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HEART AND SOUL IN ARISTOTLE

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Under this rather sentimental sounding title I should like to recall a critical problem in Aristotle's psychology, trace briefly some of the discussion of that problem, and suggest a few considerations which, if not entirely original, may at least advance the discussion along lines already suggested by others. The problem is, of course, that which Francois Nuyens raised over twenty five years ago (L'Évolution de la Psychologie d'Aristote, Louvain, 1948) when he declared Aristotle's famous definition of the soul in De Anima (=DA)* 412b5-6 to be "ab-solutely incompatible" (p. 165) with the notion of the soul present "in the heart" and operating principally through the heart, a notion he finds prominent in some of the Parva Naturalia (=PN) and the majority of the biological works. This incompatibility, assumed throughout Nuyens' study (45, 47, 55-58, 119, 159-171, etc.), served as his chief criterion for dividing Aristotle's works chronologically into those of an earlier "transitional period" and those of the "terminal period" of hylomorphism.

Nuyens' use of a single criterion for distributing the works chronologically promised an advantage over the procedure of Jaeger, who depended upon particular internal criteria established for each treatise. Nuyens' work was acclaimed and accepted substantially by some very great scholars, notably by Augustin Mansion and Sir David Ross, along with Drossaart Lulofs, Pierre Louis, Barbotin, Gauthier, D. A. Rees, and others (see W. Fortenbaugh, "Recent Scholarship in the Psychology of Aristotle," CW 60, 1967, 318-20). Ingemar Düring, in his article on Aristotle published in Pauly-Wissowa (Suppl. XI, 253-54) in 1968, expressed the judgment that Nuyens' position at that time could "als die hernschende Meinung betrachtet werden." Yet even while Düring's article was being written, the most searching critiques of Nuyens' view, especially as adopted by Ross, were already in print.

Objections to details of Nuyens' work had been raised, of course, from the time of its publication. But the first serious challenge to the validity of his main criterion seems to have been published by Irving Block in his paper on "The Order of Aristotle's Psychological Writings" in 1961 (AJP 82, 50-77). Block argued first that A.'s definition of soul as form or entelechy of the body does not logically forbid him to emphasize a particular organ as source of the activities whereby the body lives. Secondly, Block analyzed the passages from the De Sensu (=DSen) cited by Ross as illustrating a "two substance theory of body and soul" and provided alternative interpretations and arguments to show that these statements could be reconciled with the hylomorphic view of soul. Thirdly, Block here first called attention in print to the important passage in Metaphysics (=M) Zeta (1035b14 ff.) where A. speaks clearly of the soul as "form and essence of the body" and at the same time refers to it as being present primarily in a dominant organ of the body, thereby indicating that these notions, absolutely incompatible for Nuyens, apparently were not so for A. Block's effort in this part of his paper was largely negative, countering the arguments of Ross especially, yet providing solid evidence that the "entelechy view" and the "heart view" were not incompatible in A.'s mind. Two years later Marjorie Grene's A Portrait of Aristotle appeared (Chicago, 1963), presenting further evidence

*The following symbols will be used in referring to the works of Aristotle (=A.): DA=De Anima; DGA=De Gen. Animalium; DJuv=De Juventute; DMA=De Motu Animalium; DRes=De Respiratione; DMem=De Memoria; DPA=De Part. Animalium; DSen=De Sensu; DSom=De Somno; M=Metaphysica; PN=Parva Naturalia. Ross DA and PN refer to his editions.
against Nuyens' view by pointing out (p. 35) that both the hylomorphic soul and the doctrine of the heart as source of life are found side by side in the De Generatione Animalium (={DGA}), a work which Nuyens dates with DA in the latest period of A.'s development.

This evidence from DGA and the passage from M Zeta were both incorporated in W. F. R. Hardie's article on "Aristotle's Treatment of the Relation Between the Soul and the Body," published in 1964 (Philosophical Quarterly 14, 53-72) but written some years earlier. Hardie uses them effectively against two propositions assumed by Nuyens, namely, (1) that A. knew or believed there was a contradiction between the "entelechy view" and the "heart view" of the soul, and (2) that he gave up the latter after developing the former. In support of his position Hardie also presents a long analysis of the passage in De Motu Animalium (=DMA) on the origin of movement in animals (699a14-b7, 702a21-b11), showing it consistent with the cryptic description of the same in DA III, 433b21-29, a consistency acknowledged by Ross in his commentary on DA (p. 317). Hardie finds evidence of the hylomorphic view, too, in DA I, DSen, and De Memoria (=DMem), all regarded by Ross as written before A. adopted the entelechy view. Thus Hardie succeeds in establishing that "Aristotle finds no inconsistency between the hylomorphic doctrine and localization in the heart" (p. 67) and in detecting inconsistencies in the position of Nuyens and Ross. However, his attempt to go beyond this, to show that the two doctrines complement each other (p. 67 ff.), is, I believe, only partially successful.

While Nuyens' position, in Dühring's judgment, could be considered the prevailing view in 1968, these critiques were having their effect. That same year saw the appearance of G. E. R. Lloyd's Aristotle: The Growth and Structure of His Thought (Cambridge, Engl.) in which Lloyd remarks of Nuyens' position on the "entelechy view" vs. the "heart view" (p. 25): "...scholars such as Block and Hardie have shown...that whatever we may think of the relationship between the two doctrines in question, Aristotle himself was unaware of any incompatibility between them." Two years later, in 1970, R.-A. Gauthier published the revision of his introduction to Aristote: L'Éthique à Nicomachie (2nd ed., I, 1, Louvain), retaining Nuyens' chronology and dealing briefly with these critiques (46-47, n. 113). His effectiveness, and theirs, is evaluated thus by Jonathan Barnes in his review in AQP 55, 1973, 80: "The distinction between Instrumentism and Hylemorphism, which forms the core of Nuyens' position, has been demolished by Block...and by Hardie.... Gauthier discusses Block's and Hardie's criticisms...but fails to appreciate their direction and their force."

If we accept Barnes' opinion that the core of Nuyens' position "has been demolished by Block and by Hardie," what more remains to be done? Have their discussions settled the problem, leaving room for nothing but autopsy? Perhaps not. These studies have presented compelling evidence that the "entelechy view" and the "heart view" of the soul, though regarded as incompatible by Nuyens and by Ross (see his PN, 7-12), apparently presented no incompatibility to A.'s mind since they appear together in the same context and the same works. This is enough, of course, to demolish the core of Nuyens' position and the basis for his chronological distribution of A.'s writings. But it leaves us with the problem which troubled Nuyens in the first place, to which he offered his developmental or chronological solution. There does seem to be something incompatible between the notion of the soul as entelechy of the whole body (so that every organ, to be alive, must be "ensouled") and statements that the soul is "in the heart" (e.g., De Juventute=DJuv 469a5-7) and that "there is no need of soul in each part"
as long as it "is present in some ruling center of the body" (DMA 703a36-37).
If A. did not regard these as incompatible, how would he reconcile them? What
relationship would he see between them? How are they compatible in his terms?

Block has argued that the notion of the soul present in the whole body is
logically compatible with the notion of the soul centered in one part, using as
illustration the light in an electric bulb and in its filament (52-53). Hardie
deals helpfully with the passage from DMA 702a21 ff. but backs away from the
troublesome statement just quoted (703a36-37) with the warning that we should not
press it too hard (p. 60). Brief but valuable suggestions on how A. might relate
the two doctrines appear in Paul Siwek's introduction to his De Anima (Rome, 1965,
18-19) and in H. J. Easterling's "Note on de Anima 413a8-9" (Phronesis 11, 1966,
161-62). But of those I know, the longest and most helpful contribution in this
direction is Charles Kahn's study of "Sensation and Consciousness in Aristotle's
Psychology" published in AGP (48. 1, 43-81) in 1966.

Kahn's study is concerned specifically with the relationship of the psychic
to the physical aspects of sensation in Aristotle and in contemporary psychology.
The greater part of the study (46-70), devoted to a comprehensive review of A. 's
sense psychology in his terms, establishes that A. 's "sensory soul" comprises a
single psychological system in which the functions of the special senses are inte­
grated by the sensus communis, identical under other aspects with the faculty pro­
ducing sense of time, images, memories, sleep and dreams. But the "sensory soul",
in A. 's terms, must inform, and function physiologically through, an appropriate
organic system which, for A., can only be the organs of the special senses in con­
nection with the organ of the sensus communis, the heart. Reflecting on the impli­
cations of A. 's description of the "sensory soul" and its functions as presented in
DA, Kahn shows that they require the physiological system eventually presented in
the PN, so that the discussion of sensation and the "sensory soul" begun in the DA
is continued, and not contradicted, by that of the PN (67-68). Why, then, is the
sensus communis treated so sketchily and the heart hardly mentioned in DA? Kahn
maintains (vs. Block II) that the reason is methodological, not chronological.

The De Anima takes up a somewhat different point of view, since it ab­
stracts from all consideration of physiological detail. But there is
really no reason to suppose that the physiological model in Aristotle's
mind, which he systematically refrains from introducing into the De
Anima, is in any way different from that which is actually expounded
by him in the other works (68-69).

Kahn's study, I believe, represents a long step toward a solution of the prob­
lem raised by Nuyens. Following his lead, I shall attempt to develop further some
of the considerations proposed there, and shall assume as valid his demonstration
that A. 's discussion of the "sensory soul" and its organs in the PN is continuous,
progressive, and in essential agreement with the doctrine proposed in general terms
in DA. Any errors or imperfections in the attempt, of course, will be my own.

The Heart in the De Anima

First of all, to confirm and go beyond the position modestly stated in Kahn's
last sentence quoted above, I suggest that we find very good reason indeed to believe
the physiological model in A. 's mind in DA is substantially the same as that actually
expounded by him in the PN and other works if we examine carefully the references to
the heart in DA, few and incidental though they be, in conjunction with other prin­
ciples and remarks appearing in that same work. Elsewhere Kahn has suggested that
"these passages are revealing enough...the heart in need of breath and the rational or sensitive soul operating in the chest can hardly reflect anything but Aristotle's own biology" (64-65, n. 50). This seems important enough to elaborate, especially in view of the fact that Ross considered A.'s relative silence on the heart in DA a sign that he had abandoned the psychophysiology of the biological works (PN, 7-8, 12).

Distinguishing it from the hylomorphism of DA, Ross characterizes the view of the biological works as follows (PN 6): "In this phase of Aristotle's thought, soul is thought of as closely associated with heat, and with the hottest organ in the body, the heart." Ross then cites as typical of the "heart view" selections from the De Partibus Animalium (=DPA) where A. asserts that the soul, while itself not fire, uses heat as a most apt instrument in its operations, specifically nutrition and the imparting of motion (652b7-16); that the heart is the center of life and of vital heat (653b5-6), the source of motion and sensation (665a10-13) essential to all animals (678b1-4). However, I believe it can be shown that these same functions are attributed to vital heat and to the heart in the DA also, where the "entelechy view" is proposed in detail.

Turning then to DA, Book II ("...in all probability the latest of Aristotle's writings on psychology": Ross, PN 17), we might consider first the passage where A. denies that "the nature of fire" is the cause, without qualification, of nutrition and growth, but asserts that: "A co-cause, in a sense, it certainly is; but not the cause absolutely; that is rather the soul" (416a13-15). Shortly thereafter he explains (416b20 ff.) that in nutrition (1) it is the body that is nourished, (2) the "nutritive soul" that nourishes, (3) while that by which the body is nourished must be understood to include (a) the food, which must be concocted (i.e. changed without changing another, like a ship's rudder) and (b) the vital heat, which effects concoction (i.e., is moved by the soul and itself changes the food, like the helmsman's hand on the rudder,— implying that the soul, like the helmsman, effects change while remaining unchanged: see Hicks 348-49). Clearly, then, in DA as in the biological works, the soul is closely associated with the vital heat, using it as co-cause or primary instrument to effect nutrition and growth. And the same passage (416b9 ff.) explains how indispensable an instrument heat is to soul; for that which is ensouled or alive is said to preserve its substance only as long as it is nourished (416b14-15), but "all nourishment must be able to be digested; and what produces digestion is heat; therefore everything that is ensouled possesses heat" (416b28-29).

This principle must apply not only to the organism as a whole but to each part of the organism, since all living parts need nourishment. However, A. indicates also in DA II that he is not thinking of all parts of the animal body as possessing heat in equal degree, but rather that the heart is "the hottest organ of the body," i.e., the center of vital heat, as in the biological works. For in DA II, while explaining that nature uses breath as a necessary means of regulating the internal heat of the body (420b20-21), A. mentions, incidentally but explicitly, that the area which needs cooling before all others is the one surrounding the heart (420b 25-26). This is perfectly consistent with his detailed description of heat distribution in the body at DJuv 469b6 ff.: "Now in animals all the parts and the body as a whole contain a certain natural innate heat.... And the source of this heat in blooded animals must be in the heart..."

Ross himself, in his commentary on DA 416b25-29 and 420b21 ff. (231-32, 252), refers to this and other passages from the last two treatises of the PN for A.'s full explanation of the physiological functions of the vital heat centered in the heart. It appears, then, that even in DA II, where he sets out the "entelechy view"
of the soul, A. is also thinking of it as "closely associated with heat, and with the hottest organ of the body, the heart."

The passages from DA which Ross cites as typical of A.'s thinking in the biological works indicate a further close connection between the heart as center of vital heat and as source of sensation and movement in animals. In his 1957 edition of PN Ross states simply (p. 12): "In the De Anima no such significance is attributed to the heart..." This judgment is qualified, however, in his 1961 edition of DA (p. 10): "In contrast with the importance attached to the heart in the biological works and the Parva Naturalia, in none of the four passages in which the heart is mentioned in the De Anima is any primary importance attached to it, although in 403a 31, 408b8, and 432b31 it is still treated as the seat of anger and fear."

It is true that in these passages in DA the heart is "mentioned only incidentally and in other connections," as Ross remarks elsewhere (PN 12). But this does not necessarily mean that in none of them "is any primary importance attached to it" (DA 10). The incidental references may be more revealing for what they assume or imply, as in the case of the first at 420b25-26 indicating the heart as center of the vital heat necessary to the basic functions of nutrition and growth. In the other three references mentioned by Ross we find the heart invariably singled out as the specific organ in which psychic states are immediately manifested in the body. When considering these one should bear in mind a principle upon which A. insists in the DA, namely, that the existence of one sense power in part of an animal, even the lowest, implies the coexistence of others in the same part: "If there is sense perception, there is also imagination and appetite; for where sense perception exists there is also pleasure and pain, and where these, desire necessarily exists" (413b22-24; and see 414b1-6). "Speaking generally, then, in as much as an animal is capable of appetite it is also capable of self-movement; but it is not capable of appetite without imagination, and all imagination involves either calculation or sensation" (433b27-29; and see 433b31-434a7). The same principle is restated in De Somno (=DSom) 454b29-31, which goes on to attribute these conscious activities to the central sense faculty whose organ is the heart.

Of the three mentioned by Ross we might consider first the reference at 408b8, which occurs in a context recognized by Nuyens as hylémorphique (186). Aristotle here (408b1-19) is emphasizing the bodily aspect of psychic states, the aspect which, he says, is often overlooked when we speak of the soul as being pained, pleased, bold, fearful, etc. Each of these states is a movement (which implies matter) having its origin in the soul. "For example, to be angry or to fear is for the heart to be changed (moved) in this way or that, and to reason (διανοομαι) involves this organ or some other" (408b7-9; or "that the heart be changed in a similar way or some other": Ox. transl.; Hicks 274 ad b9). The nature and manner of the change in the heart is not specified. Thus far 408b1-11. The point is, A. continues, that to say the soul is moved or changed, e.g., feels anger, is like saying it weaves or builds. It is better not to speak of the soul as feeling angry but rather to say that the composite, the man, does so, understanding that the change involved in sensation and emotion does not occur in the soul but reaches to the soul or starts from it (b11-18).

The latter part of this passage (b11-18) is employed some seventeen times by Nuyens as illustrative of the hylomorphic theory, and properly so. But he never cites or comments on the first half (b1-11) in which the heart is specified as the organ immediately involved in the movements of anger, fear, and reasoning.
It is perhaps surprising to find "reasoning" (διανοητικά) linked to a change in the heart. Yet, in a continuation of this passage, A. again links "reasoning" with emotions (love and hate) as dependent upon a certain physical organ which somehow "possesses" the thinking soul (408b27); in which the soul is present (b23); an interior organ (b25) whose disturbance by drunkeness, disease, or old age impairs the rational processes (b22-25); upon which memory too is dependent (27-28). I follow the interpretation of Ross (DA 196-99 ad 408b25) that A. here attributes the loss of the capacity to reason, remember, love, etc. to the disability of a particular internal organ. Ross identifies it:

We should say 'the brain', A. would say 'the heart', which at this stage of his thinking he treats as the seat of anger and fear (403a31, 408b8, 432b31). In De Sensu 456a4 and in De Iuv. 478a29 he treats it as the ultimate seat of all psychical events; but it plays a much less prominent part in De Anima.

If this interpretation is sound, we have here an important but implicit reference to the heart-sensorium not generally recognized. (See, e.g., Kahn, p. 65, note 50.) Ross, realizing its significance, quite consistently refuses to include DA I among the works of A.'s "hylomorphic" period (PN 16-17; cf. Hardie 66-68).

The connection between the reasoning faculty and the emotions leading to pursuit or avoidance is taken up again (as Hicks indicates, 274 ad 408b9) in DA III.7. Having introduced the doctrine of the sensus communis (426b12 ff.) and the "ultimate" sensorium through which it operates (426b16), and having described the image-producing faculty (427b12 ff.) and the thinking mind in man (429a10 ff.), A. here returns to the connection between thought and action and finds them linked through images produced by the central, the "ultimate" sense (431a14-20). Where is the organ of this "ultimate" sense? A.'s discussion of touch and taste in DA II, 422b17 ff. makes it clear that for them it is not the outer flesh but some interior organ. Ross again, commenting on this (DA 262-63, 265 ad 423a15-16, b23), suggests that A. has the doctrine of DSen 439a1-2 in mind, where the common organ of touch and taste is said to be "near" or "closely related to" the heart. The full implication appears, however, in DJuv 469a10-16 where A. argues to the location of the common sensorium on the ground that "we see clearly that two senses, touch and taste, extend to the heart, so that the others must also" (a12-14). Consequently we should recognize another implicit reference to the heart in DA II at 423b23 where A. refers to the common sensorium "within". He must have the same in mind when he speaks of the "ultimate" organ of sense later in DA III at 426b16 and 431a18.

In DA III.7 A. explains that the faculty of pursuit and avoidance, pleasure and pain, is rationally distinct from but really identical with the faculty of sense perception (431a10-14) which also produces the images necessary to and concomitant with the operation of the thinking faculty (431b2-5). Having established this, he is ready to discuss the origin of motion in man and animals (432a15 ff.). In exploring this problem A. again refers to the heart.

First, the heart is explicitly mentioned as the physical organ affected by the image of something painful or pleasant: "When the mind contemplates some such object, it does not immediately order avoidance or pursuit. For example it often thinks about something frightful or pleasant, but does not bid one be frightened, though the heart is moved or, if the object be pleasant, some other part" (432b29-433a1). The heart, as organ of the central sense and image-making faculty, is the first organ to react to the image of a painful or pleasant object though the mind may not
sanction its reaction, in which other organs may also be involved.

Secondly, the psychophysiology suggested here helps to elucidate the cryptic passage toward the end of this discussion (433b19-27) where A. speaks of the "bodily part" which the appetitive faculty uses as its organ to move the animal. This organ is found "at a point where beginning and end coincide." "For everything is moved by pushing and pulling, so that something must remain fixed, like the center point of a moving circle, from which motion has its origin." Ross, with most commentators (see Hicks 565 ad 433b26), identifies the organ in question as the heart, "which is for A. the central seat of life," and refers the reader to DPA 665a10 and DMA 698b1-4 (DA 317 ad 21-27, 25-27). These passages certainly provide clarification. But early in DA itself A. has already indicated something of the basic dynamics of emotion and the origin of movement in the heart; and this will find further elucidation at the end of the PN.

As we have seen, DA II 420b25-26 indicates that A. is thinking of the heart as the "hottest organ of the body," the center of vital heat so necessary to nutrition and growth. How this function as center of the thermal system enables the heart to operate also as center of emotional response and movement is suggested by the first explicit reference to the heart in the DA, that at 403a31. In the context A. is bent on establishing that most psychic events involve the body, with the possible exception of human thought (403a5-8). Examples are "anger, confidence, desire, and sensation in general" (403a7) and, again, "anger, gentleness, fear, pity, confidence, joy, loving and hating" (a17-18). To illustrate A. turns to a favorite pair of opposites, anger and fear, appealing to the common experience that we sometimes feel these emotions when there is little or no stimulus, while at other times we do not feel them though the stimulus is great (b19-25). Consequently these are to be conceived as λυγην ξυνανανομη, and any adequate definition should include both their formal and material aspect (a24ff.). Taking anger as an example, A. explains that its formal aspect might be defined as "an urge to inflict pain in retaliation," while its material aspect would be "a boiling ( ξηθος ) of the blood around the heart" (a25-31). This suggests that the physical manifestation of anger arises from a more than normal increase of vital heat in the heart, causing the blood to "boil".

Now anger and fear are linked as opposites in this passage and elsewhere (DA 403b18, 408b8; and cf. DM 453a26-28; DPA 650b27 ff., 667a16-23, 692a22-26; Rhet. 1380a33, etc.) and have different bodily manifestations (403a19-26). If anger-reaction is started as an increase of vital heat in the heart, then presumably fear-reaction begins as a decrease in its normal heat, causing the blood there and elsewhere to cool. This ties in precisely with the detailed physiology of De Respiratione (=D'lies) 479b17-480a16, where A. distinguishes "palpitation" of the heart from "pulsation": palpitation is a contraction of heat in the heart caused by a cooling down (479b19-20); in a state of fear the body grows cold and the heat, contracted and concentrated in the heart, makes it palpitate, sometimes so violently that the organism dies of fright (b21-26). Pulsation, the opposite, an expansion due to an increase of heat, "is like boiling ( ξηθος )". For boiling occurs when liquid is vaporized by heat and expands because its bulk increases" (b30-32). This must be the "boiling" of the blood A. has in mind at DA 403a31 as the physical dimension of anger. And this contraction and expansion through decrease or increase of the normal temperature at the heart accounts for the "pushing and pulling" communicated from the central organ in A.'s description of the origin of movement at DA 434b25. (For the mechanics involved see Pseudo-A., Mechanica 847b16 ff.) It is basic to the more comprehensive description in DMA 698a14 ff. and elsewhere.
Finally, one type of complex animal movement, voice production, is traced specifically to the region of the heart, pharynx and lungs in DA II (420b27-33) immediately after A. has indicated the heart as the "hottest organ of the body" (b25-26). In discussing sound and voice, A. asserts that nature uses breath inspired through the pharynx to the lung for two purposes, refrigeration and voice production. Refrigeration is needed most at the heart (25-26). And voice is a striking of breathed-in air against the windpipe "under the influence of soul in these parts" (b28). A. explains immediately what he intends by this last phrase since it constitutes the specific difference of "voice": "For not every sound produced by an animal is voice...since it is possible to make a sound just with the tongue or like coughing; but the sound-impact must be ensouled, i.e., its production accompanied by an act of the image-making faculty. For voice is the kind of sound that conveys meaning" (b29-33: σημαντικάς ψόφος). The "meaning" understood here is of the most elemental type, shared with other animals by man, who also has the higher power of speech. "Voice is a sign (σήματος) of pain and pleasure, and for this reason is possessed also by other animals, for their nature is developed to this point that they have sensations of pain and pleasure and signal (σημαίνειν) these to one another" (Politics 1253a11-14). Clearly implied, then, is that the "soul in these parts" functions in sense perception, imagination, emotion or pleasure-pain reaction, and the communication of emotion through production of appropriate sound, implying control of breath and bodily organs. These are obviously activities of the "sensitive soul" integrated in the common sensorium, the heart. The anatomy, physiology, and teleology of this is detailed in DPA (664a37 ff., esp. 65a7-26), while DGA states clearly that the heart is the source of voice (776b18) and explains differences in male and female voice quality by relative taughtness or slackness of the heart (787b15-788a16).

Thus the explicit and implicit references to the heart in DA, though relatively few and introduced incidentally, indicate clearly enough that A. is thinking of the heart even in this work as the central organ of the nutritive and sensitive life, a doctrine he develops explicitly and in detail in the PN and the biological works. Even in DA II, where he introduces the definition of soul as entelechy of the body, he also thinks of soul as being present and operating on the nutritive and sensitive levels "in these parts", i.e., in the heart and surrounding organs. These notions which to Nuyens and Ross seemed incompatible evidently were not so for A.

What then was the relationship between the two notions for A.? I believe a case can be made for the position that A. not only thought of them as compatible but even as joined by necessity, that his presuppositions about the soul and his conception of soul as described in DA II made it necessary, in his eyes, to postulate a single dominant organ in which the soul functions primarily in animals and man. This is the antithesis of the position of Nuyens. Kahn has argued to such a necessity for the "sensible soul" (67-68). There seems to be no reason why the same should not be true for the animal soul as a whole.

The Necessity of the Heart as Center in Hylomorphism

First let us look at the characteristics of the hylomorphic soul and the condition of its existence as A. presents them in the DA. After a brief introduction on the value and difficulty of his subject (402a1-403a2) A. opens the DA with the first of what Richard Sorabji has called his "two main theoretical statements" ("Body and Soul in Aristotle," Philosophy 49, 1974, 77). This is the passage we have already examined (403a3-b19) in which A. introduces his fundamental position that no function or affection of soul (with the possible exception of pure thought) exists independently
of a concurrent physical change. We may distinguish rationally the formal essence from the physical manifestation of anger, for example; but the two are joined in the real event. The form or essence must be embodied in appropriate matter (ἐν ἰδιαίτεραι τούτοις) to exist (403b2-3); and for the truth both must be taken into account, since emotions like anger and fear "are inseparable from the animal's physical body in which they take place" (b17-18). A.'s view from the start is obviously hylomorphic, with emphasis here on the need for matter, and appropriate matter, if the form is to exist.

Sorabji locates A.'s second "main theoretical statement" at the end of DA II "where it rounds off the discussion of the five senses" (424b3-18: Sorabji 77; but better 424a17-b18). Here A. is concerned not with perceptive or emotional activities but with their faculties. Again he distinguishes rationally the sense faculty from the sense organ in which it exists. But in reality "they exist as one and the same thing, though they differ in essence. For that which senses must have extension; but neither the having power to sense nor the sense faculty is something extended; they are rather a certain λόγος or power of something extended" (424a25-28). Here A. stresses the immateriality of the faculty as form. But both principles join to constitute the living reality and both are equally necessary. These two passages catch the basic hylomorphic view of body and soul and should be kept in mind through the intervening discussion which they frame (Sorabji 77).

Following the first of these statements at the opening of DA I A. presents a critical account of earlier theories on soul. Ross has remarked (DA 12) that A.'s own views about the soul "are largely shaped by his sense of the objections to which earlier views were exposed." That being the case, the account of his predecessors becomes important as an index of the errors A. is trying to avoid and as a formulation of the presuppositions which help to shape his own definition and description of the soul. Some of A.'s negative reactions to previous theories of soul are as follows:

1. Soul is not material, i.e. an element like fire or air or any combination of them: 403b28 ff.; nor is it a spatial magnitude (vs. Plato): 407a3-33.

2. Soul is not joined to body unnaturally or painfully: 407b1-4; but body and soul must be of a special nature so as to join connaturally; it is absurd to think any chance soul could be joined to any body; each body must have form and shape suitable to the soul it serves as instrument (vs. Plato ?, Pythagoreans): 407b13-25.

3. On the other hand soul is not simply the harmony, ratio, or blend of the opposing constituents of the body; one reason, among many, is that it has the power to originate motion: 407b26 ff.

4. Soul does not move body by moving itself; rather, while not itself moving, it is moved only indirectly by reason of the body, its vehicle, like a sailor on a ship: 405b31-407a2, 408a30-33; when soul is said to change, as in emotion, it is the physical organ (the heart) that changes locally or qualitatively; not the soul but the composite changes; movement is from the soul and to the soul; decline of mind in old age is due to deterioration of the interior organ on which it depends; soul is not changed, nor changes itself: 408b1-32. (Hylomorphism)

5. Souls are not all of the same kind, e.g. not all that have sense perception (animals) can originate local motion; plants have soul but cannot perceive or move locally; and many animals are without power of reason: 410b16-27.
6. The soul is not divided into a multiplicity of really distinct parts each serving a separate function, e.g. perception and knowing, appetite, local motion, etc., or one part thinking, another desiring (Plato?); so the soul is one: 411a26-b14.

7. Parts of the soul do not hold together parts of the body, but rather the whole soul with all its parts is present in each part of the body; though in plants and some insects the whole soul can be divided, since these organisms can be divided into living segments of the same species; but they do not survive if in them the soul does not possess organs suitable to preserve their nature: 411b15-30.

Some of A.'s presuppositions, then, are that the soul is single with multiple powers, immaterial but existing only in a connatural material body equipped with organs suitable to the various functions of soul, and to this particular type of soul, there being many. Soul does not change but is the source of change in the ensouled organism. Within the context of these presuppositions A. undertakes his own positive definition of soul in DA II. There is no need to rehearse his development of the definition of soul as the substantial form, entelechy or actuality, and first actuality, of a natural body having life potentially (412a1-29). This aspect, especially the notion of soul as entelechy of the entire body, receives close attention from Nuyens (66 ff.; 238 ff.) and Ross (DA 10 ff.), and quite properly. But there is little to be found in the commentators and, for that matter, in the DA itself, about that part of the definition describing the kind of body the soul can inform and activate.

It is identified first as "a natural body having life potentially" (412a28). A. immediately specifies this as "a natural body equipped with organs," and hastens to point out that the definition applies to plants since they also have organs. In contrast to an artifact, e.g. an axe, it must be "a natural body of a particular kind, viz. one having in itself a principle or source (δρύχ) of its motion or rest" (412b16-17; cf. Physics 192b4-23). Later, after distinguishing the various powers of soul in plants, animals, and man, A. reinforces the point that each kind of soul can exist only in a body proper to it, since "the actuality of any given thing can only be realized...in a matter of its own appropriate to it" (414a25-27). But A. has not much more to say directly about the body beyond these generalizations in DA. Nor should we expect him to go beyond this in a work on the soul, though we have seen in his incidental references to the heart in DA that he thinks of the heart as the central organ in man and other blooded animals. But A. could not properly discuss the appropriateness of this body, or the bodily structure demanded by any soul, until he had first presented a more comprehensive account of the varieties and functions of soul, the soul as efficient and final as well as formal cause of the organism, the soul's nutritive, sensitive, locomotive, and intellectual faculties and their objects, which is what he does in the remainder of DA, and continues to do through the early treatises of the PN, as Kahn has shown.

We must turn then to other works which obviously share with DA the hylomorphic view of soul. Both Nuyens (e.g. 176-77) and Ross (DA 11) regard the Metaphysics as closely related to DA in this respect. There the now familiar passage at Zeta 1035b14 ff. is instructive. Discussing the relation of parts to the whole, A. describes soul in hylomorphic terms as the "form or essence of a body of a certain kind" (b16) and explains that the soul and its parts, as essential substance, are prior to the animal and to the body and its parts; though in a sense they are not, since they cannot exist apart from the concrete whole, the composite of body and soul.
Then, speaking of the relationship of parts of the composite to the whole, he goes on to remark without qualification: "Some parts are neither prior nor posterior to the composite, namely, those which are controlling (κύρια) and in which the formula, i.e., the essential substance (ὁ λόγος καὶ ἡ ὀψωτικὴ) is primarily present (ἐν ὑποτόμῳ), e.g., the heart, or perhaps the brain, -- for it does not matter which of the two is of such a nature" (b25-28).

Here, as has been remarked, A. speaks of the hylomorphic soul as being "present in" some particular controlling organ (at the moment he is not interested in taking sides on whether this be heart or brain; see below). The soul is present in this controlling organ primarily. And the organ is one that is not prior or posterior to the composite but comes into existence simultaneously (ἀμφοτέρως) with it. The context of A.'s thought is clarified by a related passage in M Delta where, in listing various meanings of the word ἀρχή (source, beginning) he mentions in third place "that thing as a result of whose presence something first comes into being, e.g., as the keel is the beginning of a ship, the foundation the beginning of a house, and in the case of animals some say the heart, others the brain, others something similar..." (1013a4-6).

Though these passages do not commit A. to either the heart or the brain, they certainly make it clear that he conceives the hylomorphic soul as present in, forming and informing, some one principal or controlling organ first in the generation of the animal. And the moment that organ is formed marks the beginning of the animal, the composite. For the rest of the animal is formed from this organ and around it as its beginning and source.

The necessity, as well as the dynamics, of this process is brought out forcefully in DGA, a work which Nuyens regards as hylémorphique (256-263). The hylomorphic soul of DA cannot exist except as formal cause informing an appropriate organ or system of organs; it is also the efficient cause, the source of change and motion, which forms and functions in the composite; and it is the final cause for the sake of whose functions the complete organism, the End, is developed and maintained. Accordingly, in DGA 735b34 ff. A. explains that to initiate the independent life of a new animal the soul must form a single primary organ from the residue of seed, which ensouled organ becomes the source of all other organs subsequently formed (742a33-b3): "First of all it is necessary (ἀναγκαίον) that some part exist in which the source of motion is present (since of course this is a part of the End, being single and all-controlling, ἐν καὶ ἐπικτῆσι) and after this the whole organism, i.e., the End... So that if there is some such part -- which must (ἀναγκαίον) be present in animals, one which possesses the principle (ἀρχή) and the End of the animal's whole nature -- it is necessary (ἀναγκαίον) that this be formed first(πρῶτον) qua instrument of change (χωνταὶ χάραξεν) but simultaneously with the whole organism qua part of the End."

The implications are no doubt clear. The soul must form, inform and activate a single controlling organ from the start, by means of which it produces the natural growth of the other organs necessary for the functioning of all its powers or faculties. This organ is not only chronologically first in generation but also the dominant or controlling organ in the fully-formed animal, since it must continue to do its work as primary control center of the life processes if the organism is to continue to be nourished, refreshed by sleep, etc. so as to maintain itself. Hence the soul is present in this organ primarily and as controlling the other organs through it. This is not to deny that the soul also forms, informs and activates -- and so is present in -- the other organs necessary to all its functions. But it can do this...
only because it is present first in one organ formed to serve as origin and control center (δρυς) of the other organs. Thus soul is present in all the organs of the body, but not in the same way. It must be, and continue to be, present in one organ πρώτης και πολυωκ. Yet this organ, like any other, lives and functions only as part of a living whole. Perhaps it is this A. has in mind at DA II 412b16-17 where he describes the body appropriate for the hylomorphic soul as "a natural body of a particular kind, viz. one having in itself a principle or source (δρυς) of its motion and rest." Of course the soul must always be the ultimate source of motion and rest; but it can only exist as incorporated in an appropriate organ.

DGA leaves no doubt about which organ this is (e.g. 741b16-17): "The first to be formed is the source (δρυς), which in blooded animals is the heart..." A. establishes the heart (vs. those who favor the brain) as the primary organ on the basis of several considerations: The heart is observed to be the first formed in the embryo; it is the center of the vascular system from which nourishment (blood) is pumped to the other organs; it is the center of vital heat necessary for the nutritive and formative (see 740b30-741a3) processes; it is located in the place of command at the geometrical center of the organism. In lower animals it is an organ analogous to the heart. And even plants grow out symmetrically from some part formed as an δρυς (DGA 762b18-21).

We have been concerned with the processes of formation, nutrition, and growth, --all functions of the "nutritive soul" which, as we have seen, necessarily informs a primary organ, the heart, as source and control center of these processes in the developing and in the mature animal. But the distinguishing characteristic of an animal is the presence of a "sensitive soul". What necessity connects this with the "nutritive soul" and the heart? DGA is of little help here.

As we have seen, the question of the distinction between the nutritive, sensitive, and other "parts" of soul was settled at the end of DA I in favor of one soul with a number of rationally, not really, distinct faculties. The question arises again in DA II (413b13-32) and at the end of DA III (432a22 ff.) and reaches the same conclusion: Aside from pure intellect, "the remaining parts of the soul...are not separable in the way that some allege them to be; at the same time it is clear that they are logically distinct" (413b27-29). The statement asserting the real unity of soul is aimed, here as elsewhere, at the Platonic view of Timaeus 69 D ff. which divides the soul into three really distinct parts and assigns each to a particular area of the body (Hicks 327 ad 413b26). We have also seen that three of the explicit, and several implicit, references to the heart in DA show that A. is thinking of it as the organ of the central sense power; while the fourth explicit reference points to the heart as center of the vital heat operative in nutrition and growth. Thus in the DA, though concerned with the formal and avoiding the material aspect of the organism, A. indicates incidentally that he is thinking of the single animal soul as embodied in a unified physiological system centered in the heart. This becomes explicit in the PN.

Kahn has established by careful analysis of A.'s theory of sensation in DA and the first three treatises of the PN that "the De Anima and the Parva Naturalia form a continuous and progressive exposition" (67) in which investigation of the individual senses gives way to "ingressive exploration" of the sensus communis until, in his explanation of sleep, "Aristotle's psychology meets his physiology" (59), i.e. the "unity of the entire sense faculty" is in De Somno (455a12-22) "for the first time linked to the physiological doctrine of the unity of the sense apparatus in the common sensorium, the heart..." (ibid.). Later, rounding off this subject, Kahn
concludes that there is a necessary connection between A.'s sense psychology and his physiology (68):

For the sensory soul is, by definition, the form and realization of the sensory body; and the unity of one is unthinkable without the unity of the other. Far from contradicting the psychological doctrine of the De Anima, the physiology of the Parva Naturalia and of the biological works is required if the doctrine of sense perception as a single faculty of the soul is to be understood at all. The inference from unity of faculty to unity of physiological system is explicitly made by Aristotle himself in the Parts of Animals (667b21-31), where the fact that 'all animals possess a sensory soul which is actually one' is cited as a causal explanation for the unity of the vascular system in the heart.

The conclusion is, I believe, inescapable. But though the principle may be validly extended to the whole animal soul, Kahn is concerned specifically with the "sensory soul", as is A. in the passage cited from DPA. Moreover, we are committed to showing that A. was himself aware of the necessity of a unified physiological system to serve the single animal soul.

As Kahn points out, for the first time in the continuous discussion beginning with DA "Aristotle's psychology meets his physiology" explicitly in the DSom 455a12-22 where the common sensorium is identified as the heart. However, it is essential to A.'s explanation of the phenomenon of sleep and waking that he also identify the heart here as center of the nutritive functions. For what specifies the "incapacity of the sense faculty" in sleep is that it is caused by thermal changes in the heart, center of the vital heat and of the vascular system. And these thermal changes are induced by the ingestion of food (456a30 ff.). Thus the functions of the "nutritive soul" closely affect those of the "sensitive soul" because both nutritive and sensory systems are united in their common central organ, the heart.

A. identifies the heart, then, as center of both systems in DSom; but he does not use the vocabulary of necessity which would reveal his conviction that the animal soul must be actualized in a body unified by the heart. This is reserved until he has completed his discussion of the "sensitive soul" and allied subjects in the first five treatises of the PN and has returned to consideration of topics related to the "nutritive soul" in the last three.

These are so closely related that they constitute a continuous discussion (Hett, Loeb 388). The first treatise introduces the subject of the length and shortness of life, describing the ultimate physical constituents of various organisms and their role in determining the life-span of each. Following this, A. plans to explore in detail the subjects of youth, old age, death, and the related topic of respiration (467b10-13). In preparation he discusses explicitly the relation of the "parts" of the animal soul to each other and to the body, referring to his treatment of soul in DA and connecting the notion of soul developed there with a body unified through a central controlling organ (467b13-16): "Since we have discussed the soul in precise detail in another treatise and it is clear that its essential nature cannot be corporal, nevertheless it is also evident that soul is present in some particular bodily part, and this one of the parts having control over the rest."

We have seen A. use the language of necessity in DGA in connecting the opera-
tion of the "nutritive soul" to a single primary organ. Here he employs it again to establish the unity of the nutritive and sensitive soul in a controlling organ (b18-23):

Regarding things that are said to be 'animals' and to be 'alive', -- in those organisms to which both these terms apply (viz. to be an animal and to be alive) it is necessary \( (\delta \nu \alpha \gamma \kappa \eta ) \) that there be a single identical part in virtue of which the organism both 'lives' and is called an 'animal'. For it is impossible for an 'animal' qua 'animal' not to be alive...

An organism endowed with an animal ("sensitive") soul must always possess the powers of the "nutritive" soul in virtue of which it lives (DA 414b28-415a2). And the single soul with both nutritive and sensitive powers must operate through a single controlling organ. This organ, to be a suitable instrument for such a soul, "must be numerically one and the same but have multiple and different modes of being, since to be 'animal' and to be 'alive' are not identical" (467b25-27).

A. proceeds next (b27 ff.) to establish that this organ is the heart, on the basis that (1) the organ of the sensus communis and the source of the nutritive faculty would occupy a central position in the body; (2) the heart is observed to be formed first in the embryo; (3) the heart is the source of the blood vessels which carry nourishment (blood) to the rest of the body. "Therefore it is necessary \( (\delta \nu \alpha \gamma \kappa \eta ) \) that in blooded animals the source and control center \( (\delta \rho \chi \eta ) \) of both the 'sensitive' and the 'nutritive' soul be in the heart" (469a5-7). The conclusion is further reinforced by observation that the central sense is located in the heart since the basic senses of touch and taste are traced to that organ (469a10-16): and by deduction from the principle that nature always works to achieve the best possible, and the central position is the best for control (a28-b1). A. closes the argument with the statement (469b3-6): "Since therefore an animal is defined by the possession of a 'sensitive soul', in blooded animals it is necessary \( (\delta \nu \alpha \gamma \kappa \alpha \tau \omicron \omicron ) \) that this have its source and control center \( (\delta \rho \chi \eta ) \) in the heart."

What is the nature of the "necessity" which A. has in mind in these statements? Probably that which he explains in another context (DSom 455b26-28): "I use the term 'necessity' in its conditional sense, meaning that if an animal is to exist and have its own proper nature, by necessity certain things must belong to it; and if these are to belong to it, certain others must also belong to it."

Following this direction, we might suppose his reasoning would proceed somewhat as follows: If the hylomorphic animal soul, being one with several faculties, is to exist, it must be realized in an appropriate body. But this must be a "body equipped with organs" in such a way that the one soul can carry on its complex functions in a unified and coordinated manner. But this can only be done through a complex system of appropriate organs unified under a single central and controlling organ through which the soul can operate as source of motion and rest in the entire organism, integrating and controlling the life functions on both the nutritive and sensitive levels. But in blooded animals this must be the central and controlling organ of the vascular system and the sensory system, the heart.

The best constructed animals, A. remarks (468b11-13), have a nature that is, as far as possible, one. Paul Siwek has seen that, unlike Plato's tripartitie soul, Aristotle's hylomorphic soul can only incorporate its unity by forming, and informing, a body integrated about a single controlling organ (op. cit. 19): "Tunc solummodo unitas entis vivi potest salvari." The same point was made several centuries ago by
Jacob Zaharella in his commentary on DA II (cap. II, 295 D):

Ad unitatem vero animalis servandam unum tantum praecipuum membrum est concedendum, in quo tota sit anima radicata et a quo tamquam principio et fonte ad omnes corporis partes effundatur...

Soul in the Heart and in the Body as a Whole

In the light of these considerations, how are we to deal with A.'s statements that the soul "is present in (eivai eiv) some particular part of the body" (DJuiv 467 b15), that some part of the body "possesses" the sensitive soul (εὐγένεια νόμον: DMem 450a29), that the ἀπόχη of the sensitive and nutritive soul is "in the heart" (ἐν τῷ ἀπὸ ἐνάρξει : DJuiv 469a6-7)? How can A. speak in these terms and at the same time conceive the soul as form or entelechy, the principle of life throughout the body?

This is obviously the problem which led Nuyens to declare the "entelechy view" incompatible with the "heart view" and to propose his chronological solution. Kahn, discussing sensation only, suggests a more promising approach (69): "Since the sensory soul...includes not only the general power of sensation but also the special faculties of external sense, it must be thought of as informing the entire sense apparatus, although it does so from its source or foundation (archē) in the heart. Thus there is a derivative psychic power resident in the eye..."

If Kahn's statement were broadened to include the whole nutritive-sensory soul, it could apply to the animal as a whole, thus: The soul must be thought of as informing the entire nutritive and sensory apparatus, i.e. all the organs of the body, but as doing so from its source or foundation in the primary and first-formed organ of the body, the heart. The psychic power informing and maintaining the other organs is derivative in that it originated genetically in the heart, formed the other organs and preserves them in dependence on the heart, imparts change and movement to them from its center in the heart.

To say that the soul has its source in the heart is not to deny its presence in the rest of the body, but only to affirm that it is present in a different way in the heart and in the other organs. For the soul forms and activates the heart as the primary and controlling organ of the body, and so is present in the heart in a way different from its presence in all secondary and subordinate organs, i.e., it is present in the heart as the control center of all functions carried out through the organic systems that constitute the body. Conceived in this way, some of A.'s difficult statements about the presence of the soul "in the heart" are more easily understandable.

Nuyens and Ross find a contradiction between the notion of soul as form or entelechy of the whole body and soul as being present "in the heart" because they evidently understand the latter expression to imply local presence in the strict sense. Thus Nuyens interprets the phrase as equivalent to "localisée à une place définie" (259); and Ross takes it as meaning "being located in" (PN 12: DA 10). Understood in this way, the soul would "be located in" the heart as wine is in a jar, to use A.'s example (Physics 210a24 ff.). This, of course, would certainly preclude its being present in the same time in the rest of the body.

However, as Sorabji points out (85, note 62), "the soul does not meet Aristotle's requirements for 'being in a place'". (Cf. DA 406a12-16 and Physics 210b32 ff.) To
A. "being in place" implies matter and extension, as does moving from place to place. The soul, therefore, being incorporeal, can no more "be in place", of itself, than it can move locally, of itself (DA 405b32 ff.). A. can hardly have intended, then, that the immaterial soul be understood to be "in the heart" locally. He must have in mind some other mode of "being in" that organ.

As a preliminary to his discussion of space in the Physics, A. enumerates eight different senses in which one thing is said to "be in" another (210a14-24). The last, signifying localization in the strict sense, is inapplicable to soul and heart, as are the first four, which involve the relationship of part to whole and genus to species. The fifth concerns the relationship between form and matter, since the form is said to "be in" the matter of the compound. Perhaps A. speaks of the soul "in the heart" in this sense.

A. certainly affirms that the soul is "in" a body as its form or entelechy. He agrees with those who think that the soul cannot exist without a body, though itself not body: "For it is not a body, but something belonging to a body, and for this reason is present in a body" (ἐν καταλληλίαν ἄναρχος: DA 414a21-23). But then A. goes on to insist that this must be "a body of a particular kind; not at all as our predecessors supposed, who fitted it to any body without specifying in which or what kind of body, though obviously one chance thing does not receive another" (a23-25). The actuality or soul of each organism comes to exist only in what is potentially such by nature, i.e. in its own proper matter.

We have seen that for A. the matter necessary and proper for activation by the soul of a blooded animal (including man) is a body generated from and integrated by one primary and controlling organ, the heart. Clearly the animal and human soul can properly be said to "be in" the whole of such a body as form in its proper matter. But could it also be said to "be in" the heart in this sense? Certainly not if this is understood in an exclusive sense to mean that the soul is present "in the heart" as form in its proper matter but not in the other organs. For they also must be informed and activated by soul to be alive; and a heart is not a heart except as part of a living whole, as A. insists. But is there a sense in which the soul can be said to be in the heart as form in its proper matter without excluding its presence in the other organs?

Discussing the notion of cause in M Delta 1013a24 ff., A. remarks that "causes are spoken of in may senses, and even of those which are of the same kind some are causes in a prior and some in a posterior sense" (1013b31-32). Later, discussing the material cause of generable natural substances and events in M Eta (1044a15 ff.), he maintains that we must state not only all the causes (material, formal, efficient, final) but the most proximate (1044b2), i.e. not fire or earth as the material cause of man, but that which is proper or peculiar to his form. Turning to the example of sleep, he asks what is its proper material, what is the proximate material affected (b15-20). The whole animal, he agrees, is certainly affected. But with respect to what, and of what proximately? His answer is "the heart, or some other part" (b18). (The "other part" can be disregarded, introduced here for pacific reasons.) And what particular affection of that part, and not of the whole animal? It is a special kind of immobility, induced in that part (the heart), the proximate subject. (A. assumes the psychophysiology of sleep explained in DSom 456a30 ff.)

The distinction introduced here between the heart and the whole animal as proximate and secondary material cause may be important. While designating the heart as the primary or proximate subject of sleep A. does not deny, but specifically affirms, that the whole animal is the subject of sleep. But the whole animal sleeps because
of a specific affection or immobility in the controlling organ. The proper and proximate material subject of sleep is the heart; the whole animal is the proper but secondary subject of that affection.

It is possible, then, that when A. speaks of the soul "in the heart" he has in mind the heart as primary and proximate material organ of the soul, the controlling organ originally informed and activated by the soul, upon which all other organs depend for their formation and activation by the soul. They too live, i.e., are informed and activated by the soul, but in a way which is secondary and more remote. To speak of the soul as existing "in the heart", then, is not to deny its presence in the other organs but only to indicate the primary and proximate subject it informs and activates. A heart would be no heart if not part of a living whole.

A. uses another difficult phrase when he speaks of a certain part of the body that "possesses" the sensitive soul (ἐν...τῷ μορφ...ἐξουσίᾳ αὐτῆι; Mem 450a29). This suggests an exclusive possession incompatible with hylomorphism. And it is incompatible if understood in the sense that a part of the body "possesses" or "holds" the sensitive soul "as the container holds the contained." This is the third sense of the verb "to possess, to hold" (ἐξαστέλλω) distinguished by A. in M Delta 1023a8-25 and illustrated by the example "as the jar holds the liquid" (al5-16). Obviously this sense brings us back to that strict localization in space which for A. is inapplicable to the immaterial soul. He must be using the verb in another sense, probably the second, which he explains thus: (al2-13): "We say something 'possesses' or 'holds' another when the other is present in it as in receptive material, e.g. as the bronze 'possesses' or 'holds' the shape of the statue." In this sense a certain part of the body (the heart) would "possess" the sensitive soul as the material organ "possesses" its form. As we have seen, this need not imply that other organs do not "possess" the sensitive soul, but only that the one organ, the heart, "possesses" it primarily as proximate material cause.

What of the troublesome passage at the end of DMA 703a28 ff.? There A., after describing the psychophysiology of the origin of motion in the heart, compares the animal organism to a well governed city-state where, once a constitutional order is set up, there is no need for several separate monarchs to preside over various areas of operation, since each individual performs his function as ordered under a single source of command. The same, he says, comes about in the animal organism through natural growth and structure, each part formed by nature to fulfill its proper function, so that -- and here is the difficult statement (703a36-b2) -- "there is no need for soul to be in each part (ἐν ἐκτόσῳ ἐναλλ.), but with the soul being present in some center of control (ἐφαρμοσθείς or 'central origin of authority', Peck, Loeb 477) over the body, the other parts live by organic unity with it (προσεπάφηκενι: cf. M 1014b20-23) and perform their own functions through their natural formation."

It seems clear from the nature of the treatise and the immediate context that A. is thinking here of the soul not as formal but as efficient cause, and is describing particularly how and where the soul initiates movement or change in the animal body so as to control its functions and locomotion. He is insisting that under this aspect the soul occupies and operates from only one control center, the heart. This is a brief echoe of a point he makes constantly and at length in DPA, namely, that one source and center of control is best (657b20-21; 665b14-16; 666a14) and that this is the heart, which occupies the center, the place of leadership and command (665a10-13; 665b18-21). Ultimately, as we have seen, A. links this with the unity of the animal soul. "The sensory soul is, in all animals, one actually; therefore the part which primarily (πρώτος) possesses this soul is also one..." (667b23-
24). Here A. characterizes the heart as possessing the soul primarily, implying that the other organs possess it, but in a secondary mode, i.e. not as control centers but as controlled. The soul as originating change and controlling the life functions is present in the heart in a way in which it is not present in other organs.

Aristotle apparently makes this point against other thinkers (Plato?) who postulate more than one control center in the animal. At DPA 665b27-29 he criticizes certain persons who claim that the source of the blood-vessels is in the head, on the ground that "first of all they set up many control centers (ἀρχαί) scattered about." He may have these in mind in DMA 703a31-33: There is no more need for separate control centers in different parts of the animal organism than there is for separate monarchs to occupy and oversee different sections of a well organized city-state. In the animal organism, as in the body politic, one center of control is best.

Among the various ways one thing is said to "be in" another, listed at Physics 210a14 ff., A. distinguishes the sixth way thus: "As the affairs of the Hellenes are said to 'be in' the king and, in general, as something is said to 'be in' the primary agent of motion or change" (ἐν τῷ πρῶτῳ κυνηγούσι: 210a21-22). This may be the meaning A. has in mind with regard to the soul and the heart at DMA 403a37: As the "affairs of the Hellenes" are in the whole social organism so the animal soul is in the whole animal organism. But as the affairs of the Hellenes are "in the king" in a special way so the animal soul is present "in the heart" alone in the same special way, i.e. as in the primary source of change and control.