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Science and Philosophy

THERE was a blissful time when human knowledge was not formally differentiated. Without going far back into history, we may recall the wise men of ancient Greece, who never thought of drawing a distinction between mathematics and natural science, psychology and moral science. So Thales and Pythagoras are hailed as the true founders of practically every major branch of knowledge. Indeed, the early Greek thinkers were at the same time not only philosophers and social reformers, mathematicians and physicists, but also politicians and soldiers, engineers and traders—a fact which suggests a special conception of the unity of knowledge, if not of knowledge and action as well. Even the teaching of the Academy and the Lyceum, following the Pythagorean tradition, had a universal character, though some members of these schools specialised in particular branches of learning. It was not until the Alexandrians that the various sciences were really differentiated and studied separately.

This unitarian conception of knowledge was developed in a most remarkable and inspiring way. To take but one example, the Pythagoreans considered number not only as the basis of abstract science but also of music, ethics and religion. Such doctrines as that of the harmony of the spheres, or of the correspondence between certain numbers and the moral virtues, may appear fantastic. Yet, they have a profound meaning; and strange as it may seem to be, mathematics was one of the fundamental causes which influenced the social activities of the Pythagorean order. Indeed, the discovery of the irrational quantities was the spiritual cause of the breakdown of the Brotherhood. But the spirit and the method remained: it was the necessity of 'explaining' the irrationals which led Plato to build up a philosophical system in which mathematical and scientific ideas were freely used, for the justification of both Nature and the world of ideas.

It was only natural that all knowledge should be one when the particular sciences were in their infancy. There is, however, a deeper meaning in the unitarian attitude of the Greek mind: it illustrates the fact that the growth of mathematical and scientific ideas is intimately interwoven with the threads of philosophy proper. This attitude can be traced all through the ages up to the cosmological disquisitions of Copernicus, of Kepler, of Newton himself. Again, we find the

mathematical and physical discoveries of Descartes influencing his 'method', his philosophy, his cosmology and even his biology, and suggesting to Spinoza a geometrical proof of the dictates of conscience. With Leibniz we can see how the idea of the 'infinitesimally small' is made the basis not only of the calculus, but also of his conception of substance, of monads and their pre-established harmony, of psychology, ethics and theology. Further, though Kant's philosophy opens with this fundamental question 'How is pure mathematics possible?', its collapse was largely due to the discovery of non-Euclidian geometry and to the invention of imaginary quantities which could not be easily explained with that system.

Kantian philosophy was, however, responsible for the definite estrangement of science and philosophy in the nineteenth century. Science was firmly attached to the realm of pure reason, while the major values of reality were left to the charitable conclusions of practical reason, the arbitrariness of which ultimately cast doubts on the relevance of philosophical issues to the claims of positive knowledge. The alliance of the sciences with reason and the remarkable scientific developments of the time, led the Positivist school to discard philosophy from the sphere of human concerns. With philosophy at a discount, the way was clear for a mechanist and materialist interpretation of the universe and of life. The notion that to be real a thing must be of the same nature as a piece of matter, became the predominant axiom upon which was based any explanation of scientific results; and as matter can be seen and touched, whatever was real ought to be seen and touched, at least theoretically. The analysis and description of a thing in terms of molecules and atoms and their movements was the sole condition of dealing with reality; all else, such as metaphysical values and religious experience, was a pointless incursion into a world of shadows. Yet, it is a curious fact that the further analysis of the objects perceived finally exploded the very 'reality' they represented.

This is, however, the epic of the contemporary development of our knowledge. With matter considered as a hump in space-time and gradually vanishing into nothingness, the obvious and solid foundation of nineteenth century science has disappeared. The imaginative conception of reality no longer being restricted by its likeness to the objects of perception, there could be no reason why the promptings of moral, æsthetic and

religious experience should be still considered as unreal, and the way was thus open for a reconsideration of the philosophical interpretation of the universe on its merits. The immediate effect of this new situation was to narrow the gulf between science and philosophy. Physicists began to look for a solution of their particular problems in the boundless extent they discovered beyond the traditional horizon of physics. In reaching out to these inquiries, philosophers became more and more interested in the methods and results of the special sciences, and brought down metaphysics into the laboratory and the market place.

What are the results of this welcome co-operation? Eminent astronomers and physicists like Eddington, Jeans, Planck and Einstein, do not conceive the world of matter as something existing independently of the mind. Not only does scientific thought affect the nature of the things it studies, but also matter itself becomes simply an appearance of the mental or spiritual unity which alone is real. Compared with the dogmatic pronouncement of their predecessors fifty years ago that matter alone was real, the present attitude of these scientific thinkers is its extreme opposite. This complete reversion is the more arresting when one considers that matter which, in the past, was subject to the blind laws of classical mechanics, is now endowed with something almost like free-will, thanks to the implications of Heisenberg's principle of indeterminacy. With Whitehead, Russell, and the idealist philosophers, this peculiar character of matter is further emphasised.

The important consequences of such views in the field of biology are that life is not a by-product of blind processes of dead matter, but something fundamental and creative, exhibiting its own purposes and ends. Hence arise theories of creative evolution in which the processes of life continually bring to birth something new. Even those who refuse to accept a fundamental distinction between matter and life have to talk of emergent evolution, of 'organism' and of 'holism'. Whitehead, for example, considers the universe as an organic whole of which the living organism is a pattern; while Smuts assimilates biological progress with the integration of more and more elements to form larger and larger organic wholes.

When we reach psychology, however, we find the position again reversed. Two generations ago, psychology was not acknowledged to be a science, on the ground that it was mainly introspective,

and therefore subjective; it gave too much importance to mind as against matter, which was, as we have seen, the ultimate basis of reality. To-day, however, psychology is becoming more and more objective; and with the advent of behaviourism or the conditioned reflexes, it describes the processes of the living organism in terms appropriate to a highly complicated automatic machine. We are thus faced with the conclusion that freedom, which physics allows to dead matter, is refused by psychology to thinking organisms. Indeed, while the highest achievement of physics is to have become subjective, the last word in psychology is to give that science an objective character.

Between such extreme views, of course, a number of intermediate theories have taken their place; and though the most prominent properties of physics and biology, in the minds of some of their brilliant exponents, are their subjectivism, there are a number of physicists, biologists and philosophers who still hold mechanistic or dualistic views on the interpretation of these sciences. Again, behaviourism, the doctrine of conditioned reflexes, and psycho-analysis, are not the only representatives of psychological theories: idealism and dualism have still a strong following in this field. This chaos of values indicates clearly that science does not tell us the whole truth about things, but only partial truths about those aspects of things which can be subjected to its methods. In other words, science is not the only guide which can help us in the exploration of the universe and in the interpretation of our findings. On the other hand, without the theoretical and practical data of the sciences, philosophy alone could neither undertake its scrutiny of reality, nor carry our minds to the highest flights of purposive thinking.

This mutual dependence of science and philosophy is one of the major characteristics of the intellectual atmosphere of our time. Neither of them is a detachable unit in an unorganised aggregate, or an independent agent which is not itself acted upon: they are both living members in the organic whole of knowledge. Science and philosophy have emerged from man's contact with Nature, and have become social habits; but they are customs so geared with the world about us that they must run smoothly, irrespective of climate, race or creed. As man is a social as well as a rational animal, the vast complex of social, emotional and intellectual behaviour he has inherited from society, cannot be simply dismissed

in the name of science if it cannot be described in abstract formulæ. On the other hand, as science is a social outgrowth serving social ends, all attempts to isolate any aspect of it from the intellectual and social movement, of which it is an integral part, can lead to nothing but false and dangerous conclusions. It is true that the scientific analysis of the universe of experience requires its division into a series of differentiated compartments, and the isolation of subjects and objects from their original context; but it would be improper and misleading to build up elaborate structures on these isolated groups, as if there were originally water-tight compartments of knowledge, each having its own independent criteria of importance. On the whole, our schools and our universities seem to be designed to accentuate the practice of isolation, though the pursuit of any one thing cannot be a complete end in itself.

The reconciliation of science and philosophy we witness to-day ought to change the practical conditions of such an outlook if we believe in the constant progress of civilisation and in the greatness of human destiny. An important step in the right direction would be for the academic authorities to introduce the study of philosophy and scientific method as compulsory subsidiary subjects in the official curricula for a first degree. But this brings us back to the attitude of the wise men of ancient Greece, who naturally thought of human knowledge as essentially one, as against the atomised outlook of most thinkers of to-day. Whatever be the specialised fields of scientific workers, they should know how to turn to philosophy for the connecting links between their diverse interests, so as to be able to discuss with competence the true significance and value of their results. On the other hand, it should be the business of philosophers not only to inquire into the higher values of life, but also to subject to a critical analysis all the presuppositions and results of science, and to build up synthetic systems of the whole realm of knowledge and experience. At every new step in human progress, we find men of genius able to make synthetic attempts of this kind. But while to-day science may rightly claim to have performed its part, philosophy is still in the expectation of actual systems which will provide a comprehensive explanation of the results of science and an adequate justification of the periodical and progressive changes in the material conditions and mental outlook of the human race.