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THE MEANINGS OF 'EMERGENCE' AND ITS MODES[1]

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THERE is an old and persistent tendency in the human mind to conceive of the causal relation as rationally explanatory, and therefore to assimilate it, vaguely or explicitly, to the logical relations of inclusion, implication, or equivalence. That 'there cannot be more in the effect than there is in the cause' is one of the propositions that men have been readiest to accept as axiomatic; a cause, it has been supposed, does not 'account for' its effect, unless the effect is a thing which the eye of reason could somehow discern in the cause, upon a sufficiently thorough analysis. This antipathy to the notion of an absolute epigenesis has left its mark deep and wide upon the history of thought; it appears, indeed, at the very outset of Western speculation in the struggles of the physiologers with the supposed difficulty of admitting qualitative change. Two of the later phases of what may be named the preformationist assumption about causality may pertinently be remembered here. The first is the doctrine of most medieval European metaphysics that all the 'perfections,' or positive attributes, of the creatures must be possessed by the First Cause—even though it were found necessary to assert with equal emphasis that that Cause and its creatures have no attributes in common. In this theological form the preformationist principle implied an addition to the empirically known sum of reality; it left undiminished the abundance and diversity of nature and did not exclude quantitative and qualitative change from the natural order, but placed behind these a supersensible cause in which all this abundance and diversity were declared to be in some fashion antecedently or eternally contained. Since this way of construing the assumption meant no simplification of the universe for our understanding, it was not serviceable to natural science. But in the seventeenth century there began to develop a conception which, while it fulfilled the same assumption, did so in a significantly different way—the conception, namely, of natural events as

[1] The greater part of this paper was read as a communication to the Sixth International Congress of Philosophy at Cambridge, Mass., U.S.A., on September 14, 1926. The four paragraphs preceding the last have been added since the publication of General Smuts's *Holism and Evolution*, part of the doctrine of which is similar to that here set forth.

combinations or re-arrangements of relatively simple, pre-existent entities, of which the total number or quantity remains invariant, and of each of which the qualities and laws of action remain the same through all the combinations into which it may enter. By this mechanistic conception of causation there is nothing *substantive* in the consequent which was not in the antecedent, and the supposed paradox of epigenesis is thus avoided. But in this second form the preformationist assumption implied a programme of reduction or simplification; it was in its essence a scheme for abating the difference of things. For if complexes contain nothing (except their patterns) not already in their simple components, *rerum cognoscere causas* means learning to see in the complex nothing but its beggarly elements—the meagre qualities and limited répertoire of the simple, merely multiplied a certain number of times. Scientific explanation becomes equivalent to mathematical analysis; and if the method is universalized, all philosophy, in Hobbes's phrase, becomes "nothing but addition and substraction." But many complex things have properties not convincingly describable as multiples of the properties of the simple things through the combination of which they arise; and thus the notion of observed causal processes as re-arrangements of the unchanging, while formally denying that there is 'more' in the effect than there is in the cause, nevertheless seemed to imply that there is less in the cause than is apprehended in the effect. The mechanistic conception escaped this paradox only through its conjunction with another feature of most seventeenth-century and subsequent philosophy; its plausibility at the outset and ever since has been wholly dependent upon its association with some form of psychophysical dualism. By means of this all that considerable part of the data of experience, together with the phenomenon of experiencing itself, which seemed plainly irreconcilable with any principle of quantitative and qualitative constancy could conveniently be assigned to the side of the 'merely subjective.' The eventual triumphs of the principle in modern science were made possible through the restriction of its literal application to the physical order, after that order had first been carefully purged of the classes of facts most recalcitrant to such application.

I have recalled these historical commonplaces because they lead up to the first of a series of distinctions which I wish to propose. Most judicious readers of recent British and American philosophy, I suspect, feel that the now modish terms 'emergence' and 'emergent evolution' stand in some need of clarification. In current use their meanings are various and usually vague; and though it may be recognized that they point towards some real and important philosophical issues, the precise nature of those

issues, their relation to one another, and the logical procedure suitable for dealing with them, have not yet, perhaps, been formulated quite so clearly and methodically as could be wished. It is, therefore, towards such preliminary definition, discrimination and correlation of problems that I shall attempt to contribute. While opinions on certain of the issues mentioned will be expressed, it must be with the brevity that is indistinguishable from dogmatism; and the chief purpose of this paper is simply to offer some prolegomena to any future discussion of 'emergence.'

What is chiefly needed, however, is not an extreme narrowing of the signification of the general term. In this case, as often in philosophy, it is better to leave to the generic term a meaning so broad as to appear vague, and to approach precise definitions and clear-cut issues by progressively distinguishing species within the genus. 'Emergence,' then, may be taken loosely to signify any augmentative or transmutative event, any process in which there appear effects that, in some one or more of several ways yet to be specified, fail to conform to the maxim that 'there cannot be in the consequent anything more than, or different in nature from, that which is in the antecedent.' And the first distinction which it is essential to make, in reducing this vague general notion to something more definite and discussable, is that between what I shall call the theses of (*a*) the possibility of general or absolute, and (*b*) the actuality of specific or empirical, emergence, theses antithetic respectively to the first and second sorts of causal preformationism.

To affirm the possibility of general emergence is to reject the preformationist assumption formally and completely, and therefore to deny the validity of any argument from it to the existence of a metempirical cause or causes which somehow pre-contain 'all that is in the effects.' But to many this assumption apparently still has the force of an axiom, and the argument in question therefore figures conspicuously in some recent discussions of our theme. Thus Taylor repeats the Scholastic maxim: "The principle *e nihilo nihil fit*," he writes, "is fundamental to all explanation"; and it is therefore "true that no cause can contribute to its effect what it has not to give. The full and ultimate cause of every effect in a process of evolution will have to be found not simply in the special character of its recognized antecedents, but in the character of the eternal which is at the back of all development. And this must contain"—though "in a more eminent manner"—"all that it bestows, though it may contain much more." [1] Boodin has recently built a highly original superstructure upon the same ancient foundation; for the main argument of his interesting

[1] A. E. Taylor in *Evolution in the Light of Modern Knowledge* (1925), p. 460.

volume on *Cosmic Evolution* appears to be, in brief, that philosophy must "explain" the seeming emergence of novelty in the course of evolution, that "causality from behind cannot account for more than there is in the antecedents," and that therefore the higher forms of being which are progressively attained in terrestrial history must have pre-existed in, and been communicated through ready-made "energy patterns" from, some other part of the universe. "There cannot be evolution of new levels," for this would be equivalent to "something coming from nothing." [1]

The question here raised is one of the crucial issues in all philosophy. If we really know that an absolute or general emergence is impossible, we know something very curious and important about the universe. But the short and easy method usually employed for proving such impossibility I find unconvincing for numerous reasons, of which a few may be briefly indicated. The universal cause or set of causes in which all that is in the (temporal) effects is declared to be precontained must be one of three things: a temporal *prius*, or an eternal which contains the temporal effects as its parts, or an eternal extraneous to those effects. If taken in the first of these senses the assumption on which the argument rests cannot, of course, mean that the effects themselves are in the cause; it can only mean either (*a*) that the effects collectively do not *differ* either qualitatively or quantitatively from the *prius*—that is to say, that they are either mere repetitions of it, or else that they differ only in some relational property which is regarded as unimportant, such as the arrangement or distribution of the qualities and components present in the cause; or (*b*) that they are never of higher metaphysical rank or excellence than the cause. This latter is what the supposed axiom seems often to reduce to; the 'lower,' we are told, can come from the 'higher,' but not the 'higher' from the 'lower'; the stream of being cannot rise higher than its source. But—though this will seem to some a hard saying—neither of these ways of applying the preformationist assumption to temporal relations of cause and effect appears to be justified by anything better than a prejudice—an idol of the tribe, at best. The supposed axiom lacks self-evidence, and though there are some, there are no cogent, reasons for postulating it. It is entirely conceivable that temporal reality as a whole is not only augmented but attains higher levels within any finite time which we may choose to consider; and there are some to whom this evidently seems the more satisfying thing to postulate. Certainly, if consistently carried out, metaphysical preformationism has less edifying and cheering implications than are sometimes attributed to it. If the sum of being and the sum of realized value are constant

[1] J. E. Boodin, *op. cit.* (1925), pp. 9, 44, 67, 82, 96–8, 101, and *passim*.

—and unless they are either constant or diminishing the assumed axiom is false, and there *is* absolute emergence—then the whole movement and travail of the creation is but a barren shuffling-about of the same pieces; an increase or ascent in one region must be simultaneously compensated by an equivalent decrease or decline elsewhere; the more the universe changes, the more it is the same thing. If, however, the 'cause' is conceived as a supra-temporal totality which contains the temporal 'effects,' the impossibility of general emergence undeniably follows; an 'eternal' cannot grow or improve. But such a conception implies the true inclusion of a real succession in a *totum simul*; and no ingenuity has ever succeeded in showing this to be other than a self-contradiction. And this aside, since the temporal world is still admitted to be in some sense real, the whole of *that* world may, so far as the argument shows, conceivably differ at different moments in the number of its elements or in their value. Finally, if the Cause by which 'all that is in the effects' is said to be possessed is conceived as an eternal that does *not* contain these effects within its being—which I take to be the orthodox Scholastic view—the same difficulties present themselves as in the first case, together with some additional ones. The notion of an existent which at once is alien to all succession or change, and yet is the efficient cause of a series of temporal changes, is, to say the least, somewhat elusive; and the supposition that that cause must 'possess' all that is in the temporal effects seems not only gratuitous—the same venerable prejudice as before—but also self-contradictory. None of their *distinctive* qualities can be predicable of it, except in a sense so 'eminent' as to be no sense at all. And even if the qualities were the same, their 'communication' to the effects would mean the emergence of additional existent *instances* of those qualities, unless the qualities were at the same time lost by the Cause. And in any case, there is nothing in this last form of the argument which would preclude emergence on the side of the temporal beings; and this, as before, would necessarily mean an augmentation and enrichment of the general sum of things. There is, then, no valid ***a priori*** argument against the possibility of general (which, of course, does not necessarily mean perpetual) emergence to be drawn from the notion of causality. The subject is one on which we have no means of arriving at objective conclusions, unless it be through more or less probable inference from experience.

The thesis of specific or empirical emergence means denial of the second form of preformationism; it is the assertion of the occurrence, among the phenomena ascertainable by science, of events which are not mere re-arrangements of pre-existent natural entities in accordance with laws identical for all arrangements of

those entities. It is to be observed that the reality of such specific emergence is often asserted by those who declare general or absolute emergence to be inconceivable. This combination of views is, at least on the face of it, logically possible, since the denial of qualitative and quantitative constancy in certain empirically observable changes does not of itself forbid the supposition of an ulterior general cause, of whose relation to the entire series of changes the supposed axiom about causality would hold good; and the combination is natural, because there is a radical incompatibility of temper between the two types of causal preformationism. On the other hand, if such a compensatory general cause is not admitted, any instance of specific emergence, however slight, would obviously imply also general emergence. Much of the opposition in certain scientific quarters to current doctrines of specific emergence seems to be due, at bottom, to the same feeling as is expressed in the Scholastic principle—the feeling that there would be something queer and illogical about a universe in which substantive increments popped into existence. The chief significance of our problem is that it raises definitely the question of the tenability of this historic assumption, common to and potent in both traditional theology and mechanistic science, in spite of their mutual antipathy.

Agreeing in what they deny, doctrines of specific emergence may differ in two respects in what they affirm: in their accounts, namely, of the occasions of emergence, and of the types of actual emergents. In the first regard we must first of all distinguish between indeterminist and determinist theories. The former declare that there are instances of emergence which are reducible to no causal law; *no* fixed occasions can be formulated upon which they invariably occur. The hypothesis of 'undetermined evolution' which has been suggested by Driesch, is, I take it, a theory of this sort; but it is undesirable to define this as the only or the 'strict' sense of 'emergent evolution.' The determinist type of theory declares that whenever certain specific junctures occur a specific variety of emergent uniformly arises. The general nature of these occasions may be variously conceived. One abstractly possible sort would consist merely in intervals in the proper time of one or another physical system; but the most widely current hypothesis on the matter—the so-called theory of creative synthesis—finds the chief, if not the only, occasions of emergence to consist in the formation of special integrations of matter and (or) energy. The question what, in fact, these occasions are, must, of course, depend upon the character of the emergents which can be shown really to arise. Before raising this question of fact it is useful to consider what types of emergent there conceivably *may* be—what, in other words, are the ways in

which it is possible to think of a consequent as differing positively, otherwise than in the re-arrangement of the same elements, from its causal antecedent. In distinguishing these modes of possible emergence I shall—in order to gain brevity by combining two definitions—put the enumeration in the form of a statement of the meaning of 'emergent evolution,' that term, in general, here signifying the occurrence as a feature of the evolutionary process of *any* of the modes of emergence. An 'emergent evolution' may, then, be said to have taken place if, upon comparison of the present phase (called Ph.N), of earth-history (say that since the appearance of *homo sapiens*) with any prior phase (called Ph.A), there can be shown to be present in Ph.N any one or more of the five following features lacking in Ph.A.: (1) Instances of some general type of event admittedly common to both phases (*e.g.* relative motion of particles), of which instances the mode of occurrence could not be described in terms of, nor predicted from, the laws which would have been sufficient for the description and (given the requisite determination of the variables) the prediction of all events of that type occurring in Ph.A. Of this evolutionary emergence of laws one, though not the only conceivable, occasion would be the production, in accordance with one set of laws, of new local integrations of matter, the motions of which, and therefore of their component particles, would thereupon conform to vector, *i.e.* directional, laws emergent in the sense defined. This first mode differs from the others in that it implies no quantitative variability of the prime or irreducible *existents* (other than relations) in the system under consideration. (2) New qualities and, especially, classes of qualities (*e.g.* the so-called secondary qualities) attachable as adjectives to entities already present, though without those accidents, in Ph.A. (3) Particular existents *not* possessing all the essential attributes characteristic of those found in Ph.A., and having distinctive types of attributes (not merely configurational) of their own. (4) Some type or types of event or process irreducibly different in kind (not merely in their laws) from any occurring in Ph.A. (5) A greater quantity, or number of instances, not explicable by transfer from outside the system, of any one or more types of prime entity common to both phases.

In the enumeration of types of possible emergence included in this definition, the most significant point is the contrast between the first, which may be called functional, and the remaining four, which may be distinguished as existential, emergence. Several writers have recently declared that any attempt to prove the reality of the first mode is subject—for familiar reasons chiefly inherent in the notion of a 'law,' which need not be recalled here—to an intrinsic logical limitation. Our inability, they remark, at

any given time to discover, or even conceive of the general nature of, any single law or set of joint laws from which all the motions of matter in its different integrations would be deducible, is not conclusive proof that no such law is formulable; "within the physical realm it always remains logically possible," Broad has said, "that the appearance of emergent laws is due to our imperfect knowledge of microscopic structure or to mathematical incompetence." This *non possumus* does not seem to me to be itself conclusively established; but as there is no time to give reasons, I shall not here challenge it. Even supposing it true, it would not follow that the emergence of laws can be said to be improbable. Such emergence would, to be sure, imply the impossibility of a complete unification of science; and there is for this reason, we are often told, a decisive methodological presumption against it. But here we must distinguish between heuristic rules and propositions of fact. It is the business of the scientific investigator to *look for* identities of law in seemingly diverse phenomena, and to find as many of them as he can; it is not the business of the philosopher to assume *a priori* that nature must to an indefinite degree lend itself to the gratification of this ambition. Though rigorous and conclusive proof of the first mode of emergence be impossible, the hypothesis of its occurrence seems to me to be patently the more probable in the present state of our knowledge. But with these cursory dogmatizings I leave to others the question of functional emergence, in order to consider somewhat less summarily that of existential emergence.[1]

Concerning this, the first thing to remark is that an attempt to prove it is not subject to the general logical disability said to inhere in all arguments for emergent laws. An existential emergent would be a quality, or a thing or event possessing distinctive non-configurational qualities, which was found in the subsequent and not in the prior phase of some causal process; and its presence in the one case and absence in the other would be facts determinable either by observation or by inference from observed data. Where observation of both phases is possible the proof of existential emergence can be direct and virtually complete, as in the case of the qualitative changes incident to chemical synthesis, which have long been recognized, under a different terminology, as examples of such emergence.[2] This simplest instance, obvious and commonplace though it is, has a crucial importance which some writers on

[1] For a fuller discussion of functional emergence, *cf.* the writer's "The Discontinuities of Evolution," in *University of California Publications in Philosophy*, vol. v.

[2] *Cf.* Sir Leslie Mackenzie's paper in *Aristotelian Society*, Supplementary Volume No. VI, "Methods of Analysis," 1926, pp. 56–62.

the subject do not appear to realize; for it alone suffices to show that there can be no general and decisive theoretical presumption against *other* hypotheses of existential emergence, and that nature is assuredly no affair of mere re-arrangements. In less simple but philosophically more consequential and controversial cases, the argument for existential emergence may involve somewhat complex and difficult reasonings, and therefore attain a less high degree of probability; but even in these cases, to which I shall shortly return, the difficulty is of a kind different from and less fundamental than that said to infect all reasonings concerning emergence of laws.

With the distinction between functional and existential emergents in mind we are also in a position to deal with the commonest general or antecedent objection brought against theories of specific emergence. The objection was raised, in differing terms, by several participants in the recent discussion of the subject by the English philosophical societies. To characterize an effect as 'emergent,' it is urged, is to give up the attempt to 'explain' it; and since science cannot give up this attempt, the characterization can have, at best, no more than a provisional validity, as a way of admitting that certain things have not as yet been completely 'explained.' Now, what sort of explanation is it that these critics desiderate in theories of emergence? 'Causal explanation' in the ordinary sense—the recognition that every event follows upon some other *nach einer Regel*, the 'determinism of the experimentalist'—is, as we have seen, entirely compatible with the belief in emergence. The sort of explanation which specific emergence, or emergent evolution, would exclude, is simply that demanded by the second form of preformationism—the conception of the effect as *neither* (*a*) manifesting any law, or mode of uniform behaviour, nor (*b*) containing any existent, not found in its antecedent. To maintain, then, that everything is 'explicable,' in the sense incongruous with emergence, is to raise a definite, though by no means simple, question of fact; it is to imply, for example, that, barring mere summations or re-arrangements, there is to be found in the present phase of terrestrial history no existent whatever—no quality, type of entity, or kind of process—which could not already have been discerned by a scientific angel observing the cold-gaseous-nebula stage of the development of our solar system. This proposition cannot be said to have a high degree of *prima facie* plausibility; and its truth cannot be assumed *a priori* merely because it is one of the two conceivable ways of satisfying the demand for a special type of so-called 'explanation' which is not practically indispensable to science, and which in one case—that of qualitative change in chemical synthesis—is certainly irreconcilable with patent facts.

Wholesale attempts to dispose, in advance, of all specific hypotheses of existential emergence by *a priori* assumptions of this sort being ruled out, both assertors and deniers of any such hypothesis must address themselves to the analysis of definite empirical data. The assertor must (if the question be that of emergent evolution) point out some type of observable event, entity or quality—call it E—existent in Ph.N which does not—even when analysed into its components, if it is not a simple—appear to be adequately describable in the same terms as would describe any event, etc., which we can with probability suppose to have existed in Ph.A. The denier must attempt to show that everything in E *is* describable in the same terms as some class of events, entities or qualities in Ph.A; to this end he may employ either of two methods, which may be termed the reductive and the retrotensive; *i.e.* he may either (1) seek by analysis to reduce E to the same descriptive terms as are sufficient for certain events, *etc.*, admittedly found in Ph.A; or (2) admitting that E has the characters attributed to it by the assertor of emergence, he may maintain that these characters must be read back into the earlier phase—in other words, be supposed to be present in all phases—of the process.

The general logical nature of the problem being thus formulated, we may consider a particular hypothesis of existential emergence, which I believe to be true. It is nowise original, being approximately the same as the theory to which Broad has given the name of 'emergent materialism'—though that designation seems to me a veritable *lucus a non lucendo*. According to this hypothesis, both the third and fourth modes of emergence—*i.e.*, emergent types of entities and emergent kinds of event or process—have appeared in evolution, and continue at present to recur, in the form, but only in the form, of what may be called 'transphysical' emergence. By this I mean the production, as effects of the formation of certain complex and late-evolved integrations of living matter when acted upon by certain forms of radiant energy, of psychical events and psychical objects. An example of a psychical event is an act of awareness. By psychical objects I mean individual entities empirically existent, having extension and certain other of the properties commonly called physical, but differing from true physical objects in that they do not conform to the laws of physics, have individually only an ephemeral existence, have collectively no quantitative or numerical constancy, have no direct dynamical relations with one another, and are grouped into 'private' sets, *i.e.* each is directly accessible only to an act of awareness of an individual organism. Examples of such entities are sensa and images, both delusive and veridical. In other words, the "generative theory of sensa,"

recently defended by a number of writers, is a part of the hypothesis of emergent evolution I am presenting. The initial cases of transphysical emergence were followed by a further evolution of the same type, conditioned upon the formation of new and still more complex integrations of matter and (or) energy, and the process thus far apparently culminates in the cognitive and affective functions of the human organism.

To the plain man, and to some men of science, these theses will, I dare say, seem rather obvious, and not much in need of defence. But in philosophy they manifestly raise numerous highly controversial issues. The existential emergence they assert is attacked chiefly from two sides, and by the two methods already defined; the reductive method is at present represented by behaviourism, the retrotensive mainly by panpsychism, or the mind-stuff theory. The behaviouristic argument I shall not here examine; the view that both the act and the content of awareness, when I apprehend an object distant in space or time, are adequately describable as present changes of the relative position of molecules under my skin, really seems to me to be itself adequately describable by Broad's epithet, 'silly.' There is, however, an important contemporary doctrine which would apply the reductive method to the immediate objects of awareness, but not to the act of awareness; the former, it declares, are simply parts of the physical world, and, if emergent at all, are not transphysical emergents. This contention is assuredly deserving of serious discussion; but the reasons for rejecting it are too complex to be presented here. The attempts of panpsychists to escape from the admission of transphysical emergence seem plainly to be due, in part, to the influence of an attenuated, vestigial form of the ancient pseudo-axiom mentioned at the outset; while it is not necessarily maintained by them that specific emergence is impossible in principle or non-existent in fact, they appear to feel that a causal antecedent cannot be so *very* different in nature from its effect as a physical event is from a mental one. Thus the author of a recent admirably lucid defence of the mind-stuff theory remarks that "discontinuity in evolution would be a baffling and unintelligible phenomenon," and declares that the mind-stuff theory alone "gives us a universe without such unintelligible breaches." "If a mind is simply a brain regarded from the outside . . . the gradual evolution of a brain *is* the gradual evolution of a mind"; thus "there is no need to postulate any discontinuity in evolution to account for the appearance upon the scene of minds, of consciousness, of qualities." Yet the same writer tells us that "the units" of mind-stuff "which make up our mental states" and also our brains "are not *aware* of anything—neither of anything else nor

of themselves. They just *exist*; . . . the fact of their constituting a group of units that function together, or the fact of their being in such and such a position in space and time, is a fact about them, not an aspect of their psychic being." Nor do they possess any of (at least) the secondary qualities. It is only when, "as a product of organic evolution," brains are formed, that "awareness," and therewith qualities, make their appearance.[1] This, however, is to strain at an emergent gnat and swallow an emergent camel. The state of being aware, and the cognition of external objects thereby eventually achieved, are not describable as the sum of the atomic, non-cognitive sentiencies supposed to inhere in the component particles of the brain; and they are therefore no more "accounted for" by the assumed sentiency of those particles than by their motion. They are as blankly different and discontinuous new facts as anything could be. Little, manifestly, can be accomplished in this way to save a residuum of causal preformationism. Another attempt to employ the retrotensive method for avoiding the admission of transphysical emergence is to be seen in the parallelistic form of emergent evolutionism, the view that emergence occurs (in just what modes is not very clear) in the physical as well as in the psychical series, but in each independently. Such a view, however, appears to involve the general doctrine, at once confused and incredible, that physical events can have no causal relation to mental ones—which implies that sensations are not due to physical stimuli, and that if a man, after receiving a blow on the head, loses his memory, the blow is wholly irrelevant to the amnesia. This doctrine does not appear to me to lie within the bounds of serious discussion. The retrotensive method, therefore, not only gratuitously extends to the whole of nature a concomitance for which there is probable evidence only in a special class of cases; it also either falls far short of its objective or else leads to impossible implications.

It remains to consider, before concluding, the ulterior philosophical consequences of any theory of emergent evolution which, like that outlined, purports to rest upon empirical grounds. Supposing such a hypothesis true, what, if anything, does it imply with respect to the question which is at the heart of the philosophy of religion—the question of the relation of facts to values, of the real world to man's hopes and ideals? Does any special significance attach to the fact that certain emergents appear gradually in the course of planetary history, that there seems to be a sort of orthogenesis in transphysical emergence, and that the types of entity and event which we are accustomed to place highest in the scale

[1] Drake, *Mind and Its Place in Nature* (1925), pp. 97–100, 241–3.

of being—such as the extraordinary phenomenon of knowing—have been among the latest to emerge?

To some the hypothesis seems to afford the basis for a new sort of jubilant teleology. Precisely because the later products of evolution are in no sense logically implicit in the earlier, we must, it is argued, invoke the notion of purpose to 'explain' their emergence and must conceive the whole process as merely the unfolding of a completely rational design. But it is obvious that no such unqualified finalism, however one might wish to accept it, finds any justification in the empirical facts, or in the account which the theory of evolutionary emergence gives of them. No form of evolutionism, indeed, is consistent with a belief in the thorough rationality of the universe. For the process commonly called 'evolution' might more significantly be named 'retardation'; in essence it is a *postponement*, either in nature as a whole or in some limited region of it, of the existence of certain forms of being which are logically and even physically possible; and among these are all those that, so far as we can judge, possess value. Any system, therefore, of which the history is that of an 'evolution'—certainly any in which the higher types of conscious life are but tardily evolved—*eo ipso* betrays a non-rational strain. It is this truth which has found a poetic or mythical expression in those Romantic or Manichean sorts of evolutionist philosophy which conceive of cosmic history as a long *Wechselspiel von Hemmen und von Streben* —the struggle of a finite and initially feeble God, or of a half-personified Life Force, to generate ever richer and ever more diverse modes of being, against the resistance or inertia of matter or some other non-rational, or—in the anti-intellectualist forms of the doctrine—of some too rational, obstacle. This, I think, is one of the best and religiously most profitable of the philosophic myths; but it is not to be confused with the scientific hypothesis of emergent evolution here suggested. In this hypothesis there is no hypostatized Vital Energy, there is no dramatic struggle of opposing powers, and matter is no obstacle, but rather the basis or instrument of the realization of the higher levels of being. Nor can matter or energy be assumed to acquire new potencies in the process. It cannot be shown that the laws of their behaviour really evolve; every corpuscle would presumably be capable at any moment of playing its part in generating any emergent, even mind, if only the suitable conjunction of other particles and (or) energy-quanta were given; and wherever the configurations of these are the same, the emergents—subject to a possible qualification which would not essentially affect the conclusion—are the same. The prime cause of the retardation is simply the distribution of matter and energy in the initial phase of the history of a stellar

system. This it was that—given the properties and laws of physical substance, themselves contingent and inexplicable—made it inevitable that evolution should be the slow, crawling thing that it has been—barren, through by far the greater part of its course, alike of life, of sentiency, of emotion, of thought, of reason. Now there is, I think, in popular and sometimes even in philosophic thought a tendency to assume vaguely that this initial distribution had itself some sort of *a priori* inevitability—that matter in a state of nebulous diffusion, a relatively "indefinite, incoherent homogeneity," must in the nature of the case precede matter in a state of compact, complex, and diverse integration. But there seems to be no warrant for this assumption. The distribution, at any prior stage of which astronomy can give us a conjectural picture, was not even the most probable mathematically—though, indeed, if it had been, it would have been so much the less rational. Apparently no sort of reason can be given for its having been what it was. It remains for our understanding an unsolved and probably irresoluble mystery.

Furthermore, the types of dualistic evolutionism to which I have referred give an unwarranted cosmical extension to the notion of emergent evolution; and the same must, I think, be said of the conception of a universal cosmic impetus towards "perfection" which S. Alexander has so eloquently and attractively set forth, and of the final conclusions of General Smuts's notable volume *Holism and Evolution*. It is, surely, an extraordinary piece of inductive inference to apply to the universe as a whole generalizations established only for a single satellite of a minor star belonging to a "system of some 1,500 million or so of stars," which is only one of at least a million such systems. That the higher emergents are to be found at all beyond this planet, we have no direct evidence; and there are definite astro-physical and bio-chemical reasons which make it seem probable that these emergents are, at all events, unusual in time and space.[1] Even where life and intelligence appear, their presence is, if we may judge by our own system, but an episode; they come late and probably leave early. The tendency to integration, the "holistic *nisus*" which General Smuts sees "arising like a living fountain from the very depths of the universe" as "the guarantee that failure does not await us," is, so far as our vision reaches, forever accompanied by its antithesis, the tendency to dissolution and diffusion.

There is, then, nothing in any empirically grounded hypothesis

[1] *Cf. e.g.*, Jeans, in *Evolution in the Light of Modern Knowledge*, pp. 28–9, and Perrier, *La Terre avant l'histoire*, 1920, pp. 64–81. Since the above was written, the point has been more fully argued by Jeans in *Nature*, December 4, 1926, Supplement, p. 40 and *passim*.

of emergent evolution to suggest that the gradualness and successiveness of the appearance upon earth of the higher emergents has a profound metaphysical significance, as the revelation of a value-augmenting tendency inherent in the time-process itself, of a ubiquitous and persistent urge in nature towards greater diversity and fullness of being. All we can say is that moving matter and (or) energy have, in the various integrations of which they are capable, a very great and admirable diversity of accomplishments, including even the power to generate that which is not matter nor energy nor motion; but that the inexplicable manner of their distribution has prevented them from manifesting all of these at once, or the best of them for any relatively long time in any one region of space. We clearly can draw no cogent inference as to the range of these powers, and none, therefore, as to the probability of a continuance of the process. Yet, even though no knowledge which we possess concerning evolution justifies that generalized or cosmic meliorism which now so frequently does duty for a religion, there nevertheless lies before our terrestrial race in its little corner of the world a future which, if dim with uncertainties and beset with perils, is not necessarily devoid of possibilities immeasurably transcending all that the past has brought forth. There perhaps yet remain to mankind, we are told, some thousand million years; if it be so, before that long day ends it is possible that, besides all that man's labouring reason may accomplish, there may yet emerge out of the latent generative potencies of matter, as there quite certainly have emerged before in our strange planetary history, new and richer forms of being, such as no prescience of ours could foresee and no contrivance of ours create.