CHAPTER V

PHENOMENALISM AND POSTPHENOMENALISM

David Hume thought he knew much more about human nature than that it knows what there is to know and that it has two legs and lungs; though he knows it less rationally. He knew human nature as a shrewd and enlightened observer. How he knew it was the same in China as in London, Edinburgh, and Paris he does not tell us. I suppose he would say, not having read Watson on infants and learning—or Ruth Benedict on cultural relativity—why not the same? That understanding can have no direct effect on action he knows more rationally: by definition or axiomatically (despite his careful but to me question-begging argument in the Treatise, II,iii,3). The products of analysis, factual and logical, are final, except for the recognition that more analysis may come. And "all coherence is lost"; except for the fact that among human propensities is the propensity toward an idea of coherence and so toward a belief in some substance or substantiality, even a belief in our own.

If we take Hume's propensities and make them rational, and his uniformitarianism and make it necessary; call our fond believing human nature the forms and categories of sensibility and understanding, of mind as such; then we have Immanuel Kant. Surely the two men are contrasts, as are their languages and manners of argument; yet their basic theories—perhaps as I interpret them without full sympathy for either—rather invite a transformation equation. And Kant may be said to formalize and clarify the splitting in the approach to substance which was apparent in Locke but undeveloped; which was shunned by Berkeley; and which was
made inescapable in the reduction of all things to phenomena in the theoretical theory of Hume. There had been two chief directions in which men had looked for substance: Is what is really there individual things, or an underlying stuff? Now with "the way of ideas": Is substance real-beyond-knowledge or is it an idea? The first alternatives appear in Locke's two treatments of substance under the rubric of power and as the "something I know not what." But it can also be seen that the latter treatment, the substrate, leaves Locke reluctantly accepting the idea of substance as needed by his other ideas and by their dialectical use together (the Kantian method); the former, power, takes him at once into that independent world of resistant things which he never gave up. Berkeley made substance spirit but kept it individual and independent; and he limited ideas to the picturesque "objects of knowledge." Thus selves—and cause—are not ideas nor can there be ideas of them. For Hume there is and can be, for our philosophic understanding, nothing but ideas ("impressions and ideas"); so "substance" as a topic of discourse without a proper impression must be philosophically a myth, which nevertheless our human nature inclines us to act upon and talk of believably.

For Kant substance is the "first analogy"; cause is the second analogy. This at first sounds to me profoundly silly: the most real, and the next-to-most real, facts of existence being presented as abstract hypotheses needful for the working of a calculus. But I know it is not silly (it may in a sense be profoundly superficial); it is one of many instances but a privileged instance of Kant's amazing combination of honesty and accuracy with ingeniously pedantic loyalty to the premises he has started with. Hume, Kant is saying, is right in that experience is phenomenal and the sensation in experience is phantasmal and unstructured. But we do know and Newton is to be trusted. So it must be that the forms
of our knowledge, whereby experience has structure and science is possible and trustworthy, are necessary in the minding of mind—not only requisite for knowledge but sure in knowing. So the dialectic of knowledge reaches out for “substance”—the idea, the form, the category, the first analogy—without caring whether substantial substance is or not. But Kant cares; and so we have—to the dismay of some—the “thing in itself.”

The “analogies of experience,” the specifications of the category of relation, in one way are derived from the logician’s classification of propositions as categorical, hypothetical, alternative: the first analogy, substance, being the categorical This is thus; the second analogy, cause, being the hypothetical If this is thus then that is so. This is a sagacious and plausible way to get at the twelve forms the understanding works with—and distinctive of the difference between Kant and Hume. I have come to think it is true and important that the mind naturally, and the scientist’s mind almost inevitably, tends to see what has happened in terms of antecedents. But I think it is more basically true and important that cause is real and effective but far from all-embracing; there are also chance and freedom. These views I had come to without thought of Kant. Then I became aware that they are an easy transformation from Kant’s doctrine that the second analogy is all-embracing within experience but that the noumenal egos are free and the things-in-themselves are at least not phenomena under the dialectical command of the second analogy. But I can do without all phenomena and let the habits of people and scientists be just that; and it seems to be so much better to let the things-in-themselves and the selves-in-themselves be the ones we started life with and still know best and most directly.

Kant’s celebrated rebuttal of the ontological argument
for the existence of God suggests itself for redeployment against Kant's own thing in itself and against my suggested variation of the ontological argument for substance. Existence being a part of the meaning of the "concept" of God, says Kant, it follows that when we think of God we must think of him as existing, but it does not follow that he exists—substantially. I would not want to change anything of the superb simplicity and eloquence of Anselm's putting of his argument in the encounter with the Biblical "fool" who "says in his heart"; but, in the light of the long subsequent argument over the argument, it seems unfortunate that Anselm began with that thinking in the heart, and perhaps more unfortunate that his cogitari became the then new-fangled "conceived" and so "concept." An "ontological argument for existence" has to start from what is thought and try to go to what exists; and I suspect that without some ingredient of existence it cannot succeed; but it does not have to start with an actual mental content, an idea or a concept. Yet if I am allowed to consider the supposed presence of this idea and what it is supposed to be—if I am allowed to think about it and not merely to have it or, in the Humean sense, be it—then I can say, "If this poor beautiful thing is all there is, then it is by definition substance; but I know it is not all, for there is this I, or at least this thinking, which thinks about it"; and I can also say as Kant says in this section of the first Critique on the division of all things into phenomena and noumena that there is a clear insufficiency in the nature of the idea for independent being. Before Descartes' "I think therefore I am," he should have declared "I think, therefore there is something to think about." But this, while I believe it would have taken him beyond the realm of post-Lockean ideas, would not have given him the personal and physical world he wanted.
Arthur Schopenhauer and Friedrich Nietzsche carry on the human-nature-propensity-passion realism-of-the-cellar, which was in David Hume's teaching. They, so far as I know, never say or feel they are carrying on from Hume, and in their nineteenth-century romanticism the passions are more passionate and have become the will, or the Will. In Nietzsche the metaphysical-epistemological interest lapses more and more into the moral, and his moral homiletic, like his personality, can scarcely be thought Humean. The idealism as to matter of Schopenhauer and Nietzsche, and their personalism, are more like Berkeley's (instructors have liked to make it seem that the later Germans derive from Kant, playing the role of Locke to his English successors); but their voluntarism feels to me closer to Hume's background and partly anti-intellectualist existence than to the lyrical and esthetic spiritualism of Berkeley. If there is anti-intellectualism in Berkeley, it is Neoplatonic and mystic; Hume's is skeptical and pragmatic. Schopenhauer here, more than Nietzsche, may have elements of Berkeley. What I am concerned about is that Schopenhauer and Nietzsche do represent the revival of a direct substantialism of the living-doing-suffering persuasion, going back perhaps to the power strain of Locke, if not to the Scotist voluntarism of the fourteenth-century Franciscans. The metaphysics is stated by Schopenhauer. Kant, he says emphatically, was right—if he is rescued from the misinterpretations of Hegel—except for his failure to recognize that the thing in itself is not removed from our acquaintance but is indeed that which is best-known, is closest, is ourselves, is will. And Schopenhauer's ethics, with its essential foundation in sympathy, has its kinship with Hume and the eighteenth century (Schopenhauer is dividedly romantic, Enlightenment, and classicist), although its goal and outcome, still equivocal, are as far from Hume as is Sanscrit. His ethics and sympathy add to his
feeling for and our assurance of his substantialism. When he tells us: by all means read Newton and learn the mathematics of gravity, but go to the cathedral and feel the pressure of the stones on the arches, columns, and buttresses and you will know weight better—when he gives us such admonitions to sympathetic interaction, he does better for substance than Descartes does in his definition or Kant in his second analogy.

But voluntaristic substantialism seems cramped, or diluted—in its appeal to both common sense and philosophic theory—by a failure of ancient familiarity in what is meant by “will” and by a lack of the greater imaginative stability of those other abstractive directions leading to matter or soul or even the picturesque ideas. (I think it has some advantages, especially over the ideas, in its appeal to our feeling for power.) What is it that stays through, is permanent, in the unresting will? And it suffers by comparison with knowledge, taken as an action or function rather than as content, because of its lack of individual inwardness and outward awareness. What is it that brings the “blind” will into selfhood or response to the world? At any rate the Schopenhauerian will has had a wide influence but one generally becoming shallower and less substantial.

Bergson may be said to have given it its best channel; but Bergson, by his own account, paid more heed to Schelling (and to Zeno), and his influence in turn has been more epistemological than metaphysical. Schopenhauer we have said was radically moralized by Nietzsche and so by the existentialists who have used Nietzsche, with a further heavy (or fluffy) infusion of subjectivism. Martin Heidegger, at least by declaration, shuns the subjective, and the possible hope for substantialism among the existentialists would seem to be with him. I think he is the best philosopher among
them; but it is doubtful if even a sudden vogue would sufficiently pierce his famous opacity to make him a great influence in philosophy or general thought.

Alfred North Whitehead, by usual consent the best metaphysician and the most hospitable of our century, expresses his debt to Bergson (and to Berkeley) and has among his many backgrounds or similarities something of the will and empathy of Schopenhauer. But I believe our chief gratitude to Whitehead should be for his enrichment of our view of knowing and for varied recognitions of the sort of integralism I have been preaching, not for any ontological realism or substantialism. Here it is not only his aloofness from the word “substance” (taken in Locke’s “something I know not what” sense and in that of the physicists’ and chemists’ substrate) but also the subjectivistic commitment of his “experience” metaphysics that stands in the way.

George Santayana liked the word “substance” and its out-there realism, and might have made a substantialism on more classic grounds, but he too let substance lapse into stuff—a Democritean-Epicurean-Lucretian matter—and added an “epiphenomenal” realm of ideas which the elegant and literal Epicurus never thought of and would never have thought of. Perhaps a more traditional or Aristotelian theory of substance may be achieved by the personalists: Brightman, Flewelling, Bertocci, Smith; but they have not made real impact so far.

So I look to the physicists, who, in this mid-twentieth century, are declaring the abstractness, the finality and artifice, of the notion of substrate, together with its Anaximanderian unboundedness of possibility and Aristotelian potentiality when it is taken in the account of the actual. And the novelty in physics—not only in the Copenhagen school but in Max Born, Schrödinger, Eddington—has doubtless aided
a kindred openness in the consideration of life in biology and in the ADN enthusiasms of biophysics and biochemistry.

Whitehead makes a notable exposure of the shortcomings of the modern scientific view of substance as stuff, as geometrical matter, whether or not one goes all the way with him in giving up the "fallacy of simple location" (in which he foreshadows Copenhagen physics). He probably did more than any other philosopher to champion a larger and deeper view of our acquaintance—for the infusion of it by quality and feeling and value. And he makes an honest effort for what he thinks of as realism. But his realism seems to me to be always epistemological and not metaphysical. He cannot do better, for he never breaks the net of that Humean-Hegelian retraction of both the knowing person and the known thing into "knowledge." Why, I have sometimes asked, do not the prizefight reporters go on from the naive account of one man hitting another to a sophisticated doctrine of "hitledge," and then, when the uninstructed see the heavyweights trying to damage one another, the experts can parcel out the mutual and sometimes symmetrical relations of action and passion of the hitledge on display in the ring. Whitehead’s "actual occasions" and "prehensions" as well as his "least puff" of experience are still awarenesses. His nearest approach to substance, a substantialist will feel, is in the "eternal objects," entering into or excluded from the actual occasions. This would be a sort of super-Platonism. He does much to get around this complaint and to reconcile me when he says, as he does, that he wants experiencing rather more than experiences. His is meant to be and is a philosophy of process. So I should want mine to be. I am a Heraclitean who believes that all substance is in process and that nothing else is. The substance changes and is permanent through the change and endures and perdures; it is itself but is never
mathematically or logically identical at different times. There is no boy who grows or dancer who dances substantially different from the growing boy or the dancing dancer, although the growing boy will later be the full-grown man and the dancer will go to sleep. "It may be a weakness of my metaphysics" but I cannot—and I have tried to try—imagine a substance that is not in process; and it seems to be still more impossible to imagine a process that is not of a substance. Now it might be a Berkeleyan spiritual substance, even a Cartesian purely thinking substance; but it will not be a mere percipere or penser. And I weary trying to follow the patience and ingenuity of Whitehead trying to make a world: a continuing world of prehending brevities and an extended world of perspectives. I love knowing but I want a knower and what is known. "This horse and this man" seem to be more than their own knowing or experiencing, and certainly they are more than mine. And I have trouble (partly illicit I do not doubt) with the dynamic and the causal, whose good friend Whitehead meant to be, explaining how my prehending or the horse's makes me lose a bet on him or bring into presumably additional prehension his or my children.

Process requires continuance—per-manence—as well as change. Whitehead was fully aware of this and tries to provide for it in prehensions, and personal "societies" of prehensions, which have an interfusion from one to the next: "actual occasions" of greater or less duration but never long. But can this be enough? It seems to make of me a train of communicating cars at best; hardly a vehicle, much less an organism. There are several trains in my process, with occasional cross glances but not couplings serially, and yet all my own. When I go from the classroom to the race track I am still myself—indeed I may be said in going to renew myself—but the "occasions" scarcely coalesce: at the
track everything not racing or gambling is erased. And if, back at lecturing, I use a racing illustration, it is no intrusion of track "experience" into that of the lecture but an intellectual reaching out of the lecturer to something outside himself he has known. If there is danger of split personality, I suspect (I am surely no psychiatrist) the danger is in the overly concentrated attention of the man of single interest. Just as common sense thinks my body goes from the University to Pimlico—a changing body "proceeding" across town—so my self, staying myself but always changing, goes through the changing Baltimore to the track, by tradition stand-pat and the scene of speed and upset. One of the basic charms of the track is the way its problems, as apart from those of the university, come to a conclusion and are gone with every race; while the continuing, and triumphing, and defeated, rejoicing and suffering self can move on to a brand new race—solving as he can the problem of another two dollars.

I am aware that much of what I am doing is no more than translating the language of Process and Reality into my ordinary idiom. But I am convinced the idiom is easier, not merely because I know it, but because it is easier: it would be easier to learn and use for one who had known neither. And I think it is easier because it is closer to what is really there. It also seems to me to succeed in saying, or partly saying, what the experience language can not say, despite the wonderful width and depth of Whitehead's consideration, his patience, and his ingenuity.

Santayana's normally Epicurean description of substance as atomic matter is itself rather in his realm of "essences" than it is asserted to be "essential" of the literal being of substance. Santayana's assurance of the symbolic character of knowledge is too real to allow such realism to any descrip-
tion of what stands under knowledge in existence. So the classic atom in the void with the atom's size, shape, position, and motion is both not bare enough (using Bacon's fable with respect to "Cupid or the atom")—as asserting of substance descriptive epithets we cannot be sure of—and too bare—as denying of substance other characters and powers beyond our little symbology. This richness of feeling for the stuff of things brings Santayana back into association with the Milesians and Bacon and also forward into association with the differently based "complementarity" of Bohr, de Broglie, Heisenberg. Here are some sentences from Santayana's Herbert Spencer Lecture on "The Unknowable" at Oxford in 1923:

A point in which he [Spencer] seems to me to have been a true philosopher . . . [is] his belief in a substance which by its secret operation, in infinite modes, kindles experience. . . . Any experience is incidental to animal life and animal passions, which in turn are incidental to the general flux of substance in the world. Appearances and feelings and consciousness itself are in their nature desultory and unsubstantial yet not altogether groundless nor altogether mad, because substance creates and sustains them. . . .

We need but sharpen our wits, and shake our minds loose from prejudice, trying new categories, until we come nearer the heart of those substantial dynamic objects which confront us in action. This approach need not be a magical divination of their essence, although when the object recognized is a mind like our own, such literal divination is not impossible.

Human experience is filled full with such appropriate comments on neighboring modes of substance, and with appropriate names and sketches clapped upon events. Among these signs and tokens there are some especially venerable symbols, those same ideas already mentioned of matter, of God, of the natural world, of various persons and passions. These venerable symbols are characters attributed to substance and its modes by the human imagination, after long experience and much puzzled reflection.
What exists is the substance at work, and this substance is never an idea hypostatized. It is prior to all ideas and descriptions of it, the object that, in their rivalry, they are all endeavoring to report truly. . . . But whether we think fit to call substance there matter, and here God, or invent other names, substance will remain what it is, our ideas and appellations will have no power to create it where it is not, or to dislodge or modify it where it is.

As centers of light, jewels seem rather trivial and monotonous. And yet there is an unmistakable spell about these pebbles. . . . They are substances.¹

But it is also intimated in these passages about substance that Santayana’s mind is as convinced of the ideality of the ideas—both of their unsubstantiality and of their contentual presence—as his heart is moved toward substance. So he is a sort of Locke rendered thoroughly skeptical of any proof of the representative accuracy, or even the representative character, of the ideas, which are now “essences”: skeptical and saving his assurance of substance only by his acceptance of “animal faith.” I suppose this is the counterpart of Locke’s “sensible knowledge” of the world, made self-conscious and critical; for Santayana shares Locke’s feeling for the dynamics of acquaintance and makes this too self-conscious and much wider. It is one of his virtues that he was one of the chief twentieth-century voices for enriching our modes of acquaintance. The official post-Humean philosophic psychology, he says, must have been the outcome of studying the dictionary, not the mind.² But this makes a difficulty for him like that of Berkeley and the “notion.” When Santayana thinks of substance he presumably has to think with an “essence,” the meaning of “substance”; but no essence is literally representative; and our acquaintance with

². George Santayana, Scepticism and Animal Faith (New York, 1923), p. 188.
the substantial things and events of the world is existential and participationist rather than a contemplation of essences. So, corresponding with "knowledge," is "animal faith."

In the lecture on Spencer, Santayana grows wary of the epithet Spencer is fond of, "the unknowable," and says that there cannot be anything that is intrinsically unknowable. This is partly his dislike of what he calls "idealism." It is also because of his restriction of the word "knowledge" to the use in "discourse" of always-partly-arbitrary symbols either in dialectic or in sentences about our fellow things, which we are aware of in living interplay, the existence of which our animal faith gives us ground to assert, and the attributes and relations of which we may be said to "know" in our selection of relevant essences to use in our discourse about them. "Knowledge is a salutation, not an embrace." 3

It may that his brief association with the "critical realists" in their reply to and controversy with the "new realists" (the two volumes of 1912 and 1920) helped deflect the nonassociative and noncontroversialist Santayana to the emphasis upon "essences" and "animal faith" which marked his middle period, especially the first half of the opening volume of his "realms" series, *Scepticism and Animal Faith*. Perhaps more it was because he was then in his middle period; middle age is well skipped by anyone: certainly the philosopher should be able to say "I have been young and now am old"—or not care.

There is always a gentlemanly skepticism in Santayana—skepticism is by nature well-mannered, he says. But when skepticism becomes theoretical and doctrinaire it becomes pedantic and fits the gentlemanly Santayana ("philosophic dandy," Lovejoy called him) only in his brief poses of deliberate theory. And perhaps this was when he wore it. But

his colleagues fixed upon his pose. And he was proud of his essences. (I do not wish to depreciate them. There is—and he helped us to see it—a Platonic element in any acquaintance, no matter how little intellectual, but ready to be discriminated by our minds. But I think I see dogs and mountains, feel stomach aches, have intimations of immortality, choose goods, say prayers: and none of these are essences.) As the declarer of essences, skepticism, and animal faith, he lost what I want to be grateful for, his influence toward an awareness of a richer and more realistic awareness, and toward substance.

But his earlier more existentialist and more substantialist potentiality was not lost or foreclosed; in The Life of Reason and the Three Philosophical Poets (The Sense of Beauty may be a case apart) it survived the rewriting of the former and the writing of the Realms of Being, and even came to the surface inside them. After the first part of Scepticism and Animal Faith, chapter XIX on “The Belief in Substance” is one of his warmer statements of substantialism. I could have quoted it rather than the lecture on Spencer. (Both were published in 1923.) At the end of that chapter in my first edition I find I wrote: “If he had not worked so hard earlier to turn the outer perceptions into dreams, essences, illusions, he would not now have to keep them so far apart from partnership with his ‘voice of hunger’ in announcing and describing substances.” The reference is to a sentence just above: “Belief in substance, taken transcendentally, as a critic of knowledge must take it [a caveat from the first part of the book], is the most irrational, animal, and primitive of beliefs: it is the voice of hunger.” His old-age book, The Idea of Christ in the Gospels, which philosophers are apt to bypass, is appropriately an intensification of some themes of his youth with, I believe, almost no projection of his middle age.
From first to last Santayana uses the word “substance” with kindly feeling for the word and notion if not always for the thing. In the chapter on piety in his early *Reason in Religion* he talks of piety toward the universe. “Its extent, its order, its beauty, its cruelty make it quite impressive. If we dramatize its life and conceive its spirit, we are filled with wonder, terror, and amusement, so magnificent is that spirit, so prolific, inexorable, grammatical and dull. . . . Great is this organism of mud and fire, terrible this vast, painful, glorious experiment. Why should we not look at the universe with piety? Is it not our substance?” And in *Dominations and Powers*, published when he was eighty-eight, there is a passage dwelling on the word “substance” which, if less purple, is more kindly.

In the preface to *Scepticism and Animal Faith* George Santayana said:

There is one point, indeed, in which I am truly sorry not to be able to profit by the guidance of my contemporaries. There is now a great ferment in natural and mathematical philosophy and the times seem ripe for a new system of nature, at once ingenuous and comprehensive, such as has not appeared since the earlier days of Greece. We may soon be all believing in an honest cosmology, comparable with that of Heraclitus, Pythagoras, or Democritus. I wish such scientific systems joy, and if I were competent to follow or to forecast their procedure, I should gladly avail myself of their results, which are bound to be no less picturesque than instructive. But what exists today is so tentative, obscure, and confused by bad philosophy, that there is no knowing what parts may be sound and what parts merely personal and scatter-brained. If I were a mathematician I should no doubt regale myself, if not the reader, with an electric or logistic system of the universe expressed in algebraic symbols. For good or ill, I am an ignorant man, almost a poet, and I can only spread a feast of what everybody knows.

This was in 1923. The most literary of the philosophers and the one with the least personal involvement in science
(a character he carefully intimates in his use of the somewhat quaint “natural and mathematical philosophy” for relativity physics and subatomic physics) is one of the perceptive as to the scientific climate and promise. Albert Einstein’s two “breakthrough” papers, on relativity and light quanta, were in 1905, and Max Planck’s quantum goes back to 1900. Niels Bohr’s theory of the discontinuous electron orbits had been achieved, but quantum mechanics—Bohr’s complementarity, Max Born’s probability, Louis de Broglie’s wave-particle, Erwin Schrödinger’s and Werner Heisenberg’s differing mathematics and similar indeterminacy—still lay ahead, but not far. It was in 1923 that Charles Galton Darwin, in a paper entitled “The wave theory and the quantum theory,” wrote the sentence which Max Jammer (in The Conceptual Development of Quantum Mechanics) thinks is the first, but unclear, statement of the wave-particle duplicity. Santayana was not in C. G. Darwin’s position; but I think he knew something of the “ferment” in the theory of the atom. And he knew Einstein, to whom his (respectful) references are not infrequent. Relativity, indeed, by 1923 had a vogue—by no means an always admiring one—even among the philosophers. A very infrequent writer of papers, I had written one on the theory of relativity. I have no intention of rereading it, but I think it was not all bad and had a point of some relevance. But I was not as perceptive as Santayana. I did not see in 1923 anything of what seems clear to me now, that the first half of our century, the time of Einstein and Bohr—and possibly what comes after—is one of the great periods, and is so on account of its science, ranking with the early period of the Greeks and the early period of the moderns. A great scientific period must, I think, be great in its contribution to philosophy when the philosophers get around to it, especially its contribution to the theory of substance, what is really there;
and normally in its contribution to that meaning of “substance” which is the Milesian problem of “the constitution of matter,” the Milesian physics-philosophy of the stuff of which things are made.

Here Einstein gave us a superbly new shaking-up of the pure-Pythagorean doctrine of space-time-number by the stirring-in of non-Euclidean geometry; and Bohr gave us a superbly new shaking-up of Democritean atomism by a stirring-in of probability and hesitation even as to the “inner” character of the “indivisible” particle itself. In both schools there is the common element, quite differently accented and used, of the ineradicable and uncorrectible effect of measuring upon that which is measured. And as the best-known, human, and not unimportantly theoretic, strand of the story is the inability of the older Einstein to accept the somewhat younger Bohr’s indeterminacy, thus creating the continuing distress of the two great men, creators, friends, and opponents.

Such a shaking and loosening, with the optionalism of the three geometries and of the two roles of wave and particle, naturally loosens and reinterprets the alternatives philosophy had supposed it had in the theory as to the reality and actuality (or not) and as to the character of the stuff of things. Pythagoras said all is number, and meant it. And yet the “whole” Pythagoras could not mean it because he was a religious teacher, intent on the career of the soul, which by studying the numbers can win salvation and which is in danger of going bad. Numbers do not have that hope or that worry. Even as describers of nature the Pythagoreans had to call on the outside darkness, albeit under their breath, to fill in and give existence to their forms. Back in Ionia, Anaximander had said all is the boundless, a stuff with no form or limits or character. Yet out of this the forms, limits, characters are, without apology, shaken. Democritus, with
the aid of the impossible One of Parmenides and with the audacious introduction of empty space, the void, puts together no more than what is needful from Anaximander and Pythagoras. Inside the atom there is no character except indivisibility. Nothing can be shaken out of an atom, precisely because there is nothing (no character) in there and because there is no nothing (no space) in there. Externally the atom has very little—only size, shape, position, motion—but what it has is very precise—mathematical—and all else is very positively ruled out as not there. Nothing can be shaken out of the atom, but a lot of atoms shaken together do, the theory says, eventuate in all the manyness of characters we know—the qualitative, passionate, valuative, cognitive world we live in—and doubtless eventuate in more characters in other worlds or later in this one if we learn more and make more instruments. How this can be, with nothing but atoms and the void so precisely characterized and so definitely denied further character, has always seemed a puzzle to some imaginations. And the void—its literalness and the definiteness of its negativity, like the kindred adjectives of the atom—has been a hindrance as well as a help.

Greek materialism, or atomism if the word be taken vaguely, as the doctrine of a natural world of bodies moving with regular ways in time and space, has been the normal, if not quite unanimous, acceptance of natural science since the pre-Socratic Greeks. Atomism more precisely—as the assertion of indivisible bits of matter, with size, shape, position, motion only, in a void, and with nothing else substantial—has been more frequently denied, qualified, or embroidered, but has remained in its essentials a general basis of physics and chemistry down to our own time.

Aristotle, although he calls the soul the form of the body, "the first entelechy of a body having life naturally within it," declares the Democritean view that an arrange-
ment of atoms can be life or soul preposterous, as is also, he thinks, the indivisibility of the atom, since it must be and is extended and anything extended can be imagined divided; and to this he added a denial of empty space. And Aristotle was the "master of those who know," especially in the later Middle Ages. But atomism went on, through Epicurus and the Epicureans and others, down to Pierre Gassendi the contemporary of Descartes. (Gassendi, like Ralph Cudworth on the other side in England, might have had a larger influence if he had not been so verbose.) Descartes followed Aristotle (he would not like that phrase) in needing a different soul from that of the atomists, in denying the void, and in denying indivisibility—in favor of the dimensionless point, I suppose. Newton and the English, perhaps with some influence from Bacon, preferred "corpuscle" to atom. Dimitri Mendelyeev with his periodic table brought the new atom back to more Pythagorean elegance. And the atom of Ernest Rutherford, with whom Bohr worked and for whom he wrote his theory of the orbits, is the lineal descendant of the atom of Democritus, or of the presumed creator, Democritus' shadowy teacher, Leucippus of Abdera and Miletus. But this is not the place nor am I the person to give a history of scientific matter. It has been given, from a different point of view, by Stephen Toulmin and June Goodfield (Mrs. Toulmin) in The Architecture of Matter.

Democritean atomism, with its precisely given atoms and void, is what Francis Bacon calls Cupid naked but shapely. Thales, with his stuff of water, familiar and familiarly rich in potential variety, is Cupid clothed. Aristotle, and back of him Anaximander, with a substrate asserted as without character, is Cupid not only unclothed but formless. (Bacon has a fourth: "Cupid not only cloaked but masked," which I leave out.) Bacon prefers the naked Cupid but he chides Democritus for the shape he gives him. Bacon, in-
deed, though he too would not like my saying so, is, on my interpretation of the three men, rather Thalesian than Democritean. I would add to Bacon’s apologue that Heraclitus does not belong where Bacon puts him, with Thales and Cupid clothed. For Heraclitus makes his substance not the stuff fire but the person, the soul, the spirit of the individual—man or world—which the fire stands for, as the water and earth of the animal “embodies” the fire of his soul. And so Aristotle, for whom the substrate is only at times and after a fashion substantial while “this man or this horse” is prime substance, is only Anaximanderian in his view of stuff; whereas in his substantialism he is rather in the following of Heraclitus.

So in stuff doctrine we can go with Thales, Anaximander, or Democritus. Or we can formalize away from the materiality of stuff toward space-time-number and go with Pythagoras. Or we can integrate to the full individual with Aristotle. Or we can spiritualize away from matter and the physical toward Neoplatonism. In these rubrics Einstein would figure as Pythagorean, Bohr as Anaximanderian (despite Heisenberg’s liking for Heraclitus) or, perhaps, in Bohr’s beginning in physics, as Democritean. But Einstein and Bohr, as we said, have shaken the rubrics. A Pythagorean cosmos with three geometries may be a super-Pythagoreanism. A boundless into which has been infused a wave-particle probability might have pleased Anaximander. At any rate some rhetorical if not real easing has been given to the puzzle of how all the somethings of our world can come from what is declared not to be those somethings and to be what those somethings are not. We are now less taken back when Aristotle tells us often that prime matter has no character and then tells us (and in the Physics of all places) that prime matter has the character of yearning for character as the female yearns for the male.
One fact that seems to come to light in the study of stuff, matter, is that Democritus alone gives us an account of matter which we can both imagine and be intelligible about. (This may be a measure of its inadequacy.) I have heard many persons challenged to make clear what they mean by “soul” but few challenged to make clear what they mean by “matter.” For some years I have liked to ask students a question about what Aristotle means by matter and form; and I have been struck by the regularity with which they have their hardest time trying to tell me what Aristotle means, or what they think he means, or indeed what they themselves mean, by matter. Actually, I suppose we have no acquaintance with pure matter. Nor do we with pure soul. As to form, or “Idea,” I think we have no existential acquaintance, or “reminiscence,” of pure form; and yet we have a beautifully clear and distinct ability to think of and discourse about many “essences” quite abstract from the things in which we may have come to know them. We can not do this with either soul or matter. And still for the Aristotelian the ensouled body, the embodied soul, is the substance “in the truest sense.” But physics, all science, is the endeavor both to dissect and to abstract what is really there in order to make it intelligible. Science as it grows wiser and more successful should bring us back again to all of the world from which it started, so as to make what is really there not only intelligible but understandable. It may sound odd to say that relativity and quantum physics are on the way to doing this; but I believe it is so. Are the still newer physics, such as parity and imparity and antimatter, on the same way? And the biophysics of ADN? And what else? I think so; but this is still in the making. At least much else has taken the élan of the Einstein-Bohr physics.

I was thinking the other day that we are fortunate to have so much narrative and description of the making of
science in this century when I came across a paragraph de­
ploring how little we have—that Einstein and Bohr and
Pauli and Schrödinger and Szilard and many others are gone.
There is truth in both feelings. But surely there have been
an extraordinary number of books, especially in the last few
years, mostly for the general reader—books like George Ga­
mow’s Thirty Years that Shook Physics and Barbara Lovett
Cline’s Questioners: Physicists and the Quantum Theory
(recounted and reviewed at length in The New Yorker in
1966 by Jeremy Bernstein)—and many with pictures. To be
sure we do not have the photographic record we have of
movie, stage, and TV stars, of warriors or athletes or politi­
cians; but we must not demand the impossible. And when
we think what we have in the way of accounts of Copernicus,
Vesalius, Galileo, Kepler, Bacon, Descartes, Harvey, Gilbert,
Boyle, Newton, Huyghens, we may well be grateful.

Controversies frequently, if not regularly, get hotter, de­
generate in quality, and are just put aside as people get tired
of them or of the acrimony. In my boyhood before World
War I there was a pleasant belief that understanding widens
and deepens and tolerance grows. We are no longer apt to
think so, but we can take some comfort that fashion and
boredom can do for us something of what improved under­
standing was supposed to do. So of homoiousian against
homoousian and supra- and infra-lapsarianism. Not a few
lives were lost over each. The putting aside is a great worldly
help, however theory may be postponed. Sometimes as the­
oretic controversy the rivalry is about the nature of a real or
good thing, and the result is in a denial that the thing is.
Is it true that X is a or that X is b? After a time let us,
somewhat timidly, deny that there is any X. Then we go to
other fields.

So I think it has happened twice, on large scale, with
“substance.” Aristotle’s debate, after a fine first sight in the Categories of the nature of prime substance, is so often and so convolutedly about whether substance is always prime substance, the thing; or may also be, or may contrarily be, matter or form; that philosophers, wearied and humble anyway after the three hundred years of the glory that was Greece, tried dogmatically to accept and then to put aside decision or to deny or ignore the actuality of substance.

After Descartes’ unfortunate definition and his accent on extended substance for the sake of physics, argument rose and reached a pedestrian “height” in the Locke-Stillingfleet correspondence, which was radically deflected by the subordination of the question “What is substantial?” to the criterion of the helpfulness or otherwise to the contemporary Christian version of the immortality of the soul. It may be that out of this the imaginative originality of Berkeley brought his spiritualist substantialism. But Berkeley was slightly misunderstood or misunderstood, and his immaterialism with respect to the objects of perception was promptly denatured by Hume into a denial of all substance.

Students sometimes ask what a Milesian “hylozoism”—an integral theory of the soul and body—does to a belief in immortality. They ask this especially after reading Aristotle, who uses just such a theory of soul to dismiss immortality (except now and then for the “purely rational,” which does not give him sure evidence of a material organ and medium) and to deride the transmigration doctrine of Socrates, to whom in general he seems to me to be closer than Plato is. Well, this is another story. But I should be sorry to leave a barrier to any otherwise willing listener; and it may be enough to say that the difficulties are rather for our conventionally trained imaginations than insuperable in logic. Aristotle did not have his imagination trained to our conventions, but he had a very literal imagination (I would not change it) which
sometimes made his own theories too literal, as it did sometimes in respect of this very theory of the soul as the “form of the body.” He shuns any passage of the soul from one body to another as being like the passage of the insignia on a ring to the wax; but he denounces Democritus for supposing that the soul, that life, could possibly reside in any shape or arrangement or configuration of the material atoms in the void. The life of the body, he says better, is like the seeing of the eye: “the soul is the first entelechy of a body having life naturally within it.” But sight is a function and does not seem to have the unity of even an eye when considered apart from the rest of its body; whereas the soul seems to be that which contributes individuality to the body, or if you prefer to say, as Aristotle would have preferred, the living individuality of the body is what we call soul. Can that in any meaningful way be thought to live after the end of this life, or to have lived before the birth of this life? It would seem to require—on the premise that life needs body and body needs life and that life and body are aspects of substance and not separate substances (this is leaving open the question whether there is lifeless matter; although such a doctrine might suggest, symmetrically, that there is an immaterial life)—a previous or subsequent life of the soul would seem to require either an instantaneous passage to another body, or a period of nonexistence between bodies, or more than one body or sorts of body of which the deaths are not simultaneous. The last might have been explored by Aristotle with his theory of the three souls and of reason without gross body. And it may be enough to add that there have been fairly many believers in body-soul mutuality—considering the much greater number of dualists, materialists, idealists—who have also been believers in immortality or continuance. Saint Paul was one; he seems to have been
as sure he would have a body as he was uncontent with the one he had this time.

As a Christian I have suggested a Copenhagen interpretation of the dogma of the Trinity, a dogma that has delighted some, offended some (including Mr. Lovejoy), and puzzled many. Make up your mind whether light is a wave or a particle. Fresnel seemed to answer “crucially” in favor of wave. Now the quantum answers otherwise, without upsetting Fresnel. So Athanasian Christian experience finds three in one. The instrument we use to measure, the need and the path we go, do not give the nature found, but they seem to have something ineradicable to do with what person, hypostasis, continuity or discreteness, comes to answer. Perhaps such complementarity is our proper approach to any ultimate. (A further suggestion, from Athanasius—and from Kant—would be that Copenhagen physics might look for a third.)

A new edition of Mother Goose reminds me that she has a story for substance, which I use to end with:

There was an old woman
   Lived under a hill;
And if she’s not gone
   She lives there still.

But then I think of more and more summings-up from the same source. Mother Goose is, indeed, a collection of very substantial poems.