The Classical Mind

A History of Western Philosophy

SECOND EDITION
might expect) that Aristotle's early thought was very much influenced by Plato. Not only are the dialogues stylistically Platonic, but the views expressed in them—the account of the soul in the *Eudemus*, for instance—are characteristically Platonic and are at variance with the theories subsequently developed by Aristotle. It is important to emphasize this Platonic period in Aristotle's development because some writers have seen him as the opponent of Platonism. But though Aristotle rejected the apartness of the forms, he was fundamentally and acknowledgedly a Platonist, and his work can be understood only as an effort to reformulate the insights of Plato. His primary interest, like Plato's, was to reaffirm the existence of a public and knowable reality and to answer the question, "What is the good life for man?" Like Plato again, he found that answer, not in radically new doctrines, but in a reinterpretation and reformulation of the traditional beliefs of the Greeks. He and Plato together gave these beliefs a new vitality by grounding them in a comprehensive metaphysics—by showing that the traditional ethical and political values were rooted in the nature and structure of the universe as they conceived of it.

How, except on the basis of the closest sympathy, could Aristotle's long association with the Academy be explained? As a matter of fact he departed only after Plato's death (347 B.C.), when Plato's own tendency to emphasize mathematics and mathematical knowledge was carried to an extreme by his successor as head of the institution. After leaving the Academy, Aristotle spent some years in travel, then in 343 or 342 B.C. he became tutor to the young Alexander, son of King Philip of Macedonia.

It is not easy to assess the influence Alexander and Aristotle—two of the greatest geniuses the Western world has produced—exercised on each other. In any event, their connection lasted no more than two or three years. Whether or not in conscious reaction to Aristotle, Alexander eventually developed a policy that certainly ran counter to Aristotle's views. Aristotle, for instance, held that the largest organization in which political values could be realized is the city-state; Alexander founded a world empire in which the old city-state civilization was drowned. Again, Aristotle, believing in the native superiority of Greeks over barbarians, would have opposed Alexander's attempt to base his empire on a racial merging of Westerners and Orientals.

Nevertheless, Alexander seems not to have forgotten his old teacher. There is a pleasant story, which may have a basis in fact, that his armies were instructed to collect and ship back to Aristotle any rare flora and fauna they discovered in their expeditions into the remote corners of the world.

By 335 B.C. Aristotle was back in Athens, where he set up his own school, the Lyceum. It was during his years there, presumably, that he composed most of his extant works. As we know them today these are treatises on separate subjects—logic, physics, biology, ethics, meteorology, and so on. They are often repetitious, sometimes break off abruptly, and seem to have been hastily put together from previously existing materials. Perhaps the most reasonable explanation for this is that each of the various treatises consists of notes written by
Aristotle for his lectures. These notes, sometimes sketchy, sometimes worked out carefully, were presumably collected, for the most part after Aristotle's death. As a result, all his writings on a given subject—say, political science—extending across a long period of years, in the course of which his views naturally underwent development, were lumped together in a single treatise, in this case labeled *Politics*.

For twelve years—until Alexander's death in 323 B.C.—Aristotle directed the course of studies at the Lyceum. Alexander's death, however, released a strong tide of anti-Macedonian feeling, pent up during the period of Macedonian hegemony in Greece. Aristotle thereupon withdrew from Athens to the protection of a nearby Macedonian garrison. There he died the next year, not having purchased much time by his discretion.¹

Aristotle's will has been preserved; it reveals an attractive nature, full of careful thought for his family, affection for his friends, generosity to his slaves, and a touching sentiment for his long-dead wife, beside whom he asked to be buried.

**Aristotle's Aim**

Aristotle's aim was identical with that of Plato and with that of all their philosophical predecessors. He wanted to discover what is real. Thales and the other Milesians, and later the Atomists, had undertaken to find this in the material universe. Matter—variously defined as “water,” “air,” “boundless,” “seeds,” “atoms”—had been asserted by the thinkers of this school to be the only real. But in the course of the century or so after Thales, the failure of this materialistic answer had been demonstrated. The materialists were unable to give an adequate account of the nature of man as a moral and religious creature. Value is not material, and in the exclusively material world of these thinkers there was, therefore, no place for value.

Plato had sought to locate reality in an immaterial world of forms. But like the materialists' answer, this was too exclusive; like their answer, it was oversimplified, though in an exactly opposite direction. Because he had affirmed that the forms are apart from things, Plato had been unable to relate values to the world of sense perception.

From Aristotle's point of view, this, too, was inadequate. He wanted to establish a theory of reality that would allow both values and sense objects to be real. Moreover, he saw that a satisfactory account of reality must resolve the problem of change. This problem has been with us from the start, for though change is one of the most obvious facts of experience, it is also seemingly irrational. Every philosopher from Thales' day on had wrestled with this problem in vain. The best the Atomists could do was to reduce all qualitative change to motion, that is, change of place. As for Plato, originally he had virtually denied the fact of change, affirming with Parmenides that the real and the knowable must be unchangeable. Subsequently he had relaxed this position and allowed a motion that was supposedly initiated by psyche. But neither his procedure nor that of the Atomists was satisfactory, and as long as the problem of change defied the best efforts of human reason, a doubt existed about the power of reason.

Any adequate metaphysics, Aristotle saw, must show that reality really changes, as it appears to do, and thus rehabilitate reason as a valid instrument for obtaining knowledge. Further, it must vindicate our intuition of man as a moral creature, a focus of values. This was the great dual undertaking to which Aristotle set himself.

**The Nature of Reality**

Before Aristotle's conception of reality is examined, some preliminaries must be dealt with. First there is a matter of terminology. We shall find Aristotle using Platonic-sounding expressions—for instance, the term “form.” This can properly be taken as a sign of Aristotle's Platonic inheritance, but we must not suppose that identical words have identical meanings for different writers. Plato tended to equate form with reality; Aristotle denied that form is coextensive with the real. Let us begin our discussion of Aristotle's philosophy by comparing his notion of form with Plato's. This will lead us naturally to his conception of reality, which, as we shall see, was designed to solve the problem of change and the other questions on which the Platonic theory of forms had broken. Then we can turn from metaphysics and theory of knowledge to the special sciences—physics, ethics, politics. Throughout the whole discussion it will be interesting to see how the modifications Aristotle made in Plato's theory of forms in order to solve the problem of change are reflected in corresponding changes and shifts of emphasis in Aristotle's treatment of the special sciences.

The root of all the differences between Plato and Aristotle, one may be tempted to say, lies in Aristotle's struggle to correct Plato's theory of knowledge. This is true, but it is only a part of the truth. Aristotle's reformulation of the theory of forms was the result, in part, of a purely intellectual struggle to solve the epistemological problem; but it was also rooted in a temperamental difference. Like the Gilbert and Sullivan Englishman who is born either a Liberal or a Conservative, it has been remarked that everyone is born either a Platonic

¹ It is reported that Aristotle explained his departure by saying he did not want “the Athenians to sin twice against philosophy.” He felt his exile keenly but adopted a philosophical attitude toward the insults heaped upon him by his enemies during his absence. He wrote to his friend Antipater, Alexander's recent in Greece: “Almost the only thing that I was left with was the consolation that I am not sorry but not extremely sorry”—quotation in W. Jaeger, Aristotle (Charnwood Press, Oxford, 1934), p. 330, n. 2.
an Aristotelian. Plato and Aristotle, that is, represent two different attitudes toward the world. Plato was a perfectionist whose inclination, even in discussing problems of practical politics, was always toward a utopian solution that was practical precisely because the perfect is never realized in this world. Where Plato was otherworldly and idealistic, Aristotle was practical and empirical.

Plato's bias toward mathematics was symptomatic of his general point of view; mathematical intuition is not found in this world. It is an ideal object transcending the imperfections of physical triangles. For Aristotle, in contrast, biology is the leading and, as it were, model science. Just as it is natural in discussing Plato's views to draw examples from the field of mathematics, so it is natural any discussion of Aristotle's views to take examples from biology. In mathematics we are dealing with perfect but lifeless entities; in biology, with imperfect living ones. This difference corresponds exactly to the difference between Plato's and Aristotle's conceptions of the forms and (still more fundamentally) the difference between their basic emotional and temperamental preferences. Politics, for instance, Plato thought constantly in terms of an absolutely ideal state and shrugged off the question of whether such a state is "possible" with a characteristically perfectionist reply: "It is laid up as a pattern in heaven...it whether such a city exists or will exist in fact, is no matter..." Aristotle, on the other hand, began his study of politics by a careful survey of one of one hundred actual states. What sort of state would be best under such actual conditions? What kind of constitution should a small state have? What sort of a wealthy state have? These questions, rather than speculations about the nature of the absolutely ideal state, are the ones that interested Aristotle.

Whether one prefers Plato's philosophy or Aristotle's depends in large measure on one's own basic temperamental bias. To some, Plato may seem too visionary and impractical; these people will probably prefer Aristotle as a cool, well-headed realist. Those who are moved by Plato's "lofty idealism" will probably feel that Aristotle by comparison is pedestrian and uninspiring. To the present author it seems reasonable to say (at the risk of revealing his own temperamental bias) that Aristotle's position is sounder than Plato's. He shared Plato's notion of the real, the actual, the ideal, the ideal everywhere, but he did not have the same effect on Plato that Plato had on Aristotle. He believed, for instance, that the real is from one actual to another. Aristotle, unlike Plato, believed the higher is eventually, somewhere, a here and now, the real through and through one world; all ideals are somewhere embodied and all embodiments are in some respect ideals achieved. To put this another way, it might be said that Aristotle was more a Platonist than Plato was an Aristotelian.

ARISTOTLE'S REVISION OF PLATO'S FORMS

How then—given these differences in Aristotle's temperament as well as the greater emphasis he put on change—did Aristotle's theory of forms differ from Plato's? Plato thought of the forms as separate entities in which the individual particulars of this world obscurely participate; Aristotle held them to be embedded in the particulars. It has already been argued that Plato's tendency to hypostatize the forms, that is, to treat them as independently existing things, had serious consequences in every department of his thought. If what we know is form and if form is separate from the space-time world, it follows that we cannot know the space-time world. If only form is truly real and form is separate from the things we experience in sense perception, those things are not truly real. Further—as it seemed to Aristotle—separation leads to otherworldliness, to a chasm between the actual and the ideal. It means that discussion of what is can never amount to more than a "likely story," and knowledge of what ought to be has little or no relevance to pressing moral, political, and social problems.

Hence Aristotle was led to deny Plato's dualism, to reject his separation of the universe into two worlds. For Aristotle, there was but one world, the world of actual things. Form is simply one aspect of this world, distinguishable in thought (as we may in thought distinguish color and shape) but not distinguished in fact (we never find shapes that are uncolored or colors that have no shape).

According to Aristotle, taking the forms as separate entities results from confusing intellectual analysis and ontological status. It is as if, because we can think of color abstracted ("separated") from shape, we were to suppose there exists somewhere, in absolute purity and perfection, color by itself.

What then is reality in Aristotle's view? Not Plato's forms, for they are, according to Aristotle, mere abstractions—not illusions, of course, but certainly not the whole of reality. Reality for Aristotle consists of that from which the forms are abstractions, and this is individual things—particular men, plants, rocks, and animals—Socrates, Plato, Dobbins, Bucephalus. These particulars Aristotle called "substances," and his analysis of reality was in terms of individual substances. But what is an individual substance?

Every particular thing, taken as it is at any given time, has two aspects. In the first place, it has properties it shares with other particulars. Socrates has properties it shares with Plato (for that matter also with Dobbins and Bucephalus); Dobbins has properties it shares with Bucephalus. We may call this aspect of an individual substance its "whatness," because these are the properties we normally think of when we are asked what the substance is. In reply to the question, "What is Socrates?" we say that he is a man, a rational animal, a living thing, and so on, until we have enumerated all the properties that Socrates shares with other things and that define his whatness. It is clear that we can know any object only insofar as it has such common properties. About an absolutely unique object, which had no properties in common with other objects, it would be impossible to communicate. About it we could not answer the question, "What is it?"

But enumerating the common properties of a thing never gets at the thing's individuality—at that about it which makes it this horse or this man. For the common properties are common; they are characteristics this object shares, or
might share, with other objects. Enumerate as many properties of Socrates as you like: his pig nose, his shambling gait, his midwife mother, his conviction by the Athenian court, his death by hemlock, and so on. Each of these is a property that other individuals have had. So, too, the totality of them might theoretically describe another individual. Hence we may say that Socrates (and every other individual substance) has a "thinness" as well as a whiteness. Every individual is a member of a class, but it is also this particular member of its class.

FORM AND MATTER

The terms Aristotle used in making this distinction between whiteness and thinness are "form" and "matter." In the most elementary sense, matter is the physical "stuff" out of which something is made; form is the physical shape that the thing has. For instance, a brick is made of clay—that is, its matter, it has a characteristic shape—that is, its form. Normally we would not talk about a lump of clay as being a "thing," but we do not hesitate to call a brick, made of that clay, a thing. We hesitate to call the lump of clay a thing because it does not seem to us to have a characteristic shape; on the contrary, it is "just a lump." The brick, however, is a thing precisely because it does have a specific shape. This illustrates Aristotle's point that a thing (an individual substance) is formed matter (or, in the case of the brick, "shaped" matter).

But shape and stuff are only very rudimentary instances of form and matter. In something as simple as a brick, form (whatness) may be virtually exhausted by physical form, or shape. But Socrates' shape is obviously a very minor aspect of his whatness. The difference between a form like "brick" and a form like "man" can be seen if we consider the way we answer when someone points to a certain object and asks, "What is this?" If the object pointed to happens to be a piece of baked clay of an oblong, rectangular shape, the correct answer to the question is, "This is a brick." Why? Because the questioner is inquiring about the "whatness" of the object pointed to. "What" of the question asks the name of the class to which the object belongs, and this is determined by the property (oblong, rectangular shape) that this object shares with numerous other objects. But the "this" of the question (as indicated by pointing) refers to this particular bit of clay. Shape of such-and-such a character is something this brick shares with many others; what distinguishes it from all those other bricks is its being made of this particular bit of clay.

But suppose the object pointed to happens to be a certain pig-nosed, shambling-gaited, Athenian son of a midwife. In this case we might answer the question, "What is this?" in all sorts of ways. "This is a pig-nosed man," "This is an Athenian citizen," "This is the son of a midwife," "This is a philosopher," "This is the teacher of Plato," "This is Socrates"—all are possible answers. Hence we may reply with another question: "What do you mean, 'what is that'?" This is a request for a specification of the "whatness" of the object pointed to, and it reflects our awareness of the richness and complexity of that object's whatness (that is, its form).

Now consider the brick again: It has a characteristic shape, and it has been said that this is its form. But why does it have this shape? Because, since it is used as an element in constructing walls, it is handy for it to be a unit with flat sides on which other units can be firmly placed. The brick has the shape that it has because of the use to which it is put.

Speaking generally, each thing has the form that it has because of the purpose, or function, that it serves. The form of a knife differs from the form of a spoon because the former is used for cutting and the latter for ladling. The form of a private house differs from the form of an office building because its function is different. In these examples it should be noted that we have passed from the simple notion of form as merely the physical shape of an object to the notion of form as the overall plan of an object. In a word, function determines form in the sense of giving an object the characteristic structure that it has. To say this is to say that a thing's function gives it unity, makes it the sort of whole it is. Indeed, it is a whole, instead of being merely a collection of discrete elements, only because the elements are organized into a specific arrangement that serves some purpose. This is easier to see in the case of man-made objects than in the case of natural objects, in which no conscious purpose is at work. But it is not too far-fetched in the case of an organism. What is the form of the hand or other organ? Not, certainly, merely its shape, but the arrangement of parts that enables it to do certain things. The uses to which the body (or the hand) can be put give unity to the body, just as physical shape (which in its turn gives unity to the undifferentiated mass of clay) makes the brick one particular thing. This obviously expands the notion of form.

A similar expansion occurs in the concept of matter. If form comes to mean the purpose, or use, anything serves, matter comes to mean the possibility of serving a purpose, the possibility of being of use. Matter is simply that aspect of a thing that opens opportunities for further development. For instance, it has been noted that clay is the matter of the brick. It is the brick's matter both in the literal sense that it is the material out of which the brick is made and (as we now see) in the more extended sense that it is the opportunity, given this form, for there to be bricks. Similarly, the bricks are the matter of a wall, that is, the existence of bricks creates the possibility of there being walls.

Thus every particular thing is, as it were, on a mountain path looking two ways: downward toward something (for example, clay) in comparison with which it is an end—a more articulated structure, and upward toward something (for example, a wall) for whose further articulation it is the necessary condition. The world presents itself, then, not as a collection of utterly separate and discrete things, but as an ordered hierarchy of individuals related to one another in such a way that each individual is at the same time the fulfillment of the purpose inherent in some other individual and the basis for a further development beyond itself.
To summarize, every individual thing has two aspects, matter and form, and her without the other is an abstraction and unreal. Every individual thing has properties that make it what it is, properties that it shares with other things (universality); every individual thing is just this particular thing and not another thing (thinness).

So far we have been considering an individual substance at any particular given time. But substances develop through time (that is, they grow), and in order to think effectively of a substance as it endures, yet changes, we must reinterpret matter and form as potentiality and actuality. Any given particular growing thing (an acorn), thought of as existing at some particular moment, can be analyzed in the way that has been described into material and formal elements. The formal elements are those if there is interaction with other acorns; the material elements are those for example, occupancy of this particular bit of space) that makes it this acorn. But an acorn grows to be an oak tree. In this sense, the oak is the form of the acorn. It is the purpose, as it were, that the acorn serves (just as the wall is the purpose that the bricks serve). It is that which, by giving unity and direction to the acorn’s development, makes what we call growth, a process. Similarly, just as the bricks are the basis for the possibility of a wall, so the acorn is the potentiality of there being an oak tree, and the oak tree is the actuality of this potentiality. The acorn is the basis that makes an oak tree possible; the oak is the purpose, or end, toward which the acorn grows.

It has already been said that Aristotle conceived of the universe as a hierarchy of individuals related to each other as matter to form. It must now be added that he conceived each of these individuals to be itself a life in which these relations are repeated. Each individual is a process of development in which what is not yet becomes completely itself. What we call life (or growth, or development) is a coming-to-be. A form, at the outset existing only potentially, operates upon matter, shaping and molding it as a sculptor models his clay, and eventually becomes its fully articulated self, just as the esthetic form is finally realized under the sculptor’s hands. The sculptor’s purpose is outside the clay, in his mind; moreover, this purpose is at least partially conscious. In a natural object the purpose is the form working unconsciously to shape the inert matter. Form can therefore be conceived of as a kind of driving force working its way to fulfillment. “Entelechy” is the term Aristotle used to describe this property of form, and what we call “growth” is nothing but the visible result of form at work.

CHANGE

This brings us to the problem of change. Change, it will be recalled, is a puzzle because it seems to involve a contradiction. If we say that A changes to B, we seem to be saying that A is both itself and not itself. It must be A, for we say, “A changes”; it cannot be A, because we say it is B. If water is water, it is not ice; if it is ice, it is not water. None of Aristotle’s predecessors, including Plato, had wrestled with this paradox successfully. Plato had had to confess that according to his theory, though change “participates” in some mysterious way in the unchanging forms, it is only appearance.

Aristotle’s analysis of reality in terms of form and matter made it possible for the first time to come to grips with change. The individual A turns out on analysis to be a complex; it is a substance, a formed matter. During its change into B some part of A endures unchanged and some part of A alters. What endures is A’s matter; what changes is its form. Consider a piece of clay being worked on by a sculptor. Throughout his successive manipulations the clay endures; what changes are the forms (that is, the shapes) through which the sculptor advances to the final, esthetically satisfactory object that is the goal of his activity.

We may generalize by saying that in any change from A to B one identical material factor loses one form, A, and acquires another, B. In the simplest case (for example, when dough is cut into stars, circles, and squares for baking) one form (shape) is lost and another acquired without any internal transformation of the matter. Here matter equals physical material, form equals physical shape, and change is simply the substitution of one physical shape for another. In more complicated kinds of changes the principle is the same. When the acorn becomes (changes into) the oak tree, more is involved than a substitution of one physical shape for another. To begin with, a whole succession of physical shapes replace one another according to a well-defined scheme. But in addition there is an articulation of structure, in which each successive stage appears as the actualization of the form that was potentially present in an earlier stage and becomes in turn the matter of a later stage. In spite of these complexities, the analysis is identical. The change that we speak of loosely as acorn-becoming-oak is a succession of smaller changes, in each of which matter loses and gains form. Instead of the simple alteration of form (physical shape) that occurs when a cooky-cutter is used to shape dough, a succession of immensely complicated forms (including physical shape) follow one another in a systematic way. Indeed, we can now draw a distinction between “change” and “development.” Development, or growth, is change in which a succession of steps follow a pattern toward an end.

This concept of a thing as formed matter also resolves the old puzzle over the one and the many. In the successive changes by which an acorn gets to be an oak we certainly have a “many,” a plurality. But we feel this many to be also one; otherwise we would not say the acorn becomes an oak. What is the one that we feel to be uniting this diversity? Surely it is the fact of development, of movement toward an end. What unites all the various stages is simply that they are stages. The purpose (whatever it is) unifies all the steps that are the means to its fulfillment.
ARISTOTLE'S FOUR CAUSES

From this it follows that one of the ways of understanding anything is to relate it to the subsequent stages in the series of which it is a member. In a game of chess, for instance, a move made by an expert may seem incomprehensible to a tyro, but the move that appears irrelevant at the time it is made turns out to be only too comprehensible when it leads to a mate. The move is a means to an end—winning the game. Understanding the end, therefore, throws light on the means. Since the thing's end is its form, Aristotle could say with Plato that the form of anything throws light on its nature. Plato understood this to mean that knowledge of the transcendent form illumines the changing, unreal particular; Aristotle understood it to mean simply that knowing the purpose, or function, of a thing in the total economy of nature is indispensable to understanding that thing.

But a thing's function, or purpose, is only one part of its nature. Although the function (which Aristotle called the "final cause") is in his view the prime concern of the scientist, an adequate scientific understanding of anything must include an account of three other aspects, which he called the "material cause," the "formal cause," and the "efficient cause." Thus, besides knowing the purpose of a piece of sculpture (to decorate a building, to win fame or money for the artist, or whatever), we must know what material (wood, bronze, marble) it is made of. For, since a sculptor cannot achieve identical effects with all materials, we cannot fully know the piece unless we know its material. Third, we must identify the esthetic form of the particular sculpture (a human figure, a centaur, a Pallas Athene, or whatever), for knowledge of this, too, throws light on the nature of the work. Finally, we must know the efficient cause of the sculpture, the sculptor who fashioned it.

These four factors are usually referred to as the "four Aristotelian causes," but only one of them, the efficient cause, would be called a cause today. This linguistic difference points up sharply the contrast between Aristotle's conception of scientific knowledge and our own. Aristotle believed that in order to understand any individual thing we must know four aspects of it, each of which operates to determine its nature. We must know (1) the material of which it is composed (the material cause); (2) the motion or action that began it (the efficient cause); (3) the function or purpose for which it exists (the final cause); and (4) the form it actualizes and by which it fulfills its purpose (the formal cause).

3 Ignorance of this factor is often a problem for the archeologist. We discover a fragment of a marble head. Was its purpose portrait or religious ceremonial? Was it an architectural embellishment or a free-standing figure? If we knew the answers to these questions, we might be able to date the figure or to identify the artist.

4 The archeologist is also handicapped if he is unable to tell from the fragment what the full esthetic form is. Is this the head of a man? a woman? a centaur? As long as he is ignorant of this he lacks full knowledge of the piece.

The fourfold analysis works pretty well with regard to man-made objects, like houses or pieces of sculpture. Here there is an efficient cause, or agent, outside the object; here, because there is a conscious purpose, form and end are relatively distinct. But the analysis becomes very strained when it is extended to natural objects and events—for instance, growing plants and falling rocks. What are the final causes of a rock's fall or of a plant's growth? We have either to admit that there are none or to invent them—we say that the rock falls because it is seeking the center of the earth, that the plant grows because it is seeking the upper air. On the other hand, we can certainly specify the material of the plant and the rock. We can also specify the form, or pattern, of the plant's growth (for example, its direction and rate) and of the rock's fall. But what are the efficient causes of growth and of fall? It may be tempting to say that life is the cause of the growth of plants and that gravity is the cause of the fall of rocks, for this would preserve the Aristotelian scheme. But life is not (though Aristotle constantly wrote as if it were) a kind of power, or entelechy, in living things; gravity is not an external agent that causes rocks to fall, as the sculptor is an external agent that causes stone to acquire such-and-such a shape. On the contrary, a body behaves in a certain way we say that it is alive; when it accelerates at such-and-such a rate we say that it is gravitating. Thus "life" and "gravity" do not designate causes of behavior, they are terms designating two different patterns of behavior, that is, they are formal, not efficient, causes. We can indeed, if we like, say that an earlier stage in the patterned sequence of events is the cause of a later stage, but then the efficient cause is simply one aspect, or phase, of the formal cause. The fundamental idea is that of regularity of pattern. Accordingly, if we eliminate final causes altogether and if we combine efficient and formal causes, we are left with our two original concepts, matter and form.

The fourfold causal analysis thus simply repeats the form-matter analysis from the point of view of theory of knowledge. Because reality is analyzable into formal and material aspects, it follows that we know reality when we know these aspects. If we recall that every object faces two ways, upward toward its fulfillment and downward toward the basis on which it rests, we will see that explanation consists in making this upward and downward reference. Until we locate the individual substance (person, event, or object) in this double relation, we cannot understand it. The extent to which we manage to trace these two strands that connect the individual with the rest of the world is exactly the extent to which we fathom its own individual nature.

Take some particular person at any particular moment in his life—say, Hitler at the moment he became chancellor of Germany. Obviously we cannot under-

5 It is necessary to say "relatively" distinct, because even here form and end tend to fuse. Suppose the sculptor's purpose were not to make money but simply to produce this particular esthetically satisfying form.

6 See p. 221.
stand him as he was at that moment in 1933, nor why he did the things he then did, unless we know the "matter" from which the Hitler of 1933 grew—the unhappy child, the frustrated artist, the social failure, the defeated veteran. Nor can we know the Hitler of 1933 unless we know where he was going, what he wanted, what he became. These things were hidden from us in 1933, and only as we were gradually revealed to us in the course of time did we come gradually to understand the Hitler of that earlier year. Thus a present event is always explained in the light of both the process that leads up to it and the process that extends beyond it. This is what Aristotle meant when he said that we understand things only in terms of their causes. If we want to use the term "cause," we can say that everything has a material and a formal cause—the cause out of which it has come and that into which it is going. But this is only a way of saying that to understand any "life," that is, any process through time, we must see how and why the later stages develop out of the earlier stages.

So far "understanding Hitler better" has been spoken of. But when do we understand him best? Obviously, when we have made a complete analysis of his material and formal "causes." But this is impossible, for, as we have seen, the universe is a single interlocking hierarchy of matter and form. As we go back into Hitler's past, we see that his childhood was conditioned by and grew out of the social and cultural milieu in which his family lived, and there is no end, clearly, to this process of going back. As we go forward into the future there is no end to the consequences of Hitler's acts. Hence, just because Hitler (or any other individual) is but one link in the interlocking hierarchy that is the universe, eventually a knowledge of the whole universe is relevant to our knowledge of Hitler, just as our knowledge of Hitler is relevant to our knowledge of the universe—a knowledge that consists in the same way of interlocking and correlative "formed matters."

This, of course, is Aristotle's reformulation of Plato's Form of the Good. And the reformulation is characteristic. Aristotle agreed with Plato that the universe is a relational structure and that every element in it can be known only by transcending that element, by seeing it in relation to other elements (and eventually to all of them) in the universe. But whereas Plato's acceptance of the transcendental character of knowledge led him to a separate world of forms and eventually to the Form of the Good, mysterious and incommunicable, Aristotle never passed beyond this world to a supersensible realm of forms. For him, knowledge of an individual particular requires transcendence of this individual, but the supplement that is required is merely knowledge of other individual particulars.

Plato and Aristotle agreed that knowledge of the isolated particular is not knowledge at all. They agreed that complete knowledge is impossible. Yet there was a radical difference between them. The knowledge Plato thirsted for is abstract, general, static—knowledge from which all particularity has been purged. For Aristotle complete knowledge would have been the same sort of knowledge we now have, that is, knowledge of the multiple interrelatedness of particulars—of "formed matters."

So far we have been considering the nature of reality in general, that is, characteristics that are true of the real everywhere. It is time now to turn to Aristotle's account of the physical world and to see how he applied the principles that have been discussed to the study of nature.

Natural Science

What is nature? What is the subject matter of natural science? According to Aristotle, nature is the sensible. It consists in those substances of which men become aware by perception. In this way we distinguish natural substances from other, nonsensible substances (for instance, god), which we know in other ways.

But nature is not identical with the sensible world. Stones, plants, and animals are natural, but beds and houses (though sensible) are not. Natural objects have within themselves an innate impulse to change. Rocks "naturally" fall (that is, change place); fire naturally rises; men and animals naturally move about, seek the companionship of their fellows, flee danger, pursue the good. Such natural objects, which have a spontaneous power of movement, must be distinguished from artifacts, which lack this spontaneous power and require an outside agent to move them. Trees grow of themselves; therefore they are natural objects.

Houses grow, but only as a result of the acts of carpenters and masons. Houses therefore are artifacts. It might be objected that houses and beds fall, if they are left unsupported, just as naturally as do rocks. But it is not qua houses or beds that they fall; it is qua some natural material (wood, for instance) that they fall. Qua artifacts, therefore, they do not have a natural movement. Nature may thus be defined as the totality of sensible objects capable of spontaneous change.

Aristotle formulated these and other distinctions at the beginning of Book II of the Physics.

Of things that exist, some exist by nature, some from other causes.

"By nature" the animals and their parts exist, and the plants and the simple bodies (earth, fire, air, water) . . .

All the things mentioned present a feature in which they differ from things which are not constituted by nature. Each of them has within itself a principle of motion and of stationariness (in respect of place, or of growth and decrease, or by way of alteration). On the other hand, a bed and a coat and anything else of that sort, qua receiving these designations—i.e. in so far as they are products of art—have no innate impulse to change. But in so far as they happen to be composed of stone or of earth or of a mixture of the two, they do have such an impulse, and just to that extent—which seems to indicate that nature is a cause or cause of being moved and of being at rest in that
to which it belongs primarily, in virtue of itself and not in virtue of a concomitant attribute.

I say "not in virtue of a concomitant attribute," because (for instance) a man who is a doctor might cure himself. Nevertheless it is not so far as he is a patient that he possesses the art of medicine; it merely has happened that the same man is doctor and patient—and that is why these attributes are not always found together. So it is with all other artificial products. None of them has in itself the source of its own production.

What nature is, then, ... has been stated. That nature exists, it would be absurd to try to prove; for it is obvious that there are many things of this kind, and to prove what is obvious by what is not is the mark of a man who is unable to distinguish what is self-evident from what is not.

Natural science, then, is concerned with the changes of natural objects, and every change is the fulfillment (the coming to actuality) of some potentiality. Whenever an object A that is potentially B becomes B, there is change. Change is the process by which A's potentiality to be B is realized. For instance, a cold dish is potentially hot. If it becomes hot this is (1) qualitative change. Other types of changes are (2) quantitative, in which something increases or decreases in amount, and (3) locomotive, in which something changes place. These are the kinds of changes that occur in, or to, substances. Finally, there is (4) substantial change, in which substances themselves come into being or pass out of being. The best example of this change is the process by which parents procreate offspring—new individual members of their species.

MOTION IS ETERNAL

Was there ever a time when there was no change? Will there be such a time in the future? Aristotle dealt very effectively with arguments that deny the eternity of motion. Conceive a time, he said, at which there is no change. Then conceive the beginning of the first change. Why does it begin at this time? Something must have hindered it from beginning earlier (otherwise it would have begun earlier), and this, whatever it is, must have changed, otherwise it would still be a hindrance. Therefore a change occurred before our hypothetical first change.

It remains to consider the following question. Was there ever a becoming of motion before which it had no being, and is it perishing again so as to leave nothing in motion? Or are we to say that it never had any becoming and it is not perishing, but always was and always will be? Is it in fact an immortal never-failing property of things that are, a sort of life as it were to all naturally constituted things? ...

Let us take our start from what we have already laid down in our course on Physics. Motion, we say, is the fulfillment of the movable in so far as it is movable. Each kind of motion, therefore, necessarily involves the presence of the things that are capable of that motion. ... Moreover, these things also must either have a beginning before which they had no being, or they must be eternal. Now if there was a becoming of every movable thing, it follows that before the motion in question another change or motion must have taken place in which that which was capable of being moved or of causing motion had its becoming. ... For if we are to say that ... there is a time when there is a first move and a first moved, and another time when there is no such thing but only something that is at rest, then this thing that is at rest must previously have been in process of change; for there must have been some cause of its rest, rest being the privation of motion. Therefore, before this first change there will be a previous change.

There was, then, no initial impetus that started the whole process of natural change at some particular point in time. Every change that occurs is caused by some antecedent change, and this by another, and so on. For nothing moves until something (either a part of itself, in the case of a complex object, or some other object) occasions its change. So we can trace movement back from one mover to another—A's movement is caused by B's, B's by C's, and so on.

And yet, Aristotle thought, there must eventually be a mover who is himself unmoved, who transmits motion but who is moved by no anterior, external movement:

The following considerations will make it clear that there must necessarily be some ... thing, which, while it has the capacity of moving something else, is itself unmoved and exempt from all change. ... Suppose it possible that some principles that are unmoved but capable of imparting motion at one time are and at another time are not. Even so, this cannot be true of all such principles, since there must clearly be something that causes things that move themselves at one time to be and at another not to be. For ... the fact that some things become and others perish, and that this is so continuously, cannot be caused by any one of those things that, though they are unmoved, do not always exist; nor again can it be caused by any of those which move certain particular things, while others move other things. The eternity and continuity of the process cannot be caused either by any one of them singly or by the sum of them, because this causal relation must be eternal and necessary, whereas the sum of these movements is infinite and they do not all exist together. It is clear, then, that though there may be countless instances of the perishing of some principles that are unmoved but impart motion, and though many things that move themselves perish, and are succeeded by others that come into being, and though one thing that is unmoved moves one thing while another moves another, nevertheless there is something that comprehends them all, and that as something apart from each one of them, and this is that is the cause of the fact that some things are and others are not and of the continuous process of change; and this causes the motion of the other movents, while they are the causes of the motion of other things. Motion, then, being eternal, the first movant, if there is but one, will be eternal also; if there are more than one, there will be a plurality of such eternal movents. We might, however, to suppose that there is one.
rather than many, and a finite rather than an infinite number. When the consequences of either assumption are the same, we should always assume that things are finite rather than infinite in number, since in things constituted by nature that which is finite and that which is better ought, if possible, to be present rather than the reverse: and here it is sufficient to assume only one mover, the first of unmoved things, which being eternal will be the principle of motion to everything else.

But evidently there is a first principle, and the causes of things are neither an infinite series nor infinitely various in kind. For neither can one thing proceed from another, as from matter, ad infinitum (e.g. flesh from earth, earth from air, air from fire, and so on without stopping), nor can the sources of movement form an endless series (man for instance being acted on by air, air by the sun, the sun by Strife, and so on without limit). Similarly, the final causes cannot go on ad infinitum,—walking being for the sake of health, this for the sake of happiness, happiness for the sake of something else, and so one thing always for the sake of another: ... If there is no first there is no cause at all.

THE UNMOVED MOVER

An eternal motion, Aristotle held, must have an eternal cause. But what kind of movement does this unmoved mover cause? The original motion must be change of place, for all the other types of motions involve change of place. Quantitative change (increase or decrease in amount) obviously involves change of place. So does qualitative change, for "the fact that a thing is altered requires that there should be something that alters it, something, e.g. that makes the potentially hot into the actually hot: so it is plain that the mover does not maintain a uniform relation to it but is at one time nearer to and at another farther from that which is altered: and we cannot have this without locomotion."*

Hence an eternal mover will cause an eternal locomotion. Further, this eternal locomotion must be circular, for all other possibilities are excluded. Locomotion is either in a straight line or circular (or a combination of the two). But infinite motion in a straight line would have to be either (1) along an infinite line or (2) backward and forward along a finite line. But (1) is ruled out because there is (Aristotle thought) no actual infinite, and (2) is ruled out because such a motion is composite. Therefore, the motion originated by the unmoved mover must be circular.

Other arguments demonstrate that the unmoved mover must be immaterial and "unmixed"—in fact, something rather like the "mind" that Anaxagoras had supposed to be the originator of the whirling of his seeds.

The next question is, "How does the unmoved mover cause the eternal circular motion that is the basis of all the complex motions of natural objects everywhere?" Aristotle's answer was that every good thing is desired insofar as it is known; as a perfect and eternal being the unmoved mover is peculiarly an object of desire and of love. The universe turns in emulation of his goodness: its regular circular motion is the nearest approximation to his perfection that a sensible object can achieve.

"There is something which moves without being moved, being eternal, substance, and actuality. And the object of desire and the object of thought move in this way: they move without being moved." Since the unmoved mover has no body to restrict his activity, he is, as Aristotle says in this passage, pure and complete actuality. But what is the nature of his activity? Obviously, it can be nothing that depends on body. This rules out sensation and desire. (Desire is ruled out anyway, because to desire something is to lack something; and the unmoved mover, being complete actuality, lacks nothing.) In fact, the unmoved mover's activity can only be thinking, and his thought obviously must be the best thought. From these considerations certain characteristics both of the nature of his thought and of its object can be inferred.

Much of man's thought is discursive; it moves from point to point, laboriously, until it reaches a conclusion. The kind of thought that goes into the writing (and reading) of a book like this one is the discursive type. Occasionally, however, we simply "see" a connection, all at once, without any process of proof. We express this by saying, for instance, that such-and-such a thing suddenly "dawns on us." Now, all the unmoved mover's thought must be of this latter type. When he thinks (and he always thinks), he understands at once, wholly and completely: he does not have to "reason things out" step by step.

And what is the object of his thought? Clearly it can be only himself. This follows because the unmoved mover knows only the best, and the best is the unmoved mover. His knowledge, then, is immediate and complete self-consciousness.

Aristotle called his unmoved mover "god." It was natural for him, therefore, to call this part of his physics "theology," for theology is literally the logos (account) of god (theos). But there are virtually no religious overtones in Aristotle's theology. Hence it is misleading to modern ears to talk about Aristotle's theology. It is better to use the neutral expression, "Aristotle's account of his unmoved mover."

Thus there is, in Aristotle's view, no divine providence, which is so important an aspect of the Judeo-Christian view of the world. His god does not look out for, care about, and provide for man. He did not create the universe, for it is eternal, and he is utterly indifferent to it. It is true that he causes its motion, but only as a beautiful picture might cause a man to purchase it. God is the object of desire for the lesser intelligences, but he is unconscious of their admiration and would be indifferent to them if he were aware of them.

In Aristotle's view god is a metaphysical necessity—the system requires an unmoved mover, a completely actual and fully realized form, but he is not an object of worship. Aristotle did not experience the Christian's love of a heavenly father, nor the Orphic's need for union with a mysterious, infinite power. Aristotle's god is transcendent and remote, and his attitude toward this god, at least
as revealed in the *Metaphysics* and other works of his maturity, was emotionally neutral.

We assume the gods to be above all other beings blessed and happy; but what sort of actions must we assign to them? Acts of justice? Will not the gods seem absurd if they make contracts and return deposits, and so on? Acts of a brave man, then, confronting dangers and running risks because it is noble to do so? Or liberal acts? To whom will they give it? It will be strange if they really have money or anything of the kind. And what would their temperate acts be? Is not such praise tasteless, since they have no bad appetites? If we were to run through them all, the circumstances of action would be found trivial and unworthy of gods. Still, every one supposes that they live and therefore that they are active; we cannot suppose them to sleep like Endymion. Now if you take away from a living being action, and still more production, what is left but contemplation? Therefore the activity of God, which surpasses all others in blessedness, must be contemplative; and of human activities, therefore, that which is most akin to this must be most of the nature of happiness.

This discussion of the nature of Aristotle’s god has led us aside from Aristotle’s physics. Let us leave the unmoved mover and turn back to the world that is moved by love of him.

**ASTRONOMY AND PHYSICS**

Aristotle conceived of the universe as a set of concentric spheres, with the earth stationary at the center. Outermost is the sphere of the fixed stars. Within are the spheres of the various planets, with that of the moon innermost and nearest the earth. An eternal and absolutely regular motion is imparted to (or better, inspired in) the outer sphere by the unmoved mover, and this motion is passed successively to each of the inner spheres. Between the spheres bearing the planets Aristotle was obliged to introduce others (fifty-five in all) to help account for the observed relative motions of the planets. Besides the motion transmitted to each sphere by that of the outer sphere that it touches, each sphere has its own original motion, imparted to it by its own incorporeal agent, or intelligence. To this extent there are, besides god, no less than fifty-five lesser unmoved movers. The motion of any planet (say, the sun) is compounded of (1) the original motion inspired in the sphere of the fixed stars by their love of

god, (2) the original motions of the other spheres, and (3) the original motion of this planet’s own sphere.

So much perhaps will suffice to summarize Aristotle’s astronomy. As regards sublunar things (that is, those below the sphere of luna, the moon), Aristotle first considered the four elements and the locomotions proper to them, then the various spatial movements of these elements, by which the qualitative and quantitative changes of ordinary natural objects are produced.

Aristotle thought that each of the four elements—fire, air, water, earth—has its own natural place and that each has a natural motion by which it seeks that place. The place of fire, for instance, is next under the sphere of the moon. The natural movement of fire is therefore upward, away from the earth and toward the sphere of fire.

The “things” of this sublunar world—plants, animals, and inanimate objects—are mixtures made up of the four elements in various combinations. Earth, air, fire, and water are the “matter” of plants, animals, and inanimate objects. These four elements are the “material causes” of physical things, or (as we would say) they are the basic physical factors that analysis of physical objects reveals. The “formal cause” of any particular thing is simply that structure into which its material factor is organized. It is the “formula” that expresses the ratio of the different elements entering into this particular compound.

**Biology—Psychology**

**ARISTOTLE’S EMPIRICISM**

In Aristotle’s biology, what has been called his temperamental difference from Plato is evident from the start. Aristotle mentioned close to five hundred animals. Although in some cases he relied for information on travelers’ or old wives’ tales, much of his work was based on close observation of actual animals, and many of his conclusions were verified in later times. Indeed, some of his discoveries were not “rediscovered” until modern times.

This interest in empirical fact was certainly not absolutely new in Greek thought—witness Thales, Anaximander, and Empedocles. But certainly the dominant tendency of earlier thinkers had been toward rationalism. Philosophers and scientists had been more interested in logical consistency than in facts. Having accepted some initially plausible hypothesis, they were content to deduce

7 Jaeger (Aristotle, pp. 159 ff.) finds a deep religious feeling in Aristotle’s early writings, but only fragments of them remain in the form of quotations by much later writers.

8 It is characteristic of the difference between Aristotle’s view and Christianity that, whereas for the latter physics is simply one aspect of God’s creativity, for Aristotle theology was but a part of physics.

9 This has naturally raised the question of whether Aristotle was a monotheist or a polytheist.

10 The four elements are matter, but only in relation to the higher structures they subserve. As distinct elements they naturally already contain formal factors, and below them is the “pure matter” that these formal factors order. This pure matter is not a separate entity, like the discussion of this difficult concept, see J. H. Randall, Aristotle (Columbia University Press, 1900).
its consequences, leaping overhastily to the conclusion that what is logically consistent must be true, instead of asking themselves whether logical consistency is a sufficient, as well as a necessary, condition of truth. Thus Aristotle's method was a healthy corrective to the overrationalism of his philosophical predecessors, including Plato.

In the *History of Animals*, a vast compendium of information about the anatomy and behavior of all sorts of animals, including man, there is ample evidence of Aristotle's empirical interest and of the effort he made to ascertain the facts. Here, for instance, is his account of the development of the embryo chicken.

Generation from the egg proceeds in an identical manner with all birds, but the full periods from conception to birth differ.... With the common hen after three days and three nights there is the first indication of the embryo; with larger birds the interval being longer, with smaller birds shorter. Meanwhile the yolk comes into being, rising towards the sharp end, where the primal element of the egg is situated, and where the egg gets hatched; and the heart appears, like a speck of blood, in the white of the egg. This point beats and moves as though endowed with life, and from it two vessel ducts with blood in them trend in a convoluted course.... and a membrane carrying bloody fibres now envelops the yolk, leading off from the vessel ducts. A little afterwards the body is differentiated, at first very small and white. The head is clearly distinguished, and in it the eyes, swollen out to a great extent.... It is only by degrees that they diminish in size and collapse. At the outset the under portion of the body appears insignificant in comparison with the upper portion.... The life-element of the chick is in the white of the egg, and the nutriment comes through the navel-string out of the yolk.  

And so on for several pages. Aristotle drew his information about animal development and behavior from all sorts of sources—from herdsmen and animal breeders, from fishermen and farmers, from direct observation. Alexander's armies may have sent him specimens. 11 It is difficult, of course, to draw a firm line between experiment and observation. Did Empedocles, for instance, merely happen to observe what occurs when the end of a tube is submerged in water and seize on this as support for his theory about the plenum? 12 Or was the tube a device to test the theory? Probably the former. On the other hand, the Pythagoreans must have experimented to discover the ratios of their tuned lyre. 13 Was Aristotle experimenting when he observed the embryo chicken? This question cannot be answered by a simple "yes" or "no," for this is a borderline case in which we cannot be sure what Aristotle's intent was. Yet there is a difference in principle between (1) recognizing the interest and importance of some fact when one chances to see it and (2) deliberately planning a situation that will test some hypothesis.

The Greek neglect of experiment is one of the chief points that distinguish their method from that of modern science. Perhaps "neglect" is too strong a word, for it may suggest they left something undone that they might easily have done. Experiment is connected with an appreciation of the complexity of nature, with a recognition of the necessity of deciding between alternatives. And the Greeks had no reason at the outset of the development of science to believe nature to be as complex as we now know it to be. Though their conviction that nature is a simply organized cosmos may have made them too facile, it had its fortunate aspect. Had they been aware of how complex the order really is they might have been too discouraged even to begin investigating it.

Whether or not Aristotle actually "experimented," he did make a notable beginning. Just as he laid the basis for his political theory by collecting and studying all available constitutions, so in biology he began by recording everything he could discover about such natural processes as reproduction, nutrition and growth, local movement, and so on. Thus his psychological theories were based on empirical evidence about nutrition and growth, local motion and sensation, perception, and thought.

Aristotle's interpretation of these phenomena naturally involved his fundamental concepts, matter and form. At each level of life there is, he held, a certain structure, or organized pattern, that yields the activity in question, and each of these structures is the basis for the next successively higher structure. His term for these structures was "soul" (*psyche*); hence his work on this subject was called psychology—the study of soul. Aristotle used this term in a much wider sense than we do today. Psyche is simply the form of a living object, and psychology is in effect the study of the formal factor in living objects.

Thus it is clear that Aristotle had a firm grasp of the fact, which modern students have had to rediscover, that all human activity (or any animal activity) is rooted in, and develops out of, the activity of lower organisms. But Aristotle also knew that it is necessary to explain human behavior (or any behavior), not only in terms of the lower structures from which it has developed, but also in terms of the higher structures toward which it is unfolding. To this day this second part of Aristotle's doctrine has not been as successfully relearned as the first.

**PSYCHOLOGY: ITS METHOD AND SCOPE**

Let us now...endeavour...to give a precise answer to the question, What is soul? I.e. to formulate the most general possible definition of it....

Among substances are by general consent reckoned bodies and especially natural bodies; for they are the principles of all other bodies. Of natural bodies some have life in them, others not; by life we mean self-nutrition and growth.
It follows that every natural body which has life in it is a substance in the sense of a composite.

But since it is also a body of such and such a kind, viz., having life, the body cannot be soul; the body is the subject or matter, not what is attributed to it. Hence the soul must be a substance in the sense of the form of a natural body having life potentially within it. But substance is actuality, and thus soul is the actuality of a body as above characterized. Now the word actuality has two senses corresponding respectively to the possession of knowledge and the actual exercise of knowledge. It is obvious that the soul is actuality in the first sense, viz., that of knowledge as possessed, for both disposing and making presuppose the existence of soul, and of these making each corresponds to actual knowledge, being knowledge possessed but not employed, and, in the history of the individual, knowledge comes before its employment or exercise.

That is why the soul is the first grade of actuality of a natural body having life potentially in it. The body so described is a body which is organized. The parts of plants in the form of their extreme simplicity are "organs," e.g., the leaf serves to protect the pericarp, the pericarp to shelter the fruit, while the roots of plants are analogous to the mouth of animals, both serving for the absorption of food. If, then, we have to give a particular form applicable to all kinds of soul, we must describe it as the first grade of actuality of a natural organized body. That is why we can wholly dismiss as unnecessary the question whether the soul and the body are one: it is as meaningless as to ask whether the wax and the shape given to it by the stamp are one, or generally the matter of a thing and that of which it is the matter....

We have now given an answer to the question, What is soul?—an answer which applies to it in its full extent....

We resume our inquiry from a fresh starting-point by calling attention to the fact that what has soul in it differs from what has not in that the former displays life. Now this word has more than one sense, and provided any one alone of these is found in a thing we say that thing is living. Living, that is, may mean thinking or perception or local movement and rest, or movement in the sense of nutrition, decay and growth....

Of the psychic powers above enumerated some kinds of living things, as we have said, possess all, some less than all, others only one. Those we have mentioned are the nutritive, the appetitive, the sensory, the locomotive, and the power of thinking. Plants have none but the first, the nutritive, while another order of living things has this plus the sensory. If any order of living things has the sensory, it must also have the appetitive; for appetite is the genus of which desire, passion, and wish are the species; now all animals have one sense at least, viz., touch, and whatever has a sense has the capacity for pleasure and pain and therefore has pleasant and painful objects present to it, and wherever these are present, there is desire, for desire is just appreciation of what is pleasant.... Certain kinds of animals possess in addition the power of locomotion, and still another order of animate beings, i.e., man and possibly another order like man or superior to him, the power of thinking, i.e., mind. It is now evident that a single definition can be given of soul only in the same sense as one can be given of figure. For, as in that case there is no fig-

ure distinguishable and apart from triangle, &c., so here there is no soul apart from the forms of soul just enumerated....

It is evident that the way to give the most adequate definition of soul is to seek in the case of each of its forms for the most appropriate definition....

It follows that first of all we must treat of nutrition and reproduction, for the nutritive soul is found along with all the others and is the most primitive and widely distributed power of soul, being indeed that one in virtue of which all are said to have life. The acts in which it manifests itself are reproduction and the use of food—reproduction, I say, because for any living thing that has reached its normal development and which is unmutilated, and whose mode of generation is not spontaneous, the most natural act is the production of another like itself, an animal producing an animal, a plant a plant, in order that, as far as its nature allows, it may partake in the eternal and divine. That is the goal towards which all things strive, that for the sake of which they do whatever their nature renders possible.... Since then no living thing is able to partake in what is eternal and divine by uninterrupted continuance (for nothing perishable can for ever remain one and the same), it tries to achieve that end in the only way possible to it, and success is possible in varying degrees; so it remains not indeed as the selfsame individual but continues its existence in something like itself—not numerically but specifically one....

Let us now speak of sensation in the widest sense. Sensation depends, as we have said, on a process of movement or affection from without, for it is held to be some sort of change of quality....

In dealing with each of the senses we shall have first to speak of the objects which are perceptible by each. The term "object of sense" covers two kinds, of which one consists of what is perceptible by a single sense, the other (b) of what is perceptible by any and all of the senses. I call by the name of special object of this or that sense that which cannot be perceived by any other sense than that one and in respect of which no error is possible; in this sense colour is the special object of sight, sound of hearing, flavour of taste. Touch, indeed, discriminates more than one set of different qualities. Each sense has one kind of object which it discerns, and never errs in reporting what is before it is colour or sound (though it may err as to what it is that is coloured or where that is, or what it is that is sounding or where that is). Such objects are what we propose to call the special objects of this or that sense.

"Common sensibles" are movement, rest, number, figure, magnitudes; these are not peculiar to any one sense, but are common to all. There are at any rate certain kinds of movement which are perceptible both by touch and by sight....

The following results applying to any and every sense may now be formulated.

(A) By a "sense" is meant what has the power of receiving into itself the sensible forms of things without the matter. This must be conceived of as taking place in the way in which a piece of wax takes on the impress of a signet-ring without the iron or gold; we say that what produces the impres-
sion is a signet of bronze or gold, but its particular metallic constitution makes no difference: in a similar way the sense is affected by what is coloured or flavoured or sounding, but it is indifferent what in each case the substance is; what alone matters is what quality it has, i.e. in what ratio its constituents are combined.

(B) By “an organ of sense” is meant that in which ultimately such a power is seated. . . .

If the movement set up by an object is too strong for the organ, the equipossion of contrary qualities in the organ, which just is its sensory power, is disturbed; it is precisely as concord and tone are destroyed by too violently twanging the strings of a lyre. This explains also why plants cannot perceive, in spite of their having a portion of soul in them and obviously being affected by tangible objects themselves. . . . The explanation is that they have no mean of contrary qualities, and so no principle in them capable of taking on the forms of sensible objects without their matter; in the case of plants the affection is an affection by form-and-matter together.1

THE NUTRITIVE PSYCHE

Aristotle’s psychology thus begins with what he called the nutritive soul—that form, or structure, that appears in, and is the fulfillment of, the most rudimentary of living objects. But the nutritive soul is also the base on which the more fully developed and articulated souls of complex organisms rest. This is what Aristotle meant when he said: “The sentient faculty [and all the other higher faculties] never exists without the nutritive; but the nutritive may exist without the sentient, as in the case of plants.”11

The immediate function of the nutritive psyche is to maintain the ratio of the various organs of the body. As the body consumes food (adds to its quantity), something must control this addition so that the process of growth is in accordance with the “plan” of this body. The food can no more do this itself than a rudder by itself can steer a ship. In both cases form is required: The rudder requires a hand to steer it; the food requires a nutritive soul to “guide” the qualitative changes by which it is transformed into body. The food taken into the body becomes flesh; therefore, before it was eaten, it was potentially flesh. The nutritive soul, then, makes the potential actual. In this process heat operates as the “efficient cause.” Just as the heat of the sun causes the changes of season, so in the body heat of the heart boils the food taken into the stomach and transforms it into blood. The blood then oozes through the body. In this process the blood is transformed again, this time by cold, into flesh and other solid parts.

So much for the immediate function of nutrition—to keep the body alive and enable it to grow. Its long-range function is the perpetuation of the species. Just as Aristotle pointed out, we tend to name things after the function they serve, and we might also call the nutritive soul the reproductive soul.

THE SENSITIVE PSYCHE

The sensitive soul is the type of form that exists at the animal level. Here there is a more developed structure that includes sense organs, for instance, the eye and the ear.

What happens in my eye when I see something—say, my desk? Clearly the sense organ is modified in the same general way that the body is modified by taking in food, but with this difference: In nutrition the matter itself is taken into the body and transformed into blood and eventually into flesh, whereas in sensation it is not the matter of the desk but only its form that enters the eye. When I eat a steak, the steak enters my body. But when I perceive my desk, it does not enter my eye; what enters is its “sensible form.” So, when I impress a seal on wax, it is not the matter of the seal (the metal) that enters the wax, but its sensible form. (To say that it is the sensible form means only that it is the kind of form that is sensible.)

Now, before I see a red object, my eye is potentially red. When I see a red object, this potentiality is made actual. The eye is potentially red (and yellow and green) just as a cold plate is potentially hot. Of course, not every form is capable of being actualized in every medium. Each sense organ has, in fact, a certain range of potentiality, and it is only within this range that it is capable of experiencing sensations. Sounds lying beyond the ear’s range cannot be heard, colors lying beyond the eye’s range cannot be seen, and so on.

But not only the sense experience is brought to actuality in perception; so also is the object perceived. Until it is actually perceived it is only perceivable, that is, potentially an object of perception. Thus perception is a dual actualization—an actualization of the object as an object of perception and an actualization of the sense organ as a perceptor. In perception, then, a form is actualized in two different media—“out there” in the object and “in here” in the sense organ. We perceive truly just because, and insofar as, the same form is both here in the sense organ and out there in the object.

This, it must be allowed, leaves much to be explained. First, for instance, the change in the sense organ may be the basis of the perception, but it is not itself perception. Perception seems also to involve something that we may for the present call “consciousness.” This was recognized implicitly by Aristotle, but he did not know how to deal with it.

The problem might be raised: Can what cannot smell be said to be affected by smells or what cannot see by colours, and so on? It might be . . . argued that what cannot smell cannot be affected by smells and further that what can smell can be affected by it only in so far as it has in it the power to smell (similarly with the proper objects of all the other senses). Indeed that this is so is made quite evident as follows. Light or darkness, sounds and smells leave bodies quite unaffected; what does affect bodies is not these but the bodies which are their vehicles, e.g. what splits the trunk of a tree is
not the sound of the thunder but the air which accompanies thunder. Yes, but... is not the true account this; that all bodies are capable of being affected by smells and sounds, but that some on being acted upon, having no boundaries of their own, disintegrate, as in the instance of air, which does become odorous, showing that some effect is produced on it by what is odorous? But smelling is more than such an affection by what is odorous—what more? Is not the answer that, while the air owing to the momentary duration of the action upon it of what is odorous does itself become perceptible to the sense of smell, smelling is an observing of the result produced?

For Aristotle to insist, as he does here, on the difference between (1) physiological change and (2) perception—that is, for him to insist on the difference between the way air is affected by odor and the way the nose is—amounts to admitting the inadequacy of his attempt to account for perception in purely physiological terms.

Second, is the sensation we experience a copy of the object that causes it? As plain men we take it for granted that the world “out there” is what our sense organs report it to be. But is this assumption justified? Atomism, for example, held that it is not. Atomism distinguished radically between the world as it really is—atoms in a void—and the world as it appears to sense organs like ours—shoes, ships, sealing wax, cabbages, and kings. Aristotle, however, is usually taken as a realist, that is, as holding that we perceive the world as it is. But how can we know that the red out there in the object is like the red in here in me? The matter is admittedly different. Aristotle would have said, but the form is the same, and this validates perception. But is the form the same? How did Aristotle know that the sensible form of the object enters the eye unchanged?

This question becomes even more acute when we turn from sensation (for example, of colors and sounds) to cognition.

THE RATIONAL PSYCHE

Thinking both speculative and practical is regarded as akin to a form of perceiving; for in the one as well as in the other the soul discriminates and is cognizant of something which is... [but] perceiving and practical thinking are not identical... for the former is universal in the animal world, the latter is found in only a small division of it. Further, speculative thinking is also distinct from perceiving—I mean that in which we find rightness and wrongness—rightness in prudence, knowledge, true opinion, wrongness in their opposites; for perception of the special objects of sense is always free from error, and is found in all animals, while it is possible to think falsely as well as truly, and thought is found only where there is discourse of reason as well as sensibility...

Turning now to the part of the soul with which the soul knows and thinks (whether this is separable from the others in definition only, or spatially as well) we have to inquire (1) what differentiates this part, and (2) how thinking can take place.

If thinking is like perceiving... the thinking part of the soul must... be... capable of receiving the form of an object; that is, must be potentially identical in character with its object without being the object. Mind must be related to what is thinkable, as sense is to what is sensible.

Therefore, since everything is a possible object of thought, mind... must be pure from all admixture; for the co-presence of what is alien to its nature is a hindrance and a block: it follows that it too, like the sensitive part, can have no nature of its own, other than that of having a certain capacity. Thus that in the soul which is called mind (by mind I mean that whereby the soul thinks and judges) is, before it thinks, not actually any real thing. For this reason it cannot reasonably be regarded as blended with the body: if so, it would acquire some quality, e.g. warmth or cold, or even have an organ like the sensitive faculty: as it is, it has none. It was a good idea to call the soul “the place of forms,” though (1) this description holds only of the intellectual soul, and (2) even this is the forms only potentially, not actually...

Mind is in a sense potentially whatever is thinkable, though actually it is nothing until it has thought. What it thinks must be in it just as characters may be said to be on a writing tablet on which as yet nothing actually stands written: this is exactly what happens with mind...

The thinking then of the simple objects of thought is found in those cases where falsehood is impossible: where the alternative of true or false applies, there we always find a putting together of objects of thought in a quasi-unity. As Empedocles said that “where heads of many a creature sprouted without necks” they afterwards by Love’s power were combined, so here too objects of thought which were given separate are combined, e.g. “incommensurate” and “diagonal”: if the combination be of objects past or future the combination of thought includes in its content the date. For falsehood always involves a synthesis; for even if you assert that what is white is not white you have included not-white in a synthesis. It is possible also to call all these cases division as well as combination. However that may be, there is not only the true or false assertion that Cleon is white but also the true or false assertion that he was or will be white. In each and every case that which unites is mind...

The so-called abstract objects the mind thinks just as, if one had thought of the snub-nosed not as snub-nosed but as hollow, one would have thought of an actuality without the flesh in which it is embodied: it is thus that the mind when it is thinking the objects of Mathematics thinks of separate elements which do not exist separate. In every case the mind which is actively thinking is the objects which it thinks...

Knowledge and sensation are divided to correspond with the realities, potential knowledge and sensation answering to potentialities, actual knowledge and sensation to actualities. Within the soul the faculties of knowledge and sensation are potentially these objects, the one what is knowable, the other what is sensible. They must be either the things themselves or their forms. The former alternative is of course impossible: it is not the stone which is present in the soul but its form.
It follows that the soul is analogous to the hand: for as the hand is a tool of tools, so the mind is the form of forms and sense the form of sensible things.

Since according to common agreement there is nothing outside and separate in existence from sensible spatial magnitudes, the objects of thought are in the sensible forms, viz. both the abstract objects and all the states and affections of sensible things. Hence (1) no one can learn or understand anything in the absence of sense, and (2) when the mind is actively aware of anything it is necessarily aware of it along with an image; for images are like sensuous contents except in that they contain no matter.\ 1\2

Just as the nutritive soul occurs in isolation from the sensitive soul (for example, in plants) but also in association with it (in animals), so the sensitive soul occurs both in isolation from, and in association with, the rational soul. And just as, again, the functions of the nutritive soul are mediated by association with a higher form (reproduction is more complicated in animals than in plants), so the functions of the sensitive soul are mediated by association with the rational soul. In other words, human sensation is more complex than animal sensation precisely because every human activity, even those "shared" with animals and plants, is modified by the fact that man is a rational creature capable of thought. Aristotle's may indeed be a "faculty" psychology, but not in the sense that the psyche is a simple collection of discrete faculties. The psyche is a group of powers mutually conditioned by the relations in which they stand to one another.

Even in animals there are signs of rudimentary intelligence. A dog, we say, "knows" his name and "recognizes" his master. What makes this possible, according to Aristotle, is that successive sensible experiences may be "remembered," that is, may fuse to make a new kind of experience that is richer in meaning than any single sense experience could possibly be. When the dog sees his master he sees more than just a man who happens to be out there in front of him. He sees his master—the man who on other occasions has fed, trained, punished, and praised him. The totality of what this experience means to him is, then, far larger than what is contained in this single perception. Even at the level of the sensitive soul, perception transcends the sensible form of what is present here and now.

At the human level of experience this process of transcendence expands. When I see my desk I see not only my desk (as the dog sees his master), but a desk, that is, a member of the class "table-frame-or-case-with-a-sloping-or-flat-top-for-the-use-of-readers-or-writers." When a dog looks at this object he presumably has much the same sensory experience that I have, that is, he experiences the same sensible forms. He may even "combine" the present experience with remembered experiences. But he does not know that he sees a desk.

Yet, though the dog does not rise to the full and articulate experience of the universal "desk," he is on the way to it because, like me, he is capable of remembering and fusing together past experiences.

Out of this remembering and fusing there emerges, at the human level, knowledge of what Aristotle called the intelligible form, or the universal—the generic character shared by all members of a class. Hence true thought goes beyond mere remembering, beyond the dog's recognition of his master.

With the activity of thought we reach the level of the rational psyche. The intelligible form is not, of course, a separate entity. To suppose it to be such would be to fall into the folly of Platonism. The form is embedded in the particulars and does not exist apart from them. Nevertheless, it is capable of impressing itself on the human mind so that the mind comes to know it. The expression "impressing itself on the mind" is used advisedly. The intelligible form was supposed by Aristotle to stand in the same relation to the mind as that in which the sensible form stands to the sense organ or the seal stands to the wax. When the seal is impressed on the wax, the form (not the matter) of the seal is transferred; the same form is present in both media. Just as the wax is the potentiality for various impressions, so the mind is the potentiality for various intelligible forms, or universals. When the mind thinks, it takes on the intelligible form of the object out there and becomes identical with it. Not identical with the object, of course (any more than the wax becomes identical with the seal), but identical with the object's intelligible form.

In thought, then, mind and its object are supposedly identical, but thought occurs only (here is another radical departure from Platonism) in the presence, and as a result of a succession, of sense experiences. Just as the movement of my hand is the efficient cause of the wax's taking the impression of the seal, so sense experience (present and recollected) of desks is the efficient cause of my thought of the intelligible form "desk." Thus, whereas for Plato the best thought was freed from sense experience altogether, for Aristotle it remained rooted in sense experience.

This should throw some light on Aristotle's remark that thought is the form of forms, just as the hand is the tool of tools. A seal is a tool fashioned by man; it is used by an instrument of a higher order, the hand. So the sensible form is utilized by a cognitive faculty of a higher order, the mind. Thought works upon, and utilizes for higher cognitive ends, the sensible forms, just as the hand works upon, and uses for further practical ends, the tools of its own fashioning. The relation between sensible form and intelligible form is another example of the relation between matter and form. Sense data are the matter out of which universals are constructed; universals are their end.

So much for the general nature of thought and its relation to sensation. We must now note that, according to Aristotle, thought can be divided into two main kinds, depending on its object. If its object is an unanalyzable whole, it is (like simple sense perception) infallible. If its object is the result of a prior synthesis, it is fallible. We must, therefore, try to discover rules that will enable us to distinguish true from false thinking.

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\1\2 If I simply perceive a white color patch, my perception is infallible; if I judge that this white patch is a handkerchief, I may well be mistaken. It may be a piece of paper.
Proposition 2, "Some men are Athenians," gives

Thus the syllogism gives us only three separate classes, with no information on the relations that may or may not exist between Englishmen and Spartans. No conclusion of any kind follows from these propositions, and the syllogism as stated is therefore invalid.

Since the syllogism is invalid not because of the particular terms that appear in it but because of its form, or pattern, we can formulate another rule to the following effect: Any syllogism that contains two negative premises will be invalid.

This syllogism can be used to illustrate the distinction already drawn between truth and validity. Proposition 3, "No Englishmen are Spartans," may or may not be true; syllogism tells us nothing about this. It tells us only whether the relation between the premises and the conclusion is valid. However, to assert the truth of the conclusion we must know not only that the argument is valid but also that the premises are true. This brings us to Aristotle's second main question, "How do we know whether the premises are true?"

**INTUITIVE TRUTHS**

Each premise, of course, can be taken as the conclusion of an antecedent syllogism and other premises can be found from which (in accordance with the rules of logic) it may be validly drawn. If these antecedent premises are true, then the original premises (and their conclusion) will be true. But how do we know the antecedent premises are true? Though we can carry the process of syllogizing back as far as we like, syllogism, which is only correct deduction from premises, must be supplemented by some other intellectual operation. This Aristotle called "intuitive reason" (nous). It is the faculty, we may say, that knows without proof. That there are some things that are known without proof seemed clear to Aristotle. Otherwise we should have a hopeless regress of proofs of proofs of proofs, without ever being able to reach certainty. There must be,
then, a starting point to syllogistic deduction—a point that is certain without proof.

Perhaps the simplest examples of intuitively known truths are the “law of identity,” the “law of contradiction,” and the “law of excluded middle.” These, however, we reason with, not from.

Examples of truths we reason from are the axioms of Euclidean geometry, which Aristotle regarded as certain, but unproved, starting points. Whereas an ordinary proposition (All Greeks are mortal) requires a connecting link to mediate and unite subject and predicate (for example, the middle, “men”), axioms are propositions that require no such link, since subject and predicate are in themselves seen to be necessarily related—"The whole is greater than the part." As soon as we understand the meaning of the terms, we grasp the necessary truth of the assertion. No proof—no connecting middle—is required; instead, this unproved proposition serves as the basis for the proof of other propositions. Truths known self-evidently in this way exist, Aristotle thought, in every science.

If this be the nature of the first principles of science, how does intuitive reason grasp them? In a way analogous to that we have already found operating in the case of ordinary universals, that is, through perception. Yet, because these are the highest and most general of universals, it cannot be simple sense perception.

Scientific knowledge through demonstration is impossible unless a man knows the primary immediate premises. But there are questions which might be raised in respect of the apprehension of these immediate premises: one might not only ask whether it is of the same kind as the apprehension of the conclusions, but also whether there is or is not scientific knowledge of both; or scientific knowledge of the latter, and of the former a different kind of knowledge; and, further, whether the developed states of knowledge are not innate but come to be in us, or are innate but at first unnoticed. Now it is strange if we possess them from birth; for it means that we possess apprehensions more accurate than demonstration and fail to notice them. If on the other hand we acquire them and do not previously possess them, how could we apprehend and learn without a basis of pre-existent knowledge? . . . So it emerges that neither can we possess them from birth, nor can they come to be in us if we are without knowledge of them to the extent of having no such developed state at all. Therefore we must possess a capacity of some sort, but not such as to rank higher in accuracy than these developed states. And this at least is an obvious characteristic of all animals, for they possess a congenital discriminative capacity which is called sense-perception. But though sense-perception is innate in all animals, in some the sense-impression comes to persist, in others it does not. So animals in which this persistence does not come to be have either no knowledge at all outside the act of perceiving, or no knowledge of objects of which no impression persists; animals in which it does come into being have perception and can continue to retain the sense-impression in the soul, and when such persistence is frequently repeated a further distinction at once arises between those which out of the persistence of such sense-impressions develop a power of systematizing them and those which do not. So out of sense-perception comes to be what we call memory, and out of frequently repeated memories of the same thing develop experience; for a number of memories constitute a single experience. From experience again—i.e. from the universal now stabilized in its entirety within the soul, the one beside the many which is a single identity within them all—originate the skill of the craftsman and the knowledge of the man of science, skill in the sphere of coming to be and science in the sphere of being.

We conclude that these states of knowledge are neither innate in a determinate form, nor developed from other higher states of knowledge, but from sense-perception. It is like a rout in battle stopped by first one man making a stand and then another, until the original formation has been restored. The soul is so constituted as to be capable of this process . . .

Thus it is clear that we must get to know the primary premises by induction; for the method by which even sense-perception implants the universal is inductive. Now of the thinking states by which we grasp truth, some are unfailingly true, others admit of error—opinion, for instance, and calculation, whereas scientific knowing and intuition are always true: further, no other kind of thought except intuition is more accurate than scientific knowledge, whereas primary premises are more knowable than demonstrations, and all scientific knowledge is discursive. From these considerations it follows that there will be no scientific knowledge of the primary premises, and since except intuition nothing can be truer than scientific knowledge, it will be intuition that apprehends the primary premises—a result which also follows from the fact that demonstration cannot be the origina tep source of demonstration, nor, consequently, scientific knowledge of scientific knowledge. If, therefore, it is the only other kind of true thinking except scientific knowing, intuition will be the origina tep source of scientific knowledge. And the origina tep source of science grasps the original basic premises, while science as a whole is similarly related as origina tep source to the whole body of fact.

The development of every science thus consists in a twofold movement of thought. First there is discovery. Study of the sense objects that lie within the sphere of the science leads us gradually to higher and higher universals. When the highest of all are reached, the process is reversed. Now comes exposition. Using the first principles thus discovered as a basis, we work out syllogisms that reveal the structural and logical relations holding between the various universals embedded in the particular objects that lie within the sphere of this science. This is Aristotle's version of that mysterious dialectic discussed by Plato in connection with the divided line. Comparison of these two accounts will throw a good deal of light on the differences, as well as the underlying similarities, of the two thinkers' philosophical positions.
LIMITATIONS OF ARISTOTLE'S LOGIC

Aristotle's version, certainly, is not without difficulties—both with regard to the intuitive starting points and with regard to the syllogistic process that depends on them. As regards nous, it is far from clear that "the primary premises" it perceives have the character Aristotle attributed to them. For instance, "The whole is greater than the part" is certain, but only because it is a tautology. Or, to put this differently, there is a "bridge" after all the meaning of the terms "whole," "greater," and "part." The word "part" means "less than whole." Hence the proposition is not making a necessary assertion about the nature of reality, as Aristotle supposed; it is merely reporting how, as a matter of fact, we happen to use the words "whole" and "part." If this is true of all Aristotle's allegedly self-evident primary premises, his vision of science as an absolutely necessary body of truths requires radical emendation. But it is hardly fair to blame Aristotle for not having seen this. Until Hume and Kant drew a firm distinction between analytic and synthetic propositions, almost all philosophers took for granted, with Aristotle, that a completely rational and deductive science of nature is possible.

Second, with regard to the process of deriving conclusions from premises, it can be said that Aristotle's fault was less one of commission than one of omission. He assumed that all propositions are of the subject-predicate form, that is, he assumed that whenever we judge we affirm (or deny) some property of a subject. We say S is (or has) P. That we do this in many judgments is clear, but it seems equally clear that many judgments do not have this "S is F" form. Suppose we reason as follows: A is larger than B. B is larger than C. Therefore A is larger than C. Everyone would agree that this argument is valid. It consists of three propositions—two premises and a conclusion. It also seems to have three and only three terms (A, B, C), and B seems to be the link between A and C. But is it a syllogism? No, for when we say, "A is larger than B," the verb "is" does not mean what it means when we say, "Socrates is a man." When we say, "A is larger than B," we do not mean that A belongs to the class "larger-than-B," but that A and B are related by the relation "is-larger-than." This difference is hidden by the fact that we use the same term, "is," in both judgments.

Thus Aristotle was mistaken in holding that the relation asserted in judgment is always attribution. Since many other relations are actually asserted, Aristotle's logical rules cover only a relatively small part of reasoning. Reasoning in mathematics, for instance, which is concerned with such relations as is-larger-than, is not covered satisfactorily by Aristotle's logic. However, to concentrate on the deficiencies in Aristotle's logic distorts the picture. Not only did Aristotle invent the science of logic, but much that he said on the subject is still valid—valid at least for some kinds of reasoning, though not (as he thought) for all.

Aristotle:
Ethics,
Politics,
Art

Animal Drives and Practical Reason

So much for Aristotle's account of thought, the study of which has taken us from psychology to logic—from an investigation of thought's nature to an analysis of the criteria by which Aristotle believed we can determine both truth and validity. But man is not only a thinking animal; he is also a behaving animal. We must therefore reverse our steps and examine briefly the psychological basis of behavior as Aristotle saw them. When we have done so, we shall proceed paralleling our study of thought, to the question of value—to the criteria which behavior is to be evaluated. This will bring us to ethics and politics.

Although local movement is omnipresent on the earth, it is only with animals that we reach a level at which behavior, properly speaking, begins. According to Aristotle, just as there is a continuous process on the cognitive side from anim