INSIGHT

CHAPTER XV

ELEMENTS OF METAPHYSICS

As the preceding chapter outlined a program, so the present chapter turns to its execution. We have to make explicit the latent metaphysics of the human mind, and the first step is to establish its elements. There are six of them: central potency, central form, central act, conjugate potency, conjugate form, and conjugate act. In the light of earlier chapters, it will be a relatively brief task to distinguish and relate them. But the prevalence of counter-positions made it seem inadvisable, if not impossible, to tackle the problem of genetic method until we were able to employ our basic metaphysical concepts; and so the present chapter owes its length and any complexity it may possess to the necessity of clarifying the notion of development and of outlining the heuristic structure of genetic method both in general and as applied to the organism, to the psyche, to intelligence, and to the combination of all three in man.

1. Potency, Form, and Act

Metaphysics has been conceived as the integral heuristic structure of proportionate being. It envisages an indefinitely remote future date when the whole domain of proportionate being will be understood. It asks what can be known here and now of that future explanation. It answers that, though full explanation may never be reached, at least the structure of that explanatory knowledge can be known at once.

For proportionate being is whatever is to be known by experience, intelligent grasp, and reasonable affirmation. While there are three components in that knowing, still only one of them is an unknown. The content of intelligent grasp of proportionate being necessarily remains unknown until full explanation is reached. But the content of reasonable affirmation is known already, for it is a virtually unconditioned "Yes". And the content of experience that survives in fully explanatory knowledge also is known already, for it is the intellectually patterned experience of the empirical residue; and already we know that experience is in its intellectual pattern when it is dominated by the detached and disinterested desire to know; similarly, we already have determined that the empirical residue lies in the individuality, the continuity, the coincidental conjunctions and successions, and the non-systematic divergence from intelligible norms, which are to be known by experiencing and only by experiencing.

Accordingly, let us introduce the terms, potency, form, and act.

Potency denotes the component of proportionate being to be known in fully explanatory knowledge by an intellectually patterned experience of the empirical residue.

Form denotes the component of proportionate being to be known, not by understanding the names of things, nor by understanding their relations to us, but by understanding them fully in their relations to one another.

Act denotes the component of proportionate being to be known by uttering the virtually unconditioned "Yes" of reasonable judgment.

It follows that potency, form, and act constitute a unity. For what is experienced, is what is understood; and what is understood, is what is affirmed. The three levels of cognitional activity yield a single knowing; for experience alone is not human knowing; experience and understanding do not suffice for knowing; only when the unconditioned is reached and affirmation or negation occurs, does knowing in the proper meaning of the term arise. In like manner, the contents of the three levels of cognitional activity constitute a unity; one does not know a first proportionate being by experiencing, a second by understanding, and a third by judging; on the contrary, the three contents coalesce into a single known. Hence, potency, form, and act, since they are known by experience, understanding, and judgment, are not three proportionate

beings but three components in a single proportionate being.

Further, it follows that potency, form, and act not only constitute a unity but also share a common definition or specification. For experience neither defines nor specifies; it merely presents. Again, judgment neither defines nor specifies; it merely affirms or denies what has been defined or specified already. All defining and specifying occur on the level of understanding, and so the unity constituted by potency, form, and act, has but a single definition or specification that is reached in knowing form.

Finally, the foregoing account of potency, form, and act, will cover any possible scientific explanation. For a scientific explanation is a theory verified in instances; as verified, it refers to act; as theory, it refers to form; as in instances, it refers to potency. Again, as a theory of the classical type, it refers to forms as forms; as a theory of the statistical type, it refers to forms as setting ideal frequencies from which acts do not diverge systematically; as a theory of the genetic type, it refers to the conditions of the emergence of form from potency.

In subsequent sections different types of potency, form, and act, will be distinguished, but at once we must draw attention to the fact that, while we employ the names introduced by Aristotle and while we assign them a meaning that Aristotle would recognize as his own, none the less Aristotle's ready use of merely descriptive knowledge and

our insistence on explanation involve different starting-points, different tendencies, and differences in implication. Thus, it is sound Aristotelian doctrine to say that potency stands to form, as eye to sight, and that form stands to act, as sight to seeing. But it is a far more prominent Aristotelian doctrine to say that potency stands to form, as the privation of heat to heat, and that form stands to act, as heat to heating. Yet the psychological illustration satisfies our definitions but the physical illustration cannot be reconciled with them.

The psychological illustration satisfies our definitions. For form is what is to be known by insight; but "sight" is known inasmuch as we understand eyes as organs of sight, or inasmuch as we understand experiences of seeing as grounded in the possession of sight. Again, act is known by the "Yes" of judgment, and we know that a person is seeing, not by a mere inspection of eyes, nor by understanding the inspected eyes as organs of sight, but by affirming that the understood sight is being put to use. Finally, potency is what is to be known by intellectually patterned experience of the empirical residue, and there is such an experience when we inspect eyes in order to understand them.

But the physical illustration cannot be subsumed under our definitions. Form is what is to be known by insight, but Aristotle considered what he named proper sensibles to be forms; such are colors, sounds, heat and cold, the wet and dry, the hard and soft, the heavy and light, etc. At least, they are extremely ambiguous forms: in the object

Foot-note to page 704.
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The historical aspect of the present analysis has been set forth in some detail in my articles on "The Concept of Verbum in the Writings of St. Thomas Aquinas," Theological Studies VII(1946), 349-92; VIII(1947), 35-79, 404-44; X(1949), 3-40, 359-93. For an excellent outline of those articles, see L. B. Geiger, O. P., Bulletin thomiste VIII^{2}(1952), 477-79, §740. On the intimate relations in both Aristotle and Aquinas between insight and εἶδος, forma, see Theol. Stud. VII(1946), 360 ff. On the quite common equivalence in Aquinas of actus, actio, operatio, in the sense of Aristotle's ἐνέργεια, as distinct from κίνησις, see Theol. Stud. VIII(1947), 408-41 passim.

In brief, I should say that the present division of being into potency, form, and act is equivalent to the Aquinas' affirmations 1) that ens dividitur per potentiam et actum, 2) that there are two kinds of actus, namely forma and operatio, and 3) that there are two corresponding kinds of potentia of which one is potentia to forma and the other, identical with forma, is potentia to operatio (see Comment. disp. de Potentia q. 1, a. 1, and ~~Aristotle, Met. Θ, 6, 1048b 6 - 9~~. In IX Metaphys., lect 5, #1828 f.)

they are sensible in potency; in sensation they are sensible in act; as named they are associated with any sufficiently similar quality through an insight that grasps how to employ the name; as objects of inquiry, they enter into a heuristic structure that seeks what is to be known when they will be understood; finally, as explained, they are related to laws that implicitly define conjugate terms. Which of the five is Aristotle's form, heat? Again, act is what is to be known by the "Yes" of judgment; but "heating" is not to be known in this simple manner. To know "heating" is to know that there are two instances of heat and that one of them is derived causally from the other. Finally, potency is known by intellectually patterned experience of the empirical residue. But the potency to the form, heat, is the privation of that form; that privation is known, not by merely experiencing the contrary form, cold, but by understanding it as contrary to heat and excluding heat.

It is easy enough to see how the ambiguities of Aristotle's physical notions made a conflict with Renaissance science humanly inevitable. If the form of heat is what is to be known by understanding heat, then the Aristotelians were bound to approve the scientists' effort to understand. In fact, there was a comedy of errors. The Aristotelians had little grasp of Aristotle's doctrine of insight into imaginative representations and they had no notion of the heuristic structure that heads for insight. On the other hand, the scientists did not conceive explaining as knowing inasmuch as one is understanding; their thought was dominated by the notion of objectivity as extroversion;

in this sense they denied the proper sensibles to be really "out there"; and they conceived explanation as the reduction of apparent qualities to the real dimensions of matter in motion. Four centuries ought to suffice for us to learn to see through this set of blunders.

2. Central and Conjugate Forms.

The second step in working out the integral heuristic structure of proportionate being will be to distinguish two general cases of potency, form, and act. For while the forms of proportionate being are to be known fully only when full explanation is reached, still the present existence of heuristic techniques can reveal at once that there are different kinds of forms. Moreover, if there are different kinds of forms, there must be different kinds of potency and of act; for potency, form, and act constitute a single known and share a common definition; and the potency and act that share the definition of one kind of form must differ from the potency and act that share the different definition of another kind.

Now, at the root of classical method there are two heuristic principles. The first is that similars are understood similarly, that a difference of understanding presupposes a significant difference of data. The second is that the similarities, relevant to explanation, lie not in the relations of things to our senses, but in their relations to one another. Next, when these heuristic principles are applied, there result classifications by sensible similarity, then correlations, and finally the verification

of correlations and of systems of correlations. But verified correlations necessarily involve the verification of terms implicitly defined by the correlations; and they do not involve more than such implicitly defined terms as related, for what is verified accurately is not this or that particular proposition but the general and abstract proposition on which ranges of ranges of particular propositions converge. Accordingly, there is a fundamental heuristic structure that leads to the determination of conjugates, that is, of terms defined implicitly by their empirically verified and explanatory relations. Such terms as related are known by understanding, and so they are forms. Let us name them conjugate forms. Since such forms are verified in the empirical residue of experience, they constitute unities with conjugate potencies and conjugate acts. Hence, conjugate potency is potency to conjugate form, and conjugate act is act of conjugate form, where potency to form and act of form mean that the potency, form, and act in question constitute a single unity.

Further, the heuristic structure that leads to knowledge of conjugate forms necessitates another structure that leads to knowledge of central forms. For one reaches explanatory conjugates by considering data as similar to other data; but the data, which are similar, also are concrete and individual; and as concrete and individual, they are understood inasmuch as one grasps in them a concrete and intelligible unity, identity, whole. Nor can one dispense with this grasp or transcend it. For science advances through the interaction of increasingly accurate descriptions and ever more satisfactory explanations

of the same objects. Unless the objects are the same, there is no relation between the description and the explanation and so no reason why explanation should modify description or description lead to better explanation. But the only object that is the same is the concrete and intelligible unity, identity, whole: for the explanatory conjugates change; and the descriptive or experiential terms undergo modifications and rearrangements. Accordingly, as long as science is developing, the notion of the intelligible unity is indispensable. But in their term no less than in their development, scientific conclusions need to be supported by evidence; the evidence for such conclusions lies in change; and without concrete and intelligible unities there is nothing to change; for change is neither the substitution of one datum for another, nor the replacement of one concept by another; it consists in the same concrete, intelligible unity providing the unification for successively different data; and so without the unity, there is no change, and without change there is lacking a notable part, if not all, of the evidence for scientific conclusions. Finally, science is applicable to concrete problems; but neither descriptive nor explanatory knowledge can be applied to concrete problems without the use of the demonstrative, this, and that demonstrative can be used only inasmuch as there is a link between concepts and data as individual: only the notion of the concrete and intelligible unity of data supplies such a link, and so that notion is necessary for science as applied.

Now concrete and intelligible unities are known by understanding; therefore, they are forms. But they are quite different from conjugate forms, and so there must be recognized another type of form to be named central form; and just as conjugate form implies a conjugate potency and a conjugate act, so also central form implies a central potency and a central act.

The difference between our central form and Aristotle's substantial form is merely nominal. For the Aristotelian substantial form is what is known by grasping an intelligible unity, a unum per se. However, since the meaning of the English word, substance, has been influenced profoundly by Locke, since the Cartesian confusion of "body" and thing led to an identification of substance and extension and then to the riposte that substance is underneath extension, I have thought it advisable, at least temporarily, to cut myself off from this verbal tangle.

The difference between our conjugate form and Aristotle's accidental form is partly nominal and partly real. The name, accidental, is misleading, for it suggests the merely incidental. Moreover, the accidental forms of Aristotle's physical theory were, perhaps, sensible qualities as sensed, but we admit no forms that are known apart from understanding. Finally, the name, conjugate, brings out what we consider the essential feature of intelligible mutual relations that implicitly define conjugate forms.

The distinction between central and conjugate forms leads to the distinction between central and conjugate

acts. Central act is existence, for what exists is the intelligible unity. Conjugate act is occurrence, for what occurs is defined explanatorily by appealing to conjugate form.

Similarly, there results a division of the empirical residue between central potency and conjugate potency. Since central form is the intelligible unity of data as individual, central potency may be identified with the individuality of the empirical residue. On the other hand, conjugate forms are verified in spatio-temporal continua, conjunctions, and successions; and so these aspects of the empirical residue are to be deputed to conjugate potency.

To illustrate the meaning of the terms, central and conjugate potency, form, and act, let us suppose that mass-velocity is a notion that survives in fully explanatory science. Then the mass-velocity will be a conjugate act; the mass, defined by its intelligible relations to other masses, will be a conjugate form; the space-time continuum of the trajectory will be a conjugate potency; what has the mass will be individual by its central potency, a unity by its central form, and existing by its central act.

3. Explanatory Genera and Species

Genera and species are explanatory if they are derived, not from classifications based on sensible similarities and dissimilarities, but from classifications based upon explanatory knowledge. The general character of such explanatory knowledge has been indicated already in the chapter on Things but, perhaps, it will not be amiss to recast it in terms of central and conjugate potency, form, and act before asking the twofold question, namely, whether or not that is the structure of explanatory genera and species, and whether or not such a structure will survive in fully explanatory knowledge of proportionate being.

First, then, if there is any explanatory science, then there is a set of conjugate forms, say C_i, defined implicitly by their empirically established and explanatory relations. Different combinations of forms from the set, C_i, serve to define explanatorily the unities or things, T_i, which differ specifically from one another but pertain to the same explanatory genus. Again, different combinations of the verified correlations yield a range of schemes of recurrence, S_i, and in the measure such schemes are realized, they make systematic the occurrence of the conjugate acts, A_i.

Secondly, either all conjugate acts of the type, A_i, occur systematically, or some occur systematically in virtue of the schemes, S_i, while others occur at random. If there are such random occurrences, then there are instances of the merely empirical residue on the level of conjugate acts. For a manifold of random occurrences offers a much

larger range of merely coincidental conjunctions and successions, and such conjunctions and successions pertain to the empirical residue.

Thirdly, there is a further possibility. Besides occurring systematically in virtue of the schemes, S_i, and occurring at random, conjugate acts of the type, A_i, may occur quite regularly yet in a manner that cannot be accounted for by any of the schemes, S_i. In that case there is the evidence that is necessary and sufficient to affirm the existence of another set of conjugates, C_j, defining another genus of things, T_j, and yielding another range of schemes, S_j, that make systematic another type of conjugate acts, A_j.

Fourthly, the foregoing possibility is recurrent. Just as a random manifold of conjugate acts, A_{ij}, is an instance of the empirical residue and so supplies the conjugate potency for the higher systematization by the conjugate forms, C_j, so also a random manifold of conjugate acts, A_{jk}, may be an instance of the empirical residue that supplies the conjugate potency for a still higher systematization by the conjugate forms, C_k. Accordingly, there can be a series of genera, T_i, T_j, T_k, ... and within each genus there can be different species, for the things are defined by their conjugate forms and the conjugate forms differ inasmuch as they systematize differently their different underlying manifolds of lower order conjugate acts.

Fifthly, in things of any higher genus, there survive lower conjugate potencies, forms, and acts, but

there do not survive lower things. The lower conjugates survive, for without them there would be nothing for the higher system of conjugates to systematize. On the other hand, the lower things do not survive within higher things. For a thing is the concrete and intelligible unity of concrete and individual data; the same data from different viewpoints can provide the evidence for different conjugate forms; but the same data under the totality of their aspects cannot be the data for different things. If any datum under all its aspects pertains to one thing, then it does not pertain to any other thing; hence, if there is a higher thing, there are data for affirming it; and the same data are not data for any other thing. It is to be noted, however, that we are speaking not of "bodies" but of things. Within the "body" of an animal, there can be many different things; but these different things are not the animal, nor parts of it; they may be foreign "bodies"; they may live in symbiosis with the animal; but they do not pertain to the animal as do its eyes and other organs.

Sixthly, corresponding to the successive genera, there will be distinct and autonomous empirical sciences. For each genus has its proper range of schemes of recurrence, S_i, S_j, S_k, ... Investigation of these regularities will lead to the discovery of empirically verified correlations and so the implicitly defined sets of conjugates, C_i, C_j, C_k, ... All the terms of the set, C_i, will be defined by their internal relations; all the terms of the set, C_j, will be defined by their internal relations; and since the two sets have no terms in common, there will be no logical

process from one set to another. Because there is no logical process from one set to another, the several empirical sciences will be distinct and autonomous.

Seventhly, the successive, distinct autonomous sciences will be related as successive higher viewpoints. For the coincidental manifolds of lower conjugate acts, say A_{ij}, can be imagined symbolically. Moreover as the coincidental manifolds are the conjugate potency for the higher conjugate forms, so the symbolic images provide the materials for insight into the laws relating the higher forms. But there is a higher viewpoint when images of lower level operations yield insight into the laws governing higher level operations. Accordingly, the structure of the successive genera runs parallel to the structure of successive higher viewpoints.

Eighthly, this parallel may be stated either as a position or as a counter-position. If one affirms the real to be being and to be known by intelligent grasp and reasonable affirmation, then the real will be existing unities differentiated by conjugate forms of various genera and species. In that case the symbolic images will have a merely heuristic value, for they will serve to facilitate the transition from one science to another and to determine to what extent data are explained or not explained by either science. On the other hand, if one affirms the real to be a subdivision in the "already out there now", then the images will be not heuristic symbols but representations of things as they really are; the successive intelligible systems will be merely subjective arrangements, for the

intelligible cannot be imagined; and so the reality of each higher genus is emptied into the lower until one reaches the image of the lowest; and as the lowest is imagined as too small to be seen, one is left with unverifiable images of the lowest genus as one's extra-scientific and pseudo-metaphysical account of reality.

We have stated our conception of explanatory genera and species, and two questions arise. Is the conception correct? Is it verifiable, not merely in things as they are known now, but also in things as they would be known if they were explained completely?

Perhaps, it may be claimed that the conception is uniquely probable. The notion of the succession of higher viewpoints would seem to be the one and only manner in which logically unrelated sciences can be unified. The notion that lower coincidental manifolds of occurrences are systematized by higher forms would seem to be the one and only way in which higher orders of reality can be immanent in lower orders without violating lower classical laws. The two notions are complementary, for the image corresponds to the coincidental manifold, and the insight into the image grasps the forms that systematize the otherwise coincidental manifold. Finally, the two notions satisfy the more general requirements of abstract classical laws, concrete schemes of recurrence, statistical residues, the emergent probability of higher forms and schemes, and the metaphysical structure of central and conjugate potencies, forms, and acts.

Further, the conception rests, not on the present state of empirical sciences, but on the fundamental properties of insight. Insight is into imaginative representations. Insights accumulate into viewpoints. Images that represent viewpoints lead to insights that accumulate into higher viewpoints. This transition can be repeated. Images, apart from insight, are coincidental manifolds; but images under insight cease to be coincidental, for their elements become related intelligibly. Potency corresponds to the imagined empirical residue. Form corresponds to the insight. Again, direct insight expresses itself in abstract classical laws; this abstractness is an indeterminacy that leaves room for the inverse insights that grasp statistical laws; the compatibility of classical and statistical laws leaves room for the coincidental manifolds that provide the potency for the higher forms. Not only do all these elements mesh together to provide a single coherent account of explanatory genera and species, but the resultant account has no competitors for, to the best of my knowledge, no one else has attempted to work out the pure theory of genera and species, where the genera and species are conceived not descriptively but explanatorily.

Now a conception is uniquely probable if it meets an issue fairly and squarely and there are no available alternative views. Moreover, in the present instance, this probability is of a higher order. It regards not an imaginative synthesis of outer events, such as the Ptolemaic or Copernican systems, but the inner ground that is generative of successive imaginative syntheses and systematic unifica-

tions. Such syntheses and unifications can rise and fall in endless succession without altering a single element in the fundamental properties of insight, for those fundamental properties are the principle whence the endless succession would spring. Hence, the greater one's familiarity with human intelligence and its properties, the clearer it becomes that our development of the notion of the higher viewpoint into a theory of explanatory genera and species has exploited the basic and permanent factors that will hold their ground in subsequent modifications and improvements.

Finally, such unique probability is sufficient for a metaphysical theorem when metaphysics is conceived in accord with the definition of the preceding chapter. For if a metaphysics aims at integrating the empirical sciences and common sense to yield a single view of the universe of proportionate being, then it has to deal with facts. It cannot accept the criteria of a deductivism that is content to affirm the necessary laws of any possible world. It is bound to be nuanced; it may have no doubt about central and conjugate potencies, forms, and acts, yet it can be content with unique probability when it comes to differentiating the explanatory genera and species of forms.

There remains the question of fact. Are there in this universe things that differ specifically and generically, where these differences are conceived not descriptively but explanatorily? A negative answer is dictated

by the counter-position, for them reality reduces to imagined and unverifiable entities that differ, not intelligibly, but only in their imaginable determinations. On the other hand, if we appeal to the immemorial convictions of common sense or to the actual division of scientific departments, all the evidence favors the affirmation of different explanatory genera. Finally, we may invoke the testimony of the future and hypothetical reviser of the present affirmation. For if he is to revise that or any other affirmation, he must appeal to experience, understanding, and judgment, and so he will be a concrete and intelligible unity of empirical, intelligent, and rational consciousness. Moreover, he must make his pronouncement, not while he is conscious within the biological, the aesthetic, the artistic, the dramatic, or the practical patterns of experience, but while he is conscious within the intellectual pattern. Still, he will be capable of experience in those other patterns or in some blend or alternation of them, for otherwise he would not be a man. It follows that the hypothetical reviser, if he is a man, will be more than a concrete and intelligible unity of empirical, intelligent, and rational consciousness. What else will he be? One has to invoke at least one other genus of conjugate forms to account for the concrete possibility of other patterns of experience, to account for preconscious and subconscious influences upon consciousness, to account for the fact that the hypothetical reviser eats and breathes and walks on

other things besides men. On the other hand, if one's hypothetical reviser is not a man, then one is rather hard put to it to conceive a manner in which the existence of different explanatory genera can be denied.

4. Potency and Limitation.

Each higher genus is limited by the preceding lower genus. On the one hand, it must not interfere with the autonomy of the lower order for, if it were to do so, it would destroy its own foundation. On the other hand, the higher genus is a higher systematization of manifolds that would be coincidental on the lower level; and a higher systematization is limited by the manifolds which it systematizes.

Since each higher genus is limited by the preceding lower genus, it follows that the lowest genus provides a principle of limitation for the whole domain of proportionate being.

Moreover, this universal principle of limitation resides in the potency of the lowest genus. For act corresponds to judgment, form to insight, and potency to experience of the empirical residue. But the "Yes" of judgment is restricted to the formulation it affirms; and this formulation results from an insight that is restricted

to the pattern of the data to be understood. Accordingly, as judgment is limited by insight, and insight by data, so act is limited by form, and form is limited by potency.

It will be convenient to introduce the name, prime potency, to denote the potency of the lowest level that provides the principle of limitation for the whole range of proportionate being.

Certain characteristics of prime potency are already familiar. For potency is what is to be known by intellectually patterned experience of the empirical residue. The empirical residue consists in individuality, the continuum, particular place and time, and the non-systematic divergence from theoretically grounded anticipations. Since all these features of the empirical residue are to be verified in the lowest genus of proportionate being, all are to be attributed to prime potency.

However, one may ask whether, in the light of contemporary science, prime potency has anything to do with energy. In a general fashion one may argue that, since energy may be latent or potential, it is not act. Since it is relevant to mechanics, thermodynamics, electromagnetics, chemistry, and biology, it is not form. Finally, since it functions as a universal principle of limitation, it must be grounded in prime potency.

An investigation of the notion of energy lies outside the scope of the present inquiry, but it may not be amiss to put a few leading questions. In the first place, the notion of energy is reached, not by differentiating,

but by integrating. It is not surprising when differentiating, which is an abstractive procedure, yields notions of broad generality. But energy is a notion of extreme generality yet it is reached by integrating. Might one not say that the quantity of energy is the concrete prime potency that is informed mechanically or thermally or electrically as the case may be?

Again, there is the curious fact that the science of mechanics can be developed logically in terms of classical laws and without any mention of energy (Lindsay and Margenau, p.120), yet once the notion of energy is introduced, one can develop Lagrange's method of generalized coordinates and Hamilton's canonical equations, which constitute the most powerful techniques in mechanics. Is one to say that there is a mechanics based on the laws of motion and the conjugate forms which the laws define and that there is another equivalent but more powerful mechanics based upon limitations set by prime potency?

Further, while the notion of a quantity of energy receives its basic formulation in mechanics, still it is not restricted to mechanics. Thermodynamics conceives heat as a form of energy, which it limits by a law of conservation and a law that settles the direction of its changes (Ibid., p. 214 ff.). M. Planck has worked out Maxwell's electromagnetic equations by beginning from the notion of energy (Ibid., 315 ff). The Hamiltonian function, which represents total energy, has provided basic clues in quantum mechanics (Ibid., pp 405, 145). There is the release and absorption of energy in chemical change, and

there is the role of chlorophyll in capturing the energy of radiation. Do these facts refer to prime potency as a universal principle of limitation?

Again, there is an inertia of energy and there is an equation relating mass and energy. Is one to relate the inertial coefficient of mass to the prime potency it informs, and to conceive mass itself as a conjugate form that is implicitly defined by the laws that relate masses to one another?

Finally, there has been suggested a correlation between the expanding universe and the emergence of additional energy. If this happens to become accepted, is it to be explained because prime potency grounds both the space-time continuum and the quantity of energy, so that an increase of one involves an increase of the other?

What would seem desirable is a single coherent answer to all these questions such that prime potency would be conceived as a ground of quantitative limitation and general heuristic considerations would relate quantitative limitation to the properties that science verifies in the quantity it names energy.

5. Potency and Finality

Being has been conceived heuristically as the objective of the detached and disinterested desire to know and, more precisely, as whatever is to be known by intelligent grasp and reasonable affirmation. This heuristic notion has been found to underlie all our knowing, to penetrate all conceptual contents, to go beyond them, to provide a core for all meaning. We have now to formulate a reciprocal notion of equal significance. For it is not only our notion of being that is heuristic, that heads for an objective that can be defined only in terms of the process of knowing it, but also the reality of proportionate being itself exhibits a similar incompleteness and a similar dynamic orientation towards a completeness that becomes determinate only in the process of completion.

Just as intellectually patterned experience heads towards insights and judgments, so potency heads towards forms and acts. Just as cognitional activity mounts through accumulations of insights to higher viewpoints, so objective process involves the information and actuation of prime potency only to uncover a residue of coincidental manifolds and so mount through successive levels of higher systematization. Just as cognitional activity does not know in advance what being is and so has to define it heuristically as whatever is to be known by intelligent grasp and reasonable affirmation, so objective process is not the realization of some blue-print but the cumulation

of a conditioned series of things and schemes of recurrence in accord with successive schedules of probabilities. Just as cognitional activity is the becoming known of being, so objective process is the becoming of proportionate being. Indeed, since cognitional activity is itself but a part of this universe, so its heading to being is but the particular instance in which universal striving towards being becomes conscious and intelligent and reasonable.

Such is the meaning we would attach to the name finality. Accordingly, we do not mean by finality some expedient of a lazy intelligence attempting to make amends for the deficiencies in its account of efficient causality. Much less do we mean by finality some pull exerted by the future on the present. By finality we refer to a theorem of the same generality as the notion of being. This theorem affirms a parallelism between the dynamism of the mind and the dynamism of proportionate being. It affirms that the objective universe is not at rest, not static, not fixed in the present, but in process, in tension, fluid. As it regards present reality in its dynamic aspect, so it affirms this dynamism to be open. As what is to be known becomes determinate only through knowing, so what is to be becomes determinate only through its own becoming. But as present knowing is not just present knowing but also a moment in process towards fuller knowing, so also present reality is not just present reality but also a moment in process to fuller reality.

The objective ground of this open dynamism is potency. For potency is what is to be known by intellectually patterned experience of the empirical residue. But intellectually patterned experience is dynamic: it is experience under some heuristic structure that is derived from the detached and disinterested desire to know; it is experience dominated by that desire. And the dynamic orientation of such experience no less than the experience itself has its counterpart in proportionate being. Indeed, since cognitional activity is itself but a part of this universe, its striving to know being is but the intelligent and reasonable part of a universal striving towards being.

I have been indicating a parallel between incomplete knowing heading towards fuller knowing and an incomplete universe heading towards fuller being, and now I propose to employ the name, finality, to denote the objective member of the parallel. Against such usage, perhaps, there will be complaints. The imaginative will contend that finality refers to pull exerted by the future on the present. Abstract deductivists will argue with Scotus that finality should denote a necessary property of every possible world. Concrete deductivists will argue with Spinoza that finality is just a mistake: as premisses prove conclusions, so because birds have wings they are able to fly; as premisses do not exist in order to prove conclusions, so birds do not have wings in order to be able to fly. Kantians will contend that finality is not a law of nature but a maxim of thought, that it does not

reveal a constituent of things but regulates and orders our knowledge of them. In simpler fashion positivists will maintain that, since finality is known by understanding, it does not pertain to the "already out there now real". The surviving advocates of scientific monism, finally, will point out that there is no room in their universe for all-pervasive notions such as being and finality, for philosophy has nothing to add to science, and science deals only with the precise concepts proper to particular departments.

In brief, there are as many views of finality as there are philosophies, nor is there any point to repeating here our reasons for the stand we have adopted. Present concern has to be limited to working out the implications of previous conclusions. Because the real is being and being is whatever is to be grasped by intelligent grasp and reasonable affirmation, finality would not be real if it were known merely as a constituent of the "already out there now". Again, because we have conceived metaphysics as the integral heuristic structure of proportionate being, so we must restrict in similar fashion our consideration of finality. Lastly, since analytic principles differ from analytic propositions by the addition of judgments of fact, our knowledge of proportionate being and so our knowledge of finality is knowledge of what in fact is so. Accordingly, our question of finality is simply a question of correctly understanding a fact.

Basically, then, finality is the dynamic aspect of the real. To affirm finality is to disagree with the Eleatic negation of change. It is to deny that this universe is inert, static, finished, complete. It is to affirm movement, fluidity, tension, approximativeness, incompleteness. It is an affirmation that may turn out to have implications for the future, but such implications are a further question, for finality is an affirmation of fact and fact pertains not to the future but to the present and to the past. Finally, the fact in question cannot be denied outrightly, for our knowing is an event in the universe, and it is not inert, static, finished, complete; on the contrary, in so far as our experience is patterned intellectually, our knowing is in process: it consists in setting questions for intelligence, meeting them by insights, raising further questions to elicit further insights, shifting to critical reflection and judgment only to shift back to further inquiry that will need the control of further critical reflection.

Secondly, finality means not merely dynamism but directed dynamism. It neither denies nor minimizes such facts as entropy, cataclasm, the death that follows every birth, the extinction that threatens every survival. It offers no opinion on the ultimate fate of the universe. But it insists that the negative picture is not the whole picture. For it knows proportionate being as constituted by explanatory genera and species of central and conjugate potencies, forms, and acts. It knows that potency stands

in some dynamic direction towards form, that form stands in some dynamic direction to act, that coincidental manifolds of act stand in some connection with potency to higher forms. Just what that dynamic direction may prove to be, is a further question. But at least in some sense, dynamic direction is to be affirmed. For potency, form, and act constitute a unity; potency is presupposed and complemented by form; form is presupposed and complemented by act; and these relations of presupposition and complementation involve some directing of potency towards form and of form towards act.

Thirdly, the directed dynamism of finality is not deductivist, for deductivism is a mistake. Accurate predictions are possible, but their possibility rests on the survival of schemes of recurrence; that survival is not necessary but probable; and while probability excludes systematic divergence from ideal frequencies, it does not exclude non-systematic divergence.

Fourthly, the directed dynamism of finality is not determinate in the more obvious meanings of that term. It is not headed to some determinate individual or species or genus of proportionate being. On the contrary, the essential meaning of finality is that it goes beyond such determinations. Potency heads to form, but it also heads beyond it to act; and it heads beyond act to coincidental manifolds of acts and, through them, to higher forms and higher coincidental manifolds of acts. Finality goes beyond the myriad individualities of the lowest genus to the fewer individualities of higher genera, and it goes

beyond those fewer individualities in perpetual cycles of change. Finality goes beyond lower genera and species to higher genera and species and, if it is halted at some genus, the halt reveals not finality but the limitations which it endeavors to transcend. Even if one cares to assert that finality can go no higher than man, it is clear enough that man's unrestricted desire to know provides concrete evidence that the alleged maximum of possibility is not the maximum of aspiration.

Fifthly, the directed dynamism of finality is an effectively probable realization of possibilities. For potency is an objective possibility of form; form is an objective possibility of act; acts are an objective possibility of higher forms and higher acts. The realization of these possibilities is effectively probable, for on the supposition of sufficient numbers and sufficiently long intervals of time, the realization of any possibility can be assured.

Sixthly, this directed dynamism is realistic. It results from the classical laws that rest on forms, from the statistical laws that rest on acts, from the emergent process that rests on potency. It is not a contrivance added to an incompetent universe to make it work but an unfolding of its immanent implications that is bound to work. Men are apt to judge the universe by anthropomorphic standards. They look for the efficiency of their machines, the economy of their use of materials and power, the security of their comprehensive plans, the absence of

disease and death, of violence and pain, of abuse and repression, that reflects the desires and the aspirations of their hearts. But human utopias are paper schemes. They postulate in the universe more perfect materials than those with which it builds. They suppose that the building can be some extrinsic activity apart from the universe itself. They forget that they themselves and all their great achievements and all their still greater hopes and dreams are but by-products of the universe in its proper expansion in accord with its proper intelligibility.

Seventhly, finality is universal. It is no less the sadness of failure than the joy of success. It is to be discerned no less in false starts and in break-downs than in stability and progress. It is as much the meaning of aberration and corruption and decline as of sanity and honesty and development. For finality is an immanent intelligibility operating through the effective probability of possibility. Effective probability makes no pretence to provide an aseptic universe of chrome and plastic. Its trials will outnumber far its successes, but the trials are no less part of the program than the successes. Again, in human affairs, finality does not undertake to run the world along the lines of a kindergarten; it does undertake to enlighten men by allowing their actions to have their consequences that by this cumulative heaping of evidence men may learn; and if one tribe or culture, one nation or civilization, does not learn, finality will not stoop to coaxing and pleading; it lets things take their course

that eventually tribes and nations, cultures and civilizations, may reach the degree of intelligent and rational consciousness necessary to carry forward the task of finality in transcending limitations.

Eighthly, finality is nuanced. It is not some single simple-minded formula. It is as concrete, as differentiated, as various, as are the multitudinous beings of this world. Each has its limitations, its incompleteness, its dynamic aspect, its tension, its thrust towards a fuller future. Just as the notion of being underlies all other contents, and penetrates them and goes beyond them, so too does finality underlie and penetrate and head beyond each being that in fact is.

Ninthly, finality is flexible. There is the routine process of the universe and throughout it the same classical and statistical laws obtain. But routine process is not a rule without exceptions. There also are changes of state; throughout such changes the same classical laws obtain, but statistical laws undergo modification. Nor are changes of state without their significance, for they provide in the long run for the occurrence of emergent trends that begin from one set of classical laws and end with the verifiability of another. Again, the emergent trend is itself flexible. Just as the same lesson can be taught in different manners, just as the same discovery can be made in different ways, so too the emergent process from potency to higher forms may follow different routes. Of this the classical illustration is H. Driesch's experiments with embryonic sea urchins for, as he found, violent distortions of the early course of cell division were compensated

by later and opposite departures from normal development. Finally, as it seems, there is the major flexibility that arises when new coincidental combinations provide the materials for new species and new genera of higher systemization.

We have worked out a notion of finality that attributes to the universe of proportionate being a directed dynamism that parallels the heuristic structure of inquiry and reflection. It is a view that squares with our conception of metaphysics. For if we have appealed to the three levels of our knowing to distinguish potency, form, and act, if we have appealed to individuality and similarity to distinguish central and conjugate forms, if we have appealed to higher viewpoints to set up explanatory genera and species, if we have found in potency a principle of limitation, we also must recognize in heuristic structure itself a clue to the nature of the universe proportionate to our capacities to know. At the root of all heuristic structure is the detached and disinterested desire, and so at the root of universal process we have affirmed a directed dynamism. The pure desire heads for an objective that becomes known only through its own unfolding in understanding and judgment, and so the dynamism of universal process is directed, not to a generically, specifically, or individually determinate goal, but to whatever becomes determinate through the process itself in its effectively probable realization of its possibilities. Finally, as our notion of metaphysics involves not

only a major premiss affirming an isomorphism between knowing and known and a principal minor premiss affirming the structure of knowing but also subsidiary minor premisses supplied by empirical science and common sense, so our affirmation of finality rests not simply on an a priori parallel but on that parallel as supported by vast ranges of fact. For our knowing might be much as it is, though the universe were otherwise inert, static, finished, complete, or dynamic but undirected, or dynamic and directed by deductivist necessity, or dynamic and directed naturally or artificially to some determinate goal. But the fact is that this universe is not static but dynamic, not undirected but directed, not deductivist nor inflexible but the effectively probable realization of its own possibilities.

There remains a final point. Is it potency or form or act that provides the objective ground of finality? The answer is not doubtful, if finality is the direction immanent in the dynamism of the real. For the real is dynamic inasmuch as it is incomplete, inasmuch as it is less than it can be. But act constitutes its achievement; form determines what that achievement is; only in potency can one discern the principle that refers determinate achievement to some indeterminate betterment.

It follows that potency is a tension of opposites. As we have seen, it is the ground of universal limitation; as we have just added, it is the ground of the finality that carries proportionate being ever beyond

actual limitations. However, this does not mean that potency is a contradictory notion, for contradiction arises only when mutually exclusive predicates are attributed to the same object under the same aspect. In potency there are at least the two aspects of its proper contribution to the constitution of proportionate being and, on the other hand, its relation to the other contributions of form and act. The proper contribution of potency is limitation. But the relation of potency to the other contributions is general and indeterminate, yet dynamic and directed towards such contributions. It is the indeterminacy of that directed dynamism that makes potency the principle of the tendency to transcend limitations.

Lastly, if we have explained what we mean by finality, it may not be out of place to add what we do not mean. In Chapter XIX the question of efficient and final causality will be raised. But our present concern is not with such extrinsic causes but with the immanent constituents of proportionate being. Accordingly, if any reader wishes the Aristotelian parallel to our finality, he will find it not in Aristotle's ἀρχὴ ὅθεν ἡ κίνησις nor in his τέλος but in his φύσις. For finality is not principium motus in alio inquantum aliud; it is not id cuius gratia; it is principium motus in eo in quo est. [illegible]

ἀρχὴ τῆς κινήσεως

6. The Notion of Development

Because the notion of development is peculiarly subject to the distorting influence of counter-positions, our account of insight as activity made no attempt to discuss the nature of genetic method. This omission has now to be remedied and, perhaps, the simplest procedure will be to begin by stating and illustrating the principles of development.

First, there is the already familiar principle of emergence. Otherwise coincidental manifolds of lower conjugate acts invite the higher integration effected by higher conjugate forms. Thus, in our account of explanatory genera, chemical elements and compounds are higher integrations of otherwise coincidental manifolds of sub-atomic events; organisms are higher integrations of otherwise coincidental manifolds of chemical processes; sensitive consciousness is a higher integration of otherwise coincidental manifolds of changes in neural tissues; and accumulating insights are higher integrations of otherwise coincidental manifolds of images or of data.

Secondly, there is the principle of correspondence. Significantly different underlying manifolds require different higher integrations. Thus, the chemical elements differ by atomic numbers and atomic weights, and those differences are grounded in the underlying manifold. Different aggregates of aggregates of chemical processes involve different organisms. Neural events in the eye and

in the ear call forth different conscious experiences. Different data lead to different theories. It is true, of course, that not every difference in the underlying manifold demands a different integration; the same kind of atom can have subatomic components at different energy levels; the same kind of organism admits differences of size, shape, weight; similarities of character and temperament are compatible, probably enough, with neural differences; and the same theory can be reached from different data. Accordingly, the principle of correspondence enjoys a measure of floxibility; within limits the same higher integration will systematize differing manifolds; the point to the principle is that these limits exist and that to transgress them is to eliminate the higher integration.

Thirdly, there is the principle of finality. The underlying manifold is an upwardly but indeterminately directed dynamism towards ever fuller realization of being. Any actual realization will pertain to some determinate genus and species, but this very determinacy is limitation, and every limitation is to finality a barrier to be transcended.

There follows at once a distinction between static and dynamic higher integrations. Every higher integration systematizes an otherwise coincidental manifold, but the systematization may be effected in two different manners. It is static when it dominates the lower manifold with complete success and thereby brings about a notable imperviousness to change. Thus, the inert gases

lock coincidental manifolds of subatomic events in remarkably permanent routines. On the other hand, the higher integration is dynamic when it is not content to systematize the underlying manifold but keeps adding to it and modifying it until, by the principle of correspondence, the existing integration is eliminated and, by the principle of emergence, a new integration is introduced.

Fourthly, then, there is the principle of development itself. It is the linked sequence of dynamic higher integrations. An initial coincidental manifold is systematized and modified by a higher integration so as to call forth a second; the second leads to a third; the third to a fourth; and so on, until the possibilities of development along a given line are exhausted and the relative stability of maturity is reached.

Fifthly, the course of development is marked by an increasing explanatory differentiation. The initial integration in the initial manifold pertains to a determinate genus and species; still, exclusive attention to the data on the initial stage would yield little knowledge and less understanding of the relevant genus and species. What is to be known by understanding, is what is yet to come, what may be present virtually or potentially but, as yet, is not present formally or actually. Accordingly, if one attends simply to the data on each successive stage of a development, one finds that the initial integration can be understood only in a generic fashion, that subsequent

integrations are increasingly specific intelligibilities, that the specific intelligible differentiation of the ultimate stage attained is generated in the process from the initial stage. Thus, initial single cells of different organisms admit material differences, for example, in the number of chromosomes, but their functioning does not exhibit differences that are comparable to the later differences in functioning. Again, men of widely different temperament and character began, as infants, from instances of sensitive consciousness that not only were remarkably similar but also remarkably undifferentiated; there were sensations but perceptiveness was undeveloped; there was nothing to remember and powers of imagination were latent; affects were global affairs of elementary types; and skills were limited to wailing. Finally, intellectual development has its roots in the detached and disinterested desire to know; but the mere desire is not knowledge of anything; it will lead to highly differentiated structures that are masteries of logic, mathematics, natural science, common sense, philosophy, and human science; but these intelligible differentiations are yet to come, and they come only in and through the process of development.

Sixthly, the course of development is capable of minor flexibility inasmuch as it can pursue the same ultimate goal along different routes. In other words, the initial manifold with its material differences, though it can evoke no more than the initial integration, none the less suffices to determine what the ultimate goal is to be.

In virtue of this determination, the course of development can yield to circumstances and so follow any of a set of alternative linked sequences. Thus, a normal sea urchin can result from an embryo subjected to distorting pressures: psychic health can be due to untutored spontaneity or to the ministrations of the psychiatrist; the same science can be taught successfully in accord with different methods, and the same discovery can be made in different manners.

Seventhly, the course of development is capable of a major flexibility that consists in a shift or modification of the ultimate objective. In biology this is the familiar fact of adaptation; in depth psychology it may be illustrated by sublimation: in cognitional activity it appears in the manner in which inquirers, often enough, begin from one problem only to find themselves by the logic of issues forced to engage in the solution of another.

Major flexibility appears to conflict with minor flexibility, for the former involves a shift in the objective while the latter rests on the fixity of the objective. However, this difference is merely descriptive. In minor flexibility, there is at work the determination of the development that rests on the initial manifold. This determination exhibits potency as the ground of limitation. But potency is also the ground of finality, and from this viewpoint it heads to ever fuller realizations. Moreover, a higher integration is characterized only partially by its systematization of an underlying manifold:

on an adequate account, it is the emergence of a solution to the compound problem of systematizing a coincidental manifold in a given milieu or context; and this solution consists in a set of conjugate forms that are related not only to one another within the integration but also to other instances of the same type outside the integration.

In the light of the foregoing considerations, a development may be defined as a flexible, linked sequence of dynamic and increasingly differentiated higher integrations that meet the tension of successively transformed underlying manifolds through successive applications of the principles of correspondence and emergence. However, lest this prove a mere jumble of words, let us add to the illustration of parts of the definition a few illustrations of the whole.

As there are stable chemical elements, that block the road to development, so too there are unstable elements that easily form compounds. The compounds in turn may be more or less unstable, and vast aggregates of them provide a coincidental manifold of processes that in the cell is made systematic. The cell, however, sets up not a static but a dynamic integration. It is ever intussuscepting fresh materials and extruding others that have served their purpose. Nor is it content merely to maintain the balance of this process, but heads towards the duplication of its dynamic pattern, and then it divides. Such division may be an instance of reproduction or of growth. In the former case, there is the multiplication

of life in different instances. In the latter case, there is development. Higher integration is on the move, for growth is not merely an increase in bulk but also an increase in differentiation: the initial manifold is subjected progressively to ever more intricate arrangements and patterns; the principle of correspondence repeatedly forces out earlier integrations and, on each occasion, the principle of emergence evokes a more definitely differentiated integration. Eventually, full intelligible differentiation is reached, and development yields place to maturity. Inasmuch as the goal of the genetic sequence is fixed by the initial manifold, only oaks from acorns grow. But in large numbers of instances and over long periods of time, there is an effective probability of different initial manifolds and so of diverse objectives for genetic sequences. However, the attainment of such objectives is conditioned by the prior existence of a suitable environment, and inversely environments change cumulatively with the addition of each new type of organism. There follows a problem of the environment to be solved by a phylogenetic sequence of different organisms such that each earlier member both can survive in a less developed and can contribute to a more developed environment. In turn, this solution supposes the possibility of major flexibility, for each earlier member has to emerge in one kind of environment yet, if it is to survive, must be able to adapt successively to the cumulative changes produced by later arrivals. Finally, there is to be reached

a partial transcendence of environment in the animal that develops in the shelter of the egg or womb, that enjoys parental care, that can move about from one place to another, that is equipped to outwit or to conquer foes.

As there is organic, so also there is psychic development. As the organism in its growth has to assemble and arrange its multitudinous cells, so the animal in its development has to include the genesis and patterned distribution of neural tissues. As the differentiation of material organs grounds a sequence of integrations of intelligible organic functions, so neural differentiation and structure provides a material basis for a sequence of increasingly complex forms of sensitive consciousness. As it is not in the plant but in the animal that the full potentialities of organic diversity are realized, so it is not in the animal but in man that the full potentialities of a richly diverse and highly integrated sensitive consciousness are attained.

In the single cell there seems to be the irritability that in a generic and highly rudimentary fashion foreshadows the later sensitivity of touch. But it is a potentiality that the plant neglects and the animal exploits. Moreover, such exploitation moves in two different directions. The multiplication of particularized nerve endings grounds a possibility of increasingly differentiated sensible impressions and sensitively guided components of movements. The mounting hierarchy of nerve centers grounds the possibility of ever more notable integrations of impressions and ever more diversified

coordinations of response. Without the rods and cones, there is no seeing. Without the brain, there is no center on which external influences converge and there is no base from which integrated responses emanate. The two types of development are complementary, and if animals surpass man in keenness of sense or agility of movement, man surpasses them in powers of integration.

However, neural development merely supplies the underlying manifold for psychic development. The latter is conditioned by the former but it consists ~~not~~ neither in neural tissues nor in neural configurations nor in neural events, but in a sequence of increasingly differentiated and integrated sets of capacities for perceptiveness, for aggressive or affective response, for memory, for imaginative projects, and for skilfully and economically executed performance. While the capacities have a basis in some neural counterpart of association, still the distinction between the two is emphasized by the difference between the normal single integration of capacities and the abnormality of multiple personality in which a single individual exhibits at different times quite different integrations of different perceptive, associative, emotive, conative, and operative characteristics. Just as the single cell is so integrated as to head towards a duplication of its dynamic pattern and a consequent division, so in a fashion that is not altogether different, the higher integration of sensitive consciousness can so interact with its neural basis as to generate different and incompatible integrations.

Perhaps because animal consciousness is dominated by biological purpose, its development is more conspicuous in a comparison of different animals than in contrasts between the behavior of the young and the mature member of the same species, in the effects of training, and in experimentally provoked and charted instances of learning. In any case, it is in man that there are to be observed the greatest diversities of perceptiveness, of imaginative power, of nuanced affects, and of acquired skills. The generic consciousness of the infant becomes differentiated in the process of sensitive living at home, in school, at work, and the traditional laws of the development are the power of example and the maxim that practice makes perfect.

However, the relatively recent science of depth psychology has thrown a great deal of light upon the subject, and it hardly will be amiss to indicate that our definition of development serves to supply a single scheme that unites otherwise unrelated principles. Thus, the notion of finality brings together Freud's wish fulfilment, his somewhat ambiguous sublimation, and Jung's archetypal symbols. The unconscious neural basis neither means nor wishes in the proper senses of those terms, for both meaning and wishing are conscious activities. But the unconscious neural basis is an upwardly directed dynamism seeking fuller realization, first, on the proximate sensitive level and, secondly, beyond its limitations on higher artistic, dramatic, philosophic, cultural, and religious levels. Hence, it is that insight into dream

symbols and associated images and affects reveals to the psychologist a grasp of the anticipations and virtualities of higher activities immanent in the underlying unconscious manifold.

A similar phenomenon on a different level is offered by Freud's super-ego: within consciousness, it is a compound of preceptive symbols and submissive affects; by its finality it anticipates, by its subordination it reflects, by its obsessive and expansive tendencies it caricatures, the judgments of rational consciousness on the conduct of a rational being.

Again, the censor is neither an agent nor an activity but simply a law or rule of the inter-relations between successive levels of integration; the constructive censorship is the admission into consciousness of elements that enter into the higher integration: the repressive censorship is the exclusion from consciousness of elements that the higher integration cannot assimilate; the analyst that attempts a retrospective education of his patient is engaged in enlarging potentialities for integration; and the resistance offered by the patient is a by-product of the higher integration putting its own twist on what it can assimilate and circumventing what it cannot.

Finally, there are three general principles relevant to the possibility of Freud's embryology of sensitive sexual phenomena with their successive stages and their consequent dangers of arrested development,

perversion, and retrogression. The first principle is that a developing integration moves from the generic to the specific. The second is that integration cannot precede the unfolding of its underlying manifold; just as the accumulation of insights follows the successive presentations of relevant data, so psychic integration has to follow the stages of development of the organic and neural basis. The third principle is that, so to speak, the degree of freedom of the sensitive integration decrease as one moves from the highest nerve centers towards the particularized nerve endings; hence one can imagine as one pleases but one cannot both be normal and see as one pleases. It follows that the psychic side of sexual development will be from the generic to the specific, that it will divide into stages imposed by somatic development, that the successive sensitive integrations have to meet increasingly determinate neural demands, and that to meet these demands they must imitate, not the artist or mathematician or philosopher following out the logic of previous positions, but the scientist or man of common sense attending principally to ever larger fields of quite determinate data.

The principal illustration of the notion of development is, of course, human intelligence. An otherwise coincidental manifold of data or images is integrated by insights; the effort to formulate systematically what is grasped by insight or, alternatively, the effort to act upon it gives rise to further questions, directs attention

to further data, leads to the emergence of further insights, and so the cycle of development begins another turn. For if one gives free rein to the detached and disinterested desire to know, further questions keep arising. Insights accumulate into viewpoints, and lower viewpoints yield to higher viewpoints. If images are the sole basis of the movement, there develops logic; if images serially related to facts form the basis, the development is mathematical; if data in their bearing on human living determine the circle, there develops common sense; if data in their relations to one another are one's concern, there develops empirical science; finally, if one attends to the circle of development itself and to the structure of what can be known of proportionate being, the development is philosophic. In each of these fields, as in organic growth and in the unfolding of the psyche, development is a flexible, linked sequence of dynamic and increasingly differentiated higher integrations that meet the tension of successively transformed underlying manifolds through successive applications of the principles of correspondence and of emergence.

7. Genetic Method

In our study of insight as activity, we were able to indicate the heuristic structures and procedures of classical and of statistical method. But while we employed genetic method in outlining the development of mathematics, of natural science, and of common sense, still we were forced to refrain from explaining what precisely we were doing. To remedy this defect, to reveal the heuristic significance of the notion of development, and to prepare our statement of the integral heuristic structure that we have named metaphysics, attention must now be directed to genetic method. First, we shall offer our own account of the matter; secondly we shall clarify this account by contrasting it with other views.

As classical method anticipates an unspecified correlation to be specified, an indeterminate function to be determined, so genetic method finds its heuristic notion in development. In the plant there is the single development of the organism; in the animal there is the twofold development of the organism and the psyche; in man there is the threefold development of the organism, the psyche, and intelligence. Let us make this general statement more precise by recasting it in our metaphysical terms.

7.1 General Notions

First, then, in any plant, animal, or man, there is to be affirmed an individual, existing unity. By central potency it is individual; by central form it is a unity, identity, whole; by central act it is existent.

Secondly, besides central potency, form, and act, there are conjugate potencies, forms, and acts. Moreover, the central potency, form, and act are constants throughout the development; it is the same individual and existing unity that develops organically, psychically, intellectually; and so development is to be formulated in terms of conjugate potency, form, and act.

Thirdly, conjugate acts are occurrences, events, functioning. Such are the organic acts of intussusception, assimilation, excretion, the psychic acts of perception, conation, response, the intellectual acts of insight and formulation, reflective understanding and judgment. Further, such acts are recurrent and their recurrence exhibits a regularity that establishes the relevance of schemes of recurrence. But the regularity in question lacks the fixed and rigid periodicity of the planetary system and, indeed, if the functioning of the organism, the psyche, or intelligence is to be understood, one must think not of some single scheme of recurrence but rather of a flexible circle of ranges of schemes. For the same organism, the same psychic habits and dispositions, the same intellectual development result in widely different operations under different conditions and in accord

with different circumstances.

Fourthly, conjugate forms are implicitly defined by empirically established explanatory correlations. Now just as the conjugate form, mass, was reached by Newton, inasmuch as he reduced Kepler's planetary scheme of recurrence to his abstract laws of motion and gravitation, so also the conjugate forms of the organism, the psyche, and intelligence are to be discovered by proceeding from the schemes of organic, psychic, and intellectual recurrence to the underlying correlations. In both cases, one first discerns a regularity of events and then advances to the abstract relation that 1) is verified in the events, 2) implicitly defines the explanatory specification of the events, and 3) fixes by their relations to one another the conjugate forms. Inversely, once correlations are known, it is possible to work out lists of possible schemes of recurrence; from Newton's laws one can proceed to Laplace's account of planetary periodicity; from an understanding of the organism one can conclude to its behavior under given circumstances; from a synthetic account of insight one can set up the procedures of the mathematician, the natural scientist, and the man of common sense.

Fifthly, the foregoing parallel is highly abstract. It rests on the connection between formulation and judgment, law and event, conjugate form and conjugate act. But far more conspicuous than the parallel, there are the differences between physics and, on the

other hand, biology, psychology, and intellectual theory. Regular physical events are apt to recur in some single, determinate scheme. But organic, psychic, and intellectual events are recurrent, not in single schemes, but in flexible circles of ranges of schemes. Nor is this all. There is the fact of development. In the course of time the conjugate forms advance from generic indeterminacy towards a specific perfection. Concomitantly the flexible circle of schemes of recurrence both shifts and expands. Operations that initially were impossible or extremely awkward and inefficient become possible, spontaneous, economical, rapid, and effective. Masses and electric charges, atoms and molecules, are statically systematic: their performance is not a function of their age; there is not a different law of gravitation for each succeeding century. In contrast, organic, psychic, and intellectual development involves a succession of stages; and in that succession the previously impossible becomes possible and the previously awkward and difficult becomes a ready routine. The infant can neither walk or talk, and once we all were infants. Hence, where the physicist or chemist is out to determine single sets of conjugate forms and consequent schemes of recurrence, the biologist or psychologist or intellectual theorist is out to determine genetic sequences of conjugate forms and consequent sequences of flexible circles of schemes of recurrence.

Sixthly, there follows the outstanding difference between classical and genetic method. Classical method

is concerned to reduce regular events to laws. Genetic method is concerned with sequences in which correlations and regularities change. Accordingly, the principal object of genetic method is to master the sequence itself, to understand the development and thereby to proceed from the correlations and regularities of one stage to those of the next. If a mathematical illustration is helpful and not too much out of place, one might say that genetic method is concerned with a sequence of operators that successively generate further functions from an initial function.

Seventhly, as the heuristic assumption of classical method is the indeterminate function to be determined, so the heuristic assumption of genetic method lies in the notion of development. Again, as classical method determines its functions both by the particular procedures of measuring and curve-fitting and by the general procedures of invoking differential equations and principles of invariance and equivalence, so also genetic method determines the course of a development by the scissors-like action of both particular and general procedures.

The general procedures are implicit in the notion of development itself. As has been mentioned already, a development is from generic indeterminacy towards specific perfection. Because of the initial generic indeterminacy, all organic functioning increases in similarity as one mounts to its early stages. Inversely,

because of the increasing specific perfection, psychic development is a matter of character becoming set, temperament fixed, skills acquired and perfected. Both the acorn and the oak are alive; both the infant and the adult perceive and respond; but there are vast differences between the earlier and the later living and perceiving, and the differences consist in transitions from generic potentiality to specific determination.

Besides this general direction of development there also is its general mode of operation. The sequence of conjugate forms is a sequence of higher integrations of otherwise coincidental lower manifolds of events. This sequence is intelligible inasmuch as each successive higher integration modifies the lower manifold it systematizes so as to call forth the next higher integration in the sequence. Thus, if the lower manifold of events may be identified with conjugate potency, the mode of operation of development is a circular interaction of potency, form, and act. In the coincidental manifold there emerge corresponding conjugate forms; in accord with the conjugate forms there recur operations in accord with the flexible circle of ranges of schemes made possible and effective by the forms; from the operations there result, not only the higher systematization of the lower manifold, but also its transformation into the materials for the next higher integration in the sequence.

Besides the general direction of development and its general mode of operation, there is the third general consideration of the field in which it occurs.

In metaphysical terms, this field may be described as the finality, the upwardly directed dynamism, of proportionate being. But in terms of the implications of scientific method, the field may be described more precisely as a generalized emergent probability. It is emergent probability that supplies the initial coincidental manifolds of events in which the higher conjugate forms emerge. It is emergent probability that provides the compound conditioned series of things and schemes of recurrence such that the developing organism or psyche or intelligence will have an environment in which it can function successfully. It is with respect to this field of emergent probability that the genetic sequence enjoys a twofold flexibility, a minor flexibility that reaches the same goal along different routes, and a major flexibility that shifts the goal in adaptation to environmental change. Not only do conjugate forms emerge in coincidental manifolds of lower events; not only do flexible circles of schemes of recurrence result from the conjugate forms; but also operations in accord with the schemes 1) are linked with occurrences outside the organism, the psyche, the intelligence, 2) effect the higher systematization of the lower chemical, neural, or psychic manifold, and 3) so transform the lower manifold as to evoke the emergence of the next conjugate forms that will yield new schemes that will enable the developing subject to function in its environment towards still further development.

Besides the foregoing determinations of development in general, there are the special character-

istics of the simple development of the organism, the twofold development in the animal, and the threefold development in man. The physicist cannot reach laws of nature considering only differential equations and principles of invariance and equivalence; he must also invoke the more concrete techniques of measuring and curve-fitting. Similarly, the biologist, the psychologist, and the intellectual theorist have to operate not only in the light of a general notion of development but also in accord with more specialized directives.

In this connection, our first observation must be negative. The extraordinary success of the physical sciences naturally enough led investigators of the organism, the psyche, and intelligence, to a servile rather than an intelligent adoption of the successful procedures. In physics and chemistry, measuring is a basic technique that takes inquiry from the relations of things to our senses to their relations to one another. But when one mounts to the higher integrations of the organism, the psyche, and intelligence, one finds that measuring loses both in significance and in efficacy. It loses in significance, for the higher integration is, within limits, independent of the exact quantities of the lower manifold it systematizes. Moreover, the higher the integration, the greater the independence of lower quantities, so that the meaning of one's dreams is not a function of one's weight, and one's ability in mathematics does not vary with one's height. Besides this loss

in significance, there is also a loss in efficacy. Classical method can select among the functions that solve differential equations by appealing to measurements and empirically established curves. What the differential equation is to classical method, the general notion of development is to genetic method. But while the differential equation is mathematical, the general notion of development is not. It follows that while measurement is an efficacious technique for finding boundary conditions that restrict differential equations, it possesses no assignable efficacy when it comes to particularizing the general notion of development.

7.2 Organic Development

How, then, is a concrete instance of development to be investigated? One has to follow the lead of the successful scientists, the physicists and chemists, but one has to imitate them not slavishly but intelligently. They employ insights of a particular type, namely, the insights of the mathematician and of the curve-fitter grasping in an aggregate of measurements a possible law. The student of development also must employ insight, but he must not restrict himself to the particular types relevant to physics and chemistry. On the contrary, he has to work out his own structures of accumulating insights and, indeed, different structures for the study of the organism, the psyche, and intelligence itself.

Study of an organism begins from the thing-for-us, from the organism as exhibited to our senses. A first step is a descriptive differentiation of different parts and, since most of the parts are inside, this descriptive preliminary necessitates dissection or anatomy. A second step consists in the accumulation of insights that relate the described parts to organic events, occurrences, operations. By these insights, the parts become known as organs, and the further knowledge, constituted by the insights, is a grasp of intelligibilities that 1) are immanent in the several parts, 2) refer each part to what it can do and, under determinable conditions, will do, and 3) relate the capacity-for-performance of each part to the capacities-for-performance of the other

parts. So physiology follows anatomy. A third step is to effect the transition from the thing-for-us to the thing-itself, from insights that grasp described parts as organs to insights that grasp conjugate forms systematizing otherwise coincidental manifolds of chemical and physical processes. By this transition, one links physiology with biochemistry and biophysics. To this end, there have to be invented appropriate symbolic images of the relevant chemical and physical processes; in these images there have to be grasped by insight, the laws of the higher system that account for regularities beyond the range of physical and chemical explanation; from these laws, there have to be constructed the flexible circle of schemes of recurrence in which the organism functions; finally, this flexible circle of schemes must be coincident with the related set of capacities-for-performance that previously was grasped in sensibly presented organs.

The foregoing three steps of anatomy, physiology, and their transposition to the thing-itself reveal one aspect of the organism as higher system in an underlying manifold of cells, chemical processes, and physical changes. Let us name that aspect the higher system as integrator. The higher system itself is the set of conjugate forms. As integrator, this set is related 1) to inspected organs as the set of functions grasped by the physiologist in sensible data, 2) to the physical, chemical, and cytological manifold as the conjugates implicitly

defined by the correlations that account for additional regularities in the otherwise coincidental manifold, and 3) to immanent and transient activities of the organism in its environment as the ground of the flexible circle of ranges of schemes of recurrence. However, the organism grows and develops. Its higher system at any stage of development not only is an integrator but also an operator, that is, it so integrates the underlying manifold as to call forth, by the principles of correspondence and emergence, its own replacement by a more specific and effective integrator.

The difference between the higher system as integrator and as operator may be illustrated rather simply. There is a well-known interlocking of organic parts that enables the biologist to reconstruct an organism by examining, say, its bones. Now this simultaneous interlocking of parts rests on the higher system as integrator: the conjugate forms are related to one another but also are emergent in organic parts; it follows that the parts are related to one another and that through those relations the whole can be reconstructed from the part. But besides the simultaneous interlocking, there also is a successive interlocking. Just as the dinosaur can be reconstructed from the fossil, so a determinate stage in the development of the whole can be made the basis from which earlier or later stages could be reconstructed; and in this reconstruction over time the major premiss of the inference is supplied by the higher system as operator.

What is the operator? Obviously, I am not referring to a mathematical entity, though there is an extremely important point to the mathematical analogy. For a mathematical operator changes one function into another; the higher system as integrator corresponds to a set of conjugate forms, of laws of the classical type, of alternative ranges of schemes of recurrence; and the higher system as operator effects the transition from one set of forms, laws, schemes to another set. Accordingly, while development may be extremely regular, such regularity is not to be confused with the regularity that conforms to classical law; it is the higher regularity of the emergent trend that successively conforms to different sets of classical laws.

Still, what is the operator? In the general case, it is the upwardly directed dynamism of proportionate being that we have named finality. It is conditioned by instability in the underlying manifold, by incompleteness in the higher integration, by imperfection in the correspondence between the two. It is constituted inasmuch as the higher system not merely suffers but provokes the underlying instability, inasmuch as the incompleteness of the higher system consists in a generic, rudimentary, undifferentiated character that can become differentiated, effective, specific, inasmuch as the imperfection of the correspondence is, so to speak, under control and moving towards a limit where the principles of correspondence and emergence result in the replacement of the prior integration by a more developed successor, inasmuch as such

operators form a flexible series along which the organism advances from the generic functioning of the initial cell to the flexible circle of ranges of schemes of the mature type.

How is this operator studied? All learning is a matter of data and insight, hypothesis and verification. The difficulty in studying the operator lies in the complexity of its data. We have outlined the procedure 1) of inspecting and describing the dissected parts of an organism, 2) of grasping functions or capacities-to-perform in the parts, 3) of interrelating these functions with one another to determine the flexible circle of ranges of schemes of recurrence, and 4) of replacing the inspected colonies of cells (organs) by their underlying physical and chemical manifolds. Now this procedure can be duplicated with respect to successive stages in the development of the same organism, and the juxtaposition of the twofold set of results illustrates the meaning of comparative study. One compares successive stages of organs, successive capacities of successive organs, successive integrations of capacities, successive physical and chemical manifolds. One goes on to contrast normal and abnormal successions, to note similarities and differences of successions in different sub-species and species, to form an account of the various economies in which some parts develop before others, some are permanent and others transitional, some advance at one rate and others at another. The totality of such information constitutes the data on the operator.

The second step is to understand the data. Now understanding is sought methodically through a heuristic structure, and the relevant heuristic structure is, Specify the operator. In general, development is higher system on the move. The operator is the higher system known by grasping the interrelated set of capacities-to-perform; but it is this interrelated set, not as the integrator of a given stage, but as the source of the differences that appear in the next stage. But just how is it the source of the concrete differences revealed in comparative study? That question asks for the specification of the operator. It is the question in genetic method that parallels the classical question, How does one determine the indeterminate function?

The matter may be clarified by an illustration. There seems to be a general principle of development that is named the law of effect. It contends that development takes place along lines of successful functioning. Thus, a tree in a forest puts forth branches and leaves not to its sides but at its top. Now such a principle offers a specification of the operator. For the operator is the higher system on the move. The higher system is the ground of the flexible circle of schemes of recurrence in which the organism functions. The law of effect states that the ground of functioning advances to a new ground of functioning where functioning occurs successfully. Clearly, though this specification of the operator is extremely general, it offers some determination of the direction of development. Its application to concrete instances may not only confirm

it but also give rise to further questions. The further questions will lead to further insights and so to still further questions. In this fashion, one's understanding of the operator begins to be an instance of higher system on the move in the development of scientific knowledge of development.

7.3 Psychic and Intellectual Development

Essentially the same heuristic structure is applicable to the study of the psyche and of intelligence. But now we are confronted with twofold and threefold developments. In the animal, there is psychic development supervening upon organic development. In man, there is intellectual development supervening upon psychic and psychic supervening upon organic. Moreover, there is an important difference in the accessibility of data. In the organism both the underlying manifold and the higher system are unconscious. In intellectual development both the underlying manifold of sensible presentations and the higher system of insights and formulations are conscious. In psychic development the underlying neural manifold is unconscious and the supervening higher system is conscious. Finally, the higher the level of integration, the greater the freedom from material limitation, the more dominant the dynamic and expansive aspect of the operator, the more significant the laws of development itself, and consequently the fuller the development not only on the higher level but also on subordinate levels. Thus, organic differentiation reaches its maximum in animals, and psychic differentiation reaches its maximum in man.

The proximate underlying manifold of psychic development consists in the events and processes of the nervous system. This system involves a central core with afferent and efferent branches. It is at once both a part

of the organism and the seat of the manifold of events that have their higher integrations in conscious perceptions and coordinated responses. Psychic development is that higher integration on the move, and the movement is in two different but complementary directions. What may be named the lateral movement is an increasing differentiation of the psychic events in correspondence with particular afferent and efferent nerves. What may be named the vertical movement is an increasing proficiency in integrated perception and in appropriate and coordinated response. The lateral movement has its limit set by the multiplicity and diversity of nerve endings. The vertical movement has its limit set 1) by the operationally significant set of combinations of different nerve endings and 2) by the existence of higher neural centers at which such combinations can be integrated or coordinated.

The study of animal behavior, of stimulus and response, would reveal at any stage of development a flexible circle of ranges of schemes of recurrence. Implicit in such a circle of schemes, there would be correlations of the classical type. Implicit in such correlations, there would be the conjugate forms that 1) account for habitual perceptiveness of determinate types and habitual modes of aggressive and affective response and 2) would seem to be emergent in underlying neural configurations or dispositions as insights are emergent in images and functions in organs. While such study would reveal the higher system as integrator at any given stage

of development, comparative study of successive stages, of normal and abnormal successions, of similarities and differences of successions in different subspecies, species, and genera, and of the general economy of increasing psychic differentiation, would provide the materials to be understood in grasping the nature of the higher system as operator.

With the development of intelligence, the reader already possesses some familiarity. The lower otherwise coincidental manifold is provided by sensible presentations and imaginative representations. In accord with the principle of correspondence, insights emerge to unify and correlate elements in the sensible flow, to ground the formulation of such unifications and correlations in concepts, thoughts, suppositions, considerations, definitions, postulates, hypotheses, theories, and through such conceptual constructions, or their deductive expansions, or their concrete implementation, to give rise sooner or later to further questions. Clearly, as the conceptual construction is the formulated higher system as integrator, so the emergence of the further question effects its transition into the operator. For further questions lead to further insights only to raise still further questions. So insights accumulate into viewpoints, and lower viewpoints lead to higher viewpoints. Such is the circle of the development of understanding, and it occurs in the different departments of logic, mathematics, science, common sense, and philosophy, according to differences in the route of the circle.

Two peculiarities of intellectual development call for attention. On the one hand, there is its exceptional freedom from limitation. The higher system of the organism or of the psyche develops in an underlying material manifold of physical, chemical, cytological events that are subject to their own proper laws. The higher system of intelligence develops not in a material manifold but in the psychic representation of material manifolds. Hence, the higher system of intellectual development is primarily the higher integration, not of the man in whom the development occurs, but of the universe that he inspects. Further, along with this freedom from material limitation, intellectual development has an exceptional principle of control. The organism or the psyche justifies the higher system it becomes by its pragmatic success. While the pragmatic criterion is employed by intelligence as well, still its availability commonly is confined to the short run and to superficial issues. The proper criterion of intelligence lies in its own capacity for critical reflection, for grasping the unconditioned, for determining the norms of investigations that are headed towards the unconditioned and therefore probable.

7.4 Human Development

It remains that a word be said on total development in man. Organic, psychic, and intellectual development are not three independent processes. They are interlocked with the intellectual providing a higher integration of the psychic, and the psychic providing a higher integration of the organic. Each level involves its own laws, its flexible circle of schemes of recurrence, its interlocked set of conjugate forms. Each set of forms stands in an emergent correspondence to otherwise coincidental manifolds on the lower levels. Hence, a single human action can involve a series of components, physical, chemical, organic, neural, psychic, and intellectual, and the several components occur in accord with the laws and realized schemes of their appropriate levels. However, while physical and chemical laws are static, higher correlations pertain to systems on the move and, quite obviously, there results the problem of formulating the heuristic structure of the investigation of this triply compounded development. What the existentialist discovers and talks about, what the ascetic attempts to achieve in himself, what the psychiatrist endeavors to foster in another, what the psychologist aims at understanding completely, the metaphysician outlines in heuristic categories.

First, then, at any stage of his development a man is an individual, existing unity differentiated by physical, chemical, organic, psychic, and intellectual

conjugates. The organic, psychic, and intellectual conjugate forms ground respective flexible circles of ranges of schemes of recurrence that are revealed in the man's spontaneous and effective behavior, in his bodily movements, in his dealings with persons and things, in the content of his speech and writing. Moreover, if one turns from outward behavior to inner experience, one finds that it shifts into quite different patterns as one engages in different types of activity: absorption in intellectual issues tends to eliminate sensitive emotions and conations and, inversely, mystical absorption tends to eliminate the flow of sensitive presentations and imaginative representations; again, aesthetic experience and the pattern of practical activity tend to be mutually exclusive; finally, while the dramatic pattern of one person dealing with other persons draws upon all one's resources, still, it subdivides, like the successive coatings in an onion, into a series of zones from the ego or *moi intime* to the outer rind of the *persona*, so that one is aloof with strangers, courteous with acquaintances, at ease with one's friends, occasionally unbosoms oneself to intimates, keeps some matters entirely to oneself, and refuses even to face others.

Secondly, man develops. Whatever he is at present, he was not always so and, generally speaking, he need not remain so. The flexible circles of ranges of schemes of recurrence shift and expand, for neural, psychic, and intellectual conjugates pertain to systems on the move. The functioning of the higher integration involves changes

in the underlying manifold, and the changing manifold evokes a modified higher integration. There obtains the law of effect, for development occurs along the directions in which it succeeds. But there also obtains an anticipated law of effect on the psychic and intellectual levels. Thus, unless one asks the further questions, one remains with the insights one has already, and so intelligence does not develop: inversely, because one wants to develop, one can frequent the lectures and read the books that put the further questions and help one to learn. Again, one develops through functioning and, until one has developed, one's functioning has the lack of poise, of economy, of effectiveness, that betrays as yet undifferentiated potentialities. Unless one is encouraged out of shyness, timidity, pretended indifference, to zest and risk and doing, to humility and laughter, one will not develop but merely foster the objective grounds for one's feeling of inferiority. Rather, one will not develop along a certain more common line; one will seek and find less common fields in which to excel; and there one will be apt to over-compensate for deficiencies elsewhere.

Thirdly, there is a law of integration. The initiative of development may be organic, psychic, intellectual, or external, but the development remains fragmentary until the principle of correspondence between different levels is satisfied. Thus, the initiative may be organic, for the organism is an upwardly directed dynamism, seeking to be more fully, evoking its higher

integration by calling forth psychic images and feelings. So man is prompted to waking and sleeping, to eating and drinking, to shade in the summer and the fireside in winter, to loving and begetting children and fending for them: and these psychic, sensitive, corporal activities in their turn call forth the family and technology, the economy and polity, morality and law. Again, the initiative may be psychic, for man's sensitivity not only reflects and integrates its biological basis but also is itself an entity, a value, a living and developing. Intersubjectivity, companionship, play and artistry, the idle hours spent with those with whom one feels at home, the common purpose, labor, achievement, failure, disaster, the sharing of feeling in laughter and lamenting, all are human things and in them man functions primarily in accord with the development of his perceptiveness, his emotional responses, his sentiments. Thirdly, the initiative may be intellectual: its source is a problem; one is out to understand, to judge, to decide, to choose. Finally, the initiative may spring from a change in one's material circumstances, in the perceptiveness or sentiments of another, in the discoveries of other minds and the decisions of other wills.

Still, the initiation of a development is one thing and its integrated completion is another. If one adapts to external change merely out of deference to material necessity or social pressure, the behavior of the outward persona is modified in a manner that, at

best, is tolerated by the inner subject. Again, if one sincerely makes an excellent resolution about one's mode or style of behavior, the resolution is apt to remain sterile if the appropriate perceptiveness and feelings are not forthcoming and one does not know how to evoke them. Inversely, a development can begin in one's perceptiveness and feelings, yet it will remain frustrated if one fails to understand oneself, to plan the strategy, and to execute the tactics that secure congenial companionship or employment. Finally, the non-conscious neural basis can send up its signals that express a starved affectivity or other demands for fuller living, but the signals need an interpreter and the interpreter an intelligent and willing pupil.

The law of integration, then, is a declaration of what is meant by human development. Because man is a unity, his proper development is no more than initiated when a new scheme of recurrence is established in his outward behavior, in his thinking and willing, in his perceptiveness and feeling, in the organic and neural basis of his action. Generally speaking, such an initiation of development invites complementary adjustments and advances, and unless they are effected, either the initiated development recedes and atrophies in favor of the dynamic unity of the subject, or else that unity is sacrificed and deformed to make man a mere dumping ground for unrelated, unintegrated schemes of recurrence and modes of behavior.

Fourthly, there is a law of limitation and transcendence. It is a law of tension. On the one hand, development is in the subject and of the subject: on the other hand, it is from the subject as he is and towards the subject as he is to be. Finality has been conceived as the upwardly but not determinately directed dynamism of proportionate being. Its realization may be regular, but its regularity is not according to law, according to settled spontaneity, according to acquired habit, according to existing schemes of recurrence; on the contrary, it is a change in the law, the spontaneity, the habit, the scheme; it is the process of introducing and establishing a new law, spontaneity, habit, scheme. Its point of departure necessarily is the subject as he happens to be; but its direction is against him remaining as he is; and though its term will involve him in a fresh temptation to inertial repetition and recurrence, that term is to be approached only by breaking away from the inertia of his prior stage.

Now the tension that is inherent in the finality of all proportionate being becomes in man a conscious tension. Present perceptiveness is to be enlarged, and the enlargement is not perceptible to present perceptiveness. Present desires and fears have to be transmuted and the transmutation is not desirable to present desire but fearful to present fear. Moreover, as has been noted, the organism reaches its highest differentiation under the psychic integration of the animal, and the psyche reaches

its highest differentiation under the intellectual integration in man. Because ~~human~~ psychic development is so much more extensive and intricate in man than in other animals, it is involved in a more prolonged tension and it is open to more acute and diversified crises.

There is a further and deeper aspect to the matter. Intellectual development rests upon the dominance of a detached and disinterested desire to know. It reveals to a man a universe of being, in which he is but an item, and a universal order, in which his desires and fears, his delight and anguish, are but infinitesimal components in the history of mankind. It invites man to become intelligent and reasonable not only in his knowing but also in his living, to guide his actions by referring them, not as an animal to a habitat, but as an intelligent being to the intelligible context of some universal order that is or is to be. Still, it is difficult for man, even in knowing, to be dominated simply by the pure desire, and it is far more difficult for him to ~~make or~~ permit that detachment and disinterestedness to dominate his whole way of life. For the self, as perceiving and feeling, as enjoying and suffering, functions as an animal in an environment, as a self-attached and self-interested center within its own narrow world of stimuli and responses. But the same self, as inquiring and reflecting, as conceiving intelligently and judging reasonably, is carried by its own higher spontaneity to quite a different mode of operation with the opposite attributes of detachment and disinterestedness.

It is confronted with a universe of being in which it finds itself, not the center of reference, but an object coordinated with other objects and, with them, subordinated to some destiny to be discovered or invented, approved or disdained, accepted or ~~and accepted or disdained and~~ repudiated.

Such then is the height of the tension of human consciousness. On the side of the object, it is the opposition between the world of sense of man the animal and, on the other hand, the universe of being to be known by intelligent grasp and reasonable affirmation. On the side of the subject, it is the opposition between a center in the world of sense operating self-centeredly and, on the other hand, an entry into an intelligibly ordered universe of being to which one can belong and in which one can function only through detachment and disinterestedness. Not only is the opposition complete but also it is ineluctable. As a man cannot divest himself of his animality, so he cannot put off the Eros of his mind. To inquire and understand, to reflect and judge, to deliberate and choose, are as much an exigence of human nature as waking and sleeping, eating and drinking, talking and loving. Nor is there any escape from the universe of being and its intelligible order by devising some particular type of metaphysics or counter-metaphysics. For the universe of being is whatever is intelligently grasped and reasonably affirmed; by its definition it includes an intelligible order; and to set up as a philosopher of any school whatever, one has to claim to understand and pretend to be reasonable.

It is this heightened tension that in human development supplies the content of the compound, antithetical law of limitation and transcendence. All development is development inasmuch as it goes beyond the initial subject, but in man this "going beyond" is anticipated immanently by the detachment and disinterestedness of the pure desire. Again, all development is development inasmuch as it possesses a point of departure, a concrete material to be transmuted, but in man this concrete material is permanent in the self-centered sensitive psyche content to orientate itself within its visible and palpable environment and to deal with it successfully. Nor are the pure desire and the sensitive psyche two things, one of them "I" and the other "It". They are the unfolding on different levels of a single, individual unity, identity, whole. Both are I and neither is merely it. If my intelligence is mine, so is my sexuality. If my reasonableness is mine, so are my dreams. If my intelligence and my reasonableness are to be thought more representative of me than my organic and psychic spontaneity, that is only in virtue of the higher integration that, in fact, my intelligence and reasonableness succeed in imposing on their underlying manifold or, proleptically, in virtue of the development in which the higher integration is to achieve a fuller measure of success. But no matter how full the success, the basic situation within the self is unchanged, for the perfection of the higher integration does not eliminate the integrated or modify the essential

opposition between self-centeredness and detachment. The same "I" on different and related levels of operation retains the opposed characters.

Fifthly, there is a law of genuineness. At first sight it is an obvious matter of simplicity and honesty, of perspicacity and sincerity. But a little probing brings to light a paradox. In so far as development occurs non-consciously, there is no relevance to genuineness, for simplicity and honesty, perspicacity and sincerity, are qualities of conscious acts. On the other hand, one may argue, the more consciously a development occurs, the less the likelihood that it will be marked by genuineness, for when one speaks of a simple and honest soul, one is not thinking of a person given to deep and prolonged self-scrutiny. What, then, can genuineness be? It does not pertain to non-conscious development, and it seems to stand in conflict with any notable consciousness of development. Is it a property of some twilight development that is neither unconscious nor fully conscious? And if it is, how can there be a general law of genuineness? Such is the paradox.

To meet it, let us say that the requirement of genuineness is conditional and analogous. It is conditional, for it arises only inasmuch as development occurs through consciousness. It is analogous, for the requirement has a different content in different cases. The genuineness, of which we think when we speak of a simple and honest soul, is the happy fruit of a life in which illusion and pretence have had no place. But there is

another genuineness that has to be won back through a self-scrutiny that expels illusion and pretence; and as this enterprise is difficult and its issue doubtful, we do not think of its successful outcome when we cast about for an obvious illustration of genuineness.

In the light of these distinctions, the law of genuineness can be put as follows. Every development involves a starting-point in the subject as he is, a term in the subject as he is to be, and a process from the starting-point to the term. However, inasmuch as a development is conscious, there is some apprehension of the starting-point, the term, and the process. But such apprehensions may be correct or mistaken. If they are correct, the conscious and unconscious components of the development are operating from the same base along the same route to the same goal. If they are mistaken, the conscious and unconscious components, to a greater or less extent, are operating at cross purposes. Such a conflict is inimical to the development, and so we have the conditional law of genuineness, namely, that if a development is conscious, then its success demands correct apprehensions of its starting-point, its process, and its goal.

Further, besides being correct or mistaken, the apprehensions that make a development conscious may be minimal or more or less extensive. They are minimal when they involve little more than the succession of fragmentary and separate acts needed to carry out the

successive steps of the development with advertence, intelligence, and reasonableness. They are more or less extensive when one begins to delve into the background, the context, the premisses, the inter-relations of the minimal series of conscious acts, and to subsume this understanding of oneself under empirical laws and philosophic theories of development. Now, other things being equal, there is less likelihood of error in the minimal series alone than in the minimal series fitted out with its concrete background and its theoretical explanation; and for this reason we expect genuineness to be more common in the simple and honest soul innocent of introspection and depth psychology. But it very well may be that other things are not equal, that errors have become lodged in the habitual background whence spring our direct and reflective insights, that if we relied upon our virtual and implicit self-knowledge to provide us with concrete guidance through a conscious development, then the minimal series so far from being probably correct would be certainly mistaken. Accordingly, the law of genuineness not only is conditional but also is analogous; it becomes relevant in so far as development is conscious; and what it demands will be spontaneous in some cases and in others only obtained through more or less extensive self-scrutiny.

The necessity, then, of genuineness is the necessity of avoiding conflict between the unconscious and the conscious components of a development. But one moves to a deeper grasp of the issue when one asks why

conflict should arise. For if one does not have to look far to find a reason, the reason is not without its profundity. As we have seen, all development involves a tension between limitation and transcendence. On the one hand, there is the subject as he is functioning more or less successfully in a flexible circle of ranges of schemes of recurrence. On the other hand, there is the subject as a higher system on the move. One and the same reality is both integrator and operator; but the operator is relentless in transforming the integrator. The integrator resides in successive levels of inter#related conjugate forms that are more familiar under the common name of acquired habits. But habits are inertial. The whole tendency of present perceptiveness, of present affectivity and aggressivity, of present ways of understanding and judging, deliberating and choosing, speaking and doing, is for them to remain as they are. Against this solid and salutary conservatism, however, there operate the same principles that gave rise to the acquired habits and now persist in attempting to transform them. Unconsciously operative is the finality that consists in the upwardly but indeterminately directed dynamism of all proportionate being. Consciously operative is the detached and disinterested desire raising ever further questions. Among the topics for questioning are one's own unconscious initiatives, their subsumption under the general order intelligence discovers in the universe of being, their integration in the fabric of one's habitual living. So there emerges into consciousness a concrete apprehension

of an obviously practicable and proximate ideal self; but along with it there also emerges the tension between limitation and transcendence; and it is no vague tension between limitation in general and transcendence in general, but an unwelcome invasion of consciousness by opposed apprehensions of oneself as one concretely is and as one concretely is to be.

Genuineness is the admission of that tension into consciousness, and so it is the necessary condition of the harmonious cooperation of the conscious and unconscious components of development. It does not brush questions aside, smother doubts, push problems down, escape to activity, to chatter, to passive entertainment, to sleep, to narcotics. It confronts issues, inspects them, studies their many aspects, works out their various implications, contemplates their concrete consequences in one's own life and in the lives of others. If it respects inertial tendencies as necessary conservative forces, it does not conclude that a defective routine is to be maintained because one has grown accustomed to it. Though it fears the cold plunge into becoming other than one is, it does not dodge the issue, nor pretend bravery, nor act out of bravado. It is capable of assurance and confidence, not only in what has been tried and found successful, but also in what is yet to be tried. It grows weary with the perpetual renewal of further questions to be faced, it longs for rest, it falters and it fails, but it knows its weakness and its failures and it does not try to rationalize them.

Such genuineness is ideal. It goes far beyond the native endowment of detachment and disinterestedness that we possess in the pure desire to know. For it presupposes the accumulations of direct, introspective, and reflective insights that are needed to discriminate between issues. Some are momentous, some important, some secondary, some minor, some merely silly. Without due perspective and discrimination, the exercise of genuineness, as described above, results only in the earnest person with a remarkable flair for concentrating on the wrong questions. Nor can perspective and discrimination be acquired without asking the significant questions. There is, then, a vicious circle to be broken, for we cannot become wise and discriminating without concentrating on the right questions, and we cannot select those questions unless we already are wise and discriminating.

Still, vicious circles are logical entities, and development is a series of emergent leaps from the logic of one position to the logic of the next. Higher system as on the move, as operator, is not to be deduced from precepts and maxims alone, nor from inner impulses alone, nor from external circumstances alone. It is a creative response that meets the requirements of all three in a concrete intelligible synthesis. Man is alive, sensitive, intelligent, reasonable. Nor is he an isolated monad. His development is a movement from the relative dependence of childhood to the relative autonomy of maturity. And as he develops, the content of the analogous requirement of genuineness-for-him shifts from the simple

demand of the pure desire for detachment to an ever more intelligent, more wise, more self-reliant unfolding of that desire.

Finally, there is the sanction of genuineness. To fail in genuineness is not to escape but only to displace the tension between limitation and transcendence. Such a displacement is the root of the dialectical phenomena of ~~individual~~ scotosis in the individual, of the bias of common sense, of basic philosophical differences, and of their prolongation in ~~morals~~, natural and human science, in morals and religion, in educational theory and history. But this issue takes us from genetic method to dialectic and so the present discussion ends.

It has all been, of course, very general. It is meant to be so. A heuristic structure is only the framework in which investigation is to introduce specific laws and particular facts. The question before us is not whether we have dealt adequately with human development. The question before us is not whether we have established the fertility of the heuristic structure or even whether we have explained its precise mode of application. Our topic is genetic method and the sole question is whether the key idea of the method has been found. Our account takes its stand upon the structure of human knowing. Its basic elements are supplied by the theory of explanatory genera and species, by the consequent analysis of development in general, and by the special characteristics of

the triply compounded development of man. It finds that, as classical method rests on the assumption that similars are to be understood similarly, so genetic method rests on the assumption that an understanding of significantly dissimilar individuals is to be reached by subsuming their respective histories under common genetic principles. Again, it finds that as classical method is concerned with laws, so genetic method is concerned with emergent trends, with successions of operators that successively change the laws to which an individual is subject. Further, it finds that, because genetic method is concerned with emergent trends, its object can be formulated only by introducing categories in which the notion of emergence and its implications are set forth adequately and with sufficient generality. Finally, it is for this reason that the account of genetic method had to await the discussion of metaphysics; and within this metaphysical context it has been found possible, I believe, to offer a single integrated view that finds its point of departure in classical method yet embraces biology, the psychology of behavior and depth psychology, existentialist reflection upon man, and fundamental elements in the theory of individual and social history, of morals and asceticism, of education and religion.

7.5 Counter-positions

The complexity of the issue with which we have been dealing has made it impossible for us to weave into our exposition an account of contrary views and our reasons for rejecting them. However, there is a notable addition to clarity that results from such contrasts and, if we are not to invite misinterpretation, we had best attempt some negative indication of our position.

In Ernst Cassirer's The Problem of Knowledge, (Yale University Press, New Haven, 1950, pp. 118-216; English translation by W.H. Woglom and C.W. Hendel of Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit, Vierter Band, Von Hegel's Tode bis zur Gegenwart, 1832-1932.) the interested reader will find a well documented study from the Neo-Kantian viewpoint of the biological methods and theories from the time of Linnaeus to the present. By presupposing this exposition of other views, it will be possible for us to set forth compactly the essential contrasts between our position and mechanism, vitalism, organicism, and Kantianism. Finally, we shall indicate the points in which we believe it necessary to develop Aristotle's views.

First, then, our views on reality and objectivity separate us from the mechanists. In our position, there is not only room but also relevance for every insight that physics and chemistry can offer to the biologist, for the organism is a higher system of underlying chemical and physical manifolds, and the higher

system in no way violates the autonomy of physical and chemical laws. Again, in our position, there is a welcome for every discovery of such connections as the conditioned reflex and the tropism, for all such connections are simply parts in the flexible circle of ranges of schemes of recurrence. But we cannot but reject the mechanist belief that reality consists in imaginable elements as imagined, for such images as images are unverifiable; and we cannot share the mechanist hope that some day the laws of physics and chemistry will account for all biological phenomena, for the only evidence for that hope is the mechanist belief that reality consists in imaginable elements as imagined.

Secondly, our rejection of mechanism is not an affirmation of vitalism, for we do not believe that vitalism, at least as it commonly is conceived, is sufficiently radical in its rejection of mechanism. For the vitalist seems to accept the mechanist view that reality consists in imaginable elements as imagined but to add [also that] there are unimaginable, vital entelechies. In contrast, we reject outright the belief that ultimate reality is known by a set of unverifiable images, and if we affirm forms, we affirm them not only in organisms but also in electrons, protons, atoms, and chemical compounds. Nor is such an affirmation to be termed mystery mongering. For a mystery is what is not understood, but a form is what is to be known inasmuch as one understands correctly. The real mystery is that, while scientists are

regarded universally as men of intelligence, none the less, it is thought outrageous to suggest that they know anything by understanding or that they know better and more adequately when they understand better or more adequately.

Thirdly, while we affirm forms both in atoms and in organisms, while we do so for the same reason in both cases, still we do not affirm that biology deals with the same type of conjugate forms as does chemistry or physics. If one compares the chemical elements, one finds that some, e.g. the inert gases, are highly stable, while others move easily and almost endlessly into compounds. Still, both the stable and unstable chemical elements are static systems; carbon of a given weight and number, no matter how large the range of compounds into which it enters, never gives rise to a developing series of instances of carbon of that weight and number. The outstanding characteristic of the organism is that in it instability is matched and balanced by a moving system, that the same individual unity is differentiated by an explanatory sequence of conjugate forms, that these sequences are members of the more comprehensive sequence of ever bolder and more resourceful strategies by which organisms solve the problem of living in an environment.

Fourthly, by our affirmation of central forms we agree with the advocates of holism or organicism. But we affirm not only the intelligible unity to be grasped in data as individual but also the intelligible functions and relations to be grasped in data as of kinds. Moreover,

these intelligible relations and functions not only are emergent in the underlying manifolds and determine the flexible circle of ranges of schemes of recurrence but also constitute a moving higher system that so integrates the underlying manifold as to make another and different integration emerge.

Fifthly, we employ the name, emergence, but we employ it in a quite determinate meaning to denote a quite unmistakable fact. The prototype of emergence is the insight that arises with respect to an appropriate image: without the insight, the image is a coincidental manifold: by the insight the elements of the image become intelligibly united and related: moreover, accumulations of insights unify and relate ever greater and more diversified ranges of images, and what remains merely coincidental from a lower viewpoint becomes systematic from the accumulation of insights in a higher viewpoint. If the meaning of emergence is thus determinate, so also the fact is unmistakable. There are routine processes and throughout them one can verify the same classical and statistical laws. There are changes of state and during them statistical laws are modified but classical laws remain the same. But there also are emergent processes and the classical laws that can be verified at their inception are not the classical laws that can be verified at their end. ~~There~~ There are correlations that can be verified in the adult organism. There are correlations that can be verified in

the fertilized ovum. But the two sets of correlations are not identical. In determinate materials, there has occurred a change in what can be grasped by insight, formulated as law, and affirmed as verified. One set of conjugate forms has given place to another. The process from one set to the other is regular. But this regular process is not in accord with classical law, for there are no classical laws about changes of classical laws; nor is it in accord with statistical law, for it is not an indifferent choice between a set of alternative processes; and so one is forced to recognize the fact of a third type of process to be investigated by a third, genetic method.

Sixthly, Kant affirmed a maxim of formal purposiveness as relevant to biological inquiry. Such purposiveness was no part of the reality under investigation, but it was a necessary component of the mind's intelligible ordering of the data. Now we affirm finality in a sense that has been defined already. It is an affirmation of dynamism, of a general directedness to fuller intelligibility and systematization, and of the attainment of ever greater but never complete fulness through an effective probability. A clear example of the exact meaning of such finality is the flexible strategy of the dynamic higher system and, again, of the cumulative succession of ever bolder and richer strategies. Accordingly, our affirmation of finality means no more than what can be grasped intelligently in the data and affirmed

reasonably on the basis of the data. But the real is being, and being is what is to be grasped intelligently and affirmed reasonably. On this showing, finality is just as real as anything else. Inasmuch as Kant's formal purposiveness involves a certain anthropocentricity and, also, a greater determinacy than our notion of finality, we are ready to grant its subjective status but then we would deny that it possessed any relevance to biological inquiry. Finally, Kant's views in this field are no more than a consequence of his general position and, as has been suggested already, that position has no better foundation than an incomplete rejection of naive views on objectivity along with a failure to find the virtually unconditioned as constitutive of judgment and thereby to reach the universe of being.

Seventhly, though we are in basic agreement with Aristotle, we differ from him in many positive ways and it will not be amiss to clarify the matter very briefly. Aristotle acknowledged central and conjugate forms: as sight is to the eye, so soul is to the whole animal. His form is also an end: sight is the intelligibility grasped not only in the developed eye and optic nerve but also proleptically in the developing eye of the foetus. He distinguished between thing-for-us and thing-itself: not only are forms grasped in sensible presentations but also they exist in a prime matter that is sheer potency and so falls short of all categorical description.

On the other hand, Aristotle did not grasp the notion of successive higher viewpoints, nor employ it to account for explanatory genera and species. He did not grasp the notion of probability as explanatory, nor conceive an emergent probability, nor think of higher forms as accounting for regularities in underlying otherwise coincidental manifolds. He did not conceive finality as heading beyond every generically and specifically determinate achievement, and his analysis of movement as incomplete act is only a distant approximation to the notion of development as higher system on the move from undifferentiated to fully differentiated perfection. Finally, on his position there is no proximate potentiality to conceive human development as a triply compounded movement of successive higher systems.

8. Summary

Metaphysics has been conceived as the integral heuristic structure of proportionate being. Proportionate being is what is to be known by experience, intelligent grasp, and reasonable affirmation. Integral heuristic structure is the anticipatory outline of what would be known by affirming a complete explanation of experience.

The significance of metaphysics lies not in the future but in the present. It is a matter of indifference to metaphysics whether or not there will be some future date in which complete explanation will in fact be reached. But it is a matter of supreme importance to metaphysics that here and now one reject all obscurantism and so accept in all its implications the effort for complete explanation. Again, the value of an anticipatory outline of a hypothetical complete explanation is not to be measured by the extent to which the future explanation is anticipated. For the metaphysical issue is not the present order of future knowledge but the order immanent in the dynamics of all knowledge whether past, present, or future. Even when science has accounted for all phenomena and common sense has been purged of all bias, there remains the question of the unification of the sciences and of the myriad instances of common sense. As that question never will be met either by science or common

sense, so the answer to it can be ascertained at once in its general structural lines; and the point to the answer is not the value of a forecast but the value of a correct order and perspective in present knowledge and present inquiry.

As the significance of metaphysics, so the evidence for it lies in the present. But the uniqueness of metaphysics makes an account of the evidence extremely difficult. Any doctrine can be presented in a set or sets of definitions, postulates, and deductions. But evidence does not lie in the outward vocal or written expression, nor even in the inner assent, but in the prior reflective grasp that compels reasonableness to assent. Once one has accepted definitions and postulates, deduction makes manifest the unconditioned that is to be grasped reflectively. But the definitions and postulates of metaphysics are a manifold of disputed alternatives; the evidence for discriminating between them is as large as the universe on which they pronounce; and a grasp of that evidence lies, not within easy reach of every indolent mind, but only at the term of a long and difficult accumulation of direct and reflective insights.

For this reason a statement of the evidence for a metaphysics has to be in dynamic terms. If a spatial image and a military metaphor may be helpful, the advance of metaphysical evidence is at once a break-through, an envelopment, and a confinement. The

break-through is effected in one's affirmation of oneself as empirically, intelligently, and rationally conscious. The envelopment is effected through the protean notion of being as whatever one intelligently grasps and reasonably affirms. The confinement is effected through the dialectical ~~function and~~ opposition of the twofold notions of the real, of knowing, and of objectivity, so that every attempt to escape is blocked by the awareness that one would be merely substituting some counter-position for a known position, merely deserting the being that can be intelligently grasped and reasonably affirmed, merely distorting the consciousness that is not only empirical but also intelligent and not only intelligent but also reasonable.

Once this foundation is laid and as long as it is retained effectively, one can proceed rapidly with the erection of the integral heuristic structure of proportionate being. In a first moment, dialectical criticism transforms one's common sense and scientific views to provide the secondary minor premiss of the argument. In a second moment, cognitional theory brings to light the four methods of possible inquiry, the condition of their use, and the possibility of their integration, to yield the principal minor premiss. In a third moment, metaphysical understanding unites the principal and secondary minor premisses, much as a physicist unites a differential equation with empirically ascertained boundary conditions,

to obtain the integral heuristic structure relevant to this universe. In a fourth moment, there is invoked the isomorphism of knowing and known: the pattern of relations immanent in the structure of cognitional acts also is to be found in the contents of anticipated acts and still will be found to obtain when the heuristic contents of anticipated acts give place to the actual contents of occurring acts.

To summarize the second moment, one begins by noting that understanding leads to the formulation of systems, and that systems may be supposed either to be constant over time or to change in time. Again, besides the direct understanding that posits systems, there is the inverse understanding that rests on the opposite assumption of defective intelligibility. Accordingly, the anticipation of a constant system to be discovered grounds classical method; the anticipation of an intelligibly related sequence of systems grounds genetic method; the anticipation that data will not conform to system grounds statistical method; and the anticipation that the relations between the successive stages of changing system will not be directly intelligible grounds dialectical method. But data must either conform or not conform to system, and successive systems must be either related or not related in a directly intelligible manner. Accordingly, taken together, the four methods are relevant to any field of data; they do not dictate what data must be; they are able to cope with data no matter what they may

prove to be.

However, the use of the methods has a basic condition. For they head to general systems and structures, which, despite their generality, must be discovered, verified, and applied in data that are all individual. To link intelligibly the individual data with the general structures, there is needed a further and distinct type of understanding that grasps concrete unities, identities, wholes. Whence it follows that the general structures are concerned with the properties of things, where properties and things are what is to be known by understanding the same data by different but complementary procedures.

Besides their unity by concrete reference, the methods also possess structural unifications. Thus, in a universe in which both classical and statistical methods are relevant, the immanent intelligibility of the order of events can be shown to be an emergent probability. Again, in a universe in which the same things have properties investigated in distinct, autonomous sciences, then the notion of successive higher viewpoints is alone capable of intelligibly relating the generically distinct properties of the same thing without violating the autonomy of the sciences. There follows a generalized emergent probability for both things and events, and the heuristic structure of knowing is matched by the finality of being.

To turn now to the fourth moment of the metaphysical argument, there are introduced the notions of

central and conjugate potency, form, and act. Proportionate being is what is to be known by experience, intelligent grasp, and reasonable affirmation. The integral heuristic structure of proportionate being is the structure of what is to be known when proportionate being is explained completely. But in that explanatory knowledge there will be affirmation, there will be understanding, and there will be experience of the empirical residue. Let act denote what is known inasmuch as one affirms; let form denote what is known inasmuch as one understands; let potency denote what is known inasmuch as one experiences the empirical residue. From the distinction, relations, and unity of experienced, intelligible, and affirmed contents, there follow the distinction, relations, and unity of potency, form, and act. From the different modes of understanding concrete things and abstract laws, there follows the distinction between central and conjugate forms and, as a corollary, the distinctions between central and conjugate potency and between central and conjugate acts. From the structural unification of the methods by generalized emergent probability, there follow the structural account of the explanatory genera and species and the immanent order of the universe of proportionate being. Such are the elements of metaphysics.

There remains the task, to be opened in the next chapter, of investigating a little more deeply the nature of these elements and their relations. But it may not be amiss to locate once more our position in

the history of philosophy. There exists a necessary isomorphism between our knowing and its proportionate known. But that parallel is missed by Spinoza's deductivist ordo idearum est ordo rerum. The correct locus of the parallel is to be found in the dynamic structure of our knowing. Inquiry and understanding presuppose and complement experience; reflection and judgment presuppose and complement understanding. But what holds for the activities, also holds for their contents. What is known inasmuch as one is understanding, presupposes and complements what is known by experiencing; and what is known inasmuch as one is affirming, presupposes and complements what is known by understanding. Finally, the contents of cognitional acts either refer to the known or are identical with the known, and so the dynamic structure of knowing is also the structure of proportionate being. This was grasped by Aristotle and more fully by Aquinas and, while the present account of the matter does differ in details from their position, the difference lies in the fact that modern science has made it possible to distinguish very sharply betwen preliminary description and scientific explanation.