixture is that the result has the same volume as the original copper, as though it received tin within itself without becoming larger. This lack of increase in volume may be what Empedocles had tried to explain by his model of hollow and solid parts fitting together: for if solid parts in a body fit inside hollow parts in the other, it could be that both mix without gaining any volume; only the mixture will have no hollow parts anymore, or at least fewer than the original ingredients, which accounts for its being harder. If this hypothesis is true, Aristotle's objection could be more precisely restated as the following: Empedocles explains the lack of volume increase in the mixture between copper and tin by the combination of hollow and solid parts, whereas actually it results from an unbalanced mixture in which one body excessively dominates the other. Another hypothesis, philological now, could be that at the time of writing this part of *On the generation of animals*, Aristotle had dealt with this issue in a separate *Problem*, the content of which was reused when writing *On generation and corruption*; then this separate *Problem* was lost while only the reference to it in *On the generation of animals* remained.

The second part of the objection is rather epistemological than physical: here Aristotle's point seems to be that the combination of hollow and solid parts postulated by Empedocles is far beyond our perception, presumably because these parts are too small, so that his theory is based

<sup>9</sup> ARISTOTLE, *De generatione animalium*, II 8, 747<sup>b</sup>4–10: λέγων οὐτ' ἐπὶ τοῦ χαλκοῦ καὶ τοῦ καττιτέρου τὴν αἰτίαν ὀρθῶς (εἴρηται δ' ἐν τοῖς Προβλήμασι περὶ αὐτῶν) οὐθ' ὅλως ἐκ γνωρίμων ποιούμενος τὰς ἀρχάς. τὰ γὰρ κοῖλα καὶ τὰ στερεὰ ἀρμόττοντα ἀλλήλοις πῶς ποιεῖ τὴν μίξιν οἶον οἴνου καὶ ὕδατος; τοῦτο γὰρ ὑπὲρ ἡμᾶς ἐστὶ τὸ λεγόμενον· πῶς γὰρ δεῖ λαβεῖν τὰ κοῖλα τοῦ οἴνου καὶ τοῦ ὕδατος λίαν ἐστὶ παρὰ τὴν αἴσθησιν.

<sup>10</sup> ARISTOTLE, *De generatione et corruptione*, I 10; on the issue of mixture in Aristotle, see J. GROISARD, *Mixis. Le problème du mélange dans la philosophie grecque d'Aristote à Simplicius*, Paris, 2016, part I: "La théorie aristotélicienne du mélange", pp. 1–76.

<sup>11</sup> ARISTOTLE, *De generatione et corruptione*, I 10, 328<sup>b</sup>6–13.

on things we cannot know for sure. Obviously, this is quite a weak argument, since the microscopic combination of parts postulated by Empedocles could be both beyond our perception *and* true. Besides, there is a strange shift in Aristotle's objection from tin and copper to the case of wine and water. Could it be that the combination of hollow and solid parts was in Empedocles a more general model of mixture also applying, for instance, to water and wine? Probably not, since this model seems specifically designed to explain hardness, whether it be that of the bronze alloy or that of the semen mixture giving birth to mules. So the shift to wine and water rather seems an undue generalisation by Aristotle himself, who seems to apply Empedocles' combination model to a less special case than tin and copper; as a matter of fact, wine and water is the most commonplace example of mixture, so here Aristotle seems to ignore the specificity of the tin and copper combination to transfer Empedocles' explanation to the most unspecific case of mixture, then blame it for relying on a microscopic process. This rather awkward argumentative strategy can be set in sharp contrast with Aristotle's very subtle treatment, and refutation, of combination models in *On generation and corruption*,<sup>12</sup> which could be another sign that the present passage was devised at an anterior and far less elaborate stage of his reflection about mixture theories.

Let us now move to Aristotle's second argument, which more specifically bears on the problem of hybridity and mules' sterility. Once again Aristotle's text is not entirely clear, but here is a tentative translation:

Moreover, (1a) since it happens that a horse is born of horses, or a donkey of donkeys, or a mule of a horse and a donkey, whether they are respectively a male and a female or the contrary, (1b) why in the latter case is the product so hard that it becomes sterile whereas when coming from male and female horses, or male and female donkeys, it does not become sterile? And yet (2a) both the semen coming from the male horse and that coming from the female are soft, (2b) and both stallion and mare can mate with, respectively, a female and male donkey. (3) And the reason they are born sterile in both cases, according to him, is that from both of them is produced something hard, because semen from both of them is soft. (4) So it should also be the case for what is produced from male and female horse. (5a) For if only one of them could mate, then it would be possible to say that only one of them is the cause of infertility by being identical with the donkey's semen; (5b) but in fact, whatever quality has the semen with which the mixture is made, the semen of the congener will also have it.<sup>13</sup>

Although the order of exposition is slightly disconcerting and some passages are quite intricate in detail, Aristotle's general line of argument can clearly be summed up as follows: according to

<sup>12</sup> See J. GROISARD, *Mixis*, pp. 6–10 as well as M. RASHED, *Aristote. De la génération et la corruption* [CUF], Paris, 2005, pp. 149–150.

<sup>13</sup> ARISTOTLE, *De generatione animalium*, II 8, 747<sup>b</sup>10–23: ἔτι δ' ἐπειδὴ συμβαίνει καὶ ἐξ ἵππων γίνεσθαι ἵππον καὶ ἐξ ὄνων ὄνον καὶ ἐξ ἵππου καὶ ὄνου ἡμίονον, ἀμφοτέρως ἄρρενος καὶ θήλεος ὁποτέρου οὖν ὄντος, διὰ τί ἐκ μὲν τούτων γίγνεται πυκνὸν οὕτως ὥστ' ἄγονον εἶναι τὸ γενόμενον, ἐκ δὲ ἵππου θήλεος καὶ ἄρρενος ἢ ὄνου θήλεος καὶ ἄρρενος οὐ γίγνεται ἄγονον; καίτοι μαλακὸν καὶ τὸ τοῦ ἄρρενος ἵππου ἐστὶ καὶ τὸ τοῦ θήλεος, μίγνυται δὲ καὶ ὁ θήλυς ἵππος καὶ ὁ ἄρρην τῷ ὄνῳ, καὶ τῷ ἄρρην καὶ τῷ θήλει. καὶ διὰ τοῦτο γίνονται ἄγονα ἐξ ἀμφοτέρων, ὡς φησιν, ὅτι ἐξ ἀμφοῦν πυκνὸν τι γίγνεται, μαλακῶν ὄντων τῶν σπερμάτων. ἔδει οὖν καὶ τὸ ἐξ ἵππου ἄρρενος καὶ θήλεος γιγνώμενον. εἰ μὲν γὰρ θάτερον ἐμίνυτο μόνον, ἐνὴν ἂν λέγειν ὅτι θάτερον αἴτιον τοῦ μὴ γεννᾶν ὁμοιον δὲ τῇ τοῦ ὄνου γονῇ· νῦν δ' οἷα περ ἂν ἡ ἐκείνη ἢ μίγνυται, τοιαύτη καὶ ἡ τοῦ συγγενούς.

Empedocles, mules are sterile because they are born from a hard semen mixture, whose consistence results from both parents' semen being soft (3); yet cross-breeding between horse and donkey is possible between either a stallion and a she-ass, or a mare and a he-ass (1a and 2b); so in order for Empedocles' explanation to work, all the four of them should have a soft semen (2a and 5b); but if this is the case, then the offspring should be sterile not only in the case of cross-breeding between both species, but also in the union of congeners, since in all cases the semen from both parents will be soft, and consequently the semen mixture will be hard, and consequently again the offspring developing from it will be sterile (1b and 4). Unlike the first argument above, which was rather weak, this seems to be quite a sound objection to Empedocles' theory, which is criticised from the inside by constructing a contradiction between its internal explicative pattern (mixture of identically soft semen from both parents results in sterility) and the established fact that cross-breeding between horse and donkey is possible for both sexes in each species.

Since Aristotle is our sole source here, some caution is needed as to whether Empedocles' theory was actually liable to such a criticism; as always with Aristotle's account of his predecessors, it is difficult to draw the line between the original theory and the refutation of it. Yet there is clearly an Empedoclean flavour in the theory refuted here, for the most striking aspect of it is that sterility of cross-bred offspring is not caused, as one could expect, by difference, namely by mother and father being of different species, but on the contrary by identity, namely the identical soft consistence of the semen coming from both parents: if sameness results in infertility, then conversely fertile reproduction should rely on difference, and this fits well into the frame of Empedocles' general theory of sexual reproduction, where difference plays a decisive part. Our source about this theory is again Aristotle in another passage of *On the generation of animals* where he reports that Empedocles accounted for generation by using the metaphor of the symbol, i.e., a broken piece of pottery whose parts fit perfectly and serve as a sign of recognition:

For Empedocles says that parts of the offspring are in the male and the female like a symbol, and the whole of it does not come from only one of them: "but the nature of members is scattered, one in the male's..."<sup>14</sup>

Aristotle's quotation of Empedocles is incomplete but one can easily supply something like "one in the male's *semen* and another in the female's".<sup>15</sup> So Empedocles' point is that the parts of the offspring coming from each parent are different, which is explicitly stated a few line below in Aristotle's text: "just as he says, not the same parts come from each of them".<sup>16</sup> This is also quite obvious from the symbol metaphor, since the broken fragments would never fit if they were identical. So Empedocles' theory of generation is clearly based on the difference and fertile complementarity of both sexes, and this could account for an explanation of mules' sterility by excessive sameness rather than excessive difference.

<sup>14</sup> ARISTOTLE, *De generatione animalium*, I 18, 722<sup>b</sup>10–12 [= DK 31 B 63]: φησὶ γὰρ ἐν τῷ ἄρρενι καὶ τῷ θήλει οἷον σύμβολον ἐνεῖναι, ὅλον δ' ἀπ' οὐδετέρου ἀπιέναι, "ἀλλὰ διέσπασται μελέων φύσις, ἥ μὲν ἐν ἀνδρός..."

<sup>15</sup> This is also the interpretation of H. DIELS and W. KRANZ, *Die Fragmente der Vorsokratiker*, 6<sup>th</sup> ed., Berlin, 1951–1952, who translate: "Aber der Ursprung der (menschlichen) Glieder liegt auseinander: das eine liegt in dem männlichen, (das andere in dem weiblichen Samen verborgen)."

<sup>16</sup> ARISTOTLE, *De generatione animalium*, I 18, 722<sup>b</sup>15–16: οὕτως ὥσπερ ἐκεῖνος λέγει, οὐ ταῦτ' ἀφ' ἑκατέρου.

## 4 Textual problems in Aristotle's refutation

The interpretation given above of Aristotle's second argument is based on a few emendations to the text of most recent editions of *On the generation of animals*.

The first one is in sentence (3): διὰ τοῦτο γίνονται ἄγονα ἐξ ἀμφοτέρων, ὥς φησιν, ὅτι ἐξ ἀμφοῖν πύκνον τι γίνεται, μαλακῶν ὄντων τῶν σπερμάτων. The text of manuscripts is corrupt and the word πύκνον is in fact an excellent correction by Platt, where manuscripts have έν. In his authoritative work on Empedocles, Bollack does not correct the text and reads έν as it is transmitted by manuscripts,<sup>17</sup> but in that case the sentence would mean that unity of the semen mixture is the cause for mules' sterility, and that this unity is itself caused by softness of the seminal matter coming from both parents; but such statements would be altogether unrelated to the context of Aristotle's account of Empedocles' theory and his refutation of it; as argued above, it is very clear that in the context mules' sterility is explained by the semen mixture being too hard, not by its being one unified thing. Recent editors of *On the generation of animals*, first Peck and after him Louis as well as Drossaart Lulofs, rightly follow Platt's correction, but instead of replacing πύκνον by έν, they add πύκνον after γίνεται while keeping έν before τι, which translates as: "from both of them is produced something one and hard". Of course the mention of unity could be understood in the context of mixture, meaning that seminal matter coming from both parents is mixed into something one, but once again this is not the point here: what matters in this passage is just that soft semen mixing with soft semen makes something hard, so on the whole a reference to unity of semen mixture is not really needed. Another good reason to return to Platt's correction of έν into πύκνον is palaeographical: the word έν could just be what is left of the end of πύκνον in majuscule script, since *epsilon* and *omicron* have a similar round shape in that kind of writing. The fact that this mistake is common to the whole tradition also argues for an early date, before transliteration from majuscule to minuscule script.

Another change from most recent editors' text of *On the generation of animals* is in sentence (5a): εί μὲν γὰρ θάτερον ἐμίγνυτο μόνον, ἐνῆν ἂν λέγειν ὅτι θάτερον αἴτιον τοῦ μὴ γεννᾶν ὁμοιον ὃν τῇ τοῦ ὄνου γονῇ. In our interpretation of this sentence, the first θάτερον refers to either male or female in the horse species, and the second θάτερον to the same sex as the first occurrence: if only the male could mate with a she-ass, then the male would be the cause for the sterility of hinnies, and conversely if only the mare could mate with a he-ass, then the female would be the cause for the sterility of mules. In both cases, the reason of sterility is the softness of both parents' semen, i.e., the fact that the semen from the stallion or the mare is *similar* to that coming, respectively, from the she- or he-ass. Although the manuscript reading ὁμοιον seems perfectly adequate in this context, it has been corrected in ἀνόμοιον by Platt, followed by Peck and Louis in their own editions. Without using Platt's correction, Drossaart Lulofs agrees with his interpretation since he chooses the equivalent reading οὐχ ὁμοιον which he finds in only one *recentior* Greek codex, the *Riccardianus* 13, and which is also reflected in the Arabic and Graeco-Latin translations of the treatise;<sup>18</sup> yet there is little philological ground for this editorial choice because ὁμοιον without

<sup>17</sup> J. BOLLACK, *Empédocle*, vol. II, Paris, 1969, p. 261.

<sup>18</sup> H. J. DROSSAART LULOFS, *Aristotelis De generatione animalium*, Oxford, 1965, p. 91, critical apparatus *ad locum*.

the negation οὐχ is given by all the most authoritative manuscripts, including Z, P and S, whose consensus is usually taken by Drossaart Lulofs himself as the base of his edition.<sup>19</sup> The reason for this surprising decision may be the one adduced by Bollack, who also chooses οὐχ ὅμοιον<sup>20</sup> and interprets the negation as meaning that, for instance, the stallion is responsible for the sterility of hinnies because he is *not* able to provide the she-ass with the same semen as the he-ass.<sup>21</sup> Yet, as already said, this does not match the precise context of Aristotle's report on Empedocles, and the negation before ὅμοιον in part (and not the most authoritative one) of the tradition could easily have been added at some point in transmission by a process of banalisation or trivialisation of the text, since the idea that sterility comes from the difference of cross-bred species is far more commonplace than explaining it by a *similar* property in both parents' semen.

The last and most intricate textual problem is about sentence (5b), whose interpretation is made difficult both by Aristotle's extreme concision and by corruptions in the transmitted text.<sup>22</sup> All recent editors, Peck, Louis and Drossaart Lulofs, give the same text: νῦν δ' οἴαπερ οὔση ἐκείνη μίγνυται, τοιαύτη καὶ τῇ τοῦ συγγενοῦς. The train of thought leading to this sentence requests the conclusion that "in fact" (νῦν δέ), since cross-breeding is possible both for male and female of the horse and donkey species, the quality of softness that is said to cause mules' sterility will also be found in congeners, so that the semen of the congener is exactly *such as* the semen of the partner of different species in the case of hybridisation; in the Greek text, it is most likely that the οἴαπερ... τοιαύτη... correlation expresses this idea of *such as*. Now we are embarrassed with datives τοιαύτη and τῇ in the main clause;<sup>23</sup> here the manuscript tradition is of some help since

<sup>19</sup> *Ibid.*, p. xiii.

<sup>20</sup> J. BOLLACK, *Empédocle*, vol. II, no. 682.

<sup>21</sup> *Ibid.*, vol. III, p. 573, no. 8. The same interpretation of this argument (sterility could be caused by only one sex not providing the same semen as the same sex in the other species) could also be adduced by reading μὴ γεννᾶν ὅμοιον without the following ὄν, which is omitted by several manuscripts, including Z and S (but not P), and taking ὅμοιον as the object of μὴ γεννᾶν; in this interpretation, the subject of μὴ γεννᾶν is no longer mules, but θάτερον, namely either male or female horse, and the whole sentence means that, if hybridity were not reciprocal between both sexes, only one sex (in horse) could be said to be "responsible of its not giving birth to something similar to the donkey's semen". From a palaeographical point of view, one could indeed suppose that ὄν has been wrongly added by dittography after ὅμοιον, but the ὄν may just as well have disappeared in ὅμοιον ὄν by haplography, so the palaeographical argument is not decisive here; yet, since relating hybridity to a lack of similarity with the semen of the other species (μὴ γεννᾶν ὅμοιον τῇ τοῦ ὄνου γονῇ) is much more obvious than relating it to similarity with it (ὅμοιον ὄν), this latter variant seems to have the advantage of the *lectio difficilior*. Besides, in the context of Aristotle's discussion about mules, it is much more natural to take αἴτιον τοῦ μὴ γεννᾶν as meaning "the cause of mules' sterility" (with "mules" as an implicit subject of μὴ γεννᾶν) rather than the cause of any reproductive disability in horses (with θάτερον as the subject of μὴ γεννᾶν).

<sup>22</sup> The meaning of this sentence is so closely determined by the preceding argument that it can be understood from the context in spite of its intrinsic obscurity. The interpretation given here is not new: it corresponds to that of most modern translators and already appears in the Byzantine commentary on Aristotle's *De generatione animalium* by Michael of Ephesus (wrongly attributed to John Philoponus, ed. M. HAYDUCK, *Ioannis Philoponi (Michaeli Ephesii) in libros De generatione animalium commentaria [Commentaria in Aristotelem Graeca]*, Berlin, 1903, p. 125). My attempt is just at providing a sounder textual base for this already existing interpretation.

<sup>23</sup> One way to account for these datives would be to invoke some kind of attraction of expected nominatives τοιαύτη and ἡ in the main clause by οἴαπερ οὔση ἐκείνη in the subordinate clause; yet since the expected nominatives have good manuscript authority, my hypothesis is that they were corrupted by contamination from the three preceding datives. If one wants to keep the datives in the main clause, I think they should be related to an implicit μίγνυται ("just as it mixes with that semen being such and such, likewise it mixes with the congener's semen also being such



Z has the nominative ἡ instead of τῇ; Z is the *Oxoniensis Collegii Corporis Christi* 108, nothing less than the most ancient (9<sup>th</sup>–10<sup>th</sup> century) and most authoritative manuscript of the treatise;<sup>24</sup> so a sound move seems to consider the nominative ἡ τοῦ συγγενούς as the grammatical subject of the main clause, the feminine ἡ referring to γονῇ at the end of the previous sentence. The next step is to take τοιαύτη as predicate and read it τοιαύτη in nominative, which also seems to be the reading of Z which has τοιαυτη with no accent and without the iota adscript used by the scribe for the dative.<sup>25</sup> Until now, our corrected text of the main clause can be translated as “the (semen) of the congener is such...” Things get a little more complicated with the subordinate clause introduced by οἷαπερ: here again Z has a better text with a relative pronoun ἥ before μίγνυται; Drossaart Lulofs' critical apparatus indicates that this relative is added by the original scribe of the manuscript,<sup>26</sup> but this does not affect the value of this reading since the pronoun could have been omitted first by haplography at the end of ἐκεῖνητι. The antecedent of this relative is most likely the previous word ἐκείνη so that ἐκείνη ἥ μίγνυται would mean: “that (semen e.g. of species B) to which is mixed” the semen of species A. Once again we should read a nominative ἐκείνη rather than a dative (although in this case Z has ἐκεῖνητι) and make it the subject of the subordinate clause with οἷαπερ, also corrected in οἷαπερ, as predicate. One last problem is οὕσῃ which has no reason to be in dative and participle form; a not so unlikely solution would be to consider it the corruption of the subjunctive ἂν ᾗ. A very literal translation of the whole corrected sentence (νῦν δ' οἷαπερ ἂν ᾗ ἐκείνη ἥ μίγνυται, τοιαύτη καὶ ἡ τοῦ συγγενούς) would then be: “in fact, such as is that semen to which it is mixed, such will also be that of the congener”; or more explicitly, “whatever quality (responsible for sterility, i.e., softness) that has that semen (of species B) to which it (i.e., the semen of species A) is mixed, the semen of the congener (of species A) will also have it (i.e., softness)”. Which is the required meaning for the sentence to match exactly the context of Aristotle's report, and refutation, of Empedocles' theory on mules' sterility.

## 5 Conclusion

Of the two testimonies we have about the way Empedocles explained mules' sterility, Aristotle's one is by far the most authoritative. This is not only because Aristotle is chronologically closer to Empedocles and as a rule more reliable than later and less accurate doxographical sources: as seen above, the name “Empedocles” in the testimony given by Aëtius may probably have been introduced in a text about another philosopher and physician, Alcmaeon, maybe by confusion with the physician Diocles whose anatomical observations were used to confirm Alcmaeon's (and not Empedocles' as in the present state of the text) theory about mules' sterility. With this high probability that this Aëtius testimony is just *not* about Empedocles, we have to rely exclusively on Aristotle to reconstitute Empedocles' original theory. We have two good reasons to trust Aristotle's testimony: first, it is included in a refutation of Empedocles' argument, which allows us to check our interpretation of the testimony itself by the way Aristotle tries to refute it; second, there is

and such”); this is quite rough syntax, but not impossible for Aristotle.

<sup>24</sup> H. J. DROSSAART LULOFS, *Aristotelis De generatione animalium*, pp. vi–vii and xiii.

<sup>25</sup> *Ibid.*, p. 91, critical apparatus *ad locum*.

<sup>26</sup> *Ibid.*

a strong congruence between a rather paradoxical feature of the view ascribed to Empedocles (sterility in hybrids such as mules is not due to difference but to sameness) and what we know of Empedocles' general theory of sexual reproduction. Yet, we have also two good reasons to remain careful about Aristotle's report: first, we have no parallel testimony to check its accuracy and Aristotle is well-known for often reworking or simplifying his predecessors' views to match his own context or arguments; second, Aristotle's text is not completely clear, which is due not only to the obscurity for which he blames Empedocles, but also to the various textual problems we have discussed above.

(Tokyo Metropolitan University)