

the preceding section. Form especially is worthy to be called nature since it determines the matter to be this or that, an interior and original thing, as the ensuing sections will show.

SUBSTANCE IS A NATURE EXISTING

So much can be said about matter and form in the general sense. There are various degrees and various kinds of changes in the world of nature, and it might naturally be suspected from this that matter and form appear in different kinds and degrees. Such is actually the case.

There are four kinds of being which display motion and therefore recommend themselves to the philosophical physicist. These are substance, place, quantity, and quality. Substance, as chemical changes show, may be generated or destroyed; place may be changed by what is called local movement; quantity is augmented or diminished in the realm of life where things grow larger or smaller; quality may be altered as water which has different sonic properties in a solid and a liquid state. Of these six species of motion—generation and destruction, local movement, augmentation and diminution, and alteration—only substantial changes will be treated for the present, with local and qualitative motions to be explored later and quantitative changes left to that part of the philosophy of nature which opens the door to psychology.

Naturally the first question is, what is substance and what is its relation to nature which has been set up as the only stock in trade of the philosophical physicist. As in the whole of the philosophical science of nature, motion is the frame for the definition, and substance is not considered, as in metaphysics, by the light of being. Substance is contrasted with accidents or attributes. Silver is a substance; its accidents are its color, its specific gravity, its melting point, its electropositive character, and its magnetic properties. Water, radium, sulfuric acid, a cow, a man, a neutron—all are substances. Substance corresponds to the question, what the being is, and an accident is what the being has. An accident has thus been called *ens entis*—the being of a being.

Treated in the climate of philosophical physics as the being of a thing, substance seems at first sight confusingly like the cause and source of motion and of rest that Aristotle called nature. The difference between the two is that nature is a universal community of a given kind (often called second substance), whereas substance proper (first substance) is the individually existing thing within the kind. Thus, all iron has the same nature, but it does not all have the same substance. Each atom of iron is different from every other atom and does not inhere in a common all-pervasive nature that would lead to a monism in the world of iron. In the strict sense of the term, an individual atom like an individual man *has* a nature; it *is* a substance. Similarly of the other examples mentioned above. Substance for present purposes may be taken as a nature existing, a nature that is no longer universal but invested with all the requisites to be an independent existing thing. It is being concretely existing.<sup>2</sup>

Substantial changes involve the generation of a new substance, the change from non-being to being, and the destruction or corruption of the old substance, the change from being to non-being. It is from its changes, substantial and accidental, that substance is known to the philosophical physicist in his strict limits, and to explain such changes Aristotle saw the necessity of matter-form. This dualism in the substantial order is emphatically not a doctrine to explain bodily essence but to explain substantial change. Philosophical physics is not a philosophy of essence but a philosophy of nature, which is essence viewed as a principle of operation.

Are there substantial changes in the world? Experience answers with an unqualified yes. Certainly there is a much greater change in silver when it unites with chlorine than when it is cut and stamped in the mint to become a ten-cent piece. Wood changes much more when it burns than when it is carved into a

<sup>2</sup> What makes a substance individual (so-called signate matter) is being omitted from the discussions in this book and is usually treated in psychology in connection with the problem of personality.

leg for a table. An atom changes much more when it is split than when it is heated. And the evidence is very obvious that an apple changes much more by being digested in man than by its variations of color in the autumnal sun. Clearly there is a difference among the various changes. In some of them, only accidental properties are modified, while in others the identity of the original entity is lost, and a new being can be recognized. A substantial change is a change of substance, and a substance is not the attribute of the being which is transformed but the very being itself. This is the best definition which the science of nature can give of substance, and its fuller elaboration has been adjourned until now because the philosophical physicist can only work it out from the changes that matter goes through.

The empiriological temper would not admit the existence of substantial changes, choosing rather to nail down all the motions in the cosmos in terms of quantity and local displacement. Parts are simply rearranged into new configurations. The universe becomes a game of Chinese checkers.

In Chapter 6, it will be seen that Aristotelian dualism is required and mechanism is refuted by the contemporary achievements of empiriological physics. It may simply be stated here that the changes in accidents which occur in growth, local motion, and alteration are not in the same class with generation and corruption. Substantial changes show not only variations from the outside working inward toward the interiority of the changing being but the reversal of this direction. An accident is directed from the outer to the inner structure of the being and of its motions, whereas substance is just the opposite. Accidents and substances thus cannot be reduced to the same principle, and if a change results in a new intrinsic principle of operation, a new nature, then the original substance has been substantially changed. Chemical changes in the living and the lifeless and nuclear transformations in nature and in the laboratory—all of these are substantial changes. The new substances have different principles of motion from the old ones. They are new beings.

#### SUBSTANTIAL CHANGES INVOLVE PRIME MATTER

The form and the matter of substantial changes are called substantial form and prime matter respectively; there are also accidental forms and second matter, which are involved in accidental changes.

The general discussion of the principles of motion will underwrite the conclusion that matter, as the subject, is the principle of potency, and form, the term of movement, is the principle of act. What makes prime matter different from second matter is that it is not only potency but pure potency.

Why do Aristotle, Aquinas, Augustine, Bonaventure, and nearly all of the later scholastics agree to the matter-form report of substantial change? First, because substantial changes occur; and secondly, nothing can come from nothing.

To account for the second truth, prime matter is required in its role as the first subject of change. If prime matter were not a reality abiding through the change and appearing in both the old and the new beings, substantial change would be a matter of annihilating the old substance and creating the new. But this sequence of annihilation and creation cannot be accepted. If it actually occurred in nature, it would be impossible to explain the dispositions which a substance possesses to be changed into *this* other determinate something rather than *that*. Oxygen and hydrogen have an affinity for each other, and zinc combines with sulfur, though not with gold. These dispositions and determinations, poised for action in one direction rather than another, would lack a sufficient reason and be self-contradictory if the ingredient substances of a new being had to be annihilated and the new substance created out of nothing.

Something in the original has an influx into the production of what is new. Otherwise, new substances would be only the successors of the old, not their effects. Hume's definition of causality as mere sequence would carry the day in philosophy, and the universe of modern mathematics would replace the changing phys-

ical world studied in the first order of abstraction. Peano, translating Hume into mathematics, attempted to elaborate a theory of number in which one number is related to the next lower one in terms of the unique relation "successor of." But if substantial change is not a case of annihilation and creation, then prime matter must be admitted as an abiding substrate.

Aristotle defined prime matter in two ways. In a positive sense, he called it "the primary substratum of each thing from which it comes to be without qualification, and which persists in the result." It is the first subject of change, and from it there results not a substance-accident union but the constitution of the substance itself which is then ready to receive qualification or accident. It is not an outside cause, separated from its effect; it persists in the effect, since it is that *out of which* the effect is made.

In a negative way, Aristotle described prime matter "as that which in itself is neither a particular thing nor of a certain quantity nor assigned to any other of the categories by which being is determined." It is not a particular thing since it has no actuality; it is not a quantity since quantity is an accident and can only inhere in a particular thing; it is not a category since a category is a determinate something and prime matter is indeterminate—determined by the form which is united with it.

Prime matter is an elusive reality to grasp since there is nothing like it that could act as its substitute in a full definition. Though every analogy limps, to suggest prime matter is to ask an analogy to limp rather far. The best way to exemplify its nature is to take an instance from the accidental order.

A handful of putty can be shaped into any number of geometrical figures. It can be rolled into a ball, it can be squared neatly into a cube, molded into a cylinder, an oblong, a model airplane, the figure of an animal. A hole can be worked into it until it resembles a doughnut, or it can be squeezed into irregular form to plug up a hole that worms have eaten into a tree. The same marble that Michelangelo used for his Moses might have

been used to sculpture any one of the billions of human beings, animals, and plants which, in various sizes and shapes, have appeared or will appear on this globe.

The putty and the marble may be likened, but likened only, to prime matter, and their various configurations to substantial form. Nothing could be more fatal to the matter-form account, however, than to lift these analogies from the window cases of example designed to lead the mind to abstract the substantial principles. Matter in the cases of the putty and of the marble is second matter (composed of prime matter and substantial form), and the form is an accidental one, far removed from the form that goes to make up a substance. Prime matter cannot be imagined; and like all potencies, it can only be understood from its actualization accomplished by form.

Prime matter must be pure potency in order to explain the difference of being which substantial changes produce, differences from the core out and not merely in the accidental order. Generation is the change from non-being to being, and corruption is the reverse. If prime matter were not pure potency, a substance would be an aggregate.

Prime matter is incorruptible; it subsists through all changes. Unable to exist by itself since of itself it bears no actuality, it is incomplete and indeterminate. But it is not simply nothing. Its reality is as a potency, pure potency,—potentially any material thing that is but none of them by itself. Prime matter is in the substantial order since it is a constituent of substantial being and is called its intrinsic cause like form. Like form also, it is an incomplete substance, and the two incomplete substances together compose the complete one.

Since prime matter is the fundamental changeless element in change, it can only have been created. None of the species of motion which the philosopher of matter explores can account for its origin. It is not a product of change but a principle. Substances are generated and corrupted; prime matter is not. This changeless

element cannot be produced from a preëxisting matrix since there is nothing more potential than pure potency, from which it could emerge.

#### SUBSTANTIAL CHANGES INVOLVE SUBSTANTIAL FORM

Form is the first act of the prime matter. In a substantial change like the fission of uranium into barium fragments, the change of iron and oxygen into rust, and the furious fuming and spitting when potassium is dropped into water to form potassium hydroxide—in all these the identity of the initial being is lost and a new identity emerges. The prime matter has lost its old form and gained a new one. In the examples from the accidental order, the putty and the marble could be cast into an indefinite number of shapes. One shape differs from another by a principle that is called its accidental form. In a parallel but only analogous fashion within the substantial order, one being differs from another by means of its substantial form.

Substantial form, according to the slant taken on the world in the physical order of abstraction, is the term of generation. It is defined by motion not by quantity. In metaphysics, form is considered as the principle of being which makes a thing what it is; there it is a broad synonym for essence or quiddity just as the philosophic science of nature often interchanges the words *nature* and *form*. In a secondary, indirect, and improper sense, the philosophical physicist may consider form not only as the term of generation but in the light of its origin since substantial change does not begin absolutely but from a matter here and now invested with a form that the change will overcome.

The primary meaning, however, is not as the origin of generation but as the term since the office of form is precisely to inform matter, terminating it so to speak. Matter is directed to form as to a final cause which will later be more clearly defined. Moreover, it is only as a term of generation that the philosopher of nature comes to a knowledge of form since both matter and form are recognized from substantial changes. It is in these senses and

for these reasons that matter is properly defined as the subject of generation and form as its term. Form is that which makes iron iron; it makes the elements and compounds what they are; the vegetative and animal souls are forms of their respective matters and the soul of man must likewise be considered as the form of a matter.

When a form is acquired in a substantial change, it is educed from the potency of the matter. Similarly, when a form is lost, it reverts to the potency of the matter to emerge anew whenever external conditions conspire to cause its reappearance. Such a stand may sound like an appeal to magic rather than to realism in the light of modern misconceptions of form. Yet it is only in such a view that the appearance of substantial novelty in our universe can be accounted for. To resume the analysis of the putty which must still be kept within the limping body of example, it may be asked where the spherical form existed while the plastic mass was actually shaped like a cube. Since a sphere can be rolled the next minute out of what is not spherical, the putty is capable of rotundity. The spherical shape comes from such capacities, and when in turn it disappears, the putty is still really and truly capable of being rolled anew into a ball. The same principle applies, divested of its accidental references, in the substantial order. Otherwise, the novelty involved by changes from being to non-being, and vice versa, is impossible.

Augustine held that forms were actually precontained in the matter in a kind of seminal existence (*rationes seminales*)—a hint, it has been said, of modern morphological evolution. Such a view where forms are actually present within the matter does not account for the substantial unity of the composite being, and it churns substance into an aggregate. A much shallower opinion of how novelty occurs in the world is found in contemporary scientism. There, cashing in on the Cartesian currency that all mutation is but local motion which is now called displacement, the opinion thrives that novelty results from the simple shifting of particles, those of atomic and subatomic dimensions and finally

pure quantities. Differences become a matter of differently related points, in a coordinate system of geometry, where the subject of motion is ultimately quantity alone. It is as though a woman could change the kind of her powder by simply shaking the box.

In a mobile universe principled by pure quantity and its displacement, nothing new could ever result, and hence no motion could occur and no mobility be detected. In this far-fetched cosmos, everything must remain what it is and do nothing but, in an extremely mysterious fashion, change its position. But novelty is not explained in being when only quantity and place are allowed to change. If a ton of coal is shoveled into a bin, it is still coal on arriving at its destiny and it would still be coal if a half ton were taken away. Local movement and quantity are not enough to account for any novelty if they and they alone exist. If newness occurs in experience, something that was present before has vanished and something new has been gained. In the homogeneous universe of mere quantity where only position changes, the same homogeneous something that is in the new position was there preceding the change by the very premise of homogeneity, and no change has really occurred. There must be something more than the displacement of the same by the same if novelty is real. Act and potency must be involved, form and matter. Something goes out of existence and something comes into it. Something goes from act to potency in corruption and from potency to act in generation.

No actual precontaining of the new can explain novelty nor explain why the old form has vanished. This is but another way of stating that the new form must emerge from pure potency since it is not actually precontained; it must return to pure potency when it gives way through another change. No references are being made here to the external agents which act upon substances from the outside and cause the substantial changes to occur. The whole question is here the intrinsic principling of motion in substantial changes, where the change is an inward

change, a change of being. The form of the new substance is said to be educed from the prime matter, and the old form returns to the bosom of matter's pure potencies. Lest education be taken as a verbalism to cloak a medieval ignorance, it simply states, as Aquinas remarks, that "something becomes actual that was previously potential." It is tempting to use the contemporary term *emergence* as a synonym for *eduction*, but the shadows of confusion have closed in around this word in the doctrines of "emergent evolution."

Form and matter must be immediately united, and on this point, the Thomistic position diverges from that of Suarez who envisioned the union as occurring through a medium. The medium wedged in between the matter and the form would have to be actual, if it differed from the matter, and hence would have a form of its own. But one form cannot be intrinsically united to another when both preserve their actuality, any more than a car becomes one with the street by being parked on it. The Suarezian union of actual forms, the one mediating, the other terminating the substantial composition, would be only accidental. The result would not display the intrinsic unity characterizing substances and changing when they change.

The problem of the plurality of forms was one of the big questions which beset the middle ages from the controversy between Abelard and William of Champeaux in the twelfth century to the full decadence of scholasticism at the time of Ockham. The issue was alive in Aquinas' day, and in meeting it, he departed sharply from the Franciscan scholastics like Bonaventure and Alexander of Hales and even from his own master, Albert the Great. Only when matter and form are immediately and intrinsically united do we have one substance. The doctrine of the plurality of forms would seek to argue that things like man, the maple tree, the elements, and the compounds are simply aggregates of many substances, like a tapestry which is an aggregate of threads. But substances show, each in its own way, an immediate and an intrinsic union, a unity of the parts. How this immediacy of union

is possible can only be explained by the fact that matter is pure potency, and any act that it owns must therefore be united to it immediately. Between pure potency and any act there is no middle ground that could mediate their intrinsic union.

Substantial form, like prime matter, is an incomplete substance; like matter, it is also an intrinsic cause of mobile being. It is neither generated nor corrupted since these changes occur only in the composite. Substances are generated and corrupted but not the principles of change.

Natures do not change; substances do.

Matter and form are concreated; neither can exist without the other (except in the case of man where the form, being spiritual, cannot be educed from a material potency nor return there when it can no longer exist in the matter).

But if form and matter must be created, how can any change of substance actually have occurred after the first instant of creation when a world burst into being? How explain all the subsequent motion which the facts of experience verify beyond doubt? Was this not the ultimate question that prompted Augustine to posit his "seminal reasons"?

The only possible explanation is the definition of motion in terms of potency and act. Forms are not generated or corrupted, but they are brought from a potential to an actual condition and vice versa. New forms were in the potencies of matter from the moment of its creation, and they are educed in time into an actual status.

This is one of the natural mysteries that the mind may continue to meditate but never exhaust. Potency and prime matter cannot be imagined or even directly known by intelligence. They can only be apprehended from act. A curtain will always be drawn over the direct view of them which would permit a glimpse of all that matter could achieve. By intelligence—never by our imagination—we know that prime matter is and we reach an indirect knowledge of its nature by way of negating what act is. Therefore, we in a sense overcome our own ignorance by accounting for its reasons.

Widely speaking, no form ever returns to pure potency, in the sense that the fact of its existence has altered the face of the actual and left its trail for all time upon the universe of existing things. Motion is not neutral; all of it makes a difference in the cosmos. Succeeding chapters will show that all motion is not so much a return to an origin as a development toward an end. In this respect, it is much more natural and rewarding not to look "backward" into matter but "forward" into form.

An emphatic note in connection with substantial change is its instantaneous character. In this respect, substantial motion differs from all others and is not properly motion at all. It is better called change (*mutatio*). Because a new being comes into existence, it cannot be evolved from its privation in gradual steps, any more than being can come from nothing on a graduated scale. Substantial change involves an abruptness that other motions do not require. In originating substantial changes, alteration and local motion are always necessary, as will be later seen, but they are more in the manner of dispositive influences. They are continuous processes, shortening but never bridging the gap between the old substance and the new. For the rupture is there. The new substance is not divided from the old by a scale of more or less but by a change of inner principle. This is another indication that matter must be pure potency since any act united with it would make all changes affairs of addition and subtraction, never permitting that change of inner being which substantial transformations exhibit.

Finally, the form of a substantial thing is present wholly in the whole and wholly in every part of it. The whole of an iron atom is iron, and every part of it is iron. The so-called virtual presence of elements in compounds and of subatomic particles in atoms will be discussed in Chapter 6.

#### SUBSTANTIAL CHANGES PROVE MATTER-FORM DUALISM

The proper and convincing argument for the matter-form dualism is substantial change. Such changes occur, and nothing can come from nothing. These are the twin principles on which the

proof depends. There are, however, some confirmatory evidences that, if they lack pointedness, may nevertheless carry a certain expository appeal:

1. Material substances reflect unity and multiplicity. There must hence be principles of unity and multiplicity within them. The first corresponds to form, the second to matter. Wood, for instance, has a certain extension, an extraposition of its cellulose molecules in space. Yet all of the wood is wood. An atom of helium has quantity, but it is all helium.
2. Material substances display both passivity and activity, and there must be a corresponding principle for each. Passivity is ascribed to matter and activity to form. Water has a certain reality from within which makes it what it is; yet it is also passive, capable of being drunk, evaporated, frozen, decomposed, combined with carbon to form organic compounds.
3. Time and space are often differentiated. Time reflects the dynamism of things and space the drag that resists change. Time, runs this argument, has the flavor of form and space of matter.
4. There is a determination (form) and an indetermination (matter) in everything. A material thing is something, but it is always struggling to be something else.
5. There is a principle of limit (matter) and of limitlessness (form) in corporeal reality. Man is fully man in individuals, but individuals are multiplied so that any one individual does not possess the full perfection of the species.

Such arguments are exceedingly suggestive in their own way, but the way does not lead necessarily to matter-form dualism. The arguments show, to use a Whiteheadian term, that matter is bifurcated. But they are not of themselves sufficient to rank with substantial change in proving the dualism of matter and form. This doctrine is drawn from motion, not from essence or quantity or even being as the metaphysician studies it. The metaphysician uses arguments similar to all of the five listed to introduce his doctrines of potency and act, of essence and existence, of substance and accident. Unless the arguments are based on the

pivotal issue of substantial change, they do not localize substance which, from the standpoint of the philosophical science of nature, can be established only by motions.

Thus, in the arguments above, unity and multiplicity, time and space, passivity and activity, determination and indetermination, limit and what is limited—all show the bifurcation of matter, but by themselves, they do not report whether atoms or molecules are substances or whether these might not be just the mechanical aggregates of fundamental particles inhabiting a sub-atomic world. The problem of the continuum (1) involves in the proper sense more the divisibility in quantity than motions in substances. All such arguments are, in a realistic view, simply aspects of the basic argument when they are convincing, and though often used, it is in the larger context of motion that they should be taken.

#### ATOMISM AND MECHANISM ARE INERTIALISMS

The dualism of matter and form, to put it mildly, is not generally accepted. In its stead, modern philosophy has tended to waver between mechanism (atomism) on the one hand and dynamism on the other, attempting by such principles to deal with the problem of change.

Mechanism and atomism are ancient doctrines, dating back to pre-Aristotelian philosophies like the views of Anaxagoras, Anaxamander, and Empedocles, and ripening into classic form with atomists like Democritus and Epicurus. Democritus, for instance, held that everything is made up of tiny individuals called atoms, differing among themselves in shape and size and forming our qualitative universe by chance differences of order and position. In mechanism, atomistic or otherwise, a thing is viewed as a machine without intrinsic unity and with all its principles, art-like, outside it.

Descartes' mechanism takes its rise from his definition of body in terms of extension and of all corporeal change in terms of local movement. Prompted by Descartes, Gassendi revived atomism as a philosophy, and the atomic theory, though developed inde-

pendently of earlier philosophical atomism, carried off such great stakes in chemistry that atomism as a philosophy seemed to win strong academic support. Clerk Maxwell, Helmholtz, and Du Bois-Reymond, empiriological scholars of the first magnitude, were among the leading advocates of mechanism in the nineteenth century.

At the turn of the present century, Max Planck originated the quantum theory which eventually showed that not only matter but energy as well could be studied as a phenomenon of particles, which he called quanta. Atomism was migrating from chemistry to empiriological physics. In the twentieth century, the study of matter by breaking it up has reached such a kindling point that the atom itself was finally split in laboratories and even over cities, and today's empiriological signposts lend credence to the belief that the subatomic particles are being experimentally divided.

All of the successes of this atomism in both chemistry and empiriological physics might seem to sanction the mechanical view of reality which the empiriologist, by adhering rigidly to measurement, is compelled to adopt. Quantum physics is puzzling in this respect because it has concluded that exact measurements of individual particles are hopelessly out of range and that the only reliable account of nature can be given in terms of aggregates, where individuals are grouped in a statistical whole. But quantum mechanics still amounts to an atomism by regarding wholes in partitive terms. All processes are referred to smaller ones. What happens in the visible world is only a forest of microscopic trees, and the microscopic in turn is explainable in terms of the sub-microscopic, making matter into a labyrinth where the paths become narrower for man to tread but never run out. The claim of quantum mechanics to dispense with mechanism because of the rank it assigns to wholes cannot be made good for another reason. Like the rest of empiriological physics, it is still mechanistic in viewing whatever is and whatever moves as entirely the result of outside forces. As empiriological in temper, it cannot proceed otherwise.

The hylosystemists incline to shrink philosophical physics to fit the empiriological world picture, and in this respect hylosystemism is but a philosophical mechanism dressed in scholastic terminology. This view maintains that empiriological physics studies corporeal substance and descends to the fundamental constitution of bodies. It forgets the difference between the methods of the empiriological and philosophical attacks on the universe, and it overlooks almost wholly that the philosophy of nature is not primarily concerned with body and its constitution but with motion and its principles.

Hylosystemists want philosophy to pitch its camp on empiriological terrain, without remembering the prescientific experience (contrasted with experiment) that is the beginning of all knowledge and that gives the philosopher a positive and critical prestige with respect to the empiriological physicist. If experience is banned as a source of knowledge, even metaphysics must become either a continuation of empiriological disciplines or an *a priori* dogma like that of Kant or Plato. Hylosystemic mechanism thrives on the confusion between the philosophy of quantity and the philosophy of nature, and like the grosser mechanisms it eventually supplants the view that matter is nature with the dogma that matter is art.

#### DYNAMISM REDUCES MATTER TO THE IMMATERIAL

Dynamism differs from atomism by tending to reduce the material to the immaterial. Its final report declares that the universe is made of points, the inextended, motion, energy, field. Heraclitus was the greatest of the ancient dynamists, and his thoughts are countersigned, in many respects, by the twentieth-century systems of Bergson and of Edouard Le Roy.

Leibniz, reacting to Cartesianism, distilled out a doctrine known as monadology in which the cosmos is resolved into inextended substances called monads, each of which is different from every other and all of which are close to living. Boscovich held that matter is composed of indivisible points, and Kant took a similar view. Hegel was a thoroughgoing dynamist by his view



that the universe is but an idea in pure motion. His philosophy is usurped by Marx and Lenin, who viewed matter as possessed of its own contradictions and hence capable of accounting for its own motion, like an explosive mixture in a cosmic carburetor.

Herbert Spencer, by his doctrine of evolutionism; Samuel Alexander, by his view of all things as the radical motion in a space-time matrix; Santayana, impressed only by the fertility of things and describing matter only in terms of its forward tensions; Whitehead, for whom all reality is formed of monadic units called "actual entities" and the world is shot through and through by a "creative advance into novelty"; emergent evolutionists, like Jan Smuts and Lloyd Morgan who view matter as essentially spontaneous or emergent—all of these men are dynamists. For whatever is of interest to the philosophical physics, Dewey and his naturalistic school are likewise dynamists, presenting the universe as a continuum of ongoing tensions where life is ever "perilous" and "precarious."

Ostwald in the last century is the classic example of the view that all is energy, a statement that Einstein was to solemnize in his theory of relativity a half century later. In this respect, relativity physics diverges from quantum physics, and one of the major empiriological struggles of the age is to seek which of these two systems is fundamental or to try to transcend them both. The space-time *continuum*, even in its expression, reflects its variance with the quantum system where the leading idea is the discrete energy packet. Whitehead acknowledges his debt to Einstein's theory, and Alexander, though apparently independent of both thinkers, has constructed a system strikingly like that of the relativity continuum of space-time.

#### MECHANISM AND DYNAMISM ARE INADEQUATE

Mechanism and dynamism have the general common denominator that they deny substantial changes, either reducing them to local motion or calling them an illusion of mind. Experience refutes both for that reason. Dynamism, in general, has caught a

glimpse of the truth that motion involves the novel, but it cannot account for the persistency factor in change. Mechanism in general sees the abiding ingredient of change, but it cannot explain the production of the new. As a result, neither accounts for motion. Change becomes a shifting of position; in some cases as in that of Leibniz not a reality at all but only an appearance; in other cases as in those of Hegel and Marx the union not of contrary principles but of contradictory ones; sometimes the sheer burst, with no reason, of a material spontaneity called "emergence" or "creative advance"; in still other cases as in that of Einstein an affair of relation or relativity. However subtly they may be defended, these views fall by their own weight either because they are extremisms as philosophies or because they are the children of empiriological method that cannot survive outside it.

It should be noted that there is no unanimity of opinion among modern thinkers on the things that count most, the ultimate reality on which their thinking bears. Mechanism and dynamism are in polar contrast. Chapter 6 will put forth evidence to show that such fluctuations should not be a scandal in empiriological physics but are a fate, natural and normal to the method it employs. The real scandal of our times is to inflate empiriological physics into a philosophical science.

Error is more than often a truth gone madly to extremes, and this is the case with mechanism and dynamism in philosophy. Mechanism emphasizes the inertial aspect of things and dynamism, matter's activity. It is a kind of vindication of the matter-form dualism that it keeps its feet on the firm ground of experience and can hold in each hand all of the truths which dynamism and mechanism propose while avoiding their unfortunate extremes.

A material substance is bifurcated. The same material substance is both active and passive, dynamic and inert. Form points up the truth which dynamism has detected, while the reality of prime matter can account for the successes of atomism. Modern philosophy is at the same impasse as Greek thought before Aris-

totle's time which faced the dilemma of Parmenides and Heraclitus. Aristotle did not compromise, patching up a soft mechanical union between his opponents. He dug deeper into things than either of them and found principles of potency and of act that could unite both. In a kindred dilemma on the modern scene, the answer to the conflict of atomism and dynamism will only be found by probing deeper than sensism and scientism are capable of searching. Beneath the senses and beyond scientism lies the genuine dualistic answer of a genuine realistic philosophy.

*Suggested Readings*

Aristotle, *Physics*, Bks. I, II.

Aristotle, *Metaphysics*, Bks. VII, VIII.