Chapter Six

NECESSITAS MATERIAE

I.- DETERMINISM AND NECESSITY

A - TENETS OF DETERMINISM -

In a recent short story, a 21st century man is depicted as hurled back into time. Alighting in the age of the dinosaurs, he indulges in the sport of hunting those mammoths. Flustered with excitement he accidentally kills a butterfly, and when he returns to the present, he discovers that the death of that insect -- its effect snowballing through time -- had changed the whole history of his century.

The story is admittedly facetious, but it is nonetheless based on a principle not far removed from the theory of Determinism proposed by many philosophers and scientists. Witness this statement of La Place:

> Nous devons donc envisager l'état présent de l'univers comme l'effet de son état antérieur et comme la cause de celui qui va suivre. Une intelligence qui, pour un instant donné, connaîtrait toutes les forces dont la nature est animée et la situation respective des êtres qui la composent, si d'ailleurs elle était assez vaste pour soumettre ces données à l'analyse, embrasserait dans la même formule les

> mouvements des plus grands corps de l'univers et ceux du plus léger atome; rien ne serait incertain pour elle et l'avenir, comme le passé, serait présent à ses yeux. (1)

Restricting ourselves to the point of view of nature, the tenor of this teaching is that the products of natural activity are results that flow necessarily from antecedent causes, and therefore are not effects of a causality from the end. The entire present state of the realm of nature is the necessary consequence of the immediate pre-existent conditions; it was necessarily determined in them, and they in the conditions prior to them, etc. This enables us to affirm that, granted an intelligence of a capacity sufficient to know all the ingredients of the initial constellation of the world, that intelligence would be able to see in them the entire history of the world, past, present, and to come. All natural events would be absolutely determined in those primordial conditions.

This hypothesis is not a new one; it dates back to the beginnings of philosophical speculation, and both Aristotle(2) and St. Thomas have discussed and refuted it. The latter sums up the position well:

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1) In his Essai sur le Calcul des Probabilités, cited by Louis de Broglie, Matière et Lumière (Paris: Michel, 1937), p. 263.
2) Cf. Metaph., I, ch. 3, 983b7-18.

> Quidam enim posuerunt, quod quidquid fit in mundo habet aliquam causam per se; et iterum quod qualibet causa posita, necesse est sequi effectum ejus. Unde sequebatur quod per quamdam connexionem causarum omnia ex necessitate acciderent, et nihil esset per accidens in rebus. (3)

> Videbatur enim hoc quibusdam, quia ea quae naturaliter accidunt, videntur ex prioribus principiis procedere, quae sunt agens et materia et non ex intentione finis. (4)

Notice that St. Thomas is describing the determinist stand as a whole, -- the antecedent factors that impose necessity are both the agent and the material causes. Among the determinists themselves there is a faction that attributes all the necessity to matter alone. It is this thesis we denominate 'Materialistic' Determinism, and it is the theory that is of primary interest here. We will, however, discuss briefly and dismiss the opinion that calls also for a necessity from the agent cause. But first let us clarify our notion of necessity.

B - NECESSITY - ABSOLUTE AND HYPOTHETICAL -

"We say that that which cannot be otherwise is necessarily as it is."(5) Something is said then to be

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3) In VI Metaph., lect. 3, n. 1191.
4) In II Phys., lect. 14, n. 7; see also lect. 15, n. 3.
5) Metaph., V, ch. 5, 1015a34; cf. all of ch. 3; St. Thomas, lect. 6.

necessary that cannot be other than it is; it is impossible that it be not as it is. And the reason why it is necessary, is its necessity. "Necessity is that because of which a thing cannot be otherwise."(6)

In commenting on the fifth book of the Metaphysics, St. Thomas notes that following his consideration of the causes, Aristotle treats the different modes of the necessary, for the reason that the necessary pertains to the very notion of cause. A cause is that on which something else necessarily follows.(7) There is a definite relationship between the notion of necessary and the notion of cause so that there are as many principles or causes of necessity as there are causes of things. Each of the four causes may necessitate an effect, although the manner of necessity imposed will not be the same for all.(8) Since our primary concern is with necessity as found in natural events, we can consider the type of necessity of which each cause may be the source in nature.

Necessity is of two kinds, either absolute, or

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6) Metaph., loc. cit., 1015b1.
7) "Postquam Philosophus distinxit nomina, quae significant causas, hic distinguit nomen quod significat aliquid pertinens ad orationem causae; scilicet necessarium. Causa enim est ad quam de necessitate sequitur aliud." -- In V Metaph., lect. 6, n. 827.
8) Cf. In V Metaph., lect. 6, nn. 827-835.

hypothetical. The necessity is absolute when it is due to a cause prior in being. The necessity coming from the material, formal and efficient causes will then be absolute, for these causes enjoy a priority of being (not necessarily of time) to their effects.

> Quaerit ergo primo utrum in rebus naturalibus sit necessarium simpliciter, idest absolute, aut necessarium ex conditione, sive ex suppositione. Ad cuius evidentiam sciendum est, quod necessitas quae dependet ex causis prioribus, est necessitas absoluta, ut patet ex necessario quod dependet ex materia. Animal enim esse corruptibile, est necessarium absolute: consequitur enim ad hoc quod est animal, esse compositum ex contrariis. Similiter etiam quod habet necessitatem ex causa formali, est necessarium absolute: sicut hominem esse rationalem, aut triangulum habere tres angulos aequales duobus rectis... Et similiter quod habet necessitatem ex causa efficiente est necessarium absolute; sicut necessarium est esse alterationem noctis et diei propter motum solis. (9)

When the necessity arises from a cause 'posterius in esse', that is, when the physical (as opposed to the intentional) existence of the cause results from the existence of its effect, and that cause enjoins necessity, we then have hypothetical or conditional necessity. The end, or the final cause, is the origin of this type of necessity:

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9) In II Phys., lect. 15, n. 2; cf. De Principiis Naturae, ch. 4; Contra Gentiles, II, ch. 30; ibid., I, ch. 83; Ia, q. 19, a. 3; q. 82, a. 1.

> Quod autem habet necessitatem ab eo quod est posterius in esse, est necessarium ex conditione, vel suppositione; ut puta si dicatur, necesse est hoc esse si hoc debeat fieri; et huiusmodi necessitas ex fine, et ex forma inquantum est finis generationis. (10)

We know that the end precedes its effect in the order of intention, while its physical actuality follows upon the actuality of its effect. A sick man desires to become healthy, so he takes medicine and his health is restored. The final cause (desire for health) is then a cause 'posterius in esse', -- its physical being (actual health) results from the existence of its effect (taking the medicine). The necessity it imposes will for that reason be conditioned on its existence; if this end is to exist, it is necessary that this effect of the end precede it, -- if the man is to become healthy, he must take this medicine. The medicine is necessary on the supposition that he is to become healthy. It is the prior condition that is said to be necessary, but its necessity is derived from the supposition that the end is to be. The source of necessity here is subsequent to what is necessitated, whereas in the case of the absolute necessity enjoined by the material, formal and efficient causes, the source is prior to that which is necessitated.

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10) In II Phys., lect. 15, n. 2.

II.- NECESSITY IN NATURE - FROM THE END OR FROM THE MATTER

The question then before us is whether in natural causations there is an absolute or hypothetical necessity. We may however resolve the problem further and ask whether there be in natural activity a necessity due to the end or to the matter.

> Quaerere igitur utrum in rebus naturalibus sit necessarium simpliciter aut ex suppositione, nihil aliud est quam quaerere utrum in rebus naturalibus necessitas inveniatur ex fine, aut ex materia. (11)

What enables us to do this is that the other two causes, agent and formal, may be either reduced to the former or immediately put aside as not entailing necessity.(12) In natural things, as we noted, the end and the form are the same, as the form is the end of generation. In truth, the form of a natural thing is in one sense a prior cause, e.g. it is the cause that man be rational; but in the process of generation, it is posterior in existence, for it is the term of generation. Consequently, if the form is to be the cause of necessity, the necessity it imposes will be hypothetical, just as that of the end.

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11) In II Phys., loc. cit.
12) Cf. De Principiis Naturae, ch. 4.

With regard to the agent cause, this is either the composite of matter and form, or the form alone since every agent acts through its form, and in naturalia the form is the active principle of motion. We may exclude it as not implicating necessity for two reasons. The first is that, since we have demonstrated that nature acts for an end, it follows that the final cause moves the natural agent to its efficiency, and therefore any necessity it may impose will be derived from the end. There is a difficulty with this though in that the determinist both disavows that nature does act for an end, and contrarily explains natural phenomena by the necessity of antecedent causes. Obviously, this reason cannot appear too efficacious for him.

But we have another justification for dismissing the agent cause as a source of necessity. It is, as we have proved in the previous chapter, that the natural agent is not a necessary, but rather a contingent, cause. Owing to the insufficient determination of the natural form and the indefinite possibilities of matter, the natural agent cannot infallibly produce its effect. In order that its effect follow of necessity, there must be a complete lack of indetermination on the part of the form in such a way that the form thoroughly exhausts the

possibility of matter. However, as we have seen, such a condition would render impossible the operations of nature, and in fact would do away with nature.

These are moreover our grounds for dismissing those determinists who claim natural events are the necessary result of antecedent factors, those factors being both efficient and material causes. Leibniz is one of these. In his system of monads, pre-established harmony, and the optimum universe, Leibniz conceives all happenings in the world as necessary,

> for all is regulated in things, once for all, with as much order and mutual connexion as possible, since supreme wisdom and goodness can act only with perfect harmony. The present is big with the future, the future might be read in the past, the distant is expressed in the near. We might get to know the beauty of the universe in each soul, if we could unfold all that is enfolded in it and that is perceptibly developed only through time. (13)

This necessity is physical or hypothetical, as opposed to metaphysical or absolute necessity:

> Accordingly the reasons of the world lie hid in something extramundane, different from the concatenation of states or the series of things, the aggregate of which constitutes the world. And thus we must go beyond the

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13) G. Leibniz, Principles of Nature and Grace, in Leibniz: the Monadology and Other Philosophical Writings, trans. R. Latta (London: Oxford University Press, 1898), par. 13, p. 419; cf. Monadology, par. 22, p. 231.

> physical or hypothetical necessity, according to which the later things of the world are determined by the earlier, to something which is of absolute or metaphysical necessity, of which a reason cannot be given. For the present world is necessary physically or hypothetically, but not absolutely or metaphysically. That is to say, the nature of the world being such as it is, it follows that things must happen in it just as they do. (14)

That is metaphysically necessary for Leibniz whose opposite involves a contradiction, and thus God is the only being necessary in this way because He is the one Being alone whose essence is to exist. Physical necessity is a necessity of fact; it is conditioned on the actual existence of some thing, and ultimately on the existence of the Divine decree.(15) This is further Leibniz' single basis for distinguishing necessary from contingent beings. God alone is necessary, and all creatures, though necessitated in fact, are contingent upon His free decree.(16) But we know this to be solely extrinsic contingency. He has overlooked the intrinsic contingency of natural beings, because he has identified the possible with the logical possible, forgetting the real

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14) G. Leibniz, On the Ultimate Origination of Things, in op. cit., p. 339.
15) Cf. G. Leibniz, op. cit., pp. 338-344.
16) Cf. G. Leibniz, loc. cit., and Discourse on Metaphysics, n. XII, p. 19; see also Remarks on Arnaud's Letter (May, 1686) and Reply to Arnaud (July, 1686), edition of Open Court Publishing Co.

possible, which is opposed to the necessary, and is intrinsic to actually existing things.(17) In consequence, he has further identified the contingent with the common contingent, which is convertible with the logical possible. For him something is contingent solely because considered in itself its opposite does not imply a contradiction.(18) Remaining in the realm of pure logical possibility, he was unable to get to the source of nature as a contingent cause.

There are some scholastics who approach very closely to this position. Logically they are determinists even though they are not so by intention. Among these we may mention Suarez and Maritain(19), both of whom take fundamentally the same stand. Excluding by hypothesis the intervention of free agents, who would introduce certain

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17) For Leibniz a thing is possible simply because no contradiction is implied in its concept. This, as we saw, is the logical possible which is opposed to the impossible. Cf. Leibniz, On the Ultimate Origination of Things, pp. 338-344.

18) "Tous les philosophes le reconnaissent, en avouant que la vérité des futurs contingents est déterminée, et qu'ils ne laissent pas de demeurer contingents. C'est que la chose n'impliquerait aucune contradiction en elle-même, si l'effet ne suivait; et c'est en cela que consiste la contingence." -- Leibniz, Essais de Théodicée, in Oeuvres Philosophiques de Leibniz, edited by P. Janet, 2nd ed., (Paris: Baillière, 1900), T. II, p. 109.

19) Maritain's position, which is essentially the same as that of Suarez, was sufficiently discussed in the preceding chapter.

unforeseeable determinations in nature. Suarez maintains that a natural effect is necessitated when we consider the entire series of causes that preceded it:

> Effectus qui est contingens respectu causae proximae naturaliter operantis, si comparetur ad totum ordinem ac seriem causarum universi, et in his causis nulla intercedat libera agens, saltem ut applicans alias causas, vel removens impedimenta, non habet contingentiam, sed necessitatem. (20)

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20) F. Suarez, Disputationes Metaphysicae, disp. 19, sec. 10, n. 5. Compare with St. Thomas, In VI Metaph., lect. 3, where he explains that as long as we reduce contingent things to created causes, even having supposed an extended series of these causes, we can never say that all natural effects come to be from necessity. If, however, we reduce contingent things to the universal causality of God, then we can speak of them as being necessitated since their existence depends on His immutable will. But in our experience natural effects are seen as resulting from their proximate natural causes, and the proper way to explain them is with reference to these proximate causes. If the proximate cause is necessary, the effect is necessary; if contingent, the effect is contingent. "Ad divinam igitur providentiam pertinet non quod faciat hoc ens, sed quod det ei contingentiam vel necessitatem. Secundum enim unicuique dare voluit contingentiam vel necessitatem, praeparavit ei causas medias, ex quibus de necessitate sequatur, vel contingenter. Invenitur igitur uniuscuiusque effectus secundum quod est sub ordine divinae providentiae necessitatem habere. Ex quo contingit quod haec conditionalis est vera, si aliquid est a Deo provisum, hoc erit. Secundum autem quod effectus aliquis consideratur sub ordine causae proximae, sic non omnis effectus est necessarius; sed quidam necessarius et quidam contingens secundum analogiam suae causae. Effectus enim in suis naturis similantur causis proximis, non autem remotis, ad quarum positionem pertingere non possunt." -- Loc. cit., nn. 1220-1221. Cf. also, In II Phys., lect. 7, n. 9.

Again, it is merely a case of things being contingent not by something intrinsic to them, but solely because of the active indetermination of a free agent. Natural beings are contingent because with reference to an exterior potency they could have been otherwise, while in fact they are necessary. By logical inference and by admission their contingency is only extrinsic.

> Contingentia vero illa dicitur esse, secundum quid, quia est tantum respectu unius causae, ut impediri potest ab alia; non vero respectu totius collectionis occurrentium causarum. Dicitur etiam extrinseca et per accidens, quia non provenit ex intrinseca virtute causae per se agentis sed ab extrinseco impediente. (21)

The same criticisms we made for Mr. Maritain hold here, so that we need not detain ourselves any longer, except to make this observation: as we have shown, natural agents can be impeded because of some intrinsic non-necessity; therefore however much we multiply individual natures their totality can never produce necessity:

> Ex multis contingentibus non potest fieri unum necessarium: quia, sicut quodlibet contingentium per se deficere potest ab effectu, ita et omnia simul. (22)

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21) Opus. II, de scientia Dei futurorum contingentium absolutorum (ed. Vivès), cap. 1. It is plain that neither Suarez, Maritain nor Leibniz can speak of chance in its proper sense, for they admit only of a contingency that is extrinsic and "secundum quid". According to them the casual effect is seen to be necessary when all its antecedent causes are taken into account. Compare with St. Thomas, In VI Metaph., lect. 3, nn. 1191-1201.

22) Contra Gentiles, III, ch. 86.

Contrary to all determinists then we say the agent cause can never be a source of necessity in nature. And so, from this digression we return to our original statement that the question whether there be a hypothetical or absolute necessity in nature may be reduced to asking whether there be a necessity from the end or from the matter.

A - MATERIALISTIC DETERMINISM -

There are those who would answer our question by affirming that there is a necessity in nature and that the necessity is absolute because it comes from matter.(23) This theory is what we call 'Materialistic Determinism'. It assigns matter as the sufficient reason of the production of things. An absolute priority is vested in matter to the degree that what happens in nature is simply a necessary consequence of anterior material conditions, and of nothing other. Such matter exists, therefore of necessity such effects will follow. Matter dominates all and in it all natural events are perfectly determined.

Now it is beyond our scope to treat and refute in a thorough fashion all that is inherent in the material-

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23) Cf. In II Phys., lect. 12, n. 1.

istic hypothesis. For that reason we will content ourselves with pointing out its more glaring inconveniences, and then in a positive way show just what necessity matter does entail.

First of all, we may remark that the proponents of this theory must deny, as in fact they do, that nature acts for an end. For, where there is activity for an end, the final cause is the reason of the being of the other causes; hence any necessity these causes impose has its actual source in the end. As a rebuttal to the materialists denial of finality in nature, we offer all that we have thus far discussed in this work, -- the demonstrations for finality, the notion of final causality and its application to nature, and contingency.

Furthermore, as a definitive explanation of the coming-to-be and existence of things, materialism is found wanting. Aristotle describes that conception of natural activity:

> A difficulty presents itself: why should not nature work, not for the sake of something, nor because it is better so, but just so the sky rains, not in order to make the corn grow, but of necessity? What is drawn up must cool, and what has cooled must become water and descend, the result of this being that the corn grows. Similarly, if a man's crop is spoiled on the threshing-floor, the rain did not fall for the sake of this, -- but the result just followed. Why then should it not be the same with the parts

> in nature, e.g. that our teeth should come up of necessity -- the front teeth sharp, fitted for tearing, the molars broad and useful for grinding down the food -- since they did not arise for this end, but it was merely a coincident result; and so with all the other parts in which we suppose there is a purpose? Wherever then all the parts came about just what they would have been if they had come to be for an end, such things survived being organized spontaneously in a fitting way; whereas those which grew otherwise perished and continued to perish, as Empedocles says his 'man-faced progeny' did. (24)

We perceive immediately that in the very description of this materialist postulate Aristotle has put his finger on its undoing. Since this theory places all the rationality of nature in antecedent material dispositions, it denies completely the influence of a directing cause. In examining natural events we must 'ex suppositione' consider them as unintended issue, as pure result. The forms they have are purely accidental, and hence are not true natural forms since they do not represent the end of matter. The natural effect becomes a product of mere chance; it is a 'coincident result'. Now as the materialistic determinist forthrightly negates the existence of chance and attributes a 'per se' cause to every effect, we may consequently censure his position as inherently untenable. If in natural operations we must exclude direction toward

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24) Phys., II, ch. 8, 199b12-17.

a definite goal, if what occurs happens not from intention, then natural beings are mere random issue, an incidental outcome of indiscriminately organized matter; -- which is certainly a notion incompatible with a basic determinist tenet that chance does not exist.(25)

Most modern materialists, however, are willing to concede this; in fact they maintain that is exactly what happens. Natural events are simply the coincident issue of anterior material factors, no more no less; and if it so occurs that a good effect arises for an individual being, this is purely by chance. H. Heath Bawden, who is a fair representative of this school of thought, presents his account of cosmic phenomena:

> One living cell divided into two or united with another cell, and the race began. Certain protein organizations developed chromosomes, genes, enzymes, hormones, and even manufactured vitamins in the digestive tract. In a world of spontaneous variations and random reactions anything could happen and we are an example of what did happen. There is no scientific evidence that what happened was the result of premeditated design. Adaptation of means to ends took place in the same fortuitous way that a spinning proton will enter the nucleus of an atom, turning it into an isotope, or a spinning neutron will throw off a revolving electron, thus altering its electrodynamic status. Stable genes gave continuity to genera and species. Unstable ones were responsible for the mutations, sports, variations, of evolution... The so-called laws of chance account for the facts of nature up

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25) Cf. In II Phys., lect. 7, n. 2.

> to the point where human nature steps in to intentionally redirect its forces... The alleged teleological adaptation of means to ends in sub-human nature is a result of the operation of the principles of random distribution which, among the infinity of nature's forces does at times achieve what we regard as relevant results. (26)

Unquestionably, Mr. Bawden resolves the whole problem of the sufficient reason of things into their material components. We need go no further in the search for the 'why' of a natural event than in its preceding material conditions, where its existence is determined, not by some inclining principle like a substantial form, but solely by the random, sportive, and unguided character of the conditions themselves.

With Aristotle, we may reject this interpretation of nature on the grounds that it destroys nature:

> The person who asserts this entirely does away with 'nature' and what exists 'by nature'. For those things are natural which, by a continuous movement originated from an internal principle, arrive at some completion: the same completion is not reached from every principle; nor any chance completion, but always the tendency in each is toward the same end, if there is no impediment. (27)

It is to be remembered always that the materialist theory pretends to be a valid explanation of natural

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26) H. Heath Bawden, The Psychical as a Biological Directive, in Philosophy of Science, Vol. 14, no 1, Jan. 1947.

27) Phys., II, ch. 8, 189b13-17.

events, and as such it ought to be in harmony with the data. In fact it is not, for an absolute priority of matter entails by concession and by logical consequence a random production of things. But chance cannot sufficiently account for natural phenomena. When demonstrating that nature acts for an end, we observed that nature evinces two highly significant characteristics: a sequential mode of proceeding in the attainment of an effect, and the constancy and fittingness of the effect produced. Each element in a process that terminates in the existence of a natural thing has an ordered relationship to what precedes it and to what follows it, and all the elements together are so related to the result achieved that they are said to be apt for attaining it, -- the various stages that issue in the birth of a cat, for example. Moreover, the effect itself, which is constantly recurring, is some fitting thing, some good for the agent initiating the process or motion, so that we are forced to consider the agent as actually operating in view of that good effect. But the principle of that motion is what we call nature, and the operating agent, a natural agent. Therefore, whoever asserts that the fitting results of cosmic activities are merely random consequences of given material conditions, is at the same time destroying nature and speaking against

the patent facts of observation.(28)

Aristotle continues his critique of the materialist postulate by drawing on a comparison with the production of an artifact, a house:

> The current view places what is of necessity in the process of production, just as if one were to suppose that the wall of a house necessarily comes to be because what is heavy is naturally carried downwards and what is light to the top, wherefore the stones and foundations take the lowest place, with earth above because it is lighter, and the wood at the top of all as being the lightest. (29)

Now it would be utterly absurd to explain the existence of a house in such a way, namely, from the matter alone. While it is certain that a house cannot be without its material constituents, stone, wood, nails, etc., we recognize that there are other causes that enter into its construction; and one, the final cause, -- the desire for shelter and protection,-- determines first of all whether the house is to be or not. Because of this intention certain materials are chosen out of which to fashion the structure, and the builder is moved to exercise his efficiency in organizing the materials. The materials are disposed and arranged according to the pattern, or particular form the builder intends his house to have. And when

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28) Cf. In II Phys., lect. 14, n. 7.
29) Phys., II, ch. 9, 199b35-200a5.

the work is completed, we look at it and know it to be the product of a directing intelligence. Never, for example, would we think that it resulted from a violent wind whirling up stray piles of stone, wood, and nails. Yet, this is what the materialists would have us think happens in nature, where similar processes and relationships of causes obtain.(30) We witness the recurrence of a good effect, say, the birth of children, and a definite order among the events that lead up to the actuality of that effect. Are we to understand the child as the mere result of preexisting material conditions, having hands above and feet below because of the heaviness and lightness of body fluids, or of a certain texture of flesh; is his ontogenetic development, the complex structure of his eye which makes it an apt instrument of sight, his whole bodily system with its marvelous powers of adaptation, regulation and integration; -- are all these to be explained simply by the 'principles of random distribution' in matter? Or should we rather say that the interrelated steps of pregnancy were

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30) "... Quidam opinantur quod generatio rerum naturalium proveniat ex necessitate absoluta materiae; ut puta si aliquis diceret quod paries aut domus taliter sit ex necessitate materiae... Ita etiam existimabant dispositiones rerum naturalium provenisse tales ex necessitate materiae; ut puta si dicatur quod homo habet pedes inferius et manus superius propter gravitatem aut levitatem humorum." -- In II Phys., lect. 15, n. 3.

directed toward the birth of the child, that his eye is as it is for seeing, that the instrument of instruments, the hand, comes to be in order that the child may use it to do his will? In other words, the nature of the facts impels us to acknowledge that all these processes have a certain controlled character to them as being guided by a fitting goal to be reached, and that the material factors involved are chosen as apt for achieving that end, just as the builder selects stones as suitable for the house he desires.

Notice we do not deny that matter enters into play in the causations; matter has a definite causality, for the house cannot be without stones or wood, nor the child nor the eye, without certain material ingredients.(31)

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31) "... Licet inconveniens videatur dicere quod in rebus naturalibus sit talis dispositio propter necessitatem materiae, sicut et apparet hoc esse inconveniens in rebus artificialibus, de quibus exemplum positum est; non tamen est talis dispositio facta in rebus naturalibus et artificialibus, sine principiis materialibus habentibus aptitudinem ad talem dispositionem: non enim domus convenienter constaret, nisi gravioria in fundamento ponerentur, et leviora superius. Non tamen dicendum est quod propter hoc domus sic sit disposita quod una pars eius sit inferius et alia superius, propter hoc, id est propter gravitatem aut levitatem quarundam partium; nisi secundum quod haec propositio propter dicit causam materialem, quae propter formam est: sed partes domus sic sunt dispositae propter finem, qui est cooperire et salvare homines a caumate et pluviis. Et sicuti est in domo, similiter est in omnibus aliis, in quibuscumque contingit agere propter aliquid... Non tamen res factae aut generatae sic disponuntur propter hoc, quod principia materialia sunt talia, nisi sicut ly propter dicit causam

But it is not the only cause, nor the principal cause. The efficient activity of the parents; the form, i.e. the rational nature of the child, -- are other causes that concur in the generation. Above all, however, it is the end to be achieved, the birth of the child in our example, that governs the causality of the other causes. For that reason we must say that the material ingredients involved in the birth of a child exist for that end or purpose, and not the child for them, in the same manner as we say the wood exists for the house, and not the house for the wood.

It is thus that Aristotle concludes:

> Whereas, though the wall does not come to be without these, it is not due to these, except as its material cause; it comes to be for the sake of sheltering and guarding certain things. Similarly in all other things that involve production for an end; the product cannot come to be without things which have a necessary nature, but it is not due to these (except as its material); it comes to be for an end.... What is necessary then, is necessary on a hypothesis; it is not a result necessarily determined by antecedents. (32)

In sum, the materialist explanation must be rejected as not conforming to the facts of experience. When it calls upon matter alone to explain phenomena,

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materialem; sed sic disponuntur propter aliquam finem, et principia materialia quaeruntur ut sint apta huic dispositioni, quam requirit finis." -- In II Phys., lect. 15, n. 4.

32) Phys., II, ch. 9, 200a5-14.

it is overlooking extremely important considerations: the orderliness and apparent directiveness of natural operations as well as the frequency of the good effects produced. And if it does not overlook them, but assigns them to the causality of matter, it is attributing to matter qualities that cause can never possess; for, the results of matter alone can only be random occurrences.

As a particular response to Mr. Hawden, who claims the 'so-called laws of chance account for the facts of nature', and the 'alleged teleological adaptation of means to ends in sub-human nature is the result of the operation of the principles of random distribution', we cite the words of one of his more eminent fellow-scientists, Lecomte de Noüy:

> The laws of chance have rendered and will continue to render, immense services to science. It is inconceivable that we could do without them, but they only express an admirable, subjective interpretation of certain inorganic phenomena and of their evolution. They are not a true explanation of objective reality. What they cannot take into account or explain is the fact that the properties of a cell are born out of the coordination of complexity and not out of the chaotic complexity of a mixture of gases. This transmissible, hereditary, continuous coordination entirely escapes our laws of chance.
>
> To believe that we shall ever be able to explain biological phenomena in general, and the evolution of living beings, through the use of the same calculations employed to estimate the number of houses which will burn or

> the pressure of a gas in a vessel, is an act of faith and not a scientific statement. (33)

The Author goes on to give his conclusion on the problem:

> An explanation of life by chance alone is untenable today. It does not permit the incorporation of man and of his psychological activities into the general pattern of things. It does not explain the progressive, ascensional development of life forms and it even denies this development. Consequently, another hypothesis must be tried. There is only one, namely finalism. (34)

B - NECESSITAS MATERIAE -

We have just dismissed with the postulate that natural beings are accounted for by the necessity of matter, which is the last principal objection to our theory of finality in nature. Before, however, we can rest complacent with our own position, it is imperative that we account for a fact that prompted the materialistic hypothesis, namely that matter does involve some necessity. As a point of fact, the proper notion of the necessity of matter was contained all along in the undertones of our refutation of materialistic determinism, and it is simply a question now of bringing it into proper focus. This is perhaps best done by an illustration from artificial creations.

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33) Lecomte du Nouy, Human Destiny, p. 37.
34) Op. cit., p. 43.

A smith is commissioned to forge a saw. He knows that to be apt for cutting the saw must be durable and for that reason he is compelled to select iron as the metal from which he will fashion it; iron most fittingly suits his purpose. Iron then as the matter out of which the saw is fabricated becomes necessary for the attainment of the intended effect, namely, an implement suitable for cutting; because such an effect is desired, such matter must be used to achieve it. And this is what we call hypothetical necessity, or 'necessitas ex suppositione'.(35) The intended end cannot be brought about unless this matter is used; therefore, if the end is to be, this matter is necessary. The necessity is in the matter, but it is derived from the end; the end causes the necessity that is in the matter.

> Non enim dicimus quod necessarium sit esse talem finem, quia materia talis est; sed potius e converso, quia finis et forma talis futura est, necesse est materiam talem esse. Et sic necessitas ponitur ad materiam, sed ratio necessitatis ad finem. (36)

There is an additional necessity in matter, however, that arises more properly from the matter itself.

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35) Cf. In II Phys., lect. 15, n. 4.
36) In II Phys., lect. 15, n. 4; cf. Q.D. de Malo, q. 5, a. 5; Q.D. de Anima, q. un, a. 8.

> In materia duplex conditio invenitur: una quae eligitur ad hoc sit conveniens formae; alia, quae ex necessitate consequitur prioris dispositionis. Sicut artifex ad formam serrae elegit materiam ferream, aptam ad secandum duram; sed quod dentes serrae hebetari possint et rubiginem contrahere, sequitur ex necessitate materiae. (37)

The quality of hardness that iron possesses makes it fitting for the purposes of a saw; but there are other characteristics of iron, e.g. rustability and brittleness, that actually run contrary to these purposes. A rusty saw does not cut well, neither does a broken one. Consequently, just as the smith is necessitated by the end to choose iron out of which to fashion his saw, so must he accept the inconveniences imposed by the nature of iron. The smith would avoid these inconveniences if he could; if he could find a metal that would at once serve his purpose and not entail damaging characteristics, he would certainly employ it. The necessity here is from the matter as from its source, and is therefore absolute, since matter is a prior cause.

These same two necessities of matter are found in nature. It is the proper work of nature to generate and perfect substance. To achieve this goal nature must use matter, since the form, which makes the substance

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37) Ia, q. 76, a. 5, ad 1.

what it is, needs matter either for 'esse', as is the case with all material forms, or at least for operation, as in the instance of the human soul. Moreover, matter has an intrinsic appetite for form and is perfected by it. Here we have an example of hypothetical necessity: because nature desires this end, namely, form, it is necessary that it employ this means, to wit, matter. In matter there is something which befits the form since the existence, or at least the operation, of the form depends on it; and it is for this reason that nature selects matter. Matter becomes necessary owing to the end in view.(38)

> Corporis autem humani conditio dupliciter considerari potest: uno modo secundum aptitudinem ad formam; alio modo secundum necessitatem materiae tantum. Secundum aptitudinem quidem ad formam, necessarium est corpus humanum esse ex elementis compositum et medie complexionatum... Cum enim anima humana sit intellectiva in potentia, unitur corpori ut per sensus accipiat species intelligibiles, quibut fit intelligens actu. Non enim unio animae ad corpus est propter corpus, sed propter animam; non enim forma est propter materiam, sed materia propter formam. Primus autem sensuum est tactus, qui quodammodo est fundamentum aliorum; organum autem tactus oportet esse medium inter contraria... Unde corpus congruens tali animae fuit corpus ex contrariis compositum. (39)

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38) Cf. Phys., II, ch. 9, 200a30-b8; St. Thomas, lect. 15, nn. 4, 6; Q.D. de Malo, q. 5, a. 5; Q.D. de Anima, q. un, a. 8.

When, however, nature utilizes matter to accomplish its work, it must at the same time accept all the consequences of matter(40), even though they be incompa-

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39) Q.D. de Malo, loc. cit.; "The fittest mode, then, of treatment is to say, a man has such and such parts, because the conception of a man includes their presence, and because they are necessary conditions of his existence, or, if we cannot quite say this, which would be the best of all, then the next thing to it, namely, that it is either quite impossible for him to exist without them, or, at any rate, that it is better for him that they should be there; and their existence involves the existence of other antecedents. Thus we should say, because man is an animal with such and such characters, therefore is the process of his development necessarily such as it is; and therefore is it accomplished in such and such an order, this part being formed first, that next, and so on in succession; and after a like fashion should we explain the evolution of all other works of nature." -- De Partibus Animalium, I, ch. 1, 640a34-b4.

40) The consequences of matter are what we call the 'accidents of the individual'. Some are very significant, e.g. corruptibility of the human body, the brittleness of bone structure; others are relatively unimportant, e.g. color of an animal's hair, eyes, feathers, one's particular height, or pitch of voice. We call them 'accidents of the individual' because, while some, like corruptibility, are necessarily related to the attainment of the end, they are nevertheless outside of, hence accidental to, nature's direct intention. For example, we do not include rustability in the definition of a saw since it is not within the purpose of that tool, but something quite accidental to it. These 'accidents' have their proper source in the matter of an individual thing. Because this matter is such and such, these accidents necessarily result. "... In accidentibus individui non est quaerenda causa finalis sed solum causa materialis; proveniunt enim ex dispositione materiae, non ex intentione agentis." -- Q.D. de Malo, loc. cit. In the De Generatione Animalium, V, ch. 8, 789b3-15, Aristotle notes that when these accidents are peculiar to a whole

tible with the form. Matter is 'possibilis ad multa', and when actualized by one form it remains in potency to the others of which it is deprived. Thence in matter are tendencies toward different forms whether substantial or accidental; and some of these tendencies conflict with the substantial form by which the matter is in act. Thus iron can rust and break, and, if either happens, the saw made of iron will become useless. The human form needs a material body in order to perform proficiently its proper operation of intellection; there are certain characteristics of matter that are highly suitable for this work. But matter is composed of contrary tendencies, and so by an absolute necessity the human body is corruptible, -- a condition definitely hostile to the work of the soul. St. Thomas discusses this very situation and in so doing throws light on the notion of necessity that comes from matter:

> Quod autem sequitur ex necessitate materiae quod sit corruptibile, secundum hanc conditionem non

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species they may be supposed to have a final cause also. It may be this particular teaching on the material cause that prompted Cassirer to say: "But material causes are in Aristotle's terminology 'accidental' causes. Aristotle emphatically asserted the impossibility (?) of understanding the phenomenon of life by such accidental causes." -- An Essay on Man, (New Haven: Yale University Press, 1944), p. 20. If any other meaning were intended the statement would be false, since Aristotle held matter to be a co-substantial principle of every natural being.

> habet aptitudinem ad formam, sed magis repugnantiam ad formam. Et quidem omnis corruptio cujuscumque rei naturalis, non est secundum convenientiam ad formam; nam cum forma sit principium essendi, corruptio, quae est via ad non esse, opponitur ei; ... corruptio seminum et omnis defectus sunt contra naturam particularem hujus rei determinatae per formam, quamvis sit secundum naturam universalem, cujus virtute reducitur materia in actum cujuslibet formae ad quam est in potentia, et uno generato necesse est aliud corrumpi; sed speciali modo corruptio proveniens ex necessitate materiae est praeter convenientiam huius formae quae est anima intellectiva... Nam aliae formae sunt corruptibiles saltem per accidens; sed anima intellectiva non est corruptibilis nec per se nec per accidens. (41)

In fine, a twofold necessity is found in the works of nature. The first is a hypothetical necessity that derives from the end; -- because this form is desired this matter must be utilised to achieve it. The necessity is in the matter, while the reason for it comes from the end. This 'necessitas ex suppositione' is not, however, coercive to the extent that the intention of the end would entail necessarily, hence without exception, the execution of the end. This is due in a great degree to the second necessity disclosed in natural phenomena, that which is in matter and which arises from matter. Matter has definite

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41) Q.D. de Malo, q. 5, a. 5; cf. Q.D. de Anima, q. un, a. 8; In III de Anima, lect. 17, n. 851; see all of ch. 1, De Partibus Animalium, I, 639a1-642b4, where Aristotle explains these two necessities and points up the priority of the final cause.

qualities consonant with the form that actualizes it, but since its full potentiality is not exhausted by that form, matter retains tendencies to other forms. From these tendencies arise certain characteristics in opposition to the form, and these antithetic characteristics nature must accept when she uses matter. They are not intended by nature; she would avoid them if she could. Matter imposes them on nature and with an absolute necessity since matter is an anterior cause.

A last remark is in order. Both the necessity from the end and the necessity of matter suppose that nature acts for an end. It is the purposive activity of nature that makes the employment of matter necessary, and likewise it is only because matter is thus chosen that it is able to impose the necessity that it has.

From beginning to end, therefore, we are compelled to recognize in the activity of nature a priority of the final cause, a priority that is in a sense relative since its efficacy depends on the other causes, and particularly matter. And since the end is the good, that priority indicates that matter is for the form, although form never dominates matter to the extent where it can escape all the inconveniences of matter. Most often the intention of the end is realized, but in exceptional instances

there occur unintended effects that have their origin in the discrepancies between the matter and the form. In fact, it is precisely this play between the matter and the form, this lack of complete determination, that enables nature to operate and realize determinate effects 'ut in pluribus'. Yet, at all times it is the end that exercises the ruling influence so that without this priority of the final cause nature would be not only inexplicable, but also non-existent. We may therefore conclude, as Aristotle does, by saying: "It is plain then that nature is a cause, a cause that operates for a purpose." (42)

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42) Phys., II, ch. 8, 199b32.

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