

We have no external evidence for a victory by Cratinus in the 450s and Καρκί[νο]ς would fit perfectly well. Alternatively, in col. ii.9 of the same inscription the fragmentary KA[ has been restored to read Κἀ[νθαρος, for a victory before 422 B.C., but this too could just as easily be Κα[ρκίνο]ς.<sup>18</sup> (*IG* 2<sup>2</sup> 2325 lists each poet only once, so these would be mutually exclusive possibilities. The dates in question—the 450s or 420s—are consistent with what could have been Carcinus' career.)

With so few hard facts and with evidence of marginal credibility I make no claim to certainty. But the case for Carcinus as a tragic poet perches on especially fragile twigs: a conjectural restoration in the *Fasti* and inferences in the scholia. The weakness of the case for his tragic career opens up the possibility that Carcinus was a κωμωδιοποιός who wrote a play titled Μύες (probably with an animal chorus). Allusions to him in Aristophanes and in some scholia are not inconsistent with this, and with so many tragic playwrights in the succeeding generations, including his grandson of the same name, it is understandable that he was thought to be a tragedian himself.<sup>19</sup>

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18. For the restoration of Cantharus see E. Capps, "Epigraphical Problems in the History of Attic Comedy," *AJP* 28 (1907): 199.

19. The author gratefully acknowledges the helpful comments of the two anonymous readers for *CP*.

## OF MICE AND MEN IN ARISTOTLE

### *De Motu Animalium* 698b12–18:

ὥσπερ γὰρ καὶ ἐν αὐτῷ δεῖ τι ἀκίνητον εἶναι, εἰ μέλλει κινεῖσθαι, οὕτως ἔτι μᾶλλον ἔξω δεῖ τι εἶναι τοῦ ζώου ἀκίνητον, πρὸς δὲ ἀπεριδόμενον κινεῖται τὸ κινούμενον. εἰ γὰρ ὑποδῶσει ἀεὶ, οἷον τοῖς μυσὶ τοῖς ἐν τῇ γῇ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις, οὐ πρόεισιν, οὐδ' ἔσται οὔτε πορεία, εἰ μὴ ἡ γῇ μένοι, οὔτε πτήσις ἢ νεύσις, εἰ μὴ ὁ ἀήρ ἢ ἡ θάλαττα ἀντερείδοι.

16 τοῖς μυσὶ τοῖς ἐν τῇ γῇ: τοῖς ἐν τῇ γῇ μυσὶν YV *b*<sub>1</sub>    μυσὶ: ποσὶ E    τῇ ante γῇ  
om. *b*<sub>2</sub>    πορευομένοις post γῇ *b*<sub>1</sub>, post γῇ et post ἄμμῳ Y

The οἷον clause in b15–16 has bedeviled editors and interpreters, and the MS variants, which I have taken from Nussbaum's admirable edition (*Aristotle's "De Motu Animalium": Text with Translation, Commentary, and Interpretive Essays* [Princeton, 1978]), show clearly that the Byzantines also felt a difficulty here, since, with the exception of the omitted τῇ before γῇ in the *b*<sub>2</sub> group (doubtless a mechanical lipography), all the variants are deliberate attempts to restore some sense by conjectural intervention.

Aristotle asserts here that, for movement to be possible, not only must the moving animal have within itself some part that remains at rest but, even more importantly,

there must be an *external* medium of resistance that is itself unmoved and against which the moving animal can support itself. (The principle is of some importance for Aristotle's philosophy, as he points out just above in b10–12 ἔχει γὰρ τὴν θεωρίαν οὐ μόνον ὅσον ἐπὶ τὰ ζῷα συντείνουσιν, ἀλλὰ καὶ πρὸς τὴν τοῦ παντὸς κίνησιν καὶ φοράν.) In b15–18 Aristotle considers the hypothetical situation in which the external medium of resistance continually gives way and offers no support; in such a case there can be no movement.

The οἷον clause in b15–16 appears to give one or more specific exempla in illustration of such an hypothesis. The chief, but not the only, stumbling block to extracting sense from the passage would seem to be ἐν τῇ γῇ; “unqualified earth is not a shifting medium,” as Anthony Preus remarked.<sup>1</sup> There are other problems of interpretation. Does τοῖς ἐν τῇ ἄμμῳ πορευομένοις refer to *men* walking on sand (as many, perhaps most, take it) or does the phrase rather refer back to the mice? In other words, does Aristotle introduce here two separate species of ζῷα, each represented in one medium of resistance, or one species in two media of resistance? And whether one or two species, is the first (or only) species *mice* or is that word itself (μυσὶ) corrupt? A number of conjectures has been proposed. Not one is, in my view, correct. Moreover it is a remarkable fact that every conjecture known to me can be shown to be wrong, simply on the basis of the Greek itself: all entail Greek that is either actually incorrect or that, if translated correctly, gives a wrong sense for this context.

Here are the several proposals that have been put forward:

1. ἐμύσι for μύσι Diels, reported and printed by Werner Jaeger in his 1913 Teubner edition of the *De Motu Animalium*.
2. τοῖς ποσὶ [τοῖς ἐν τῇ γῇ ἢ] τοῖς ἐν τῇ ἄμμῳ πορευομένοις Platt (in *JP* 32 [1912–13]: 295).
3. τοῖς μυσὶ ἐν τῇ ζεῖᾳ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις A. S. L. Farquharson (in his Oxford translation of 1912). Forster, in his 1937 Loeb edition, argued that the form ζέῃ would be “nearer to the MS reading” than ζεῖᾳ.
4. τοῖς μυσὶ τοῖς ἐν πηλῷ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις M. C. Nussbaum (“The Text of Aristotle's *De Motu Animalium*,” *HSCP* 80 [1976]: 140–42, where she accepts G. E. L. Owen's suggestion that μυσὶ is used in the meaning “mussel,” a class of shellfish).
5. τοῖς ἐμύσι τοῖς ἐν πηλῷ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις Nussbaum, “*De Motu Animalium*.”
6. τοῖς μυσὶ [τοῖς ἐν τῇ γῇ ἢ] τοῖς ἐν τῇ ἄλλῳ πορευομένοις J. Barnes (*CR* 30 [1980]: 223–24, in a review of Nussbaum's edition).

It will repay the effort to examine each of these proposals. Diels' conjecture ἐμύσι would remove the mice altogether and replace them with a different creature, the ἐμύς

1. Aristotle and Michael of Ephesus. *On the Movement and Progression of Animals*. Translated, with introduction and notes by A. Preus (Hildesheim and New York, 1981), p. 119. Aristotle might have illustrated his point by introducing animals attempting to move on or in a medium not natural to them, for instance land animals walking on water. Michael in fact uses this illustration in his commentary to the *IA*, p. 138.16–18 (Hayduck) . . . ὁ συμβαίνει τοῖς πεζοῖς ἐπὶ τοῦ ὕδατος· οὐδὲν γὰρ αὐτῶν ἀπερεῖσαι τοὺς πόδας δύναται, ὥστε πορεύειν ποιήσασθαι ἐν τῷ ὕδατι κτλ. It may be taken as certain that no illustration along such lines lies concealed in this passage of the *MA*, for, were it so, it would have been more natural for Aristotle to use *generic* terms (τὰ πεζά, τὰ χερσαῖα, τὰ ἐνυδρά, etc.) rather than mention any particular animal, mouse or other, with an apparently pointless specificity. Interpretation should start from the assumption that the animal(s) and medium(s) in question are not alien to one another.

(or ἐμός),<sup>2</sup> a kind of freshwater tortoise. Jaeger accepted this conjecture, as does Nussbaum in her edition. The conjecture is ingenious, but as turtles move with reasonable ease over shore mud and sand, the relevance of the exemplum is not apparent.<sup>3</sup> Professional zoologists could perhaps remove my doubts on this score, but it would be to no purpose. *For the evidence is impressive, and derived from Aristotle's own writings, that ἐμός is a noun of feminine gender.*<sup>4</sup> The phraseology τοῖς ἐμόσι τοῖς . . . τοῖς . . . πορευομένοις, despite its appearance in distinguished editions, is ungrammatical Greek.<sup>5</sup>

2. The aspiration is uncertain; as I shall be quoting the readings of specific scholars on occasion, a certain inconsistency between smooth and rough breathing will be apparent below. It does not affect the argument. (I am inclined to prefer, on no very strong grounds, the form ἐμός.)

3. Aristotle does not seem to have thought of these creatures as "sliding about" (Nussbaum, "*De Motu Animalium*", p. 288); see *IA* 713a17–25, *HA* 558a8–11, 589a28–30, all passages that hardly suggest that he conceived of them as slipping about with difficulty. In any event, this interpretation implies the acceptance of the conjecture ἐν πηλῷ, which I hope to demonstrate below to be unjustified.

4. Here is the evidence: 1) *Resp.* 470b19 ἐτι δὲ αἱ ἐμούδες τε καὶ χελῶναι; 2) *HA* 558a8–9 ἡ δ' ἐμός ἐξιούσα ἐκ τοῦ ὕδατος τίκτει, ὀρύζασσα βόθρονον πιθώδη, καὶ ἐντεκοῦσα καταλείπει κτλ.; 3) *HA* 589a28 οἶον αἱ θ' ἐμούδες καὶ τὸ τῶν βατράχων γένος; 4) *PA* 671a31 ἡ δ' ἐμός οὐτε κύστιν οὐτε νεφροὺς ἔχει; 5) *PA* 671a33 ἡ μὲν οὖν ἐμός κτλ.; 6) *IA* 713a16–17 οἶον οἱ τε κροκόδειλοι καὶ σαῦροι καὶ ἀσκαλαβῶται καὶ αἱ ἐμούδες τε καὶ χελῶναι. (For my conjecture αἱ here, compare above, *Resp.* 470b19 [= example 1]. Nothing depends upon the correctness of this.) The only potential evidence *contra* is *HA* 600b21–22 καὶ γὰρ ἡ χελώνη τῶν φολιδωτῶν ἐστι καὶ ὁ ἐμός. In view of the materials given above, this passage ought to be, and usually has been, dismissed. (The Balme-Gotthelf Loeb edition of *HA* 7–10 (1991) prints ὁ ἐμός without comment or recording of variants.) The vv. ll. ad loc., ὁ μῦς and αἱ μῦς, show what happened. Uncial epsilon and omicron (ε, ο) were often confused, and the sounds ε and αι had in time become identical. The uncommon word ἐμός, by one route or the other, generated all three readings: ὁ ἐμός, ὁ μῦς, αἱ μῦς. Camus conjectured ἐμός and Piccolos ἡ ἐμός. Aubert and Wimmer bracketed the entire sentence as a gloss. (As we are concerned with Greek usage and not specifically Aristotelian usage, the question of the spuriousness, in whole or part, of the later books of the *HA* may be disregarded here.) Nussbaum ("*De Motu Animalium*", p. 287) writes "there are no extant references [sc. to the ἐμός] outside Aristotle." In this she is almost certainly wrong, for an occurrence of the word probably is to be found in a fragment of Aristotle's own student Theophrastus, frag. 171 (Wimmer) . . . φαίνεται δ' οὖν . . . ἐπαμφοτερίζειν, οὐ τῇ τροφῇ καὶ τῇ διαγωγῇ καθάπερ ἡ φῶκη καὶ ἡ ἐμός καὶ ἕτερ' ἅττα . . . Here ἡ ἐμός is Schneider's correction; Wimmer printed ἐμός without article. (It would make little difference: with the article omitted the ἡ before φῶκη is naturally carried over; compare, e.g., *Resp.* 470b19, cited above, αἱ ἐμούδες τε καὶ χελῶναι. This can occur even when the following article would be of different gender, e.g., *GA* 786b1 αἱ ἀνθρῆναι καὶ σφήκες.) The MSS have neither ἐμός nor ἡ ἐμός in this fragment, but ἡ μῦς and ὁ μῦς; in other words, they show the same sort of corruptions as have been generally assumed for *HA* 600b22. On the interesting question whether μῦς, in addition to its meanings "mouse" and "mussel," also was used of some sort of sea animal, perhaps even a turtle, see D'Arcy Wentworth Thompson, *A Glossary of Greek Fishes* (London, 1947), pp. 167–68. Sir D'Arcy concluded "it looks as though ἐμός were an unfamiliar word, apt to be replaced by μῦς, but with more or less recognition of its proper meaning." Finally, one should beware of positing ἐμός, ὁ and ἡ, with the masculine used of males, the feminine of females. Such distinctions do occur, chiefly with the higher or commoner animals (e.g., ἄνθρωπος, ὁ, ἡ and βοῦς, ὁ, ἡ, although even in such cases the distinction is often not observed), but most ζῷα have one fixed gender for both male and female. Thus in *HA* 558a7–8 (above) Aristotle writes ἡ δ' ἐμός ἐξιούσα ἐκ τοῦ ὕδατος τίκτει . . . καὶ ἐντεκοῦσα καταλείπει not because the female tortoise lays the eggs but because ἐμός is of feminine gender. As W. S. Barrett has concisely remarked in a note to Eur. *Hipp.* 231 (in a similar context; compare also his note to v. 18), it is "a question not of sex but of gender." Thus Pliny, *HN* 9.76.166, in a passage that ultimately must go back to this very passage of Aristotle, as the precise details common to both make clear, writes *mus marinus in terra scrobe effosso parit ova et rursus obruit terra, tricesimo die refossa aperit fetumque in aquam ducit*. Somewhere in the tradition Aristotle's ἐμός had become μῦς and was so taken over into Latin, appearing in Pliny as the *mus marinus*: despite the fact that the egg-laying female is in question, the masculine gender *mus marinus* remains. This general practice is common to Greek and Latin; many examples could be provided. Recall also such expressions as ὁ θῆλυς ὄρεῦς (*HA* 577b22) and ἄνθρωπος . . . καὶ ὁ θῆλυς καὶ ὁ ἄρην (*PA* 688b31), where we might expect rather ἡ θῆλεια ὄρεῦς and ἡ θῆλεια ἄνθρωπος. Aelian *NA* 12.10 refers to ὁ θῆλυς μῦς.

5. It is essential to distinguish clearly between 1) carelessly composed Greek, including anacolutha, and 2) incorrect and subliterary Greek. It is well known that Aristotle is quite capable of the former, especially

Admirable scholar though Platt was, his conjecture as well must be rejected. He set it out as follows: "If the ground is to keep on giving way beneath you, you can't get on. For *μοσὶ* read *ποσὶ* with E and omit *τοῖς ἐν τῇ γῇ* together. SY already omit *τοῖς*, and I take it that *ἐν γῇ* was a variant on *ἐν ἄμμῳ*." (*ποσὶ* in E cannot be original; it is either slip or conscious conjecture, more likely the latter.) Many verbs of motion are accompanied by an instrumental dative *ποσὶ*, but *πόδες* as *subject* of such a verb is quite a different matter. *ποσὶ τοῖς ἐν τῇ ἄμμῳ πορευόμενοις* is as odd a phrase as "the feet that are travelling on the sand" is in English.<sup>6</sup> (As for the notion, not peculiar to Platt, that *ἐν τῇ γῇ* is a variant or gloss on *ἐν τῇ ἄμμῳ*, I hope to show below that the very opposite would be closer to the truth.)

At this juncture we would do well to determine whether *τοῖς ἐν τῇ ἄμμῳ πορευόμενοις* can mean "when *men* walk on sand" *here*, for the words are often so understood, however the rest of the clause be interpreted: "for mice walking in grain or persons walking in sand" (Farquharson); "when mice walk upon loose soil and when persons walk on sand" (Forster); "as when tortoises walk in mud or men on sand" (Nussbaum in her edition). Jaeger also seems to have accepted this interpretation, to judge from the fact that he places a comma after *τοῖς ἐν τῇ γῇ*, thereby separating rather than linking together the two cola. These versions are all mistranslations of the Greek.

Consider. That *οἱ ἐν τῇ ἄμμῳ πορευόμενοι* may mean "those who walk on sand," "persons walking on sand," is certain. However, in such an expression the article serves to make the participle a substantive; that is its function in the phrase, and once having performed its function it cannot be called upon to perform another. In other words *τοῖς ἐν τῇ ἄμμῳ* cannot then correspond to *τοῖς ἐν τῇ γῇ*; rather, the one substantive, *τοῖς πορευόμενοις*, would correspond to the other substantive, *τοῖς μὺσιν*. Then *τοῖς μὺσιν* would be modified by *τοῖς ἐν τῇ γῇ* and *τοῖς πορευόμενοις* by *ἐν τῇ ἄμμῳ*. Both expressions are, in and of themselves, quite correct, but they do not balance each other at all. The situation can be simply stated: once *πορευόμενοις* has become a substantive by its collocation with *τοῖς* (and only so could the meaning "*people* walking on the sand" be gotten out of the Greek), it is no longer available to modify as well *τοῖς μὺσιν τοῖς ἐν τῇ γῇ*; it has been "committed" to *τοῖς ἐν τῇ ἄμμῳ* and to that alone. The correct translation would thus be: ". . . to the mice, those on the earth, or to persons *walking* on the sand." The first colon has been deprived of the participle that it needs to balance the second colon. Notice that in all the English versions given above a verb is instinctively, but unjustifiably, supplied with the first substantive.

There is another consideration that refutes "persons walking on the sand" as the correct interpretation. Such an interpretation violates Aristotle's own usage. In his zoological treatises (and elsewhere) man is but one of many species of *τὰ ζῷα* and Aristotle regularly refers to him by the name of the species—*ἄνθρωπος*. If he were giving two exempla here involving two distinct *ζῷα*, one of which happened to be

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in lecture notes and memoranda intended primarily for his own eyes (not incidentally the case with the *De Motu Animalium*); he is no different from many another professor in this regard. But to introduce by conjecture into his text such bad Greek as a false gender is quite another matter and hardly justifiable.

6. Barnes also had doubts about the correctness of such Greek: "I do not know if A. could say that feet *πορεύονται*" ("Review of Nussbaum," p. 224).

man, he would have used the two nouns that precisely identified the two species involved (. . . μουσὶ . . . ἢ ἀνθρώποις. . .), and not the participle used as substantive.<sup>7</sup> Consider the following examples, but a few of many: *EN* 1155a18–19 . . . οὐ μόνον ἐν ἀνθρώποις ἀλλὰ καὶ ἐν ὄρνισι καὶ τοῖς πλείστοις τῶν ζώων. *HA* 507b16 οἶον ἄνθρωπος ὅς κύων ἄρκτος λέων λύκος. *Long.* 465a4–5 . . . οἶον ἄνθρωπον πρὸς ἵππον. *PA* 674a2 . . . οἶον ὅς καὶ ἄνθρωπος καὶ κύων. 674a25 . . . οἶον ἄνθρωπος καὶ κύων καὶ λέων. In *PA* 676b31–32 mice and men appear together: . . . οἶον ἐν τῷ τῶν μυῶν [sc. γένει]. τούτων δ' ἐστὶ καὶ ὁ ἄνθρωπος. If the species “mice” and “men” were being contrasted, there would have been an explicit mention of both μύες and ἄνθρωποι and that we do not have.

Consider next Farquharson's treatment of the passage. His note on 698b15–16 in his Oxford translation goes as follows: “Leg. οἶον τοῖς μουσὶ ἐν τῇ ζειᾷ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις . . . Mich. had γῇ but did not understand it: in his Commentary to *de Inc.* (p. 138.18) he illustrates the same point by βάδισις εἰς ἄλω πλήρη κέγχρου.” Whether the omission of τοῖς after τοῖς μουσὶ was intentional on Farquharson's part or a mere slip I cannot say. (It has no MS authority, since only those MSS that place μουσὶ after ἐν τῇ γῇ omit this τοῖς; the sequence τοῖς μουσὶ ἐν is apparently found in no MS.) If such is really the text that Farquharson intended (no one seems to have attended to this omitted τοῖς, nor do the editors report it under his name), then it is even clearer that πορευομένοις could only go with the second member of the clause and not with μουσὶ, producing a sense that is hardly acceptable as we have seen. And how does Farquharson render the passage? “. . . as it does for mice walking in grain or persons walking in sand”: Two mistranslations, whether or not he omitted the τοῖς after μουσὶ (“mice walking,” “persons”).

Why Farquharson conjectured ζειᾷ is apparent. He objected, as others have, to γῇ, as being too resistant a medium, the opposite of what seems wanted here, and, on the basis of an illustration in Michael's commentary (*not* here, but on *IA* 705a3–25), sc. βάδισις εἰς ἄλω πλήρη κέγχρου) at p. 138.18 (Hayduck), he proceeded to search for some word for “grain” that bore any paleographical resemblance to γῇ. Curiously, it does not seem to have occurred to him that Michael's own example (κέγχρος), so far from supporting any form of ζειᾷ, is in fact an argument against it. The reason why Michael chose κέγχρος as an illustration in his *IA* commentary, loc. cit., is not far to seek. As Ingemar Düring has observed in his commentary to the *De Partibus Animalium* (Göteborg, 1943), at *PA* 679a33, κέγχρος is in Aristotle “the standard object of comparison for something very tiny.” See also Bonitz, *Index Aristotelicus* (Berlin, 1870), p. 380b2–5. Now in his comments on *IA* 705a3–25. Michael is in fact expanding upon Aristotle's remarks at *MA* c. 2, the passage that is our present concern. Consider his language: . . . ὑπόκειται δὲ τοῖς μὲν πεζοῖς πρὸς τὴν πορείαν ἢ τὴν ἄλσιν ἢ γῇ ἢ ξύλον ἢ πέτρα ἢ ἄλλο τι γεῶδες καὶ στερεόν (p. 138.10–12 [Hayduck]). He lists a number of “earthy and solid” substrates of motion, *beginning with ἡ γῇ itself* (note the article), which is as genus to species vis-à-vis the following list. Michael proceeds almost immediately thus:

7. Note also that this participle, πορευομένοις, would be ambiguous: masculine or neuter? In this context, where τὰ ζῷα are at issue (compare especially 698b10–11), it would be surely the latter. Compare Michael of Ephesus ad loc., p. 105.24–26 (Hayduck) λέγει εἰ γὰρ ὑποδῶσει καὶ ὑπεῖξει αἰὲν ἡ γῇ τοῖς ἐν τῇ γῇ πορευομένοις μουσίν' (ἔστω γὰρ λόγου ἕνεκεν τὰ πορευόμενα μῶς). This is one more argument against referring the participle specifically to “persons.”

διόπερ ἑάν τε ὑποφέρηται τὸ ὑποκείμενον καὶ ἐκφεύγη, ὃ συμβαίνει ἐπὶ τινων, ψάμμου, κέγχρου, καρύων καὶ ἄλλων πολλῶν κτλ. (p. 138.12–14 [Hayduck]). Here he lists some examples of relatively unstable substrates, *beginning with sand*. Michael thus gives pride of place to earth and sand respectively, the two examples that we find in Aristotle. The other examples are clearly Michael's own additions. There is no support whatsoever here for the notion that Aristotle mentioned not sand, but some type of grain.<sup>8</sup>

The notion that μυσί here means “mussel,” not “mice,” suggested by the eminent interpreter of Greek thought G. E. L. Owen, and approved by Nussbaum in her *HSCP* paper, is ingenious, but it cannot be correct. For this ignores the very serious objection that the phrase ἐν τῇ γῇ clearly refers to land animals, τὰ πεζά, whereas mussels and other bivalves are marine creatures *that do not have feet*.<sup>9</sup> Furthermore such an interpretation strains the Greek. It is true that μῦς may mean “mussel” and Aristotle so uses it, but always where the surrounding context makes the sense plain, e.g., *HA* 528a14–15 τῶν δὲ διθύρων [= “bivalves”] τὰ μὲν ἐστὶν ἀναπτυκτά, οἷον οἱ τε κτένες καὶ οἱ μύες κτλ.; *PA* 679b26 τὰ δὲ διθύρα, οἷον κτένες καὶ μύες. Here, by contrast, in a theoretical discussion of animal locomotion in general, the introduction of shellfish without adequate identification is simply too *recherché* to be intelligible. No Greek seeing here the words τοῖς μυσὶ τοῖς ἐν τῇ γῇ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις could fail to think of mice.

Perhaps mindful of this, Nussbaum conjectured ἐν πηλῷ for ἐν τῇ γῇ to go with Owen's interpretation of μυσί = “mussels.” The conjecture is improbable: ἐν τῷ πηλῷ would be the corresponding analogue to ἐν τῇ ἄμμῳ; the absence of the article with πηλῷ in *this sentence* is enough to condemn it. (Another normal correspondence would be ἐν πηλῷ ~ ἐν ἄμμῳ.) Nussbaum quotes in support of her conjecture *HA* 599b26–27 φωλεῖ δὲ τὰ μὲν ἐν τῇ ἄμμῳ τὰ δ' ἐν τῷ πηλῷ. If anything, this sentence is an argument against anarthrous ἐν πηλῷ. Compare further *HA* 591b11–12 νέμονται . . . τὸν πηλὸν καὶ τὸ φῦκος καὶ τὸ βρύον κτλ.; *HA* 592a9 ἀναθολοῦται τὸ ὕδωρ καὶ ὁ πηλὸς ὑπὸ πνευμάτων κτλ.; *Long*. 466b26 οὔτε τὰ πεζὰ ἐν τῇ γῇ οὔτε τὰ ἐνυδρὰ ἐν τῇ θαλάττῃ. Had Aristotle mentioned mud here, and nothing suggests that he did, he would have written ἐν τῷ πηλῷ to balance ἐν τῇ ἄμμῳ. Even in Aristotle's most loosely composed lecture notes there is a difference between compendious Greek and unidiomatic Greek.

In her edition Nussbaum gave up Owen's suggestion that the μύες here were mussels, but retained her conjecture ἐν πηλῷ: “This now seems wrong to me: The

8. Forster attempted to increase the transcriptional probabilities by a minor change: “The form ζέη may be nearer to the MS. reading” (Loeb edition [Cambridge, Mass., 1937], p. 445). This suggestion points the pitfalls of a mechanical approach to scholarship. ζέη may be nearer to the *ductus litterarum* than ζειᾶ, but it would intrude itself into the text with a rather large millstone around its neck. It is in the wrong dialect. The Attic tongue, even as written by Aristotle and Theophrastus, retained long alpha after an epsilon; the eta in ζέη rules it immediately out of court. (For ζειᾶ see further the appendix below.)

9. Strictly, modern zoologists describe bivalves as having an organ called a foot—one foot; they belong to the class of pelecypods (= “hatchet-foot”). Aristotle himself does not so describe them. For him all animals possessed of feet, whether bipeds, quadrupeds, or polypods, must have an *even* number of feet. See, e.g., *HA* 489b19–23, *IA* 708a21, 708b20. As regards the motion of testaceans, such as the mussel, he was genuinely puzzled, *IA* 714b13–16 τὰ δ' ὀστρακόδερμα κινεῖται μὲν, κινεῖται δὲ παρὰ φύσιν· οὐ γὰρ ἐστὶ κινητικά, ἀλλ' ὥς μὲν μόνιμα καὶ προσπεφυκότα κινητικά, ὥς δὲ πορευτικά μόνιμα. It is surely out of the question that the sole exemplum that Aristotle would choose to illustrate motion would be a problematic creature that he has described as not strictly mobile and capable of movement only “contrary to nature.”

second τοῖς is much better taken with ‘people’ understood: and the creatures who slip about in the mud are unlikely to be sea-dwellers. They may be the mice of the MSS. But I now find Diels’ emendation of μυσί to ἐμύσι (reported and accepted by Jaeger) the most attractive solution” (“*De Motu Animalium*”, p. 287). Thus the text to be found in the most recent edition is οἶον τοῖς ἐμύσι τοῖς ἐν πηλῷ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις, translated by the editor “as when tortoises walk in mud or men on sand.” The various objections to this text and translation have all been discussed above.

The final proposal to be considered is that of Jonathan Barnes in his 1980 *CR* review of Nussbaum’s edition (p. 224): “I suspect that ἄμμῳ is a corruption of ἄλφ (cf. Michael, in *IA* 138.17–21), and that A. wrote: τοῖς μυσί τοῖς ἐν τῇ ἄλφ πορευομένοις—that, after all, is where A.’s audience will have seen mice, and where mice do scabble about.” (Barnes accepts Platt’s deletion of τοῖς ἐν τῇ γῇ ἦ.) Michael’s words are: οὐδὲν γάρ αὐτῶν [sc. τῶν πεζῶν] ἀπερεῖσαι τοὺς πόδας δύναται, ὥστε πορείαν ποιήσασθαι ἐν τῷ ὕδατι, οὐδὲ εἰς ἄλφ πλήρη κέγχρου χωρὶς ἀχύρου οὔσης ἢ βάδισις ῥαδίᾳ γίνεται κτλ. Here are two examples, land animals (1) attempting to move on water, represented as impossible, and (2) walking onto a threshing floor full of grain, represented as difficult. Barnes’ conjecture introduces a solecism that is the very contrary of that proposed by Nussbaum. She suggested ἐν πηλῷ, where one would expect ἐν τῷ πηλῷ. Barnes proposes ἐν τῇ ἄλφ, where one would expect ἐν ἄλφ. Earth, sand, water, mud—these are natural elements, and regularly (not invariably) occur with the article;<sup>10</sup> not so ἄλως. The phrase ἐν τῇ ἄλφ should refer to one specific threshing floor (= “on the threshing floor” and not “on a threshing floor”), which is not the sense wanted. Nor can the article be defended here as a “generic” use. Michael’s own phrasing in this passage illustrates clearly these two distinct usages: . . . ἐν τῷ ὕδατι οὐδὲ εἰς ἄλφ . . . , that is, arthrous and generic water followed by an anarthrous and indefinite threshing floor.

All attempts to emend this passage seem to start from the same assumption, namely that the οἶον clause must introduce one or more actual examples, taken from life, which illustrate Aristotle’s point. This immediately creates two distinct problems, each of which has caused a good deal of confusion. Jonathan Barnes has put the first problem as well as any: “The first thing to see is that τῇ γῇ will not do: earth is a resistant medium *par excellence*, and cannot be cited as something which ὑποδώσει ἀεί.”<sup>11</sup> This explains all the attempts to rewrite ἐν τῇ γῇ; it is an invalid objection (compare below). The second problem, arising from the same assumption, entails that the unstable medium of resistance is only relatively, and not absolutely, so. Compare A. Preuss: “Michael errs in assuming that absolute stability is required for movement, for Aristotle clearly means *relative* stability. . . . The mice (or tortoises) and men walking in loose earth, grain, mud, sand, or whatever, need *some* friction, but not absolute immobility of the footing.”<sup>12</sup> But the sentence in which the οἶον clause occurs as an exemplum, so far from positing relative stability, explicitly posits absolute instability on the part of the medium of (non-)resistance and

10. Compare my remarks in “Some Greek Textual Problems,” *HSCP* 67 (1963): 275 on Lucian *Ver. Hist.* 1.7.76 . . . τοὺς ἄλλους ἰχθῦς τοὺς ἀπὸ τοῦ ὕδατος.

11. “Review of Nussbaum,” p. 223.

12. “On the Movement and Progression of Animals”, p. 71 on *MA* 698b15.

therefore a total absence of motion. This becomes clear if one “strips” the sentence down to its basic proposition: εἰ γὰρ ὑποδώσει αἰεῖ . . . οὐ πρόεισιν, οὐδ’ ἔσται οὔτε πορεία . . . οὔτε πτήσις ἢ νεύσις. This is absolute, not relative, language. How any example of any actual creature that really is in motion, howsoever clumsily, can illustrate absolute instability, even imperfectly, is not apparent, for all such motions necessarily involve a *relatively* stable, or unstable, medium of resistance.<sup>13</sup>

It is not difficult to surmise why Aristotle has expressed himself in absolute terms here, even though relative language would have sufficed for τὰ ζῷα. He has just stressed that the general principle of motion involved is not confined to the animal world, but applies to the entire universe, ὁ ὅλος οὐρανός (compare above, pp. 245–46). In the latter case there *is* something absolutely resistant in the strictest sense, τὸ ἔξωθεν ἀπλῶς ἡρεμοῦν καὶ ἀκίνητον (678b9), namely τὸ πρῶτον κινουῦν; this is completely external to the universe. The πρῶτον κινουῦν is the culmination of Aristotle’s thought about motion and is very present in these chapters; that he uses absolute language is fully intelligible once this is perceived. The next thing to grasp, crucial for an understanding of the passage, is that *the entire sentence, including the οἷον clause, is hypothetical*. Mice can scamper over earth or sand, but here the οἷον is part of a “what if,” not a real, situation: what if earth or sand were *not* mediums of resistance, and absolutely so? Then mice, for example, could not move over them. (I suppose that Aristotle chose mice because of their small size; on this hypothesis even a very light creature could not progress.) Aristotle intends us to suspend our belief in the actual attributes of earth and sand to make the illustration fit his hypothesis—εἰ γὰρ ὑποδώσει αἰεῖ. The truth of the matter is that he had no good exemplum from the physical world to illustrate such a hypothesis and he would have done better to have given none. The natural tendency of readers to make the οἷον clause—whatever the creatures envisaged in it—correspond exactly to physical realities has been at the core of all the confusion.

Had Aristotle employed a contrary-to-fact condition, his meaning might have been clearer. But once again a close inspection of the Greek is illuminating; notice that the protasis is neither “more vivid” (ἐὰν c. subj.) nor “less vivid” (εἰ c. opt.), but the so-called “most vivid,” or “minatory-monitory,” εἰ with the future indicative, which is a very emphatic construction. *Aristotle has a proclivity for the future indicative in expressing ἀδύνατα*. Thus in the next chapter of the *MA*, 699b8–11 he writes τοσαύτην οὖν δεήσει τὴν δύναμιν εἶναι τῆς γῆς . . . εἰ δὲ τοῦτο ἀδύνατον κτλ. There is a very clear example at *GA* 787a8–10 εἰ οὖν κατὰ τὸν λεγόμενον ἔσται διορισμὸν τὸ δὲ καὶ βαρὺ, συμβήσεται τὰ αὐτὰ εἶναι βαρύνοντα καὶ μεγάλωφωνα καὶ ὀξύφωνα καὶ μικρόφωνα. τοῦτο δὲ ψεῦδος. Compare also *Met.* 992b7–8 περὶ τε κινήσεως, εἰ μὲν ἔσται ταῦτα κινήσις, δῆλον ὅτι κινήσεται τὰ εἶδη [which is an ἀδύνατον]. In our passage the future indicative ὑποδώσει, joined with αἰεῖ, serves to bring out the ἀδύνατον “most vividly.”

I now reproduce the entire sentence and give a free translation, with what is unexpressed but implied therein supplied between angular brackets, in the hopes that an intelligible interpretation of the Greek will thereby emerge:

13. That Aristotle is not thinking of an animal attempting motion on a medium of resistance unnatural to it (for example τὰ περὶ ἅ ἐπὶ τοῦ ὕδατος), which would provide a clear, if imperfect, illustration (since that too involves relative instability), we have noted; see above, n. 1.



εἰ γὰρ ὑποδώσει αἰεὶ, οἶον τοῖς μυσὶ τοῖς ἐν τῇ γῇ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις, οὐ πρόεισιν, οὐδ' ἔσται οὔτε πορεία, εἰ μὴ ἡ γῇ μένοι, οὔτε πτήσις ἢ νεῦσις, εἰ μὴ ὁ ἀήρ ἢ ἡ θάλαττα ἀντερείδοι.

For if (the external medium of resistance) shall always give way beneath (the animal), as for example (if earth shall give way without cease beneath) mice walking on it, or on sand (if you will), (then the animal) shall not move forward, and there shall be neither motion on land, unless the land should resist (as, in fact, is actually the case apart from this hypothesis) nor flight nor swimming, unless air or sea should offer counter-resistance (as of course they do in reality).

Observe now the style of this sentence. The apodosis that we expect to follow the protasis εἰ ὑποδώσει αἰεὶ is simply οὐ πρόεισιν, οὐδ' ἔσται οὔτε πορεία οὔτε πτήσις ἢ νεῦσις. That is straightforward and emphatic. The two εἰ μὴ clauses may seem a superfluous interruption of the flow of the sentence. In fact, they serve a definite purpose; they are Aristotle's reminders that the entire sentence is hypothetical and does *not* correspond to any reality in the phenomenal world. I have tried to convey their force in the paraphrase given above. Michael has been dismissed by modern commentators for failing to understand the text; his remarks are very concise, but, if I mistake not, they show that he understood the sense perfectly: λέγει [sc. Ἀριστοτέλης] “εἰ γὰρ ὑποδώσει καὶ ὑπείξει αἰεὶ ἡ γῇ τοῖς ἐν τῇ γῇ πορευομένοις μυσὶν (ἔστω γὰρ λόγου ἕνεκεν τὰ πορευόμενα μῦς), οὐκ ἔσται πορεία” (p. 105.24–26 [Hayduck]). To recapitulate: there are three basic media of resistance in the physical world—earth, air, water. Aristotle proposes a “what if?” situation. What if these media, for instance earth, failed to perform their natural functions of resistance, what, then, would be the consequence? He tells us the answer—no local motion would be possible. The sentence is hypothetical from beginning to end, and objections such as that of Barnes to ἐν τῇ γῇ (“earth is a resistant medium *par excellence*”) are beside the mark.

It remains to explain the meaning of the words τοῖς ἐν τῇ γῇ ἢ τοῖς ἐν τῇ ἄμμῳ, which have caused no little confusion. At first sight the reason for this mention of both earth and sand rather than the one or the other alone is not apparent and clearly confused those Byzantine scholars who rewrote the clause (see the apparatus criticus). On grounds of sense also some scholars (Platt, Barnes) have deleted the words τοῖς ἐν τῇ γῇ ἢ. Again, as we have seen, both the nouns in question, γῇ and ἄμμῳ, have been conjecturally replaced by others (ζεῖα, ζέη, πηλῶ, ἄλω). But that earth, γῇ, as one of the three fundamental media of resistance (along with air and water), would naturally be mentioned here ought now to be apparent. (Indeed the clause just below in b17, εἰ μὴ ἡ γῇ μένοι, strongly suggests a previous mention of γῇ, as Erwin Cook has pointed out to me.) Sand is added merely as a particularly unstable *species* of earth in an attempt to make the hypothetical situation easier to picture. It does not seem to have been noticed that the word order shows that neither earth nor sand can easily be deleted here as an interpolation or later addition. For had Aristotle mentioned only one of the two, the natural word order would have been τοῖς ἐν τῇ γῇ πορευομένοις μυσὶν (or τοῖς ἐν τῇ ἄμμῳ κτλ.), with the prepositional phrase inserted between τοῖς and πορευομένοις—which is exactly what we find in Michael's commentary, p. 105.25 (Hayduck). (Beware of inferring from his silence that he did not also have ἡ τοῖς ἐν τῇ ἄμμῳ in his copy of Aristotle!) On the other

hand, there is a well-known usage of ἥ to signalize not so much a strict disjunction as a *correction* or *restriction*: "It should be remembered that Aristotle sometimes uses the term ἥ in order to correct or to restrict a preceding statement."<sup>14</sup> Once this usage is recognized, οἶον τοῖς μυσὶ τοῖς ἐν τῇ γῇ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις becomes more intelligible: "take the case of mice, those that is to say moving on earth—or more precisely those moving on sand." (The *first* article, before μυσί, is presumably generic.)

Thus the *language* of this sentence, despite the various assaults upon it, is unobjectionable; the fact remains that the *thought* contained in it is confusing. The responsibility for this is to be laid at the door of Aristotle himself. He has attempted to describe two things that are ultimately incompatible and thus has produced a sentence that is to a certain extent at cross purposes with itself. First, as we have indicated, he proposes a hypothetical situation that entails *absolute* instability. Then, in an attempt to assist his audience in picturing such a situation, he introduces a specific illustration. This immediately introduces a case of relative, not absolute, instability. The reason why he mentions sand in particular is not far to seek. Under the general category of the element earth, it would be difficult to conceive of a better and more familiar example of an earthy, non-resisting medium than sand. One need only think of our sand egg-timers or of sand slipping through one's fingers in order to picture its instability.<sup>15</sup> But a medium of *relative* non-resistance it remains. The exemplum thus illustrates only imperfectly what it was intended to illustrate.

#### APPENDIX: ζεῖά and ζεῖαί

For all that I reject any form of ζεῖά as a conjecture in this passage (see above), we may not part company with it quite yet, for the word has not received adequate treatment. To begin with, Forster's only authority for his conjecture ἐν τῇ ζέῃ is the form ζέῃ in *PPetr.* 2, p. 69. The document in question is a letter, said to be of the third century B.C. and written in ordinary "Attic" koinê, that is to say, in a Greek where one would not expect such a form as ζέῃ. The editor of the papyrus, J. P. Mahaffy, states the following: "The hand is very bad, and the lines irregular. *The writer's α and η are hardly distinguishable* [emphasis mine]." A new inspection of the papyrus might well reveal that the form occurring therein is actually ζεῖα, a well-attested spelling.

Nussbaum, *HSCP* 80 (1976):140–41, makes the following statements: "Farquharson's suggestion ἐν τῇ ζεῖᾳ . . . must be rejected. ζεῖά, in its everyday use designating animal fodder, occurs invariably in the plural (Hom. *Od.* 4.4 [*sic*: read 4.41], Hdt. 2.36, etc.). Its only attested use in the singular is a technical name for a species of grain (Theophr. *H.P.* 8.9.2)." These remarks are inaccurate and appear to be based on the entry in LSJ, which is itself defective.

14. W. J. Verdenius and J. H. Waszink, *Aristotle on Coming-to-Be and Passing-Away*<sup>2</sup> (Leiden, 1966), p. 19. They give examples. Compare also R. D. Hicks on *De An.* 416a11 αὐτὸ . . . μόνον τῶν σωμάτων ἢ τῶν στοιχείων, "ἥ is corrective, 'I mean'." *De An.* 419b24, ὥσπερ ἂν εἰ σωρὸν ἢ ὄρμαθὸν νόμμου τύποι τι φερόμενον ταχὺ, may be comparable. See the commentators ad loc. For this and related uses of ἥ see further W. Wyse on Isaeus 6.16 (p. 502), the apparatus criticus to T. W. Allen's edition of the *Ps.-Hdt. Vit. Hom.*, 305, 333, 420, and my remarks in "Aristotle's Definition of Anger," *Philologus* 107 (1963): 68.

15. I am aware that neither of these comparisons involves sand functioning as a medium of resistance for motion. They are nevertheless suggestive of the peculiar instability of sand. For sand as an unstable medium consider the following sentence: "when it comes to the allegedly pervasive and *irresistible* influence of science in society, Appleyard ventures onto sandier ground [emphasis mine]." T. Ferris in an article in *The New York Review of Books* 40.9 (13 May 1993), p. 17.

LSJ give two meanings for ζειά, 1) “one-seeded wheat, *Triticum monococcum*” and 2) “rice-wheat . . . ζ. δίκωκος, *Triticum dicoccum*.” Most of the examples in LSJ occur under the first meaning, *Triticum monococcum*. Note that LSJ s.v. τίφη also define that word as one-grained wheat, *einkorn*, *Triticum monococcum*; compare H. Rackham’s note to Pliny *HN* 18.81: “Ζειά (δίκωκος) and ὄλυρα were both varieties of two-grained or ‘emmer’ wheat, while τίφη = ζειά ἀπλῇ was one-grained or ‘einkorn’ wheat (*Triticum monococcum*).” For more precise details on the different types of grain see J. André, *L'alimentation et la cuisine à Rome* (Paris 1961), p. 53, with references there given. From Nussbaum’s account quoted above the following assertions may be extracted: 1) ζειά had an “everyday” use, specifically in the sense of “animal fodder”; 2) this everyday use was found invariably in the plural; 3) the word also had a technical use as the name of a species of grain; 4) only in this technical use is the singular attested. Not one of these assertions can be accepted without qualifications; some are plainly false.

That ζειά in common speech meant specifically animal fodder is apparently an inference based on the beginning of the LSJ entry: “one-seeded wheat, *Triticum monococcum*, used as fodder for horses, Hom. only in Od.; πὰρ δ’ ἔβαλον ζειάς, ἀνὰ δὲ κρὶ λευκὸν ἔμειξαν 4.41, cf. 605 . . .” It is perfectly true that in the fourth book of the *Odyssey* ζειά is used as horse fodder and doubtless it continued to be used for animal fodder; compare Theophr. *Hist. Pl.* 8.9.2 ὁ . . . καρπὸς [sc. of the ζειά] προσφιλὴς πᾶσι τοῖς ζώοις. But the word was also very commonly used with the meaning food for humans. The next passage cited in LSJ (the Greek is quoted) is Hdt. 2.36, where he tells us that the Egyptians made their bread from it. Xen. *An.* 5.4.27 (also in LSJ) mentions its use as food among the Mossynoeci on the south coast of the Euxine. Attic Greeks were familiar with the employment of the grain for human consumption, as is clear from two comic fragments (neither in LSJ), Aristoph. frag. 428 K.-A. ἀρακοὺς, πυρούς, πτισάνην, χόνδρον, ζειάς, αἴρας, σεμίδαλιν (note especially this last word = “the finest wheaten flour” according to LSJ) and Pherecr. frag. 201 K.-A. κυάμους, ἀφάκην, ζειάς, αἴρας, ἀκεάνους.

To distinguish between a “non-technical” and “technical” meaning of ζειά is artificial; to attempt to establish on the basis of such a distinction a rigid rule whereby the non-technical meaning is used in the plural only, the singular being confined to the technical meaning, is wrong. Both meanings are equally technical or non-technical (I prefer the latter); Galen 6.516.17 Διοσκουρίδης δὲ ἐν δευτέρῳ περὶ ὕλης [= 2.89] ταῦτα γράφει· ζέα διόσῃ, ἡ μὲν γὰρ ἀπλῇ, ἡ δὲ δίκωκος καλεῖται. The reality is that where the singular is used it is usually collective; this is normal Greek. Compare the way such words as πυρός or καρπός occur in actual use, or take, for that matter, Michael’s illustration, which inspired Farquharson’s conjecture in the first place, κέγχρος; Herodotus uses this word both in the singular (1.193.4) and in the plural (4.17.1). Michael himself used the collective singular. It remains true that some words occur more frequently in the plural (κριθαί, ὄλυραι etc.), but appeal must not be made to that fact to deny the correctness of the singular.

In the absence of evidence from Aristotle’s own writings the most pertinent evidence is to be sought in the botanical works of Theophrastus, Aristotle’s chief assistant in that area of research, and it is remarkable that he has been largely ignored. There are at least fourteen occurrences of ζειά in Theophrastus. (LSJ cite only *Hist. Pl.* 8.9.2; add *Hist. Pl.* 2.4.1, 4.4.10, 8.1.1, 8.1.3, 8.8.3; and *Caus. Pl.* 4.4.5, 4.6.3, 5.6.12. Some of these passages contain more than one example of the word.) Of these, eleven are examples of the singular and three of the plural. Of the plural examples, two of the three occur in passages side by side with the singular (*Hist. Pl.* 8.1.1; *Caus. Pl.* 4.4.5, 6.6.12; singulars occur in the last two passages). Farquharson’s ἐν τῇ ζειᾷ is wrong, but it is not wrong because it is singular.

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