

### Chapter Three

#### NATURA AGIT PROPTER FINEM

"The best course appears to be that we should follow the method already mentioned and begin with the phenomena presented by each group of animals, and when this is done, proceed afterwards to state the causes of those phenomena."<sup>(1)</sup>

The methodological principle Aristotle lays down here is one we already touched upon, but we mention it again for purposes of orientation. From a mere cursory glance at Aristotle's proofs demonstrating that nature acts for an end, we perceive that this is in fact the method he is employing. He is concerned with rendering an account of the natural facts, or better perhaps, the results of the activity of nature; thus his arguments proceed "ab effectu ad causam." "This is what happens," the Stagirite seems to be saying, "let us explain why it happens, the causes of its happening." This principle of investigation, the experimental method with its a posteriori mode of demonstration, needs no justifying exposition, since it is accepted, nay demanded, by scientist and philosopher alike

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1) De Partibus Animalium, I, ch. 1, 640a13-17; see also above, p. 38.

in the study of nature. Difficulties arise only in its particular applications, not with reference to the principle itself to be certain, but with the use made of it. In respect to our own problem, a critical reader may question the validity of the facts which found Aristotle's arguments, as well as their sufficiency.

It is evident that our panorama of the world of nature has been immeasurably extended since the days of the great Peripatetic with the resultant feature that, what may have seemed to him an unquestionable datum of experience, may by modern instruments and techniques of observation be shown to be of an entirely different character. Lacking microscope and telescope, and other such aids which have become for us necessary experimental equipment, Aristotle was forced to rely on what his senses could report to him of the world of our experience. His common sense observations were all he had to work with, and, as Lecomte du Noüy so pointedly stresses<sup>(2)</sup>, common sense observations do not merit our complete confidence. Add to this the consideration that the experimental sciences in the 4th and 3rd centuries B.C. were in the embryonic stage, and it seems justifiable to look askance at any Aristotelian

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2) Cf. P. Lecomte du Noüy, Human Destiny (Toronto: Longmans, Green and Co., 1947), p. 5.

demonstration based on the observation of natural phenomena. In truth, such an attitude would be warranted, were it not that the phenomena employed by Aristotle are so common and general in character that he who runs can read. No contrived methods of experimental analysis are required to acquiesce to their existence. I need no test tube or vacuum-sealed cultures, for example, to tell me that from human sperm a human being is born, and not a cow; or, an oak tree rather than a spruce springs from an acorn.

These facts are indisputably true, any predilection, not uncommon among modern savants, to dismiss without discrimination every scientific statement of the Ancients because based on false physical and biological systems notwithstanding.

Granted these facts are incontestably valid, there nevertheless arises the allied question of their sufficiency. Are they adequate for warranting the conclusion that nature acts purposively, or is it necessary to probe further into the bowels of nature in search of more circumstanced evidence? St. Thomas has anticipated this difficulty and resolved it for us in distinguishing the two parts of the science of nature. (3)

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3) "Et sicut diversa genera scientiarum distinguuntur secundum hoc quod res sunt diversimode a materia separabiles, ita etiam in singulis scientiis, et praecipue

The study of nature pursues a path of determination that proceeds from a highly general knowledge of natural phenomena to a knowledge of them in their proper differences. As long as we remain in the plane of universality that knowledge, though less detailed, less distinct, will be proportionately more certain because detached from the variability of the singular, while the method of argumentation will be rigorously demonstrative. This first approach is already a part of the Philosophy of nature. As soon, however, as we recede from universals and approach more and more to things in their concretion, our knowledge becomes less certain because more involved in the indeterminacy of matter, and a strictly dialectical mode of argumentation is employed. This is the realm of the experimental sciences.

It is easy to recognize from this how the natural philosopher can solve fundamental problems without the

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in scientia naturali, distinguuntur partes scientiae secundum diversum separationis et concretionis modum. Et quia universalis sunt magis a materia separata, ideo in scientia naturali ab universalibus ad minus universalis proceditur... Unde et scientiam naturalem incipit tradere ab his quae sunt communissima omnibus naturalibus, quae sunt motus et principium motus, et demum processit per modum concretionis, sive applicationis principiorum communium, ad quaedam determinata mobilia, quorum quaedam sunt corpora viventia." In De Sensu et Sensato, lect. 1, n. 2; see also In I Phys., lect. 1, nn. 5-11; In I Meteorologicorum, lect. 1, n. 1; Ia, q. 85, a.3, c. and ad2.

service of highly circumstanced experience; a modicum of experience suffices to show him the universal reasons of things; whereas the experimental scientist, since he studies things in their concretion, depends on an increasingly detailed experience for his principles.

We can affirm then that the phenomena employed by Aristotle to establish his principle that nature acts for an end are adequate. He is not concerned with showing that this or that particular natural being operates for this or that particular end, which, if he were, would certainly call for a minute experimental analysis. That nature as a whole acts purposively, is all that Aristotle wishes to vindicate, and for founding this general principle, facts of common observation are sufficient.

This does not mean, however, that we ought to neglect entirely the findings of modern experimental science. That would be attacking our problem in an unscientific spirit. We are simply trying to bring out that an intricately detailed knowledge of natural phenomena is not necessary to demonstrate purposive activity in nature. As a point of fact, in the course of analyzing the quintet of arguments for finality, we will utilize as corroborative material the data the sciences of our day offer us; such a procedure will enable us not only to reinforce

these proofs, since they will be shown to be substantiated by every newly discovered fragment of reality, but also to overcome any prejudicial attitudes toward them that may be born of a questioning glance at their understructure.

### I.- CONSTANCY OF THE EFFECT

The first argument is based on the constancy of natural events and consists of two parts, the first of which St. Thomas phrases thus:

*Omnia quae fiunt naturaliter, aut fiunt sicut semper, aut sicut frequenter: sed nihil eorum quae fiunt a fortuna vel per se vano, idest a casu, fit semper vel ut frequenter. Non enim dicimus quod a fortuna vel a casu fit, quod multoties pluat in hieme; sed dicemus esse a casu si forte multum plueret sub cane, idest in diebus canicularibus: et similiter non dicimus quod fit a casu quod cauma sit in diebus canicularibus; sed si hoc esset in hieme. (4)*

Here we have the statement of the facts, the phenomena that intelligent observation presents us. In the things that come to be around us, we recognize an absolute or relative constancy: men are usually born with two eyes, two feet; there is the continual rising and setting of the sun, the seasonal cycle; from characteristic seeds spring determinate beings, etc. These are events

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4) In II Phys., lect. 13, n. 2; Arist., ch. 8, 198b34-199a2.

that are evident and obvious in themselves; the acknowledgement of their repeated occurrence depends on no complexly contrived technique of analysis or instrument of observation. Everyone recognizes the fact of their determinate repetition.

Owing to the constancy and frequency of these effects, we quite reasonably ascribe them to a determinate agent cause that we call nature, and have defined as: *principium et causa motus et quietis in quo est primo et per se et non secundum accidens*. That this cause exists is incontestable, as we saw, and hence requires no substantiating argument.<sup>(5)</sup>

Likewise evident is the existence of exceptional facts<sup>(6)</sup>, things which come to be rarely and yet issue from the same natural agents. A blind dog; a tailless cat. These happenings we do not impute to nature, but rather to chance, inferring that somehow or other nature has miscarried. We make this inference because we recognize these are not the normal result of natural activity but apparently frustrations of nature's purpose.

With these considerations as a basis, we can for-

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5) Cf. In II Phys., lect. 1, n. 8.

6) Cf. Above p. 47 regarding what is intended by "exceptional facts".

mutate the conclusive part of the argument.

Omnia quae fiunt, aut fiunt a casu, aut fiunt propter finem; quae enim accidunt praeter intentionem finis, dicuntur accidere casualiter: sed impossibile est ea quae fiunt semper vel frequenter, accidere a casu: ergo ea quae fiunt semper vel frequenter, fiunt propter aliquid. Sed omnia quae fiunt secundum naturam, fiunt vel semper vel frequenter, sicut etiam ipsi confitebantur; ergo omnia quae fiunt a natura, fiunt propter aliquid. (7)

The significance of treating chance as a preface to our discussion of finality is brought into focus now. We have observed that a chance effect is that which occurs outside the intention of the end in natural operations: a lioness stumbles upon her wandering cubs while stalking a kudu. Moreover, the chance effect happens rarely: dogs are very infrequently born blind. These two factors -- absence of intention and infrequency of occurrence -- enjoy a significant role in this demonstration. In fact, they comprise the probative link between the two disjunctions that Aristotle has, at least implicitly, constructed. The first disjunction is this: as regards the things that come to be, either they come to be by chance, or because of some end. The second is based on the constancy (absolute or relative) and the non-constancy of the things that come to be: in things that come to be, either they come

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7) In II Phys., lect. 13, n. 2; Arist., ch. 8, 199a2-8.



to be always or frequently, and are held to have nature as their principle, or they happen rarely and are said to be from chance.

Granting (for the moment) the truth of these propositions, we need only to render explicit what they implicitly contain. Since chance is the cause of the exceptional, it cannot be the cause of the constant and frequent. Yet, the exceptional is outside the intention of the end. It follows then that what occurs constantly and frequently must be on account of some end. Now, cognizant of the fact that nature is recognized as the principle and cause of what happens for the most part, we conclude that nature must act for an end.

The correctness of our conclusion I think can be conceded. Its truth, however, hinges upon the truth of the premises that we have fashioned into two disjunctive propositions. The second of these, to wit, what occurs always or frequently is from nature, while what happens rarely is from chance, is manifest.<sup>(8)</sup>

The first disjunction though may perhaps be called into question. Can we say with certitude that, of the things that come to be, those that are not from chance come to be "propter finem"? It seems that we can. The

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8) Cf. In II Phys., lect. 13, n. 8.

chance event reveals a lack of intention and a rarity of instance, which are tantamount to indeterminacy. On the other hand, the effect that occurs "ut in pluribus" by that very condition evinces a certain determination, and therefore an intentionality or purposefulness.

The tenor of this argument may be more easily grasped by reflections made on our voluntary activity. Reviewing our purposive actions we witness that for the most part they are successful, although occasionally they may be frustrated, or else be recipient of some good fortune. Mr. B.B. Bloombaum enters his office every working day at 9 A.M. with monotonous regularity; but one particular day he fails to arrive at the accustomed hour due to an unhappy collision with a truck. It is the continued resolve of Bloombaum to be at his office at nine every morning that accounts for his constant punctuality, just as it is the occurrence of something outside of his intention that explains his absence on a particular day.

The same is evidenced in artifacts. The flute, for example, is fabricated to produce high-pitched sounds, and it is recognized by its peculiar tonality. When it does not emit its characteristic sound, we claim it an imperfect flute because it is prevented from fulfilling its purpose by an imperfection in the mechanism.

Krikorian subscribes to this principle in determining purposive operations:

In every instance of purposive activity there is a bias, a tendency toward a certain type of result. (9) ... Empirically, the purpose of an event, as earlier stated, is to be discovered among the results of an event... If for a number of events one could find an average common result, would one not be justified in considering this result as the bias or the purpose of this class of events? (10)

There is a difference to be noted, however, between the application given the principle by Krikorian and that given it by Aristotle. The former wishes to employ it as an empirical instrument in designating the particular end of a specific agent; while the latter's objective is definitely more general. Aristotle purports only that the fact of repeatedly recurring effects shows that nature as a whole is determined to act for some end. The very notion of end denotes an opposition to indetermination, and by achieving the same results "ut in pluribus" nature evidences a sufficient determination. But end, as we saw, is also essentially good; and to decree empirically the precise end for which a particular agent acts, as Krikorian wishes to do, is in many instances an impossible task, for it involves showing that the object interpreted as

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9) Op. cit., p. 40.

10) Ibid.

the end is actually a good for the agent. It is one thing to conclude from the constance of an effect that an agent is determined to some end, and quite another to assert that the effect in question is in reality the end aimed at. More detailed consideration will be given to this problem later.

We may view this demonstration of Aristotle's from another slant and restate it in this fashion. The repeated occurrence of the identical effect in nature's operations, one must admit, demands some explanation. There ought to be a sufficient reason why nature, despite the diverse and varied conditions in which she operates, continuously produces the same result. Some accounting must be made for the fact that, the presence of an identical environment notwithstanding, different natural agents produce different typical effects, i.e., each according to its own specific character. In each case, it is to be noticed, the entrance of chance as an explanatory factor is precluded, -- by a sameness of result in different circumstances on the one hand, and on the other, by different specific results in like circumstances. Our only reasonable conclusion can be then, that the definite recurrent effect attests to a term at which nature aims; that nature as the intrinsic principle of operation has

a determination from the end, and therefore acts purposively.

The foregoing paragraph is but an attempt to express in brief what would seem to be the line of reasoning of an experimental scientist apropos of this argument. Here are two statements made by savants outlining the conditions that would justify the inference of purposeful behavior from the fact that some agent repeatedly produces the same effect.

The recognition of purposeful behavior requires that several observations be made with the system exposed to different initial or subsequent conditions. Repetition with varying conditions is indispensable to eliminate random conditions. It is also necessary to ascertain that the particular relation between the acting object and the constituents of the system interpreted as the goal was not reached by the independent development of processes which fall into phase at a given moment. (11)

These men demand a variation of conditions surrounding the "acting object" to eliminate chance, and an intimate connection between the "acting object" and the achieved effect. In the citation to follow we will see that Mr. Cassirer speaks (he does not, however, draw the conclusion of purposiveness - that inference is mine but based on his observations) of a reverse process, namely,

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- 11) N. Wiener and A. Rosenblueth, Purposeful and Non-Purposeful Behavior, Journal of Philosophy of Science, Vol. 17, no 4, Oct. 1950.

If we wish to examine further what experimental science has revealed to us regarding purposive activity in nature, the most striking instances, to my mind, are those exhibited by the adaptive functions of the human body. Dr. Alexis Carrel in his work "Man, the Unknown" devotes an entire chapter to the description and analysis of these processes. Speaking of one phase of the regenerative functions Carrel writes:

The adaptive aspect of cicatrization is evident in superficial wounds. These wounds are exactly measurable. Their rate of healing can be calculated by Lecomte du Nolly's formulas. And the process of cicatrization thus analyzed. First, we observe that a wound only cicatrizes if cicatrization is advantageous to the body. When the tissues uncovered by the extirpation of the skin are completely protected against microbes, air, and other causes of irritation, regeneration does not take place. In fact, under such conditions it is useless. The wound, therefore, does not heal and remains in its initial state. Such a state is maintained as long as the tissues are guarded against the attacks of the outer world as perfectly as they would be by the regenerated skin. As soon as some blood, a few microbes, or an ordinary dressing is allowed to come in contact with the damaged surface and to irritate it, the process of healing starts and continues irresistibly until cicatrization is complete.

... If one prevents either the epithelial tissue or the connective tissue from accomplishing its respective tasks, the curve does not change. It does not change because the deficiency of one of the factors of repair is compensated by the acceleration of the other. Obviously, the progress of the phenomenon depends on the end to be attained. If one of the regenerating mechanisms fails, it is replaced by the other. The result alone is invariable. (13)

Unquestionably, here is Aristotle's very argument realized in the latest scientific discoveries and expressed by one of our greatest modern scientists. We notice that cicatrization occurs only when it is good for the body, and does not when it can confer no advantage - a perfect exemplification of the notion of end as good. Further, it is always the result which is insured; the particular regenerative mechanism in use may vary, but the healing of the wounded tissue is always attained. That a causality from the end is in force here appears quite obvious. (14)

As a supplemental note, it may be interesting to see how the phenomena of repetition in nature affected one of our greatest modern writers, G.K. Chesterton. He describes the appeal made to him by this fact:

The modern world as I found it was solid for Modern Calvinism, for the necessity of things being as they are. But when I came to ask them I found they had no proof of this unavoidable repetition in things except the fact that the things were repeated. Now, the mere repetition made the things to me rather more weird

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13) A. Carrel, Man, the Unknown (N.Y.: Harper and Bros., 1935), pp. 201-202.

14) Carrel concurs: "Each element of the body adjusts itself to the others, and the others to it. This mode of adaptation is essentially teleological. The existence of finality within the organism is undeniable." -- Op. cit., p. 197.

than more rational. It was as if, having seen a curiously shaped nose in the street and dismissed it as an accident, I had then seen six other noses of the same astonishing shape. I should have fancied for a moment that it must be some local secret society. So one elephant having a trunk was odd; but all elephants having trunks looked like a plot. I speak here only of an emotion, and of an emotion at once stubborn and subtle. But the repetition in Nature seemed sometimes to be an excited repetition, like that of an angry schoolmaster saying the same thing over and over again. The grass seemed signalling to me with all its fingers at once; the crowded stars seemed bent on being understood. The sun would make me see him if he rose a thousand times. The recurrences of the universe rose to the maddening rhythm of an incantation, and I began to see an idea. (15)

Thus was he persuaded to infer finality, and from this the existence of a Divine Artist. Though this is admittedly an emotional approach to the problem, it nonetheless serves to accentuate the lesson of purposiveness that nature tries to teach us in her regularity. She does act for an end.

## II.- TELEOLOGICAL PATTERN

The foundation for the second proof for finality in nature is what we may refer to as a teleological pattern. (16) The argument is more subtle and abstruse, perhaps,

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15) G.K. Chesterton, Orthodoxy (N.Y.: Dodd and Meek Co., 1949), pp. 106-107.



but once grasped it may prove proportionately more cogent. Here we do not regard so much the frequency of the ultimate term of a natural agent's activity, but rather the ordered sequence in the activity itself. We may exemplify this by a comparison with the building of a house. We can conceive the construction of a house in staccato fashion, that is, as broken up into several parts, or we can look at it as one continuous motion. In either case, we detect a rationality in the whole process. There is a reason governing the builder's choice of materials and the orderly way he proceeds in his work. We recognize an order of "before" and "after" in the work of construction, that is to say, each phase or part exists for, and is explained by, the succeeding phase or part, and their ensemble exists for, and is explained by, the completed work, - the house that is a fitting shelter for man. The orderliness of the process of building compels us to acknowledge the directing influence of an end to be attained.

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- 16) In view of this second proof of Aristotle's it is difficult to understand this statement of A.S. Farquharson: "A. (Aristotle), though free from the vulgar Teleology of Design, is fond of calling nature a cunning artificer, especially in his Nat. Hist. treatises. His language becomes colored with enthusiasm in such passages...." -- Cf. Farquharson's transl. of *De Motu Animalium* (Oxford ed.) in footnote for 702a5. Apparently it did not occur to him that quite possibly Aristotle's fondness and enthusiasm might spring from just such a conviction.

And unless we regard the pattern of the builder's activity and his materials in the light of the good effect achieved, the house, they have no reasonable explanation.

The principle we are trying to illustrate is this: wherever there is an operation proceeding from an agent and issuing in some term so that the consecutive phases of the operation are ordered to each other, and all have their *raison d'être* in the ultimate result achieved, we are forced to regard the effect of the operation as the reason why the operation took place; in other words the operation must have been in view of it as an end. The pattern or design displayed in the operation can only call for a teleological interpretation.

We now take this principle and unite it with the following one. There is a definite correspondence between an activity and the agent from which it emanates. The character of an agent will determine the character of his activity. Hence, from characteristics disclosed in the activity, we can argue to proportional characteristics in the agent. When, therefore, we witness a determinate sequence of events, an order of "before" and "after" in the attainment of an effect, such that the existence of the prior is sufficiently explained only in the consequent and ultimately in the term realized, we are compelled to

acknowledge that the agent cause of the ordered sequence acts in view of the final term, or, it acts for an end.

St. Thomas interpreting Aristotle applies this manner of reasoning to nature. He takes as evident and undeniable the principle we have just described and upon it constructs his demonstration.<sup>(17)</sup> When we see something being brought about in a natural way, we adjudge it innately apt to be produced in this way; for to be accomplished naturally, and to be innately apt to be produced, are identical in meaning. The reverse of this -- namely, if something is indigenously disposed to be brought about in a particular manner, it will be produced in that way, -- is likewise true, but with the provision that its accomplishment be not impeded.<sup>(18)</sup>

The major premise established, it remains to fashion the minor. In things that come to be naturally, we observe that they are the result of a determinate and

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17) "... in quibuscumque est aliquis finis, et priora et consequentia omnia aguntur causa finis. Hoc supposito sic argumentatur." -- In II Phys., lect. 13, n. 3.

18) "Sicut aliquid agitur naturaliter, sic aptum natum est agi: hoc enim significat quod dico naturaliter, scilicet aptum natum. Et haec propositio convertitur, quia sicut aliquid aptum natum est agi, sic agitur: sed oportet apponere hanc conditionem, nisi aliquid impediat. Accipiamus ergo primum quod non habet instantiam, quod sicut aliquid agitur naturaliter, sic aptum natum est agi." -- In II Phys., loc. cit.; cf. Arist., ch. 8, 199a9-11.

orderly mode of proceeding to the extent that they can be understood only as that final term in view of which the ordered process took place; that is to say, they are the end and reason of being of the procession of events from which they resulted. And since they are brought about naturally, we infer that nature as the agent cause has an inborn aptitude to tend toward something as a goal; for this is what we mean when we aver that nature desires the end, namely that she has an innate tendency for an end. So, we conclude again, "natura agit propter finem". (19)

One ought to advert to the continual insistence of St. Thomas on the innateness of the activity of nature, - that activity issues from an innate desire for the end, while in itself it reveals an innate design, or teleological pattern. In so doing, St. Thomas is distinguishing the ordered processes involved in natural activity from similar processes that obtain in the production of artifacts. In art the principle of activity is exterior; also the operations of the artificer proceed from an elicited appetite and so entail knowledge of the end. But by

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19) "Sed ac quae fiunt naturaliter, sic aguntur quod inducuntur ad finem; ergo sic apta nata sunt agi, ut sint propter finem: et hoc est naturam appetere finem, scilicet aptitudinem naturalem ad finem. Unde manifestum est quod natura agit propter finem." -- In II Phys., loc. cit.

definition natural activity emanates from an intrinsic principle and, as we will see in detail later, there is no knowledge of the end, or if there is, as in the case of animals, it is not deliberative knowledge.

St. Thomas makes use of this comparison with art to show that the operations of nature do exhibit an ordered sequence of events, and hence an innate design.

Similiter enim ex prioribus pervenitur ad posteriora in arte et in natura; unde si artificialia, ut domus fierent a natura, hoc ordine fierent quo nunc fiunt per artem; ut scilicet prius instituereetur fundamentum, et postea erigerentur parietes, et ultimo superponeretur tectum. Hoc enim modo natura procedit in iis quae sunt terrae affixa, scilicet in plantis; quarum radices quasi fundamentum terrae infiguntur; stipes vero ad modum parietis elevatur in altum; frondes autem supereminent ad modum tecti. Et similiter si ea quae fiunt a natura, fierent ab arte, hoc modo fierent sicut apta nata sunt fieri a natura; ut patet in sanitate, quam contingit fieri et ab arte et a natura; sicut enim natura sanat calefaciendo et infrigidando, ita et ars. Unde manifestum est quod in natura est alterum propter alterum, scilicet priora propter posteriora, sicut et in arte. (20)

There seems to be in nature and art a sort of reciprocity of imitation. Each performs its work according to a set formula of "before" and "after", so that if each could do the work of the other, it would perform it in the same manner as the other. If nature could build a house, it would do so as the architect does; and if art

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20) In II Phys., loc. cit.

could produce a plant, it would follow the lead of nature. In constructing a house, we build the foundation first, then the walls, and lastly the roof. That nature would build a house in the same fashion, if it were able, seems to be shown by the way plants are generated. In plants we have roots first, from which sprout the stem and leaves. This similarity between art and nature is more strikingly brought to light in matters where both successfully operate, as, for example, in inducing health. In healing the doctor copies the processes revealed in nature's curative activity. All of which manifests that in nature, as in art, there is a determinate order of "before" and "after", so that the prior is for the sake of the consequent, and both for the sake of the ultimate term as end.

To place this proof in high-relief, we can take note of a parallel argument in the "De Partibus Animalium".<sup>(21)</sup> Here Aristotle's point of view is somewhat different, but the use of the teleological pattern is still in evidence. The argument may be summed up thus:

Whenever we have an effect which represents the completed term of a motion, we say that that motion was in view of the said effect as a final term or end. It was the aim or purpose of the motion. Yet, it is patent that

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21) Bk. I, ch. 1, 641a9-642a1.

in the heavens, everything is perfectly ordered, while among living beings the species are perpetuated naturally. We ought then to posit for natural effects a principle that stands in relation to these natural effects, as art does in relation to artifacts. The cause of the artifact is art itself which is exterior to it. To explain the origin of natural things we ought to have an analogous principle, which nevertheless is internal.

In this instance Aristotle infers from the existence of a motion ordered to a term the existence of a nature tending toward that term. The existence of nature was supposed in the above argument from the Physics. We argued there from the necessary relationship between nature and its activity, asserting that since its activity reveals an ordination to a final term, nature herself must tend toward that term as end. In each case, however, the fulcrum of the argumentation remains the teleological pattern or innate design displayed in nature's operations. An ordered sequence in accomplishing some term is shown to mean action for an end.

And thus it is the germ that is the ruling influence and fabricator of the offspring. For these it is by nature, the offspring being at any rate that which in nature will spring from it. At the same time the offspring is anterior to the germ; for germ and perfected progeny are related as the developmental process and the result. (22)

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22) Ibid., 641b29-33.

The proof for finality founded on a teleological pattern appears to be most engaging to scientists, especially theoretical biologists. The argument from the recurrent effect somehow or other fails to appeal to them. The reason may be that in its obviousness this phenomenon is overlooked, or perhaps it is thought that a mechanistic explanation may just as adequately account for it as a theory of purposiveness. Whatever may be the cause, it is certain that it offers no similar hindrance in the question of design in nature's operations, for this palpable fact shocks all observers into feverish speculation. (23)

Beginning with Aristotle we remark that for him these ordered processes disclosing direction toward a goal are not to be met solely in a few privileged natures, but are seen in the totality of nature.

Absence of haphazard and conduciveness of everything to an end are to be found in nature's works in the highest degree, and the resultant end of her generation and combinations is a form of the beautiful. (24)

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- 23) It does not seem necessary to give here a detailed description of any determined natural activity to instance its sequential order. Physics and Biology textbooks are replete with examples, especially with regard to the processes of reproduction, assimilation, growth, etc. One might profitably read that enlightening chapter of Carrel's on Adaptive Functions, op. cit.
- 24) De Partibus Animalium, I, ch. 5, 645a23-26.



Still, it is in the study of life that this phenomenon is most evident, and we see that here Aristotle arrives at the notion of organization.

As every instrument and every bodily member subserves some partial end, that is to say, some special action, so the whole body must be destined to minister to some plenary sphere of action. Thus the saw is made for sawing, and not sawing for the saw. Similarly, the body too must somehow or other be made for the soul, and each part of it for some subordinate function, to which it is adapted. (25)

Leaving Aristotle and descending into the modern era where the study of life has reached an immensely higher stage in its evolution, the subordination of activities within the living organism and their apparent directiveness is even more in evidence, owing, of course, to a profounder knowledge of vital processes. This is not to intimate that all biologists, or even the greater number, draw the inference of final causality from their observations. Many forthrightly eschew the use of the terms teleology, end, or purpose; but they nonetheless cannot avoid employing equivalent terms, such as, directiveness, function, regulation. The factual presence of design in nature's operations is something they all attest to, wittingly or no; and it is this that we wish to point up.

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25) Ibid., 645b14-19.

The distinctive element in Cuvier's "type" was the relationship existing between the organs of a living body, and he maintained that their correlation resulted in a concerted effort toward a common end.<sup>(26)</sup> Later, Roux, as Cassirer points out<sup>(27)</sup>, distinguished nine typical spontaneous activities, or functions, such as, assimilation, growth, reproduction -- all of which conduce to the preservation of the living being. The organism possesses an individual identity or inwardness and its survival depends upon a "self-regulation with regard to its own form." Roux, however, did not draw the teleological conclusion; contrarily, he thought himself adhering to orthodox mechanism. Driesch, and Gustav Wolff<sup>(28)</sup> before him, were taken up with the regulatory processes of the organism and decided one must go beyond mechanics, if an adequate understanding is to be had of vital activity.

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26) G. Cuvier, Leçons d'anatomie comparée (2nd ed., Paris: Crochard, 1835), préface and première leçon, v ff., p. 6, edited by M. Duméril.

27) For a succinct and objective account of the principal theories of modern biologists, cf. E. Cassirer, Problem of Knowledge, Part II. Mr. Cassirer's interpretative remarks, since colored with Kantianism, are not recommended however. See pp. 180-192 for Roux.

28) H. Driesch, La Philosophie de l'Organisme, trans. M. Kolmann (Paris: Rivière, 1921). For Wolff, see Cassirer, op. cit., pp. 193-199.

Thus Wolff frankly admitted of a "primary purposiveness" and Driesch spoke of an "entelechy" to which he gave the name soul, but later modified to "psychoid", so as not to introduce the notion of conscious purposefulness. This latter difficulty is what troubled, and continues to trouble many a biologist. The phenomenon of apparent purposive direction in natural operations definitely argues against a mechanistic interpretation; nevertheless the only alternative seems to be the positing of an inherent will or a consciousness in all living beings, if the purposive view point is to be accepted. As a consequence, recent men like Emil Ungerer and Ludwig von Bertalanffy strike out for a theory of holism, or organicism.<sup>(29)</sup> Von Bertalanffy writes:

That phenomena in the organism are chiefly "whole-forming" or "system-forming" in character and that it is the task of biology to establish whether and to what extent they are so can hardly be a matter of dispute. Those who followed long custom and called this organization of life "purposive" were wont to ask what end or function an organ has. In their notion of purpose, however, they seemed to conceive of a will and an aiming at a goal, and this is a way of thinking with which the natural scientist is rightly out of sympathy. And so the attempt was then made to represent purposiveness as a merely subjective and unscientific way of looking at things. <sup>(30)</sup>

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29) Cf. L. Von Bertalanffy, Problems of Life (N.Y.: John Wiley and Sons Inc., 1952).

30) L. Von Bertalanffy, Theoretische Biologie (Berlin, 1932), Bd. I, cited by Cassirer, *op. cit.*, p. 215; see also Von Bertalanffy, Problems of Life, pp. 168-171.

For the proponents of organicism all the objections hurled at the false use of purpose bounce harmlessly off the armor of the concept of wholeness. Nevertheless, they themselves are unable to avoid in their descriptions of life processes the language of teleology. While Ungerer speaks of three types of wholeness, he nonetheless claims for them the "maintenance of the organization" as a common feature; and Bertalanffy confesses:

Of course we can describe such processes in the organism in a physico-chemical way, but as life processes they are not at all to be so characterized. The great majority, if not all, of the processes of life are ordered in such a manner that they are directed toward the preservation, repair, or restitution of the whole organism... Even the concept itself of an organ, for instance, that of vision or hearing or sex involves function of which it is an instrumentality. Actually every textbook on biology is forever telling us of the functions performed by the heart, lungs, chlorophyll, achromatic spindle, reflexes, secretions and so on. (31)

If this be not finality, what is it? Of course, an escape device is still open to them, in this that they may consider the teleological concept, with Kant, as simply a methodological, though necessary, principle. This seems to be the position of Krikorian, who uses this second proof of Aristotle as one of the principles for detecting purpose. He speaks of "purposive processes" involving means-and-end

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31) L. Von Bertalanffy, Theoretische Biologie, cited by Cassirer, op. cit., p. 215.

relation, of "subordinate acts which are the means of bringing" about a particular biased result. (32) There is only one quirk to his explanation, and that is that purpose or teleology for him does not indicate causality; in fact the two are contradictory notions. This is undoubtedly the result of a mechanistic prepossession that would identify causality with efficient causality. Just what influence telic factors may have for him is difficult to detect. He states:

Living beings are teleological, but one need not suppose that they are aware of their specific ends and especially of their major biological ends. Certainly such complex physiological and behavioral activities as the healing of a wound, the regulation of body temperature, and the adjustment of oxygen to the needs of the body are non-intentional (?) in their nature. Yet these activities are teleological in the sense that they take an organism out of a disturbed condition into a normal one. A recent biologist suggests the term 'directive activity' for such biological processes. (33)

The expressions "take an organism out of a disturbed condition" and "directive activity" certainly denote some determinate relationship between the teleological elements, whatever they be, and the means-and-end activities that issue in a biased result. That this is final causality in the Aristotelian-Thomistic sense is indisputable,

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32) Y.H. Krikorian, Teleology and Causality, p. 42.

33) Krikorian, *op. cit.*, p. 45.

and one is easily prone to accept Krikorian as a defender of that thesis. Nevertheless, from the underlying tone of his treatment I am led to think that for him the principle of teleology is purely methodological with no ontological basis.

On the other side of the ledger of the organismic theory we have scholars, who, faced with the same manifestations of a teleological pattern in organic processes, bow before the facts and admit there is a real telic influence at work in nature. They try to account for this by assigning certain psychical factors to all forms of life below man.

W.E. Agar (34) in delimiting the concept of "wholeness" depicts the organism as a combination of intrinsic and contingent "wholes". The intrinsic whole is characterized as a causal unit with internally related parts, whose total effect is greater than the sum of the causal actions of its parts; the parts exhibit also a homogeneous activity. The intrinsic whole is exemplified by the field of the nervous system. The differentiating attribute of a contingent whole is that its functioning does not depend on an intrinsic relation of the parts but

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34) W.E. Agar, Wholeness of the Living Organism, in Philosophy of Science, Vol. 15, July, 1948, pp. 159-191.

on factors external to the parts, which transmit the causal influence from part to part.

For instance, the entry of the acid contents of the stomach into the duodenum results in the passage into the blood of a substance, secretin, present in the duodenal mucosa. This, when it reaches the pancreas, causes the latter to discharge an alkaline secretion into the intestine. (35)

These contingent wholes overlap the intrinsic and serve to transmit the effects of the functioning from one organ to another. One cannot fail to recognize here Aristotle's description of the organization of living beings, as given above.

Mr. Agar is fascinated by these contingent wholes and explains them in terms of final causality, the causal relation empirically being that of stimulus and response. He categorically asserts purposive activity which is spelled out by a "perception" that in simpler organisms signifies only "a pre-feeling of specific satisfaction not in terms of anticipatory images. By a pre-feeling we mean a process aroused centrally... if consciously entertained it would become an imagined feeling." (36)

Ralph S. Lillie (37) is likewise impressed by

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35) W.E. Agar, op. cit., p. 181.

36) W.E. Agar, op. cit., p. 186.

37) R.S. Lillie, Some Aspects of Theoretical Biology, in Philosophy of Science, Vol. 15, no 2, April, 1948.

the telic pattern observed in natural activity, and he draws the same inferences as Agar, interpreting his observations in terms of "directive activity" and "directive factors" that are quasi-psychical.

Directiveness appears to be a primary and fundamental organic factor... The processes of selective de-mixing, chemical transformation and redistribution of components occur in conformity with a definite and stable organic pattern which is inherited and is regarded as having its genetic representation in the nuclear of gene system of the organism... From these various facts it seems clear that the process of placing the various protoplasmic products in the definite positions which they occupy within the organic structure requires factors of other than a random kind. These are the factors which we distinguish as directive in contrast to casual or random. (38)

And lest one regard the term directive as being used here in a purely mechanistic sense, we can note that Lillie characterizes the directiveness as selective, preferential and psychical. (39)

It is clear that modern biological research concurs with Aristotle respecting the presence of a teleological pattern in nature. Whatever may be the ultimate conclusions and hypotheses reached by individual scientists, they all point up one fact, and that is that the activity of nature discloses a telic determination, a controlling influence from the result to be achieved; and

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38) R.S. Lillie, op. cit., pp. 126-127.

39) Ibid.



this is especially brought to light by ordered relationships in the activities. The fact that scientists disagree in their interpretation of this phenomenon should not disturb us, for this is the task of the natural philosopher. It pertains to the demonstrative portion of natural science to judge upon the facts that experimental science uncovers. I would like to note, however, that the principal reason, it seems to me, which prevents most biologists from recognizing the existence of final causes at work in nature, is the mistaken metaphysical notion that only beings empowered with intelligence are capable of aiming at some goal. Thus, to acknowledge purposive actions in natural beings other than men would be equivalent to imputing intelligence to the whole of nature. The criticism of this opinion will be taken up in a later chapter; we are concerned now only with proving that nature does act for an end, and this the teleological pattern does.

### III.- ARS IMITATUR NATURAM

The third proof in contention of finality in nature represents a kind of complement and explanation of the preceding.<sup>(40)</sup> Here again we are making use of the

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40) "Potest tamen dici quod haec non est alia ratio a praemissa; sed complementum et explicitio ipsius."  
-- In II Phys., lect. 13, n. 4.

similarity that obtains between the operations of art and nature, but this time with a different emphasis. In the previous argument we established a comparison between art and nature to illustrate the order of "before" and "after" that is in natural activity, while the probative force of the proof came from showing the necessary connection between the ordered sequence and its agent cause, nature. Now, however, the similarity between art and nature becomes the basis of our argument. We expressly use the principle that "art imitates nature".

This principle is founded on the notion of art and on the nature of human knowledge.<sup>(41)</sup> Art in its more restricted sense is a "*recta ratio factibilium*" and thence a principle of operation in the intellect of the artist or craftsman as a result of which some external matter is transmuted, is given an accidental form different from that which previously informed it. That principle of operation in the mind of the artist is in fact the knowledge he has of what he intends to introduce into matter; so the architectural art will be the universal plan of a house the architect has conceived and which will be concretely realized by the arrangement of these bricks, boards,

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41) Cf. In II Phys., lect. 4, n. 6; In I Politicorum, Prologus; Arist., Pol., VII, ch. 17, 133a1-3.

nails, etc. Intelligence then is the very root cause of artificial achievements, and, as a consequence, since all human knowledge is acquired from natural things through the medium of the senses, it is no surprise that art should imitate as much as possible nature's productive activity.

Thus we say art does in a fitting way what nature would do if it were able to, and as regards what either can accomplish, art imitates nature. Health serves as an ample illustration. Both nature and art are efficient causes of health, yet nature enacts the role of exemplar for art. Men observe the order of "before" and "after" that nature displays in her curative activities, and they endeavor to follow that same process in healing the sick. Aristotle would express it this way: Health is a certain state of the body which nature establishes and maintains by a chain of movements. That series may run thus: heat, uniformity of bodily humors, health. The physician attempting to aid nature in the restoration of health takes cognizance of this mechanism and prescribes something that will induce heat from which the other motions in the chain will follow. (42)

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42) Cf. *De Generatione Animalium*, II, ch. 5, 741a18ff.; *Metaph.* VII, ch. 7-9; St. Thomas, lect. 7-9.

Dr. Carrel makes note of this:

The knowledge of the processes of healing has brought modern surgery into being. Surgeons would not be able to treat wounds if adaptation did not exist. They have no influence in the healing mechanisms. They content themselves with guiding the spontaneous activity of those mechanisms... Surgery is based on the existence of this phenomenon. It has learned to turn adaptation to account. (43)

Some day perhaps when the nature of healing processes is better known, it will become possible to increase their rapidity. (44)

Once we acknowledge the principle that "art imitates nature", it is easy to construct our argument. We know that art acts purposively, for workmanship is essentially the use of determinate means for a definite goal. The conclusion that nature acts for an end becomes inevitable, since it is in the activity of nature that art discovers its determinate means.

This last observation is important because it precludes any question of anthropomorphism in a pejorative sense. Aristotle and St. Thomas are careful to call our attention to the fact that the same relations obtain at each stage in the operations of art and nature.

... Ars quaedam facit, quae natura non potest facere, sicut domum et alia hujusmodi: in iis vero quae contingit fieri et ab arte et a natura, ars imitatur naturam, ut patet in sanitate,

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43) A. Carrel, Man, the Unknown, p. 203.

44) A. Carrel, op. cit., p. 205.

ut dictum est: unde si ea quae fiunt secundum artem, sunt propter finem, manifestum est quod etiam ea quae fiunt secundum naturam, propter finem fiunt, cum similiter se habeant priora ad posteriora in utrisque. (45)

As can be seen, we are simply encountering again the challenge of teleological design, which now comes under a different purview and is buttressed by all the weight the principle "art imitates nature" can impart to it. Moreover, it is not a question of projecting human characteristics into nature, but simply of availing ourselves of the best means at hand, namely, the knowledge of our own actions, to aid us in understanding something less known to us.

#### IV.- EX ANIMALIBUS ET PLANTIS

Aristotle bases his fourth demonstration on the purposeful activity of plants and animals. It is his claim, and indeed we may easily acquiesce, that this is the most obvious example of finality in nature. (46) That animals act for ends is clear enough as soon as we recognize that they know pleasure and pain. In fact, the evidence is so strong that many have been erroneously led to concede deliberative activity to brutes, that is to say,

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45) In II Phys., lect. 13, n.4; Arist., ch. 8, 199a12-19.  
46) Phys. II, ch. 8, 199a20.

that animals not only act for a definite end, but they actually possess a knowledge of the end in such a way that they can deliberate about the means of obtaining it. It is useless, therefore, to attempt any exposition of this fact. A dog in search of a mate, a cat brandishing a menacing paw at a canary, -- either indicate purpose, or they lack meaning. We would only be marking time if we tried to expatiate.

Indeed, our sole difficulty here seems to be in showing not that animals act purposively, but that they do not have reason; for if animals pursue goals through the guiding influence of an intellect, obviously we cannot adduce them as an argument that nature acts for an end. But Scholastics, to whom this work is primarily addressed, admit that animals do not possess intelligence, since they recognize the complete dichotomy of knowledge into sensible and spiritual; hence they have no quarrel with us on this score. Men such as Bertrand Russell, though, will take issue with us, because for them knowledge is merely "a matter of degree"<sup>(47)</sup>, and "thoughts are not made of any different 'stuff' from that of which material objects are made."<sup>(48)</sup>

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47) Bertrand Russell, An Outline of Philosophy (London: Allen and Unwin Ltd., 1927), p. 95.

48) B. Russell, op. cit., p. 218.

Yet, it is clear that to discuss this problem with them to any satisfactory degree would entail projecting ourselves far beyond the scope of this treatise. Consequently, it is feasible to limit ourselves to what St. Thomas implies in his commentary.

... Naturam operari propter aliquid maxime est manifestum in animalibus, quae neque operantur per artem, neque per inquisitionem, neque per deliberationem; et tamen manifestum est in operationibus eorum, quod propter aliquid operantur. Propter quod quidam dubitaverunt utrum aranei et formicae et huiusmodi animalia operentur per intellectum, vel per aliquod aliud principium. Sed tamen ex hoc fit manifestum quod non operantur ex intellectu, sed per naturam, quia semper eodem modo operantur; omnis enim hirundo similiter facit nidum, et omnis araneus similiter facit telam, quod non esset si ab intellectu et arte operarentur: non enim omnis aedificator similiter facit domum, quia artifex habet iudicare de forma artificiati, et potest eam variare. (49)

The fact that all animals of the same species compass their ends in an identical determinate fashion is clear evidence that they do not operate from an intellectual principle, but from an innate appetite or instinct. The very first time a swallow builds a nest, it builds the same kind of nest and in the same way as every other swallow that preceded it, and this without having been taught. Moreover, the swallow will not vary its method, but every

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49) In II Phys., lect. 13, n. 5; Arist., ch. 8, 199a20-30; see also De Motu, ch. 6, 6, where Aristotle describes instinctive actions of animals.

succeeding, nest that it builds will be fashioned in the same way. If a spider had universal knowledge of a web, it could and would spin one differently than its brother spiders. The fact that it does not shows there is no judgment intervening in the operation, but the whole process is ruled by a natural instinct or appetite. Mr. Russell seems to defeat himself on this point. He acknowledges as characteristic of human beings "the power of reacting to form," (50) and that by form he means universal is evident from his illustration. He told his three year old son that the three-cornered piece of bread he was about to eat was a triangle. Later the boy's attention was drawn by triangular bits in a pavement, and he promptly called them "triangles", indicating he was able to abstract the quantitative form from the sensible qualities of edibility, texture, color, as well as to infer that every similar quantitative form should be called a triangle. This rudimentary act of reasoning on the part of young Mr. Russell is what distinguishes him from an irrational animal; and if his illustrious father can show conclusively that, say, a monkey can also syllogize, we will concede only that the monkey is human and not a brute.

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50) B. Russell, op. cit., p. 88.



Purposeful behavior is likewise manifest in plant life.

Ulterius autem procedenti de animalibus ad plantas, in eis etiam apparent quaedam esse facta ut utilia ad finem, sicut folia sunt utilia propter cooperimentum fructuum. (51)

I do not feel it expedient to add to what St. Thomas has here given. A perusal of any botanical treatise will point out the functional utility of floral parts, as well as of vegetative processes. The fact that plants draw nourishment from the soil in which they are rooted, the arrangement of stamens and pistil to insure fertilization, the transmutation of starch into glucose to render storage possible -- all these evince utility for an end. We recognize a disposition of parts for the sake of the whole, and a division of labor assuring the preservation of the individual and the perpetuation of the species.

In both plants and animals then we find activity for the sake of some end, and since nature is the principle of that activity, we must acknowledge that nature acts for an end.

Unde si hoc est a natura et non ab arte, quod hirundo facit nidum et araneus telam, et plantae producunt folia gratia fructuum, et radices sunt in plantis non sursum, sed deorsum, ut accipiant nutrimentum a terra; manifestum est

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51) In II Phys., lect. 13, n. 5.

quod causa finalis invenitur in iis quae fiunt  
et sunt a natura, natura scilicet propter ali-  
quid operante. (52)

V.- EX GENERATIONE NATURALI

The generative activity of nature compels us  
to acknowledge once again causality from the end in na-  
ture. That fifth argument is expressed thus:

Cum natura dicatur dupliciter, scilicet de mate-  
ria et forma, et forma est finis generationis...  
hoc autem est de ratione finis, ut propter ipsum  
fiant alia; sequitur quod esse et fieri propter  
aliquid, inveniatur in rebus naturalibus. (53)

The term of the generative process is the form  
of the being that is generated. Here, though, generation  
must be understood in its wider signification denoting  
both substantial and accidental changes; consequently  
the form may be either substantial or accidental depend-  
ing on whether the generated being is substantial or acci-  
dental. When a person by diligent study passes from the  
state of a non-musician to that of a musician, he acquires  
a new entity, which is accidental. The quality of being  
musical is the form of the accidental being just acquired,  
and it is also the goal aimed at by the student of music.  
In the case of human generation, the soul of the infant

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52) In II Phys., loc. cit.

53) In II Phys., lect. 13, n. 6; Arist., ch. 8, 199a30-33.

is the term of all the previous operations in the reproductive process from the impregnation of the ovum, through its subsequent divisions and development, to the stage when it is sufficiently disposed to receive and retain the human soul. The form then represents a goal toward which the generative operations of nature tend. "Forma... finis est et cujus causa fit generatio." (54)

Another consideration enters in here. The form is indeed the end of the generative process, but this process is a kind of means to end. There ought to be something that properly desires the form, and owing to which the work of generation takes on the formality of means. The form is then the end of what? Of the being that is generated? Hardly. The human form is the end of the

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54) In II Phys., lect. 11, n. 6; see also n. 12. "... Quod forma sit ultimum generationis, hoc est per se manifestum." -- In II Phys., lect. 4, n. 8. When we said that the term of the generative process is the form of the generated being, and that the infant's soul is the term of the human reproductive process, we did not mean that it is the form which is generated. The composite of form and its material substratum is what is properly generated, and so it is the proper term of generation. (Cr. In VII Metaph., lect. 1, nn. 1417-1431.) But since the generated being is what it is through its form, and further since the generative process is completed when form is received in its subject, we can in that measure say that form is the term of generation. Form remains the end of generation because it is the perfective actuality, the good, which the agent desires and for which matter has a natural appetite, as will be seen presently.

generation of a man, but it is certainly not the end of the man himself. (55) It is through his form that the man will be able to operate for the attainment of his end. Is it the end of the natural agent? Yes, in a very real sense; for it is the natural agent's desire for the form that causes it to initiate the whole reproductive process.

Yet, the form is, in addition, the end of matter. (56) Matter is also a cause of the process of generation, in as much as it is matter that receives the form. (57) The form is a good for it and hence something to be desired as perfecting it.

Forma est quoddam divinum et optimum et appetibile. Divinum quidem est, quia omnis forma est quaedam participatio similitudinis divini esse, quod est actus purus: unumquodque enim in tantum est actu in quantum habet formam. Optimum autem est, quia actus est perfectio potentiae et bonum ejus: et per consequens sequitur quod sit appetibile, quia unumquodque appetit suam perfectionem. (58)

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- 55) "... Causa formalis et finalis sint una secundum numerum. Et hoc est intelligendum est de causa finali generationis, non autem de causa finali rei generatae. Finis enim generationis hominis est forma humana; non tamen finis hominis est forma ejus, sed per formam suam convenit sibi operari ad finem." -- In II Phys., lect. 11, n. 2.
- 56) "Non solum autem aliquid ens in actu per virtutem activam ordinatur in suum finem, sed etiam materia secundum quod est in potentia; nam forma est finis materiae." -- In I Phys., lect. 15, n. 10.
- 57) "Sicut mater enim est causa generationis in recipiendo, ita et materia." -- In I Phys., lect. 15, n. 7.
- 58) Ibid.

It is of the very reason of matter to have an appetite for form<sup>(59)</sup>, that is, it is intrinsically ordered to a form as to its proper end and perfection.<sup>(60)</sup> Consequently, the form, the completed term of generation, is actually the gratification of the natural appetite of matter.

This last demonstration of Aristotle's is of particular importance, in that it enables us to know with certainty that "inorganica" act for an end. This merits an explanation. We have been speaking all along of natural activity, and in so doing it has been taken for granted that both animate and inanimate nature were included. Nevertheless, it must have been remarked that all examples of natural operations have been borrowed from the organic world to the complete neglect of the inorganic. There exists a good reason for this. Remember we are attempting to prove that nature acts purposively, and we proposed to do this by way of an examination

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59) Phys. I, ch. 9, 192a5; also In I Phys., lect. 15, n. 10; In IX Metaph., lect. 8, nn. 1857-1858; "Materia enim, secundum id quod est, est in potentia ad formam." -- Ia, q. 66, a.2.

60) "Nihil est igitur aliud appetitus naturalis quam ordinatio aliquorum secundum propriam naturam in suum finem... Nihil igitur est aliud materiam appetere formam, quam eam ordinari ad formam ut potentia ad actum." -- In I Phys., lect. 15, n. 10.

of natural phenomena. But end, as seen, is essentially good, and therefore to determine empirically that such an action of a natural being is for the sake of a particular effect as end; it is necessary to show that the effect, interpreted as end, is a good for the natural agent. This becomes more difficult to do the farther removed the natural agent is from human nature. In every study we progress from that which is more known to us; and the purposeful activity we know best is certainly our own, from which, as a basis, we are able to judge of the actions of other moral agents, and with steadily decreasing exactitude of brute animals, plant, and "inorganica." The less in common a particular natural agent has with human agents, the less we can know about it in general, and about the purposefulness of its operations in particular. (61) It is no problem to recognize the particular good attaching to a man's visit to a doctor, or a cat's pursuit of a mouse, but in simpler forms of animal life, and in plants, we do not find the task so easy, because these have less affinity with human actions. It is usually possible, though, to specify at least some general good, as nourishment, for example, in the hydrotropic tendency

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61) Cf. footnote 3 of this chapter; also it is recommended to read C. DeKoninck, Introduction à l'étude de l'âme, preface to a work entitled "Précis de Psychologie Thomiste" by l'abbé Stanislas Cantin (Québec, Université Laval, 1948), pp. X-XIV, where Dr DeKoninck applies this principle to the study of life.

of plant roots. As soon as we descend to inorganic nature, however, to designate empirically the good, in view of which a particular natural agent operates, becomes impossible. In what way can we say that union with oxygen is a good for hydrogen? What good is the crystalline state for carbon, or a vaporized condition for water? Because carbon after a certain chemical process assumes a crystalline form, it does not mean necessarily that crystallization is a good, and therefore the end of that reaction. It could be just a concomitant of a good of which we are unaware. Aristotle recognizes this truth.

Everything given by nature is either itself an end, or is the incidental accompaniment of something else that is so given. (82)

Though we cannot in many instances of natural activity designate the particular end striven for, we can be nonetheless certain that nature does in fact operate for a purpose even here. We know this by means of this final argument which we have just considered. All natural beings are constituted of matter and form as substantial principles, and since matter is for the sake of form as end, every natural process which terminates in the reception of a new form into matter, is in reality a purposive

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62) De Anima, III, ch. 12, 434a31; also De Partibus Animalium, IV, ch. 2, 677a16-19.

action. Again we conclude: *natura agit propter finem*.

By means of these five proofs Aristotle has been able to establish definitively that in nature there is a real causality from the end. Yet, he is not finished with the problem, for he is now going to substantiate his contention in a negative way, by destroying the contrary arguments proffered by his predecessors and contemporaries, while making use of what truth they contain to clarify his own position. The reasons given by the Ancients in denial of final causality in nature are in effect these: (63)

Nature does not act purposively because it seems evident that natural events are simply the necessary result of prior principles, efficient and material, and are not due to an intention of the end.

If nature acts for an end, how does one account for monster, and like casual occurrences? These latter indicate that things just happened the way they are, and therefore final causality must be excluded as an explanation of natural phenomena.

Purposive action demands intellection as a necessary condition; but it is absurd to admit of an intelligence in animals and plants, much less in the inorganic world.

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63) Cf. *Phys. II*, ch. 8, 196b9-33, and 199a33-b33; ch. 4, 195b35-196b10; *St. Thomas*, lect. 7, 12, 14.



Hence a teleological explanation is unfounded.

These opinions will receive further amplification as each is examined in turn. We mention them now to give us a skeletal perspective of what we shall discuss in the ensuing section. Moreover, as there is an ordered dependence in the solution of these difficulties, we will consider them in the inverse order in which they are given, which means that the last, on whose exposition hinges the resolution of the other two, will come first under our critical eye.