"REAL KINDS" AND "GENERAL LAWS".

In the course of his able exposition of M. Bergson's fundamental views, in *MIND*, No. 77 (p. 38), Mr. J. Solomon makes the following important observations: "The 'general law' of the logical text-books is a fusion—by 'endosmose,' as Bergson would say—of the 'law' of modern science and the 'genus' (form, species) of Aristotelian [science]. The two ideas are quite different, though the modern logician . . . often tries to persuade himself that modern science no less than Aristotelian is a search for 'real kinds'. But 'real kinds' imply a negation of the reality of movement; *they* are the one reality, permanent things that maintain themselves generation after generation. Modern science takes movement and change for the ultimate fact and seeks to discover the laws of its stages, that is, the correspondences among those stages; it gives relations; in its most perfect form it gives quantitative relations. Such a relation is 'general,' in our sense, but it is not a genus, a thing, at all. It crosses and confuses all that Aristotle would have thought the most palpable distinctions of genera."

This passage raises some fundamental and debatable questions,—particularly as to the place of Movement, Development, and Teleology, in the Aristotelian system. For our present purpose, however, this is a side-issue, since no one denies that Greek science gave rise to the conception of Nature as a hierarchy of forms or essences whose differences were fixed; and Mr. Solomon's main point appears to be that the idea of 'real kinds,' so understood, and the idea of 'general laws,' characteristic of modern science, are entirely different, and cannot be fused. He refers to myself as one of the writers who endeavour to assimilate the two ideas. I cannot admit that the general logical doctrine, which finds expression more or less imperfectly in my *Introductory Text-book of Logic*, involves in its view of "general laws" a mere fusion of two unrelated and even opposed conceptions.

In a *Note* to chap. v. of the book referred to (pp. 154-156, second or later edition), the idea of "real kinds," derived from ancient science, is examined from the point of view of the modern theory of Development. Just as certain conceptions of modern geometry, involving the "generation" of geometrical figures, enable us to conceive of a "geometrical evolution" of one figure from another, without taking away the meaning of the "real kinds" indicated by the names ellipse, circle, etc., which the Greeks thought to be

absolutely separated from one another; so, in the world of living beings, there are natural divisions, marked off by typical differences which are obvious and clear,—although between them there are margins of debatable ground, as it were, showing transition-forms, and we conceive them as descended from a common stock and as subject to further changes. Species have a relative instead of an absolute stability. And if—since the idea of "real kinds" is not limited to living beings—we take it in its widest reference, and ask what is meant by the "nature" or "essence" of a thing, from the point of view of modern thought, the answer would seem to be in brief that a *thing is what it does*. "To say that a thing has a nature or essence at all, simply means that it is capable of definite modes of behaviour in response to what is done to it. Thus, let us consider some substance which is being used by man for his own purposes. However plastic it is to his designs, whatever transformations he makes it undergo, there remains something that he cannot alter, and which seems indeed to dictate the limits within which his transforming power over the substance shall extend. This is the truth which underlies the ancient doctrine of fixity. There is a 'nature' of the thing, not separate from the changeable qualities, but *revealed* in the qualities as a law controlling their changes in action. Hence to understand things we must make an extensive study of their behaviour, and if possible *make* them act,—experiment with them."¹

Here we come upon the conception of the "general law," which I must maintain to be simply the expression, in terms of modern thought, of the philosophical truths underlying the Aristotelian doctrine of the metaphysical reality of the γένος and εἶδος, and the Platonic doctrine of the transcendence of the εἶδη (with their mediæval counterparts, *universalia in rebus* and *universalia ante res*). Here of course the question is not what these doctrines meant to the consciousness of Aristotle or Plato or the Scholastic Realists. The question is, I repeat, of the implicit philosophical tendency of these epistemological speculations and of its statement in terms of modern thought. It is irrelevant to object that the modern statement involves an idea which was not part of Aristotle's or Plato's conscious thinking and would have greatly disturbed his general system of the world.

What do we mean by a "law of Nature"? It seems to me that this question must be answered by considering the nature of *experimental science*, and that to define law as quantitative statement of relations is inadequate, apart from an examination of the method by which the statement was obtained. We must distinguish and set aside the meaning of "law" as standing for those great probabilities or moral certainties, based on past experience, that such and such things will occur in the future as they have done in the past; that "while the earth remaineth, seed-time and

¹ *Op. cit.*, p. 156.

harvest, and cold and heat, and summer and winter, and day and night shall not cease". Such laws, or uniformities, are only the starting-points of scientific investigation. The laws that science *seeks for* go deeper than these superficial uniformities. The real laws of Nature, though they never tell us absolutely that anything "must" happen, do tell us that *if* certain things are done *then* certain things will follow. Every scientific experiment is directed by an endeavour to discover or test such a law; it is a question put to Nature to see what she will do if we do certain things. The real laws of Nature are laws with an "if".¹ They do not themselves provide the occasions of their own operation, any more than the major premise of a syllogism can of itself provide the minor premise and conclusion.

This is in harmony with the familiar logical analysis of the universal, hypothetical, and disjunctive Judgments. The truth of the hypothetical judgment consists in its reference to an actual objective system within which it affirms the reality "of such a general law as would, if we suppose some conditions present, produce a certain result" (Bradley). In its purely hypothetical form, such a Judgment lacks connexion with a particular case; in fact it cannot be connected with any particular case at all unless supplemented by a true singular or collective judgment referring to concrete existence. In the same way it may be shown that the disjunctive Judgment, when *used* in the interpretation of experience, implies the reality of a system of orderly relations, as Bosanquet shows, and requires reference to a particular case which is to be placed in that system.

These conclusions seem to involve the recognition of an important element of truth even in the extreme forms of scholastic Realism. Every real law of Nature is *ante rem*, and would never come into action at all if the circumstances to which it is applicable never occurred; on their occurrence, it is *in re*, and waits to be traced by us in the empirical result.

I must confess that the view set forth in the preceding paragraphs seems to me so nearly self-evident that I do not know how to argue it. Science implies the reality of universals. Take the simplest possible instance. One stone falls to the earth when allowed to drop; another does the same. Is there any real connexion? If there is none, then it was a chance coincidence. If a million stones fell to the ground under the given condition, it would be a chance coincidence, and would afford no *reason* whatever for supposing that the next stone would do the

¹ If this statement appears too simple, the following may be offered as its equivalent, in reference to the movements of the most elementary masses of which the physical universe is believed to consist: the equations of motion are differential equations of the second order, involving, therefore, two "arbitrary constants" for each moving atom or corpuscle, and there is no mathematico-physical uniformity discoverable in connexion with these "constants".

same. The events would be independent in their real nature. If on the other hand they are not independent, if there is a real connexion, then it is a real universal. It proves on examination to be a "law". This points to an element in Nature which no consistent Nominalist can admit; though, like Mill, he may endeavour to evade the difficulty by speaking of "uniformities" of Nature. But either the "uniformities" point to real universals—to "laws" in the sense in which we have used the term—or Science is impossible.

The conclusion is, then, that even if we take the extreme and (I venture to think) quite untenable view that Plato and Aristotle, like the scholastic Realists, meant by the universal merely the abstract "class-concept,"—even then, there is good ground for assimilating the ancient doctrine of the reality of universals with the modern doctrine of general laws of Nature.

From this point of view, it is possible to bring out the deeper significance of the Aristotelian theory of knowledge, which is suggestive not only in reference to the valid application of systematised knowledge to unsystematised fact, but even to the process of constructing systematised knowledge on the basis of experience. Aristotle's suggestions as regards the method of the latter process (the problem of "Induction" in the ordinary sense) are contained mainly in his doctrine of the *ἐνθύμημα* and *παράδειγμα*.¹ The method of the former process is essentially the same as the principle of the Aristotelian *συλλογισμὸς ἐπιστημονικός*.²

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¹ Mellone, *Logic*, chap. viii., § 3 (pp. 251 ff.; second or later edition).

² *Op. cit.*, chap. viii., § 7 (pp. 232 ff., 237-239, 384).