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# Aristotle's Definition of the Soul: Why Was it Misunderstood for Centuries? The Dubious Lines *Anim.* II 1,412b1–4

By Abraham P. Bos, Amsterdam

**Abstract:** At least from AD 200 onwards Aristotle's definition of the soul has been misinterpreted. The soul is not the entelechy of a body 'furnished with organs' but of a body which is the soul's instrument (not only for producing organs, but for perception and locomotion as well). But what made the mistake so natural that nobody became suspicious in eighteen hundred years? No doubt this was due to lines II 1,412b1–4 of *On the Soul*, where the parts of plants are called '*organa*'. These lines must have originated from a marginal note like one we find in ms E (Parisinus gr. 1853).

## 1. Introduction

Aristotle, *On the Soul* II 1 is of crucial importance.<sup>1</sup> However, no justice has been done to it in the exegetical tradition. In the first part of the chapter Aristotle develops his famous definition of the soul.<sup>2</sup> But for centuries this definition has been misinterpreted.<sup>3</sup> At least since Alexander of Aphrodisias (AD 200) scholars have accepted the view that Aristotle interpreted the soul as: 'the first entelechy of a natural body *equipped with organs*'.<sup>4</sup>

- 1 Cf. M. Furth (1988) 147: "The pivotal section of the work is chapter 1 of Book ii" and C.H. Kahn (1966) 67. See also W.D. Ross (1961) 10: "The conception of soul as the entelechy of the living body is so much the central conception of the *De Anima* that ..."; see also p. 15.
- 2 *Anim.* II 1,412b5–6: ἐντελέχεια ἡ πρώτη σώματος φυσικοῦ ὁργανικοῦ (text A. Jannone and E. Barbotin 1966). Cf. 412a27–28.
- 3 That the text of *Anim.* II 1 was the source of many misunderstandings must be due to the fact that the text as such was not intended for publication, but primarily for the author, Aristotle himself. The Aristotelian Corpus must go back to his private archival material.
- 4 Cf. Alex. Aphrod. *Anim.* 16, 11 (ed. I. Bruns, 1887): ἔστι γὰρ ὁργανικὸν σῶμα τὸ ἔχον πλείω τε καὶ διαφέροντα μέρη ψυχικαῖς δυνάμεσιν ὑπηρετεῖσθαι δυνάμενα. *Quaest.* 54, 9–11. Because Aristotle states in *Hist. anim.* VII (IX) 3,583b15–28 that a male foetus is still ἀναρθρον, ἀδιάρθρωτον (unarticulated) during its first 40 days, scholars later concluded that such a foetus does not yet contain a soul. Cf. G. Jerouschek (1988) 14–16; 41 and L.G.M. Spruit (1991) 68. D.A. Jones (2004) 21–32 is much more accurate. But Aristotle does not say such a thing anywhere. And it would clash with his views in *Gener. anim.* II 1 and *Anim.* II 1,412b27 and 5,417b16–18, where he explicitly declares the soul to be present in semen. If Aristotle had really wanted to talk about 'a body that possesses differentiated parts', he would have written σῶμα διηρθρωμένον. But to effect this differentiation, the soul always needs an 'instrumental body'. Aristotle's remarks in *Anim.* III 12,434b4–5; 434a13 and II 7,418b9 should also have counted more significantly against Alexander of Aphrodisias' interpretation. G.E.R. Lloyd (1996) 42, who talks about "the perceptive soul, which is supplied by the male parent and is present, again potentially, only at the point when a

This traditional hylomorphistic interpretation of *On the Soul* should be abandoned.<sup>5</sup> The unity of the soul as first entelechy with its *sôma organikon* is not a unity with the visible body 'equipped with organs', but a unity of the soul as first entelechy with its 'instrumental body',<sup>6</sup> which for Aristotle is also the soul's instrument for perception as well as its instrument for locomotion.

Aristotle calls this instrumental body the ἔμφυτον or σύμφυτον πνεῦμα or 'vital heat',<sup>7</sup> ἔμφυτος θερμότης, ἔμψυχος θερμότης (*Anim.* II 4,416b29), ψυχικὴ θερμότης (*Gener. anim.* III 2,752a2; 11,762a20), φυσικὴ θερμότης (*Meteor.* IV 3,380a20), ζωτικὴ θερμότης (*Iuv.* 12 (6) 473a9); τὸ θερμόν (*Anim.* II 4,416b29; *Spir.* 9,485a28), τὸ φυσικὸν θερμόν (*Meteor.* IV 3,380a22), ψυχικὸν πῦρ (*Resp.* 15,478a16), ἔμψυχος οὐσία (*Mund.* 4,394b11), φυσικὸν πῦρ (*Resp.* 8,474b10–13) etc. It has been claimed too often that Aristotle's *On the Soul* can be understood without paying attention to Aristotle's doctrine of *pneuma* as vital principle. And without any justification J. Annas has categorically stated: "Aristotle has no overall coherent view of the biological role of *pneuma*; perhaps he would have developed one if he had lived longer."<sup>8</sup>

new animal is recognisable as such", also fails to solve how this perceptive soul is added. From Plutarch, *Quaestiones Platonicae* 8, 1006D (ed. H. Cherniss 1976) and [Hippolytus], *Refutatio Omnium Haeresium* VII 24,1–2 (ed. M. Marcovich 1986) it is evident that before Alexander of Aphrodisias a different exegesis of 'organikon' was accepted. It is remarkable that these texts have never been mentioned in commentaries on Aristotle, *De Anima*.

5 Cf. A.P. Bos (2003) 363–368.

6 There has been a change to the translation 'instrumental', 'serving as an instrument' in recent times. See M.L. Gill (1989) 133; 220; G. Reale and A.P. Bos (1995) 288; G.E.R. Lloyd (1996) 41; S. Everson (1997) 64; A.P. Bos (2003) esp. 69–122; See also J. Barnes (1999) 121; B. Schomakers (2000) 219; 220; R. Ferwerda (2000) 19; id., (2005) 136; D. Gutiérrez-Giraldo (2001) 164; S. Menn (2002) 110 n. 40; L.M. de Rijk (2002) vol. 1, 50 n. 145; L.P. Gerson (2005) 136; D. Quarantotto (2005) 240; D. Bronstein (2006) 425; J. Dillon (2007) 55 n. 7; P. Gregoric (2007) 19 and 23; R. King (2007) 323; R. Polansky (2007) 161; K. Corcilius (2008) 31: 'werkzeughaft'; F. Buddensiek (2009) 311; M. Canarsa (2009) 76 n. 79; J. Dillon (2009) 353 n. 7 ('perhaps'); P. Macfarlane and R. Polansky (2009) 113; M. Migliori (2009) 243–244; C. Shields (2009b) 283.

7 Cf. A.P. Bos and R. Ferwerda (2007) and (2008).

8 J. Annas (1992) 20. Cf. also D. Bronstein (2006) 426: "The *De anima* definition focuses on the soul's relation to the visible body, while the biological works emphasize *pneuma*"; R. King (2007) 323: "Now, there is hardly a whiff of *pneuma* in *De An.*" In a more general sense I. Düring (1966) 343–344: "Viele Gelehrte haben versucht, entweder eine aristotelische Theorie über die Lebenswärme oder eine über das Pneuma zu rekonstruieren. Keiner dieser Versuche hält einer Gegenüberstellung mit den vorliegenden Aussagen des Aristoteles stand, wahrscheinlich deshalb nicht, weil Aristoteles die Aufstellung einer konsequenten Theorie nie zu Ende geführt hat"; M.C. Nussbaum (1978) 143: "One of the thorniest exegetical problems confronting an interpreter of *MA* is the theory of the *symphyton pneuma*, or innate breath, presented in the treatise's penultimate chapter. The theory is internally obscure, one of a series of cryptic pointers towards a fuller account of this *pneuma* that Aristotle may have planned, or even composed, but which does not survive"; ibid. 161: "But in the absence of the detailed account of its operations that we suspect Aristotle at some point either wrote or planned, they strike us as a somewhat incredible promotional effort"; ibid. 163: "We had better regard the theory as one in the course of development and *pneuma* as a hypothetical gap-filler whose workings cannot be scrutinized too closely"; G.E.R. Lloyd (1996) 46: "What little Aristotle has to say on the subject of *pneuma*



## 2. What Is Wrong with the Exegesis of ‘*Sôma Organikon*’?

There is a fundamental error in the traditional description of the soul as ‘the first ἐντελέχεια of a natural body furnished with organs for the exercise of its faculties,’ as formulated by W.D. Ross (1961) 20.

(a) In the first place there is the problem that ‘a body furnished with organs’ is something entirely different from ‘a body which potentially has life.’ For ‘a body furnished with organs’ is already a living body.

(b) Another objection to this formulation is the assumption that Aristotle made the beginner’s error of drawing up a definition which already contains the *definiendum*: ‘the soul is the first entelechy of an ensouled body.’

(c) However, ὀργανικόν never means ‘furnished with organs’ in Aristotle, but always ‘instrumental’, ‘serving as an instrument.’<sup>9</sup> It is out of the question that only in the definition of soul the word ὀργανικόν has been given a meaning which it does not have anywhere else.<sup>10</sup>

(d) Also, in that case it is totally unclear from what moment the soul is present as ἐντελέχεια. For at the moment of fertilization there is no question yet of ‘a body furnished with organs for the exercise of its faculties.’ This would mean that the soul only enters a κύημα in a later phase of the development of the

is notoriously obscure and has occasioned protracted scholarly debate? K. Corcilius (2008) 332: “Aristoteles’ Äusserungen zum *symphyton pneuma* sind spärlich und zudem schwer unter einen Hut zu bringen”. G. Freudenthal (1995) 112: “Now, scholars are in general agreement that Aristotle never completely worked out the theory of connate *pneuma*. Therefore, the task which faces the interpreter is to make a plausible guess as to what Aristotle *intended* to accomplish by introducing the concept of *pneuma* into his physiology: What, we should ask, were the *problems* he sought to solve?” Freudenthal himself concludes on p. 136: “Aristotle apparently groped toward a general theory of connate *pneuma*, which was to describe the physiology of all soul-functions”; id. (2009) 249. See now also F. Buddensiek (2009).

9 Cf. *Anim.* III 9,432b18: ‘some part instrumental towards this movement’ (transl. W.S. Hett (1936) 183) – μόνον ὀργανικόν –; and b25: ‘parts instrumental to progression’ – τὰ ὀργανικὰ μέρη τῆς πορείας –. H. Bonitz, *Index Aristotelicus* 521a20–49 mentions 23 passages. To these might be added six more: *Anim.* III 9,432b18; *Hist. anim.* I 6,491a26; *Part. anim.* II 1,647a2; *Inc. anim.* 3,705b2; *Gener. anim.* II 6,742b2; b10. C. Shields (2009) 282 n. 22 is right that on the basis of most of these texts it might be concluded that “anything which is sufficiently structured to be ‘*organikon*’ must already be anhomoiomerous.” But that is because Aristotle is speaking there about ‘instrumental parts’. However, when Aristotle speaks about the ‘instrumental body’ of the soul he means the body that is necessary for the production of these anhomoiomerous parts.

10 Cf. C. Shields (2009) 282–283: ‘The word has this meaning nowhere in Aristotle.’ Pace R. Bolton (1978) 275 n. 6 and F. Ricken SJ (2005) 426 in his review of A.P. Bos (2003): “Die traditionelle Interpretation versteht unter *soma organikon* einen Körper, der mit Organen ausgestattet ist. An allen anderen Stellen, die der Index von Bonitz bringt, hat *organikon* nach B. jedoch nicht diese Bedeutung; es wurde vielmehr gebraucht für Dinge die instrumental sind, d.h., die als Mittel oder Werkzeug dienen. Das mag zutreffen, schließt jedoch nicht aus, daß Aristoteles das Wort in *De anima* II 1 anders gebraucht. Daß das der Fall ist, wird aus den unmittelbar folgenden Zeilen (412b1–4) deutlich.” See also M.D. Boeri (2009) 62–63 with n. 15 and R.W. Sharples (2009) 159 n. 23: “A major difficulty to Bos’s interpretation of Aristotle is that 412b1–4 need to be deleted as a mistaken gloss”.

κύημα. But Aristotle never talked about this in his œuvre. He did establish in *On the Soul* II 1,412b27 that semen of animals and fruit of plants already possesses soul. And in *Generation of Animals* II 1,735a20–22 he established emphatically that directly after fertilization the κύημα grows and develops thanks to the vegetative function of its own soul.<sup>11</sup>

(e) An urgent question for the traditional view is what principle leads the development of an embryo from the moment of copulation to the situation in which the embryo can be characterized as ‘furnished with organs’.

(f) On the other hand the Aristotelian view was that soul is already present in semen and in the fruit of a plant,<sup>12</sup> and therefore a σῶμα ὁργανικόν of the soul is also present, even if it is not a ‘body furnished with organs’, but a body with potential for vegetative activity (and in the case of human semen potential for perception and intellective activity). For the powers of the soul are immediately present with the existence of the soul, and long before the instrumental parts of the visible body have been formed.

(g) If the σῶμα ὁργανικόν can be taken to designate the σύμφυτον πνεῦμα, there would also be complete agreement between Aristotle's biological works and his *On the Soul*, which in so many respects serves as the doctrinal basis of the biological writings and is frequently referred to there as having already been written.

(h) It is then clear that Aristotle is referring to this specific soul-body whenever he declares that the soul cannot undergo all its πάθη ‘without body’.

(i) And it is then clear what he means when he says in I 3,407b25–26 that just as a craft needs to use its instruments, so the soul needs to use its body.

(j) It is then clear that the soul uses the vegetative heat (τὸ θερμόν – *Anim.* II 4,416b29; *Spir.* 9,485a28 –, ψυχικὴ θερμότης, ἔμψυχος θερμότης – *Anim.* II 4,416b29 –, ψυχικὸν πῦρ) as its instrumental body for its vegetative, nutritive and generative functions. Aristotle can only have designated ‘ensouled heat’, ‘ensouled fire’ or ‘ensouled air’ (*Anim.* II 8,420b7) in this way because he saw

11 Cf. A.P. Bos (2009). In *Anim.* II 5,417b16–18 Aristotle also says explicitly: ‘The first change in the sensitive part (of the soul) is caused by the male parent, and when it has been begotten the subject has sensation in the sense in which we spoke of the mere possession of knowledge’ – Τοῦ δ’ αἰσθητικοῦ ἡ μὲν πρώτη μεταβολὴ γίνεται ὑπὸ τοῦ γεννῶντος, ὅταν δὲ γεννηθῇ, ἔχει ἤδη ὥσπερ ἐπιστήμην καὶ τὸ αἰσθάνεσθαι –. Aristotle is not talking here about the moment of birth, as is suggested by the translations of W.S. Hett (1936) 99, W.D. Ross (1961) 234 “the first stage in the history of the capacity is the imparting of it by the parent to the child at birth” and J.A. Smith in J. Barnes (ed.) vol. 1 (1984) 664, but about the moment of conception, as A. Jannone and E. Barbotin (1966) 45 and P. Thillet (2005) 122 make clear. Cf. D.W. Hamlyn (1968) 102: “The first change ... takes place on conception.” Cf. *Gener. anim.* II 1,735a13. From the moment of his conception man is a living being endowed with potential for perception although this potentiality is not yet actualized.

12 Cf. R. Polansky (2007) 159: “If we go back to the seed we arrive at a condition where such life is only a potentiality. Seeds can remain in this condition of potentiality for a long time.” However, rather disappointingly, he continues: “Perhaps this goes back too far in the genesis of the living being since the definition of soul may not apply to the seed.”



souls as forms of the ‘instrumental body of the soul’ which he postulated. That Alexander of Aphrodisias disagreed with him does not alter this fact.

(k) The soul uses its αἰσθητήρια as instruments for perception (and these αἰσθητήρια are plainly different from the ‘instrumental parts’ – such as eyes and ears – of the visible body).

(l) The soul needs πνεῦμα as a material instrument for effecting locomotion (*Anim.* III 10,433b19–20), just as Aristotle argued in *Motion of Animals* 10.

(m) This explains why Aristotle does not say in III 4 that the intellect does not need ‘a body equipped with organs’, but that it does not need ‘an instrument’.

(n) In this reading, the definition of the soul is wholly compatible with Aristotle’s proposition in *Generation of Animals* II 3,736b29–27a1 that the δύναμις of every soul seems to have something of a body different from and more divine than the so-called elements, viz. πνεῦμα.

(o) In this reading, we can recognize that this definition also tallies with the proposition of *On the Cosmos* 4,394b9–11 that πνεῦμα is an ‘ensouled substance’ – ἢ τε ἐν φυτοῖς καὶ ζώοις ... ἔμψυχος οὐσία<sup>13</sup> and with the treatise *On the Life-Bearing Spirit* (*De Spiritu*), which W. Jaeger and other modern authors have wrongly dated almost a hundred years after Aristotle, and where the σύμφυτον πνεῦμα is said to be connected with the soul in a natural unity (1,481a17), and is called the soul’s instrument in chapter 9,485b1–10.

(p) Hence he can also say *On the Soul* II 4,415b18 that all ‘natural bodies’ are instruments of the soul, in reference to the four sublunary elements, which play an important role in his theory of perception.<sup>14</sup>

(q) And hence Aristotle in *On the Soul* II 4,415b7 can freely talk about semen as ‘instrument of the soul’.<sup>15</sup>

### 3. So Where Does the Misinterpretation Come From?

But how then is it possible that for centuries everybody felt free to interpret σῶμα ὀργανικόν as ‘a body equipped with organs’? This is hard to reconstruct in the case of Alexander of Aphrodisias. It is certainly conceivable that, five hundred years after Aristotle’s active period, he wanted to put forward a modernized version of Aristotle’s philosophy, and remove vulnerable positions of his great predecessor. Plotinus dealt with Plato’s legacy in comparable fashion.

But with regard to modern readers we will doubtless have to concur with R. Bolton, F. Ricken, and R.W. Sharples (cited above) that lines II 1,412b1–4 gave scholars cause to read ὀργανικόν in the transmitted text as ‘equipped with

13 Cf. G. Reale and A.P. Bos (1995) 288.

14 This passage has usually also been interpreted in a hylomorphistic sense, as if Aristotle is talking there about ‘living bodies’ of plants, animals and human beings. Cf. § 6. below.

15 On this passage, which has been wrongly excluded from the modern editions of *On the Soul*, cf. § 7 below and A.P. Bos, *Hermes* (2010).

organs'. For after Aristotle has introduced the term ὀργανικόν for the first time, the Greek text continues as follows:

412b1–4: 'The parts of plants are instruments too, though very simple ones: e.g., the leaf protects the pericarp, and the pericarp protects the fruit (καρπός); the roots are analogous to the mouth, for both these draw in food' (W.S. Hett, 1936, 69 – with changes) – "Ὅργανα δὲ καὶ τὰ τῶν φυτῶν μερῇ, ἀλλὰ παντελῶς ἀπλᾶ, οἷον τὸ φύλλον περικαρπίου σκέπασμα, τὸ δὲ περικάρπιον καρποῦ. αἱ δὲ ρίζαι τῷ στόματι ἀνάλογον. ἅμφω γὰρ ἔλκει τὴν τροφήν – This passage undoubtedly persuaded many later readers that σῶμα ὀργανικόν must refer to the body of a plant with its leaves and fruit as instrument/organ for protecting the seeds/fruit, and just so to the body of animals and humans with their various bodily parts.

But there is a problem with these four lines. They bring up the very notion of 'fruit' (καρπός) which Aristotle mentions in the same chapter as an example of 'a body that possesses soul' (412b27).

And they immediately raise the question how 'the (anhomoiomerous) instruments' of a plant, like the skin and the flesh of the fruit, are formed from the seed of a parent plant. Aristotle is very keen on this. In *On the Life-Bearing Spirit* 4,483a12 he also attacks those who claim that breath is the most fundamental system of life in all living beings, by asking how the lungs of a new animal or human being are formed in an embryo that does not yet breathe – τὸ μὲν γὰρ ἀναπνεῖν ὅταν ἀπολυθῇ τῆς κυούσης, ἡ δ' ἐπιφορὰ καὶ ἡ τροφή καὶ ξυνισταμένου καὶ ξυνεστηκότος – (text A. Roselli 1992). A plant's roots and leaves, too, must be produced by a soul-principle as entelechy. But this principle can only do so in an indissoluble unity with an operative principle that is material.<sup>16</sup> (Cf. *Phys.* II 8,199b7–8: "Ἐτι ἀνάγκη σπέρμα γενέσθαι πρῶτον, ἀλλὰ μὴ εὐθὺς τὰ ζῶα.) For the real 'work' (ἔργον) of the vegetative soul is concoction (πέττειν, τρέφειν). And for this purpose the vegetative soul requires an instrument, and only later 'organs'. In *On the Soul* II 4,416b29 Aristotle calls this instrument 'vital heat'. And he identifies this heat there as that which 'effects' (ἐργάζεται) the typical function of the vegetative soul, i.e. the concoction of food (cf. *Spir.* 9,485a28).

#### 4. Who Is the Author of Lines 412b1–4?

We can certainly note that the proposition advanced in lines 412b1–4 seems soundly Aristotelian. Aristotle talks repeatedly about leaves and fruits of plants. And elsewhere in his work we also find him saying that the roots of a plant are an equivalent of the mouth of animals and human beings. Precisely in *On*

16 For plants it can be said: 'their psychical principle is corporeal and impeded in its motion' – ἡ τῆς ψυχῆς ἀρχὴ πολλῶν δυσκινητός ἐστι καὶ σωματώδης –, *Part. anim.* IV 10,686b23–7a6. This passage shows that the fact that plants have their roots 'below' is due to their low-quality soul-principle.



*the Soul* II 4,416a4–5, when Aristotle discusses the vegetative soul-function and criticizes Empedocles, he notes: ‘the head in animals corresponds to the roots in plants, if we are to identify and distinguish instruments by their function’ – ἄλλ’ ὥς ἡ κεφαλὴ τῶν ζώων, οὕτως αἱ ρίζαι τῶν φυτῶν, εἰ χρὴ τὰ ὄργανα λέγειν ἕτερα καὶ ταῦτά τοῖς ἔργοις – (transl. W.S. Hett 1936, 89). And in *Parts of Animals* IV 10,686b35–7a1 he says: αἱ ρίζαι τοῖς φυτοῖς στόματος καὶ κεφαλῆς ἔχουσι δύναμιν. Cf. *On Youth* 1,468a9–11: ἀνάλογον γὰρ εἰσιν αἱ ρίζαι τοῖς φυτοῖς καὶ τὸ καλούμενον στόμα τοῖς ζώοις and *Inc. anim.* 4,705b8.

In *Physics* II 8,199a23–26 he observes: ‘By gradual advance in this direction we come to see clearly that in plants too that is produced which is conducive to the end – leaves, e.g. grow to provide shade for the fruit’ – κατὰ μικρὸν δ’ οὕτως προϊόντι καὶ ἐν τοῖς φυτοῖς φαίνεται τὰ συμφέροντα γινόμενα πρὸς τὸ τέλος, οἷον τὰ φύλλα τῆς τοῦ καρποῦ ἕνεκα σκέπης – (transl. R.P. Hardie/R.K. Gaye, in J. Barnes ed. vol. 1, 340).

He continues in 199a26: ‘If then it is both by nature and for an end that ... plants grow leaves for the sake of the fruit and send their roots down (not up) for the sake of nourishment ...’ – Ὡστ’ εἰ φύσει τε ποιεῖ καὶ ἕνεκά του ... καὶ τὰ φυτὰ τὰ φύλλα ἕνεκα τῶν καρπῶν καὶ τὰς ρίζας οὐκ ἄνω ἀλλὰ κάτω ἕνεκα τῆς τροφῆς ... – And in 199b9 he notes: ‘Again, in plants, too we find that for the sake of which, though the degree of organization is less’ – Ἔτι καὶ ἐν τοῖς φυτοῖς ἕνεστι τὸ ἕνεκά του, ἧττον δὲ διήρθρωται –.

So the content of lines 412b1–4 is soundly Aristotelian. Nevertheless, they cannot be accepted as having been written by Aristotle himself in the place where they now stand.<sup>17</sup> In the argument which he has set out so far, Aristotle cannot yet talk about plants and about bodies with instrumental parts. For all genesis starts with the presence of homogeneous components (ὁμοιομερῆ) on the basis of the four sublunary elementary bodies. That is what his argument has been about up till now.

In *Generation of Animals* II 1 Aristotle explained in detail that at the moment of fertilization no part of the body of the new conspecific specimen is present, but that all parts, as typical parts of a specimen of this particular species, must be produced by the soul’s instrumental body directed by the soul as entelechy and as specific form. At the moment of copulation there is only male semen and female menstrual fluid. The male semen consists evidently of physical σῶμα, but it possesses (potential) soul. The female menstrual fluid also consists evidently of physical σῶμα, and is ‘that which receives soul’ (407b21; 414a24) (from the male semen) and subsequently possesses soul. The κύημα resulting from fertilization is a unity of ‘natural σῶμα and soul, and the generative, nutritive function of the soul and its instrumental body is directly

17 G. Picht (1987) 325 already noted: “Der Satz über die Organe der Pflanzen ist lediglich eine eingeschobene Anmerkung, die zeigen soll, dass und warum der Begriff “organischer Körper” auch auf die Pflanzen angewendet werden kann. Vermutlich handelt es sich um eine jener eingeschobenen Randnotizen, wie sie uns im Text des Aristoteles öfter begegnen.”



operative in it. At the moment of fertilization there is no question yet of non-homogeneous components (ἀνομοιομερῆ), like the leaves and roots of plants and the hands and feet of a human being. And 'natural body' cannot possibly be explained as a living body of a plant, animal or human being. Aristotle always calls such a living body an 'ensouled body'. But of the 'natural bodies' he also says very simply in II 1,412a13 that they are the principles of the other (bodies).

Nor does omission of lines 412b1-4 affect the train of thought of Aristotle's argument. We could even regard line 412a28 as concluding the construction of Aristotle's definition of soul and could continue in 412b4 with εἰ δὴ (with VX) τι κοινόν ... , as a summary of the entire preceding argument.<sup>18</sup>

Lines 412b1-4 must therefore have been added by a reader or commentator who supported the psychological view of Alexander of Aphrodisias.

And the fact that there were such readers emerges very clearly from the famous manuscript E (Parisinus gr. 1853, from the 10th century), which is the oldest manuscript in which *On the Soul* has been passed down, but which contains in many parts an intriguingly different reading of the Greek text from the majority of some eighty manuscripts. In discussing this textual matter we will have to bear in mind that according to M.C. Nussbaum (1992) 2 the text of *On the Soul* is 'unusually corrupt'.<sup>19</sup>

A. Torstrik (1862) 124 states that in this manuscript (fol. 187 bis, l. 15) there is a note explaining the word ὀργανικόν in the text of 412b1. This note reads:

"For the soul is not the first entelechy of fire; I mean the calorific power, even if that is also a natural body. But, because it is not furnished with organs, the soul is not its entelechy. ὀργανικόν is what possesses organs, via which the vital functions manifest themselves." – οὐ γὰρ ἡ πρώτη τοῦ πυρὸς ἐντελέχεια ψυχῇ. λέγω δὴ ἡ θερμαντικὴ δύναμις. καίτοι καὶ τοῦτο φυσικόν ἐστι σῶμα. ἀλλ' ἐπεὶ οὐκ ὀργανικόν, οὐκ ἔστιν ἡ πρώτη αὐτοῦ ἐντελέχεια ψυχῇ. ὀργανικὸν δὲ ἐστὶ τὸ ἔχον ὄργανα δι' ὧν αἱ κατὰ τὸ ζῆν ἐνέργειαι γίνονται. – That is to say: this reader considered that Aristotle's words 'natural body' could be linked to an elementary body, and specifically to vital heat. But he himself believes that Aristotle must be referring to a body equipped with organs. And so he states that τοιοῦτον in 412a28 is not a purely modifying demonstrative pronoun, but a limiting one. In his view, Aristotle means a 'natural body' which must also be ὀργανικόν, and therefore is not a simple body, but a body 'furnished with organs'. He seems to be led here by the text of Aristotle's *On the Soul*, but gives it a fundamentally different meaning from the one intended by Aristotle and

18 As does R.D. Hicks (1907) 50; G. Biehl/O. Apelt (1926) 31; W.S. Hett (1936) 68; W.D. Ross (1956) and (1961). A. Jannone and E. Barbotin (1966) read δέ.

19 For the manuscript tradition, see A. Förster (1912); M. de Corte (1933), P. Siwek (1961) and (1965), A. Jannone and E. Barbotin (1966) xxiv–xlv (who were not yet able to use P. Siwek (1965), but do sharply criticize the treatment of the manuscript tradition by W.D. Ross (1961) p. xxv). See now also P. Thillet (2005) 11–16, who was able to do justice to the work of P. Siwek (1965).

cancels out everything that Aristotle in his biological works had argued about the genesis of living beings.

The words which he uses ὄργανα δι' ὧν αἱ κατὰ τὸ ζῆν ἐνέργειαι γίνονται can be clearly recognized as non-Aristotelian and in the style of Alexander of Aphrodisias.<sup>20</sup> Note, too, that lines 412b1-4, which have been passed down in all the manuscripts, can easily be read as a continuation of the lines quoted above from the margin of the text.

### 5. The Problem of the Two Versions of *On the Soul*

Above we already pointed out that there are two textual traditions of Aristotle's *On the Soul* which cannot be explained as the result of ordinary copying errors. Most modern editions print a number of 'fragments' from manuscript E, in particular from book II, which differ strikingly from the reading of the majority of manuscripts. Moreover, manuscript E is the oldest manuscript of *De Anima* known to us and dates from the 10<sup>th</sup> century.

In his 1862 text edition with critical commentary A. Torstrick printed both traditions underneath each other and argued that we are dealing with an earlier and later redaction of *On the Soul* by Aristotle's own hand! In his view, the differences point to improvements and qualifications by the author of the text himself. He writes in his Praefatio (p. i): *ea est earum recensio auctoritas ut ea quae mutilata est et neglecta aut eodem jure sit Aristoteli adscribenda quo vulgata aut vero melius* (cf. 111; 113). A negative effect of this is that Torstrick ascribes the earlier redaction to Aristotle too and so is forced to posit that it was insufficiently clear or even erroneous. The proposition that the two redactions were made by Aristotle himself has not been adopted by other modern authors.<sup>21</sup>

### 6. 'Natural Bodies' as Instruments of the Soul in II 4,415b18

In connection with the problem of the two redactions of *On the Soul* we also need to pay attention to the striking passage in *On the Soul* II 4,415b18, where Aristotle states categorically: 'For all the natural bodies are instruments of the soul.' – πάντα γὰρ τὰ φυσικὰ σώματα τῆς ψυχῆς ὄργανα. – Does Aristotle perhaps mean there that the degree to which a combination of the four

20 Cf. Alexander of Aphrodisias, *Mantissa* 104, 15: ἔστιν τὸ δύνامي ζῶν ἔχον τὸ δυνάμενον ζῆν, τουτέστιν τὸ ἔχον ὄργανα πρὸς τὰς κατὰ τὸ ζῆν ἐνεργείας καὶ ἔστιν ἴσον τὸ 'δυνάμει ζῶν ἔχον' τῷ 'ὀργανικόν'. Cf. also *Anim.* 16, 2–4: σώματος γάρ, καὶ σώματος φυσικοῦ. οὐ γὰρ τεχνικοῦ, ὡς τὸ τοῦ ἀδριάντος. καὶ φυσικοῦ οὐχ ἀπλοῦ ὡς τὸ πυρός, ἀλλὰ συνθέτου τε καὶ ὀργανικοῦ. 24, 6: πρὸς δὲ τὰς κατὰ ταύτην ἐνεργείας χρῆται τοῖς ὀργανικοῖς μέρεσι τοῦ σώματος. For a critique on the position of Alexander in Simplicius (?), *In De Anim. Comm.* cf. M. Perkams (2003).

21 Cf. especially P. Siwek (1965) 176–179.



sublunary elements is present in the 'body that receives the soul' determines the quality and level of life that a certain living creature realizes? For instance in the sense that a plant or tree has a soul-principle of which the soul-body is predominantly earthy? And that a fish or another aquatic animal has a soul-principle of which the soul-body contains water? And that a four-footed mammal has a soul-principle of which the soul-body contains air? Did Aristotle take the principal distinctions in living nature somehow to correspond with the distinction of the elements and their natural regions?<sup>22</sup> But this brings us up against the pressing problem that the relevant passage in *On the Soul* II 4 has always been interpreted in an entirely different direction.

(A) The standard interpretation is: 'all bodies of living creatures are instruments of soul.' R.D. Hicks (1907) 65 translates: 'for all the natural bodies are instruments of soul: and this is as true of the bodies of plants as of those of animals.' He explains on p. 343 that, according to the indications of John Philoponus, we should read 'all natural bodies' as 'all natural living bodies'. Hicks refers to II 1,412a11–15, 'where natural bodies are classified as animate and inanimate. In fact σῶμα is slipping into this narrower meaning in 412b26–3a4.' Hicks has clearly felt that there is something strange about his view that Aristotle's focus here is on *living* natural bodies. He is aware that Aristotle repeatedly characterizes the elementary bodies as 'natural bodies'.

For this reason A. Torstrik (1862) 139 had proposed to correct φυσικὰ σώματα to ἔμψυχα σώματα, believing that φυσικὰ σώματα also include the elements and other non-living bodies ('haud dubie etiam elementa et inanima corpora his verbis comprehendantur'). Hence Torstrik says: 'much better is καὶ πᾶν τὸ σῶμα ὄργανον τῇ ψυχῇ,' which is read by MS E. In this he sees a deliberate correction and improvement of the text. But this 'improvement' is motivated by the interpretation of *On the Soul* II 1 as hylomorphic.

J.A. Smith in W.D. Ross (ed.), vol. 3 (1931) had: "all natural bodies are organs of the soul. This is true of those that enter into the constitution of plants as well as of those which enter into that of animals." (Likewise in J. Barnes ed. (1984) vol. 1, 661.) Smith was apparently unwilling to identify 'natural bodies' with the bodies of living creatures. But he is forced into a subterfuge, adding the words '<that enter into the constitution>', in order to make the transition from elementary bodies to the living bodies of animals and plants.<sup>23</sup>

22 Cf. *Gener. anim.* III 11,761b13–21. I have argued this position in A.P. Bos, *Review of Metaphysics* (2010) 827–831.

23 But it is unclear in Smith whether Aristotle describes the elementary bodies as 'instruments of the soul' or the bodies of plants and animals. See also P. Gohlke (1947) 66; I.J.M. van den Berg (1953) 109; J. Tricot (1959) 88: "car tous les corps naturels <vivants>"; W.D. Ross (1961) 229. A. Jannone and E. Barbotin (1966) 39: "tous les corps naturels [vivants] sont de simples instruments de l'âme"; P. Thillet (2005) 115: "Tous les corps naturels, en effet, sont des instruments de l'âme; c'est le cas des corps des animaux". A very free translation is M. Bastit (1996) 32: "Tous les corps

(B) I subjoin the following critical remarks:

(a) Everywhere else Aristotle uses the expression ‘natural bodies’ only in the sense of ‘elementary bodies’.<sup>24</sup> And in *On the Soul* II 1,412a12 he adds that the natural bodies are the principles of other bodies. He also says in 412a13 that ‘some natural bodies possess life but others do not.’ In II 4,415b8 Aristotle talks about the soul as the principle of ‘the living body’ – τοῦ ζῶντος σώματος – and in 415b11 about the soul as the principle of ‘ensouled bodies’ – τῶν ἐμψύχων σωμάτων –. It is therefore impossible that ‘natural bodies’ in 415b18 suddenly means the same as ‘living bodies’.

(b) We should consider, too, that this passage is obviously connected with Aristotle’s definition of the soul in *On the Soul* II 1, where Aristotle talks about the necessity of a ‘natural body’ as σῶμα ὁργανικόν of the soul. The entire tradition from Alexander of Aphrodisias onwards interpreted this as the visible body ‘equipped with organs’. But nowadays it is clear that this cannot possibly be Aristotle’s meaning. (Traditionally in *Anim.* II 1,412a27–28 and also 412b5 ‘natural body’ was taken to mean ‘the body of a living plant, animal or human being’.) However, as soon as the translation ‘equipped with organs’ for ὁργανικόν has been rejected as false, it might be recognized that Aristotle is speaking about a special soul-body. *On the Life-Bearing Spirit* ch. 9 also shows very clearly that Aristotle assumed an indissoluble unity between the soul and its instrumental body.<sup>25</sup> (That was one of the considerations which led to the general rejection of the treatise as spurious.)

Could it not be, then, that the tradition has forced the text of II 4,415b18 into a Procrustean bed owing to the reinterpretation of Aristotle’s theory of soul by Alexander of Aphrodisias, and that Aristotle actually means here: ‘All elementary (natural) bodies are instruments of the soul’?<sup>26</sup>

dotés d’une nature organique sont les instruments de l’âme”; D.W. Hamlyn (1968) 18 with his commentary on p. 96: “It cannot be said that the sense in which the soul is the end is very clear.” He notes that the words ‘instruments for soul’ should not be taken in the sense that the soul uses these instruments. For the soul is final cause here and there is no question of the soul ‘acting as agent’. This statement by Hamlyn is at odds with Aristotle’s definition of the soul (properly understood) and with *Anim.* I 3,407b13–26 and *Spir.* 9,485a30–b15. M. Ransome Johnson (2005) 75 translates in 415b16: ‘animate bodies’ and in 415b18 ‘natural bodies’, but takes these again as ‘natural bodies of animals’ and plants.

24 Cf. A.P. Bos (2003) 74–78.

25 Arist. *Spir.* 9,485b6–15. Cf. A.P. Bos and R. Ferwerda (2008) 177–180. The authenticity of *De Spiritu* has been defended also by P. Macfarlane (2007).

26 See R. Polansky (2007) 210: “the natural bodies utilized by soul need hardly thus be restricted to bodies of animals and plants - the claim is for *all* natural bodies – since nonliving natural bodies can also serve as instruments for soul.” Note, too, that Aristotle is arguing in this passage that nature, like the mind, works with a view to a goal. This goal of nature is the mature specimen of a kind which is capable of reproduction. Pace D.W. Hamlyn, the soul for Aristotle is always the immanent productive principle (*Gener. anim.* II 1,735a2–4), but as immaterial formal principle the soul can only produce thanks to the ‘instrumental body’ with which it is inextricably linked. So Aristotle is probably saying here: ‘all four sublunary elements are instruments of the soul,



We might then consider that Aristotle is already working here on his own alternative to the theories criticized in I 5,411a7–b30, and that, instead, he related differences in quality of life to differences in the quality of the mixture of πνεῦμα with these elements.

If that is the case it becomes evident that Aristotle's use of the notion of an 'instrument' in *On the Soul* I 3,407b25–26, II 1, 412a28 and b6, and in II 4,415b7 and b18 provides the necessary explanation of the difference in quality of life, an explanation which is given nowhere else. Living beings differ through the quality of their vital functions (ἔργα) and these functions need an instrumental body which is adequate. An instrument which may be used for the process of concoction is not at the same time adapted to sense-perception or locomotion.

However, in that case the reading we find in E cannot be attributed to Aristotle himself, but is the result of a revision influenced by Alexander of Aphrodisias' interpretation of *On the Soul* II 1.<sup>27</sup>

Thus the text of *On the Soul* repeatedly gives cause to suspect that the reading of the text has been influenced by its interpretation. The fact that many readers after Alexander of Aphrodisias took it for granted that Aristotle was referring to the concrete, anhomoiomerous, visible body has probably sometimes encouraged the addition of the article before 'body' in the Greek text.<sup>28</sup>

Remarkable, too, is what happens in MS E with the passage in I 1,402a25–26. An overwhelming majority of the manuscripts reads there: ἔτι δὲ πότερον τῶν ἐν δυνάμει ὄντων ἢ μᾶλλον ἐντελέχειά τις. But E uniquely reads there: ἢ μόνον ἐντελέχειά τις. This reading cannot possibly be an unfortunate slip of the pen. The E reading does not accept that Aristotle is posing the dilemma that the soul either belongs to matters which are in potency or it does not. The author of E reads μόνον because he identifies the distinction 'in potency' and 'in act' with the distinction between 'first entelechy' and 'second entelechy'. Hence his answer to the question 'does the soul (also) belong to what is in potency, or is it only entelechy?' is categorical: the soul is not just entelechy, but is also in potency!

However, the writer is not voicing Aristotle's view here, but that of his reinterpreter Alexander of Aphrodisias.

and this applies to the instrumental bodies of the soul of both plants and animals.' That is to say: the soul of a plant, too, accomplishes 'work' of its own, the conversion of food into parts of the living body, and the plant soul needs an 'instrumental body' for this.

27 W.D. Ross (1956) 211 also observed more agreement between Alexander's text and this new version of book II in MS E than with the other reading of book II.

28 E.g. *Anim.* I 1,403a6; a9; a16; *Phys.* VII 2,244b12 (cf. *Top.* IV 5,125b16).

### 7. Did *On the Soul* II 4,415b7 also disappear through Revision of the Text under the Influence of Alexander of Aphrodisias?

We also note that in *On the Soul* II 4,415b7 a number of manuscripts pass down an extra sentence of which we argued earlier that it cannot be by any other author than Aristotle himself.

415b6–8: <It is> identical not numerically but specifically. <For that reason the seed of animals and plants is an instrument of their soul.> It is the soul that is the cause and first principle of the living body.’ – translation W.S. Hett (1936) 85–87 with changes.

The Greek text reads in the edition of A. Jannone and E. Barbotin (1966) 39, if we add the extra sentence: καὶ διαμένει οὐκ αὐτὸ ἀλλ’ οἷον αὐτό. Ἀριθμῶ μὲν οὐχ ἓν, εἶδει δ’ ἓν <ἐστι. Διόπερ τὸ σπέρμα τῶν ζώων καὶ φυτῶν ὄργανον ἐστὶ τῆς ψυχῆς>. Ἔστι δὲ ἡ ψυχὴ τοῦ ζῶντος σώματος αἰτία καὶ ἀρχή, etc.

The sentence may have been lost through parablepsis. But the fact that the sentence was not reinstated in the other manuscripts will certainly have been partly due to the incompatibility of its content with the hylomorphic interpretation of *On the Soul* which had become prevalent since Alexander of Aphrodisias.<sup>29</sup>

### References

- Annas, J., *Hellenistic Philosophy of Mind* (Berkeley/Los Angeles/Oxford: Univ. of California Press, 1992).
- Barnes, J. (ed.), *The Complete Works of Aristotle*. The Revised Oxford Translation, 2 vols (Princeton, P.U.P., 1984).
- Barnes, J., ‘Review of S. Everson (1997)’, *Classical Review* 49 (1999) 120–122.
- Bastit, M., ‘Qu’est-ce qu’une Partie de l’Âme pour Aristote?’, C. Viano (ed.), *Corps et Âme. Sur le De Anima d’Aristote* (Paris: J. Vrin, 1996) 13–35.
- Berg, I.J.M. van den, *Aristoteles’ Verhandelning over de Ziel* (Utrecht/Nijmegen: Dekker & Van de Vegt, 1953).
- Boeri, M.D., Μήτ’ ἄνευ σώματος εἶναι μήτε σῶμά τι ἡ ψυχὴ (Aristóteles, *De anima* B 2,414a19–20). A Propósito del Alcance de las Interpretaciones Funcionalistas de la Psicología Aristotelica y del Carácter Causal del Alma’, *Elenchos* 30 (2009) 53–97.
- Bolton, R., ‘Aristotle’s Definition of the Soul. *De Anima*, II 1–3’, *Phronesis* 23 (1978) 258–278.
- Bonitz, H., *Index Aristotelicus* (Berlin: Königliche Preussische Akademie der Wissenschaften, 1870; repr. Graz, 1955).
- Bos, A.P., *The Soul and its Instrumental Body. A Reinterpretation of Aristotle’s Philosophy of Living Nature* (Leiden: Brill, 2003).
- Bos, A.P., ‘The Soul and Soul-Parts’ in Semen (*GA* II 1,735a4–22), *Mnemosyne* 62 (2009) 378–400.
- Bos, A.P., ‘A Lost Sentence on Seed as Instrument of the Soul in Aristotle, *On the Soul* II 4,415b7’, *Hermes* 138 (2010) 276–287.
- Bos, A.P., ‘Aristotle on the Differences between Plants, Animals and Human Beings and on the Elements as Instruments of the Soul (*Anim.* II 4,415b18)’, *Review of Metaphysics* 63 (2010) 539–557.

29 Cf. A.P. Bos, *Hermes* (2010).



- Bos, A.P. and Ferwerda, R., 'Aristotle's *De Spiritu* as a Critique of the Doctrine of *Pneuma* in Plato and his Predecessors', *Mnemosyne* 60 (2007) 565–588.
- Bos, A.P. and Ferwerda, R., Aristotle, On the Life-Bearing Spirit (*De Spiritu*). A Discussion with Plato and his Predecessors on *Pneuma* as the Instrumental Body of the Soul. Introduction, translation, and commentary (Leiden: Brill, 2008).
- Bronstein, D., 'Review of A.P. Bos (2003)', *Ancient Philosophy* 26 (2006) 422–427.
- Buddensiek, F., 'Aristoteles' Zirbeldrüse? Zum Verhältnis von Seele und *Pneuma* in Aristoteles' Theorie der Ortsbewegung der Lebewesen', in: D. Frede and B. Reis (eds), *Body and Soul in Ancient Philosophy* (Berlin/New York: W. de Gruyter, 2009) 309–329.
- Canarsa, M., 'Una Lacuna Platonica. Il Problema della Relazione Anima-Corpo nella Prima Accademia Antica', in: A. Fermani; M. Migliori (eds), *Attività e Virtù. Anima e Corpo in Aristotele* (Milano: Vita e Pensiero, 2009) 43–82.
- Corcilius, K., *Streben und Bewegen. Aristoteles' Theorie der Animalischen Ortsbewegung* (Berlin: W. de Gruyter, 2008).
- Corte, M. de, 'Études sur les Manuscrits du Traité *De l'Âme* d'Aristote', *Revue de Philologie* 59 (1933) 141–160; 261–281; 355–367.
- Dillon, J., 'Come fa l'Anima a dirigere il Corpo? Tracce di una Disputa sulla Relazione Corpo-Anima nell'Antica Accademia', in: M. Migliori; L.M. Napolitano Valditara; A. Fermani (eds), *Interiorità e Anima. La psychè in Platone*, (Milano: Vita e Pensiero, 2007) 51–57.
- Dillon, J., 'How does the Soul direct the Body, after all? Traces of a Dispute on Mind-Body Relations in the Old Academy', in: D. Frede and B. Reis (eds), *Body and Soul in Ancient Philosophy* (Berlin/New York: W. de Gruyter, 2009) 349–356.
- Düring, I., *Aristoteles. Darstellung und Interpretation seines Denkens* (Heidelberg: Carl Winter Universitätsverlag, 1966).
- Everson, S., *Aristotle on Perception* (Oxford: Clarendon Press, 1997).
- Fermani, A. and Migliori, M., *Attività e Virtù. Anima e Corpo in Aristotele* (Milano: Vita e Pensiero, 2009).
- Ferwerda, R., *Aristoteles, Over Dieren*, vertaald, ingeleid en van aantekeningen voorzien (Groningen: Historische Uitgeverij, 2000).
- Ferwerda, R., *Aristoteles, Over Voortplanting*, vertaald, ingeleid en van aantekeningen voorzien (Groningen: Historische Uitgeverij, 2005).
- Förster, A., *Aristotelis De Anima libri tres* (Budapestini: Typis Societatis Franklinianae, 1912).
- Freudenthal, G., Aristotle's Theory of Material Substance. Heat and *Pneuma*, Form and Soul (Oxford: Clarendon Press, 1995).
- Freudenthal, G., 'The Astrologization of the Aristotelian Cosmos: Celestial Influences on the Sublunar World in Aristotle, Alexander of Aphrodisias, and Averroes', in: A.C. Bowen and C. Wildberg (eds), *New Perspectives on Aristotle's De Caelo* (Leiden: Brill, 2009) 239–281.
- Furth, M., Substance, Form and Psyche: an Aristotelean Metaphysics (Cambridge: C.U.P., 1988).
- Gerson, L.P., *Aristotle and Other Platonists* (Ithaca: Cornell University Press, 2005).
- Gill, M.L., Aristotle on Substance. The Paradox of Unity (Princeton, P.U.P., 1989).
- Gohlke, P., *Aristoteles, Über die Seele*, (Paderborn: F. Schöningh, 1947).
- Gregoric, P., *Aristotle on the Common Sense* (Oxford: O.U.P., 2007).
- Gutiérrez-Giraldo, D., 'Psyche and Genotype', in: D. Sfendoni-Mentzou (ed.) *Aristotle and contemporary science*, vol. 2 (New York: P. Lang, 2001) 163–172.
- Hamlyn, D.W., *Aristotle's De Anima, Books II and III (with certain Passages from book I)*. Transl. with Introd. and Notes (Oxford: Clarendon Press, 1968).
- Hett, W.S., *Aristotle, On the Soul, Parva Naturalia, On Breath* with an English Translation (London: W. Heinemann, 1936).
- Hicks, R.D., *Aristotle, De Anima*, with Translation, Introduction and Notes (Cambridge: C.U.P., 1907).
- Jaeger, W., *Aristoteles. Grundlegung einer Geschichte seiner Entwicklung* (Berlin: Weidmannsche Buchhandlung, 1923; repr. 1955).

- Jaeger, W., *Aristotle. Fundamentals of the History of his Development*, transl. with the author's corrections and additions by R. Robinson (Oxford: O.U.P., 1934; 2nd ed. 1948; repr. 1962).
- Jannone, A. and Barbotin, E., *Aristote, De l'Âme* (Paris: Les Belles Lettres, 1966).
- Jerouschek, G., *Lebensschutz und Lebensbeginn. Kulturgeschichte des Abtreibungsverbots* (Stuttgart: Ferdinand Enke Verlag, 1988).
- Jones, D.A., *The Soul of the Embryo. An Enquiry into the Status of the Human Embryo in the Christian Tradition* (London: Continuum, 2004).
- Kahn, C.H., 'Sensation and Consciousness in Aristotle's Psychology', *Archiv für Geschichte der Philosophie* 48 (1966) 43–81; repr. in Barnes, J.; Schofield, M.; Sorabji, R. (eds), *Articles on Aristotle* (London: Duckworth, 1979) vol. 4, 1–31.
- King, R., 'Review of A.P. Bos (2003)', *Classical Review* 57 (2007) 322–323.
- Lloyd, G.E.R., *Aristotelian Explorations* (Cambridge: C.U.P., 1996).
- Macfarlane, P., *A Philosophical Commentary on Aristotle's De Spiritu* (Ph.D.-Thesis Duquesne University, 2007).
- Macfarlane, P. and Polansky, R., 'God, the Divine and the *NOYΣ* in Relation to the *De Anima*', in: *Ancient Perspectives on Aristotle's De Anima*, ed. by G. van Riel and P. Destrée (Leuven: Leuven University Press, 2009) 107–123.
- Menn, S., 'Aristotle's Definition of Soul and the Programme of the *De Anima*', *Oxford Studies in Ancient Philosophy* 22 (2002) 83–139.
- Migliori, M., '*L'Anima in Aristotele. Una concezione polivalente e al contempo aporetica*', in Fermani, A. and Migliori, M., *Attività e Virtù. Anima e Corpo in Aristotele* (Milano: Vita e Pensiero, 2009) 227–260.
- Nothstein, R.-R., *Seele und Wahrnehmung. Eine Einführung in das zweite Buch des Aristotelischen Werkes 'De Anima'* (Regensburg: Roderer Verlag, 1998).
- Nussbaum, M.C., *Aristotle's De Motu Animalium*. Text with translation, commentary and interpretive Essays (Princeton, P.U.P., 1978).
- Nussbaum, M.C., 'The text of Aristotle's *De Anima*', in M.C. Nussbaum and A. Oksenberg Rorty (eds), *Essays on Aristotle's De Anima* (Oxford: Clarendon Press, 1992) 1–6.
- Nuyens, F.J.C.J., *Ontwikkelingsmomenten in de Zielkunde van Aristoteles. Een Historisch-Philosophische Studie* (Nijmegen/Utrecht: Dekker & Van de Vegt, 1939).
- Nuyens, F., *L'Évolution de la Psychologie d'Aristote* (Louvain: Éd. de l'Institut Supérieur de Philosophie, 1948).
- Perkams, M., 'Doppelte Entelecheia. Das Menschenbild in "Simplikios"'s Kommentar zu Aristoteles' *De Anima*', *Elenchos* 24 (2003) 57–91.
- Picht, G., *Aristoteles, De Anima* (Stuttgart: Klett-Cotta, 1987).
- Polansky, R., *Aristotle's De Anima* (Cambridge: C.U.P., 2007).
- Quarantotto, D., *Causa Finale, Sostanza, Essenza in Aristotele* (Napoli: Bibliopolis, 2005).
- Quarantotto, D., 'Che cosa fa da una forma un'anima – l'organizzazione anatomo-fisiologica dei venti e la sede della *psyche*', in A. Fermani and M. Migliori (eds), *Attività e virtù. Anima e corpo in Aristotele* (Milano: Vita e Pensiero, 2009) 367–81.
- Ransome Johnson, M., *Aristotle on Teleology* (Oxford: Clarendon Press, 2005).
- Reale, G. and Bos, A.P., *Il Trattato Sul Cosmo per Alessandro Attribuito ad Aristotele* (Milano: Vita e Pensiero, 1995).
- Ricken SJ, F., 'Review of A.P. Bos (2003)', *Theologie und Philosophie* 80 (2005) 425–427.
- Roselli, A., [*Aristotele*] *De Spiritu* (Pisa: Ets. Editrice, 1992).
- Ross, W.D. (ed.), *The Works of Aristotle* (Oxford: Clarendon Press, 1931) vol. 3.
- Ross, W.D., 'The Text of the *De Anima*', in *Autour d'Aristote. Recueil d'Études offert à A. Mansion* (Louvain: Publications Univ. de Louvain, 1955) 207–215.
- Ross, W.D., *Aristotelis De Anima*, recognovit brevique adnotatione instruxit (Oxford: Clarendon Press, 1956).
- Ross, Sir David, *Aristotle, De Anima*, edited, with introduction and commentary (Oxford: Clarendon Press, 1961).



- Rijk, L.M. de, *Aristotle. Semantics and Ontology* 2 vols (Leiden: Brill, 2002).
- Schomakers, B., *Aristoteles, De Ziel* (Leende: Damon, 2000).
- Sharples, R.W., 'The Hellenistic Period: What Happened to Hylomorphism?', in: *Ancient Perspectives on Aristotle's De Anima*, ed. by G. van Riel and P. Destrée (Leuven: Leuven University Press, 2009) 155–166.
- Shields, C., 'The Priority of Soul in Aristotle's *De Anima*: Mistaking Categories?', in: D. Frede and B. Reis (eds), *Body and Soul in Ancient Philosophy* (Berlin/New York: W. de Gruyter, 2009) 267–290.
- Siwek SJ, P., *Les Manuscrits Grecs des Parva Naturalia d'Aristote* (Rome: Desclé et Cie, 1961).
- Siwek, P., *Le 'De Anima' d'Aristote dans les Manuscrits Grecs* (Città del Vaticano: Biblioteca Apostolica Vaticana, 1965).
- Spruit, L.G.M., *Religie en Abortus. Interactiemodellen ter Verklaring van de Houding tegenover Abortus* (Nijmegen: Instituut voor Toegepaste Sociale Wetenschappen, 1991).
- Thillet, P., *Aristote, De l'Âme*. Traduit du Grec. Édition établie, présentée et annotée (Paris: Gallimard, 2005).
- Torstrik, A., *Aristotelis De Anima, libri tres*, (Berlin: Weidmannsche Buchhandlung, 1862; repr. Hildesheim: G. Olms, 1970).
- Tricot, J., *Aristote, De l'Âme*, traduction nouvelle et notes (Paris: J. Vrin, 1959).

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