

DE GENERATIONE ANIMALIUM

(*On the Generation of Animals*)

BOOK I

1 We have now discussed the other parts of animals, both generally 715^a
and with reference to the peculiarities of each kind, explaining how
each part exists on account of such a cause, and I mean by this the
final cause.

There are four causes underlying everything: first, the final cause,
that for the sake of which a thing exists; secondly, the formal cause,
the definition of its essence (and these two we may regard pretty
much as one and the same); thirdly, the material; and fourthly, the 5
moving principle or efficient cause.

We have then already discussed the other three causes, for the
definition and the final cause are the same, and the material of ani-
mals is their parts—of the whole animal the non-homogeneous parts, 10
of these again the homogeneous, and of these last the so-called ele-
ments of all matter. It remains to speak of those parts which contribute
to the generation of animals and of which nothing definite has yet
been said, and to explain what is the moving or efficient cause. To
inquire into this last and to inquire into the generation of each ani-
mal is in a way the same thing; and, therefore, my plan has united 15
them together, arranging the discussion of these parts last, and the
beginning of the question of generation next to them.

Now some animals come into being from the union of male and
female, i. e. all those kinds of animal which possess the two sexes. 20
This is not the case with all of them; though in the sanguinea with
few exceptions the creature, when its growth is complete, is either male
or female, and though some bloodless animals have sexes so that they
generate offspring of the same kind, yet other bloodless animals gener-
ate indeed, but not offspring of the same kind; such are all that come
into being not from a union of the sexes, but from decaying earth and 25
excrements. To speak generally, if we take all animals which change
their locality, some by swimming, others by flying, others by walk-
ing, we find in these the two sexes, not only in the sanguinea but also
in some of the bloodless animals; and this applies in the case of the

715^b latter sometimes to the whole class, as the cephalopoda and crustacea, but in the class of insects only to the majority. Of these, all which are produced by union of animals of the same kind generate also after their kind, but all of which are not produced by animals, but from
 5 decaying matter, generate indeed, but produce another kind, and the offspring is neither male nor female; such are some of the insects. This is what might have been expected, for if those animals which are not produced by parents had themselves united and produced
 10 others, then their offspring must have been either like or unlike to themselves. If like, then their parents ought to have come into being in the same way; this is only a reasonable postulate to make, for it is plainly the case with other animals. If unlike, and yet able to copulate, then there would have come into being again from them another kind
 15 of creature and again another from these, and this would have gone on to infinity. But Nature flies from the infinite, for the infinite is unending or imperfect, and Nature ever seeks amend.

But all those creatures which do not move, as the testacea and animals that live by clinging to something else, inasmuch as their nature resembles that of plants, have no sex any more than plants
 20 have, but as applied to them the word is only used in virtue of a similarity and analogy. For there is a slight distinction of this sort, since even in plants we find in the same kind some trees which bear fruit and others which, while bearing none themselves, yet contribute
 25 to the ripening of the fruits of those which do, as in the case of the fig-tree and caprifig.

The same holds good also in plants, some coming into being from seed and others, as it were, by the spontaneous action of Nature, arising either from decomposition of the earth or of some parts in other plants, for some are not formed by themselves separately but are
 716^a produced upon other trees, as the mistletoe. Plants, however, must be investigated separately. [Chapters 2-16 omitted.]

721^a 17 Some animals manifestly emit semen, as all the sanguinea, but
 30 whether the insects and cephalopoda do so is uncertain. Therefore this is a question to be considered, whether all males do so, or not all; and if not all, why some do and some not; and whether the
 721^b female also contributes any semen or not; and, if not semen, whether she does not contribute anything else either, or whether she contributes something else which is not semen. We must also inquire
 5 what those animals which emit semen contribute by means of it to generation, and generally what is the nature of semen, and of the so-called catamenia in all animals which discharge this liquid.

Now it is thought that all animals are generated out of semen, and that the semen comes from the parents. Wherefore it is part of the same inquiry to ask whether both male and female produce it or only one of them, and to ask whether it comes from the whole of the body or not from the whole; for if the latter is true it is reasonable 10 to suppose that it does not come from both parents either. Accordingly, since some say that it comes from the whole of the body, we must investigate this question first.

The proofs from which it can be argued that the semen comes from each and every part of the body may be reduced to four. First, the intensity of the pleasure of coition; for the same state of feel- 15 ing is more pleasant if multiplied, and that which affects all the parts is multiplied as compared with that which affects only one or a few. Secondly, the alleged fact that mutilations are inherited, for they argue that since the parent is deficient in this part the semen does not come from thence, and the result is that the corresponding part is not 20 formed in the offspring. Thirdly, the resemblances to the parents, for the young are born like them part for part as well as in the whole body; if then the coming of the semen from the whole body is cause of the resemblance of the whole, so the parts would be like because it comes from each of the parts. Fourthly, it would seem to be reason- 25 able to say that as there is some first thing from which the whole arises, so it is also with each of the parts, and therefore if semen or seed is cause of the whole so each of the parts would have a seed peculiar to itself. And these opinions are plausibly supported by such evidence as that children are born with a likeness to their parents, not only in 30 congenital but also in acquired characteristics; for before now, when the parents have had scars, the children have been born with a mark in the form of the scar in the same place, and there was a case at Chalcedon where the father had a brand on his arm and the letter was marked on the child, only confused and not clearly articulated. That is pretty much the evidence on which some believe that the semen comes from all the body. 722^a

18 On examining the question, however, the opposite appears more likely, for it is not hard to refute the above arguments and the view involves impossibilities. First, then, the resemblance of children to 5 parents is no proof that the semen comes from the whole body, because the resemblance is found also in voice, nails, hair, and way of moving, from which nothing comes. And men generate before they yet have certain characters, such as a beard or grey hair. Further, chil- dren are like their more remote ancestors from whom nothing has

come, for the resemblances recur at an interval of many generations,
 10 as in the case of the woman in Elis who had intercourse with the
 Aethiop; her daughter was not an Aethiop but the son of that
 daughter was. The same thing applies also to plants, for it is clear
 that if this theory were true the seed would come from all parts of
 plants also; but often a plant does not possess one part, and another
 part may be removed, and a third grows afterwards. Besides, the
 15 seed does not come from the pericarp, and yet this also comes into
 being with the same form as in the parent plant.

We may also ask whether the semen comes from each of the homo-
 geneous parts only, such as flesh and bone and sinew, or also from
 the heterogeneous, such as face and hands. For if (1) from the former
 20 only, we object that the resemblance exists rather in the hetero-
 geneous parts, such as face and hands and feet; if then it is not be-
 cause of the semen coming from all parts that children resemble their
 parents in *these*, what is there to stop the homogeneous parts also from
 being like for some other reason than this? If (2) the semen comes
 from the heterogeneous alone, then it does not come from all parts;
 25 but it is more fitting that it should come from the homogeneous parts,
 for they are prior to the heterogeneous which are composed of them;
 and as children are born like their parents in face and hands, so they
 are, necessarily, in flesh and nails. If (3) the semen comes from both,
 what would be the manner of generation? For the heterogeneous parts
 30 are composed of the homogeneous, so that to come from the former
 would be to come from the latter and from their composition. To
 make this clearer by an illustration, take a written name; if any-
 thing came from the whole of it, it would be from each of the syl-
 lables, and if from these, from the letters and their composition. So
 that if really flesh and bones are composed of fire and the like ele-
 ments, the semen would come rather from the elements than any-
 thing else, for how can it come from their composition? Yet with-
 722^b out this composition there would be no resemblance. If again
 something creates this composition later, it would be *this* that would
 be the cause of the resemblance, not the coming of the semen from
 every part of the body.

Further, if the parts of the future animal are separated in the
 semen, how do they live? and if they are connected, they would form
 a small animal.

5 And what about the generative parts? For that which comes from
 the male is not similar to what comes from the female.

Again, if the semen comes from all parts of both parents alike,
 the result is *two* animals, for the offspring will have all the parts of

both. Wherefore Empedocles seems to say what agrees pretty well with this view (if we are to adopt it), to a certain extent at any rate, but to be wrong if we think otherwise. What he says agrees with it when he declares that there is a sort of tally in the male and female, and that the whole offspring does not come from either, 'but sundered is the fashion of limbs, some in man's . . .' For why does not the female generate from herself if the semen comes from all parts alike and she has a receptacle ready in the uterus? But, it seems, either it does not come from all the parts, or if it does it is in the way Empedocles says, not the same parts coming from each parent, which is why they need intercourse with each other. 10 15

Yet this also is impossible, just as much as it is impossible for the parts when full grown to survive and have life in them when torn apart, as Empedocles accounts for the creation of animals; in the time of his 'Reign of Love', says he, 'many heads sprang up without necks,' and later on these isolated parts combined into animals. Now that *this* is impossible is plain, for neither would the separate parts be able to survive without having any soul or life in them, nor if they were living things, so to say, could several of them combine so as to become one animal again. Yet those who say that semen comes from the whole of the body really have to talk in that way, and as it happened then in the earth during the 'Reign of Love', so it happens according to them in the body. Now it is impossible that the parts should be united together when they come into being and should come from different parts of the parent, meeting together in one place. Then how can the upper and lower, right and left, front and back parts have been 'sundered'? All these points are unintelligible. Further, some parts are distinguished by possessing a faculty, others by being in certain states or conditions; the heterogeneous, as tongue and hand, by the faculty of doing something, the homogeneous by hardness and softness and the other similar states. Blood, then, will not be blood, nor flesh flesh, in any and every state. It is clear, then, that that which comes from any part, as blood from blood or flesh from flesh, will not be identical with that part. But if it is something different from which the blood of the offspring comes, the coming of the semen from all the parts will not be the cause of the resemblance, as is held by the supporters of this theory. For if blood is formed from something which is not blood, it is enough that the semen come from one part only, for why should not all the other parts of the offspring as well as blood be formed from one part of the parent? Indeed, this theory seems to be the same as that of Anax- 723^a 5

agoras, that none of the homogeneous parts come into being, except that these theorists assume, in the case of the generation of animals, what he assumed of the universe.

Then, again, how will these parts that came from all the body of the parent be increased or grow? It is true that Anaxagoras plausibly says that particles of flesh out of the food are added to the flesh. But if we do not say this (while saying that semen comes from all parts of the body), how will the foetus become greater by the addition of something else if that which is added remain unchanged? But if that which is added *can* change, then why not say that the semen from the very first is of such a kind that blood and flesh can be made out of it, instead of saying that it itself *is* blood and flesh? Nor is there any other alternative, for surely we cannot say that it is increased later by a process of mixing, as wine when water is poured into it. For in that case each element of the mixture would be itself *at first* while still unmixed, but the fact rather is that flesh and bone and each of the other parts *is* such *later*. And to say that some part of the semen is sinew and bone is quite above us, as the saying is.

Besides all this there is a difficulty if the sex is determined in conception (as Empedocles says: 'it is shed in clean vessels; some wax female, if they fall in with cold'). Anyhow, it is plain that both men and women change not only from infertile to fertile, but also from bearing female to bearing male offspring, which looks as if the cause does not lie in the semen coming from all the parent or not, but in the mutual proportion or disproportion of that which comes from the woman and the man, or in something of this kind. It is clear, then, if we are to put this down as being so, that the female sex is not determined by the semen coming from any particular part, and consequently neither is the special sexual part so determined (if really the same semen can become either a male or female child, which shows that the sexual part does not exist in the semen). Why, then, should we assert this of *this* part any more than of the others?

723^b For if semen does not come from this part, the uterus, the same account may be given of the others.

Again, some creatures come into being neither from parents of the same kind nor from parents of a different kind, as flies and the various kinds of what are called fleas; from these are produced animals indeed, but not in this case of similar nature, but a kind of scolex. It is plain in this case that the young of a different kind are not produced by semen coming from all parts of the parent, for they would then resemble them, if indeed resemblance is a sign of its coming from all parts.

Further, even among animals some produce many young from a single coition (and something like this is universal among plants, for it is plain that they bear all the fruit of a whole season from a single movement). And yet how would this be possible if the semen were secreted from all the body? For from a single coition and a single segregation of the semen scattered throughout the body must needs follow only a single secretion. Nor is it possible for it to be separated in the uterus, for this would no longer be a mere separation of semen, but, as it were, a severance from a new plant or animal. 15

Again, the cuttings from a plant bear seed; clearly, therefore, even before they were cut from the parent plant, they bore their fruit from their own mass alone, and the seed did not come from *all* the plant.

But the greatest proof of all is derived from observations we have sufficiently established on insects. For, if not in all, at least in most of these, the female in the act of copulation inserts a part of herself into the male. This, as we said before, is the way they copulate, for the females manifestly insert this from below into the males above, not in all cases, but in most of those observed. Hence it seems clear that, when the males do emit semen, then also the cause of the generation is not its coming from all the body, but something else which must be investigated hereafter. For even if it were true that it comes from all the *body*, as they say, they ought not to claim that it comes from all *parts* of it, but only from the creative part—from the workman, so to say, not the material he works in. Instead of that, they talk as if one were to say that the semen comes from the shoes, for, generally speaking, if a son is like his father, the shoes he wears are like his father's shoes. 20 25 30

As to the vehemence of pleasure in sexual intercourse, it is not because the semen comes from all the body, but because there is a strong friction (wherefore if this intercourse is often repeated the pleasure is diminished in the persons concerned). Moreover, the pleasure is at the end of the act, but it ought, on the theory, to be in each of the parts, and not at the same time, but sooner in some and later in others. 724^a

If mutilated young are born of mutilated parents, it is for the same reason as that for which they are like them. And the young of mutilated parents are not always mutilated, just as they are not always like their parents; the cause of this must be inquired into later, for this problem is the same as that. 5

Again, if the female does not produce semen, it is reasonable to suppose it does not come from all the body of the male either. Conversely, if it does not come from all the male it is not unreasonable

10 to suppose that it does not come from the female, but that the female is cause of the generation in some other way. Into this we must next inquire, since it is plain that the semen is not secreted from all the parts.

In this investigation and those which follow from it, the first thing to
 15 do is to understand what semen is, for then it will be easier to inquire into its operations and the phenomena connected with it. Now the object of semen is to be of such a nature that from it as their origin come into being those things which are naturally formed, not because there is any agent which makes them from it as . . . but simply
 20 because this is the semen. Now we speak of one thing coming *from* another in many senses; it is one thing when we say that night comes *from* day or a man becomes man *from* boy, meaning that A follows B; it is another if we say that a statute is made *from* bronze and a bed *from* wood, and so on in all the other cases where we say that the thing
 25 made is made *from* a material, meaning that the whole is formed from something pre-existing which is only put into shape. In a third sense a man becomes unmusical *from* being musical, sick *from* being well, and generally in this sense contraries arise from contraries. Fourthly, as in the 'climax' of Epicharmus; thus *from* slander comes railing and *from*
 30 this fighting, and all these are *from* something in the sense that it is the efficient cause. In this last class sometimes the efficient cause is in the things themselves, as in the last mentioned (for the slander is a part of the whole trouble), and sometimes external, as the art is
 35 external to the work of art or the torch to the burning house.

Now the offspring comes *from* the semen, and it is plainly in one of the two following senses that it does so—either the semen is the material from which it is made, or it is the first efficient cause. For
 724^b assuredly it is not in the sense of A being *after* B, as the voyage comes *from*, i. e. after, the Panathenaea; nor yet as contraries come from contraries, for then one of the two contraries ceases to be, and a third substance must exist as an immediate underlying basis from which
 5 the new thing comes into being. We must discover, then, in which of the two other classes the semen is to be put, whether it is to be regarded as matter, and therefore acted upon by something else, or as a form, and therefore acting upon something else, or as both at once. For perhaps at the same time we shall see clearly also how all the products of semen come into being from contraries, since coming into being from contraries is also a natural process, for some animals do so, i. e.
 10 from male and female, others from only one parent, as is the case with plants and all those animals in which male and female are not

separately differentiated. Now that which comes from the generating parent is called the seminal fluid, being that which first has in it a principle of generation, in the case of all animals whose nature it is to unite; semen is that which has in it the principles from *both* united parents, as the first mixture which arises from the union of 15 male and female, be it a foetus or an ovum, for these already have in them that which comes from both. (Semen, or seed, and grain differ only in the one being earlier and the other later, grain in that it comes from something else, i. e. the seed, and seed in that something else, 20 the grain, comes from *it*, for both are really the same thing.)

We must again take up the question what the primary nature of what is called semen is. Needs must everything which we find in the body either be (1) one of the natural parts, whether homogeneous or heterogeneous, or (2) an unnatural part such as a growth, or 25 (3) a secretion or excretion, or (4) waste-product, or (5) nutriment. (By secretion or excretion I mean the residue of the nutriment, by waste-product that which is given off from the tissues by an unnatural decomposition.)

Now that semen cannot be a part of the body is plain, for it is homogeneous, and from the homogeneous nothing is composed, e. g. from only sinew or only flesh; nor is it separated as are all the other 30 parts. But neither is it contrary to Nature nor a defect, for it exists in all alike, and the development of the young animal comes from it. Nutriment, again, is obviously introduced from without.

It remains, then, that it must be either a waste-product or a 35 secretion or excretion. Now the ancients seem to think that it is a waste-product, for when they say that it comes from all the body by reason of the heat of the movement of the body in copulation, they 725^a imply that it is a kind of waste-product. But these are contrary to Nature, and from such arises nothing according to Nature. So then it must be a secretion or excretion.

But, to go further into it, every secretion or excretion is either of 5 useless or useful nutriment; by 'useless' I mean that from which nothing further is contributed to natural growth, but which is particularly mischievous to the body if too much of it is consumed; by 'useful' I mean the opposite. Now it is evident that it cannot be of the former character, for such is most abundant in persons of the worst condition of body through age or sickness; semen, on the contrary, is least abundant in them, for either they have none at all or it is not 10 fertile, because a useless and morbid secretion is mingled with it.

Semen, then, is part of a useful secretion. But the *most* useful is the best and that from which finally is formed each of the parts of the

body. For secretions are either earlier or later; of the nutriment in the
 15 first stage the secretion is phlegm and the like, for phlegm also is a
 secretion of the useful nutriment, an indication of this being that if it
 is mixed with pure nutriment it is nourishing, and that it is used up in
 cases of illness. The final secretion is the smallest in proportion to the
 quantity of nutriment. But we must reflect that the daily nutriment
 20 by which animals and plants grow is but small, for if a very little be
 added continually to the same thing the size of it will become exces-
 sive.

So we must say the opposite of what the ancients said. For whereas
they said that semen is that which comes *from* all the body, *we* shall
 say it is that whose nature is to go *to* all of it, and what they thought
 a waste-product seems rather to be a secretion. For it is more reason-
 25 able to suppose that the last extract of the nutriment which goes to all
 parts resembles that which is left over from it, just as part of a
 painter's colour is often left over resembling that which he has used
 up. Waste-products, on the contrary, are always due to corruption or
 decay and to a departure from Nature.

A further proof that it is not a waste-product, but rather a secre-
 tion, is the fact that the large animals have few young, the small
 30 many. For the large must have more waste and less secretion, since
 the great size of the body causes most of the nutriment to be used up,
 so that the residue or secretion is small.

Again, no place has been set apart by Nature for waste-products
 but they flow wherever they can find an easy passage in the body,
 but a place has been set apart for all the natural secretions; thus
 725^b the lower intestine serves for the excretion of the solid nutriment, the
 bladder for that of the liquid; for the useful part of the nutriment we
 have the upper intestine, for the spermatic secretions the uterus and
 pudenda and breasts, for it is collected and flows together into them.

5 And the resulting phenomena are evidence that semen is what we
 have said, and these result because such is the nature of the secre-
 tion. For the exhaustion consequent on the loss of even a very little of
 the semen is conspicuous because the body is deprived of the ulti-
 mate gain drawn from the nutriment. With some few persons, it is
 true, during a short time in the flower of their youth the loss of it,
 10 if it be excessive in quantity, is an alleviation (just as in the case of
 the nutriment in its first stage, if too much have been taken, since get-
 ting rid of this also makes the body more comfortable), and so it may
 be also when other secretions come away with it, for in that case it is
 not only semen that is lost but also other influences come away
 15 mingled with it, and these are morbid. Wherefore, with some men at

least, that which comes from them proves sometimes incapable of procreation because the seminal element in it is so small. But still in most men and as a general rule the result of intercourse is exhaustion and weakness rather than relief, for the reason given. Moreover, semen does not exist in them either in childhood or in old age or in sickness—in the last case because of weakness, in old age because they do not sufficiently concoct their food, and in childhood because they are growing and so all the nutriment is used up too soon, for in about five years, in the case of human beings at any rate, the body seems to gain half the height that is gained in all the rest of life. 25

In many animals and plants we find a difference in this connexion not only between kinds as compared with kinds, but also between similar individuals of the same kind as compared with each other, e. g. man with man or vine with vine. Some have much semen, others little, others again none at all, not through weakness but the contrary, at any rate in some cases. This is because the nutriment is used up to form the body, as with some human beings, who, being in good condition and developing much flesh or getting rather too fat, produce less semen and are less desirous of intercourse. Like this is what happens with those vines which 'play the goat', that is, luxuriate wantonly through too much nutrition, for he-goats when fat are less inclined to mount the female; for which reason they thin them before breeding from them, and say that the vines 'play the goat', so calling it from the condition of the goats. And fat people, women as well as men, appear to be less fertile than others from the fact that the secretion when in process of concoction turns to fat with those who are too well-nourished. For fat also is a healthy secretion due to good living. 30 726^a

In some cases no semen is produced at all, as by the willow and poplar. This condition is due to each of the two causes, weakness and strength; the former prevents concoction of the nutriment, the latter causes it to be all consumed, as said above. In like manner other animals produce much semen through weakness as well as through strength, when a great quantity of a useless secretion is mixed with it; this sometimes results in actual disease when a passage is not found to carry off the impurity, and though some recover of this, others actually die of it. For corrupt humours collect here as in the urine, which also has been known to cause disease. . . . 15

From what has been said, it is clear that semen is a secretion of useful nutriment, and that in its last stage, whether it is produced by all or no. [Chapter 19 and most of chapter 20 omitted.] 26

. . . That, then, the female does not contribute semen to generation, but does contribute something, and that this is the matter of the 22 729^a