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INSTINCT AND EXPERIENCE

INSTINCT AND EXPERIENCE

BY

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PREFACE

IN the summer of 1910 a symposium on the subject of Instinct and Intelligence was held in London at a joint meeting of the Aristotelian and British Psychological Societies and of the *Mind* Association. Considerable interest in the discussion was shown both in the room in which we met and beyond its walls. The papers then taken as read, and subsequently published in the "British Journal of Psychology," disclose not a little divergence in the sense in which the terms instinctive and intelligent are used, an underlying divergence in the principles on which the proffered interpretations are based, and indications, more or less clear, of yet deeper-seated differences of philosophical foundation.

The questions at issue seem to open out live problems, and problems of wide range. Being under promise to write a short work on some aspect of genetic psychology I thought I might do some service by expanding my own contribution to the symposium, by bringing it into relation with the views expressed by other contributors, by following up the subject in further detail, and especially by giving something like definite form to the doctrine of experience, which has, of late years, been taking shape in my mind, under influences too numerous to admit of detailed citation.

The burden of my contention is that the history of the universe, so far as we are able to read it, is one continuous story, every episode in which is, if one may so phrase it, logically correlated with other relevant episodes. I use the word logically in a broad sense as equivalent to intelligibly, with no finalistic implication. For reasons which I hope to render clear I avoid the terms mechanical or mechanistic, since there is much in the world-story which, though it should be interpreted as logically or intelligibly determinate, involves natural relationships with which neither mechanics nor mechanism, as such, has any concern. The world-story, then, is intelligible and, in that sense, has a logic which we may endeavour to understand. But the story is only given up to date; we can only found our interpretation on the part that has so far been told; of its further and future development we can only make forecasts in so far as we can, in some measure, sympathetically identify our own finite and imperfect logic of interpretation with the fuller and more perfect logic of the story we attempt to read, a world-story within which our own life and thought is itself a correlated episode forming part of the story as a whole. Often our powers of prevision are balked. It is true that where we are dealing with repetitive routine, little more is required than a skilled application of our powers of calculation. But in the evolution which supersedes routine we have again and again to confess that we cannot foretell how the world-story will work out in the future. This however, I contend, is not because the inherent development of the story will be lacking in logical coherence; it is because our imperfect insight and reason fail to grasp the

determining factors within the deeper logic of the universe. This deeper logic is what I have elected to term the ground of the world, both as that which is experienced or experienceable, and as the process of experiencing. This is the basis of the uniformity of nature, if by this we mean, not merely repetition *da capo* of the tune of the past in recurrent routine, but that progressive and unitary development of a harmonious theme, which is true evolution. In claiming for the universe an inner relevance—a unity of concatenation of correlated episodes—I am not, however, concerned to contend that, for our finite understanding, there is nowhere and at no time discoverable irrelevance. World-processes in their detail seem often to have a way of running into blind alleys which are off the line of evolutionary progress; but even along the main lines of progress since, so far as we can judge, the elimination of irrelevance is a condition of advance in human logic, it may well be that what we call evolution is of the same type. At any rate the development of the world, and of life on its surface, tends consistently to increasing relevance and more closely knit coherence in logical texture. As differentiation and integration proceed the growing complexity involves a type of structure which answers more and more closely to what in our thought is characteristically logical, apparent irrelevance being caught up into a richer relevance within a progressive whole.

Within this developing whole with which experience deals that experience has itself been developed. This involves the presence of those special relationships which are characterized by conscious awareness.

How shall we deal with them? There they are as a matter of fact; that no one can deny. They eventually have all the richness and complexity which are abundantly illustrated in human life; that must be realized to the full. But how are they to be interpreted? As part of the world-story, the highest outcome of its logic developed *ab intra?* Or as alien insertions *ab extra*, derived from a logic of wholly different source? I advocate the acceptance of the former alternative.

But what does this imply? It implies that the explicit logic of human reason is but a higher development of the scarcely explicit logic of perceptual intelligence; and that this in turn has its roots deeply embedded in the implicit logic of instinct which, as I define it, is organic behaviour suffused with awareness.

Now granted that we have here genuine evolution as contrasted with the routine repetition which it supersedes, it appears to me that the key-note of the successive steps of progress is that (if I may pursue the logical analogy) there is always more in the conclusion than was contained in the premises. That is what I understand by the progressive synthesis which is characteristic of an evolving universe which we can interpret in rational fashion. It emphasizes, for example, the fact that in natural selection we have not only the elimination of failure; we have also the synthetic production of success. But I contend that the grounds of the conclusion are always within the logical system of nature, and are not imposed on that system *ab extra.* That is where I part company with Dr. Driesch's Entelechy, M. Bergson's Vital Impetus, and the Psychic Entity of Mr. McDougall's Animism.

And if (carrying things yet one stage further back) conscious experience in the individual organism, as a concrete universal containing its share of the ground of the universe, appears to involve a conclusion carrying more than was present in the merely organic premises of embryological development—that, I urge, is just a fact of world-synthesis to be accepted—that, I claim, is of the same order as the facts which are characteristic of evolution throughout its entire range. If then we ask why this fact should be what it is and as it is, we must surely generalize the question, and ask why evolution should have those characteristics which, by patient research, we find that it does possess; to which question, as I understand the matter, we can give no answer unless we resort to what I have termed the metaphysics of Source.

Such being in outline my personal orientation towards the intra-mundane philosophy of experience, I have attempted to lead up to a discussion of some of the problems it opens out through a consideration of the nature of instinctive behaviour and its accompanying instinctive experience.

C. LLOYD MORGAN

UNIVERSITY OF BRISTOL
May, 1912

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INSTINCT AND EXPERIENCE

CHAPTER I

INSTINCTIVE BEHAVIOUR AND EXPERIENCE

I PROPOSE to approach the problems of experience through the avenue of biology. My aim is to treat the phenomena of conscious existence as a naturalist treats the phenomena of organic life. I shall therefore begin with instinctive behaviour and shall endeavour to give some account of the nature of the instinctive experience which, as I believe, accompanies it. In this way we shall get some idea of what I conceive to be the beginnings of experience in the individual organism.

A consideration of the criticisms to which such a method of treatment, and its results, have been subjected will lead to some qualification of the hypothesis at first barely outlined, and will open up further problems with regard to the nature and development of experience. We shall find as we proceed that the term instinctive is used by different writers with rather wide divergence of meaning. It will become evident that men of weight, like Dr. Titchener and Dr. Thorndike in America,

interpretation of natural processes. My only concern with them will be an emphatic, and perhaps often repeated, denial of their right of entry into a *scientific* universe of discourse, as I define the term scientific. It may, of course, be said that, by doing this, one leaves the scheme of science quite unexplained. Not only the mode of origin of the world in which we live, but its final end and purpose are thus wholly disregarded. Exactly so! These are just the questions which should be left over for metaphysical treatment. Physics, chemistry, astronomy, geology, mineralogy—all the sciences which deal with the inorganic world—have long ago recognized this. Some day biology and psychology will do so with equal candour and to their lasting profit.

Some years ago[1] I had under observation two young moorhens or waterhens which I had hatched in an incubator and watched from day to day, almost from hour to hour, with some care. One of these, about nine weeks old, was swimming in a pool at the bend of a stream in Yorkshire. A vigorous rough-haired puppy, highly charged with canine vitality, ran down from the neighbouring farm, barking and gambolling; and from the bank he made an awkward feint towards the young bird. In a moment the moorhen dived, disappeared from view, and soon partially reappeared, his head just peeping above the water beneath the overhanging bank. Now this was the first time the bird had dived. I had repeatedly

[1] Cf. "Habit and Instinct," p. 64. "British Journal of Psychology," vol. iii., pp. 11 and 221. Some passages which have appeared in papers contributed to this Journal are here utilized.

endeavoured to elicit this characteristic piece of behaviour, but had failed. My friend Mr. F. A. Knight tells me that he has seen a moor-chick, not more than a day old, dive under a log of wood when suddenly disturbed. I have seen them dive nearly as early in life. Under unnatural conditions, however, in a large bath, and under natural conditions in the Yorkshire stream, do what I would in my efforts to coax or to frighten the young bird, I had never been able to make him dive. But now at last that blundering puppy succeeded, where I had so often failed. And when this characteristic piece of behaviour came upon my little friend—came upon him suddenly and without warning—his dive was absolutely true to type.

I have elsewhere[1] advocated the acceptance of a definition of instinctive behaviour as that which is, on its first occurrence, independent of prior experience; which tends to the well-being of the individual and the preservation of the race; which is similarly performed by all the members of the same more or less restricted group of animals; and which may be subject to subsequent modification under the guidance of experience. Such behaviour is, I conceive, a more or less complex organic or biological response to a more or less complex group of stimuli of external and internal origin, and it is, as such, wholly dependent on how the organism, and especially the nervous system and brain-centres have been built through heredity, under that mode of racial preparation which we call biological evolution.

How far does the behaviour of the moorhen,

[1] "Animal Behaviour," p. 71.

when it dives for the first time in its life, conform to this definition? I conceive that it conforms all along the line so long as, but only so long as, we restrict our attention to its specific nature as dive. *Qua* dive, it is independent of prior diving experience, for there has been no such experience. Of course it may be said that diving involves swimming and that of swimming the moorhen has had abundant experience during two months of active life. That is surely true enough. But to dive is not only to swim, but to swim with a difference. It is adapted to the peculiar circumstances of complete immersion. I do not think that any careful observer will deny that diving is a differentiated form of swimming and that it has specific characters which make it something other than merely swimming under water. The whole poise and set of the body, the position of the head and outstretched neck, the impelling strokes of the legs, are specially adapted to a relatively new mode of progression. There must be a correlated modification of the processes of respiration. The question is whether these and other specific differentiations of behaviour are instinctive in the sense that they are as such independent of prior experience. That they are wholly independent of all previous experience I do not assert. If that were the case it is difficult to understand how they could possibly be incorporated with, and synthetically assimilated to, the experience already gained. But that they provide new factors to be so incorporated and assimilated seems to me to be a conclusion forced upon us by the facts of the case. The particular and specific form of behaviour exhibited

by the moorhen on the occasion of its first dive is, I believe, dependent as such on how the nervous system has been built up under that mode of racial preparation which we call biological evolution. If in further criticism of the view I wish to make clear, it be urged that though perhaps the specific form of the scare-begotten dive-situation is due to the hereditary make-up of the nerve-centres, it is also partly dependent (e.g. in its relation to swimming) on how the nerve-centres have been moulded and modified under previous experience—that is to say in psychological terms, partly dependent on intelligent guidance—I venture to remind my critic that we are endeavouring to disentangle the factors of behaviour; that all I urge is that an instinctive factor, new to experience, is introduced. I am ready to admit, nay more I am prepared to contend, that, just in so far as the behaviour is dependent on previous experience, we have also the presence of the intelligent factor. In a moorhen two months old instinct and intelligence co-operate. None the less the instinctive and intelligent factors are distinguishable in analysis.

What are we to understand by intelligent guidance? At a later stage of our enquiry I shall endeavour to defend the hypotheses that intelligent guidance is the function of the cerebral cortex with its distinguishing property of consciousness; that the co-ordination involved in instinctive behaviour, and in the distribution of physiological impulses to the viscera and vascular system, is the primary function of the lower brain-centres; that, in instinctive behaviour as such, consciousness correlated with processes in the cerebral cortex, is so to speak, a

mere spectator of organic and biological occurrences at present beyond its control; but that, as spectator, it receives information of these occurrences through the nerve-channels of connexion between the lower and the higher parts of the brain. This, however, is only an outline sketch of a programme for further discussion. At present we are only concerned with this question: What gives to experience its guiding value? Dr. Stout has enabled us to give the answer in one word. Experience has guiding value in virtue of the *meaning* it embodies. Why does the burnt child shun fire? Because the sight of fire has meaning. Why does the chick that has but once or twice taken a ladybird into its bill no longer peck at these insects notwithstanding its instinctive tendency to peck at any small object within reach? Because the appearance of the ladybird carries meaning. Why does your dog beg when you say "biscuit"? Because the sound has meaning. One is obliged, in order to avoid pedantry, to say that the sight or sound or other presentation to sense carries or conveys or has meaning. It would be more correct to say that the total experience in any one of these situations is meaningful. Any given experience in any given moment is a synthetic product or, from a different point of view, a phase in a continuous synthetic process. It is essential to bear in mind that, no matter how far and in what detail we may analyse such a synthetic phase of naïvely developing experience into its constituents, within the experience as given and felt, or as Professor Alexander would say enjoyed, these constituents merge their individuality to form an indissoluble whole.

We may here distinguish between primary and secondary meaning.[1] Suppose there be a bit of developing experience occurring as such for the first time—our moorhen's dive for example—which gives a sequence *a*, *b*, *c*, *d*. Since the consciousness of the first part of the sequence has not faded away when the latter part comes, the experience at the phase *d* is not one of *d* only but of *d* as qualified by the net results of the precedent *a*, *b*, *c*. This qualification of *d* by what has gone before is the primary meaning which *d* "carries"; it is that which makes *d* meaningful through primary retention. There is here no revival of what has faded out of consciousness and has to be reinstated. Thus primary experience—that of the dive to wit—swells with meaning as it grows, as it develops, as it proceeds on its course. But now suppose the completed series *a*, *b*, *c*, *d*, *e*, *f*, has been previously experienced; then on a subsequent occasion when *d* is reached it is not only qualified by the precedent *a*, *b*, *c*, of this occasion, but also by a revival or pre-perception of the *e*, *f*, which formed part of the series on a previous occasion. This pre-perception, this expectation begotten of previous experience, is the secondary meaning which *d* then carries. Behaviour in part determined by secondary meaning I term intelligent. If the situation within which the sound "biscuit," in its appropriate setting, occurs had not developed on former occasions in a certain routine, your dog would have no expectation or pre-perception of what would follow on this occasion—the sound would carry no secondary meaning. We must remember

[1] Cf. G. F. Stout, "Manual of Psychology," Bk. I. Ch. ii. §§, 7 and 9.

that in the early stages of the genesis of experience, what is expected is in large measure the revived experience of behaving in certain ways within the previous routine. It must be remembered too that meaning—(I shall use this term in reference to secondary meaning)—is limited to the qualifying revival of part of the previous routine—re-presented in experience but not again presented to experience through the channels of sense as the situation actually develops.

Bearing this in mind let us return to our puppy and moorhen. I will first describe in physiological terms what I conceive to take place; and I shall, for the moment, disregard the fact that the bird has a cerebral cortex. He is therefore, I assume, an unconscious automaton of the purely reflex order, until we take his higher brain-centres into consideration. Groups of effective stimuli fall upon the receptor end-organs of eye and ear. These initiate physiological impulses which are transmitted by the optic and auditory nerves, and throw the lower brain-centres into functional activity. From these centres two sets of impulses proceed outwards along efferent nerves. The first set calls into play the muscles concerned in diving. The second set is distributed to the viscera—the vascular system, alimentary system, respiratory system. When I took it out of the water the bird was panting with open beak, its heart-beat was strong and quick. Although I did not observe defecation in this case, I have frequently observed its occurrence in similar cases. It is often noticeable when young birds are first put into water. Now from the organs concerned

in swimming and diving and from the heart, lungs, and other viscera, afferent impulses proceed inwards to the lower brain-centres and either initiate new processes therein or modify those which are already taking place.

Thus there are three sets of afferent or in-going impulses. The first set of afferent impulses (*a*) is due to some specific mode of sensory contact with the environment. This through its action on the lower brain-centres gives rise to the two sets of afferent impulses (1) to the organs of behaviour, (2) to the visceral organs. And then from these organs come the other two sets of afferent impulses (*b*) from limbs concerned in behaviour and (*c*) from heart, lungs, etc. Is this scheme already somewhat complex? It is reduced to a simplicity which is probably absurdly inadequate to the facts. If we regard the dive as a whole we have to remember that the stimuli to eye and ear merely start the train of events which breaks in upon a foregoing train of events. Directly the bird is under water there are new stimuli due to complete immersion. It is probable that the mere fact of total immersion is the condition (or a condition) of the differentiated mode of swimming under water. There is a new influence of the environment as the moorhen approaches the bank. Is it going too far to say that, throughout the continuous dive, the total stimulation of the lower brain-centres is constantly varying? Is it unreasonable to suggest that each phase of the dive is definitely correlated with the progressively varying group of processes in the lower brain-centres?

Now whether a decerebrate bird—one whose cerebral hemispheres had been removed or thrown out of action—would dive as did my moorhen in the Yorkshire stream, I cannot say. We have some data for the discussion of such a question; and these will be considered in the sequel. As a matter of fact, however, in my moorhen, the higher brain-centres and cortex were intact. And I think it in the highest degree unlikely that the processes occurring in its cerebral hemispheres were without influence on its behaviour. This indeed is but to repeat in other words what I have said above—that in such behaviour instinct and intelligence co-operate; for the cortex is the organ of intelligence; meaning is correlated with cortical process. Let us then restore to their proper place the cerebral cortex, the presence of which we have so far disregarded. The cortex is connected with the lower nerve-centres. From them, or through them, it can receive physiological impulses; to them it can transmit other controlling impulses. When groups of visual and auditory stimuli excite the receptor end-organs of eye and ear, not only are the lower brain-centres thrown into activity but, through them, certain regions of the cortex are excited. In and through this excitement the moorhen sees and hears the puppy. When afferent impulses reach the brain from the organs concerned in behaviour, not only is the activity of the lower brain-centres qualified by their effects, but through them the cerebral cortex is further excited. In and through this excitement the moorhen feels its own behaviour; has the experience of swimming and diving. When

afferent impulses reach the brain from the heart, lungs, and other viscera, from many parts of the organism, not only is the activity of the lower brain-centres further qualified by their added effects, but through them also the cerebral cortex is further excited. In and through this excitement, the moorhen (according to the James-Lange theory of emotion) feels scared. At any rate they help to contribute to the total complex experience which has emotional colour. Now all these three sets of data unite and combine to form that part of the synthetic product of the bird's continuous experience which is due to the performance of the instinctive act. But the situation is meaningful; and the incorporated (secondary) meaning is the outcome of previous experience which has left traces in the cortex and mind of the moorhen. It is in the highest degree improbable that even on the initial occasion when the bird dives for the first time, cortical and conscious processes exercise no controlling influence on the behaviour of the moorhen. And just in so far as they do exercise such influence, the behaviour is under intelligent guidance.

If then I interpret the matter correctly in outline, there was, correlated with the cortical processes of the moorhen as he swam in the pool, a certain amount of experience actually present, and a certain amount of individual preparation of the cortex such as to afford the neural conditions of revived experience. So much to begin with. Here we have the moorhen as actual or potential experiencer. Then comes a new situation which the experiencer can assimilate. In this case, in so far as a new instinctive

response is called forth, the conditions are largely supplied by the racial preparation of the lower brain-centres as the outcome of evolutionary process. The new factors comprise (1) a specific presentation differing from previous presentations in what one may term initiating value, (2) a specific response, differing in certain ways from all previous responses and therefore affording new data to behaviour-experience, and (3) a hitherto unfelt quality of emotional tone. I do not think that the young bird had ever been really scared before. But though we may analyse the newly experienced situation in some such way as this, the bird presumably gets the whole as a coalescent synthetic net result with a bearing on behaviour and some, perhaps much, reinstatement of the meaning which has qualified previous situations. He just lives through one palpitating situation, assimilates its teachings, and emerges from the ordeal a new bird. As experiencer he is never again what he was before.

Let us now go back to an earlier stage of our little moorhen's life, to near the beginning of his free existence, to a time when he was, not two long months old, an experiencer of some standing as moorhens go, but when he had seen but a few brief days of life beyond the confines of the egg-shell. We started with our birdling as experiencer swimming about in the stream. The question I have now to consider is this:—How did he reach this level of conscious organization? It is obvious that I cannot trace in detail the genesis of his experience, though I watched him carefully from day to day. I must select an episode which has some bearing upon his diving

in the stream. It may be said that this behaviour was closely and intimately related with the long experience of swimming which he had already gained. But there was a time when he had no experience of water and swimming. I remember the day when I first placed him in a large bath. Even then he was already an experiencer having gained so much experience as was possible during the few hours of life he had enjoyed. Still, comparatively few things had for him, so far, become meaningful. Of swimming experience he had none. The great lake of my bath had for him no meaning. Racial preparation had however fitted the tissues contained within his black fluffy skin, and the subtler tissue of his lower brain-centres, to respond in a quite definite manner to the stimulation of water on the breast and legs. And in the first act of swimming—true to type, practically serviceable to secure a biological end, though needing that which came later, the perfecting touch of intelligent guidance,—in this first act of swimming there were afforded to his experience analogous factors to those I have given above in considering his instinctive dive—a specific presentation, a specific group of behaviour feelings, a specific emotional tone, all coalescent into one felt synthesis, developing in accordance with a developing situation.

We have not yet, however, got back to the initial genesis of experience in our moorhen. So long as he brings to any given situation experience already gained, his very first behaviour in that situation may carry meaning—not very definite *ad hoc* meaning, no doubt, but still some meaning. Dr. Myers lays stress on this already gotten meaning,

but he goes further than I am prepared to go. He says[1]:—"To my mind it is certain that, on the occasion of the chick's first peck, or the duckling's first swim, the bird is dimly, of course very dimly, conscious of the way in which it is about to act. I believe this because no organism can ever execute a new movement which does not involve other movements that have been performed previously. A completely new movement is as impossible as a completely new thought. When a chick first attempts to peck, many of the muscles then called into action must have contracted before. Thus the feeling of activity arising on the occasion of the chick's first peck is not altogether a new one. It is related, as each of our own experiences is related, to past experiences. And the very vague awareness of results, associated with those previous feelings of activity, gives the chick a vague awareness of the result of its first peck, before it has actually performed the action." Now for the present I will assume that "awareness of results" is synonymous with secondary meaning. If the chick's first peck has some dim and vague meaning due to foregoing use of the same muscles, none the less the accomplished peck supplies the data for *new* meaning—not merely meaning in terms of previous other-use of the same muscles, but meaning in terms of their specific pecking-use. It is this specific pecking-use which I believe to be biologically determined through the natural selection of variations (or mutations?) of germinal origin. I find difficulty in accepting the view, to be considered in the sequel, that it is appreciably determined by any dim and

[1] "British Journal of Psychology," vol. iii., p. 211.

vague awareness of results which, as pecking-results, have never yet been experienced. With regard to the moorhen's first swim, then, I do not deny that when placed in the bath he had already gained the experience necessarily involved in using the same limbs and the same muscles in walking. But I conceive that when he makes his first strokes in the water the awareness that he is going to swim, even granting its existence, is so very dim and vague as to be negligible in comparison with the purely reflex tendency to swim grounded in the moorhen's organic constitution. As M. Bergson says[1]:—"Thousands and thousands of variations on the theme of walking will never yield a rule for swimming. . . . Swimming is an extension of walking, but walking would never have pushed you on to swimming." In the first peck or the first swim, therefore, according to my interpretation, we have *as* peck and *as* swim the instinctive factor relatively, but still only relatively, pure—relatively impure in so far as it is accompanied by such very dim and very vague awareness of what is coming as may be due to *other* previously gotten experience. Some slight admixture of intelligent meaning is still present because we have not yet got down to the very beginning of our moorhen's experience.

If one tries to follow out to its logical conclusion Dr. Myers' statement that "no organism can ever execute a new movement which does not involve other movements that have been performed previously;" if one tries to grasp his contention[2]

[1] "Creative Evolution," p. 204.

[2] "British Journal of Psychology," vol. iii., p. 269.

that "there never can be a beginning of experience, —a beginning which has no relation to previous experience"; one seems posed by the problem of infinite regress. One gets back to the embryo within the egg-shell, and thus to the fertilized ovum, and so to parents and ancestors more and more remote; and still we are, I suppose, told that there never can be a beginning to experience; the stage we have reached, no matter how remote or how primitive, still has relation to previous experience! I am fully aware that any adequate discussion of the place of experience in the universe must lead up to very difficult philosophical problems. Every movement regarded as a part or phase of the world-process is conditioned by antecedent movement likewise so conditioned. Every organic movement however new (really new, in some cases, as I hold) is of course related to foregoing organic changes. And for those who are convinced by the arguments of Paulsen and others in favour of panpsychism, there is, of course, no beginning of consciousness; and if we equate experience and consciousness, there is for them no beginning of experience. All this is, however, beyond the scope of our present considerations. Our universe of discourse is just now of a much more limited range. I assume that the behaviour of the moorhen has a beginning—a beginning that is sufficiently well marked for the practical purposes of our inquiry, however limited may be their philosophical range. I want to get, if possible, at the very beginning of such experience as correlated with such initial behaviour. And I therefore go yet one stage further back in the history

of our little bird. I suggest that when the moorhen chick was struggling out of the cramping egg-shell there came what we may fairly regard as the initial presentations to sense, followed by the initial responsive behaviour in the earliest instinctive acts, accompanied, we may presume, by the initial emotional tone, coalescent in primary synthesis. Thus I conceive that, for scientific interpretation, experience has its genesis. A number of instinctive responses occur in virtue of the organization established by centuries of racial preparation as the outcome of natural selection or of other factors in organic evolution. These unite synthetically to generate experience.[1] It is itself dim and vague, but it can carry no meaning, however dim and vague, in terms of previous experience, for of such previous experience there has been none. The only meaning in this sense which can possibly be present is such as might conceivably be derived from experience previously gained within the unbroken egg-shell. I am ready to yield this much for what it is worth, merely remarking that for practical interpretation it is not worth much, and that what there is of it is of the reflex and instinctive order. If I may be allowed to neglect it as a vanishing quantity, then I conceive we reach the stage at which the experiencer as such has its primary genesis. It is called into existence by the earliest instinctive behaviour (whenever and however that earliest behaviour occurs), and here, for strictly scientific interpretation, I find the

[1] I have elsewhere used the expression "primary tissue of experience." I shall use it no longer. It is by no means felicitous and it has misleading implications.

very first beginnings of the individual experience. From this primitive stage to that later stage when the moorhen swam in the Yorkshire stream is a far cry. But just as there is one moorhen with inter-related parts and organs, one central nervous system correlating the incoming data of presentation and co-ordinating the outgoing nerve-impulses in responsive behaviour, so there grows up in correlation with the cortical-processes, one experience for which the presentative data acquire meaning and become precepts for the guidance of further behaviour. Thus is it, I conceive, in the case of the moorhen: thus is it in the case of the human infant. Such in all cases is the starting-point of the natural history of experience, the unification of which finds expression in behaviour and conduct.

Such is my main thesis. I shall have to consider in the next chapter the question whether my assumption that all meaning is the result of individual acquisition needs qualification; and, if so, whether my thesis is invalidated. I must ask the reader to remember that I seek to give at the outset an outline sketch of my view. I must ask him to remember that any hypothesis with regard to the genesis of experience must inevitably remain beyond the range of direct verification from the aspect of experiencing. I have never been a moorhen. And though I was once a baby, I have no memory-data for compiling my reminiscences during the first year. No one has. When did my experience begin? At birth? Or was it some time later? Is what Wm. James calls "the big blooming buzzing confusion" of the early days of life to be called experience? Or

does experience begin when this chaos of stimulation becomes incipiently cosmic? Or, again, must we seek the beginnings of experience before birth, when the child is still in the womb? And, if so, when did it begin? At what stage of the development of the nervous system? Or was it even before the neural band was differentiated from epiblastic tissue? Has all vital process an accompaniment of consciousness? And, if so, is all such consciousness to be called experience? Such questions are easily asked. But only speculative imagination can furnish answers. I have assumed that experiencing is correlated with physiological processes in the cortex. Trying to look at the genesis of experience from as reasonable a point of view as my modest share of common-sense permits, I suggest that instinctive behaviour, biologically determined, affords those grouped stimulations which initiate cortical process, and afford grouped data in consciousness which may serve in some degree to explain (so far as it can be explained) the genesis of experience.

It appears to me, then, that for purposes of psychological interpretation, in so far as this is concerned with the genesis of experience, we should so far broaden the connotation of the qualifying adjective instinctive as to include all those primary and inherited modes of behaviour, including reflex acts, which contribute in any degree to experience. If there be reflexes or modes of instinctive behaviour which have no correlated consciousness, with them the psychologist has no concern. He may cheerfully hand them over to the biologist.

Now among the invertebrates, and especially the

insects, there are cases of instinctive behaviour of a remarkably stereotyped nature. A complicated series of acts, showing wonderful nicety and accuracy of adaptation, is performed once, and only once, in the lifetime of the individual without any opportunity of imitation so-called. These cases may conform to Dr. Driesch's definition [1] of an instinct as "a complicated reaction that is perfect the very first time." Dr. Myers has criticized this definition. "I question," he says,[2] "whether this is ever literally the case, if only the reaction could be submitted to close enough examination. . . . Instincts are almost always modifiable and perfected by later experience. . . . An instinct which is from the first unalterable is nothing but a reflex." I believe that in all cases an instinctive act is, from the biological and physiological point of view, nothing but a reflex. But from the psychological point of view it is always something more than a reflex, in so far as it affords data to conscious experience. I am, however, in full agreement with Dr. Myers when he says that instincts are almost always modifiable and perfected by later experience. Dr. Driesch's brief definition applies only to a very limited number of instinctive activities. It scarcely applies at all to the instinctive behaviour of such vertebrates as birds and mammals. I have therefore suggested the following modification of the brief definition: Instinctive behaviour, as congenitally determined, is practically serviceable on the occasion of its first performance. Take the

[1] "Science and Philosophy of the Organism" (1908), vol. ii., p. 110.

[2] "British Journal of Psychology," vol. iii., p. 211.

flight of the swallow as an example which may illustrate a vast number of instinctive acts. Is there a biologist who has adequate acquaintance with the facts, who would dream of asserting that the instinctive performance at the outset has anything approaching in delicacy and effectiveness the perfected skill of the mature bird—a skill shot through and through with meaning of the highest value for experience of life on the wing?[1] None the less, I am convinced from personal observation[2] that the relatively imperfect instinctive flight of the young swallow taken from the nest is practically serviceable and has survival value. It is good enough to preserve the little bird from falling to the ground and running the risk of destruction, the very first time it leaves the nest, even when, as in my own experiments, the normal period of flight is somewhat antedated. The outcome of natural selection is not to produce either behaviour or organic structure which is so perfect that no trace of imperfection can be discovered by the closest examination. One of the least imperfect organs is the normally developed human eye; and yet, as we all know, Helmholtz found in the organ of vision many defects.[3] The products of natural selection are practically serviceable, not theoretically perfect. Only where, as most markedly in the case of some of the instinctive activities of insects, a close approach to perfection is necessary in order that the behaviour shall be serviceable for survival of the

[1] Cf. "Animal Behaviour," p. 88.

[2] Cf. "Habit and Instinct," p. 71.

[3] "Popular Lectures on Scientific Subjects,"—The Eye as an Optical Instrument, pp. 197, ff.

species, do we find that it is scarcely, if at all, subject to further improvement.

But if we accept the view that instinctive actions are susceptible of improvement under the guidance of intelligence, it is clear that the biological value of such instinctive actions includes the fact that they are serviceable as affording a basis for such improvement. Improvement implies something which can be improved; instinctive activities supply that improvable something. I have said above that for purposes of psychological interpretation, in so far as this is concerned with the genesis of experience, we should so far broaden the connotation of the qualifying adjective instinctive as to include all those primary and inherited modes of behaviour, including reflex acts, which contribute in any degree to experience. In many cases the instinctive action, in this broader sense, is serviceable as a congenital factor which, under the guidance of intelligence, is incorporated in a larger whole. Mr. McDougall, who is unable to accept[1] my modification of Dr. Driesch's brief definition, says that while he agrees that the imperfections of many instinctive actions on their first performance render inacceptable the definition proposed by Dr. Driesch, he thinks that these imperfections are so great in many cases as to render my own definition untrue of much instinctive behaviour. "When the young kitten attentively watches the dangled button or the rolling ball, and makes its first futile effort to seize it, its behaviour is instinctive, but can hardly be called practically serviceable." I shall deal later with Mr. McDougall's general theory of instinct—a

[1] "British Journal of Psychology," vol. iii., p. 259.

theory which is worthy of careful consideration. Here and now I will only say that, accepting as I do the cardinal features of Dr. Groos's contention that the biological value of animal play lies in the fact that it affords the instinctive basis for the further developed and perfected activities of later life, the behaviour of the kitten is eminently serviceable.

Dr. Stout[1] regards my criterion as "too purely biological to meet psychological requirements," and supplements it by adding, as characteristic of instinctive behaviour, "a definiteness such as would require to be explained as the result of learning by experience or conscious contrivance, if it were not directly provided for by inherited constitution of the nervous system, as determined by the course of biological development." This emphasizes the purposive (but not purposeful) character of instinctive behaviour, and appears to me to be a helpful and acceptable supplement for purposes of description.

I suggest then that, for the biologist and the psychologist, a criterion—not the only criterion, but a criterion of instinctive behaviour, is that it is serviceable on the first occasion. But the biologist, for the purposes of his interpretation of animal life, will ask: Serviceable to what end? First of all, serviceable as affording the congenital foundations for an improved superstructure of behaviour. That is one way in which instinctive behaviour is serviceable —the way which is of special interest to the psychologist. From the more distinctively biological point of view, instinctive behaviour is broadly and generally serviceable for survival to which sundry

[1] G. F. Stout, "British Journal of Psychology," vol. iii., p. 245.

bodily activities contribute. In further detail, instinctive behaviour is serviceable for avoiding danger, by shrinking, quiescence, or flight; serviceable for warding off the attacks of enemies; serviceable for obtaining food, capturing prey, and so forth; serviceable for winning and securing a mate, for protecting and rearing offspring; in social animals, serviceable for co-operating with others, and so behaving that not only the individual but the social group shall survive. But, it will be said, surely these are the very ends for the attainment of which intelligence is also serviceable! Unquestionably this is so. It is just because the many and varied modes of instinctive behaviour are serviceable for the attainment of the same ends for which intelligence is also serviceable, that their consideration is essential to the right understanding of the natural history of experience. Instinctive behaviour, which has its roots in organic evolution, affords the rude outline sketch of that far less imperfect and far more fully serviceable behaviour, the finishing touches of which are supplied by practice under the guidance of intelligence. The net result (what is for popular speech the perfected instinct) is a joint product of instinct and intelligence, in which the co-operating factors are inseparable, but none the less genetically distinguishable.

I must here plead guilty to the charge of some laxity of expression. It is difficult at the same time to avoid undue pedantry and to attain some measure of exactness. What do I mean by saying that instinctive behaviour comes "under the guidance of intelligence"? I mean that physiologically the

functioning of the sub-cortical centres is conditioned by the functioning of the cortical centres. I mean that, psychologically, the experience begotten by behaving instinctively, reacts on subsequent behaviour. In so far as behaviour is modified or in part conditioned by such reaction I call it intelligent. The guidance of intelligence is merely a convenient form of words by which to indicate the influence of the conditioning factor—acquired meaning; a factor which is absent in the automatism of instinctive behaviour.

But the relation of instinct to intelligence will be discussed more fully in the next chapter, wherein some criticisms of my thesis will come under consideration.

CHAPTER II

THE RELATION OF INSTINCT TO INTELLIGENCE

THE specific definiteness of behaviour of the type to which I apply the term instinctive, is an organic heritage. It is dependent upon the inherited structure of the nervous system. According to the interpretation suggested in the last chapter, it is determined by the hereditary disposition of the neurones in the lower or sub-cortical brain-centres. But the accompanying experience is correlated with functional activities within the cortex. And when such experience has been gained it may be the condition of intelligent modification of behaviour. This interpretation is, however, open to criticism." Dr. Myers regards[1] "the separation of instinct and intelligence as a purely artificial abstraction." Instinct and intelligence are, he urges, the same process regarded from different standpoints. "So far as instinctive behaviour can be regarded from the standpoint of the individual experience of the organism it appears, however imperfectly, as intelligent—characterized by finalism. So far as intelligent behaviour can be regarded from the standpoint of

[1] "British Journal of Psychology," vol. iii., pp. 209 and 270. Page references in brackets in this Chapter are to this volume.

observing the conduct of other organisms, it appears, however imperfectly, as instinctive—characterized by mechanism." "Thus the psychology and physiology of instinct are inseparable from the psychology and physiology of intelligence. There is not one nervous apparatus for instinct and another for intelligence. . . . Throughout the psychical world there is but one physiological mechanism; there is but one psychological function—instinct-intelligence." I suppose the divergence of opinion between us partly rests upon differences in the definition of terms. In any case this double-aspect doctrine is interesting and suggestive. I cannot discuss it now; nor can I here follow Dr. Myers into the difficult regions of finalism and mechanism. Somewhat will be said concerning them in due course. At present I am only concerned to emphasize the fact that, so far as the consciousness of instinctive performance is under consideration, I too believe that there is one and only one "physiological mechanism," within which, as I have indicated above, neural processes have experience-correlates. This, in my interpretation, is the cerebral cortex. Just now, however, I have nothing to do with the cortex. I must ask to be allowed to develop my thesis on the assumption that the specific nature of the instinctive performance is biologically and physiologically determined by the inherited disposition of the neurones in the lower sub-cortical brain-centres.

I pause here to consider in passing a question of terminology. In the current popular phraseology we often speak of the instincts of animals, using the word in the plural. This plural implies the singular. But what is an instinct? Mr. W. McDougall protests

against the usage of the word instinct to denote an instinctive action. "It is true," he says, "that this has the sanction of general usage; but to describe any particular action as an instinct is, I submit, a loose and confusing usage against which we ought to set our faces. We ought," he continues, "rather to use the term an instinct to denote that feature of the innate constitution of any organism, that inherited disposition, in virtue of the possession of which the organism acts instinctively; just as we ought to distinguish between a habit and the habitual actions of which the habit is the enduring condition" (p. 253). I cannot regard Mr. McDougall's suggestion as quite satisfactory. It savours somewhat of "faculty" interpretation. It naturally arises out of his use of the word instinct for an inherited mental tendency correlated with an inherited neural disposition. But even accepting his definition of instinct I question the propriety of calling an inherited disposition an instinct. Is it not better to use the adjective instinctive to qualify the words behaviour or disposition, according to the context, and to use the term instinct, as we use the term intelligence, to serve as the general heading for a definite type of behaviour or a definite type of disposition, as the case may be?

Apart from this question whether we should apply the word instinctive to a kind of behaviour or to the disposition with which a kind of behaviour is correlated or to both, there is a wider divergence in the use of terms. Indeed there is scarcely any term that is used with greater differences of connotation. At present we need only consider the extension of the term instinctive so as to cover not only the modes of

behaviour and dispositions which are congenital but also those which are acquired. The interpretation I have put forward involves the distinction, which I believe to be valid on biological grounds, between congenital modes of behaviour dependent upon inherited dispositions, and acquired modes of behaviour dependent upon the modifications of these dispositions superinduced in the course of individual life. The former fall under the heading instinct; the latter under the heading intelligence. Professor Wundt in his lectures on Human and Animal Psychology accepted the distinction, but applied the term instinctive to both kinds of behaviour. "Movements," he said,[1] "which originally followed upon simple or compound voluntary acts, but which have become wholly or partly mechanized in the course of the individual life or of generic evolution, we term instinctive actions." He here, therefore, divides instinctive actions into two classes, (1) those which are congenital and (2) those which are acquired. Father Wasmann,[2] too, distinguishes instinctive actions under two groups; (1) those which *immediately* spring from the inherited dispositions; (2) those which proceed from the same inherited dispositions but *through the medium of sense experience.* The first group he regards as instinctive in the strict sense of the term; the latter as instinctive in the wider acceptance of the term. Since we have the word habit as a general group name, and the phrase

[1] "Lectures on Human and Animal Psychology." English Translation (1894), p. 388. But Cf. "Outlines of Psychology." English Translation (1907), p. 317.

[2] "Instinct and Intelligence in the Animal Kingdom." English Translation (1903), p. 35.

habitual actions, to apply to those modes of behaviour "which have become wholly or partly mechanized in the course of individual life" "through the medium of sense-experience," it is better, I submit, to restrict the term instinctive to congenital modes of behaviour dependent upon inherited dispositions.

But I go further. I restrict the term instinctive *in its biological acceptation* to congenital modes of behaviour dependent upon inherited dispositions *within the lower brain-centres*.[1] I ask that, for the present, I should be allowed to proceed on this assumption as a working hypothesis. In virtue of these inherited dispositions, the organism appropriately stimulated exhibits adaptive responses and is subject to visceral disturbances. These adaptive responses and these visceral disturbances afford new stimuli which in turn affect the lower brain-centres. *But* the initial sensory stimuli, those from the motor organs concerned in behaviour, and those from the viscera, not only stimulate the lower brain-centres, they also stimulate the cortex of the brain. Here, and here only, occur those physiological processes which are intimately correlated with the experience process. Here, and here only, therefore, does experience have its genesis. If then I restrict the term instinctive in its biological acceptation to congenital modes of behaviour dependent upon inherited dispositions within the lower brain-centres, I extend the term instinctive in its psychological acceptation to the cortical experience which results from the presentation of a situation and the correlated performance of a biologically instinctive action.

[1] I have here in view the higher vertebrates only.

In the interpretation I seek to develop, the primary rôle of the psycho-physiological functions of the cerebral cortex is to play down upon and control the functional activities of the lower nerve-centres and thus to modify the behaviour of the organism as a whole. That is their essential function at any rate for genetic treatment, and in their earlier manifestations in the life of an active organism. As soon therefore as the cortex is called into functional activity it begins to influence the sub-cortical centres and to modify the physiological processes which are going on therein. Although in a decerebrate animal an instinctive train of activities might, and I conceive would, run its course wholly in virtue of the inherited organization of the lower centres, in the unmaimed cerebrate animal the later stages of even the first performance of an instinctive behaviour-sequence would be liable to cortical control — would be liable to some modification due to the influence of the cortex. Hence, if we regard the present as a short but appreciable period of time, we may say that present experience is constantly influencing present behaviour.[1] In the interpretation which I suggest, then, experience is correlated with the functional activity of the cortex; that functional activity and that experience are initially called into being by a complex sequence of stimuli due to the development of an instinctive situation through the integrative action of the sub-cortical brain-centres. But the moment it is called into being by the initial phases of an instinctive sequence it is, or may be, influential in modifying succeeding phases of that

[1] Cf. "Animal Behaviour," pp. 45 and 47.

sequence. Such modification by cortical and experiential guidance is, as such, intelligent. Thus the instinctive and the intelligent factors in behaviour, closely as they are related, are distinguishable in analysis.

But here Dr. Stout, than whom there is no more acute and able critic in matters psychological, raises the question whether every instinctive action as such is not also determined by intelligence. "The crucial issue, here," he says, "concerns the nature of the mental process in the first performance of an admittedly instinctive action. If the first performance involves intelligence, it will not be disputed that the same holds true of subsequent performances" (p. 237).

Dr. Stout then turns to a criticism of my thesis. "Mr. Morgan," he says, "holds that instinctive behaviour cannot at the outset be determined by intelligent consciousness. His reason appears to be as follows. . . . An animal, in consequence of a train of previous experience, intelligently modifies its behaviour from the outset, when it is again confronted with a similar situation. This implies what we call learning by experience. But when does the animal learn its lesson? Does the actual process of learning take place on the second occasion or on the first? Plainly it takes place on the first and not on the second. On the second occasion the lesson is utilized: but in order to be utilized it must already have been learned. Thus if the actual process of learning involves intelligent consciousness, intelligence must accompany every instinctive act which leads to intelligent modification of behaviour

on its repetition in a similar situation. But Mr. Morgan's position is that an instinctive action which leads to intelligent modification of behaviour on its repetition, may none the less be itself wholly unintelligent. What he regards as implying intelligence is not the actual process of learning by experience, but only its product, the state of having already learnt by experience. Such a view seems to run counter to all that we otherwise know concerning the development of knowledge. Setting aside the special question concerning instinct there is nothing to show that learning by experience is ever an unintelligent process involving merely a sequence of blind sensations and feelings without discrimination and identification and without any apprehension of successive and simultaneous parts as related to the whole and to each other within the whole.

"When it is thus exactly defined, Mr. Morgan's view becomes, I think, much less plausible."

Dr. Stout at the beginning of this passage quite correctly states my opinion that instinctive behaviour cannot at the outset be determined by intelligent consciousness. It is, I believe, at the outset biologically determined by the inherited disposition of the neurones in the lower nerve-centres. But it is, from the outset, accompanied by consciousness. And this accompaniment of consciousness is, I contend, the beginning of experience in the individual —here we have the primary genesis of experience for natural history treatment. Dr. Stout asks, *when* does the animal learn its lesson, on the second occasion or the first? Now, in accordance with the common usage of our language, I take it that to

learn a lesson implies an already conscious learner. The lesson so learnt is something added to previous experience or knowledge. To avoid ambiguity, therefore, I prefer to put the question in the following form :—When does the animal acquire experience —or when does its experience begin—on the second occasion or the first ? I had supposed that my own answer to *this* question was tolerably clear. For my contention is that the animal gets its initial experience on this first occasion, that is to say through the performance of instinctive actions biologically determined. In this sense, then, I fully agree that the animal learns its lesson, or acquires its experience, on the first occasion and utilizes it on the second. But when we come to the further question :—What is involved in such learning ?—in our answers to this question Dr. Stout and I are seemingly poles asunder. If I correctly understand the concluding sentence of his paragraph, there are involved in the very first learning by experience during the performance of an instinctive action "discrimination and identification . . . an apprehension of simultaneous and successive parts as related to the whole and to each other within the whole." Can I be mistaken ? I think not. Dr. Stout says :—There is nothing to show that learning by experience is ever "without these characteristics." I had thought that, for genetic interpretation, within psychology as a science, the apprehension of simultaneous and successive parts as related to the whole and to each other within the whole was a very late product of the conceptual development of human thought. I had even fancied that Dr. Stout himself had, more

effectively than most men, helped me to realize this fact. But apparently Dr. Stout believes that all this is present, implicitly I suppose, at what I regard as the very outset of experience. There we differ.

My own interpretation of the genesis of experience involves no such implicit knowledge. At the risk of wearisome repetition I will restate my position. Let me use the phrase synthetic impression for the direct and immediate experience which is the result of the felt development of an instinctive situation—say the pecking of a newly-hatched chick at a small object and all that immediately follows thereon. In the performance of this act a specific form of experience has its genesis. Now consider a second occasion on which the chick pecks at a similar object. Its action is initiated, let us say, by a group of visual stimuli. These visual stimuli, in so far as they affect the cortex of the brain, give rise to a visual presentation. But this presentation is only part of—only the initial phase of—the total synthetic impression which was the net result of the felt development of the whole instinctive situation. The rest of the original total impression is, on the later occasion, re-presentatively revived or reinstated in the cortex *before* it is presentatively supplemented by afferent nerve-impulses from the organs concerned in behaviour and by the results of that behaviour. There is a pre-perception of what is or may be just coming. The visual presentation has meaning and is raised to the level of a percept. It calls up or reinstates the past experience. Whereas on the first occasion the cortex responded in virtue of its congenital psycho-physiological dispositions; on the second occasion

the cortex responds in virtue of these dispositions as modified by the total impression received on the previous occasion. Since the cortex plays down on the lower centres and modifies *their* dispositions the behaviour on the second occasion is different from that on the first.

In the foregoing statement of my interpretation I used the phrase synthetic impression for the net result in conscious experience of the development of an instinctive sequence as a whole on the first occasion of its performance. And I said that when, on the second occasion, a presentation is given the rest of the original total impression is re-presentatively revived or reinstated before it is presentatively supplemented by afferent nerve-impulses from the organs concerned in behaviour and by the results of that behaviour. There is, I said, a pre-perception of what is or may be just coming; the visual presentation has meaning and is raised to the level of a percept. I think that this, in principle, accords with the view hitherto generally accepted by psychologists. Both pre-perception and secondary meaning are commonly regarded as dependent on revival and give to a presentation its perceptual value. Mr. McDougall has, however, suggested a different view. He regards what I have called the instinctive impression as already perceptual, and defines instincts as congenital perceptual systems.[1]—"The impression," he says,[2] "must be supposed to excite not merely detailed changes in the animal's field of consciousness, but a sensation or complex of sensations that has

[1] "Physiological Psychology," p. 106.

[2] "An Introduction to Social Psychology," p. 28.

significance or meaning for the animal; hence we must regard the instinctive process in its cognitive aspect as distinctly of the nature of perception, however rudimentary." Dr. Stout in further criticism of my interpretation has developed the position at greater length. The importance of the point at issue is such as to justify a somewhat lengthy citation of his criticism. The plausibility of my view, he says, (p. 238), "does not wholly depend on the failure to distinguish between the actual process of learning, and its result as expressed in subsequent behaviour. It rests also on the supposed impossibility of mentally referring to the future except in the way of looking forward to an experience which has already occurred on a past similar occasion, and is now recalled by association. . . . This view is plausible and may even appear self-evident. But it will not, I think, bear rigorous scrutiny. In the first place, I would point out that if the mind of the animal is initially aware only of the actual sensations and feelings belonging to the present moment of experience, mere revival by association cannot, of itself, make any difference in this respect." . . . Such revival "would not, of itself, suffice to explain the birth of the new power of transcending its blind and ignorant present so as to anticipate a future event which, as such, cannot actually be experienced when it is only anticipated. Such a power can in the last resource only be accounted for as involved in the fundamental nature of that relation between mind and reality, or between reality and mind which we call knowledge.

"It will of course be said that though the faculty of mentally anticipating the future does not itself

depend on the revival of the content of past experience through association, yet such revival may be a necessary condition of its being called into actual exercise, and this position, it may be conceded, has a certain *primâ facie* show of self-evidence. For how, it may be asked, can the mind anticipate when there is nothing to determine what it is that is to be expected by it. How can it look forward to a future which is utterly indefinite? And how can the direction of expectant thought be defined except by previous experience on similar occasions? Such questions seem to me to admit of a simple answer. It is conceded by everybody, and by Mr. Morgan in particular, that in the first performance of an instinctive act, an animal is cognizant of a perfectly specific object, which is a complex whole of distinguishable constituents 'all coalescent into one felt situation.' Further, as Mr. Morgan himself admits and maintains, 'all experience involves a consciousness of process as transitional and in no wise static.' These points being presupposed, I see no intrinsic absurdity in the assumption that even in the commencement of the first performance of an instinctive action, the given situation may be apprehended as about to have a further development. Such anticipation, if it exists, is not wholly indefinite; for the mental reference is to a coming change and development in a certain specific situation, and is therefore, to that extent, itself a specific anticipation of the future. Of course it is relatively indeterminate; for the animal has no clue to the particular character of the changes which are to take place. The particular character of the changes only becomes specified as they

actually occur in consequence of the instinctive movements which are specially provided for in the inherited constitution of the animal. The really vital point is, that when they do occur, they occur as the further specification of something already vaguely anticipated, so that each successive stage of the advancing experience involves not only the apprehension of an actual present, but of a future which has become present.

"The significance of this can only be appreciated when we consider the process in its conative as well as its cognitive aspect. Given that a certain actual situation is apprehended as alterable, it becomes possible to want it altered. This accounts not only for the mental reference to a further development of the initial situation, but also for the thought of a development required for satisfying a felt want. Thus, under the conditions I am assuming, there will not be merely blind restlessness, but conation in the proper sense as active tendency directed to an end, which is not merely an end for an external observer, but for the animal itself."

There is much in these paragraphs which seems to me well put with all Dr. Stout's characteristic subtlety, and worthy of very careful consideration. It is true that he reads into the consciousness of the animal in the naïve instinctive situation a good deal more than I am prepared to regard as necessary to its adequate interpretation. Let me take one point in illustration. He says that it is conceded by everybody, and by me in particular, that in the first performance of an instinctive act, an animal is cognizant of a perfectly specific object. But the

question arises in what sense we are to understand the word object. If a specific group of (let us say) visual data constitutes an object, then the very first time a chick is in this kind of conscious relationship with a cinnabar caterpillar there is an object of vision. If on the other hand we define the term object as denoting a group of sensory data *which carries meaning*, then the cinnabar caterpillar as, for experience, a mere group of visual data, is not yet an object in this sense. It is not an object until further experience has supplied other data, let us say those of taste or of touch, which, in subsequent revival, may qualify the visual presentation. Then the sight impression carries meaning and the caterpillar is so far an object of perception. Let us provisionally grant that, prior to such further individual experience, there may be very dim and vague pre-perception of what is just going to be experienced. In that case the visual impression at once carries so much meaning as is supplied through this dim and vague pre-perception. Apart from this possibility, meaning is acquired through individual experience and raises the bare sensory impression to the percept of an object. I see no reason, however, why one should not speak of the caterpillar as an object for the chick, in the figure of prolepsis. Not yet an object strictly speaking, since it lacks all meaning, it is none the less the object that will be for perceptual experience. That is the sense in which I use the word object in discussing instinct.

There is another, and perhaps closely allied, way in which Dr. Stout reads into the consciousness of the animal in the instinctive situation more than

I am disposed to regard as necessary to its interpretation. The behaviour is unquestionably purposive and directed to an end which the observer can foresee; but Dr Stout regards it as in some measure purposeful, that is directed to an end which the animal itself more or less dimly foresees. In the one interpretation it is only quasi-conative; in the other it is at least incipiently conative—conditioned by prospective psychological value. I question the presence of any true conation in instinctive behaviour. Therein lies the hopeless inadequacy of my interpretation from the point of view taken by Dr. Stout and Mr. McDougall. But I cannot here follow up this part of the subject. Dr. Stout's argument clearly shows, also, the way in which an exhaustive discussion of the problem of the genesis of experience leads up to large philosophical questions, such as "the fundamental nature of the relation between mind and reality." Into the broader discussion of these questions I cannot now enter; but so much of what Dr. Stout says above involves "the faculty of mentally anticipating the future," that I must try and state briefly my reading of the psychology of prospective reference.

Innumerable incidental presentations of daily life have meaning for our behaviour in terms of its results. I see two water-taps over a basin which has a hole in the bottom. A plug attached to a chain hangs on one side. If I am in a mood to wash my hands, I either put in the plug and then turn the hot-water tap, or if I expect the water which first runs from the tap to have been chilled by standing in the pipe, I let the water run for a little while, and then

put in the plug. I probably insert the plug as soon as the water runs warm because I expect that hotter water will soon follow. Such a trivial incident exemplifies expectation in varying phases and behaviour nicely adapted thereto. The whole business is largely dependent on the interest of the moment—for if I don't want to wash my hands I shall take no notice of the presentation to sight of basin and tap. Now whether, when I begin to turn the tap and before the water actually flows, I have a definite anticipatory *image* of the water that is just going to flow; or whether I have that much vaguer form of prospective meaning which may be termed pre-perception; this is a question which we need not discuss. I certainly *can* form a definite anticipatory image; I can picture the water which might be flowing from a dry tap. But whether I do quite normally and naturally frame such a definite image under the unsophisticated circumstances of washing my hands at the club, I am by no means sure. I rather think not. To take a different example—so far as I can ascertain, I frame no definite taste-images, properly so called. But I most certainly have a pre-perception of what is just coming when I lift a cup of coffee to my lips. I take it that in any case, the pre-perception is the first genetic stage of prospective reference. And I take it there can be no question that the sight of basin and tap carries this form of anticipatory meaning, and has interest, as the outcome of previous experience. Now although we may say in popular speech that one of the characteristics of intelligent behaviour is that it is

in large measure determined by the future, this is, of course, merely an elliptic statement of the actual fact that it is, *qua* intelligent, conditioned by anticipatory meaning. The future, as not yet in being, at any rate for scientific interpretation, cannot determine anything. All determination is present determination.

The question is:—How does this anticipatory meaning originate? Dr. Stout urges that if it is not present on the first occasion of the performance of an instinctive action, neither can it be present on the second occasion which is only "enriched by elements of the same kind reproduced by association." He does not make quite definite what he means by elements of the same kind. No doubt all cognitive elements, *qua* cognitive, are of the same kind; still re-presentative elements, as such, are surely distinguishable from presentative elements. But the anticipatory meaning of which Dr. Stout speaks can hardly be termed re-presentative in the usual since of the word, since it does not follow but precedes presentation. I am not just now concerned, however, with the question whether for satisfactory interpretation we should assume that such anticipatory meaning *is* present on the first occasion. The first point for consideration is whether it *must be* then present, if ever present. Dr. Stout asserts that it must. As at present advised, I do not feel convinced that his assertion is justified. It appears to me that the very fact of the occurrence of re-presentation on the second occasion of the performance of what was, in the first instance, purely instinctive behaviour, suffices to explain quite

naturally the new power of transcending the "blind and ignorant present." For these re-presentative factors—these "elements reproduced by association"—are on the second occasion present in experience just before they are, or may be, presentatively supplemented through actual behaviour. This affords, for psychological treatment, the initial stage of that prospective reference which becomes so characteristic a feature of more highly developed intelligence. A re-presentative factor, present in consciousness, anticipates, in temporal sequence, the occurrence of a like presentative factor. And there appears to me to be nothing illogical in urging that such re-presentative revival is a necessary condition of pre-perception.

At the same time, like Dr. Stout, "I see no intrinsic absurdity in the assumption that, even in the commencement of the first performance of an instinctive action," there is present some dim and vague pre-perception of the coming development of the instinctive situation. There is certainly no absurdity in assuming that the inherited dispositions *of the cortex* are such as to furnish the neural basis of such vague and indefinite pre-perception as Dr. Stout assumes to be present *ab initio*. I must, however, lay stress on the fact that this pre-perception would be, for my interpretation, due to an inherited disposition within the cortex, whereas instinctive behaviour, as such, is entirely determined by hereditary dispositions within the sub-cortical centres. If this be so, even granting that Mr. McDougall's and Dr. Stout's assumption is correct, it nowise invalidates my own doctrine of instinct. The

supposed pre-perception is something added to, and not part of, the instinctive consciousness.

The question therefore turns upon the definition of terms. Dr. Stout and Mr. McDougall include under instinct the factor of pre-perception which, granting its presence within experience, I should exclude *from instinct.* I exclude it because I believe it to be correlated with hereditary dispositions of the cortex. If it be included, however, instinctive behaviour is conative and of the voluntary order. This is the view of Dr. Archdall Reid. Not realizing that this is implied in what Mr. McDougall had written, Dr. Reid says:—[1] "As far as I am aware, no one but myself regards instinctive actions as voluntary. Usually they are classed as a kind of reflex. However, I feel confident I am right." His confidence is, of course, justified if he so defines instinct as to make it voluntary! His definition is closely accordant with that of Mr. McDougall. Mr. McDougall[2] defines an instinct as a specific and innate mental tendency, and holds that it carries meaning from the first. Dr. Reid defines an instinct as an innate and inherited mental impulse or inclination to do a certain act, and holds that it, from the first, implies the prompting of a *desire* to do the action. Dr. Archdall Reid does not define desire; but I take it, that what he means by desire is much the same as what Mr. McDougall has in mind when he insists on the presence of meaning with prospective reference.

[1] G. Archdall Reid, "The Laws of Heredity" (1910), p. 373.

[2] Wm. McDougall, "An Introduction to Social Psychology" (1908), pp. 20 and 28.

Let us then grant that re-presentative revival is not a necessary condition of pre-perception, and that anticipatory consciousness may be determined by congenital dispositions within the cortex. The position, then, within the scheme of my interpretation, is this: Within both the lower brain-centres and the cortex there are inherited structural dispositions which on stimulation function in a congenital manner. The processes in the lower centres determine what is from a biological point of view instinctive performance; the cortex is also affected and there is correlated instinctive experience. But since the cortex itself has *its* inherited dispositions, there occurs a cortical spread of disturbance which is correlated with pre-perceptive or anticipatory consciousness. Just in so far as, through natural selection, the hereditary lines of cortical spread are consonant with the lines of sub-cortical and instinctive spread, will the anticipatory consciousness be consonant with that evoked by instinctive performance. I shall deal in the fourth chapter with hereditary cortical dispositions and innate mental tendencies.

No doubt, as Dr. Stout says, the initial pre-perception of end to be attained is "relatively indeterminate; for the animal has no clue to the particular character of the changes which are to take place. The particular character of the changes only becomes specified as they actually occur in consequence of the instinctive movements which are specially provided for in the inherited constitution of the animal. . . . The animal will initially have no anticipation of the special means by which the end is attainable, or the special form which it will assume. It is precisely

this deficiency which is supplied by the inherited constitution of its nervous system as pre-adjusted for a certain mode of behaviour in certain circumstances." But, in the form in which I can provisionally accept Professor Stout's doctrine of vague initial pre-perception, this too is provided for in the inherited constitution of the nervous system. In my view this is provided for in the inherited constitution of the cortex; while the pre-adjustment for a certain mode of behaviour in certain circumstances is provided for in the inherited constitution of the lower nerve-centres. The former provides the psycho-physiological basis of that indeterminate interest in the situation on which Dr. Stout lays stress; the latter provides for a further development of the situation on specific lines through which the interest is defined, kept up, and increased. There is close inter-relation and co-operation between instinct and intelligence.

This brings us back to Dr. Stout's original question to which he reverts in the following passage: "How can the actual process of learning by experience, which is supposed to generate intelligence, be itself entirely unintelligent? How can a series of experiences in the way of blind sensation and feeling result, on a subsequent occasion, in the open-eyed pursuit of an end? So far as I can discover, this is supposed to take place merely through the revival of past experiences by association. But the bare revival of an experience cannot be or contain more than the original experience itself. If this consist of blind sensation and feeling, so will its reproduction. No intelligent alteration of behaviour such as animals actually display could be accounted for in this way.

The intelligence is shown in a more or less systematic modification of the whole conduct of the animal when a new situation arises resembling the old one." (p. 242.)

Now I have already stated my opinion that conscious experience accompanies instinctive behaviour from its very outset and that the moment the cortical processes which have experience-correlates are initiated, they begin to play down upon and modify the processes within the lower nerve-centres. Thus I account for the beginning of experience in the individual, and for the beginning of its control over behaviour. The question therefore really turns upon the definition of intelligence. As Mr. McDougall says (p. 252) :—" Stout will not agree to restrict the designation intelligent to processes that involve modification of innately determined modes of behaviour; he maintains that the process that is capable of resulting in such modification is *ipso facto* intelligent, whether or no such modification of innate dispositions be affected by it. It seems to me that Stout is here rejecting a very useful definition of intelligence which, thanks largely to the work of Lloyd Morgan, has become widely accepted. Will it not suffice to say that the activities of a nature modifiable by experience are *ipso facto* mental or psychical; but that intelligence is not operative, is not manifested, if no modification of innate tendencies is affected?" Dr. Stout himself clearly indicates the point at issue. He says, in a passage already quoted, that what I regard as intelligent is not the actual process of learning by experience, but only its product. That is so. Using the terms instinctive and intelligent as

adjectives to qualify the word behaviour, I have sought analytically to distinguish two types of behaviour, a congenital type to which the term instinctive should be applied and an acquired type to which the term intelligent should be applied. All goes smoothly enough so long as we are dealing with behaviour. But Dr. Stout, rightly I think, insists that intelligent behaviour is the product of intelligent process. The point is one of great importance and he does well to press it home. I believe that I am in substantial agreement with him though we may seem to differ. But I cannot discuss the matter fully here. It belongs to a later stage of my thesis. I shall there emphasize the distinction, which I regard as cardinal, between experience as experien*ced* and experience as experien*cing*. Now whenever, so far, I have spoken of instinctive experience my statements have reference to what is experienced. And when I have spoken of intelligent behaviour as characterized by some element of meaning, the reference is to meaning as intelligen*ced*—as something meant. I have tacitly taken for granted that what is experienced implies a process of experiencing. Even when I have spoken of the moorhen as "experiencer" I have looked upon it as a mental organism with a quasi-objective structure built up of what it has hitherto experienced. Dealing throughout with the so-called objective aspect of experience, I have employed phraseology which some of my critics have no doubt regarded as tainted with the vice of associationism. I have described instinctive experience as compounded of factors all coalescent into one felt situation. I have said that when the behaviour is intelligent there are

present items which are re-presented or revived. As long as we are dealing with the "eds" of experience I see no objection to regarding the more complex products as built up by the compounding of a number of more elementary factors in a higher synthesis. But when we come to consider the more vital "ing" of experience, and try in some measure to think mental process instead of thinking of mental products, then, I conceive, the terminology of association is wholly inapplicable. Our own mental life is not one in which perceiving, conceiving, remembering, imagining, and so forth, are contiguously associated. It is all of these, with differing emphasis; and all of these at once, interpenetrating and merging, as M. Bergson would say. It gives rise no doubt to associated products; but that is just because it is an associating process. If then Dr. Stout claims that *an associating process* must be present on the first occasion in order that *associated products* shall be subsequently revived, I most fully agree with him. And if he claims that the associating process is one and continuous throughout conscious life, from start to finish, there is really no essential difference between us on that matter. I can therefore, in large measure, if not wholly, agree with him when he says that "there is no special form of psychical activity which requires to be distinguished by the technical term instinct. If the term is to have a distinctive and useful meaning it must refer directly, not to a form of psychical process, but to purely biological adaptation comparable to the prearrangements of structure and function which in human beings subserve the digestion of food" (p. 243). This in the main

expresses my own view. The sequence of instinctive experience, correlated with a physiological sequence in the cortex, though it is a conscious sequence, and though it affords data for an associating process, is not *in itself* a psychical process proper, because its course is not determined by conscious relationships, but is determined by purely organic and physiological relationships, comparable to those which subserve the digestion of food. It is just for this reason that I do not regard it as conative, since I conceive that it is of the essence of conative process that it *is* determined by conscious relationships with their attendant psychical values. All intelligent process is truly conative since it is determined by conscious relationship to an end more or less clearly anticipated. It is just because Dr. Stout regards pre-perception as always present as a condition of the course of mental process, that he is fully justified in urging that intelligence and conation are, so far, in being *ab initio.*

CHAPTER III

REFLEX ACTION AND INSTINCT

I HAVE approached the consideration of behaviour from the biological side, though I seek also to correlate it with its accompanying experience. Taking, for example, the graceful and effective flight of the swallow on the wing which would popularly be regarded as an instinctive performance, I regard much of its delicate accuracy, and the nicety of its accommodation to varying circumstances, as due to intelligent guidance, the outcome of much experience gained on previous occasions and now utilized on this occasion. Some slight improvement may be due to the repeated functioning of the lower nerve-centres as such: some further improvement is no doubt due to the continued development and maturing of these centres. But more improvement is, I conceive, due to cortical influence. I do not suggest, and have never dreamt of suggesting, that the flight of an adult swallow would be what it is, and as it is, in the absence of such interaction between the higher and the lower nerve-centres. But tracing backwards the story of flight-development in the individual bird —piecing together such a story from what appear to be trustworthy observations—I reach the stage when

the swallow first dives from the nest.[1] I am satisfied that on this first occasion we have true flight, in the absence of any previous experience of flight as such. If it be said that the young bird has had ample opportunities of seeing its parents fly, and has already learnt to fly by watching them, I venture to assert that in no such manner can a skilled act be learnt. If even a man cannot learn to fence or to play billiards by watching others who are skilled exponents, and this notwithstanding the fact of the large amount of control over his bodily activities already acquired by long experience and practice in other fields of skill, how can we expect a fledgling swallow to learn to fly by watching his parents, seeing that he has never yet put his wings to their true functional use? I do not deny that he has already some experience of fluttering his wings within and on the edge of the nest. I am ready to grant him so much experience before he dives from the nest; but I contend that the actual flight, when he commits himself to the wing, is a substantially new experience. Again I do not deny that during his very first flight he is, all the time of its continuance, gaining experience; nor do I deny that the experience thus being gained from moment to moment is from moment to moment influential on his effective flight. Provisionally I am prepared to admit the possible presence of exceedingly dim, vague, and ill-defined pre-perception of the behaviour that is coming, just before it actually comes; but I assume that all experience is the conscious accompaniment of the functional activity of the cortical centres, and that

[1] For details, see "Habit and Instinct," p. 71.

this should analytically be distinguished from the subtly compounded reflex actions of the lower centres by which instinctive behaviour as such is determined.

Dr. Myers has said[1]:—"The old view that instincts are merely 'complex reflexes' dies hard. Even Professor Lloyd Morgan, if I understand him correctly, hesitates to relinquish it." Dr. Myers might have gone further; for, from the physiological and biological point of view I have not the smallest hesitation in retaining it. That, in my opinion, is just exactly what primarily, and in their first intent, they are—complex reflexes, constituting adaptive behaviour of the organism, the nature of which is determined by the inherited structure and the physiological dispositions of the sub-cortical nerve-centres. It is these complexly co-ordinated reflexes which determine instinctive behaviour as I define it; and if the organism were possessed only of sub-cortical centres there would be the end of the matter. But it so happens that the organism is possessed also of cortical centres. Afferent impulses from the whole behaving animal—impulses arising out of all that occurs from the initial stimulation to the final response—reach the cortex, stimulate it to functional activity, and thus afford data of conscious experience. If then we regard instinctive behaviour as, primarily and from the biological point of view, the outcome of complex reflexes, we must also regard instinctive experience as, secondarily and from the psychological point of view, the synthetic product of the data afforded by instinctive behaviour.

Regarding the interpretation of behaviour from

[1] "British Journal of Psychology," vol. iii., p. 210.

the physiological point of view, we have now to direct our attention to the relation of instinctive performance to reflex-action on the one hand and to cortical control on the other hand. My summary account of reflex phenomena is based on Dr. C. S. Sherrington's admirable work.[1] I shall adopt his terminology and in stating some of his conclusions shall often use his own words. The simplest reflex involves three distinguishable but related processes; initiation by a stimulus, conduction, and end-effect; and for these three processes there are three separable structures, the receptor for the initiation, the effector for the end-effect, and, between these two, the conductor. Now such processes occur in the unicellular organisms; but, in them, separable structures are not clearly differentiated. Whether it is desirable to apply the term "reflex" to the behaviour of protozoa we need not here discuss. Dr. Sherrington thinks it better to reserve the term for reactions involving specifically recognizable nerve-processes, and morphologically differentiated nerve-cells—involving, that is to say, a reflex-arc, with receptor, conductor, and effector. The reflex therefore implies the existence of organic processes within the constituent structural cells; and it suggests, if it does not necessarily imply, the existence of physiological processes in the organic substance which intervenes between the cells. Such a simple reflex is then, for physiological interpretation the unit reaction in nervous integration. The idea we form of a simple reflex is, however, an abstract and analytic conception; because all parts of the

[1] C. S. Sherrington, "The Integrative Action of the Nervous System" (1906).

nervous system are connected together and probably no part of it is ever capable of reaction without affecting and being affected by various other parts. In any case it only exhibits in ideal simplicity the first grade of co-ordination. It is obvious that if the integration of the animal mechanism is due to co-ordination by reflex action, reflexes must themselves be co-ordinated with one another; for the co-ordination by reflex action there must be co-ordination of reflex actions. This is the second grade of co-ordination. By further compounding of reflexes the net result is an orderly co-adjustment and sequence of reactions in the organism as a whole.

Now if I have so far rightly expressed Dr. Sherrington's conclusions, these questions arise:— How far does this process of the compounding of reflexes extend? In the progressive development of nervous function is there some stage at which another and a different process supervenes? If so what is the physiological nature of this different process? Granted that there are two processes, does the difference between them coincide with the alleged difference between compound reflex action and instinctive behaviour? Leaving these questions for the present unanswered we may consider first the integration that is effected by the spinal cord; secondly the integration which takes place when not only the spinal cord but the sub-cortical brain-centres are effective; and thirdly the nature of the further integration which is brought about by the functional activity of the cerebral cortex.

We have seen that our conception of a simple reflex is the product of abstract thought. It is the

unit reaction which is reached by the physiological analysis of the functional process of a highly complex nervous system. It seems to involve at least three structural units or neurones—very often more than three, but at least three. There is on the one hand the receptive neurone proceeding from the receptor to the grey matter of a segment of the spinal cord; there is on the other hand the effective neurone connecting the grey matter of that or another segment of the spinal cord with the effector in gland or muscle; and between these lies the third neurone, within the spinal cord, connecting the other two. Into the details of minute structure we need not enter. The matters of emphasis are; first that the several neurones are separable but related cells; secondly that the cells are functionally coupled at the synapses, where delicately branching tufts of the one cell come into relation with those of the other cell; thirdly that the conduction across the synapse is always, under normal conditions, forward towards the effector; fourthly that crossing the synapse involves some resistance and delay in the passage of the nervous impulse through the arc, and that this resistance is variable; and lastly that, if we regard the connexions within the simple reflex arc as primary connexions, we must remember that there are indefinitely numerous secondary synaptic connexions, with other neurones. Obviously this last feature is of great importance. Isolated though it may be for abstract thought, the simple reflex is never isolated in functional activity; if it were so isolated the integration of reflexes would be a physiological impossibility.

What we commonly term a reflex act is generally a pretty complex matter and, in its normal occurrence, involves other reflexes. Take, for example, the well-known scratching reflex of the dog. If some part of a large saddle-shaped area around and behind the shoulder be irritated, vigorous scratching of the hind-foot of that side follows. But how far this is from the simple reflex reached by abstraction! It involves rapidly alternating flexion and extension; and it further involves such modification of other reflexes as is implied by the fact that the dog has to stand on three legs while he scratches with the fourth. He may at the same time turn his head, open his mouth, prick his ear, bend his tail and so forth. Moreover the dog seems to "know" just where to scratch; further forward or further back in accordance with the position of the *pulex irritans*, which affords the initiating stimulus. Now does the dog thus act by the compounding of reflexes, or does he act instinctively or again does he act intelligently? I take it that the normal dog "knows" that he is scratching in the sense of just having a bit of scratching experience; and I see no reason why we should deny that he to some extent guides his scratching in accordance with the nature of the experience he is getting. Translating this into physiological terms the cortex is called into activity and exercises some influence over the scratching process. But how shall we translate into physiological terms the relation between the instinctive response and compound reflex action? Shall we say, quite provisionally, that if it involves sub-cortical brain-centres we may term it instinctive;

while if it involves no centres higher than those in the spinal cord we may regard it as a compound reflex? If so we must remember that the distinction is quite provisional.

Now much of Dr. Sherrington's illuminating work on reflex action has been carried out on the "spinal animal." It is found that an animal will recover from the effects of the operation of transecting the spinal cord in the region of the neck. By this operation the normal connexion between the brain and the parts of the spinal cord below the level of transection is severed, and it is possible to study the integrative action of the disconnected spinal cord. If we assume that conscious experience is correlated with the functioning of cortical neurones, the spinal animal as such is an unconscious automaton. On this view, which for the present we may provisionally accept, the reflex phenomena are the outcome of physiological mechanism, or, to use a preferable phrase, of physiological integration. We shall have to consider at a later stage of our inquiry the relations of mechanism to vitalism and finalism. Here and now it suffices to emphasize the fact that the natural processes of the organic world, of which the integrative action of the nervous system is a conspicuous example, differ in many important and essential respects from the natural processes of the lifeless inorganic world. If therefore one speaks of the mechanism of the nervous system, it must be understood that one does so without philosophical implications, using the term descriptively; and that one is dealing with living mechanism subject to those

specialized conditions which it is the aim of physiology to elucidate.

The scratching reflex is readily elicited in a spinal dog, either by gently plucking some of the hairs on the receptive saddle-shaped area, or by electric stimulation with a fine needle, very lightly inserted in the skin near the hair-roots. There is some differentiation of the response in accordance with the locality of the stimulus. Thus, when the irritation is far forward the foot is carried farther forward; when the irritation is far back the foot is carried farther back. To bring about the response the stimulus must be of sufficient intensity. There is a threshold of excitability which varies according to the circumstances. Apart from the fact that the receptor has its own threshold, the reflex arc as a whole offers some resistance to the passage of the nervous impulse; for the synapses interpose barriers to the passage, and if the whole arc is to be called into activity both receptor and synaptic thresholds must be surpassed. But by summation of subliminal stimuli the reflex may be elicited. If a spot on the receptive area be stimulated so slightly that no response follows, and if the exciting electric needle be applied at successive not too short intervals to other neighbouring spots with like absence of result, it is none the less found that when two or three of these spots are simultaneously stimulated the scratching reflex is elicited. Two stimuli of the receptive neurones of allied spots, each of which is by itself ineffective, combine to constitute a sufficient stimulus calling the effector neurones into play. So, too, a succession of subliminal stimuli on the same spot,

and perhaps still more a succession of subliminal stimuli on closely allied spots, serve to evoke the response. Under normal circumstances scratching results from an allied series of slight irritations. That's where the flea comes in. In the case of some reflexes there is an added allied reflex from the receptors in muscles, sheaths and tendons which are stimulated by the muscular activity. Although the receptor portion of this reflex arc is obviously quite different from that which proceeds from the skin, it seems to make use of the same effector neurone, and thus supplements the initiating reflex. This is the case in the flexion-reflex of the leg. This reflex is elicited by a sharp pin-prick on the sole of the foot; but added strength is given to this reflex when the leg is flexed. The reflex excited by the muscles in action allies itself with the reflex excited by the pin-prick on the footpad or between the toes. A subliminal stimulation of the afferent nerve of the hamstring muscle, if it be applied simultaneously with a subliminal stimulation of the foot, results in a marked flexion reflex, though neither stimulus by itself suffices to do so. In both these reflexes, therefore, we have an effector path common to more than one receptor path, the stimuli from which act in alliance upon the effector organ.

The pin-prick on the foot gives rise to a flexion reflex drawing up the leg, and thus removing the foot from the source of injury. The same stimulus which excites the muscles which bend the leg at the same time inhibits those which extend it. But if, instead of applying a prick or electric stimulus, smooth and gentle pressure be applied to the foot between the

pads, the result is different. A strong, brief extension follows called the extensor thrust. It is generally accompanied by a similar brief extension of the three other limbs. The flexion reflex and the extensor thrust are antagonistic. They cannot both occur at once in the same limb. Similarly with the scratching reflex. A dog, whether it be normal or spinal, cannot scratch both sides at once with both hind feet. Now suppose the left leg is scratching in response to a stimulus from the left shoulder; a stimulus on the right shoulder will inhibit the response of the left leg, though the stimulus on the left shoulder is still continued. It is clear, therefore, that both stimuli, that which provokes and that, from the other side, which inhibits, take effect through the same effector neurones.

We are thus led up to the principle of the common path. I am throughout giving expression, partly in his own words, to Dr. Sherrington's results. Here I condense his description (p. 115). "At the commencement of every reflex arc is a receptive neurone extending from the receptive surface to the central nervous organ. This neurone forms the sole avenue which impulses, generated at its receptive point (or small group of points) can use, whithersoever their destination. This neurone is therefore a path exclusive to the impulses generated at its own receptive point, and other receptive points than its own cannot employ it. . . . But at the termination of every reflex arc we find a final neurone, the ultimate conductive link to an effector organ. This last link of the chain differs obviously in one important respect from the first link of the chain. It

does not subserve exclusively impulses generated at one single receptive source, but receives impulses from many receptive sources situate in many and various regions of the body. It is the sole path which all impulses, no matter whence they come, must travel if they are to act on the muscle-fibres to which it leads. Therefore, while the receptive neurone forms a private path exclusively serving impulses of one source only, the final or efferent neurone is, so to say, a public path, common to impulses arising at any of many sources of reception. . . . Before finally converging upon the motor neurone, the arcs converge to some degree. Their private paths embouch upon internuncial paths common in various degree to groups of private paths. The terminal path may, to distinguish it from internuncial common paths, be called the final common path. The motor nerve to a muscle is a collection of final common paths."

But though the impulses from a number of private paths thus converge upon the common final path they may also so affect other neurones in the spinal cord as to give rise to a distribution to other final paths. Thus the effector discharge elicited from a single point of prick stimulation in the hind limb may be distributed to the muscles at hip, knee, and ankle. The reflex throws into contraction the flexor muscles of each of these joints; it also throws into contraction the extensor muscles of the opposite limb; and it at the same time causes a relaxation of the extensor muscles in the flexed leg. If the spinal cord, as the result of other reflexes, happens to be sending impulses to these extensor muscles, the

flexion reflex has the effect of inhibiting the discharge. The result is that, when reflex action occurs, not only are the flexor muscles made to contract, but their antagonists, the extensors, are at the same time relaxed. This automatic throwing of antagonists out of action is of much service in furthering co-ordination. If there be two coincident reflexes in extensors and flexors, respectively, the result is either *this* reflex or *that* reflex, but not the two together. "The flexor reflex, when it occurs, seems to exclude the extensor reflex, and vice versa. If there resulted a compromise between the two reflexes, so that each reflex had a share in the resultant, the compound would be an action which was neither the appropriate flexion nor the appropriate extension. Were there to occur at the final common path algebraical summation of the influence exerted on it by two opposed receptive arcs, there would result in the effector organ an action adapted to neither, and useless for the purposes of either."

These purely physiological results have an important bearing on the interpretation of instinctive behaviour and its early modification through the meaning it acquires. The chick which has had experience of a nauseous insect, acts differently when it comes upon a similar insect on a subsequent occasion. But his different behaviour is not a mere compromise between originally successive reflexes, though some signs of compromise, accompanied by apparent hesitation, may sometimes be observed.[1] More commonly the pecking reflex is entirely

[1] Cf. G. F. Stout, "British Journal of Psychology," vol. iii., pp. 242, 243.

inhibited by the cortical process which carries meaning. We do not find at the same time or in rapid succession a combination of pecking at the insect and ejection from the bill. We find one reflex or the other reflex or neither; or perhaps the one with diminished efficacy. We seldom get any muddling up of the one with the other. That is not the way in which behaviour normally develops. The very familiar fact of the swiftly-established avoidance of the unpleasant or the painful,—a fact which is of the utmost importance for the theory of the guidance of behaviour in a world where pain is a warning of danger to the organism—this fact may be correlated with that prepotency of noxious stimuli, when there is any competition for the use of a common path, to which attention will presently be drawn.

To revert now to the physiological teachings of the spinal animal the "dilemma between reflexes would seem," says Dr. Sherrington, "to be a problem of frequent occurrence in reflex co-ordination. We note an orderly sequence of actions in the movements of animals, even in cases where every observer admits that the co-ordination is merely reflex. We see one act succeed another without confusion. Yet, tracing this sequence to its external causes, we recognize that the usual thing in nature is not for one exciting stimulus to begin immediately after another ceases, but for an array of environmental agents acting concurrently on the animal at any moment to exhibit correlative change in regard to it, so that one or other group of them becomes—generally by increase in intensity—temporarily prepotent. Thus there dominates now this group,

now that group in turn. It may happen that one stimulus ceases coincidently as another begins, but as a rule one stimulus overlaps another in regard to time. Thus each reflex breaks in upon a condition of relative equilibrium, which latter is itself reflex. In the simultaneous correlation of reflexes, some reflexes combine harmoniously, being reactions that mutually reinforce. These may be termed allied reflexes, and the neural arcs which they employ, allied arcs. On the other hand, some reflexes, as mentioned above, are antagonistic one to another and incompatible. These do not mutually reinforce, but stand to each other in inhibitory relation. One of them inhibits the other, or a whole group of others. These reflexes may in regard to one another be termed antagonistic; and the reflex or group of reflexes which succeeds in inhibiting its opponents may be termed prepotent for the time being" (p. 119).

It is characteristic of such reflexes as scratching that there is alternation of flexion and extension—an alternation which gives rise to a rhythm of about four strokes per second. This seems to be mainly due to the fact that following the excitation of the flexors there is a refractory state during which the mechanism shows diminished excitability. Such a refractory state allows for phases during which stimuli fail to excite, alternating with phases in which the stimuli easily excite. In the scratch-reflex the refractory period is short—less than one-fifth of a second. But in the extensor thrust it is relatively long, lasting for nearly one second. For this period of time the stimulation of the foot fails to elicit another extensor response. As the extensor thrust

is probably an important element in the mechanism of the dog's locomotion, the biological utility of the prolonged refractory state is suggested. "After the extensor-thrust, the limb has to be given over to the flexor muscles in order, without touching the ground to swing forward in preparation for the next step by the limb. It is reasonable to suppose that part of the means by which selective adaptation has secured this result is the evolution of the long refractory phase following the activity in the reflex arc of the extensor-thrust" (p 69).

The phenomena of spinal irradiation and induction, together with fatigue effect, serve to render the combination and co-ordination of reflexes more effective. A strong stimulation gives rise to spinal disturbance which spreads from that focal response which is normal for a normal stimulus, to other allied responses. But the spread is an orderly spread. Thus, as stimulation of the foot for the flexion-reflex is increased, the extension of the opposite hind limb becomes more marked, then follow in the fore limb of the same side extension at elbow and retraction at shoulder, then in the opposite fore-limb flexion at elbow, extension at wrist and some protraction at shoulder; also turning of the head towards the stimulated side, and often opening of the mouth and lateral deviation of the tail (p. 151). "The stimulus which excites a reflex tends by central spread to facilitate and lower the threshold for reflexes allied to that which it particularly excites. A constellation of reflexes thus tends to be formed which reinforce each other, so that the reflex is supported by allied accessory

reflexes, or if the prepotent stimulus shifts, allied arcs are by the induction particularly prepared to be responsive to it or to a similar stimulus" (p. 206). This is termed by Dr. Sherrington immediate spinal induction. In successive induction it would seem that, in the case of a reflex which is accompanied by the inhibition of an antagonistic reflex, this inhibition is followed by a phase of exalted activity. During the flexor-reflex, for example, the extensor arcs are inhibited; but after the flexor-reflex these opposing arcs are in a state of exalted excitability. Hence the flexor-reflex, if intense and prolonged, may, directly its own exciting stimulus is discontinued, be succeeded by a "spontaneous" reflex of extension. By virtue of this spinal contrast, therefore, the flexion-reflex predisposes to and may actually induce an extension-reflex, and conversely an extension-reflex predisposes to and may actually induce a flexion-reflex. This process is qualified to play a part in linking reflexes together in a co-ordinate sequence of successive combination (pp. 208, 212).

Another condition influencing the issue of competition between reflexes of different source for possession of one and the same common path is fatigue. "It prevents the too prolonged continuous use of the common path by any one receptor. It precludes one receptor from occupying for long periods an effector organ to the exclusion of all other receptors. It favours the receptors taking turn and turn about. It helps to ensure serial variety of reaction" (pp. 214, 222). Since the efferent neurone forms a final common path for an indefinite number of receptors, one would expect that it would

not, like them, be readily susceptible to fatigue, and this expectation is justified by experimental evidence. There are, too, certain reflexes which persist for long periods. These are the reflex postures. The hind limbs of the spinal frog assume a squatting attitude which is reflex. Similarly in the spinal dog or cat, certain muscles exhibit a slight but persistent contraction. This is observable in those muscles whose action antagonizes gravity. The reflex-arcs concerned in the maintenance of this tonic contraction of muscles have been shown in several cases to arise within those muscles which exhibit the reflex tone.[1] Of all reflexes these tonic reflexes of ordinary posture are, in Dr. Sherrington's experience, the most easily interrupted by other reflexes. "If various species of reflex are arranged in the order of their potency in regard to power to interrupt one another, the reflexes initiated in receptors which, considered as sense organs, excite sensations of strong affective quality, lie at the upper end of the scale, and the reflexes that are answerable for the postural tonus of skeletal muscles lie at the lower end of the scale. One great function of the tonic reflexes is to maintain habitual attitudes and postures. They form, therefore, a nervous background of active equilibrium. It is of obvious advantage that this equilibrium should be easily upset, so that the animal may respond agilely to the passing events that break upon it as intercurrent stimuli" (p. 231).

In this passage Dr. Sherrington places at the

[1] C. S. Sherrington, "Encyclopædia Britannica," 11th Ed., vol. xxv., p. 675.

top of the scale of potency the reflexes which, in the intact animal, have conscious concomitants of strong affective quality. It is noteworthy that even in the decerebrate animal, in which, by transection, the cortical connexions have been severed, these reflexes are prepotent over others. "It is those areas, stimulation of which, as judged by analogy, can excite pain most intensely, and it is those stimuli which, as judged by analogy, are most fitted to excite pain which, as a general rule, excite in the spinal animal—where pain is of course non-existent—the prepotent reflexes. If there are reactions to specific pain-nerves, this may be expressed by saying that the nervous arcs of pain-nerves, broadly speaking, dominate the spinal centres in peculiar degree. Physical pain is thus the psychical adjunct of an imperative protective reflex. It is preferable, however, since into the merely spinal and reflex aspect of the reaction of these nerves no sensation of any kind can be shown to enter, to avoid the term pain-nerves. Remembering that the feature common to all this group of stimuli is that they threaten or actually commit damage to the tissue to which they are applied, a convenient term for application to them is *nocuous*. In that case what, from the point of view of sense, are cutaneous pain-nerves are from the point of view of reflex reaction conveniently termed *noci-ceptive* nerves. In the competition between reflexes the noci-ceptive as a rule dominate with peculiar certainty and facility" (p. 228).

I have culled from Dr. Sherrington's illuminating work examples of the integrative action of the

nervous system in the spinal animal. From the cases cited it is abundantly clear that even in the spinal animal a reflex act is not to be regarded as an isolated response, save for the purposes of physiological analysis. Any given reflex tends to facilitate other allied reflexes and to inhibit other antagonistic reflexes. How this inhibition is effected we do not fully understand. It unquestionably plays an important part in spinal integration. In the spinal animal what takes place at any given moment, or in a brief period of time during which reflexes are enchained in orderly sequence, depends on the spinal pattern, set or disposition. "It is not usual," as Dr. Sherrington tells us, "for the organism to be exposed to the action of only one stimulus at a time. It is more usual for the organism to be acted on by many stimuli concurrently, and to be driven reflexly by some group of stimuli which is at any particular moment prepotent in action on it. Such group often consists of some one pre-eminent stimulus, with others of harmonious relation reinforcing it, forming with it a constellation of stimuli, that, in succession of time, will give way to another constellation which will in its turn become prepotent" (p. 178). If then there is, in the spinal animal, a constellation of stimuli, breaking in upon the existing physiological process in the cord, and resulting in behaviour which is purposive, adaptive, and enchained in definite sequence, are we to term the net result in response compound reflex action or instinctive behaviour? Looking at the matter from the standpoint of the observation of behaviour—disregarding the consciousness which would normally accompany the behaviour

in the unmaimed animal—this question is not easily answered. Dr. Sherrington sees (p. 266) "no wide interval between the reflex movements of the spinal dog whose foot attempts to scratch away an irritant applied to its back . . . and the reaction of the decerebrate dog that turns and growls and bites at the fingers holding its hind foot too roughly . . . which is probably the reaction of an organic machine." Granted, then, that the spinal animal gives evidence only of compound reflex action, the decerebrate animal seems to be capable of behaviour which, as such, would assuredly be termed instinctive by the biological observer.

To the decerebrate animal therefore we now turn—that is to say the animal in which the cerebral hemispheres and their cortex have been destroyed, leaving however, the sub-cortical centres and the spinal cord intact and functionally effective. We need not delay over the familiar and oft-quoted case of the frog of which Michael Foster[1] said that in the absence of the cerebral hemispheres it "can by the application of appropriate stimuli be induced to perform all or nearly all the movements which an entire frog is capable of executing. . . . The nervous machinery required for the execution, as distinguished from the origination, of bodily movements even of the most complicated kind, is present after complete removal of the cerebral hemispheres, though the movements are such as to require the co-operation of highly differentiated afferent impulses." If then we may trust such observations as those on which these

[1] "A Text Book of Physiology," 7th Ed. Part iii. (1897), pp. 1073-6.

conclusions are based, they seem to support the view that the decerebrate frog performs, if not all, at any rate a great number of activities which are of the instinctive order. Such a frog according to Dr. Max Schrader[1] catches flies, buries itself in the mud in the cold season, and takes to the water when the warmer weather comes.

In the decerebrate pigeon[2] "the appearance and behaviour of the bird are strikingly similar to those of a bird exceedingly sleepy and stupid. It is able to maintain what appears to be a completely normal posture and can balance itself on one leg after the fashion of a bird which has in a natural way gone to sleep. . . . Placed on its side or its back it will regain its feet; thrown into the air it flies with considerable precision for some distance before it returns to rest. It frequently tucks its head under its wings, and at times may be seen to clean its feathers; when its beak is plunged into corn it eats. It may be induced to move not only by ordinary stimuli applied to the skin, but also by sudden loud sounds, or by flashes of light; in its flight it will, though imperfectly, avoid obstacles, and its various movements appear to be to a certain extent guided not only by touch but by visual impressions." In the bird as in the frog it would seem that "the parts of the brain below or behind the cerebral hemispheres constitute a nervous machinery by which all the ordinary bodily movements may be carried out."

[1] Max Schrader, "Zur Physiologie des Froschgehirns," Pflüger's Archiv. Bd. xli. (1887). Schrader's results are summarized by Loeb, "Comparative Physiology of the Brain," chapter ix.

[2] M. Foster, op. cit. p. 1078.

According to Dr. Schrader the sleepy and stupid condition of the decerebrate pigeon passes by after a few days when the shock-effect of the operation has diminished. Such a bird flies from one place to another with perfectly co-ordinated movements and alights, for example on a bar, like a normal bird. It sleeps at night; but during most of the day wanders about restlessly and untiringly. It avoids obstacles, but "to these animals all objects are alike. They have no enemies and no friends. They live like hermits, no matter in how large a company they find themselves. The languishing coo of the male makes as little impression on the female deprived of its cerebrum as the rattling of peas or the whistle which formerly made it hasten to its feeding-place. Neither does the female show interest in its young. The young ones that have just learned to fly pursue the mother, crying unceasingly for food, but they might as well beg food of a stone."[1] If these observations are correct it looks as if much behaviour of the instinctive order is relatively unaffected; and the salient fact seems to be that, with the destruction of the cerebral cortex, many objects and many stimulations appear to have lost all meaning.

Turning now to observations on mammals, according to Dr. Goltz[2] the decerebrate dog "would lie curled up like a normal dog; it could be aroused by the loud blowing of a horn, and by blowing through a

[1] Max Schrader, "Zur Physiologie des Vogelgehirns," Pflüger's Archiv. Bd. xliv. (1889) quoted by Loeb., op. cit. p. 244.

[2] F. Goltz, "Der Hund ohne Grosshirn.," Pflüger's Archiv. Bd. li. (1892). See F. W. Mott in "A System of Medicine," edited by Allbutt and Rolleston, vol. vii. (1911), p. 257.

tube a current of air on to its skin, when it would raise itself on its four legs and shake itself. If the animal had been roused by the blast of a horn, it would put its paw up to its ear as if something unpleasant had happened. When the animal was removed from the pen, as it was every day, to be fed, it growled, snapped, and snarled like an angry brute, and resisted and struggled to be free and return to its cage; it showed, in fact, exactly the same signs of anger as the decerebrate dog, whose sciatic nerve was stimulated in Sherrington's experiment—lowering of the head, bristling of the hair, retraction of the ears, and growling, biting and snapping. Although removal from the cage every day would have meant to the normal animal appeasement of hunger, yet this animal every day for eighteen months, until the day of its death under chloroform, gave the same instinctive signs of anger, and never joy, fear, or affection." Similarly in the decerebrate cat, Dr. Sherrington (p. 255) could never evoke such expression as might, had the cerebral hemispheres been present, have been indication of pleasurable sensation. Never, for instance, could purring be elicited, although its opposite, snarling was obtained so easily. It must be remembered that pleasure is probably always an affective accompaniment of meaning; whereas what we interpret as pain may be a physiological reaction to noci-ceptive stimuli. The one is correlated with cortical process; the other need not be so correlated. Dr. Goltz's decerebrate bitch "made no distinction between a stranger and the man who had fed her every day. She had no memory, but still possessed desires as physiological tendencies and instinctive reactions. When hungry . . . she

performed continuous pacing movements; moreover, she would place her two forepaws on the front of the cage, standing on her hind legs. She would maintain her position on four limbs on a smooth and sloping surface and defecated normally." Dr. Sherrington found (p. 306) that even in the spinal dog defecation was invariably followed by a number of vigorous kicks with the hind limbs. Dr. Goltz's dog refused to eat meat which had been soaked in a solution of quinine. He adds that he threw to his own house dog a piece of the same doctored meat. The animal took it eagerly, pulled a wry face and hesitated. But on a look of encouragement from his master the dog swallowed it. He overcame his instinctive rejection of it and thus, as Dr. Goltz remarks, by his self-control gave proof of the intact cerebrum he possessed.

It will be observed that in the decerebrate animal there are sundry expressions of the emotions. It must be remembered that if we assume that correlated consciousness is restricted to the cortex these are purely physiological responses. From certain experiments on newly-born puppies Dr. Pagano[1] concludes that in the basal ganglia of the brain—that is in sub-cortical centres—there are found at birth physiological preorganized mechanisms of emotional reactions. The cerebral cortex not being functional at birth is, therefore, not indispensable for expressive reactions of the same kind as those which accompany emotional states. Dr. Pagano concludes also that the superior psychical centres which are superimposed on the

[1] Pagano, "Archives Italiennes de Biologie" (1906). See Mott, op. cit. 258.

lower centres are only a new source of stimulus for primordial expression, but at the same time the origin of secondary modifications of emotional expressions. Dr. Sherrington (p. 254), however, draws attention to the fact that hemicephalic children in total absence of the cerebral hemispheres and of the midbrain with its basal ganglia, seem to react as do normal infants of the same age to stimuli that, judging from adult experience, are unpleasant. They cry or whimper, pucker the mouth, and retract the head. The drawing down of the angles of the mouth and the drawing down of the lower lip seem indicative of pain: pouting of the lips seems to indicate pleasure. Of course these facts are not adduced to show that in the expression of normal children the thalamus is not implicated; they are adduced further to emphasize the fact that for certain forms of expression the cerebral cortex is not necessarily implicated.

I have now cited from the works of accredited representatives of physiological investigation and interpretation—and cited as far as possible in their own words lest I should misrepresent their statements—some evidence which seems to show that behaviour of the instinctive order, as regarded from the biological standpoint, is due to the integrative action of sub-cortical centres. Such evidence appears to me to justify the provisional hypothesis that what the biologist terms instinctive performance is the outcome of inherited sub-cortical dispositions. These dispositions are, on this view, the structural correlate of the functioning of a completely organized system of neural arcs. How they function at any given moment

depends upon the inherited organization, upon the constellation of stimuli to which they are subjected at that moment, and upon the way in which they are already functioning. Whether we draw the line between compound reflex action and instinctive behaviour at some ideal transection at the base of the bulb, appears to be a matter of little importance. More important is the question whether there is any essential difference between spinal integration and sub-cortical brain integration. I conceive that there is no essential difference. There is fuller and richer alliance between groups of reflexes; there is more subtle inhibition of other groups; there is a more complex and more widely effective phase of adaptation. But if sub-cortical behaviour is rightly termed instinctive, then I see no reason for hesitating to regard it as compound reflex action, in the sense that it is the outcome of progressive complication in the effective co-ordination of reflexes.

The psychologist will, however, object that from his point of view, and within his universe of discourse, instinct is a mode of conscious experience and that it is misleading, if not absurd, to apply this term to phenomena which *ex hypothesi* are unconscious—unconscious, that is to say, on the assumption that consciousness is correlated with cortical process. So be it. Let it be freely granted that the spinal or the decerebrate animal is unconscious and is therefore incapable of *instinctive experience*. That surely does not show that the entire and intact animal is destitute of such experience. It does not show that the cortex, when normally present, does not receive impulses from the organism that is behaving under sub-cortical

integration. It must be remembered that these cervical transections, this ablation of the cerebral hemispheres, are means to physiological analysis. The value of observations in the physiological laboratory lies not so much in the information they afford with respect to the maimed animal, as in the insight they give for the much more important task of the interpretation of the normal animal's behaviour. Only thus can we attain, through the privileged and responsible work of trained investigators, sure data for assigning to special parts of the nervous system their special functions and thus inferring their normal relationships. The outcome of physiological analysis of the kind we have been considering is that complex behaviour of the instinctive type is determined by the hereditary dispositions of the sub-cortical centres. But the lesion which cuts off impulses from the cortex, cuts off also impulses to the cortex. I submit as a not unreasonable doctrine in the present state of our knowledge, that in the entire animal orderly impulses due to the performance of determinate behaviour reach the cortex and *there* generate the instinctive experience—or let us rather say the instinctive factor in experience. In the normal life the impulses arising out of the behaviour (including of course its receptive initiation) break in upon a cortex which is already functioning. This functioning as a whole has, as its conscious correlate, the changing continuum of experience. To this continuum the instinctive experience is assimilated. The existing pattern of experience is modified and rearranged. Just as the simple reflex is an abstract concept which refers to that which probably never occurs in isolation, so is

the instinctive experience an abstract concept—having reference no doubt to an indefinitely more complex object of thought, but none the less abstract. In its isolation, save for analytical thought and the interpretation of a larger whole within which it is component—in its isolation, I say, it perhaps cannot exist as constituting experience, it can only co-exist with factors of like order. The utmost we can say is that, in the genesis of experience, the instinctive responses afford the nearest approach we can conceive to the primary pattern which ruffles the surface of the relatively uniform continuum of hitherto indefinite consciousness.

I have said above that we must bear in mind that the lesion which cuts off physiological impulses from the cortex, cuts off also afferent impulses to the cortex. The latter give rise to those cortical changes which are the neural correlates of instinctive experience; the former in some way effect the control of instinctive behaviour by the cerebral cortex—control by that part of the nervous system which, as we have provisionally assumed, alone possesses the adjunct of consciousness—hence, in our elliptic phraseology conscious control. There can be no question about the fact of this control. But, as Dr. Sherrington says (pp. 388–390), "it is urgently necessary for physiology to know *how* this control is *operative* upon reflexes, that is how it intrudes and makes its influence felt upon the running of the reflex machinery. . . . Its analysis has not proceeded far. We may premise," he adds, "that some extension of the same processes as are operative in simultaneous and in successive combination of reflexes, must be operative in this

control. There we saw reflexes modifying each other, and the more complex reactions being built up from simpler and more restricted ones. Some extension of the same process should, in view of our inferences concerning the nature and dominance of the brain, apply here also." "Looking at the matter from a purely physiological point of view," said Michael Foster (p. 1078), "the real difference between an automatic act and a voluntary act is that the chain of physiological events between the act and its physiological cause is in the one case short and simple, and in the other case long and complex."

I take it that in the ideal construction which it is the aim of the physiologist to frame, the principles of integration are fundamentally the same throughout the central nervous system. No essentially new process different in principle from other integrative processes occurs in the cortex. What does occur is, it would seem, the intercalation of new groups of arcs which permit of the associative connexions which are acquired in the course of individual life. We cannot assert as a proven fact, but we may infer from such facts as we do possess, that the cortex is the pre-eminent, if not the only, part of the nervous system in which such acquired association takes place. It is pre-eminently, or perhaps exclusively, the organ of educability, and hence the organ of intelligent control. We have seen that inhibition is by no means the prerogative of the cortex only. Inhibition and facilitation are seen in the integrative processes of the spinal cord. It is not improbable, however, that acquired inhibition, like acquired association, is characteristically a cortical function.

But the purely physiological conditions are not known. Psychical factors are at once suggested, and we pass to a quasi-psychological explanation: in so doing we confess our physiological ignorance. By whatever method of cortical linkage of neural arcs it is effected, acquired control often carries with it inhibitions which are hereditarily bound up with the controlled act. We can control our swallowing; but the act of swallowing automatically inhibits respiration; it seems also to have an automatic inhibitory effect on the heart-beat.

Simple forms of acquired association have been brought into the field of laboratory practice by Dr. Pawlow.[1] If acid fluid be placed in a dog's mouth there is a reflex which affords an increased flow of saliva. By placing a cannula in the duct of the submaxillary gland the rate of flow can be determined. Let some other sensory organ be stimulated at the same time as the mouth is moistened with the acid solution. For example let a horn be blown in an adjoining room every time the acid fluid is placed in the dog's mouth. After a while the blast of the horn affords an auditory stimulus which in and by itself gives an increased flow from the salivary gland. Indeed Dr. Pawlow found that any stimulus which was made coincident with the acid-in-the-mouth response may be, by the establishment of associative connexions, rendered a sufficient stimulus for increased flow of saliva. A new set of receptive neurones are connected up with the common path to the effector

[1] Pawlow, "Scientific Investigation of the Psychical Faculties or Processes in Higher Animals," Huxley Lecture, 1906. "Lancet," 1906, ii., p. 911. Cf. Mott, op. cit., p. 251.

gland. I am not aware whether such experiments have been made with decerebrate dogs. We do not know whether such new connexions can be established in the sub-cortical centres without the intervention of the cerebral cortex. If by further physiological research it should be shown that this is the case, it would but serve to indicate, what is not inherently improbable, that new receptor inlets for the evoking of instinctive response may be established without necessarily calling into play the intelligent or cortical arcs of the central nervous system. New connexions may be acquired within the lower centres without the intervention of the integrating influence of the cortex.

Be this as it may, Dr. Pawlow's experimental results confirm the general conclusions which may be drawn from observations dealing with acquired modifications of behaviour. Those who lay stress on the motor aspect of instinctive behaviour, and consider it in the light of physiological research, regard it as the functional outcome of a complexly organized system of final common paths. That is the essential feature of the hereditary disposition of the lower nerve centres. The receptor side is less rigidly stereotyped. That is to say, a closely similar response may be, and often is, the outcome of the play of environmental situations which have only a general likeness—which vary to some extent, sometimes to a considerable extent, in detail. The situation which evoked the moorhen's dive need not have been just that which I have briefly described. As Mr. McDougall has well said,[1] such "an instinct

[1] "Introduction to Social Psychology," p. 37.

has several innately organized afferent inlets, through each of which its central and afferent parts may be excited without the other afferent inlets being involved in the excitement." As life proceeds the inlet side of the behaviour business becomes further organized through experience. The birds which remain unmoved while the express train thunders by, may precipitately scatter at the yapping of a little dog. The organization of experience in its early stages is, in large measure, the organization of perception, the acquisition of meaning, and the correlation of the data afforded by the special senses with the data afforded by the responsive behaviour itself. This is in large measure the result of acquisition in the course of individual life. None the less this acquisition is itself dependent on hereditary dispositions and innate tendencies to the consideration of which we must now proceed.

CHAPTER IV

HEREDITARY DISPOSITIONS AND INNATE MENTAL TENDENCIES

IN an oft-quoted passage, too frequently torn from its context, Dr. Groos contends [1] that "the idea of consciousness must be rigidly excluded from any definition of instinct which is to be of practical utility," since "it is always hazardous in scientific investigation to allow an hypothesis which cannot be tested empirically." I take it, however, that the question before Dr. Groos, when he wrote these words, was that of *origin*. The question was *not*: Does consciousness accompany instinctive performance? The question was: Does instinctive performance owe its genesis to the guidance of consciousness? or, as Dr. Groos himself puts it, in words immediately preceding those which I have quoted: "Is this useful adjustment attributable to conscious will?" It is to this question that he gives a negative answer. His whole thesis implies an accompaniment of consciousness; "the feeling of pleasure," he says, "that results from the satisfaction of instinct is the primary psychic accompaniment of play" (p. 288). It is abundantly clear from a perusal of Dr. Groos'

[1] Karl Groos, "The Play of Animals" (1898). Translated by Elizabeth L. Baldwin (1901), p. 62.

work, that his contention is that the origin of instinct is to be sought in the field of biological inquiry; that within this field the idea of consciousness as exercising guidance in origin is to be excluded; but that the consciousness which accompanies instinctive performance affords data for intelligent modification of behaviour through practice and exercise.

In dealing with instinctive performance from the strictly biological point of view the question of the existence or non-existence of the psychological accompaniments may be, and often is, ignored. Thus Dr. and Mrs. Peckham [1] place under the term instinct "all complex acts which are performed previous to experience, and in a similar manner by all members of the same sex and race, leaving out as non-essential, at this time, the question of whether they are or are not accompanied by consciousness." The exclusion of the psychology of instinct is here purely methodological. The question for general biology is whether the behaviour is, as a matter of observation, adapted to the environing circumstances on the occasion of its first occurrence, or is brought into closer relation to these circumstances by acquired accommodation. The question for physiology is whether the behaviour is due to certain inherited connexions among the neurones of the central nervous system, or is due to connexions which have been established in the course of individual life. Both general biologist and physiologist may ignore the question whether certain psychological relationships are also present; but only

[1] George W. and Elizabeth G. Peckham, "On the Instincts and Habits of the Solitary Wasps" (1898), p. 231.

because they do not fall within their special field of study.

If, however, we see reason to believe that some animals learn by experience, we have to admit the existence of psychological relationships. And if we assume that some of the vital processes of the animal organism are correlated with conscious experience, we have to face the question: If some, why not all? We have to consider the problem of the relation of life to consciousness throughout the whole range of organic evolution and development. It may be that, as Dr. Titchener [1] believes, "consciousness is as old as animal life, and that the first movements of the first organisms were conscious movements." Or it may be that consciousness appeared later than life, and if so we have to face the questions: When, from what source, and under what conditions? If we accept the former alternative and hold with Dr. Titchener "that the earliest movements were conscious movements, and that all the unconscious movements of the human organism, even the automatic movements of heart and intestines, are the descendants of past conscious movements," we have the speculative difficulty of explaining the lapse of consciousness in certain admittedly unconscious movements. If on the other hand we accept the second alternative we have the speculative difficulty of explaining the rise of consciousness from the lap of the unconscious. In the one case something vanishes; in the other case something new appears. What course shall we take? We shall ignore these speculative difficulties. There are

[1] E. B. Titchener, "A Text-book of Psychology" (1911), p. 451.

certain phenomena of organic behaviour which seemingly cannot be explained unless we take into consideration experiential relationships like those which are conditions of our own conduct—relationships which really count, in that their presence or absence makes a real difference. We accept them as existent, just in so far as they appear to be necessary for scientific interpretation, and no further. As effective relationships they seem to be correlated, in the higher vertebrates, with functional processes in the cortex.

What, then, do I mean by effective consciousness? I mean consciousness which involves so much pre-perception as to condition the course of behaviour. On this depends all profiting by experience. Now whether there be some dim and vague pre-perception in the first instinctive performance; or whether this only comes as the result of previous individual performance; in either case something of the nature of conscious perception is a prior condition to pre-perception. In any interpretation on the lines of natural history, if the perceptual preparation be not provided in the life-history of the individual, it must be provided in the life-history of the race. But if effective consciousness, as pre-perceptual, is conditioned by previous perception, it is clear that such previous perception itself involves the conscious relationship. Hence there can, I think, be little question that consciousness must be present in correlation with certain dominant vital processes before behaviour guided by pre-perception affords to us sufficient evidence that it is a condition that counts in evolutionary progress and in the development of any given organism.

Apart from speculation, therefore, it is a question of evidence—evidence peculiarly difficult to obtain and to assess at its true value. Still the question is: Is there, in this or that organism, evidence that the behaviour is guided by pre-perception? If there is, then we are, I take it, bound to infer the prior presence of perceptive consciousness in order to interpret its origin. As the result of very careful and valuable observations on the infusoria, Dr. Jennings has brought forward the evidence which satisfies him that in them some behaviour is guided by pre-perception. I am not quite satisfied by the evidence. But though I have elsewhere taken up a sceptical attitude, I am fully prepared to admit that there is a reasonable probability that the behaviour of some of these lowly organisms may be conditioned by pre-perceptual consciousness. We ought not to deny the presence of consciousness in any animal; but we ought to require good evidence of pre-perceptual guidance. That seems to be essential.

How then, it may be asked, do I propose to square such a view with the reiterated assumption that in the higher vertebrates—those in which a cortex is well differentiated—conscious guidance is specially correlated with cortical conditions? Here again it is entirely a matter of evidence. As at present advised—taking into consideration Dr. Sherrington's work on the spinal animal, and the observations recorded by skilful observers on the animal deprived of its cortex—I do not find satisfactory evidence that the reflex behaviour is conditioned by pre-perception. The outcome of further research may very possibly lead me to alter

my opinion. If so, I shall, I hope, be ready to admit that I was mistaken. Till then I must continue to hold the views that I have indicated, and draw the line between the cortex and the sub-cortex. I see no evolutionary reason why we should not accept the conclusion, to which the facts seem to point, that as perception and pre-perception rise to higher grades of development, they are concentrated in, and perhaps limited to, just the very highest modes of process in the most delicately organized part of the central nervous system. I am therefore inclined to surmise that the line should not be drawn in the lower vertebrates where I am assuming that it should be drawn in birds and mammals. It is quite possible, nay, more, I incline to regard it as probable, that the line shifts upwards as the nervous system is evolved in the race and developed in the individual.

There is one more point on which I would fain, if it be possible, make clear my position. It may be said that to limit the conscious relationship to cortical process is absurd, since experience, as such, refers not to events in a particular part of the brain, but to events in the external world—the shining of a distant planet for example. But I take it that in such a case it is ideally possible to trace a complete series of correlations from certain events in the planet to certain events in the cortex and thence onwards, let us say, to certain events in the instrument by which a record of the moment of the planet's transit is made. The conscious relationship is a link in the correlated chain between the star and the instrument; for I assume that in its absence the observer would not record the transit. Now I do not think we are

able to explain how this conscious relationship in a long chain comes to refer to distant terms at either end of the correlation series. I do not, of course, mean that psychology has nothing to say on the subject; it has much to tell. I mean that, as it seems to me, the story psychology tells is that of a correlation of such references, so that *this* comes to mean *that;* but, for the present at any rate, we have to accept that reference, in some initial form, as part of the constitution of experience. No doubt from the evolutionary point of view the reference is initially in the direction from which the stimulus comes along the afferent nerve. But some such reference seems to be just a given fact which we must accept. If this be so, it is immaterial whether the specific physiological alliance is within the cortex, or extends from the receptor through the cortex to the effector, as indeed it may do for all we know. The essential point is that the cortex is functionally implicated; and that if it be not so implicated there is, it would seem, no satisfactory and trustworthy evidence that the conscious relationship is present with guiding value.

Quite provisionally, then, I assume that effective consciousness—that which is connected with the profiting by experience, is correlated with cortical process. Now both cortical processes and sub-cortical processes are dependent on connexions among the neurones of the central nervous system; some of these connexions seem to be congenital; others appear to be acquired in the course of individual life. Instinctive behaviour, as I have described it, seems to be dependent on congenital connexions in the sub-cortical centres. But there

are also congenital connexions in the cortical centres. To these are due the innate tendencies or inherited dispositions to be considered in this chapter.

There is perhaps some ambiguity in the contrast between the congenital and the acquired. Especially is this the case when we use hereditary and congenital as equivalent terms. There is a sense in which it may be said that every organic or mental process or product is, broadly considered, based on hereditary transmission—or, in stricter phrase, historically correlated with preceding phases of process along the line of parents and ancestry. No doubt we cannot act or think in any way, unless we inherit the ability or capacity thus to act or think. In this sense all acquisition depends on an innate power of acquiring. If, with Sir E. Ray Lankester, we contrast congenital instinct with educability, we must remember, as he is careful to show, that educability is, in this broad sense, an inherited character. Similarly, in an equally broad sense, everything is acquired. The adult possesses a number of characters which, since they were not present, as such, in the fertilized ovum, are, in this broad sense, acquired in the course of development. This is not, indeed, the technical sense in which biologists are, for the most part, agreed to use the term. And it sounds a little extravagant, to those who employ the term in its technical sense, when Dr. Archdall Reid [1] claims that normal racial characters are "acquired" under "the stimulus of nutriment"; for, in these racial characters the hereditary factors of correlation far outweigh any

[1] G. Archdall Reid, "The Laws of Heredity" (1910), pp. 208, 431, 432.

specific correlation there may be with the nature of the so-called stimulus—that is with the necessary conditions of nutriment, appropriate temperature, and so forth. What are generally regarded as acquired characters are those which are definitely correlated with the conditions under which the bodily tissues undergo modification.

But we cannot here discuss a somewhat subtle and technical problem. It must suffice to put the matter thus:—Every organism has an inherited constitution; and every organism develops amid an assemblage of surrounding conditions. Now in the case of some organic and mental products the emphasis seems to lie in the inherited constitution; in the case of others the emphasis seems to lie in the response to incident conditions. In the former the hereditary correlation, in the latter a definite correlation with the circumstances, is predominant. Some modes of bodily and mental behaviour come with a minimum of learning, the emphasis being on the coming rather than on the learning; others come by much learning, the emphasis here being on the learning rather than on the coming. Innate tendencies and inherited dispositions come with the constitution; of course the appropriate conditions must be there, but the stress is on the constitution.

That capacity is a constitutional trait—is what every one who deals with the problem of heredity admits, nay, contends. We scarcely need to be told by Dr. Archdall Reid with all the emphasis of italics that "if we wish to avoid hopeless confusion it is necessary to distinguish between two entirely different things; between, on the one hand, *capacity*

to make mental acquirements, and, on the other the mental acquirements *themselves*. . . . The ability is inborn and tends to be inherited by offspring; the acquirements are not" (p. 421). And it is questionable whether there is any one, who has considered the problems of heredity, in even the most superficial manner, who fails to realize that innate capacity has a constitutional tendency to be developed in more or less definite lines. "While it is possible," says Dr. Archdall Reid, "that some geniuses may be men endowed with exceptional all-round capacity, they are usually distinguished from the average type by exceptional capacity in some particular department of mental activity. It is probable, for example, that Shakespeare had more poetic capacity (i.e. power of responding to poetic experiences, of recording and learning to utilize such experiences), and less artistic capacity than Michael Angelo, who presumably had less mathematical capacity than Newton, who in turn had less military capacity than Napoleon, who again was inferior in philosophic capacity to Darwin" (p. 436).

I quote this passage, not because I think its author would claim for it any striking originality, but to raise the question whether such innate differentiations of inherited capacity should be termed *instinctive*. We are here within the sphere of intelligence, and indeed within the narrower sphere of that higher order of conceptual intelligence which approaches or reaches the level of genius. Are we still also within the sphere of instinct? It may be said that human genius is a kind of instinct, and that Mozart took to music as instinctively as a duckling takes to water.

For both, of course, the necessary medium must be presented; but both deal with this medium with a facility due to hereditary dispositions. If, then, all specialized hereditary dispositions are to be termed instinctive, and if all performance conditioned by such dispositions is likewise to be termed instinctive, we must admit the presence of an instinctive factor which permeates the whole of our intellectual life.

We here open up a question of considerable importance. In an endeavour to reach some definite conclusion in the matter we must first ask whether accredited writers apply the term instinctive to hereditary tendencies in the sphere of the intellect.

Thomas Reid considered instinctive belief as one of the best gifts of nature.[1] "Children," he says,[2] "have everything to learn; and, in order to learn, they must believe their instructors. . . . They believe a thousand things before they ever spend a thought on evidence. Nature supplies the want of evidence, and gives them an instinctive kind of faith without evidence." An example of "belief which seems to be instinctive, is that which children show even in infancy, that an event which they have observed in certain circumstances, will happen again in like circumstances." Similarly Adam Smith says[3]:—"There seems to be in young children an instinctive disposition to believe whatever they are told." Hamilton, commenting on Reid, urges that "the terms instinctive belief, judgment, cognition, are

[1] Thomas Reid, "Works," edited by Sir Wm. Hamilton (6th Ed. 1863), p. 184.

[2] *Ibid.*, p. 549.

[3] Adam Smith, "Theory of Moral Sentiments," pt. vii., § 4.

expressions not ill adapted to characterize a belief, judgment, cognition, which, as the result of no anterior consciousness, is, like the products of animal instinct, the intelligent effect of (as far as we are concerned) an unknowing cause. In like manner we can hardly find more suitable expressions to indicate those incomprehensible spontaneities themselves, of which the primary facts of consciousness are the manifestations, than rational or intellectual instincts."

But all this, it may be said, is a matter of past history. Hamilton,[1] with his marvellous erudition, may cite a cloud of witnesses in favour of the usage of the term instinctive in this manner; but have we not re-defined the term since those days? Let us turn then to a philosopher of our own times. M. Bergson has elaborated a doctrine of instinct which we shall have to consider at some length. But in the following passages the word is used in a general sense. "The impulsive zeal," he says,[2] "with which we take sides on certain questions shows how our intellect has its instincts." He speaks of the tendency to accept a mechanical interpretation of things as "the mechanistic instinct of the mind"; he tells us that "intellect instinctively selects in a given situation whatever is like something already known"; he affirms that "common-sense instinctively distinguishes between the two kinds of order"—that is, the vital order and the inert order, which for M. Bergson are strongly contrasted in nature and in

[1] Hamilton's "Reid," p. 761.

[2] "Time and Free Will," Eng. Translation by F. L. Pogson (1910), pp. 134–135.

origin; he speaks of "a strong instinct which assures the probability of personal survival"; he lays stress on "the cinematographical instinct of our thought," that is, our tendency to deal with events in continuous progress, not in their steady flow of insensible change and becoming, but as a series of isolated snap-shots taken like instantaneous photographs in the camera of thought.[1] Now these and other such expressions have reference to innate intellectual capacity; but they have reference to something more than a general store of capacity or fund of educability. There is reference in each case to a process having a definite direction. And the term instinctive is used to emphasize the fact that the specific direction is not, or not only, the result of intelligent acquisition, but is the outcome of hereditary dispositions. For though, in M. Bergson's philosophy, the hereditary dispositions are *made by* Life or Consciousness for its own free use; yet, as thus made and thus used, they are embodied in the "canalized" nervous system, so that, at any rate, "everything is bound to happen as if perception were a consequence of the state of the brain.[2]

It may perhaps be said that the passages I have culled from M. Bergson's writings serve only to illustrate certain idiosyncrasies of his own special doctrine of instinct. Let us then turn to the pages of two text-books of psychology, written quite recently. Defining instincts as "all connexions or tendencies to connexion which are unlearned—are in us apart from training or experience," Dr. Thorndike

[1] "Creative Evolution," pp. 18, 31, 236, 283, 333.
[2] "Matter and Memory," p. 314.

says[1]:—"The inborn constitution of a human being provides connexions between certain situations and the responses made to them." And after enumerating the attributes of instincts, he says:— 'All the characteristics of instincts thus summarized belong to the subtler possibilities of mental life which are called capacities"; and he proceeds to instance the capacity for managing men, and that for acting, or for literary production. Both instincts and capacities, then, are as such, dependent upon inborn constitution, and the distinction between them, if there be any valid distinction, would seem to lie in the fact that capacities are "the subtler possibilities of mental life" (p. 191).

"If we try to work out a rough classification of instincts," says Dr. Titchener,[2] "we find at the lower end of the scale a number of movements that grade off into the reflex—such things as coughing, smiling, sneezing, swallowing, threading our way on the street, beating time to music. . . . These are definite responses to particular stimuli. At the upper end of the scale, we find large general tendencies: the tendency that makes us take the world of perception as a world of real things; the empathic tendency, that makes us humanize our surroundings, animate and inanimate alike; the social tendency, that makes us imitative and credulous ("suggestible" in a narrower sense); the tendency to dual division, closely connected with the polar opposition of pleasantness-unpleasantness, which makes us classify

[1] Edward L. Thorndike, "The Elements of Psychology" (2nd Ed. 1907), p. 187.

[2] "Text Book of Psychology" (1911), pp. 463-464.

the world by pairs, good-bad, active-passive, etc. . . . Between these extremes lie what we may term the instincts proper: fear, love, jealousy, rivalry, curiosity, pugnacity, repulsion, self-abasement, self-assertion, and so on." We have thus a pretty wide range of instinctive tendencies (in the broader sense) from sneezing or coughing to classification in opposing or contrasted pairs; and even in the narrower sense, from fear and pugnacity, through jealousy and rivalry, to self-abasement and self-assertion. Dr. Titchener's classification comes to some extent into line with Dr. Thorndike's, if we correlate the "large general tendencies" of the former psychologist with the "inborn capacities" of the latter. In both there is a distinction between sundry "instincts proper" and sundry subtler hereditary possibilities of the mental life.

Let us now revert to Mozart and the duckling. The one, in virtue of innate proclivities, responds in a special way to the stimulating touch of musical phrase and cadence, falling on a peculiarly sensitive ear and brain. The other, in virtue of innate tendencies, responds in a special way to the touch of water on limbs and breast. It is true that Mozart has to learn to give expression to the music that is in him, whereas the duckling has not to learn to give expression to the swimming that is latent in his nature as a water-bird to the manner born. Still, Mozart's learning is so remarkably rapid that it may fairly be urged that there is an innate facility. If, then, we are to apply the term instinctive to all that is unlearned—to all the factors of the mental life which are the outcome of congenital dispositions, as

distinguished from the factors which are the outcome of acquired dispositions—there can be no question that Mozart took to music as instinctively as the duckling takes to water. That seems to have been Huxley's view. "The child," he says,[1] "who is impelled to draw as soon as it can hold a pencil; the Mozart who breaks out into music as early; the boy Bidder who worked out the most complicated sums without learning arithmetic; the boy Pascal who evolved Euclid out of his own consciousness; all these may be said to have been impelled by instinct as much as the beaver and the bee. And the man of genius is distinct in kind from the man of cleverness, by reason of the working within him of strong innate tendencies—which cultivation may improve, but which it can no more create than horticulture can make thistles bear figs."

If, as Huxley says, in the paragraph preceding this passage, "hereditary mental tendencies may justly be called instincts,"—and this is, as we have seen, in accordance with the usage of many writers—then, to define instinctive behaviour, as I have done, as the grouping term under which is comprised complex groups of co-ordinated responses which tend to the preservation of the race, and which characterize all the members of the same more or less restricted group of animals—such as chicks, neuter insects, and female finches—is, to say the least of it, hopelessly inadequate.

I suppose it is pretty obvious that my definition is not meant to cover the facts presented by the early

[1] T. H. Huxley, "Hume" (1879), p. 113. "Collected Essays," vol. vi., p. 132.

life of Mozart, Bidder, or Pascal. I suppose it is pretty obvious that I do not use the terms instinctive and innate as equivalent and interchangeable. In the use of terms, I advocate, while all that is instinctive is innate, there is much that is innate which is not instinctive. Instinctive behaviour is the outcome of the possession of congenital dispositions; but there are congenital dispositions which determine other features of the mental life than the sequence of instinctive experience. Since we have two adjectives, instinctive and innate, I see no reason whatever for continuing to use them as synonymous. Why not reserve the narrower term instinctive for behaviour of a specific congenital type, dependent on purely biological conditions, nowise guided by conscious experience, though affording data for the life of consciousness? Why not use the broader term innate to include also those differentiations of congenital capacity which, in man, show hereditary tendencies to artistic appreciation and expression, to mechanical invention, to scientific investigation and interpretation, to philosophic thought; always granting (as I am prepared to grant) that these inherited tendencies exist? Such an initial set of the mental life in a specific direction is of course just as characteristic of animal life as of human life. Closely connected with instinctive behaviour are what we may term the innate interests; for example, the racial interest of the cat in mousing, of the bird in nest-building, of the beaver in damming up streams, of nearly all female animals in the care of the young they have produced, and so forth. I am well aware that these are commonly regarded as typically

instinctive. That they are intimately correlated with instinctive behaviour I freely acknowledge. That they are the outcome of congenital dispositions I do not for a moment deny. But they are not instinctive as I define the term. They are innate tendencies of the mental life in the development of which the instinctive consciousness, properly so called (in my terminology), is implicated.

But why do I thus distinguish so sharply innate tendency from instinct? Because I regard it as due to the congenital dispositions of the cortex. And this brings me back to the physiological side of my doctrine of instinct. My thesis is that, in its strictly biological aspect, instinctive behaviour is, as such, wholly due to congenital dispositions in the sub-cortical centres. I have given at length in the preceding chapter the kind of physiological evidence on which I rely. But this instinctive behaviour of the ideally decerebrate animal—which is, I admit (outside the physiological laboratory), a product of abstraction—in the intact animal also stirs the cortex. Here arises conscious experience of the presented situation and of the behaviour as taking place. But here also are at the same time initiated the cortical processes which accompany mental process. Now the cortex itself, like the sub-cortical brain, has *its* congenital dispositions; and these are the physiological basis of the innate mental tendencies, proclivities, faculties, and interests. These cortical processes are the correlates of hereditary modes of conative process. I do not myself apply the term conation to mental process which merely follows in the wake of instinctive procedure determined by purely biological hereditary

dispositions of the sub-cortical centres. Perhaps we might here apply the term, quasi-conative, suggested by Dr. Stout[1] in a slightly different connexion. The point on which I wish to lay stress is that true conation is always conditioned by anticipatory meaning —by a conscious relationship, and hence in my interpretation is always correlated with cortical dispositions.

It will be remembered that in the second chapter I said that while I am ready to admit some vague pre-perception as associated with, or supplementary to, the instinctive consciousness, I am not prepared to admit that it forms part of the consciousness correlated with the instinctive situation as such. For granting the existence of such more or less vague and as yet undefined pre-perception, this is due, I believe, to hereditary dispositions within the cortex, and not to inherited connexions among the sub-cortical neurones which are the conditions of instinctive behaviour.

I have been accustomed to regard all secondary meaning, in the psychological sense, as dependent on prior individually gained experience. The sight of a lady-bird acquires meaning for the chick through taking the insect into the bill. I have therefore spoken of meaning as of guiding value through the revival of past experience. But one should be ready to assimilate new ideas. Now Mr. McDougall, Dr. Stout and Dr. Myers suggest or accept the view that some measure of re-presentation precedes presentation. Mr. McDougall gives expression to this view in a form which attributes no little definiteness to the anticipatory consciousness. The weaver-bird is

[1] "Manual of Psychology," Bk. II., ch. ii., § 3, p. 143.

credited with an innate representation of the form of the nest it is going to build. Mr. McDougall holds that "there is no such fundamental difference between the dispositions that condition perception and representation respectively, as to warrant us in drawing a rigid line between them, and in saying that, while dispositions subserving perception may be inherited, those subserving representation are not, or cannot be inherited."[1] But, if I mistake not, the inherited re-presentation is here regarded as something far more than the vague pre-perception in favour of which Dr. Stout argues. It approaches, if it does not reach the full stature of, a definite anticipatory image. I find insuperable difficulties in accepting the doctrine of innate ideas in this new form.

But though I cannot come into line with Mr. McDougall's thought, I can go some way with Dr. Stout, especially if I am allowed to regard the pre-perceptive consciousness as assuming an affective rather than a cognitional form and as taking the guise of an undefined interest in what may come. In human life interest often diffuses itself forward in a form so indefinite that it is difficult to give expression to it in cognitive terms. We may not be aware in any clear fashion, in a sense scarcely aware at all, of *what* is coming; and yet we may be keenly interested, partly because we don't yet know. Of course in human life this is a somewhat complex mental attitude. It implies a recognized gap in our knowledge, a gap that we want to be filled in, and to be filled in adequately. Still most of us, I suppose, are familiar with a less complex attitude, where we just expect some kind of

[1] "Brit. Journ. of Psych.," vol. iii., p. 251.

satisfaction, though what form this satisfaction will take remains altogether indefinite. Still it has real value; it leads us on and makes us persist in the behaviour through which the situation is further developed. May I accept Dr. Stout's teaching (I am always proud to learn from him) in some such form as this? Putting the matter in my own way I ask: May we not assume that the very first time the moorhen is in the water, there is some form of cortical spread of physiological disturbance, determined by hereditary dispositions, which takes the conscious form of undefined pleasurable interest conducing to persistence in the instinctive behaviour of swimming? Since this would be a prospective conscious relationship, of real value as a condition furthering the instinctive act, it would be so far truly conative. May there not be an innate psycho-physiological tendency of cortical process to spread along hereditary lines parallel to the lines of spread in the biologically instinctive sub-cortical process? If we speak of this as an incipient psychological end, since the diffused pleasure is a conscious relationship of real conditioning value; and if we look forward towards its further development; may we not say that, broadly speaking, the conative or psychological end, correlated with cortical process, is pleasure and satisfaction in 'living' the racial life; and that, broadly speaking, the biological end of the sub-cortical process is survival? Thus should I explain the fact that there is a correlation between pleasure or satisfaction and those modes of instinctive behaviour which conduce to the preservation of the species. I should extend this even to details—of nest-building for example. To carry out this or that detail in

racial fashion is supported by pleasure; each departure from the routine of racial procedure is checked by the diffused pain which is closely correlated with cortical inhibition. Thus, through natural selection, there is established a consonance between innate mental tendencies and the congenital automatism of instinctive behaviour. In this connexion Mr. McDougall[1] is right in contending that the establishment of this consonance must be accepted as evidence that "pleasure and pain are efficient causes of appetition and aversion"; or, as I should prefer to phrase it, that the conscious relationship is a condition which really counts in the determination of behaviour and conduct. Whether this lends any support to a doctrine of animism, such as Mr. McDougall advocates, is a wholly different question.

From what has already been said in this chapter it is sufficiently obvious that what I have spoken of as innate tendencies are just what some authors term instincts. Among these authors is Mr. McDougall, though he does not include under the term the more general innate tendencies included by Dr. Thorndike and Dr. Titchener.

A salient feature of Mr. McDougall's treatment is the emphasis he lays on the very intimate and close connexion between instinct and emotion. "Each of the principal instincts," he says,[2] "conditions some one kind of emotional excitement whose quality is specific or peculiar to it; and the emotional excitement of specific quality that is the affective aspect of the operation of any one of

[1] "Physiological Psychology," p. 160; "Body and Mind," p. 324.
[2] "An Introduction to Social Psychology" (1908), p. 47.

the principal instincts may be called a primary emotion." I fully agree with Mr. McDougall that emotional tone accompanies the mental processes which are due to hereditary cortical dispositions. I think it probable however that emotional expression, and the visceral reflexes which have played so conspicuous a part in recent discussion, form part of the instinctive automatism, and are the outcome of hereditary dispositions in the basal ganglia of the brain. As Mr. McDougall notes (p. 33), "the evidence of this view has been greatly strengthened by the recent work of Pagano." I am, however, disposed to question whether the emotional *experience* arises here. Its brain-correlates are probably cortical. This, I take it, is Dr. Pagano's opinion. But Mr. McDougall, as I understand him, regards the nervous activities in these sub-cortical ganglia as the correlates of the affective or emotional aspect or feature of the total psychical process.

In any case "the human mind," says Mr. McDougall (pp. 19, 20), "has certain innate or inherited tendencies which are the essential springs or motive powers of all thought and action. . . . These all-important and relatively unchanging tendencies, which form the basis of human character and will, are of two classes: (1) The specific tendencies or instincts; (2) The general or non-specific tendencies arising out of the constitution of the mind and the nature of mental process in general, when mind and mental process attain a certain degree of complexity in the course of evolution." "Instincts," he contends (p. 26), "are more than innate tendencies or dispositions to particular kinds

of movement. There is every reason to believe that even the most purely instinctive action is the outcome of a distinctively mental process, one which is incapable of being described in purely mechanical terms, because it is a psycho-physical process, involving psychical as well as physical changes, and one which like every other mental process, has, and can only be fully described in terms of, the three aspects of all mental process—the cognitive, the affective, and the conative aspects; that is to say every instance of instinctive behaviour involves a knowing of some thing or object, a feeling in regard to it, and a striving towards or away from that object."

This passage serves well to bring out the wide divergence of our different interpretations of instinctive behaviour and instinctive experience. Not only does Mr. McDougall include (whereas I exclude) inherited mental tendencies, correlated with psycho-physiological dispositions and processes within the cortex; he believes that the most purely instinctive action (including, I presume, such cases as that of my moorhen's dive) is the outcome of distinctively mental processes, involving cognition, affective tone, and conation; whereas I believe that they are the outcome of distinctively biological processes, though they also afford primary data in experience. But the divergence really lies deeper. It will be noticed that Mr. McDougall says that the instinctive action cannot be described "in purely mechanical terms." What are we to understand by purely mechanical terms? That we shall have to consider later. If we substitute the phrase "purely

physiological terms," I believe that it is in these terms that instinctive behaviour, as such, is to be explained. But Mr. McDougall holds[1] that all bodily processes, especially those of growth and repair, and *a fortiori*, I presume, instinctive response, are not susceptible of what I should term purely physiological explanation. How then are they to be explained? By the guiding agency of the soul. The explanation offered is animistic. For if "we deny to the soul or thinking principle all part in these bodily processes, we shall have to postulate some second and distinct teleological factor operative in organisms. The principle of economy of hypothesis, therefore," in Mr. McDougall's opinion, "directs us to attempt to conceive that the soul may be operative in the guidance of bodily growth, either directly or by means of a general control exercised by it over some system of subordinate psychic agents." Of course if this is so, if even the growth of the embryo is subject to psychical control (p. 375), the observed behaviour of the spinal animal or of the decerebrate bird or mammal, is something more than co-ordinated reflex action; it is a manifestation of "the soul or thinking principle." To this aspect of Mr. McDougall's thought we shall have to return in the sequel. For the present it suffices to draw attention to the relation of his doctrine of instinct to his doctrine of animism.

The principal instincts of man, each of which is also a primary emotion, are, according to Mr. McDougall,[2] seven in number: (1) the instinct of flight and the emotion of fear; (2) the instinct of repulsion and the

[1] "Body and Mind," p. 373. [2] "Social Psychology."

emotion of disgust; (3) the instinct of curiosity and the emotion of wonder; (4) the instinct of pugnacity and the emotion of anger; (5) and (6) the instincts of self-abasement (or subjection) and of self-assertion (or self-display), and the emotions of subjection or elation (negative or positive self-feeling); (7) the parental instinct and tender emotion. These seven instincts "are those whose excitement yields the most definite of the primary emotions, and from these seven primary emotions together with the feelings of pleasure and pain (and perhaps also feelings of excitement and of depression) are compounded all, or almost all, the affective states that are popularly recognized as emotions, and for which common speech has definite names" (p. 81). To these may be added as of less importance the instinct of reproduction, the gregarious instinct, the instinct of acquisition, and that of construction. In the chapter on the general innate tendencies (p. 90), sympathy, suggestibility, imitation, play, habit, and the temperamental factors are discussed.

I need not again emphasize the fact that Mr. McDougall and I use the terms instinct and instinctive with a difference of connotation. It will be more profitable to try and show how our differences of outlook are related. First with regard to the connexion between instinctive and emotional experience. On the fact that there is an intimate connexion we both lay stress. I may be allowed here to recapitulate my own view of the matter. When a specific situation affords an appropriate constellation of stimuli, there issue reflexly from the sub-cortical centres two sets of efferent impulses, (1)

those which evoke a specific mode of instinctive behaviour, including those motor responses which constitute much of the so-called emotional expression; (2) those which evoke visceral disturbance—changes of heart-beat, and of the respiratory rhythm, modifications of the digestive and glandular functions,[1] alterations in the peripheral vascular flow, a diffused influence on the general coenaesthesis and so forth. From all this complex of bodily changes under (1) and (2), afferent impulses come into the central nervous system, and, when they reach the cortex, qualify the experience of the presented situation and thus complete the instinctive experience with its accompanying emotional tone. I regard it as probable that, in its primary genesis, the emotional tone is in large measure correlated with cortical disturbance due to stimulation which is visceral and coenaesthetic in origin. If we look upon the James-Lange theory as one which is solely concerned with such primary genesis, there is much to be said in its favour. This may well be the way in which affective meaning is, in the first instance, acquired. But when once it has been thus acquired, when once associative connexions have been established, the emotional meaning, like the cognitive meaning which it qualifies, may be called up or revived, within a cortical disposition, *before* visceral impulses again come in to supplement and reinforce the emotional experiences in primary fashion. I take it, however, that in the absence of such reinforcement an emotion is so cold-blooded as

[1] The influence of those physiological products which are termed hormones on emotional tone is probably of very great importance. Cf. McDougall, pp. 117, 118.

to be scarcely worthy of the name. Such in outline is my account of the matter.

In Mr. McDougall's interpretation "the innate psycho-physical disposition, which is an instinct, may be regarded as consisting of three corresponding parts, an afferent, a central, and a motor or efferent part, whose activities are the cognitive, the affective, and the conative features respectively of the total instinctive process." The afferent part is the presentation of the situation, the efferent part is the behaviour response, and such visceral innervation as may modify the working of the internal organs "in the manner required for the most effective execution of the instinctive action." Between these two lies the central part, the nervous activities of which "are the correlates of the affective or emotional aspect or feature of the total psychical process" (pp. 32–33). The emotional part is thus intercalated between the presentation and the behaviour and visceral response. "All the principal instincts of man are liable to modifications of their afferent and motor parts, while their central parts remain unchanged and determine the emotional tone of consciousness and the visceral changes characteristic of the excitement of the instinct" (p. 42). These quotations suffice, I think, to indicate that there is a wide divergence in our several interpretations. But I cannot dwell further on this aspect of the problem of instinct.

When we come to the consideration of the primary innate tendencies—whether we take the major seven or add to these the minor four (one of which at least, the reproductive instinct, seems worthy of major rank)—I find it less easy to correlate our different

views. No doubt the distinction which Mr. McDougall draws between the specific and the general innate tendencies may fairly be taken as that between the relatively specific and the relatively general; though I am not sure that he would agree to this qualification, for his primary instincts seem to function as independent elements or agents. So far from regarding any one of them as a primary element, I regard each item on his list as denoting a class to which a group-name is attached—a class comprising varied modes of behaviour and modes of experience—a class within which these varied modes are grouped because they have certain features in common, and tend towards what we may term, in a very general way, the same end. Thus any one of his instinctive tendencies appears to me to emphasize what is similar in a number of rather varied experiences which are also characterized by much difference. I cannot say how many particular modes of instinctive behaviour and instinctive experience in my sense of the words would be comprised under the general heading of parental instinct—quite a considerable number. Though I should not for one moment think of denying that "self-assertion" and "subjection" involve, in each case, exceedingly complex congenital dispositions, sub-cortical and cortical; and though I do not here feel disposed to question the convenience of these particular terms, under which to group antithetical bodily and mental tendencies that accompany the performance of many rather varied modes of behaviour; none the less they appear to me rather to denote certain characteristics common to the experience that accompanies these or those

modes of behaving, in this or that set of presented circumstances, than unitary principles that determine these experiences or these modes of behaviour.

To put the matter in a different way I should regard the "seven" primary instincts as so many leading predicates we may make of the innate constitution of the organism regarded as the logical subject. Each predicate will of course be contingent upon the conditions. Thus we may say that the innate constitution of the organism is such that under these or those conditions he is pugnacious, curious, self-assertive, touched by tender emotion, and so forth. I find this point of view more helpful than the assignment of what may in each case be predicated to unitary principles or mental forces.

But here we open up a fresh aspect of the whole matter. Instinct is for Mr. McDougall a determinant of activity. The instinctive mental process "results from" the excitement of an instinct (p. 46). "We may say, then, that directly or indirectly the instincts are the prime movers of all human activity; by the conative or impulsive force of some instinct (or of some habit derived from an instinct) every train of thought . . . is borne along towards its end, and every bodily activity is initiated and sustained. The instinctive impulses determine the ends of all activities and supply the driving power by which all mental activities are sustained. . . . These impulses are the mental forces that maintain and shape all the life of individuals and societies, and in them we are confronted with the central mystery of life and mind and will" (p. 44).

Now we may, from my point of view, quite

legitimately speak of behaviour or of mental process as "determined" by psycho-physiological dispositions, if by this we mean that, among the conditions under which bodily or mental process runs a particular course such dispositions must be taken into account. But what *is* a disposition? Mr. McDougall says [1] that we ought to use the term an instinct to denote that feature of the innate constitution of any organism, that inherited disposition, in virtue of which the organism acts instinctively. Here innate constitution and inherited disposition are apparently regarded as equivalent. Are they quite equivalent? Is there not some ambiguity in the use of the word disposition? I take it that, from the physiological point of view, a disposition is a configuration or a constellation of complexly-grouped neurones which, in virtue of its physiological relationships and connexions, is the structural and functional condition of the flow of nervous process along certain channels. But should we not distinguish between the disposition, as a configuration of neurones, and the constitution of, let us say, the cerebral cortex? The constitutive elements of the nervous system are the neurones themselves, with their store of so-called potential energy; the disposition is the manner in which these neurones are grouped and connected. Now this grouping and connexion as such, this configuration or constellation of neurones, this disposition of elements, has, I conceive, nothing whatever to do with the generation of "impulsive force." The impulsive force, if we elect to use this phrase, is the energy implicate

[1] "British Journal of Psychology," vol iii., p. 253.

in the constitution of the neurones, of the nervous system, of the organism. All such "impulsive force" is, for the interpretation I accept, just part of the constitution of nature as a going concern. And since psychological relationships are themselves also part of the constitution of nature, therein lies the ground of mental process (as of all other process) as it runs its course, psycho-physiological dispositions being the conditions of certain modes of describable relationship.

But on this view what becomes of impulse? Let me lead up to an answer to this question by the prior consideration of another question.

If we say that pugnacity makes the robin pugnacious, or self-assertion makes the child self-assertive, or curiosity impels the monkey to pry into this and that, are we not in some danger of regarding each instinct as a faculty in terms of which the instinctive process may be explained? We have such a way of making our general and abstract terms pose as so-called forces. Thus by many people gravitation is supposed to make bodies attract each other; and crystallization to make sugar run into crystalline form. I am one of those who regard gravitation as a concept under which attractions of a certain order are formulated; crystallization as that which denotes certain modes of crystalline synthesis. So too I should regard pugnacity as the concept under which fall specific modes of behaviour and experience; self-assertion as that under which may be grouped certain other modes of behaviour and experience, and so forth. All such concepts are merged within, and form related factors of, the more general concept

of the constitution of nature. If then we are asked why, say, crystallization occurs under such and such conditions, all that we can reply is that the constitution of nature is such that under these conditions it does occur. There's an end of the matter so far as science is concerned. The constitution of nature as the ground of crystallization (and of other processes) is just a concept we reach by a patient study of all the facts which are presented to observation. Of course such concepts refer to reality, real facts in real relationship. But crystallization does not make the facts to be what they are; but the related facts being what they are (so far as we have learnt them) makes our concept of crystallization what it is. The constitution of nature, as a concept having reference to reality, summarises within our ideal construction a whole with closely interrelated parts. It does not make the facts: it *is* the facts as universal and not merely particular. So, too, pugnacity does not make the facts of behaviour and experience what they are; but these given facts related in certain ways are comprised under the concept of pugnacity. The constitution of the conscious organism does not make the facts of the conscious life; but the totality of correlated facts is what forms the basis of our concept of that constitution. Instinct (or a committee of instincts) is not something that, through impulsive force and motive power, drives bodily or mental processes towards their end; it is a concept in terms of which we can, in some measure, interpret these processes as facts presented in nature.

And so we get back to impulse. Impulse is not, I conceive, something which makes any process,

strong or weak, to run its course, any more than crystallization impels the molecules of a crystal to enter into synthetic form—any more than force (for those whose usage I follow) makes physical motion to occur. Impulse is the name we give to a specific mode of experience which arises when bodily and mental processes are running their course. I do not question the reality of such a specific mode of experience. I provisionally accept feelings of "activity" in the sense of awareness of process in progress. The term impulse, like the physical term force, may conveniently be used to express, though with far less of mathematical precision, a measure of the mental process within a conscious configuration. On this understanding, since impulse denotes a felt measure of intensity, there can be no objection to speaking of the strength of an impulse, or, in the higher conceptual life, the strength of a motive. Indeed, on this understanding, I see no objection to speaking of impulsive power, or of motive force, so long as it is clearly realized that these expressions denote a measure of the intensity of processes which they take no share in producing. Of course, as I am well aware, it will be said that all this, with its analogies drawn from the inorganic sphere, implies a hopelessly mechanistic interpretation. So be it, if so it be. We shall discuss the concept of mechanism later on. For the present, I would only beg my critic to realize that such a mechanistic interpretation, if such it is, nowise disregards, nay insists on, the distinguishing importance of those conscious relationships which count in any experiential situation every whit as much as the crystalline

relationships count in an evaporating solution of alum.

I take it that in what I have said I have altogether parted company from Mr. McDougall, whose doctrine of instinct and impulse has quite other implications. So that, after all, these comments, while they indicate, I trust, with sufficient clearness the nature of my own outlook, only serve to show the wide divergence in basal scientific conceptions between Mr. McDougall and me; just as the earlier comments served to illustrate the distinction I should draw between the innate mental tendencies which he terms instincts, and the compound reflexes in automatic response to which, and to the accompanying experience, I restrict the term. Let us then without further quarrel over philosophical implications, or over technical designation, take the innate tendencies. I should put the matter thus. There is, correlated with hereditary cortical dispositions, innate mental tendency to carry up into the sphere of educability all the essential life-processes which find their earliest expression in the automatism provided for by the sub-cortical dispositions. Among these are tendencies to exercise the locomotor apparatus and to go abroad in the world within a varying range; to get the food in special relation to which the species has been evolved; to mate and procreate its kind; to foster and protect the young; to associate with others in flocks or herds; to imitate others; to be self-assertive in one social situation, or submissive in another; pugnaciously to hold his own, or timidly to escape from the dangerous by flight; to pry into the strange and unusual; to overcome obstacles and difficulties by

persistent effort. The list might be almost indefinitely extended; and within the list the inter-relationships are of the most varied kind, rendering the task of analysis very difficult. Just because we have passed from the relatively stereotyped responses of the automatic order, to the more plastic moulding of behaviour which educability implies, we find the closest integration within the sphere of innate mental tendency—an integration which justifies the use of the singular rather than the plural number. In his treatment of innate tendency Mr. McDougall has written much that is thoughtful, valuable, and stimulating. Where I find it most difficult to accept his doctrine is when he divides up the differentiated and integrated tendency into specific elementary constituents. I fully realize the extreme difficulty of the discussion of the emotions—I think I should prefer to say, emotion. Where so many have failed Mr. McDougall could hardly expect to be wholly successful. For the light he has shed on the subject we should be grateful. I for one tender him sincere thanks. But I believe that in attempting to build up what we call the more complex and richer human modes of emotion as compounds of this and that and the other primary emotion, he is on a false track. Instead of saying that reverence, for example, is a combination of so much wonder, *plus* so much fear, *plus* so much submission, *plus* so much tender feeling, I should prefer to deal with such an emotion in another fashion. I should prefer to make reverence the logical subject of which wonder and the rest may be predicated. That, I conceive, leaves to Mr. McDougall's treatment all the real value which it

possesses. But I should regard these four predicates as very far from being exhaustive. With reverence or any othe. complex emotion I should feel that so much, so very much, depends on the context. I do not deny that in the case of emotional attitudes, as in the case of the cognitional attitudes we call concepts, we may in some measure treat them "in general," that is to say, use predicates which will be appropriate in *any* context. But I urge that of any emotion, as it has its being in life, or in the literature that deals with life, the particular context is all-important. To any student of the emotional life I should say :—Read Mr. McDougall's interesting discussion by all means; and then take a chapter in some first-rate novel, where life at high tide is described, underline every emotional word, and predicate of each all that you can, with all the contingent conditions in full view.

The difficulty with the emotions is that they are modes of the inner life of experiencing. Directly we pass from the interpretation of experience in terms of what is presented or represented in or to that experience, and seek to elucidate the correlative aspect of experienc*ing*, we are in a different region of psychological genesis—a region all its own, since here alone is there direct awareness of process as such. Here, as M. Bergson would say, we are in touch with life. Here the methods of intelligence and the intellect only help us in so far as they deal with symbolic substitutes for a reality which can only be felt or, as Dr. Alexander says, enjoyed. Here intuition (in M. Bergson's sense of the word) sheds a suffused light over parts of a continuum wherein

there are no distinguishable boundary surfaces. Or rather, perhaps, the glow of mental life within a continuous process *is* the suffused light of intuition, *is* enjoyment. Here the methods dear to the associationist cease to be applicable. Whatever may be said for the associationist doctrine from the point of view of what is experienc*ed*—presented to experience in the form of impressions, percepts, concepts, and so forth—(and much may be said for it from this point of view); when we consider the process of experienc*ing*, we have in place of juxtaposition what M. Bergson calls interpenetration. In the field of emotion, on its living side as a qualification of mental and vital process, we must, I conceive, put away from us all ideas of juxtaposition, compounding and algebraical summation, helpful, nay, essential, as these may be in the field of cognition, as dealing with the cognized. Here and throughout the so-called inner aspect of the mental life—the aspect of enjoyment—we have subtle differentiation of the process of experiencing which is only a phase of the ineradicably one and continuous process of living. Even the term differentiation savours of cognition and the intellect. Each succeeding phase of the mental life, as mental living, melts into and serves but to qualify the net synthetic result of all previous phases. Now, Mr. McDougall is a strenuous upholder of the unity and continuity of mental process. In his treatment of the emotions, however, he seems to follow too closely the methods of the associationists—where he speaks,[1] for example, of admiration as a binary compound, of awe as a tertiary compound, and of reverence as a

[1] "Social Psychology," pp. 131, 132.

blend of wonder, fear, gratitude, and negative self-feeling. The word blend may indeed indicate merging and interpenetration. But does not Mr. McDougall himself tell us[1] that "the consciousness of any individual is, or has, a unity of a unique kind . . . and that it cannot properly be regarded as consisting of elements, units, or atoms of consciousness put together or compounded in any way"? What Mr. McDougall here says of the soul, I hold to be true of the unitary process of living, part of which involves the conscious relationships of experience. On these grounds I find some difficulty in accepting the doctrine that the complex life of emotion is compounded of any given number of so-called primary emotions as elements.

But all this turns on the nature of one's conception of experience. It has surely become evident that our interpretation of the moorhen's instinctive dive depends on our outlook towards the universe at large!

[1] "Body and Mind," p. 283.

CHAPTER V

THE GROUND OF EXPERIENCE

THE term experience is one of those which Wm. James, in his picturesque phraseology, called double-barrelled. It has, as Professor James Ward contends, a duality of reference. In one context it refers to that which is or may be experienc*ed*. In another context it refers to some phase in the process of experienc*ing*. When Mr. Bradley says[1] that "sentient experience is reality, and what is not this is not real," the reference is in part to experience as that which is experienced. And when Professor Ward says[2] that "there is, for each, but one experience, his own; and an experience that is not owned is a contradiction," the emphasis of his reference is to experience within the process of experiencing.

Now, if all experience has this double reference (1) to that which is or may be experienced (say the world in which we live), and (2) to a process of experiencing ("owned" by "somebody"), the question arises whether we are to equate experience and existence. That in the absence of "somebody"

[1] F. H. Bradley, "Appearance and Reality," 2nd Ed. (1908), p. 144.

[2] James Ward, "Naturalism and Agnosticism," 2nd Ed. (1903), vol. ii., p. 111.

"having" experience of the objects around him, they would not then and there be experienced is obvious enough. But that when they are not being experienced by him or by any mundane sentient being they are non-existent,—that their very existence depends upon their being experienced,—upon their entering into a conscious relationship—this is sheer assumption based on negative premisses. It may, no doubt, be said that it is also sheer assumption that they do exist when they are not being experienced. How are we to establish its validity save by that direct experience which is, by the conditions laid down, excluded? Well, let us grant that we must e'en accept the one assumption or the other. I do not propose to discuss a very old problem. I merely wish to state that I proceed on the assumption that the existence of the world does not depend upon its being experienced. But granted that, on this assumption, objects exist and processes run their course in the world as actually or possibly experienced, the question may still be asked whether they are in themselves, in their essential being, independently of sensory perception, just exactly what they appear to be to us or to other sentient beings. That question does not concern us here. What does concern us is how they exist for actual or possible experience, and how this kind of existence may be interpreted. That is what science endeavours to elucidate.

I must not linger over the question at issue between realist and idealist. I may, however, devote a few more lines to an attempt to make my position quite clear—so far as that is possible within so

brief a space. Take an ordinary bit of perceptual experience. I see and feel my pen. This involves experiencing and something experienced. Now of course it is open to us to call both mental. Then the properties of the pen in the experienced context are mental; and the phases of experiencing it are mental Both are of the conscious order. Thus Miss Calkins,[1] speaking of the qualities and relations of things, says:—"You can give no unchallenged account of them except as distinctive ways of experiencing, that is, of being conscious." This may be true enough *in a sense;* but it is somewhat confusing. Why not say that these are distinctive traits of the experienced, that is, of what we are conscious of in the experience we share with others? Now the world that I am conscious of in common with others, I term physical; and the process of being conscious of it I term mental. I find this terminology more convenient than the application of the term mental to both. I seek then to elucidate the nature of relationships in the context of the physical or experienceable, and the relations which occurrences in that context bear to the process of experiencing. I do not dream of denying that the experienced and the experienceable imply actual or possible processes of experiencing. But I see no reason to accept the assertion that experienceable processes in the physical world cannot get along quite well, when there is no actual experiencing of them on the tapis. But, of course, however independent they may be in this sense, they are always dealt with in terms of the experienceable. These

[1] Mary Whiton Calkins, "Journal of Philosophy and Psychology," vol. viii., p. 458 (1911).

are the only terms in which we can deal with them.

In the interpretation I have striven to set forth in earlier chapters—and we must note that it *is* an *interpretation* in conceptual terms—in this interpretation, instinctive experience is the concrete synthesis which is primarily given in the higher vertebrate. For though we can, in the analysis of thought, resolve it into yet simpler factors, yet this *is* an analysis of what is given as a synthetic whole—a synthetic whole that is from the outset (if an outset be ideally conceivable) changing, growing, developing. We must think it in cinematographical snap-shots, as M. Bergson would say—for concepts tend to assume a static form, and it is only by thinking along them and through them that we restore to them the moving progress of reality. But in the experience as lived by the organism it is nowise static, it is pulsing onwards. It has duration, in M. Bergson's sense of the term, within which there is correlated change and progress. In other words it is process. And as process it is synthetic. All process, at any rate all vital process, is synthetic; that is part of the connotation of the term. An essential feature of the view I have tried to develop is that the synthetic process of experiencing is correlated with the synthetic process of living which is its natural precursor and which is here raised to a higher status. Its essential characteristic—that which differentiates it from the lower level of living—is that new relationships supervene—those relationships which we describe as conscious and especially pre-perceptive. Until the cortex is called into functional activity in any organism, these relationships, so far as that

organism is concerned, are not yet in being. If then we analyse any ideally static phase of the instinctive experience, snap-shotted in conception, and if we reach certain factors therein, as factors in a moving whole which is then and there the experience, we shall utterly fail to understand the whole business so long as we persist in thinking only of the factors as associat*ed*, and wilfully lose sight of the synthetic nature of the process itself as associat*ing*.

We saw, however, that Prof. Ward contends that an experience that is not "owned" is a contradiction; and I said above that in the absence of somebody having experience of the objects around him they would not then and there be experienced. What do we mean by somebody? What do we mean by that somebody owning experience? Of course, it will be said, we mean the subject! Well, then, what do we mean by the subject? Let us go back to our moorhen swimming in the Yorkshire stream. I spoke of him as an experiencer having already a body of synthetic experience to which the new experience of diving was added in further synthesis. I endeavoured to trace the moorhen's experience backwards until he was hatched. I suggested that (apart from such experience as might have been gained within the egg-shell previous to hatching) the experiencing of the moorhen then and there had its beginning. Dr. Myers in criticism,[1] urged that my endeavour to get at the beginning of instinctive experience is vain because, according to his contention, there never can be a beginning of experience—a beginning which has no relation to previous experience. Does he mean

[1] "British Journal of Psychology," vol. iii., p. 269.

that there is no beginning of the process of experience, or no beginning of the products of experience? We shall have a few words to say presently as to the relation of process to product. At present we may ask what evidence we have of process apart from its products, save in so far as we are directly aware of the process of experiencing which we ourselves enjoy—the one and only process of which we can be aware in this way. Let us, however, fix our attention on process. Does any process have a beginning? I take it that for evolutionary treatment the answer must depend on the sense in which the question is asked. All natural processes are historically correlated. If then by having a beginning it is meant that there is no correlation whatever between the process in question and previous world-process, the answer must be:—No. In this sense no process has a beginning. But if the question is whether a series of phases of process and its products may, for scientific treatment, be isolated (of course relatively) and regarded as a whole, then the answer is surely:—Yes. In this sense any span of process which may be thus rounded off as a subject of inquiry (the life of my cat, for example, or the writing of this book) has a beginning—to be correlated with process outside the limits thus assigned. In this sense the experience of what we call the individual has a beginning and an end. As a subject of inquiry it is a logical subject—that subject being the process under consideration as a whole; and as a subject a number of things may be predicted of it. The experience of the individual is a span of synthetic process which, as synthetic, hangs together so as to form, for our interpretation, one logical subject, and

any one of its predicates may be said to be owned by it or by that to which its concept has reference—by John Smith or by "somebody." That is what I understand by the subject—always a logical subject referring to a specific span of world process—nothing less and nothing more. Of course there is for each of us one specific bit of world-process of which we are aware and which we enjoy in a peculiar and unique manner, and to which we apply the term subject in a specially restricted sense. It is the logical ground of our own experience—our process of experiencing with all its experienced items.

Now in instinctive experience, and even in the early and closely succeeding phases of perceptual experience, enriched by secondary meaning, the references to "eds" and "ing" (if I may be allowed this shorthand) are scarcely, if at all, differentiated from the common ground of experience in which both are implicit. The experience is just naïve living as a process involving conscious relationships which are acted on but not yet thought—the terms of which have not yet even incipiently been snapshotted as concepts. That comes much later. And the difficulty of interpretation is that we must describe in conceptual terms that which is still in the pre-conceptual stage of natural development. We are forced to distinguish the situation with its stimulating objects in definite relation to the organism with its conscious relationships to the situation, the whole arbitrarily cut out from the total world-process in an insignificant corner of which they are a passing phase. How else can we proceed? And yet the experience itself is just this little scrap

of world-process suffused with awareness and not yet analyzed into those concepts we frame to aid us in our interpretation.

And we too, as interpreters in relation to the problems to be elucidated, are also, each one of us, just an individualized and differentiated centre within the world process; each one of us suffused with the higher awareness of systematic knowledge, in conscious relationship, not only to a set of facts as presented, but to the concepts man has framed and named for their completer mastery—capable in some measure of grasping the relationship of instinctive experience to the natural order within which it bears the relation of part to whole.

What do I mean by speaking in such a connexion of a relation of part to whole? Surely, it will be said, if by "whole" reference is intended to the order of nature and if by "part" reference is intended to conscious experience and knowledge, the two references are to radically different orders of existence—to the world we are conscious of, and to consciousness itself. This disparity is, it will be urged, fundamental. The problem of philosophy is to explain how these two utterly diverse existences come into relationship—not the relationship of part to whole within one order of existence; nay, rather of *this* mind-order with *that* world-order. But the assumption on which I proceed is that there is, for scientific treatment, *one* order and only one. Within that order there are many and varied relationships—and among these relationships are those which we call experiential or conscious. One thing is certain and involves no assumption; that the conscious

processes of which we are aware in ourselves and which we enjoy, are in relation to processes outside us which we cannot enjoy in the same sense, since they are not constituent parts of our own life-process. They may or may not have their own enjoyment; but that we cannot directly share. Herein lies the cardinal distinction which has been misinterpreted as implying two different orders of being; the distinction between a privileged world-process which is suffused with awareness and enjoyment, the flow and change of which is felt from within, and other world-processes or their products which can only be known and contemplated as they affect this privileged process from without. Why there should be, within the constitution of nature, privileged processes having this character of enjoyment is not a question to which science can give any reply. Science cannot tell us why there are chemical, or physical, gravitative or crystalline processes. Science just accepts the world as it finds it; and unquestionably among its findings are those relationships which we term conscious. The fact of experience testifies to their existence—whether we regard them as part of the constitution of one order of nature, or assume the existence of two orders of being. The former is the interpretation I seek to develop. Fully admitting that in experience we live and have our mental being; fully realizing that on experience all our knowledge is founded: I urge that the ground of experience is the constitution of nature, within privileged centres of which a privileged process is polarized into experienc*ing* and the experienc*ed*.

If then we can accept this distinction between the "eds" and "ing" of experience as cardinal within the conscious relationship as such; if we can accept the implication that there can be no "ed" in individual experience without its correlative "ing" (though there may be "ing" without clearly differentiated "eds"); and if we allow the assumption that within the world to which the "eds" refer there are other relationships independent of individual experience; we are in a position to follow up this method of interpretation. But a subtle question here arises. What are the limits of the mental? Are the "eds" *as such* within the mind? It is a matter of definition. If the mind is essentially experiencing process, then what is experienced is, in a sense, always *outside* the mind—is it that with which experiencing is in relation! Within the field of sensory perception the sens*ed*, as I urged above, is non-mental; it is what we call physical in its reference. In a series of masterly addresses to the Aristotelian Society (1908–11) Professor Alexander has contended that we ought to regard as non-mental not only the *sensa* but the *cognita*,—not only the objects of perception, but the objects of thought and imagination. The trouble is that we thus apply the term non-mental to the characteristic products of mental process! None the less the distinction Professor Alexander has in view is a really valid one, and is in line with that which M. Bergson is never tired of drawing. That distinction is the one I have drawn above, between what is experienced or thought, and the process of experiencing or thinking; it is the distinction between what is

minded, and minding. Now minding is, for Professor Alexander, the essential feature of that conation which *is*, for him, mental process, and which affords the true subject-matter of psychology. Hence, for him the minded, as such, is non-mental. Will it not, however, suffice for our purposes to hold fast to the cardinal distinction; to lay stress on the fact that the order of nature, as conceived and thought, is dealt with in a context distinguishable from that of the process of conceiving and thinking it; and to leave in abeyance the rather technical question whether *concepta* should be termed mental or non-mental.

Sir J. J. Thomson has said that the man of science deals with policies rather than with creeds. No doubt one must so far believe in one's policy as to proceed with some confidence along the course which it indicates. Still it lacks that element of finality which the word creed implies. As a policy, then, I accept one order of nature and one science of phenomena; as a policy I accept as independent of individual experience the natural processes to which our perceptual experience and our systematic knowledge refers; as a policy I regard the conscious relationship as a natural relationship to be correlated with others within the constitution of nature; as a policy I accept the cardinal distinction between the "eds" and the "ing" within the privileged process which is, for scientific treatment, my mental life; and as a policy I exclude from science, as I define it, the metaphysics of Source.

By Source (which I shall write with a capital letter merely to distinguish it as a metaphysical conception), by Source, often spoken of as Cause, I mean some

Agency outside or underlying process which calls process into being or directs its course. The Platonic Ideas, in the commonly current acceptation, Berkeley's Eternal Spirit, Kant's Transcendental Ego, Schopenhauer's Will, Dr. Driesch's Entelechy, M. Bergson's Life, the animist's Soul, the Subject of many psychologists and the Force of many physicists, all involve the metaphysical concept of Source, which refers to some (often extra-mundane) Power, of the Activity of which process is a manifestation—some Reality of which the world of science is the phenomenal expression. Thus for T. H. Green an Eternal Consciousness is necessary for the very existence of an order of phenomena. "He tells us," as Henry Sidgwick puts it,[1] "that it is a 'source' of the relations which constitute nature; that they 'result from' its combining and unifying action; that it 'makes the animal organism its vehicle'; that it is 'operative' throughout the succession of events which constitute the growth of the individual mind; that it 'acts on the sentient life of the soul,' and 'uses it' as its organ." Now all such reference to Source or Agency does not here concern us. We may ask, with Sidgwick,[2] what, *for scientific interpretation*, "is the further gain to knowledge in referring the unity and system to a unifying principle as its source, if that principle is to have no other character except what it gives itself in its unifying action"; or again more briefly:—"Why do the relations want a Source? Why cannot they

[1] Henry Sidgwick, "Lectures on the Philosophy of Kant" (1905), p. 261. Cf. T. H. Green, "Prolegomena to Ethics," §§ 67–73.

[2] Op. cit., pp. 263 and 226.

get on without one?" Although myself a believer in Source, I hold that this concept should be rigidly excluded from the scientific universe of discourse. I too ask:—Why should we not endeavour to interpret the constitution of nature just as we find it somehow presented to our experience? That I conceive is the task of science, which should leave severely alone, as beyond its province, all forms of the metaphysics of Source, all reference to extra-mundane Agency. To modify Hume's oft-quoted words, "the scenes of the universe are constantly shifting, and one object follows another in an uninterrupted succession; but the Power or Force which actuates the whole machine is entirely"—*outside the field of scientific inquiry.* No doubt any limitation of this field of inquiry is a matter of arbitrary definition. That is just why I wish to make perfectly clear where I, for one, in discussing this subject, decide to draw the line.

A few more words may serve to render less obscure my reasons for excluding the concept of Source from what I regard as the province of science. Let us suppose that Life is the Source or Cause of organic processes and products. Now according to the old scholastic adage, *Causa aequat effectum.* If Cause is the Giver and process the given then, as James put it, *Nemo dat quod non habet.* But the Cause may have, and traditionally has, more than it actually gives—*eminenter* as Descartes would say. Life when it organized the carboniferous flora and fauna possessed "eminently" the further power of organizing the plant and animal world of to-day. Now if the given in any process at any time contains just

what the Giver then gives, have we not in this given all that science has any concern with? What need have we, *in science*, of Source or Cause or Giver, if life-processes and life-products are all that we are acquainted with as given?

But it is not only that we are calling in a concept which is unnecessary for science. We are so apt to make the Source to which that concept refers do duty which poses as scientific business. When we get to a difficulty, instead of confessing ignorance and striving to remove it by scientific method, we say:—"Oh! *that* can only be explained by reference to Source"—which, to put it bluntly, is a roundabout way of expressing, without confessing, scientific ignorance. Furthermore, there is an almost ineradicable tendency to endow Source with a false and meretricious simplicity. The Life that organizes is supposed to have a simplicity analogous to that which is attributed to the mind of the captain of an ironclad, who deals in his conning-tower with all the multiplicity of the ship's intricate mechanism. But to every mechanical detail, just in so far as it is known to the captain, there is what Professor Alexander would term the "non-mental" which is in the field of his contemplation—that which is cognized, imagined, and so forth. And though the unity of process should never be lost sight of, yet within that unity, merging and interpenetrating, there is a complexity strictly correlative to the complexity of the "eds" with which it deals. It is just because this complexity in large measure *defies analysis* (for process itself can only be analysed in reference to its products) that we are bidden to

attribute it to a Source which out of its utter simplicity, falsely conceived, can produce any required amount of complexity—that is, in effect, just that amount which is actually found. What is thus given is process and products, or processing and the processed; it is the business of science to deal with them in terms of correlation. But the metaphysics of Source has a perfect right to say: Just as *in* the given there is the processed and the correlative processing; so *to* the given there is the correlative giving by Source.

The Source of phenomena being thus excluded from our limited field of inquiry, what shall be our definition of cause? I give none, because, though I have used the word above in one of its senses, I propose, so far as is possible, to avoid the use of this very ambiguous term, endeavouring to make clear the sense in which I do use it, should occasion arise. Instead of employing this term here I shall speak of any given process on which our attention is fixed, as correlated with other processes; or of an earlier phase of any given process as correlated with the later phases. I shall assume that ubiquitous correlations hold good within the constitution of nature, and that patient scientific research may lead to their discovery. I shall, however, also use the word conditions for the relevant circumstances under which a process runs its course—it being understood that these conditions afford data for correlation. We may thus speak of the conditions under which the synthesis of a chemical compound, say carbon disulphide, occurs; or the conditions under which the development of a hen's egg takes place; or the conditions

under which I write this paragraph. In each case we fix our attention on a current process reached through its products, and describe other processes related to it as conditions. But with the shifting of our attention the same process may be regarded now as conditioning and now as conditioned. Thus, to take an example from daily life, the state of the fire in my grate may be the condition of a certain mode of my experience; this may be the condition of my poking the fire; this again the condition of a freer and fuller process of combustion; and this of a satisfactory modification of my experience. I give this illustration to show first how the focus of our attention shifts from one to the other of correlated processes, each of which in turn is made the subject of certain predicates; and secondly, to emphasize the fact that conscious processes really count as conditions of change in other world-processes with which they are themselves in relation.

But how about the conditions within the process itself? Of course an earlier phase of process may be regarded as the condition of a later phase of the same process. But if we have in mind the process itself as a whole! Then it seems to me that we ought not, in that context, to use the word conditions. Of process itself as existent it is futile (in science) to seek for the conditions of its very existence. We can only find such conditions in the realm of Source, and that realm is closed to us here by a self-denying ordinance. Take the world-process as a whole. If we are asked what are the conditions of its existence, we must reply: There are none; for conditions imply that there are other processes with which this process

may be correlated! Of course if, with M. Bergson, we accept the conception of two orders of being—the one comprising all processes of the inert or the automatic type, the other all processes of the vital or conscious type—then, clearly, those of the one may be regarded as affording conditions to be correlated with those of the other. But we have at present no concern with this conception. Accepting provisionally one order—the world process with all its relationships—we cannot speak of the conditions of its existence within our universe of discourse.

But we do seem to need—if only for convenience of description—a term which shall enable us to refer the correlated phases within a given process to the process as a whole. To this end I shall use the term *ground*. The ultimate ground of all natural occurrences is, for science, the constitution of nature. In any changing configuration the ground of the change is the nature of the constitution of that configuration—gravitational in the solar system, chemical when carbon disulphide is formed, and so forth. On the constitutive nature, as ground, will depend, in any given natural system, the character and value of the changes which are observable therein. On the constitutive nature of the hen's egg will depend the character and course of its development. The living organism is thus the ground of the organic processes which run their course under normal conditions in correlation with other processes. We shall, I think, find this term useful when we have to ask with regard to some suggested "principle"—with regard to entelechy for example:—Is it suggested with reference to Source, or is it suggested with reference to ground?

Let us take as a concrete case the formation of a crystal in an appropriate solution. I select the crystal as an example of what I understand by a synthetic product in the realm of the inorganic. Now the man of science explains the formation of the crystal by describing all the relevant antecedent and accompanying conditions which may be observed or inferred from the fullest and most minute study of all the phenomena concerned and nothing but the relevant phenomena; and by referring the particular case to the type of synthesis—crystallization to wit—under which it is entered in the day-book of science. The explanation here given is expressed first in terms of correlated conditions, and secondly in terms of ground. On this understanding there can be no reasonable objection to speaking of crystallization as the ground of the formation of crystallized products. It just refers particular occurrences to that phase of the world-process which they exemplify. But what do we mean by products, and what is their relation to process? Rather a difficult question. Only a suggestion of the direction in which an answer may be sought, and perhaps found, can be given. Are not products just bits of frozen world-process which are rendered stable and static for perception and conception? Why such congealing of fragments of process, the parts of which hang together as a relatively independent whole, should take place, we do not know. It may be that the seeming stability is only a phase of process itself: that the rigidity of products is like that of the gyroscope. Is it not to such a doctrine that modern theories of the atom, purely schematic and conceptual as they are, lead

up? "Call it process, or call it product, all is process." This seems to express the tendency of contemporary scientific thought. Still for practical purposes of interpretation we must distinguish between product and process. May we not say that the product is that which is process*ed*; and that, as M. Bergson urges, such products lie strewn along the course of the ever-fluent stream of process*ing*? Why this should be we know not; that is nature's way.

Incidental reference may here be made to the old problem of "the one and the many"—a problem which Wm. James revived in his brilliant and picturesque advocacy of a pluralistic universe. I cannot, of course, discuss so large a question parenthetically. But may it not be suggested that the world of products strewn along the course of process, frozen into seeming rigidity, inevitably tends to assume a radically pluralistic guise; and yet that, none the less, the world process of which these widely scattered products are the outcome, is one and continuous; and that our conceptual scheme (which we believe refers to an existent constitution of nature) reaches its ideal limit in a completely monistic interpretation? James advocated a doctrine of discontinuity. Perception (the perceived) itself comes in pulses, as the threshold is surpassed. "On the discontinuity theory," said James,[1] "time change, etc., would grow by finite buds or drops, either nothing coming at all, or certain units of amount bursting into being 'at a stroke.'" But had he not in view the discontinuity of products? That discontinuity cannot be denied, and should not be neglected.

[1] "Some Problems of Philosophy," p. 154.

But does this show that process is discontinuous? May we not say that just as the sensibly continuous flow of water through a narrow pipe breaks into separate drops beyond the orifice, so does continuous world-process break up into the relatively discontinuous process-systems which we call products? Why this should be we know not. But thus we may have a pluralism of products and yet a monistic interpretation of process. But what do I mean by a monistic interpretation? Do I mean an interpretation which leads to an absolute unity of pure being in which all shades of difference are annulled? That is certainly not what I have in mind. That seems to me a philosophical conception with which we have here no concern. What then do I mean by a monistic interpretation? I mean one in terms of correlations so complete that all the multifarious happenings in the universe, in all their rich and varied multiplicity, are conceived as integral parts of one developing world-story; so that one could pass in thought from any given phase of process to any other phase of process along definitely describable correlation-routes. This is the monistic "unity of concatenation" which, as I understand him, even the pluralistic James was prepared to accept (p. 129) at any rate in retrospective reference.

But is the unity in the interpretation or in that which is interpreted? Another ancient problem! The old writers sought to find and to express the relation of the realm of perceptual fact to the sphere of conceptual thought. Where, they asked, is the home of universals; in the one or in the other? In their scholastic phraseology there were, they said,

three alternatives: (1) *Universalia ante rem;* (2) *Universalia post rem;* (3) *Universalia in re.* Now the first formula involves the conception of Source, and leads to the Platonic Ideas (as currently interpreted) to the world-plan of the Eternal Spirit, and the like. That conception lies beyond our province here. The second position is that of radical empiricism. The conceptual scheme is the outcome of man's thought concerning the phenomena presented in perceptual detail. So long as we are dealing with the development of human knowledge, I accept this without reservation. First the facts, then the interpretation. None the less do I accept also the third of the three scholastic formulas, in the sense that the order which we express in general terms is *in* the constitution of nature. It is there for us to discover if we can, though our discovery of it may need the patient observation of many facts. Of course it is not there as a number of propositions; it is, however, there as that to which these propositions have reference. A given synthetic process is not there in the form of a concept; but it is there ready to be named and formulated. It is there in a form that is universal just in so far as we rightly predicate universality of it.

The *res* is the perceptual country in which we live: the *universalia* of thought are the maps which we make of that country. Obviously the maps cannot possibly reproduce all the details of the country. If they could it would utterly spoil their utility as maps. They signify some of the deeper meaning of the country. The use of a map is to enable us to find our way in the country, to emphasize

essential relationships, to reduce the scale of the real to compassable limits, and to help us better to understand the country as we learn to read the maps. The omission of detail is absolutely essential to the value of a map for these purposes. But though tens of thousands of details are, and must be, excluded, none of these details must be such as to invalidate any of the teachings of the map. That is fatal. The map is no good if it is inconsistent with the country's facts. Leave out as much as may conduce to the end in view; but insert nothing which conflicts with detailed observation. But maps may be made and used for different purposes, so as to aid us to interpret the country in different ways—a political map, a road map, a railway map, a geological map, and so forth. Each must significantly represent the facts it is meant to summarize; each must be consistent within itself; each must be consistent with the other maps so far as their data coincide. Each is of use to enable us to find our way in the map, and to find our way in the country mapped. More detailed acquaintance with the country helps us to make a better map; a better map helps us to become more closely acquainted with the country; and so on, to and fro, up to the ideal limits of acquaintance with and knowledge of reality. Such maps are our ideal constructions in science. Physics makes its map; physiology its map; psychology its map, and so on. Each map leaves out certain features of perceptual reality; none can put in more than a certain amount of detail; there must be no contradiction between the several maps so far as the facts to which they refer are the same.

Every mapped out ideal construction is useful so far as it enables thought to move securely within its scheme, and affords a reliable guide in that which the scheme significantly interprets—the perceptual world with its bewildering multiplicity of particular and concrete detail. And just in so far as they are useful for these purposes, we may say that the maps are true—true in their self-consistency, true in their consistency with other maps, true to the perceptual experience from which they are derived, true to the constitution of nature in which that experience is grounded.

The ideal monistic interpretation of nature is, then, a highly generalized map of the moving and developing world-process wherein all the correlation routes are serviceable for conceptual thought, and serviceable for the interpretation of observable processes and products. Now suppose, if the supposition be not too extravagant, that we had reached this ideal. Suppose that we were in possession of an adequately complete knowledge-map of world-process and world-products up to date. Could we with like adequate completeness foretell the future? Let us narrow down the question. Let us suppose ourselves to be sentient beings living in the fire-mist at an evolutionary period before crystallization occurred in what is now our solar system. Could we then, on the basis of the fullest possible experience of our fire-mist world, foretell the forms that crystalline synthesis would assume in the not-yet of the future? I think not. How could we describe and formulate facts the like of which were not yet in being for our experience? It may be said that science is day by day foretelling facts which are not yet in being.

Yes! But does science ever foretell facts the like of which have not yet swum into the ken of experience? I speak under correction; but I believe not. I hold that all scientific explanation is after the event, and that all scientific prediction is of like events under like conditions. But surely, it may be urged, an adequate knowledge of the constitution of nature would enable us to predict any event no matter how novel or how far removed from us in future time. In a sense this is true enough—but only in the sense that the supposed adequate knowledge embraces the constitution of nature *when it is finished*—if it ever gets finished for human understanding to grasp. In the case I have supposed, the order of nature as an evolutionary product was still in the making and had not reached the critical moment of crystallization. In our interpretation of the evolutionary process, if we place ourselves at any moment in the midst of its flow, we anticipate the future on the basis of the experience gained up to date. But even if that experience were exhaustive, our anticipations must often be at fault if the world is still in the making for our experience, if new modes of synthesis hitherto unexperienced, and, therefore, as I conceive unpredictable,[1] come into being. I am, however, fully aware of the fact that many men of science would contend that the evolution of all the varieties of crystal-form, and all the correlated physical properties, could have been foretold, before their actual existence, on the basis of

[1] M. Bergson, as I think unwarrantably, restricts the range of the unpredictable to the vital order; but it must be remembered that for him all *process* is, in a wide sense, vital

an adequate knowledge of molecular polarities. But as a matter of historical fact, is not our knowledge of these molecular polarities derived from the study of crystals and their properties? Given specific modes of synthesis, we set to work to explain them in terms of what we find therein. But that is a different matter from predicting the modes of synthesis before they are given!

Is such a view proved to be incorrect by the prediction of the discovery of Neptune based on the skilled and laborious calculations of Adams and Leverrier—a prediction, the accuracy of which was established when the new planet swam into the field of M. Galle's telescope; or by the prediction of the physical properties of certain chemical elements, the discovery of which might be anticipated on the basis of Mendeleef's law? Surely not. Reduced to its simplest expression, what we have in such cases is a curve of ideal construction within which certain points may be ideally interpolated before those points have been shown by observation to exist on nature's curve of fact. But the curve of ideal construction is based on experiments and observations up to date; and these deal with occurrences up to date. But if the phenomena of crystallization had not occurred up to date, on what basis could a curve of ideal construction, dealing with the not-yets of the natural order, be founded? How could points be interpolated or extrapolated in a curve for the drawing of which nature had not yet supplied the data?

But enough of the inorganic order. Crystallization has been taken merely as an example. Chemical synthesis might have been treated on similar lines.

It might have been asked whether the constitution and properties of carbon disulphide could have been predicted before the event of its coming into being, and before like events had afforded analogical data. The point of my contention is that the progress of inorganic evolution is replete with events which are unforseeable on the basis of the fullest possible experience prior to the actual occurrence of such events. All that we can do, in science, is to correlate the new with the old.

Carrying with us the lesson we have learnt from the inorganic world, let us pass onwards to the sphere of the organic. Let us again ask a question :— Could our supposed sentient being (Irish, I admit, in the figure of prolepsis), existent before life (as the man of science regards life) appeared on the surface of this planet—could this impossible being have possibly foretold the nature of organic processes? His descendant, speaking in Belfast,[1] no doubt discerned "in that matter which we, in our ignorance of its latent powers . . . have hitherto covered with opprobrium, the promise and potency of all terrestrial life." But Tyndall was speaking after the event; and I doubt whether even the champion of biogenesis could have foretold the properties of protoplasm before that elusive substance had come into existence. Now it *is* in being, we can gain experience of these properties, though we cannot as yet correlate the genetic stages of its natural evolution. That is just part of our scientific ignorance. Some of the properties of living organisms are, however,

[1] John Tyndall, "Address to the British Association" (1874). "Fragments of Science," 6th Ed. (1879), vol. ii., p. 193.

unquestionably, as I believe, different from the properties of inorganic substances. New relationships as a matter of observation obtain. I do not care, at this stage of our inquiry, to have much traffic with "isms". But if the term mechanism be employed as a group-name by which to label certain salient characteristics of physical and chemical processes in the inorganic world, and the *same* processes in so far as they occur in organisms, there would seem to be no objection to the application of the term vitalism to the salient characteristics of the specifically physiological processes which differentiate the organism from inorganic matter. But obviously the two terms should be used on a similar footing, that is to say, to label the observed characteristics and to aid us in our classification and our scientific interpretation. Unfortunately, however, the word vitalism generally carries with it another and a different connotation. Inasmuch as any suggested interpretation of instinct is sure to be termed mechanistic or vitalistic, and inasmuch as one's attitude towards the instinctive problem is closely related to one's attitude towards vital problems generally, I must endeavour to make clear my own point of view.

First as to vital force. This opens up the question. What are we to understand by force? Given certain observable changes of position in the solar system; is force the Source of these motions? That question is beyond our province. We have excluded Source from our universe of discourse; and we must therefore have nothing to do with either gravitative or vital Force in that sense of the word. Then we may speak of force as a measure of the accelerations

which occur in a mechanical system. But we know little or nothing about the accelerations of particles in an organic system; so *that* can scarcely be the meaning we are to attach to vital force. We may, however, speak of the solar system, for example, as one in which the changes which occur are to be interpreted in terms of gravitative force, meaning thereby that the system is a gravitative system. The term gravitative force here has reference to the constitution of the system as the ground of certain observed occurrences. It names the order of relationships with which we have to deal. If the term vital force is used in an analogous manner, and if we are careful to make this quite clear in our definition, I see no reason why we should reject this usage. The only serious objection is that it is apt to suggest Source, and not what I have called ground. I should, myself, therefore, much prefer to speak of organic constitution or organic relationships. But still, since we speak of crystalline, magnetic, and chemical forces as characterizing certain natural processes, using this form of speech to describe the constitution of the system in each case, I see no objection to speaking in like manner of vital force, as characterizing organic processes as such, so long as it is distinctly understood that this is just what is meant, and that there is no implication of Life as Source. If this implication be intended, let it be clearly stated, then we shall know exactly where we are.

What then about vital chemistry? Vital or physiological chemistry is either a branch of chemistry or it is not. If it be not, then the sooner some other

name is found for it the better. If it is, then, surely, as a branch, it is still intimately correlated with other branches of the parent stem from which it is differentiated, and as such must be dealt with in terms of chemical processes and chemical products. But, it will be said, this way of putting the matter studiously avoids the very point at issue. As Dr. Driesch[1] has well phrased it:—"What physiological chemistry studies is only results that are chemically characterized—not results of processes that are chemical processes. It is very important," he adds, "to understand well what this means. Of course chemical potentials have formed the general basis of all physiological chemical results, but these results as we know, are not due to the mere play of these potentials as such, but to the intervention of entelechy; therefore something purely chemical is found in the results only, not in the processes. Without entelechy there would be other chemical results."

No one has stated the case for vitalism more clearly, ably, and cogently than Dr. Driesch. His doctrine of entelechy goes to the very root of the matter. We must try to reach an understanding of what he means by entelechy. Is it an assemblage of natural conditions; or is it a name for the constitution of the organism, that is the ground of organic phenomena; or is it an extra-mundane Source of these phenomena?

There are certain processes which are characteristic of the living organism. It is the business of the biologist to deal with these phenomena in the terms

[1] Hans Driesch, "The Science and Philosophy of the Organism," vol. ii. (1908), p. 254.

of his scientific methods—to explain, for example, the development of the chick from the fertilized egg, or the restitution of a limb in a maimed newt. Now unquestionably all the processes of growth and restitution involve chemical or metabolic changes with which the chemist may deal according to his methods, and involve molecular changes with which the physicist, no less than the biologist, is concerned. Let us assume that all the metabolic processes, in so far as they are susceptible of treatment by the chemist, are interpretable in terms of chemistry, and that all the physical changes, as such, are found to be in accordance with recognized physical generalizations. This may be more than the vitalist will grant. Let it pass, however, as an assumption which is the basis of scientific research. The question is whether, when the chemist and the physicist have done their work, there is anything left for the biologist to explain—whether correlated with these chemical processes and these molecular changes, there are also further processes which assume a specific form in the phenomena of organic growth that is nowhere to be found in the inorganic world. Dr. Driesch contends that they do—that the biologist may claim an autonomous field of research. Let us grant that he is right. As at present advised I should myself grant it freely and unreservedly. Let us, then, not only admit, but contend, that in the living organism there are specifically organic modes of synthesis. And let us provisionally agree to substitute for the familiar word organic, as qualifying, for example, growth and development, the relatively unfamiliar term entelechian. Then entelechy is the noun from

which this adjective is derived; it expresses the distinctively biological concept.

In this sense I can accept entelechy as the specific ground of organic processes within a relatively autonomous province of the constitution of nature. And in this sense the term is sometimes used by Dr. Driesch. "Entelechy," he says, "is order of relation and absolutely nothing else" (p. 169). But the ground of all order in nature is for him, following Kant, to be sought in the constitution of the mind. Its home is among the categories. Unless I wholly misunderstand him, Dr. Driesch is so far Kantian as to hold that the given manifold of sensory experience is made into a cosmos by us human knowers. I accept, as I have said above, the other alternative, and believe that it is the constitution of nature that makes us human knowers what we are in the sense that we are just parts within the whole, and parts in which conscious relationships, strictly correlated with other relationships, have been evolved. But if the knower is himself thus part of the order of nature, may it not be reasonably claimed that, whichever alternative be accepted, the sole and sufficient ground of all experience and all scientific knowledge is the order of nature? So far, as part of that order, entelechy may be accepted as a concept of value in biological interpretation.

It must be remembered that on these terms entelechy is accepted as part of the constitutive nature of the organism. It is not accepted as a natural agent existent outside the organism and somehow acting not in but into the organism. When we are told by Dr. Driesch that entelechy is a natural

agent which rules, determines, and controls organic processes (i. p. 227–8); when we are told that entelechy uses the brain as a piano-player uses the piano (ii. p. 97); when we are told that it is the task of entelechy tc build up the organism (ii. p. 149); I seek to know whether crystallization is also a natural agent which rules, determines, and controls crystalline processes; whether gravitation uses the solar system as a piano-player uses a piano; whether it is "the task" of a committee of such agents to build up the universe. I seek to know what crystallization, gravitation, organization, and the rest are doing when they are not playing their pianos; and what evidence there is of their existence independently of their business avocation as instrumentalists. And this I seek to know within the universe of discourse of science which just accepts process as given, to be correlated with other process, and has no concern with the question why process is what it is. If we say that entelechy uses matter and material causality for its purposes; if we emphasize by italics that entelechy is *alien* not only to matter but also to its own material purposes (ii. p. 336), are we not passing beyond the order of nature as given, in our search for an entity or entities through the Agency of which a part of that order has its Source and Origin? Entelechy we are told (ii. p. 235) is affected by and acts upon spatial causality as if it came out of an ultraspatial dimension; it does not act in space, it acts into space; it is not in space, it only has points of manifestation in space. So, too, it is not in the material organism but only "manifests" itself in this material (p. 336). There is no living

substance; there is only substance which is used by life (ii. p. 246 and 248 and i. p. 93). Have we not here the manifestation of Agency as the Source of the order which is observed. It certainly appears to be so. For we are led up to the question whether the harmony in certain domains of nature does not point back to "an original primary entelechy that made it just as the artist makes an object of art;" to which the reply is that "the mind is forced to assume this primary entelechy in the universe," an entelechy which has not indeed created absolute reality but which has ordered certain parts of it (ii. p. 370). This may be a perfectly valid conception for the metaphysics of Source; but it is not what I understand by natural science of which biology is a branch.

I proceed throughout on the assumption that, whatever may be their source—whether it be Life, or Entelechy or God—all natural processes, including both organic and mental processes, are related within the constitution of nature, and must be correlated within our ideal construction of the natural order. That is what I understand by a universe. If we could tell the story of evolution up to date, it would be one story, all its episodes of process being in some measure related. But if it be one story, is there not one science of nature in terms of which this story may be told? Professor J. Arthur Thomson asks[1] this question and gives a negative answer. But what are we to understand by one science of nature. Professor Thomson tells us that "it must consist of precise physico-chemical descriptions which have been, or

[1] "Hibbert Journal," vol. x., p. 110 (Oct. 1911).

re in process of being, summed up in mathematical erms." I take this to mean that the one science of ature must take into consideration chemical and hysical relationships only, and must either (1) deny he existence of, or (2) exclude from its treatment, all ther relationships, such as those which are specifically rganic, still more those that are of the conscious or xperiential order. Now of course Professor Thomson s a distinguished biologist is not prepared to do ither the one or the other, and since he is precluded y his definition of the one science from including pecifically biological relationships therein, he seems o urge that there are two sciences of nature—inorganic science on the one hand and on the other and the science of biology. But it seems to me hat the only possible justification of such treatment s the Bergsonian conception of two separate orders —the order of the inert and the order of the vital and he conscious. In other words the doctrine of two ciences is founded in a doctrine of radical dualism. The thesis I seek to develop is that there is one cience of nature—that which includes all kinds of elationships. But of course *this* one science of nature ust not be so defined at the outset as to limit it to hysico-chemical relationships and to exclude all that s distinctively organic. Professor Thomson includes nder biology certain phenomena in connection with nimal behaviour which involve experiential relationhips. That these phenomena cannot adequately be nterpreted in terms of "precise physico-chemical escriptions," and in these terms only, is for me, so ue as to be a truism. But I doubt whether there re many of even the staunchest upholders of a

so-called mechanical interpretation, who would deny the presence of other relationships than those which we term physical and chemical, or would deny that these other phenomena are susceptible of scientific treatment.

There is one further characteristic—a distinctive characteristic—of the phenomena with which biology deals to which allusion must be made. Professor Thomson rightly lays stress on the fact that organisms are historic beings. As W. K. Clifford said[1] in a passage which Professor Thomson quotes :— "A living being must always contain within itself the history, not merely of its own existence, but of all its ancestors." Every organism runs through a life-history which is substantially a cyclic repetition of that of its parents. What, then, is the relation of this distinctively organic sequence to inorganic processes? We know indeed that as the life histories run their course they are in close relation to physical processes in the environment. But what about the beginnings of life on the face of this earth? We must frankly confess that the mists of our ignorance hide the stages of correlation from our view. Must we then, to account for the origin of protoplasm, postulate the incursion of a foreign order, hitherto unrelated to the old inorganic order, and coming from an alien sphere? If we do so we leave science and resort to the metaphysics of Source. What know we in science concerning this foreign order save in and through its relationships with the native order at the points of postulated incursion? Let us once

[1] "Lectures and Essays," vol. i., p. 83. Discourse delivered in 1868.

more suppose that at some stage of world-development a sentient being might have observed the seemingly sudden (if it was sudden) appearance of lowly forms of organization. In what essential respects would such an occurrence differ from the seemingly sudden appearance of crystallization in the pre-crystalline magma of an earlier phase of development? Let us at least be consistent in our thought. If we regard organization as an incursion from an alien sphere, let us also so regard crystallization. Let us apply to the inorganic world the same canons of interpretation which we apply to the organic world. But if we do so, in the one case as in the other, are we not postulating a Source of the occurrences which *ex hypothesi*, might have been observed as matters of experiential fact?

What then is the other course open to us?—What is the course which is here advocated? The naïve acceptance of any such facts as can be established by observation and scientific inference. Among these facts is, I conceive, the frequent appearance of what must seem to contemporary experience to be new products of synthesis at critical periods of the development of world process. I suppose few will deny that the genesis of crystals is correlated with certain assignable conditions under which that genesis occurs. Why should we deny, on the basis of our present ignorance, that the genesis of organisms is or was likewise correlated with certain other conditions as yet unknown? Why should we deny that the constitution of nature, which is the sufficient ground of the genesis of the one, affords no ground for the genesis of the other?

But if we are prepared to see in the constitution of nature the ground of all those processes with which science attempts to deal, and of all those products which are strewn along the banks of the flowing stream of process—in short of all perceptual experience and all scientific knowledge—we must also be prepared to regard the constitution of nature as the ground of new and unforeseeable modes of synthesis. We must be prepared to regard the world at any stage of progress as one which is really evolving. And if it is evolving in this sense of exhibiting genuinely new modes of synthesis, the past can never be a wholly sufficient basis for anticipations with regard to the future. On this view of evolutionary progress there are, as M. Bergson and William James have claimed, unforeseen and unforeseeable possibilities in store for the universe. The tune of the future will not be merely a repetition of the theme of the past, with only such insignificant variations as may be due to minor rearrangements of already existent chords in nature's melody and harmony.

Once more a note of warning must be uttered. The constitution of nature as ground is not to be regarded as independent of natural process; nor as imposing on natural process the characters it possesses. Directly we so regard it we pass to the conception of Source. It is just the logical form, or, if it be preferred, the intelligibility of the world. It neither produces nor is produced by process; it is the essential feature of the existing and evolving universe as rationally interpretable.

CHAPTER VI

NATURAL HISTORY AND EXPERIENCE

IN earlier chapters I have attempted to interpret instinctive experience in terms of natural history. But can there be a natural history of experience? Or is the attempt to give a genetic account of experience in terms of natural history, and science founded thereon, futile and foredoomed to failure? I regard instinctive experience as the earliest phase of a continuous development in the individual, which may lead up to the enriched thought-experience of man. But am I not, it will be asked, beginning at the wrong end? Can one explain the higher in terms of the lower? Must one not reverse the procedure and explain the lower in terms of the higher? Those who approach this question along such a path as ours regard human self-consciousness as a result of evolution; it is, for them, the *terminus ad quem* to which or towards which development leads up. But those who approach the question through a different avenue, urge that self-consciousness is the *terminus a quo* from which we must start forth on our quest for explanation. Thus T. H. Green says[1] that self-consciousness is "at its begin-

[1] "Introduction to Hume," "Treatise of Human Nature," Green & Grose, vol. i., p. 166. (Impression of 1909.)

ning formally or potentially or implicitly all that it becomes actually or explicitly in developed knowledge." There is of course a sense in which the naturalist can understand and accept this statement —the sense in which an acorn is potentially or implicitly all that it becomes actually or explicitly in the developed oak-tree. But here we have only an expectation founded on knowledge of routine, and one which implies the prior existence of such knowledge, as this in turn implies the prior existence of a knower. In any case this is certainly not the sense in which Green's statement is to be understood. "A natural history of self-consciousness is," he says, "impossible since such a history must be of events and self-consciousness is not reducible to a series of events." This might perhaps be interpreted as indicating an insight into the distinction between the events experienced and the process of experiencing, or, as Green would have phrased it, between content and act. But for him the act implies an Agent, and the Agent is not of this world. Mind, though it may act into nature is not of, or belonging to, the order of nature. "A form of consciousness *which we cannot explain as of natural origin*" is, Green says,[1] "necessary for our conceiving an order of nature." Here we have Consciousness as Source. For Green, as we saw in the last chapter, Source is all-important; and his real point is that a natural explanation of Source is impossible. This may be freely granted both by those who believe in a Source of phenomena and by those who disbelieve. Now, in so far as

[1] "Prolegomena to Ethics," § 19, p. 23 (5th Ed. 1906) Italics mine.

epistemology discusses the origin of knowledge, as distinct from its genetic development, it belongs to the metaphysics of Source. Its method of interpretation is to explain the lower in terms of the higher; the end determines the course of events by which it is reached. Hence my reiterated contention that any commingling of the antithetical methods of metaphysics and of science is to be deprecated. Why should we not try to write a natural history of experience, as it somehow actually runs its course, leaving the problem of its Source to be discussed on a different platform?

But, granted that a natural history of experience might be written, were our knowledge far more adequate than it is at present; it would, I take it, in strictness, be a natural history of an individual experience, just as the natural history of an organism is, in strictness, that of an individual. Granted, then, that on these terms, a natural history of experience might be told, the question arises whether this alone would suffice for scientific interpretation. The question is perhaps a little subtle; but it opens up the wider question:—What is the relation of history to science? If history, as such, always deals descriptively with a particular series of events forming a sequence which occurred within an assignable period of time; and if it be the task of science to furnish an explanation and interpretation of these events in terms of general rules; it does not seem possible to identify the one with the other. It would appear, rather, that it is the function of history to supply, on its own terms, the data for scientific discussion. Granted that history repeats itself—a

statement which, as we shall see, may require some qualification—only in so far as it does so may we hope to ascertain the general rules which obtain in such repetition. Science can only deal effectively with the data which are afforded by routine. Only on the basis of routine can expectations and anticipations arise. For Hume, custom afforded a sufficient ground for such routine. For a modern disciple of Hume, Professor Karl Pearson,[1] routine is grounded in the nature of the perceptive faculty itself. For us the ultimate ground of perception and custom and routine is the constitution of nature. But what is the constitution of nature but that to which our concept of the natural order refers? And in the absence of recurrent phenomena could we ever have framed this conception of a natural order? If physics, chemistry, and astronomy dealt with always fresh occurrences, without any repeated series, we might indeed have history; but could we have science? If the development of this oak-tree from that acorn were not substantially the same as that of other oak-trees from other acorns, and in like manner with a vast number of organic life-histories, could we, it may be asked, frame any generalizations that could properly be termed biological? If again there were no recurrent phases of what is consciously experienced, could even that custom, on which Hume relied, have arisen? Is not all co-operative work in the interpretation of nature dependent on the fact that sequences of events are repeated in and for the individual experience of different men? Is it, then, too much to say that, apart from the repeated

[1] "The Grammar of Science," pt. i., p. 115 (1911).

recurrence of sequences which, for the purposes of interpretation, may be regarded as the same, no such conception of the natural order as has been framed by men of science could have come into being?

There is unquestionably a central core of truth in the views implied in such questions. But is it the whole truth? Is there not somewhat to be urged on the other side? Suppose that we could know the complete history of the natural order up to date. We think of it nowadays in terms of evolution. Regard then the evolution as a whole and consider the thought-model men of science have framed of its progress. Does this history repeat itself? Can we conceive that it has ever repeated itself in literal exactness, as a great progressive whole? Does the astronomer, touched with the spirit of evolution, believe that any period in the history of the solar system exactly reproduced the events of any preceding period? Does the geologist, or the palaeontologist, believe that the physical features of the whole earth and the total flora and fauna all over the globe, were ever twice the same, so far as his researches enable him to form an opinion? Has not every period, long or short, its distinguishing individuality? If so, there is surely a valid sense in which it may be urged that our concept of evolution is antithetical to a concept involving the complete and through-and-through recurrence of any phase of the evolutionary process regarded as a whole. And when we narrow our field of view and consider the history of any given organism, still more that of the individual experience of any conscious being, is not the salient fact that

history does *not* repeat itself—that history always comprises within its record some measure of genuine becoming, always presents something new, something unique?

It may, however, be urged that this so-called genuine becoming, this something new and unique, is only a re-grouping of world-old elements. But why *only* a re-grouping? Is not every synthesis within the natural order, on this view, only a re-grouping? What is thus stigmatized by the disparaging word *only* is, it may be urged, the essential and distinguishing feature of evolution, and should be recognized as such, not only by the psychologist and the biologist, but by the interpreter of inorganic phases of the evolutionary process. When crystallization first occurred in that part of the universe which is now our earth, there was in a sense only a re-grouping of molecules never before so grouped. In a sense, too, every time a crystal forms to-day there is only a synthetic re-grouping of molecules otherwise grouped just previous to its formation. But in the latter case, and in thousands of such cases, experience has afforded a basis, absent in the first instance, for the interpretation of crystal-formation in terms of routine. Let us admit then that, within the natural order as a whole, there are many details of the history which occur over and over again, and differ only in the time and place of their occurrence; for we may here neglect the fact (if such it be) that no two crystals, for example, are ever absolutely alike, and that the balance of unlikeness, perhaps infinitesimal, gives at any rate just a little uniqueness and individuality. Though the history

of the natural order as a whole (so far as we can form an ideal construction of the whole) does not in any two periods of time repeat itself, yet within that whole there are numberless repetitions sufficiently alike to be comprised under the generalizations of science.

What, then, are the characteristics of such repetitions of process? We may express the essential feature diagrammatically thus[1]:—Take the recorded curve of this bit of natural process, with its products, occurring here and now; superpose it in thought on the curve-record of another bit of natural process which occurred at another time and in another place; then if these records are substantially the same, so that the one curve approximately fits the other—history so far repeats itself.

How stands the matter then with regard to the organism? Does history repeat itself in a similar sense here? Take the relatively simple life-history of the frog or newt from the egg through the tadpole phases. Or take the much more complex case of the liver-fluke, the life-history of which is a series of quite romantic episodes. I conceive that in all such cases, simple or complex, the practical working zoologist who has no philosophical theory to advocate, will say that, in biology, history does repeat itself; that when the record of any one individual organism is compared with that of another of the same species there will be substantial agreement, and that to contend that there is not absolute identity is a bit of quibbling. But such an one cannot have learnt to the full the lesson of evolution. For, if in a long series, over a considerable period of

[1] Cf. Bergson, "Creative Evolution," p. 227.

time, each successive individual is quite like its predecessors, where is the possibility of progress in the evolution of species? On such a view where does variation come in? Does not the history of biology teach us that whereas the older zoologists were content to believe that history does repeat itself, post-Darwinian biologists have learnt to accept the view that in strictness this is not the case? Hence it can scarcely be termed quibbling to contend that in no two cases is there absolute identity. Will it not be wiser to say:—(1) that for the purposes of the systematic zoologist who is conducting a research on life-history there is substantial agreement in the case of the different individuals of any living species; (2) that for the purposes of the evolutionist those minor differences which are termed variations must be taken into consideration; and (3) that for the purposes of philosophic thought absolute identity between any two life-histories is, to say the least of it, highly improbable?

Combining these three, we may say that in any individual life-history there is a largely preponderant portion which is a repetition of what has occurred before in other individual phases of the history of the species; that there is a much smaller proportion which is a variation from previous life-histories in the same line of heredity; and that, though, among some organisms, this latter proportion is so small as to elude the closest observation, it is never a vanishing quantity. So too, in the natural history of experience, as one among the many concatenated processes of the natural order, we find, as in the organic characters which mark the course of the individual life-history

of an organism, (1) some measure of substantial but never complete repetition, and (2) some measure of the new and unique. Here again, however, we are faced with the same difficulty of interpretation. Is the apparently new and unique a veritable "creative" departure from routine? Or is it the algebraical sum of characters given in previous routines and therefore predictable if we knew the amounts of these characters and the mode of their summation? I see, at present, no ground for denying, though I am not prepared to assert, that really new synthetic combinations, as contrasted with quasi-mechanical mixtures of old characters, do occur in the natural history of experience. But since, as matters now are, we have not the data for proof of either their presence or absence, let us be content to grant that they *may* occur. In any case a large measure of individuality seems to be emphasized in the concatenated experiential processes and products of the higher organisms. In a sense that is quite valid and true the mental life-history of the individual never in any of its phases repeats itself, nor is any phase an exact repetition of previous parental or ancestral life-history. Hence in the natural history of experience the same antecedent conditions never again recur; hence I do not act to-day quite as I acted yesterday; and hence it may be said that the concept of stereotyped routine—of ubiquitous uniformity of sequence—is here inapplicable. The assertion that like antecedents will always be followed by like consequents, the constitution of nature being assumed to be constant, may be true enough; but what can be its value here, if, in the ever-changing flow of experience

the same conditions never do recur? All this has an element of truth; and M. Bergson and his followers do well to insist on this feature of the conscious life-history. But surely it is not the whole truth; for it ignores the fact that though, in strictness, the life-history does not repeat itself any more than does the history of the universe, yet there is in it enough of routine on which to found generalizations. M. Bergson seems rather extravagantly to over-emphasize the difference and to minimize the similarity in successive phases of the mental life; but it must be remembered that for him routine and habit, though they are due to the Agency of Life, are part of the automatism Life has created, and are being, or have been, translated into the stereotyped order of the inert. Then and then only do they come within the purview of science so as to be susceptible of treatment in the static terms which science as he admits rightly employs in its interpretation. Still, granted that the quality of our experience changes from day to day, it is only within the narrow margin of this "creative" difference that the resulting actions are, in M. Bergson's sense of the term, "free." And this limited freedom is, for us, but not for him, grounded in the constitution of experience which is part of the constitution of nature.

We must turn aside here to consider briefly what we mean when we speak of the individual and individuality. It is convenient, in biology, to apply the term individual to the organism which embodies that portion of the continuous life-history which is relatively (but only relatively) isolated and runs from the cleavage of the fertilized ovum to the death of

the adult, and begins again with the egg laid by the adult. Biologists will remind us that in some cases, as in that of the liver-fluke, there are, within the individual history, relatively isolable stages to which the term quasi-individual may be applied. They will remind us, too, that, where the egg is fertilized, any individual life-history is continuous with two life-histories. But these are only supplementary conceptions. The essential conception is that the individual is relatively isolated, and that it has certain characteristics which distinguish it as an individual from otherwise similar individuals.

Now it is often asserted that outside the sphere of life no such concept as that of individuality is applicable. We cannot affirm, it is urged, that each molecule of water has its own peculiar distinguishing characters which mark its true individuality. Perhaps not. But can we deny that it has? No doubt in the interpretation of the chemist any such individuality as atoms and molecules may possess, nowise matters for his purposes. For these purposes they are regarded as all just alike. But to assert that the real molecules to which that thought has reference—the molecules as they exist (if they do exist) independently of that thought, have no distinguishing characters of individuality—that, I conceive, is to go further than known facts justify us in going. We cannot get at them to compare in minute detail each with others. We have no grounds for any dogmatic assertion on the matter one way or the other. There may be, therefore individuality, in molecules and crystals, in mountains, in rivers—in the inorganic world. None the less we may quite justifiably say that outside the organic sphere the

concept of individuality is not applicable in the same sense as within that sphere. Nowhere in the inorganic world do we find such repetitive cycles; nowhere else the cumulative effects for which heredity somehow "provides"; nowhere else the subtly interrelated processes of differentiation from what is, or seems, comparatively homogeneous at the outset, combined with the integration of the differentiated products into an organic whole with characteristic unity. There is nothing quite like this in the inorganic world. And hence there is no *such* individuality outside the sphere of the organic and the conscious. Let us, however, again fix our attention on the essential feature of individuality. It is what distinguishes *this* from *that*. It is the balance of unlikeness which distinguishes this individual assemblage of processes and products, from that other assemblage otherwise so closely alike. It is a kink in the recorded-curve which prevents it from quite accurately fitting the generalized statistical curve. But though the balance of unlikeness is the distinguishing mark of individuality it is not that which *constitutes* the individual. The individual is the developing microcosm in its entirety. It is a differentiated centre within the macrocosm. It partakes of the universality which characterizes the constitution of nature within which it is differentiated.

Now does hereditary transmission "provide" only for that full measure of repetition which the study of organic and conscious life-histories discloses; or does it also "provide" in some way for that far smaller measure of variation which gives to the individual its distinguishing characters?

We must remember that the organism which expresses, or is the expression of, the life-history is only relatively isolated. It is in relation to the environment. By environing conditions it is more or less modified in running its course. Some biologists believe that the modifications impressed on the bodily tissues of the parent beget correlated variations in the offspring. But since it is at present, to say the least of it, doubtful whether such modifications, due to environing conditions affecting the bodily tissues, are inherited, we may provisionally assume that variations do not arise in this way. Or, if it be so preferred, we will assume that the environment is so far constant that these conditions of modification may be eliminated from our present consideration. But if under these circumstances variation does still occur, would a complete knowledge of life-histories up to date enable us to predict its nature? Is it strictly correlated with some parental or germinal conditions of its occurrence? I take it that the orthodox biological reply to these questions would be in the affirmative. But some biologists would differentiate between the two questions. To the latter they would reply in the affirmative; they would say that unquestionably there is hereditary correlation. But they might hesitate to affirm with equal confidence that even complete knowledge up to date would afford the basis of prediction—of foretelling the exact nature of a variation which *ex hypothesi* occurs for the first time and is therefore really new. If it be an algebraical sum of parental or ancestral characters here juxtaposed or mixed in a new pattern, it would be predictable on the basis of routine, since it would

be only a new combination of old routines. But if the constitution of the organism should have reached a critical stage, analogous to that in which new crystals or new chemical compounds are formed—a critical stage at which new variations crystallize out, or organize out, if the expression be allowed; then they would not be foreseeable, since previous routine would afford no clue to their nature. I do not contend that this is the case. I question whether there are biological data for deciding the question. All that I urge is that if such unforeseeable variations occur in the natural history of organisms, or in the natural history of experience, then the business of science is to seek the correlated conditions of their appearance, and to accept them as grounded in the constitution of nature, remembering that the world in which we live is still in the making, and may have much in store which even the most complete knowledge up to date would not enable us to predict.

Now as we have already seen, new and unpredictable events in the history of experience, and new and unpredictable variations in the course of evolution, are what M. Bergson terms "creative" and characterizes as "free." But for him they are not grounded in the constitution of the organism, as part of the constitution of nature one and indivisible, they are grounded in the constitution of life which is the Source of the creative and the free. "The spontaneity of life," he tells us, "is manifested in a continual creation of new forms succeeding others" ("Creat. Ev." p. 91). "Heredity," he says, "not only transmits characters, it transmits also the impetus in virtue of

which the characters are modified and this impetus is vitality itself" (p. 144). "It is the current of life, traversing the bodies it has organized one after another" (p. 27). And this life is identified with will "which is employed in some cases in setting up the mechanism itself, and in others in choosing the mechanisms to be released. The will of an animal," we are told, "is the more effective and the more intense, the greater the number of mechanisms it can choose from, the more complicated the switch-board on which all the motor paths cross, or in other words the more complicated its brain (p. 265). No doubt in some of these and other such passages, it is a little difficult to be quite sure when M. Bergson is referring to natural process as distinguished from its products, and when he is referring to an extra-mundane Source which acts into (rather than in) the organism. In a sense we may say that heredity "transmits" the process of organizing; that I suppose is what we mean when we say that characters, as the products of organization, are "transmitted." It would, however, conduce to scientific precision if the word "transmission" could be superseded and heredity were treated in terms of correlation. On these terms M. Bergson's extra-mundane Life or Will would be the Source of existing correlations in the routine it has established, and the Source of new correlations in its creative capacity. When M. Bergson draws a distinction between "the evolved which is a result" and "evolution itself which is the act by which the result is obtained" (p. 53), does he mean by "act" a continuous natural process of which the organisms we can study are the products, or does he mean the

manifestation of extra-mundane Will? I think he means the latter.

It must, of course, be remembered that M. Bergson's aim is to combine science and metaphysics in one comprehensive synthesis. He is, therefore, perfectly justified in introducing the concept of the Source of organic phenomena into his universe of discourse. Whether he does so to the benefit or to the detriment of biological *science* must remain a matter of opinion. My own opinion is that any introduction of the metaphysics of Source into scientific discussion is always detrimental to science. It always raises false issues. The current discussion of vitalism and animism is riddled through and through with such false issues—false, that is, within the field of science. Not content with accepting processes and products and their relationships, vitalists and animists persistently ask questions as to their source and origin, and straightway Entelechy, Life, Psychic Entity, descend from the blue of metaphysics to trouble the waters of science. The scientific task of correlating phenomena, especially the complex phenomena of living organisms, is difficult enough and is still in its early and tentative stages. There are a great number of correlation-questions (in the broader sense of the term, and not in the restricted Darwinian sense)—questions with regard to evolutionary and developmental conditions —which are easily asked, but which at present cannot be satisfactorily answered. To say that organic phenomenon are due to Life which, to paraphrase Green's words, contains within itself potentially or implicitly, all that it manifests actually or explicitly, is no

solution, not even the hint of a solution, of the scientific problem. M. Bergson in his criticism of Darwin and of later biologists asks a number of questions which have often been put before. If the variations which resulted in the vertebrate eye, he asks, were infinitesimal and insensible, how could natural selection preserve or accumulate them? A sensible value is essential to make the difference between elimination or survival. If, on the other hand, they were appreciable in amount, and sudden or discontinuous in occurrence, how could so many complementary and independent variational jumps conspire to give the perfection of the organ? Unless all jumped together in working harmony each several jump would be harmful rather than helpful. And how comes it that the pallial eye of the pecten, a mollusk, has a structure in some general features resembling the eye of man, a vertebrate? How comes it, for example, that in both there is a peculiar inversion of the retinal elements, so that their receptive ends are directed away from and not towards the object of vision? There is no attempt to correlate this arrangement with the presence of a pigmented layer; no consideration of whether the presence of such a pigment layer is advantageous or not; or of whether, if advantageous, it would be of any use in front of the retina instead of behind it; or of whether, if advantageous behind the retina, inversion of the direction of the receptor cells is not a structural necessity. Such questions, or their like, suggest lines of investigation. That is not M. Bergson's aim. His questions are put as posers to science. And because science can only feel its way towards definite

answers to difficult questions—difficult to answer but easy enough to ask—we are straightway bidden to believe that all is due to Life ; we are invited to credit the potentialities of Life with all the actualities we find in the organism. As if that helped us in the smallest degree towards an explanation of the facts ! With all due respect for M. Bergson's poetic genius—for his doctrine of Life is more akin to poetry than to science—his facile criticisms of Darwin's magnificent and truly scientific generalizations only serve to show to how large a degree the intermingling of problems involving the metaphysics of Source with those of scientific interpretation, may darken counsel and serve seriously to hinder the progress of biology. "The Origin of Species" formulated a policy which has guided the scientific work of three generations of biologists. I search in vain in the pages of "Creative Evolution" for a hint of a working policy ; or if a policy is suggested, it is that of explaining biological phenomena by going outside or behind the biological field. M. Bergson would have us rise from mere science to the metaphysics of Source.

Now, rightly or wrongly, we have elected to exclude the problem of Source from our universe of discourse. Even for us, however, M. Bergson's insistence on the cardinal importance of *process*, is none the less timely and helpful. "There is," he well says, "more in the transition than the series of states—more in the movement than the series of positions" (p. 331). If, as he believes, men of science and intellectualist philosophers, are apt to lose sight of the thread of process in contemplating the concept-beads they string upon it, M. Bergson does well in

drawing attention to what they have, perhaps too readily, taken for granted and failed to render explicit. But when he urges that all process is, or is of the nature of, vital process; when he arbitrarily sunders process, as belonging to a separate order of the vital and the conscious, from the static products of the order of the inert; and when he presents his thesis in a style so full of charm and with a wealth of illustration and of metaphor so rich and varied; the need of protest, on the part of those who have been led to very different conclusions, is imperative. The difficulty is that there is so much in his suggestive thought that can be gladly accepted by the most resolute opponents of his central doctrine. There is a sound core of truth in his criticism of thoroughgoing intellectualism, based wholly upon what he calls its cinematographical method; there is a sound core of truth in his contention that the one and only process of which we have direct intuitive awareness is that which, as living and conscious beings, we *are*. But he works these up into an argument of doubtful validity and cogency. The steps of the argument, if I have rightly grasped its purport, are these:—(1) The method of the intellect is to make a series of snap-shots by means of the instantaneous photography of thought; (2) Such a series, so made, must for ever remain a series of separate thought-pictures, each one of which is inert and static; (3) Hence process itself refuses to be photographed, and therefore cannot be intellectually conceived since the concept is an intellectual snap-shot; (4) But the word process has a meaning and refers to something that really exists; (5) This reference is always, in its first intent, to the

life and consciousness which we feel coursing within us—that is to the vital order of which we are part; (6) Thus only by intuition (as he terms it) and never by conceptual thought, with its inevitably static products, are we aware of process itself; (7) If then there be process, other than that of which we are immediately aware as we live it, we must somehow put ourselves in its place by an act of "sympatny"; (8) But since we are ourselves vital and conscious agents we can only sympathize with other like agents; (9) Hence all process is of the vital and conscious order, and even the order of the inert is only a static product precipitated from the dynamic stream of life. So runs the argument. If I have here misrepresented M. Bergson's thesis, I must plead in excuse the difficulty of the subject, the subtlety of his treatment, and the need for brevity.

For M. Bergson, with his basal assumption of two orders of being, to one of which, from the outset and throughout, is assigned all process, all duration, all time—for time is very stuff of which life is made (p. 4) —while to the other is left only static and spatial juxtaposition in a world that is dead and inert, there is no other course than that which he follows. He assumes in his premises all that emerges in his conclusion. No doubt that is what we all do more or less! He, at any rate, is bound by his basal assumption to interpret all process, whenever and wherever it occurs, in terms of conscious Agency, and to regard all order, all form, all movement in the world as due to this Source. He claims to be directly aware of Will as a Source of activity within him; and since this is the only form of Source of which we have,

or can have, immediate intuition, all modes of activity must for him be due to Will. The strict antithesis of his interpretation is that of those who explain all process in terms of physical Forces. For them Force is the Agency by which all process is called into being; and conscious will itself is only the phosphorescent glow which accompanies certain physiological processes due to a subtle interplay of physical Forces. For M. Bergson process is reality and the Reality which underlies process is the Agency of Will. For philosophical materialists, or energists, process is reality and the Reality that underlies process is the Agency of Force or perhaps hypostatized Energy.[1] For M. Bergson there are two orders, one of which, that of the vital and conscious, is the home of Reality, the other, that of the inert, being merely its sloughed off skin. For the materialists there are two orders, one of which, that of Energy, as the expression of Force, being the home of Reality, while the other is only its epiphenomenal phosphorescence. Both schools are in search of Reality as the Source of the phenomenally real. Both are, in our view, schools of the metaphysics of Source; neither of them is content to be a school of science. Here we eschew all capital letters, and accept the real as given. We make no attempt to seek Reality as its Source—whether that Reality be Life, or Force, or God.

I shall not attempt to define reality. I take the process and products of experience as a sample of reality. If anything in this universe is real, the

[1] On the tendency to hypostatize Energy see T. Percy Nunn, "Animism and the Doctrine of Energy," in "Proc. Aristotelian Soc." 1911–12.

conscious relationships within a changing context of reality, are real; and in following up the contention of this chapter that the scientific treatment of experience is a branch of natural history, I propose to deal in some further detail with these relationships.

But what are we to understand by the conscious relationship? If it be a relationship, then, it will be said, it involves at least two related terms. Of course in a complex context there may be an indefinite number of terms in subtly varying relations. But the analytic tendency of our thought leads us to try to deal with only two at a time; and so the natural question seems to be what are the two terms. The traditional answer to this question, where the experimental relationship is concerned, is that these two terms are object and subject. In perception, for example, there is the relation between the object perceived and the subject perceiving, and this may be followed by new relationships to the object through the activity of the subject which is expressed in behaviour. The subject is thus commonly regarded as an Agent, as a Source of behaviour. Those who are resolute in excluding all forms of Agency from any place in scientific interpretation, cannot accept this view of Subject as Agent. They just accept the reality of process and products. The natural order, as a going concern, is a vast system of interrelated processes; and the relationships for scientific treatment are the contextual conditions under which this or that change in the moving order of nature occurs. Now few, if any, are likely to deny that the conscious relationship is present in intelligent behaviour; but

some do deny that this specific relationship makes any difference in the behaviour as such. Surely this is little short of preposterous. Surely it is tantamount to a denial that the conscious relationship has any reality in correlation with the context of the so-called objective world as real. In any case I must proceed on the assumption (if such it be) that the evidence at our command unequivocally shows that the experiential relationship does really count. But all that this implies is that given the presence of this relationship the observed facts of process are so and so: in the absence of this relationship the facts are otherwise: the course of process is different. There is no concept of Agency here; merely a description of the relationships under which process runs this course or that course.

What, then, are the terms of a relationship? In general it may be said that any process which is in some degree independent may be in relation to any other process or its products. And what processes are selected as terms (or termini) is entirely a matter of fruitfulness for the immediate purpose in hand, within the sphere of interpretation of multiform correlations. For it is only by a useful but arbitrary act of abstraction that we isolate some part or phase of the total relational process and regard it as a term. We may thus isolate the organism and consider its relationships to the environment; or we may isolate the process of experience and consider its relationship to other life processes within the organism; or we may isolate some phase of the process of experiencing and consider its relationship to foregoing or following phases; or we may isolate some process-factor in

that phase and consider its relationship to other co-existent factors; and so on. The essential point, so far, to bear in mind is that the natural order as a whole is a contextual network of interrelated processes and their products. The natural history of experience is the story of an arbitrarily isolated stream, and, for scientific interpretation it lies wholly within the field of intra-mundane reality. When once we leave this field; when once we inquire what is the relationship between organic or experiential processes and Life as the Agency which calls them into being; when once we inquire what is the relationship between conscious processes and the Subject which guides and directs them; when once we inquire what is the relationship of the natural order to the Source of all things; we are outside those limits of scientific inquiry which I for one accept. Why should we not endeavour to interpret the natural history of experience on the basis of intra-mundane relationships, somehow existent, without entering into such further inquiries, quite legitimate in their proper place, but none the less inquiries which lie beyond the confines of Science?

We have said that it is in some respects convenient to regard the conscious processes of the organism as a relational term; they can then be correlated with the cortical or other physiological processes, and with processes in the environment. But in some respects it is often more convenient to regard the stimulating process and the responding process as the terms, and consciousness as the relationship itself between these two. When a boy, riding his bicycle, tends to fall over towards the left, he turns the handle-bar and wheel to the left, and, without knowing anything

about the mechanical explanation, utilizes the principle of inertia, as we phrase it, to recover his balance. His experience lives in the relationship between the stimulating cue of just a little leaning over to one side, and the appropriate behaviour-response. In solving a problem the intellectual relationship is between the problem and its solution. In all temporal relationships within the conscious process itself the relation is between the antecedent and consequent phases within the process. Just as in the bodily life we live along the threads of organic relationships, so too we live the mental life along the threads of the conscious relationships. From this point of view streams of process pass *through* the organism, and some of these in their passage *are* experience. Consciousness as a relational link points this way and that way to the processes, or phases of the same process, in which it provisionally terminates; or rather to processes or phases of process through which it passes on to lose itself in the vast whole of the natural order.

Of course any such view as this involves the whole-hearted acceptance of relationships as constitutive of the natural order throughout, and not only constitutive categories of the mind as knowing and thus impressing on the mere matter of sensations (*sensa*) the form which makes the world orderly for human experience. The so-called *a priori* forms of relationship are, for us, not only constitutive of experience within the sphere of mind; their peculiar primacy lies in the fact that they are common to the process of experiencing and to the world as experienced. To use the convenient phraseology suggested by Professor

Alexander, they are common to the context as *enjoyed* and the context as *contemplated*. This enjoyment of context, this awareness of meaning, is through-and-through relational, just as the world-context and world-meaning which we interpret is through-and-through relational. Indeed it may perhaps be said without extravagance, and without much, if any, disregard of the traditional use of philosophical terms, that the basal *a priori* category is meaning.

For us then all streams of process and all their relationships, general and particular, are constitutive parts of the one natural order wherein arises every bit of new becoming, every phase of evolutionary development which is interpretable in terms of scientific explanation. But we may in thought make cross-sections through the flow of events, and then we find relatively isolated streams of process, interrelated no doubt with other such streams, but yet possessing some independence; or we may make longitudinal sections, and then we find much less of isolation—much more of continuity. It is this last fact,—a fact which is at the very foundation of evolutionary treatment,—which leads M. Bergson to insist on the importance of duration. In such a longitudinal section, along the flow of process, any stage or state ideally cut out from the pulsing continuity of events, is the embodiment of results of selective synthesis all along the line from an indefinitely remote past right up to the moment of its existence. This is true of all process as continuous. But nowhere are we led to grasp this fact so clearly as in the processes of life and in the processes of consciousness that are the highest developments of life.

Now if we consider one of the higher animals at any given moment of its life-history we find a double set of relationships in accordance with our conception of the transverse and of the longitudinal sections across or along the streams of world-process. The first comprises the immediate relations to the environment, including what, from the psychological point of view, is the presentation of some situation. It is clear that what I here speak of as the transverse section is that which is primarily concerned with the relationships involved in the perception of the external world. The second or longitudinal section comprises all relations of antecedence and sequence; comprises the hereditary relationships; and comprises the phenomena of expectation and memory in their reference to future or past. The distinction it must be remembered is purely analytic. In actual life both are combined in one web. The analysis pretty nearly comes to this that, apart from other relationships, the one gives space-relations,[1] the other time-relations. But we must be careful to avoid the error of restricting time to the process of

[1] Of course time-relationships are also involved when we seek to interpret the transverse section. What is present in the ideal "now" of the moment of perception has to be correlated with events in the perhaps distant context of the environment; and these events actually occurred within that context before the now of perception. If the sight of Sirius is under consideration the natural event of perceiving the star has to be correlated with the natural event of the shining of Sirius eight years ago. The hearing of distant thunder has to be correlated with an electric discharge, say, ten seconds ago, and so on. Time-relationships of natural events can never be really eliminated though we may disregard them in an abstract discussion of the transverse section which gives us the perception of the external world.

experiencing, and restricting space to the realm of the experienced.

Some years ago William James propounded the question :—Does consciousness exist? In reply he denied the existence of Consciousness as an independent Entity, while he fully recognized the existence of conscious relationships within an empirical nexus. I should prefer to say that from the point of view of science we should neither assert nor deny Consciousness as a Source. We should leave the question for metaphysics. But we should assert that the given conscious relationships (however given) are the proper subject-matter for science which should not go beyond them to seek their Source. To the questions: Does Time exist? Does Space exist? Does Causality exist? Our answers would be of like kind. Temporal, spatial, causal relationships exist throughout the natural order, they are common to the processes of which the contemplated world is a visible changing expression, and to our enjoyment of a privileged process therein; that is what gives them their deep-seated *a priori* character. They are ineradicably real as constitutive of a relational context which has meaning. But whether Time, for example, is a Real Entity, the Source of temporal relationships—*that* is a question which lies wholly outside our limited universe of discourse.

Let us now pass on to deal with the relationships of the transverse section [1] in somewhat greater detail, remembering that our treatment is purely analytic,

[1] How far I am indebted in what follows to M. Bergson's doctrine of "pure perception," I must leave the reader to judge. Cp., "Matter and Memory," p. 26 and *passim*.

for in actual experience the transverse and the longitudinal relationships are given together in the brief span of consciousness which we enjoy. And let us, since we are proceeding by the method of abstraction, eliminate representative factors and disregard affective tone. Ideally in such an instantaneous "now" the organism is in physical relation to all that exists in the transverse section of the total flow of process; practically it is in biological relation to that part of the world which we call its environment; but psychologically it is only in relation to that part of the environment which is presented to sense at the moment of experience. Hence an essential feature of the transverse relationship, *qua* experiential, is that it is a selective and limited relationship, the selection and limitation being dependent on the sensory and nervous constitution of the organism.

This selective and limited nature of the relational process of experience has its analogies throughout the natural order. "There is no essential difference," says M. Bergson,[1] "between the process by which the acid picks out from the salt its base, and the act of the plant which invariably extracts from the most diverse soils those elements which serve to nourish it. . . . In short, we can follow from the mineral to the plant, from the plant to the simplest conscious beings, from the animal to man, the progress of the operation by which things seize from out their surroundings that which attracts them."

In the conscious relationships of the instantaneous "now" there are thus specialized limited and selected relations between the process which has the property

[1] "Matter and Memory," pp. 207–8.

of experiencing and some parallel processes in the environment as experienced. Now the data thus afforded involve correlation with external events through sensations of sight, hearing, touch, and so forth; but there are other data which are correlated with intra-organic events—snap-shot data due to general physiological tone (coenæsthesis) to visceral changes in progress, and to motor behaviour (kinæsthesis). These last, the behaviour data, are of paramount importance and give the business context of the data of sight, hearing, and the other special senses, when we restore to process its natural movement and change in time. If then we divide the data of the instantaneous snap-shot into those of extra-organic origin on the one hand and those of intra-organic origin on the other hand, these two sets of data form a synthetic complex of the experienc*ed* at a given isolated instant correlative with the process of experienc*ing* as then and there enjoyed.

Of course this is a very abstract view of experience limited to an ideally instantaneous snap-shot. It is, however, scarcely possible to overemphasize the importance of realizing the fact that even in such a snap-shot view a number of simultaneous relationships, with varying emphasis, are themselves related within a complex. Apart from such relationing of relationships it is impossible to conceive a basis for conscious experience. Any selected group of data, such as those afforded by the sight of an object, are only a salient feature within a context, and this context is not only contemplated in thought, but enjoyed in the moment of experiencing. I cannot here enter into the subtle question, important

as it is for psychology, whether relationing should be regarded as an elementary mental process not susceptible of further analysis. In any case it is of fundamental importance. The doctrine of context lies at the very foundations both of psychological and of physiological interpretation.

But enough of the instantaneous snap-shot dealing only with the transverse section. In life its process is in progress. And directly we introduce into our analytic treatment the concept of progress, we supplement transverse relationships by longitudinal relationships. We thus get a continuous sequence of transverse sections. *And that is what we get in instinctive experience according to my interpretation.* What then is the nature of the longitudinal relationships in their incipient genetic form within instinctive experience? It is that which is expressed in the doctrine of the acquirement of primary meaning. If, in any given instinctive sequence *a*, *b*, *c*, *d*, *e*, *f* (each letter representing a transverse section), we fix our attention on the phase *d* it is partly conditioned by the precedent phase *c*, as that is by *b* and so on, and it partly conditions the sequent phase *e*. Such serial conditioning is dependent on primary retention, which should be distinguished from memory as retrospection and from pre-perception. These are later developments of the longitudinal relationships. In our moorhen's dive the experiential process at any moment is not only conditioned by the data of the transverse section; it is conditioned also by the precedent phases of process. The process of experiencing, as it flows, constantly changes in pulsing continuity. I speak here, be it remembered,

of the instinctive experience as such, in abstraction from any secondary meaning which may also be present.

The essential feature of this secondary meaning is that some later phase of an original instinctive sequence may be partially re-presented before it is again presented—or rather would have been again presented in the unmodified instinctive sequence. The conditions of the phase *d* are therefore different from what they were on the first occasion—different by the addition of factors of revival as they may be termed. And since the whole sequence, all along the line, is thus differently conditioned, the experiential process—correlated with the organic processes of behaviour—is different. There is intelligent modification of behaviour since new relationships have been introduced.

Note here the intimate relation between meaning and context. Broadly speaking, if we may combine in one synthesis biological and psychological interpretation, context *is* meaning. Assuredly in the absence of context there is no meaning. And it is scarcely a straining of the use of terms to say that, in the earlier and lower phases of organic life, any stimulus has meaning within the context of the responses it evokes. The salient feature of *psychological* meaning is that re-presentative factors are present and are influential within the context as a whole. In our higher mental life the context-meaning has been partly automatized and partly generalized into that awareness of conscious attitude which is so difficult to describe and to analyse —a conscious enjoyment correlated with the total

functional activity of a complex constellation of cortical centres.

Let us now consider a little more closely the longitudinal relationships when secondary meaning is being developed. They arise within the brief span of the living or specious present. Beyond this brief span they cannot immediately reach. Their forward direction within this span gives the peculiar quality of pre-perception of what is just coming; and their backward direction gives the peculiar quality of what is just going, fading away at the rearward edge of the span. These two arise together. But pre-perception has the dominant utility in the primitive life of experience. What practically concerns the animal is what is just coming, that which at the outset of development is closely followed by the experience of the appropriate behaviour organically conditioned, and not yet conditioned by the expectant conscious relationship; but that which (when intelligence supervenes), as coming, can be met or avoided. Expectancy has a practical bearing different from the theoretical bearing of retrospective memory.

It is, I think, clear that all direct and primary experience of the order of expectation and memory must be sought within the brief span of process wherein these longitudinal relationships actually live. But it is equally clear that *our* memory and anticipation deal with a past stretching back far beyond the brief span of direct and primary experience, and with a future foreseen ahead of the living present. These deal with the duration of process *as an ideal construction.* Imagination and

conception have played their part in making a map of space and of time. M. Bergson is substantially right in his contention that, in ideal construction, we translate temporal sequence into spatial terms. Just as we imagine and conceive process-filled space—the natural order as spatial—stretching far beyond the limits of the immediate conscious relationship of the transverse section, so do we imagine and conceive process-filled time—the natural order as temporal—stretching behind the present span of consciousness as the accomplished past, and projected forward (so far as a basis of routine permits) as the expected future; and combining these two in one ideal construction, we are able to picture and think the natural order as existent and changing in space and time. Any placing of an event at any exact moment in the flow of process is *a reference to such a context of ideal construction.*

If, then, we live in the brief span of process which is the conscious present, it is within this living present that the process of remember*ing* occurs; only the remember*ed* events are referred to the ideal construction of the past. And they get their peculiar quality, that which differentiates them from the presentations of the snap-shot "now," partly from the fact that they are thus revived, or relived, partly from the sense of greater or less familiarity they import into the context, partly from the fact that they link up with the just-nows of the hinder margin of the span of consciousness—the past being the conceptual prolongation of its rearward fringe.

For M. Bergson "pure memory"[1] is something

[1] See "Matter and Memory," p. 195, and *sub verbo* in index.

very different from anything I have attempted to interpret in the foregoing paragraphs. For him Life and Consciousness have their true home in a different plane (one is forced to use spatial terms!) from that of mundane behaviour. Where these two planes intersect we have his "pure perception," since here the one order comes into relation with the other. But "pure memory" dwells in the vital plane and preserves an extra-mundane existence, save in so far as, at the intersection of the planes, it is presently inserted within the intra-mundane sphere. It is the still-existent duration of one's whole past, with all its dated events (*how* dated is not made clear) ever ready to insert itself into present action. For M. Bergson the past as "pure memory" has not ceased to exist, it has only ceased to be useful. Its mere utility for us here on earth is confined to the points of intersection. The past still exists in the vital plane beyond the view of present experience, just as on the other plane objects in space exist beyond the range of perception. If we find this concept difficult, M. Bergson will tell us that this is due to our inveterate habit of projecting duration on to the plane of space, translating it into a series of quasi-spatial points, and fancying that we have left these points behind us as we travel; forgetting that the genuine Self, "which is indeed outside space," *is* duration, since "time is the stuff that psychical life is made of." Interesting, nay, fascinating in a tantalizing fashion, as is M. Bergson's doctrine of a continuously abiding past, with wedge-like insertions into present mundane affairs, it lies for the most part outside the natural history of experience

which, for us, deals only with intra-mundane process.

There is, however, a possible point of contact between M. Bergson's conception of the manner in which Life, as memory, is influential on behaviour, and our own widely-divergent interpretation. His teaching is that, so long as response follows directly on stimulus, there is no opportunity for the guiding activity of Life to be insinuated; but that when there is some interval between the one and the other —when alternative channels of nervous discharge are established—then Life can insert itself and so far render the response an act of free choice. Now there is a sense in which we too can accept an interval of choice between stimulus and response; there is a sense in which we can accept an intervening influence; but for us it is not an extra-mundane Source of change that intervenes. For us the guiding influence that breaks the chain of that automatic and sub-cortically determined behaviour which I regard as biologically instinctive, is the functional process of the cortex in virtue of the correlated experiential relationships.

We must now revert, however, to that which I regard as the cardinal distinction between what I have called, elliptically, the "eds" and the "ing" of experience. In this connexion we have to be on our guard against the puzzling ambiguity which results from the same word being used in both contexts. The word "sensation" may be used in one passage for what is sens*ed*, in another for the process of sens*ing*. So, too, perception may be the perceiv*ed* or perceiv*ing*; the idea may be a product—what is

idea*ed*, as in Berkeley's writings, or a process, as in much Berkeleyan criticism. The same ambiguity runs up into regions of higher and more complex mental development. Consider what we mean when we speak of scientific or philosophical thought. Do we not sometimes mean the body of doctrine which is the "ed"-product of investigation; sometimes the process by which these results have been reached? The teaching of science is both a presentation of what has been sciened, and a development of sciencing—of scientific observing and thinking. To add to our difficulties and our liability to confusion, we cannot even speak of our own process of experiencing save as that which is, at the time of its occurrence, experienc*ed*, or, to use Professor Alexander's useful term, enjoy*ed*. Endeavouring, as best we may, to avoid these difficulties and to escape from this confusion, we have to note that both within the context of the "eds," and within that of the "ing," there are differentiations, but that whereas the differentiations of the "eds"—the objects of perception, conception, imagination and so forth—are relatively clear-cut and isolated for thought, the differentiations of the "ing" retain much more of their primitive continuity, are much less sharply defined, exhibit in far larger measure what M. Bergson speaks of as interpenetration. The several items of the perceived and the conceived have a relative discontinuity and mutual independence of each other which is in marked contrast with the relative unity and continuity of perceiving and conceiving. Hence among the "eds" we have what M. Bergson speaks of as "the multiplicity of juxtaposition," whereas "just in proportion as we

dig down below the surface and get to the real self [as experiencing] do its states of consciousness cease to stand in juxtaposition and begin to permeate and melt into one another, and each to be tinged with the colouring of all the others."[1] I believe that this distinction between the "eds" and the "ing" of experience lies at the root of much of M. Bergson's philosophy; though he would not accept the interpretation I put upon it. He speaks of two aspects of the self. "Our perceptions, sensations, emotions and ideas," he says,[2] "occur under two aspects: the one clear and precise but impersonal; the other confused, ever-changing and inexpressible because language cannot get hold of it without arresting its mobility or fit it into its commonplace forms without making it into public property." The former are the "eds" of experience; the latter is a phase of the "ing." Again M. Bergson says[3]: "Sensations and tastes seem to me *objects* as soon as I isolate and name them, and in the human soul there are only *processes*." The essential feature of duration is, for M. Bergson, the continuous development of experienc*ing* as it grows, when our ego lets itself live, when phases of consciousness melt into each other, when every successive phase affords an example of creative evolution. "The capital error of associationism," he says,[4] "is that it substitutes for the continuity of becoming, which is the living reality, a discontinuous multiplicity of elements, inert and juxtaposed." "In place of[5] an inner life

[1] "Time and Free Will," pp. 162 and 164.
[2] *Ibid.* p. 129. [3] *Ibid.* p. 131.
[4] "Matter and Memory," p. 171.
[5] "Time and Free Will," p. 237.

whose successive phases, each unique of its kind," melt into each other and interpenetrate, "we get a self which can be artificially re-constructed and simple psychic states which can be added and taken from one another just like the letters of the alphabet."

For M. Bergson the distinction I have drawn between the "ing" and the "eds" of experience is that between the snap-shot data with which we deal intellectually and the intuitive awareness of the continuity of conscious life. For Professor Alexander it is that between contemplation and enjoyment. But are we not, it will be asked, here putting more strain upon the distinction than it will bear. For surely, it will be said, intuition itself affords data which can be dealt with by the intellect; enjoyment itself can be contemplated. May we not make the "ing" of one moment the "ed" of a subsequent moment? May we not, for example, make the process of thinking the object of subsequent thought? In a sense no doubt we can. But only by *translating* it into terms which may be conceived; just as, according to M. Bergson, we can only deal with time intellectually when we translate the continuous duration of process into a series of spatial or quasi-spatial time-points.

What I mean by translation can perhaps best be illustrated in reference to aesthetic appreciation. Although it is no doubt impossible to have this mode of enjoyment in the absence of any contemplation of beautiful objects in nature or in art, still at the moment of enjoyment the emphasis is on appreciating rather than on what is appreciated. And the question is whether at the moment or afterwards we can make

the essential features of this appreciative enjoyment the object of intellectual contemplation. It is not easy to make one's meaning clear. When we are reading with full interest and attention, we are not interested in our interest, we are not attending to our attention. The "eds" of interest and attention are all in the subject-matter. Yes! But afterwards, in reflection and retrospection, can we not then make the process of attending the object of our subsequent attention? Can we not even, on re-reading in psychological mood, squint round at our mental process to see how our enjoyment is getting on and what it is like. Surely it will be said we can think about our appreciative enjoyment, can discourse on it, and write aesthetic treatises which deal with it. But are the concepts we employ other than suggestive, other than symbolic of that which can only be reached through direct awareness in enjoyment? It may be urged that all concepts, as *cognita*, are symbolic in universalized form of the concrete particulars which are directly experienced. Yes! But here both particulars and universals belong to the realm of the experienced. Both are what Dr. Alexander terms non-mental, in the sense that they are set before the mind for contemplation. The distinguishing feature of appreciative enjoyment is that it is not, in this sense, before the mind; it is, so to speak, at the back of the mind. It is not what is appreciated; it is a qualification of conscious process as appreciating. Can, then, the enjoyment of architecture, of sculpture, of painting, of music, of literature, with their subtle values in, rather than for, consciousness, be made the objects of contemplation? To this question, I take it, Dr. Alexander's

reply[1] would be that in no way can we make enjoyment an object of contemplative thought. I am not prepared to go quite so far. None the less I feel that in translating the aesthetic enjoyment as such into the cognitional terms in which it must be presented to the intellect, we do in large measure transform it. And it is only with this transformed material that science is able to deal.

[1] Cf., S. Alexander "Self as Subject and as Person," "Proc. Aristotelian Soc," vol. xi., p. 18 (1911). Berkeley recognized that the enjoyment of the "ing" is different from the contemplation of the "ed" and suggested the term *notion* for phases of the "ing" since the term *ideas*, in his usage, was applicable only to the "eds" of experience. Cf., "Principles of Human Knowledge," § 27, "Siris," § 308.

CHAPTER VII

THE PHILOSOPHY OF INSTINCT

WE tend to think, or, at any rate, to express our thought, in terms of antithetical contrast. A century ago Sydney Smith said[1]:—"The most common notion, now prevalent, with respect to animals is, that they are guided by *instinct;* that the discriminating circumstance between the minds of animals and of men is, that the former do what they do from instinct, the latter from reason." And he emphasizes the contrast when he says:—"When I call that principle upon which the bees or any other animals proceed to their labours, the principle of *instinct,* I only mean that it is not a principle of reason. However the knowledge is gained, it is not gained as *our* knowledge is gained. It is not gained by experience or imitation. . . . It cannot be invention, or the adaptation of means to ends; because as the animal works before he knows what event is going to happen, he cannot know what the end is, to which he is accommodating the means: and if he be actuated by any other than these, the generation of ideas in animals is . . . very different

[1] Sydney Smith, "Sketches of Moral Philosophy" (Lectures delivered at the Royal Institution in the years 1804, 1805 and 1806), p. 240.

from the generation of ideas in men" (p 247). "Ants and beavers," he tells us, "lay up magazines. Where do they get their knowledge that it will not be so easy to collect food in rainy weather as it is in the summer? Men and women know these things, because their grandpapas and grandmammas have told them so: ants, hatched from the egg artificially, or birds hatched in this manner, have all this knowledge by intuition, without the smallest communication with any of their relations" (p. 244).

We have here the contrast between two different kinds of knowledge—two kinds which may indeed coexist in the same living creatures but which are essentially antithetical, or, at least, complementary in their nature—the knowledge that is innate and intuitive and the knowledge that is begotten of experience. And these two different kinds of knowledge are the expression of, or are due to, two diverse principles or faculties; the faculty of instinct and the faculty of reason.

In our own day M. Bergson, in the philosophical doctrine of instinct to a consideration of which most of this chapter is devoted, also regards instinct and intelligence as opposite and complementary kinds of knowledge. Although they arise as differentiations of a vital activity common to both, they are diverse expressions of divergent processes of evolution. More or less commingled in any given organism, it is the proportion that one bears to the other that differs. "There is no intelligence in which some traces of instinct are not to be discovered, more especially no instinct which is not surrounded by a fringe of intelligence. It is this fringe of intelligence that

has been the cause of so many misunderstandings. From the fact that instinct is more or less intelligent, it has been concluded that instinct and intelligence are things of the same kind, and that there is only a difference of complexity or perfection between them, and, above all, that one of the two is expressible in terms of the other. In reality they accompany each other only because they are complementary, only because they are different, what is instinctive in instinct being opposite to what is intelligent in intelligence."[1] Instinct and intelligence thus involve two radically different kinds of knowledge. But "while both involve knowledge, this knowledge is rather *acted* and unconscious in the case of instinct, *thought* and conscious in the case of intelligence" (p. 153).

The relation of instinct to consciousness in M. Bergson's philosophy is a little difficult clearly to grasp. Here he speaks of knowledge as "*acted* and unconscious" in instinct. But elsewhere he says that consciousness is "the characteristic note of the . . . actually lived, in short of the *active*" ("Mat. and Mem." p. 181). This indeed is a dominant note in M. Bergson's philosophy. Our consciousness—the consciousness we enjoy—is always a consciousness of the insinuation of spirit in the present moment of action. Furthermore he tells us that "instinct and intelligence stand out from the same background which for want of a better name, we may call consciousness in general, and which must be co-extensive with universal life" ("C. E." p. 196).

[1] "Creative Evolution" (translation of "L'Évolution Créatrice," by Arthur Mitchell) (1911), p. 143.

Again and again he seems to identify life and consciousness. But on these terms, if instinctive behaviour is essentially a vital act one would suppose that it is also essentially a conscious act. M. Bergson, however, draws a distinction between two kinds of unconsciousness, that in which consciousness is absent (*nulle*) and that in which it is nullified (*annulée*). Both are equal to zero, but in the one case the zero expresses the fact that there is nothing, in the other that we have two equal quantities of opposite sign which compensate and neutralize each other. The unconsciousness of a falling stone is of the former kind; that of instinct (in extreme cases) is of the latter kind (p. 151). Even here I find difficulties; for even in the fall of a stone as a physical process I had gathered that, for M. Bergson, there is consciousness annulled. "No doubt," he says, "the material universe itself . . . is a kind of consciousness, a consciousness in which everything compensates and neutralizes everything else, a consciousness of which all the potential parts balancing each other by a reaction which is always equal to the action, reciprocally hinder each other from standing out" ("Mat. and Mem." p. 313).

But we are here concerned only with the annulling of consciousness in instinct. We must contrast it with intelligence. In intelligent action there is first a representation of the act to be performed, and then follows the performance of the act. Such representation is a measure of our possible action upon bodies, it is an outline in matter of our eventual action upon it. Now hesitation or choice is a sign of the inadequacy of the act at once to fulfil and

thus to neutralize the representation; and this inadequacy of the one to neutralize the other is emergent consciousness—a consciousness "which may be defined as an arithmetical difference between potential and real activity. It measures the interval between representation and action." But if this interval be annulled, if representation and performance coalesce, consciousness is neutralized. "The representation of the act is held in check by the performance of the act itself, which resembles the idea so perfectly, and fits it so exactly, that consciousness is unable to find room between them. Representation is stopped up by action." Consciousness however does not even then cease to exist; for if the accomplishment of the act be arrested or thwarted by an obstacle, consciousness may emerge. The interval between representation and action is reconstituted. Hence in instinctive behaviour "where consciousness appears, it does not so much light up the instinct itself as the thwartings to which instinct is subject; it is the deficit of instinct, the distance between the act and the idea, that becomes consciousness" (p. 152).

When we remember that it is only in extreme cases that representation is thus stopped up by action, we may perhaps fairly assume that these extreme cases illustrate instinctive behaviour carried to its ideal limits; in other words that they are those cases which, according to my interpretation, are strictly speaking instinctive—those in which pre-perception does not intervene between the constellation of stimuli and the resulting response. On the other hand in those cases in which some intelligent pre-perception,

in my sense of the word intelligent, does play a part in determining behaviour, we have the "deficit of instinct" which has a conscious accompaniment. I take it that for M. Bergson, that which is insinuated between stimulation and response, that which breaks the coalescent sequence of pure automatism, is "pure memory," the characteristic of which is to become conscious in action. If this be so, his insertion of "pure memory" in the guidance of behaviour is analogous to the presence of factors of revival in my interpretation; and we both should regard such behaviour as showing something more or something less than instinctive purity—as exhibiting therefore a deficit of instinct as such.

In so far as "pure memory" is insinuated as choice within the interstices of an otherwise automatic and strictly instinctive sequence the activity is really vital. For we must bear in mind that when M. Bergson bids us identify life and consciousness, it is life as "free" and "creative"—not merely mechanized and automatized routine—to which reference is made. It is true that automatism is the result of life, but it is the result of life's surrender of its essential activity, a lapse into mechanical routine. If, however, as mere biologists, we understand by life the sum-total of the physiological processes of which the organism is the privileged centre, an indefinitely large proportion of consciousness is "annulled" and hence, for mere business purposes of interpretation, may be safely regarded as non-existent. If so, the conception may perhaps be brought into some sort of relation with the view held by some earlier exponents of physiological psychology, according to which consciousness

is correlated with a measure of obstruction or tension in the cerebral cortex—with some resistance to be overcome, of which delay in response is an indication; whereas consciousness is absent when the molecular disturbances in the cortex, initiated by sensory stimulation, are rapidly and smoothly drafted off along channels pre-established through heredity or through constant habit, leading to automatic response. "In the latter case," said Romanes,[1] "the routes of nervous discharge have been well-worn through use; in the former case these routes have to be determined by a complex play of forces amid the cells and fibres of the cerebral hemispheres. And this complex play of forces which finds its physiological expression in a lengthening of the time of latency, finds its psychological expression in the rise of consciousness." I do not wish to suggest that M. Bergson's conception of the relation of consciousness to the phenomena of brain-physiology is at all like that of Romanes. Indeed they are poles asunder. But there seems to be this in common; that when automatism is complete, consciousness is absent; or, as M. Bergson would say, is annulled.

It will be remembered that M. Bergson distinguishes and contrasts two orders, that of the vital and the willed, in opposition to that of the inert and the automatic. The brain in all its parts belongs entirely to the latter order, it is only a cunningly arranged set of neurones, an elaborate and complex switch-board, which Life has made for its use, which Life has in large measure allowed to descend to materialized automatism, but within which Life has contrived, with

[1] G. J. Romanes, "Mental Evolution in Animals" (1885), p. 74.

some success in the higher vertebrates and with much greater success in man, to leave room for the insertion of its free and creative activity. The measure of success in man is such that his brain has become a perfect 'reservoir of indeterminism"—that is to say a system full of opportunities for the insinuation of choice between alternatives. It is essential to the proper understanding of M. Bergson's philosophical doctrine that we should remember that the function of the brain is to provide a vast number of alternative routes by which afferent impulses due to stimulation may be conducted to the effector organs which subserve behaviour. It is in itself wholly and solely a mechanism of conduction. It is in no sense a store-house of memories; for memories are preserved in the realm of spirit which is extra-spatial. From this realm they play down upon the switch-board of the nervous system. In so far, therefore, as choice is insinuated and an action is free and creative, this is in no sense a function of the brain; its Source is in the unconscious sphere of "pure memory"—which is the sphere of spirit,—only at the point of its insertion into present action does it glow with the light of consciousness.

We have, therefore, two, if not three kinds of unconsciousness: (1) that of the falling stone; (2) that of automatism (consciousness annulled); and (3) that of pure memory when it is not being insinuated in the present moment of action. I separate (2) and (3) in accordance with the statement in "Creative Evolution," though it seems to conflict with that of "Matter and Memory" (*supra*, p. 207). A word or two must be added with regard to (3). Pure memory

is the continuous existence of mind or spirit, and this is the vital impetus—the Source of all process. As pure memory it abides in the still existent past, outside the plane of space within which the material body and brain are rendered perceptible to the senses and the intellect. But this mind, this spirit, this pure memory, exists, not as what we are aware of as consciousness, but as a mode of the unconscious. Unless I misunderstand the teaching of "Matter and Memory," M. Bergson is convinced that a refusal to recognize the fact that the greater part of one's pure memory is an unconscious form of real existence, is tantamount to a refusal to recognize the existence of Life and Spirit as Reality—as active and forceful duration. And that which, according to M. Bergson, leads us to deny the existence of unconscious mind is our persistent neglect of the fact that the consciousness of which we have intuitive knowledge, is always in alliance with some present phase of practical activity. To guide this activity is the business of consciousness in and for the organism; only at its points of insertion in our mundane life of space-occupancy, does mind and memory glow with what, for us, in whom this insertion takes place, is conscious awareness. In a sense we may say that what we feel as consciousness is the friction of unconscious spirit as it traverses unconscious brain matter. But the Spirit which exists in time, which *is* duration, and which is only occasionally inserted in the mundane affairs of inert space, though it is itself unconscious, and contains only the potentiality of that consciousness which is actualized in the present moment of choice, is never inactive; nay, rather it is

pure activity, the Source of all change. It is the Source of instinctive behaviour.

Now, in instinctive behaviour, the current of life passes through the organism; and, as it passes, it glows with instinctive knowledge, though much of the consciousness may be annulled through the stopping up of the chinks of choice. I am not quite clear as to M. Bergson's position with regard to the relation of pure memory to hereditary sequence. But I take it that the current of life which streams through any organism, let us say a newly emergent bee or a newly hatched chick, contains unconsciously, in the sphere of pure memory, a complete unbroken and continuous record of the whole history of its particular line of racial descent to the most remote past, all of which is for M. Bergson still existent in the sphere of duration. But of this immense fund of pure memory, only that small fraction which is *useful* to that bee or chick in its present activities has the conscious instinctive glow. Still, it is this accumulated knowledge of the past, just in so far as it is inserted in present behaviour, that is the psychical basis of instinct as a form, not merely of mechanized automatism, but of life and duration and knowledge. Thus, I think, would M. Bergson explain the hereditary nature of instinctive behaviour. Thus does he elaborate a philosophy of instinct. If we divorce his theory of instinct from his doctrine of pure memory, with its storage in continuous existence of the whole of past life-history, we must fail to grasp its significance within his system of thought. The naturalist and the man of science may find in it little to their taste. But it is not meant for them.

They seek merely to describe and state in general terms the correlated stages of an intra-mundane sequence of observable or inferable phenomena. The whole of this elaborate theory of pure memory —interesting as it is as a metaphysical speculation, touched with poetry—may be ignored by the naturalist. It does not afford any clue to scientific interpretation.

Here, however, we seek to understand M. Bergson, and must therefore take him on his own terms. In instinct, a small but very useful portion of an indefinite fund of the potential knowledge of pure memory is rendered actual—just that which is wanted for the business purposes of life. But this is true also of all life-processes, "so that we cannot say . . . where organization ends and where instinct begins." "When we see," says M. Bergson, "in a living body thousands of cells working together for a common end, dividing the task between them, living each for itself at the same time as for others, preserving itself, feeding itself, reproducing itself, responding to the menace of danger by appropriate defensive reactions, how can we help thinking of so many instincts? And yet they are the natural functions of the cell, the constitutive elements of its vitality. . . . In both cases, in the instinct of the animal and in the vital properties of the cells, the same knowledge and the same ignorance is shown. All goes on as if the cell knew, of the other cells, what concerns itself; as if the animal knew, of other animals, what it can utilize —all else remains in shade" (pp. 174–176). Even in the automatism of the vital processes, such as those of nutrition, or the development of the embryo, pure

memory embracing the whole history of the past is operative. Just that part of the accumulated fund which subserves vital utility is insinuated. This selective part is knowledge, all the rest is an unutilized balance of ignorance. There is choice just in so far as there is this selective discernment of what is here and now useful. For though the material structures—the cells, tissues, and organs that we see—have been materialized and mechanized, process and change are the sole prerogative of life. It is the Life of the universe that gives it movement and flow; otherwise it would be a mere row of static or immobile snap-shots of the inert. But in the organized flow of vital processes, the consciousness is annulled; and in the instinct that is reduced to the level of automatic flow of organized routine (the "extreme cases") the knowledge is of the unconscious order. One would like to be told in language altogether free from ambiguity what the nature of this knowledge with consciousness annulled actually is. The concept is difficult to grasp. But we may now turn to other aspects of M. Bergson's treatment of instinct. For as we follow his discussion in its further implications, the development of the subject proceeds as if instinct were a kind of knowledge not less radiantly conscious than intelligence.

Let us accept this position without seeking to harmonize the doctrine of the annulling of consciousness in extreme, and one would therefore have thought typical, cases of instinct, with that of the specific nature of the instinctive consciousness as such. Instinct, then, is a kind of conscious knowledge co-ordinate with that of intelligence; but it is a

radically different kind of knowledge (p. 150). It reaches its highest development in the arthropods, and especially in the insects, as intelligence reaches its highest development in the vertebrates, especially in man. "We may surmise," says M. Bergson, in a passage which I must quote in full, "that they began by being implied in each other, that the original psychic activity included both at once, and that, if we went far enough back into the past, we should find instincts more nearly approaching intelligence than those of our insects, intelligence nearer to instinct than that of our vertebrates, intelligence and instinct being, in this elementary condition, prisoners of a matter which they are not yet able to control. If the force immanent in life were an unlimited force, it might perhaps have developed instinct and intelligence together, and to any extent, in the same organisms. But everything seems to indicate that this force is limited, and that it soon exhausts itself in its very manifestation. It is hard for it to go far in several directions at once: it must choose. Now, it has the choice between two modes of acting on the material world: it can effect this action *directly* by creating an *organized* instrument to work with; or else it can effect it *indirectly* through an organism which, instead of possessing the required instrument naturally, will itself construct it by fashioning inorganic matter. Hence, intelligence and instinct, which diverge more and more as they develop, but which never entirely separate from each other. On the one hand, the most perfect instinct of the insect is accompanied by gleams of intelligence, if only in the choice of place, time, and materials of construction.

. . . But, on the other hand, intelligence has even more need of instinct than instinct has of intelligence; for the power to give shape to crude matter involves already a superior degree of organization, a degree to which the animal could not have risen, save on the wings of instinct. So, while nature has frankly evolved in the direction of instinct in the arthropods, we observe in almost all the vertebrates the striving after rather than the expansion of intelligence. It is instinct which still forms the basis of their psychical activity; but intelligence is there, and would fain supersede it. Intelligence does not succeed in inventing instruments; but at least it tries to, by performing as many variations as possible on the instinct which it would like to dispense with. It gains complete self-possession only in man, and this triumph is attested by the very insufficiency of the natural means at man's disposal for defence against his enemies, against cold and hunger. This insufficiency, when we strive to fathom its significance, acquires the value of a prehistoric document; it is the final leave-taking between intelligence and instinct" (pp. 149, 150).

I have quoted this passage at length because it well illustrates M. Bergson's picturesque and imaginative treatment of one phase of creative evolution. He pictures the vital impetus standing at the parting of the ways, and choosing instinctive development for the arthropods, intelligent for the vertebrates and man. Of course it must be taken as a poetic rendering of the drama of life rather than as an attempt at scientific interpretation. M. Bergson enters sympathetically into the evolutionary process;

he feels the onward push of the vital impetus; he is borne now along the stream of instinct, and now down the current of intelligence; he seeks to know them from within as life alone can be known. And we too, if we would, in some degree, profit by his insight, must enter sympathetically into the current of his thought; must endeavour to place ourselves at his point of view; must try to catch the breath of his intuition. I, too, stand at the parting of the ways. And I choose that of instinctive sympathy so far as in me lies.

I do not propose, therefore, to discuss from the scientific point of view, the biological aspect of the doctrine of two divergent paths, one of which has led to the instincts of arthropods and the other to the intelligence of vertebrates. The observable differences of behaviour in bees and in birds, for example, are correlated with differences of general structure and internal anatomy, with differences of sensory endowment and build of the nervous system, with differences of mode of development, with differences of ancestral history, with differences of environment, with different kinds of relationship to their companions and to other organisms, and so forth. All of these would need careful consideration—preliminary analysis and subsequent synthesis—if the divergence of the evolutionary products at the end of such divergent routes were to be interpreted in the spirit of science. We should have to estimate with care the value of the evidence for so marked a concentration of instinct in the arthropods as a group, and so marked a concentration of intelligence in the vertebrates as M. Bergson takes as a

basis for his position Mr. Wildon Carr[1] has laid even more stress on it, and in a more uncompromising manner, than M. Bergson himself. Mr. McDougall[2] has criticized it, claiming for the solitary wasps "a degree of intelligence which (with the doubtful exception of the higher mammals) approaches most nearly to the human." These questions, however, interesting as they undoubtedly are, may be left on one side. It suffices for M. Bergson's doctrine that the instinctive kind of knowledge largely predominates in the behaviour of certain organisms, and that the intelligent kind of knowledge largely predominates in the behaviour of certain other organisms; what is essential is that the two kinds of knowledge, though they may both be present in differing proportions are radically diverse in kind, "what is instinctive in instinct being opposite to what is intelligent in intelligence."

Where shall we seek the exact nature of this deep-seated distinction? We are here faced by a difficulty which is seemingly at first sight insurmountable. For, owing to the radical nature of the incompatibility, "that which is instinctive in instinct cannot be expressed in the terms of intelligence, nor, consequently, can it be analysed" (p. 177). If, then, we seek intelligently and intelligibly to express the distinction between two modes of knowing, to the nature of one of which no expression in terms of intelligence can be given, we appear to be seeking that which the very conditions of the quest preclude us from finding. But life is in the same predicament

[1] "British Journal of Psychology," vol. iii., p. 232.
[2] *Ibid.* p. 255.

as instinct; for "the intellect is characterized by an inherent inability to comprehend life" (p. 174). These are hard sayings; and yet like other hard sayings they contain a central core of truth. It is of this central core that we are in search.

May we say that through instinct an organism knows without having to learn, whereas the knowledge of intelligence comes through a process of learning? No! this does not express the fundamental difference, though it leads up to the consideration of a distinction. Instinct does indeed know many things without having learned them; knows, for example, how to use those parts of the body which are its organized instruments (p. 146). But M. Bergson tells us that if we look at intelligence from the same point of view, we find that it also knows certain things without having learned them (p. 155). For him the distinction here lies rather in the difference in the mode of knowing and in what is known. In both instinct and intelligence there is innate knowledge. But whatever in instinct and intelligence is innate knowledge, bears in the first case on *things*, and in the second on *relations*. Here, so far as intelligence is concerned, M. Bergson reverts to the constitutive categories. In whatever way we make an analysis of thought, he says (p. 156), we always end with one or several general categories of which the mind possesses innate knowledge since it makes natural use of them. Hence, in the language of philosophy, "intelligence, in so far as it is innate, is the knowledge of a *form*; instinct implies a knowledge of a *matter*" (p. 157),[1] and he claims that this

[1] By "matter" we should not understand M. Bergson to mean the

entirely formal knowledge of intelligence has an immense advantage over the material knowledge of instinct. A form, just because it is empty, may be filled with any number of things in turn (p. 159). I believe, however, that this time-honoured distinction between things and their relations, between the matter and the form of that which is experienced, leads us away from and not towards the central core of truth in M. Bergson's doctrine. It is, indeed, true that only intelligence, and only highly developed intelligence, can distinguish analytically between things and their relationships, between matter and form. Relationship and form are concepts of intellectual thought. By that thought they are rendered explicit. But if "the behaviour of the insect involves, or rather evolves, the idea of definite things existing or being produced in definite points of space and time, which the insect knows without having learned them" (p. 154), surely the relationships thus "involved or evolved" are there and are constitutive of that instinctive knowledge. The distinction between instinct and intelligence in this respect is therefore that for the former the relationship and form are implicit, while for the latter they are rendered explicit. This may be true enough; but I conceive that the radical difference lies deeper than this.

How, then, does M. Bergson himself sum up the net result of his preliminary considerations with regard to the radical distinction? "The difference," he says

material order, for that is known by intelligence and the intellect. Should we understand him to mean the substance of life—the reality of process? Cf. "as two activities," *infra*, p. 224.

(p. 159), "that we shall now proceed to denote between instinct and intelligence is what the whole of this analysis was meant to bring out. We may formulate it thus:—There are things that intelligence alone is able to seek, but which, by itself, it will never find. These things instinct alone could find; but it will never seek them." I can myself accept this formula which accords well with my conception of instinct. For instinct never seeks though, within its range of behaviour, it is remarkably successful in finding. It is true that we should say, in the language of popular speech, that an animal instinctively seeks its food, seeks a mate, and so forth. But, in strictness, to seek surely involves an anticipation of that which, through seeking, may be found; and within the instinctive consciousness I can only provisionally admit the presence of a form of pre-perception so dim and vague that such anticipation of what is to be sought and may be found is, in my interpretation, practically negligible as a guide to behaviour. Instinct, however, does none the less effectively provide, in a biological fashion, those preliminary findings, which afford the opportunities for subsequent revival, and which thus render possible intelligent seeking. The things which instinct finds, though it seeks them not, are those things which subserve the preservation of the individual, and, through the individual, of the race; and these things, when they are subsequently sought, are sought just because their like have previously been found through instinctive behaviour. I do not of course claim that this represents M. Bergson's meaning. His distinction, I believe, here, as elsewhere, is that between the intuitive "knowledge" that life alone can

give; and the system of cinematographical snap-shots which intelligence takes of the external world in space, and from which all our intellectual knowledge is elaborated.

We are getting nearer to the central core of M. Bergson's doctrine. For instinct is moulded on the very form of life; and the order of its knowledge belongs to the order of the vital, whereas the knowledge of intelligence and the intellect always deals with the materialized, the spacialized, translating everything into the order of the inert. Hence the intellect is characterized by a natural inability to comprehend life. It can only deal with the materialized products of life. But we normally think in an atmosphere of intelligence; and it is this that prevents us from grasping the inner meaning and essential character either of life or of instinct. Even M. Bergson himself has again and again, to use modes of expression which, till one has in some degree mastered his whole thesis, are apt to lead to grave misunderstanding. Let me exemplify. The solitary wasp, Ammophila, stings its caterpillar prey in the nerve-centres along the ventral line of the body. Dr. and Mrs. Peckham have, indeed, shown that the instinctive accuracy, with resulting paralysis and not death, has been exaggerated. But this does not much matter. Relying on M. Fabre's observations, M. Bergson says:—"When a paralysing wasp stings its victim in just those parts where the nervous centres lie, so as to render it motionless without killing it, it acts like a learned entomologist and a skilful surgeon rolled into one" (p. 153). On first reading this passage one supposes that, though the knowledge is not gained by

the wasp as it is gained by the entomologist and the surgeon, yet it is like their knowledge. One is perhaps influenced by what one has been taught by many writers on instinct with regard to inherited experience, the implication being that the experience has been won by the race, as we gain experience, and has been transmitted in perfected form. That, however, is not M. Bergson's view. The knowledge is different in kind and comes in a wholly different way. Hear what M. Bergson says, some thirty pages later (p. 183). "The whole difficulty comes from our desire to express the knowledge of the Hymenoptera in terms of intelligence. It is this that compels us to compare the Ammophila with the entomologist, who knows the caterpillar as he knows everything else—from the outside without having on his part a special or vital interest. The Ammophila, we imagine, must learn one by one, like the entomologist, the positions of the nerve-centres of the caterpillar—must acquire at least the practical knowledge of these positions by trying the effects of his sting. But there is no need for such a view if we suppose a sympathy (in the etymological sense of the word) between the Ammophila and his victim, which teaches it from within, so to say, the vulnerability of the caterpillar. This feeling of vulnerability might owe nothing to outward perception, but result from the mere presence of the Ammophila and the caterpillar considered no longer as two organisms but as two activities. It would express, in a concrete form, the *relation* of one to the other." Do we find this suggestion of a specialized and selective sympathetic *rapport* between life and life more akin to poetry than to science? I

am inclined to think that M. Bergson would agree; he would assuredly agree if we substitute philosophy for poetry. "Certainly," he says, "a scientific theory cannot appeal to considerations of this kind. It must not put action before organization, sympathy before perception and [intellectual] knowledge. But once more, either philosophy has nothing to see here, or its rôle begins where that of science ends" (p. 183).

The burden of M. Bergson's message is that a philosophy of life is not, and cannot be the outcome of a science which deals with the organism, a science built up of concepts based on intellectual snap-shots in the world of space. By the cinematographical method we are bound to get a mechanical result; and that is what the intellect, as such, always provides. It is incapable (as defined by M. Bergson) of providing anything else. He admits, nay, contends, that "organization can only be studied scientifically if the organized body has first been likened to a machine. . . . This is the standpoint of science. Quite different in our opinion is that of philosophy" (p. 98).

We must take M. Bergson on his own terms. In his philosophy life is extra-mundane—the Source of all process. It is beyond the reach of science; the intellect can nowise grasp it. But by intuition, which is instinct raised to its highest power, it is aware of itself; and by sympathy it is directly aware of other process, most directly of other process in living organisms. A difficult concept this—if indeed that can be called a concept which belongs to the antithetical kind of knowledge within which clean-cut concepts have no place. M. Bergson does his best to help us to live ourselves into his mode of thinking. He therefore appeals

to experience as experienc*ing*. "Though instinct," he says, "is not within the domain of intelligence, it is not situated beyond the limits of mind. In the phenomena of feeling, in unreflecting sympathy and antipathy, we experience in ourselves—though under a much vaguer form and one too much permeated with intelligence,—something of what must happen in the consciousness of an insect acting by instinct. . . . Intelligence is, before anything else, the faculty of relating one point of space with another, one material object to another; it applies to all things, but remains outside them; and of a deep cause it perceives only the effects spread out side by side. Whatever be the force that is at work in the genesis of the nervous system of the caterpillar, to our eyes and our intelligence it is only a juxtaposition of nerves and nerve-centres. It is true that we thus get at the whole outer effect of it. The Ammophila no doubt discerns but a very little of that force, just what concerns itself; but at least it discerns it from within, quite otherwise than by a process of [intellectual] knowledge —by an intuition (*lived* rather than represented), which is probably like what we call divining sympathy" (pp. 184–5).

Here we are at the very heart of M. Bergson's doctrine of instinct. "Instinct is sympathy. If this sympathy could extend its object and also reflect upon itself, it would give us the key to vital operations —just as intelligence, developed and disciplined, guides us into matter. For—we cannot too often repeat it—intelligence and instinct are turned in opposite directions, the former towards inert matter, the latter towards life. . . . It is towards the very

inwardness of life that *intuition* leads us—by intuition I mean," says M. Bergson, "instinct that has become disinterested, self-conscious, capable of reflecting upon its object and of enlarging it indefinitely" (p. 186).

I cannot follow up in detail M. Bergson's treatment of the higher modes of intuition. Something must, however, be said on the subject since it throws further light on his doctrine of instinct with which we are here concerned. Remembering (1) that instinct is moulded on life, (2) that life is fundamentally impulsion, (3) that this impulsion is of the psychological order, (4) that instinct is sympathy, and (5) that intuition is instinct become self-conscious, as a form of enjoyment leading us to the very inwardness of life;—remembering these points, we find that in the operations of the human mind the essential feature of intuition is that it is vital impulsion, diverse from, and yet always co-operating with, the intellect. We find that pure intuition, external or internal, is that of an undivided continuity.[1] It is intelligence that breaks up this continuity into elements laid side by side. It is forced to do so by the needs of practical life and, later, by the needs of scientific thought. But "by unmaking that which these needs have made, we may restore to intuition its original purity and so recover contact with the real."[2] As Mr. Wildon Carr, interpreting M. Bergson, says[3]:—"Beside the intellect and implied in our knowledge of its limitations, is a power of intuition, that is of apprehending reality not limited by the intellectual categories, and

[1] "Matter and Memory," p. 239.
[2] *Ibid.* p. 241.
[3] "British Journal of Psychology," vol. iii., p. 236.

this reality is the living activity itself apprehended as a real duration." We get at this activity intuitively in the midst of the process of experienc*ing*, and we feel that it lies behind the items experienc*ed* and susceptible of intellectual treatment. "Any one," says M. Bergson in a passage which Mr. Lindsay quotes[1]:—"Any one who has been engaged in literary production, knows perfectly well that after long study has been given to the subject, when all documents have been collected and all sketches made, one thing more is necessary—an effort, often painful, to set oneself in the heart of the subject and get from it an impulse as profound as possible, when there is nothing more to be done than to follow it. This impulse, once received, sets the spirit on a path where it finds again all the information it had collected and a thousand other details. The impulse develops itself, analyses itself in expressions, whose enumeration might be infinite; the further you go on, the more is revealed; never can you say everything that is to be said; and yet if you turn back to apprehend the impulse that is behind you, it is hidden from you." Hidden, that is, I take it, from the intellect which deals with the multiplicity of things given to experience—the experienc*eds*—but revealed in the process of experienc*ing* of enjoying—revealed through intuition. For intuition is, it seems, both the consciousness of the vital impetus involved in the higher mental activity, and the realization of this impetus as the source of all invention. When once the profound impetus has been given, the application may be left to

[1] "The Philosophy of Bergson," pp. 237–8. Quoted from "The Introduction to Metaphysic" (1903).

the intellect working in cinematographical fashion with its symbols and its concepts. To intuition we owe "all that is greatest in the exact sciences as well as all that deserves to live in metaphysic." But "if intuition originated the invention it was the symbol alone that made the application possible";[1] and the symbol is the tool that intelligence fashions for its use.

It is, I conceive, through internal intuition that we have our knowledge of experienc*ing*—of think*ing*—of that aspect of experience which, as I urged at the close of the last chapter, can never become the object of intelligent knowledge—can never (save through some symbolic expression) take its place among the "eds" of experience. It is, I conceive, through the external intuition which M. Bergson calls sympathy, and never by any intellectual process, save through some symbolism verbal or other (the word external being itself, for M. Bergson, an intellectual concept since all intuition is interpenetrating)—it is, I say, through sympathy alone that we can have intuitive knowledge of the mental processes of our fellow men or of animals. Such intuitive sympathy is the special characteristic of the artist; it is the parent of the animism of primitive times and primitive races. But from what less self-conscious form are this intuition and this sympathy evolved? From the instinct which, in far-away times past, was interpenetrating with, and scarcely differentiated from, intelligence. The instinctive knowledge of the animal is of the same order as our own intuitive knowledge but always

[1] Quoted from "Introduction to Metaphysic," by Lindsay, op. cit., p. 225.

in the evolutionary process, specialized and selectively concentrated on those objects, or rather those processes, which are provocative of instinctive behaviour. Such I believe to be the kernel of M. Bergson's doctrine of instinct.

It is no doubt possible, nay probable, that I have selectively absorbed those parts of his doctrine which appeal to my own modes of thought. But I elected the stream of sympathy rather than that of criticism and naturally emphasize that part of his treatment with which I can sympathize. I trust, however, that I have not unintentionally mis-represented M. Bergson's central idea. It now remains for me to show how far my own interpretation differs from or accords with that which I find in M. Bergson's pages.

In the first place I must set aside all the pure memory business, all reference to extra-mundane life. With these I have no concern. Of course this ruling out of the character of Hamlet from M. Bergson's philosophical drama leaves the play a maimed and mutilated travesty which the author would not acknowledge as representative of his work. I seek, however, the intra-mundane basis which remains when the extra-mundane elements have been removed. Were there no such solid basis I feel convinced that the fabric of the philosophy could not stand. Now, for M. Bergson the characteristic feature of instinct is that it is a form of knowledge which has an inward direction, lifewards—opposite to that of the intellect which is ever directed outwards so as to apprehend objects in space. Even as sympathy instinct is an inner feeling. The Ammophila is taught *from within* of the vulnerability of the caterpillar; and this

instinctive *rapport* "might owe nothing whatever to outward perception." That seems to me to be an extravagant position. I question whether any form of sympathy can be said to owe nothing whatever to outward perception: it is only called into being in alliance with outward perception. In any case as I interpret instinctive experience it has both an outward and an inward direction—an inner awareness as the enjoyment of experiencing—an outward reference in as much as an external situation is experienced. I freely admit that at the instinctive stage of mental development these are but little differentiated; indeed the difference of reference can only be apprehended through reflective thought. But M. Bergson's instinct (inner direction) and his intelligence (outward direction) are given together. And I should urge that the business direction of what I should call instinctive experience is towards the experienc*ed*—not towards the experienc*ing*, though both are given at the same time. The practical reference when a chick is pecking at small objects is to the grains or maggots not to the enjoyment, though that is present and essential to the conscious relationship. For me the difference between instinctive experience and the supervening phase of intelligence is that, in the latter, pre-perceptions, due to the revival of previous experience, are present and play their part in determining the behaviour which is thereby rendered intelligent. But in intelligent experience, at this early stage of its genesis, both directions, inner and outward, are still present. There is that which is intelligently experienced and there is an enjoyment of intelligently experiencing. And this is carried up, in further

development, to the highest limits of our intellectual life. There, too, we have the intellectually experienced concepts and the like, and the enjoyment of intellectual experiencing.

Nothing can be experienced, by arthropod or vertebrate, without experiencing; experiencing is impossible with nothing experienced. None the less, if we may trust our own experience (and what else can we trust?) there may be a marked difference of emphasis. In our intellectual life we may so dwell on the aspect of the known that the process of knowing becomes merely a background accompaniment. In our emotional life the tide of feeling may rise to such a level of intensity that our whole being seems concentrated at the experiencing pole. This variation of emphasis is a familiar fact of our daily life. It may be that in animal life—in that of the arthropod for example—the emphasis on feeling, on enjoyment pleasurable or the reverse, predominates. Who can say? Probably nowhere, save in human thought, is the emphasis on the intellectually known and knowable, so highly differentiated until it culminates in the predominantly intellectualist temper of the man of science. And nowhere, save in human thought, is experiencing itself in some measure translated into terms of the known and knowable, so that we can discuss it in conceptual language. Thus we reach the paradox that internal intuition and the external intuition of sympathy are dealt with in a manner so splendidly intellectual as that which M. Bergson employs to win us over to the view that they are not susceptible of intellectual treatment!

But it is only by putting ourselves outside the process of experiencing that we can deal with it in terms of intellectual knowledge. We are forced to view it as if from without in order to give it a place in our ideal construction of the natural order. We live in the conscious relationship and, as we live, it is only by intuition that we are aware of its enjoyment direction. But in interpreting our own experience we stand outside it and view it thus translated in relative detachment from the process of knowing it. The correlative process is, however, never absent. No percepts are possible without the process of perceiving ; no concepts without the process of conceiving ; no synthesis of experienced items is possible without the synthetic process of experiencing. In all phases of mental life—in arthropods or vertebrates,—instinct and intelligence (in M. Bergson's sense of the words) intuition and intellect, are the inner and outer directions of the self-same experience.

It is part of M. Bergson's method to found on the results of analysis a sundering of orders of existence. An analysis of natural relationships leads us to distinguish the conscious and the organic from the mechanical and the physical. This is straightway made the basis of a separation of two wholly different orders, that of the vital and that of the inert. Again: some measure of permanence and some measure of change are given together in perceptual experience ; forthwith the permanence is bestowed unreservedly on the order of the inert ; the change is restricted to the order of the vital. But all change involves time-relationships ; and so

duration becomes the sole prerogative of the vital and the conscious, and the material universe, as such, is left timeless and irretrievably static. Intuition and intellect are blended in mental life; but the former is moulded on the vital order which can be known through it alone; the latter deals only with static snap-shots and cannot comprehend life or process. Thus are the results of analysis hypostatized in M. Bergson's philosophy.

Now I conceive that M. Bergson is right in contending that time and process, change and motion are *primarily* given in experience through intuition and enjoyment. We are thus aware of them at first hand. But is he right in restricting time and process and movement to the so-called vital order and leaving the material universe timeless, processless, and immobile? I believe that he is wholly wrong. Though we may know them outside us only in second-hand reflection; there they are to be thus known. Let us grant that abstract science, the ultimate triumph of intellectual procedure according to M. Bergson, deals with static snap-shots. As we shall see in the next chapter, mathematicians treat the mechanics of motion in terms of configurations of particles, these particles occupying a series of selected positions; and any such position is a strictly instantaneous cinematograph picture in thought. No doubt each position is that which is occupied in a given instant of time; but it is in what M. Bergson would call a spatialized time—a position on a time-chart represented by a point on a line in space which only symbolizes time for the intellect. It, too, is a snap-shot. There is no flow in a point; the continuous

progress of real duration is eliminated. Well and good. The method is triumphantly successful. But when we are thinking of the process which is thus dealt with in snap-shots, we think through the positions, and the process of thought restores the real movement, the real duration, the time-flow, which had been eliminated for the purposes of rigidly scientific treatment. Yes! says M. Bergson. But this movement, this duration, is wholly within the order of the vital; it is movement and duration of our thinking. And in so far as there is real process outside us, we come into touch with it, through sympathetic intuition, as part of the order of the vital—the Life-impetus of the universe. Now for us, as for M. Bergson there is real movement and real duration in the *process*, the products of which are experienced. For him, however, the reality is in the order of the vital artificially sundered from the order of the inert. For us the reality is in the constitution of nature, many of the processes of which are not what we should term vital. They are inorganic processes, but none the less exhibiting real changes in time.

But how do we get at the movement and the duration of any process which is outside us, since the only process we can enjoy is that of experiencing? M. Bergson says that we do so by sympathy. I should adapt his thought to my own interpretation as follows:—We are privileged centres of relationship within a relational context. Of any other centre of relationships, say another man or animal, we can only realize the nature of *its* process, by reading ourselves into its very heart. The more of the artist there is in us, the greater the measure of our success.

For in artistic appreciation intuition and sympathy are all-important. We can only realize, and that imperfectly, the instinctive relationships of bird or bee by putting ourselves in the place of the organism which is behaving instinctively—by feeling its very life. In some such form I can accept M. Bergson's teaching—But how do we come to do it? Is it through strictly intellectual procedure, the drawing of logical inference in explicit fashion. M. Bergson says No. And here again I can in large measure agree. Its roots surely lie deeper than that. It is through no such intellectual and logical procedure that the cat in some way and in some degree comes to realize the nature of its kitten,—dimly and dumbly no doubt, but still effectively for practical behaviour. The work of logic and the intellect, in us as interpreters, is concerned rather with the reasonable restriction of a sympathetic tendency which is far more primitive than scientific inference.

Does it not, however, seem somewhat strained and extravagant to say that we sympathize with the processes of inorganic nature? Is not this merely a poetical metaphor? Can we enter sympathetically into the process of crystallization? Can we sympathize with the solar system? In a sense I believe we can, and must do so, even to attain the end of scientific interpretation. If we would follow any movement or process in thought we must always to some extent identify ourselves with the process, must live its flow, must get in some measure inside it, if we are adequately to realize its nature. "How marvellously you seem to know exactly how your motor-car will behave at any moment and

just what it wants," said a friend to a skilled expert. "I do it by instinct," was the reply; "but then you see I *am* a motor-car!" Some such reading of oneself into the very heart of one's object or thought is the secret of success in all effective interpretation even of inorganic processes. You must in some fashion feel the polarities of the molecules in the crystal, feel the double refraction of the light that passes through it, feel the electrical strains of the ether you invent. It is when a man of science knows the process he seeks to elucidate, as it were from within, that he shoots ahead of his fellows who know only its outer aspect. This is part of his intuition; his touch of genius. Is this a matter of the intellect as such? Unquestionably in such cases it is, highly intellectualized. But it is probably only the supreme development of a process which permeates the whole of experience, of that which some psychologists term the empathic tendency; a tendency to *be* in some measure the object of close attention; a tendency for the enjoyment of experiencing to diffuse itself over, or to insinuate itself into, that which is experienced in the focus of perception; a tendency which, as I said above, is at the root of the animism of primitive races. One is forced to put the matter rather vaguely and picturesquely. As M. Bergson would say, it is not readily snap-shotted by the intellect. But if we ourselves endeavour to sympathize with his thought, such considerations seem to justify his view that intuition, sympathy, and instinct, in his sense of the term, point inwards to the reality of process, rather than outwards to its materialized products.

As a rider to our discussion of M. Bergson's doctrine of instinct and intuition we may devote a brief space to Dr. C. S. Myers' suggestive thesis to which allusion was made in an earlier chapter. According to M. Bergson, as we have seen, the province of instinct and intuition is to apprehend the inner nature of process, of life and consciousness, while the province of intelligence and the intellect is to know the external order of the inert. "If the consciousness that slumbers in instinct should awake," he tells us; "if we could ask and it could reply, it would give up to us the most intimate secrets of life." According to M. Bergson instinct and intuition are moulded on life and feel its inner pulses; but intelligence and the intellect are moulded on the mechanical and the inert, and mechanize all that they touch. Dr. Myers on the other hand inverts this relationship to the inner life and to objective interpretation. "According to my view, and to my use of the words," he says,[1] "instinct regarded from within becomes intelligence; intelligence regarded from without becomes instinct." And he correlates instinct with a mechanistic interpretation; intelligence with a finalistic interpretation. According to him instinct and intelligence are different aspects, outer and inner, of one and the same mental process. "We ought," he says (pp. 267–8), "to speak, not of instinct and intelligence, but of instinct-intelligence treating the two as one indivisible mental function. . . . Regarded from the objective standpoint instinct-intelligence appears as instinct; regarded from the subjective standpoint it

[1] "British Journal of Psychology," vol iii., p. 218.

appears as intelligence." Here we have a use of the term instinct which is very different from, almost diametrically opposite to, that which M. Bergson has striven to render current. We must remember, however, that as things now are, no two writers use the term in quite the same sense!

From some passages it seems as if the antithesis which Dr. Myers seeks to emphasize is that between the physiological and the mental. For he says (p. 270):—"Throughout the psychical world there is but one physiological mechanism; there is but one psychological function—instinct-intelligence." Here instinct appears to be correlated with physiological mechanism; and intelligence with psychological function. I am doubtful, however, whether I have quite grasped Dr. Myers' full meaning; for he speaks (p. 269) of instincts as "endowed with perceptual and conative dispositions." But if instinct is the physiological aspect of the two-faced unity, the propriety of applying the terms perceptual and conative to *this* aspect is questionable—so questionable that I fear that I may not be giving a correct summary of Dr. Myers' thesis.

In any case, if I understand him aright, the highest development of human intelligence is but one aspect of that which has a strictly correlative instinctive aspect. And this is brought into relation with a philosophical doctrine of the relation of mechanism to finalism. Dr. Myers advocates the thorough-going acceptance of a mechanical aspect of all that, in its psychological aspect, he regards as finalistic. "Some superhuman being," he says (p. 207), "would as surely find our human intelligence

determined by mechanism as we commonly believe the mental activity of animals to be determined by instinct." We must not, however, infer that Dr. Myers would regard such mechanism as other than the phenomenal appearance of the underlying purpose of which it is the expression. His philosophy is essentially finalistic; "for ends exist not only in life but throughout the universe" (p. 217). The mechanism of instinct is only an aspect of that fundamental finalism which is characteristic of intelligence.

CHAPTER VIII

FINALISM AND MECHANISM: BODY AND MIND

AT the close of the last chapter we saw that Dr. Myers regards the antithesis between instinct and intelligence as an example of the wider antithesis between mechanism and finalism. "So far as instinctive behaviour," he says, "can be regarded from the standpoint of the individual experience of the organism, it appears, however imperfectly, as intelligent,—characterized by finalism. So far as intelligent behaviour can be regarded from the standpoint of observing the conduct of other organisms, it appears, however imperfectly, as instinctive—characterized by mechanism." Thus for him intelligence and instinct, finalism and mechanism, are equally true and valid interpretations of the same problem regarded from different standpoints. And the broader antithesis is all-embracing in its range; "for end exists not only in Life but throughout the Universe, if only we view the Universe as a huge organism"[1] (p. 217). The last sentence suggests the doctrine of panpsychism —to be briefly considered in the sequel. Our present concern is with finalism and mechanism. We will deal with finalism first.

[1] "British Journal of Psychology," vol iii., p. 209.

What from the empirical point of view does finalism mean? It means, I suppose, that in some cases we can with advantage interpret a process as proceeding to or towards an end which we can foresee. In what cases? In those in which we have become acquainted with natural routine. Apart from routine we have no data on which to base any anticipation of end. Now there is plenty of routine in the inorganic world which we might interpret in this way. But as a matter of fact we seldom do so. Nor do we use the word purposive in such connexions. We do not speak of earth-sculpture as the end of denudation; nor do we speak of the process of denudation as purposive. When we have occasion to look ahead we are content to predict future stages of routine, without introducing the finalistic concept of end or purpose.

We will pass at once, then, to the sphere of organic life. Here we do commonly employ finalistic terms. We say that flight is the end for which wings are developed; the secretion of bile, one of the ends which the liver subserves. The whole conception of adaptation in biology, with its undertone of utility, is a conception implying an end to be attained. I have myself again and again spoken of instinctive behaviour as purposive and laid stress on its survival value—that is its value to the end of escaping elimination.

Now it may be urged that, from the strictly scientific point of view, all these modes of expression are unsatisfactory and misleading if they imply that in any single case the present is conditioned by the future or the earlier stage by the later. For the

future is not yet in being, and the later stage is non-existent till it is actually reached. Adaptive behaviour, it will be said, is in all cases to be explained as a heritage of the past; the well-adapted parents have survived and have transmitted to their offspring the so-called potentiality of like adaptation. This potentiality is just the present structure and constitution of the organism. All this is true enough and sufficiently obvious to all those who have devoted any thought to the subject. And yet there is surely something about the peculiar nature of biological phenomena which justifies the conception of end or purpose—a conception which is current among biologists of all schools. What is that something? Clearly the correlated routine which we sum up under the term heredity.

Now we must distinguish between the end foreseen, however dimly, by a conscious organism, and the end foreseen by the biologist who studies the organism. The former is a pre-perceptive or anticipatory conscious relationship developed in the intelligent organism; the latter is an anticipation in the mind of the observer who interprets. The former may, perhaps, not unreasonably for our present purpose, be excluded in the case of plants. Reading our anticipation into that which we interpret we say, that the acorn contains the potentiality of the oak-tree; that its end is to become an oak; or perhaps, more generally, that it is part of the purpose of nature that seeds should develop into plants, shrubs, or trees. And we foresee that any given seed will grow into the likeness of its parents—a likeness which is substantially perfect, if for the present we disregard all

variations and mutations. How have we come to know this? In brief by the study of life-history in a series of affiliated individuals *m*, *n*, *o*, and *p*. Such study reveals routine. We find that, in them, the tune of development is played again and again *da capo*. And having learnt the tune in *m*, *n*, *o*, and *p*, we foresee the sequence of the organic melody and harmony in *q* as soon as a few chords have been played. Then we can say that the opening bars are significant of the whole piece—may even say that the simple organic ditty of *mucor* or the complex symphony of *quercus* is the end for which the opening bars of development exist. But we can only do so in so far as history repeats itself; and history only repeats itself so far as the constitution of *q*, and the conditions at any given stage of its development, resemble the constitution of *p* and *o* and the conditions at like stages of their development. Any "prospective value," apart from constitution and conditions actually present, is entirely in the mind of the interpreter.

But here the teleological vitalists will demur. If Dr. Driesch be their spokesman he will urge that we are wholly ignoring the really important question:—Why the sequence in any given case is what, as a matter of fact, we observe it to be: we are ignoring his reply to this question, namely, that entelechy is the ground and Source of development and organization. With entelechy as Source I have here no concern; we do not seek the why of any natural process in this sense. And to entelechy as ground I raise no serious objection. It is just the inherited constitution under another name. If it be found

convenient to name the ground of organization in yeast or amoeba, in alga or mollusk, in oak-tree or man, its entelechy, I do not see what reasonable objection can be taken; so long as scientific interpretation is furthered, and so long as it avowedly labels the specific characteristic of processes which are just part of the natural order; so long, in short, as it is not hypostatized as a controlling entity.

A little way back we disregarded the occurrence of variations or mutations. Now, granted that both modes of organic change obtain; granted that biologists will some day be able to elucidate more clearly the conditions of their natural origin; granted that mutations occur beyond the field of hybridization; granted that in some more or less modified form the Mendelian laws may be fully established; nay, more, granted that it may hereafter be proved that, quite apart from natural selection, in which the environment is so potent a factor, organic evolution occurs along lines determined by the intrinsic constitution of the evolving organisms. Let all this be granted in a spirit of generous concession. We are indeed granting more than, in my opinion, is at present proven; still I see no reason why all this should not be conceded for the sake of argument. For the sake of what argument? The argument for finalism. And what does this argument come to? This:—that in organic nature up to date we find definite tendencies in apparently determinate directions; and that we may, in some cases, foretell from the trend of the evolutionary curve up to date, its probable course in the future. But the natural order is throughout replete with determinate tendencies of such a character

that we can with some confidence predict what will occur if things go on in the time to come as they have gone on in the time that is past, wherein our observations have been carried out. Such finalism, then, is really nothing other than our old friend scientific prediction under another name.

But what if the variations or mutations are genuinely new departures—are creative, as M. Bergson would say? What if they are unforeseeable and unpredictable because they are off the line of previous routine? I have already urged that this would not be a matter for surprise, since nature is replete with events which could not be predicted because the routine of their occurrence had not yet been presented for observation—the appropriate conditions had not yet occurred. But surely such unpredictable new departures cannot for one moment be regarded as affording any evidence for finalism, at our present stage of its consideration, since their essential characteristic lies in the fact that the end cannot be foreseen. For empirical treatment finalistic interpretation is based on routine: non-routine events wholly escape the meshes of its net.

So far we have considered a finalistic interpretation of processes in which we have assumed the conscious relationship to be absent. We have considered purposive processes—that is, processes which we interpret as proceeding to an end which *we* can foresee. Only where an intelligent being is guided in virtue of the presence of conscious relationships towards an end which *he* can dimly or clearly foresee do we have finalistic behaviour or conduct

and not merely a finalistic interpretation—purposeful behaviour, and not merely behaviour which we may regard as purposive like many of the tropisms in plants and lowly animals.

Now there can surely be no doubt that in human life, where elementary meaning for practical behaviour has risen to significance for conceptual thought and conduct, wherein interest is far-reaching and conative process has become fully volitional, wherein the outlook towards the possible or probable future has become open-eyed and rational;—there can surely be no doubt that here purpose and end are concepts essential for adequate interpretation of the facts. Nor can there be any doubt that what we may fairly speak of as the same end may be reached by different means. This is a salient feature of the higher mental life. It is not distinctive of the higher mental life, nor of intelligent process. It is seen in instinctive behaviour, and is abundantly illustrated in biology where somewhat similar structural features—such as those of the eye in vertebrates and in some mollusks—have been reached by different evolutionary routes, and where the regeneration of lost parts takes place in diverse manners and even in some cases, it seems, from tissues of different embryonic origin. I do not even say that this apparent identity of effect reached through a series of different conditions is restricted to the mental and the organic spheres. Even in the inorganic realm, though we may assert with some confidence that the same assemblage of conditions will always, in a system similarly constituted, be the antecedent of the same effect, we cannot convert this proposition, and

say that an apparently identical effect is always the consequence of the same assemblage of conditions. Still in the inorganic world we can work back from effect to correlated conditions with much greater security than we can in the realm of the living, where such a method of procedure is proverbially insecure. Nor is this surprising when one remembers how complexity and unity are combined in the organism as they are combined nowhere else in nature; and when one remembers that stability in constitution amid varying conditions has, perhaps more than anything else, the hall-mark of survival value; is, perhaps more than anything else, what we should expect to find under vigorous natural selection. Nowhere is complexity in unity carried to higher level than in man; nowhere is constitutional stability (which we commonly speak of as the triumph of character over circumstances) more pronounced; nowhere does the end more markedly dominate the means. In any case it is a sufficiently familiar fact that what we roughly call the same end may be attained by very different means.

But when we say that in human life the present is big with the future, which it will beget, that the child has the potentialities which will be realized in later years, that the end in view precedes and dominates the devising of means to its attainment, do we mean, can we seriously mean, that the present is determined by the future? The future is not yet in being. How can that which is non-existent determine conduct, or thought, or anything else? It is an inversion of the natural order of sequence to speak, in any natural sense, of the future as a condition of

present process. The true statement of the matter is surely this:—That among the conditions, then and there actually present, are certain anticipations of, or desires for, a further development more or less clearly foreseen as possibilities in the future; and that just in so far as these are present may we speak of a purpose and end and so-called final cause. Some form of at least pre-perception, if not of definite anticipation, is essential. If this and nothing more than this be finalism, then are we all finalists in our interpretation of human life. And there is nothing to differentiate the natural course of process in this case from that in any other case, save only the presence among the existent relationships of the psychological factors which we name prospective significance and interest. These, of course, do differentiate; and that in a most important manner, which must nowise be ignored, but which must just be accepted where pre-perceptive relationships have been established and highly developed. And such conscious relationships count, really count, every whit as much as any other natural relationships. They are not merely epiphenomenal phosphorescence; they are real conditions of the course of process, both mental and bodily.

Now, wherever we have evidence of conscious relationships with prospective reference functioning in this way, we have a genuinely teleological factor. It is just because I am not satisfied that there is evidence of such conscious relationships in the life of plants, in the development of the embryo, in the reflex actions of the spinal animal, and in instinctive behaviour from the biological standpoint, that, as at

present advised, I cannot accept a finalistic interpretation of such processes. But others, as we shall presently have occasion to show, accept it, and base their whole interpretation of organic process upon it.

And what about universal finalism? This implies not only a conscious relationship, but one of unlimited range, and one that embraces the whole not yet of the future. Am I putting the matter fairly in stating it thus? If with Dr. Myers we view the universe as a huge organism which embraces the whole duration of the natural order from start to finish within a single and immediate span of consciousness, then a fore-knowledge of end would qualify the whole of consciousness and be a condition of natural process. Would this satisfy the universal finalist? I think not. Does not such finalism generally, if not always, involve the concept of Source? Will not the finalist say that the consciousness of the universe is not only aware of the end as a condition of the direction taken by process, but is also, and essentially, the Agency through which the whole natural order is made to achieve that end? If this be so, then, in so far as universal finalism involves the concept of Source or Agency it is outside the sphere of our considerations here. We could here only accept universal teleology as an expression of universal intelligibility.

Antithetical to finalistic interpretation is mechanistic interpretation. I feel sure that finalists will regard much that I have written in preceding paragraphs as a vain and futile attempt to interpret the evidence for finalism in terms of mere mechanism. The term mechanism, and the adjectives mechanistic

and mechanical are, however, somewhat ambiguous. "Mechanics," said Kirchoff, "is the science of motion. We define as its object the complete description in the simplest possible manner of such motions as occur in nature." We may here, I take it, regard the laws of equilibrium as special cases which can be brought under the laws of motion. Now motion is a concept reached by the scientific analysis and re-synthesis of certain changes in the routine of the phenomenal world which are presented to observation. It is essential to remember that mechanics, as a science of motion, is a product of ideal construction; it furnishes a very much simplified conceptual map or model which enables us to interpret observable phenomena. And as the motion itself is purely conceptual, so, too, for mechanics, is that which moves; whether it be an indefinitely complex object, such as a planet, or a molecule, or an atom, or an electron, or a point. These are statistical units employed as occasion arises, and as may be convenient in relation to the problem in hand; and they are employed within the conceptual scheme of the thought-model. Within this scheme, the ideal motions of these purely ideal products of scientific thought (particles, let us call them) are dealt with in terms of velocity, and of acceleration as a measure of change in velocity. And the acceleration-measure may be applied either (1) to the quickening or slowing off of velocity in the same direction, or (2) to the changes of that direction. The velocity of a particle ideally isolated at any given moment is the net result of the whole of its mechanical history. If, however, the particle be not isolated, but is one among a

number of others which are related within a configuration, then, for mechanics, its acceleration is strictly correlated with, or is a function of, its relation to all the other particles in the configuration in accordance with the constitution of that configuration. We need not trouble about any mathematical difficulties in calculating the acceleration values. Theoretically, if we know the existing positions and the velocities of all the particles within a configuration as a mechanical system in any two moments, and if we know the laws of the type of configuration, that is, its constitution, then we can predict their velocities and positions in any succeeding moment. It should be noted that this statement includes all changes of direction as well as changes of speed. The assertion is often made that changes of direction may occur independently of mechanical relationships. This, however, is never the case within the configuration as an ideal construction of the science of mechanics.

Such an interpretation as I have briefly sketched above is given by Professor Karl Pearson in the new edition of his "Grammar of Science" (1911). It is, however, urged by Mr. Bertrand Russell and other mathematicians "that, ultimately, the whole history of a system of material particles is describable in terms of their masses and spatial relations" . . . and "that in order to predict the future or reconstruct the past of any material system, all we need to know is the geometrical configuration of its particles in any two moments of time."[1] If this position is accepted,

[1] T. Percy Nunn, "Animism and the Doctrine of Energy," "Proceedings Aristotelian Society," 1911-1912. Cp. his "Aims of Scientific

"it is no longer possible to think of a particle as *possessing* a velocity or an acceleration." For any geometrical position within a mechanical context is purely static. The matter may be put in this way. If in a mechanical system we take an instantaneous flash-photograph or snap-shot, A, of the configuration at a given moment, and a second snap-shot, B, at a subsequent moment, then we can predict the exact configuration which will be given in snap-shot C at a later moment, if the constitution of the system remains unchanged. Each flash-photograph just gives the momentary positions of the particles, and their positions only. But that is all that we need for mathematical treatment. If it be asked what becomes of the *motion* on this view, the reply, I conceive, is that there may be movements in the changing world which is to be interpreted, and there may be movement of thought in the mind of the interpreter, as he thinks, through A and B to C, but within the ideal construction, as such, we deal only with the snap-shotted positions.

It may perhaps be said:—If mechanics deals with ideal constructions, surely its thought-model, and its snap-shots, are merely products of the scientific imagination. Are you not by this method just putting into your ideal construction at the start, all that you get out of it at the finish? If the premises be granted, no doubt the conclusions necessarily follow. But we want to know the laws of nature, not

Method" (1907), § 45, p. 103. I have received, and wish to acknowledge, much help from Dr. Nunn in correspondence as well as through his writings. Mr. B. Russell's "Principles of Mathematics" should be consulted, especially i., chap. liv."

only the laws of your ideal constructions. Quite so! And therefore the test of the validity of an ideal construction is whether it can be applied in such a way as to enable us to interpret observable phenomena. Now observable phenomena have a way of being so terribly complex that in thousands of cases we do not know whether the necessary conclusions within a mechanical scheme, as such, are applicable to the observable routine of phenomena. We often know little or nothing about the particles or their positions. We cannot get any mechanical snap-shots. Take a particular case which bears upon our special inquiry. Whether an ideal construction of the strictly mechanical order is applicable within that exceedingly complex natural configuration of particles (if such it be) which we call the cortex of the human brain, we simply don't know. I conceive that, as things now are, anything like positive assertion or anything like positive denial is sheer unscientific dogmatism. Some day we may know: to-day we do not know. That is surely the true position of matters. Ought we not to leave it at that?

Reverting now to our ideal construction, let us call the interpretation of a system in which such a snap-shot determination as was described above is practicable, an A B C interpretation. Such an interpretation gives the A B C law in terms of mechanical relationships. There may be all sorts of other relationships very interesting and important in their proper context. But the mechanical relationships are all that mechanics wants and all that mechanics is concerned with. If the *constitution* of the system changes and with it the mechanical

relationships, we shall have to determine the law of the change, let us say in term of $\alpha\ \beta\ \gamma$. We shall then have to combine an A B C determination with an $\alpha\ \beta\ \gamma$ determination.

We may next ask whether an A B C interpretation, that is one in strictly mechanical terms of mass-particles and positions, is applicable in the case of some of the complex phenomena with which chemistry deals. I take it that, in any comprehensive sense, it is not yet generally applicable. What, then, is the scientific attitude? To assert roundly that it is and must be applicable, though we do not yet know how to apply it? Or to deny that it can be applicable because on other grounds we think it ought not to be applicable? Or to say that we do not know? I have no hesitation in advocating an honest confession of ignorance. And if this should be our attitude with regard to many chemical phenomena, still more should it be our attitude in presence of complex physiological changes.

So far I have tried to keep strictly to the A B C question which I conceive to be the question for the science of mechanics as such. May I now be allowed to apply the term mechanistic to a system interpretable in terms of the laws of physics and chemistry? Of course this is putting a number of varied phenomena in one general group; but we must do this to avoid detailed discussion here out of place. Let us grant that we have passed to a region of scientific inquiry where the strict A B C of mechanics, in terms of mass-particles and positions, cannot, as yet at any rate, be applied. In what way shall we express the

method of procedure? We find routine. How shall we deal with it? Shall we say that for any scientific determination we require a treatment in terms of D E F analogous to (but only analogous to, not identical with) the strictly mechanical treatment? Here D E F stand for three static stages snapshotted in the changing routine of, let us say, a chemical reaction. If stage D and stage E are known, then stage F can be predicted and the law of the constitution of the system for the purpose in hand may so far be ascertained. No doubt matters are often very much more complicated than this. The to and fro changes are very intricate. The poise of the system alters from moment to moment. But we want to get at certain basal principles of interpretation. I seek to indicate by the formula D E F that the determination is in terms of sequent stages of chemical or physical routine.

Now pass to the field of physiology and organic routine. I take it that the term mechanistic (but sometimes mechanical!) is commonly applied to the hypothesis that the organic changes are interpretable without remainder in terms of D E F. They may have other relationships very interesting to the physiologist, but from the mechanistic standpoint these are merely epiphenomenal. Many biologists and physiologists, however, cannot regard this hypothesis as tenable. Let us grant that they are right in claiming that certain physiological changes cannot be interpreted in terms of D E F alone; and let us apply the formula G H I to the law of the remainder—the strictly organic and physiological as such. Then we have the opportunity of correlating

G H I changes with D E F changes without identifying the one with the other.

As an example of what I mean by interpretation in terms of G H I, we may take the case of Tubularia as formulated by Dr. Driesch. If the head of this hydroid polyp be excised, a new head is restored by the combined work of many parts of the stem. Furthermore "if you cut out of a Tubularia stem pieces which are less than ten millimetres in length, you will find the absolute size of the head restored to be in close relation to the length of the stem piece" (i. 127). Here is a prediction which is fulfilled; for we may trust Dr. Driesch implicitly in his facts. How then is this explained by him? He tells us that what we can thus predict—the "prospective value" as he terms it (p.v.)—is a function of the size of the piece of stem (s), the direction of the cut (l) and the constitution of the Tubularia—its entelechy (E). And he gives the equation p.v. $(X) = f$ (s, l, E). So that given—what must always be given in any interpretable routine—the constitution of the system, and the conditions of the case, the changes which occur can be foretold, so long as the constitution E remains constant. One does not need, however, to seek abnormal cases to exemplify the method of treatment. Given the constitution of that complex organic system which we call a hen's egg, and given the conditions under which the process of development as embryogenic routine runs its course; then we can apply our G H I principle and predict the state of matters say at the 96th hour. All this I conceive is fully in accordance with the recognized

methods of scientific procedure. It remains to be seen whethe· a physico-chemical interpretation of certain organic changes in terms of D E F can be correlated with (not necessarily identified with) a further interpretation of remainder phenomena in terms of G H I.

We come now to psychological interpretation—to avoid ambiguity let us say an associationist interpretation of the synthetic juxtaposition and compounding of the "eds" of experience including thought. Epiphenomenalists claim that psycho-physiological processes, or rather their "ed"-products, are interpretable in terms of G H I without remainder. They say that although an intelligent relationship to a pre-perceived end may seem to determine the direction of behaviour, yet, none the less, this does not really count; if we knew enough about physiology that alone would suffice; just as if we knew enough about physico-chemical mechanism that would suffice for organic interpretation; and if we knew enough about mechanics that in turn would suffice for the complete understanding of every material change in the universe. All this, however, is somewhat speculative; it does not appear to be at present within the sphere of the practical politics of contemporary science. Let us grant then that psychological products, and intelligent behaviour in relation to them, cannot be interpreted in terms of organic G H I without remainder. Let us call the law of the remainder X Y Z. This means that, in any routine of psychological products, if the constitution of the mental system be known, stages X and Y and Z are sequent stages; and that if you know X and Y you can

foretell Z on the basis of routine. In the absence of routine, of course no scientific predictions are possible in any field of inquiry. Here X Y Z are not identified with G H I in the sense that the psychological is merely a phosphorescent accompaniment of brain-process. They can only be identified, within an ideal construction, in the sense that the same process may have *both* physiological *and* psychological relationships, just as an organic process may have both physico-chemical and physiological relationships. The business of science is to correlate these several relationships. Both parallelists and inter-actionists claim that there is a complete or partial correlation between what I have called the G H I and the X Y Z. But the inter-actionists call in a psychic entity which, according to M. Bergson, dwells in time but not in space; so that, for them, the correlation is only at the locus of inter-action; for M. Bergson it is along the line of the knife-edge where pure memory gets its wedge-like insertions into the spatial world of the inert. But I shall have somewhat more to say on this subject a few pages later.

Now in accordance with the foregoing analysis we have:—

1. Mechanical interpretation in terms of A B C.
2. Mechanistic „ „ „ „ D E F.
3. Organic „ „ „ „ G H I.
4. Psychological „ „ „ „ X Y Z.

It may be that the chemical and physical phenomena dealt with in terms of D E F will hereafter be resolved into complex configurations of mass-particles analytically interpretable in terms of A B C; and it may be that the organic phenomena dealt

with in terms of G H I will hereafter be shown to be complex D E F business. But we seem very far off at present from any such resolution of the presented phenomena. Let us, therefore, assume for the sake of argument, that both the D E F phenomena and the G H I phenomena are *sui generis*. Then I submit that the scientific course is just to accept the fact in each case and to seek to correlate phenomena which will not submit to identification. And my further contention is that if we attempt to explain the facts by saying that we must call in a D E F entity (Energy) as the Source of the D E F phenomena, and must call in a G H I Entity (Life or Entelechy) as the Source of the G H I phenomena; then, for good or ill, we leave the plane of scientific interpretation. And I should urge that if we do call in Entelechy in this sense as the Source of vital phenomena, then we ought, on precisely analogous grounds, to call in a crystalline entity (perhaps as a mode of Energy) as the Source of the phenomena of crystallization.

Apart, however, from this point I seek through the above table to avoid an ambiguity in the use of terms which I find somewhat troublesome. The term mechanistic (and not infrequently the term mechanical) is sometimes applied no further down the above table than 2; but they are sometimes applied to 3 and 4 also. Thus Mr. McDougall says, in a passage already quoted, that instinctive action is "incapable of being described in purely mechanical terms." And, as we have seen, Dr. Myers says:—"So far as intelligent behaviour can be regarded from the standpoint of observing the conduct of other organisms, it appears,

however, imperfectly as instinctive—characterized by mechanism." Since such phrases are in current use, it is incumbent on a writer who attempts to deal with instinct and experience to make his own position clear. This I have endeavoured to do at the risk of seeming unduly crabbed and technical.

It may, however, be said that these phrases, in such contexts, are not meant to be taken in the narrower sense to which I have attempted to restrict them. In what sense, then, are they to be accepted?[1] What does a mechanistic interpretation, from this broader philosophical standpoint imply? Does it not imply the universal, and perhaps eventually the quantitative correlation of all the happenings within the natural order, as such, without going beyond one natural order within which such correlations afford the data for an ideal "unity of concatenation"? Now whether such universal correlation obtains throughout the universe of things and thoughts, we do not yet know. There may be some loose-jointed indeterminism, just a very little of which William James demanded. We are still only beginners and novices in the interpretation of nature. We know just a little about correlation. Bit by bit we are extending this knowledge. But considering the bewildering variety and multiplicity of the events in the midst of which we live, bold indeed is he who ventures to affirm that universal correlation is more than an ideal construction the validity of which has still to be tried

[1] For M. Bergson and his interpreters everything which can be explained in intellectual terms is mechanical or mechanistic. All that is not Life (apprehended through intuition and sympathy) belongs to the mechanical order of the inert.

and tested. After all, the world may be in some measure chaotic. The cosmos may be evolving, not only from an earlier and towards a later cosmic phase, but out of partial chaos. Who can say?

We pass then to some further consideration of universal correlation, the meaning of this phrase being, I trust, sufficiently clear. Can we accept it as an ideal construction which may some day be applicable to the world of events we strive to interpret? There is (need I again add the qualifying words, within the self-imposed limits of our discourse?)—There is one *conditio sine qua non* of its acceptance. And that is the acceptance as part and parcel of it—the full free and unhesitating acceptance,—of conscious relationships as belonging to the natural order, to be correlated with other relationships, and really counting in any situation within which they are developed. To say that the motions of my fingers as I write are the same that they would be if the conscious relationship were entirely absent, is little short of absurd. To urge that behaviour in any intelligent situation is just what it would be if intelligence were non-existent, seems to me a deliberate ignoring of what for any reasonable interpretation are the facts of the case. I have little remaining space at my command. I can spare none of it to discuss the epiphenomenal doctrine. The argument, I take it, runs thus:—Intelligence is correlated with cortical functioning; but if the cortical functioning took place without the correlated intelligence, the behaviour would remain the same. (Here comes in unconscious cerebration and the like.) But have we any evidence that the very same cortical functioning which is

developed when intelligence is present, ever does occur in exactly the same way in the absence of such correlated intelligence? May we rub off the slate an observed or inferred correlation and unblushingly say that it doesn't really count? I must apologize, however, to my epiphenomenal friends and to the shade of my master Huxley, for this cavalier dismissal of their views, and again plead in excuse the exigencies of space.

We thus clear the ground and reach a plain issue; either the conscious relationships are developed within *one* natural order and are co-ordinate with other relationships; or there are *two* independent orders which inter-act; that of matter, of which the body is part; and that of life, of which mind is an attribute.

It is sometimes asserted that inter-action of mind on body and body on mind is inconceivable. But, regarding the matter from the point of view of inferred correlation of bodily and mental processes, this argument pressed home results in universal inconceivability, and a complete paralysis of interpretation, if we are to be precluded from dealing with connexions unless we can explain the "why" of them. Science just accepts correlations as facts. We may, indeed, go somewhat beyond Hume's view that, in the world around us, *this* and *that* are merely "conjoined," being "connected" only in our experience through custom. We may firmly believe that they are really connected in nature since nature is a correlated context of which our conscious relationships are part. But *why* within the correlated context of the constitution of nature, *this* should be connected

with *that*, science cannot say. We must just accept the facts as they are given. Why there should be mutual attraction between the earth and the moon, we do not know. And accredited manipulators of that triumph of ideal construction, the ether, assure us that it will not help us over our difficulty.[1] Why the motion of one billiard ball should be communicated to another by impact—this, it is said, passes the wit of man to tell. Why anything should be correlated with anything else, in this sense of the word why, we do not know; experience merely acquaints us with the facts of observation; our scientific explanations only serve to correlate the less familiar with the more familiar types of correlation. All correlation is (if you will) a mystery; granted two orders of being, there is no more mystery in the kind of correlation suggested by inter-actionists than in any other observed or inferred correlation. And if, on the one-order-of-nature hypothesis, conscious relationships are as a matter of fact found to obtain —Well, there they are, as modes of natural process to be correlated with other modes.

Now Mr. McDougall arguing in favour of interaction rightly urges[2] that it should not be rejected on the score of its being more inconceivable than other modes of correlation. But when he is criticizing the assumed correlation of conscious-processes with cortical brain-processes he speaks with a different voice. "To assume," he says, "that of all physical processes just certain brain-processes are accompanied by conscious concomitants, would leave

[1] Cf. Karl Pearson, "The Grammar of Science," vol. i., pp. 301–2.

[2] "Body and Mind" (1911), pp. 207–8.

the relation too obviously mysterious; the coming into being of the sensation, at the moment of the occurrence of a brain-process of a certain quality would be too decidedly miraculous" (p. 152). Why it should be more mysterious and miraculous than the correlation of certain events in an independent soul order with certain material processes of a second order I am unable to see. Mr. McDougall holds[1] "that the instincts are differentiations of the will to live . . . by means of which it pushes on along diverging paths, creating by their agency the various great families of the animal kingdom; each animated by the great instincts common to all, the tendencies to seek food and to reproduce its kind; each animated also by special instincts characteristic of the group; each instinct creating for its own service the bodily organs and the nervous structures best suited to serve as the instruments by which it may secure the satisfaction of its conative impulse." I confess that this interpretation of instinct seems to me to involve quite as much of mystery and miracle, as the assumption that a natural correlation obtains between cortical functioning and conscious process. But might we not wisely drop—both one side and the other—all reference to mystery and miracle?

Opposed to the doctrine of inter-action—the inter-action, be it noted, of two orders of being,—is, in current controversy, that of psycho-physiological parallelism. Now the very term parallelism seems at the outset to imply two orders of process which run side by side and cannot intersect. And even the term concomitance, as commonly accepted,

[1] "British Journal of Psychology," vol. iii., p. 258.

carries a like implication. What, then, is the thesis that the upholders of this doctrine are concerned to maintain? We may summarize it briefly thus: that every psychical process has a parallel physiological process; that for every differentiation of the former there is a parallel differentiation of the latter; and, as a corollary, that when any two physiological processes are precisely alike in every respect, and in all their relationships, then, if the one has a given psychological concomitant, that of the other is identical. Obviously this is an ideal construction which far outruns what can be established on empirical data; hence many psychologists regard it as a working hypothesis. And if this means that they abandon the concept of parallelism and accept only the concept of correlation, for what it is worth and as far as it goes, that is clearly a step in the right direction.

If this is spoken of as an appeal to physiology to the end of furthering an explanation of the facts of psychology, let us make the appeal with our eyes fully open. What do we hope to get from the appeal? An explanation of the conscious relationship between *this* and *that?* Well and good. But what do we mean by an explanation? Do we expect to gain from physiology any further information as to the nature of the conscious relationship *as such?* If so, our expectation is futile. Let us not delude ourselves with vain hopes, or, if it be preferred, worry over idle fears. The conscious relationship within a synthetic process comes into being under certain conditions. That is just a fact to be accepted. Physiology will neither make it or mar it. All we

can do is to correlate this fact with other facts. That is where physiology comes in. It furnishes a body of other facts to be correlated with these psychological facts. Why they should be correlated in the context of nature we do not know. All that we can confidently affirm is that some correlations between psychological and physiological happenings seem as well established as any other correlations in the realm of nature. For the experiential relationship is, for us, just a natural event which we come to know just as we come to know other natural events. We eschew all the metaphysics of epistemology. But if some mental states have cortical correlates, may not all? We ask this as a question to be answered bit by bit through inquiry. We do not make any positive assertion. At most we may accept a provisionally affirmative reply, as part of a policy which spurs us on to further investigation. Even if, however, we grant that only in some cases is there a correlation between the mental and the psychological; is it not in accordance with scientific method to pass on, with some measure of confidence, to the conclusion that, where such correlation does obtain, the same physiological happenings in the cortex, will always be correlated with the same states of consciousness and not with other states?

It is just here, however, that difference of opinion and divergence of interpretation come in. There is an alternative view. And, since I am desirous that it should not suffer from inadequate presentation, I will quote from an able paper written by a distinguished exponent of the philosophy of M.

Bergson. "I suppose," says Mr. Wildon Carr,[1] "every one agrees that as a fact every psychological state implies a physiological state. . . . But is it equally agreed that to the same cerebral state there corresponds the same psychical state, and conversely that to an identical psychical state there corresponds an identical cerebral state? May not different, even totally different, psychical states be accompanied by the same nervous conditions? There are some cases in which it seems to me," says Mr. Carr, "almost impossible to believe that it is not so. . . . It is not necessarily, nor even probably true that the same cerebral state determines the same psychical state, for there might correspond to the same cerebral state several very different psychical states. . . . Our body is the material instrument of the mind. . . . Why then does this mind seem to spring into being just where our afferent nerves end and our efferent nerves begin, that is to say, in the brain? Because it is just there that the intellect becomes serviceable, just there that it enables the living creature to control and direct its activity, just there that the free choice with which it endows it becomes realizable. There is no parallelism, nor causality, there is solidarity. The body serves the mind and the mind directs the body. They are inseparable, to quote an illustration of Bergson's, as the knife is inseparable from its edge. The brain is the sharp edge by which consciousness penetrates the compact tissue of events, but it is no more co-extensive with consciousness

[1] "Proc. Aristotelian Soc." N.S. vol. xi. (1910–1911), pp. 134, 135, 143.

than the edge is co-extensive with the knife." Thus Mr. Carr. One must remember here that the knife belongs to a different order of being from the events into which its edge is inserted.

I said above that parallelism implies two orders of being. Here is what Mr. Carr says in the connexion: —"Parallelism," he writes, "is an attempt to express a relation between two things that belong to different orders, to different kinds of reality. The problem of parallelism comes to us from the two substances of Descartes, the two attributes of Spinoza. It comes to us permeated with the idealist-realist controversy of the eighteenth century. It is on this dualism that the hypothesis of parallelism rests. I do not mean," he adds, "that parallelism may not find its solution in some form of monism; what I do mean is that it is based on a view of phenomena which divides them into two entirely separated orders of reality, or planes of reality, or meanings of reality, or kinds of reality—qualities and percepts, things and thoughts. Parallelism is not merely based on that view, it is essentially that view; it does not explain dualism, but is the expression of it" (pp. 139, 140).

Now it has been my aim to contribute in some slight measure to the translation of the old philosophical antithesis of two orders of being, into other terms involving other concepts. Starting with naïve perceptual experience, instead of positing the world on the one hand and mind on the other hand as independent terms within different orders of process, I accept the given experiential relationship as one among many relationships within one order

of being to be interpreted in just the same scientific way; and the old antithesis takes for me the form of that between experiencing and the experienced. But at the lowest level at which we can begin to interpret, as best we may, the experiential relationship, it is already extraordinarily complex. Just think of the chain of correlations involved in seeing an "object." And think of the differentiations involved when instead of seeing the object we subsequently have an anticipatory image of it! It is difficult enough to conceive, even in schematic form, how all this comes about—that is to say to trace step by step all the complex correlations. But this difficulty is not in the smallest degree lessened when we assume that much of it takes place in a different order of being. The correlations have to be traced there just as much as here. All we can do in either case is just to accept process as given and endeavour to show how the stages are related. And here comes the stress on process. Whatever else it may be, experiencing is a process. However else we may interpret it, the successive phases of process are correlated. On any hypothesis, there is also a correlation between this process and other processes—whether this process belongs to the mind order and the other processes to the world order, or all are given within one natural order. Now on the two-order hypothesis psychical process in the mental sphere inter-acts with physiological process in the brain. On the one-order hypothesis there are not really two processes, but one process, a psycho-physiological process; a process, with what M. Bergson would term the unity of interpenetration;

a process of which the physiologists may study the correlations within the organism, and of which the psychologists may study such correlations as are involved in M. Bergson's doctrine of pure perception. Physiological *products* and a physiological con-figura-tion or constellation are different from mental products and a psychological disposition. But though the products are diverse there is but one emerging life-process, unitary and indivisible so long as the organism functions as a whole. The life-process, however, is an extraordinarily complex one, and the belief in its unitary character does not preclude the belief in interrelations between different phases within the whole. Indeed many of the arguments in favour of inter-action between two orders, the mental and the physiological, are, in my opinion, merely translations into the language of animism, of the unquestionable inter-action between cortical and sub-cortical functioning within the organic process. In a sense too much stress may perhaps be laid on the unitary process of living, that is, if it be regarded as the unity of a blank sheet of paper. But if it be regarded as the unity of a whole with correlated parts—the whole dominating the parts and the parts contributing to the whole; if it is the kind of unity of which human design is a highly developed example, then the stress seems to be amply justified.

In the emphasis on process, and especially in the emphasis on process as one and indivisible, no matter how much distinguishable differentiation may obtain, we come to some extent into line with Mr. Carr who, interpreting M. Bergson, says in a

passage quoted above:—"There is no parallelism, nor causality, there is solidarity." But for him the solidarity is at the plane of intersection of two different orders of being. It is solidarity along the line of the knife-edge.

On what kind of evidence, then, is the existence of an independent mind-order accepted? It is confidently claimed that there are certain modes of mental process which cannot possibly be correlated with cortical process. Hence they must run their course in the mind independently of bodily happenings. Dr. Driesch takes the case of a man who notices that a lamp recently bought begins to smoke. He examines the mechanism, decides that this or that must be done to stop the nuisance, and stops it. The brain is affected in correlation with certain presented stimuli; the brain is also instrumental in initiating the appropriate movements of thumb and finger. But the middle portion of the series has "nothing to do with the brain whatever . . . it is not of a cerebral character at all, though at both ends it is in connexion with cerebral phenomena." The intervening mental events form an "intra-psychical series." This is the business, not of the brain but of the psychoid which uses the brain. The psychoid here invoked is entelechy raised to a higher power. It is the essential agent concerned in action; and action is that which is determined by past experience. It is that which has a historical basis.

But what is the evidence for an intra-psychical series, independent of any physiological series? For this we may profitably turn to Mr. McDougall's

recent book on "Body and Mind"—a work of great ability in which are skilfully marshalled the arguments for a doctrine of animism. It is not easy to grasp firmly the key to the whole position set forth in a portly volume—I believe, however, that this key bears the label "Meaning."[1]

We see an object from a dozen points of view, and yet we call it the same object. What, then, is the same? Not the presentations, for they may be all different, but the meaning. And the appropriate response is determined not by this or that constellation of stimuli, but by the meaning they suggest to the mind. The same idea may be expressed in English, French or German. The assemblage of physical marks on paper, the images on the retina, the physiological impulses coursing along the optic nerve, the exact changes in the occipital lobe of the brain are different; but the meaning for the mind is the same. We may see a sentence printed, or we may hear that sentence spoken. In the one case the visual centre in the occipital lobe is thrown into physiological activity; in the other case the auditory centre in the temporal lobe. It matters not. The meaning for the mind is the same. A telegram from a friend is received, bearing the words:—"Your son is dead." How different the effect from that produced by the words:—"Our son is dead"! And yet how slight the difference in visual stimulation! How minute the difference of cortical change! The pro-

[1] I should myself prefer to reserve the word meaning for secondary meaning in the perceptual sphere, and to apply the word significance to meaning which has conceptual relationships. But to do this here would only confuse the issue.

found difference lies in the meaning conveyed to the mind, not in the merely cerebral states. Of course the cerebral states give the cue to the meaning; but it is the meaning itself—meaning for the mind—which counts. Or, translating this into psychological terms, as Mr. McDougall puts it, "the sensory content, whether vivid and rich in detail, or dim and scanty, is but a subordinate part, a mere cue to the meaning" (p. 304).

But the essential point for Mr. McDougall is that "there exists no unitary neural process correlated with meaning; that in fact meaning has no immediate neural correlate which can be regarded as its immediate cause, or its phenomenon, or of which it can be regarded as the psychical aspect" (p. 305). So, too, with conation. "The conditions of conation," he says, "are psychical, and in many cases these psychical conditions are such as have no immediate correlates among the brain processes" (p. 328). Mr. McDougall appears to be convinced that those who provisionally accept a correlation between mind-process and brain-process, are logically committed to an atomistic psychology—to the doctrine that consciousness is compounded of elements (p. 281), and that these elements are ultimately sensations (*sensa*). Admitting that correlated with these sensations as such, there are cortical events, he claims that these are severally separate and distinct, and can only be united in experience by the relating activity of the soul. After discussing "the psycho-physics of meaning," he says:—"We have seen that even the sensory content of the consciousness of an object has for its physical correlate a number of discrete

processes in the brain, which in no sense constitute a unitary whole. How much less, then, are we justified in assuming that the unitary psychic whole of sensory-context-plus-meaning has any physical correlate in the brain" (p. 311). In fine, "the brain-processes could produce no sensations except by acting upon a soul, and their effects are combined in one consciousness only in virtue of their acting upon one soul" (p. 299). Thus Mr. McDougall is confident that the unity of consciousness remains absolutely unintelligible unless we postulate "some ground other than the bodily organization" (p. 366). Such is the animistic thesis.

Now Mr. McDougall distinguishes again and again between what I have spoken of as the "eds" and the "ing" of experience, though not in these terms. He speaks, for example, of "those who think of all consciousness and all psychical process, as consisting in what we call the sensory content of consciousness; for the sensory content does seem like a patchwork." Here we have the juxtaposed and compounded "eds" of experience—those "eds" which Dr. Alexander regards as non-mental. "But," Mr. McDougall continues, "the sensory content and the sensations and images that compose it are abstractions only, achieved by fixing our attention on one aspect of mental process. Sensations are merely incidents in the process of cognition, and no amount of compounding of sensations will result in an act of cognition, a knowing of an object" (p. 170). Here we have the "ing" of experience. Since, however, the "eds" or sensory content have neural correlates, and since they are

abstractions reached by neglecting the correlative "ing", one may surely urge that this correlative "ing" is also in like manner an abstraction reached by neglecting the correlative "eds." But it is this abstraction that Mr. McDougall hypostatizes as the psychic entity. Furthermore, since mental process is essentially a relating of the "eds" which have brain-correlates, on what valid grounds can Mr. McDougall deny that physiological process is essentially a relating of the brain-correlates? As I conceive physiological *process*, this is just its essential feature. It is the process through which organization is reached. And why should not the same process which relates and organizes the conscious experience, relate and organize also, *within one order*, the functioning of the cortex?

It will perhaps be said that I am ignoring the whole of the argument from meaning. My attitude is rather that of one who accepts all the facts and rejects the conclusion. The facts are familiar to psychologists. There can be no doubt that a number of different but allied presentations may be psychologically connected with what we may term a common meaning-path. Any one of these may then be a condition of the flow of process along that path—any one of the different presentations of what we call the same object for example; or the spoken word and the written word. But any two presentations may also be differentiated in connexion with different common paths—the words *our* and *your* for instance. Furthermore the one presentation, say *our*, may become allied with one complex set of meaning-paths, the other presentation, say *your*, with a quite

different set. And so forth. It is all terribly complex. But the psychological complexity remains precisely the same for empirical treatment (and Mr. McDougall claims that his doctrine of animism is based entirely on empirical considerations,) whether there are neural correlates or not. We have not to deal with an argument from complexity. Mr. McDougall does not say that all this is too complex to have physiological correlates. He asserts that the nature of meaning is such that it *cannot* have a physiological correlate.

This simplifies the issue. What is the essential characteristic of meaning which is adduced in justification of this assertion?

Now the word meaning, like so many other psychological terms, is used in both those contexts to which I have so often drawn attention—that of the "eds," and that of the "ing," of experience. Meaning may be something meant, or it may be—well just mean*ing*. When we say that a nauseous caterpillar has acquired meaning for a bird that has seized its like, the meaning is what will be pre-perceive*d*. In this sense of the word all meaning within a scheme of knowledge is something known—something meant. It is that which is in some way related within the scheme. Mr. McDougall does not use the word in this sense. He definitely excludes this reference in a footnote (p. 304), and tells us that he uses the word "to denote the consciousness of meaning, or the meaning part of the consciousness of an idea." Unless I wholly misunderstand him this is surely meaning as a distinguishing feature of mental *process*, as such; it is meaning as relating one related item

with another. It is the meaning that has reference not to the related terms, but to the relating process, as that which renders any relationship possible. But for Mr. McDougall the relating activity is the prerogative of the psychic entity—a prerogative all its own. Just as no juxtaposition of associated items presented to sense could possibly constitute experience, were there no psychical activity which, as associat*ing*, unites them in one synthesis; so no collocation of words on a printed page could be other than presented blotches of printer's ink unless the relating activity of the psychic entity gave them meaning.

But, stripped of what some of us regard as the non-scientific concept of the psychic entity, what does this come to? It reduces to this:—In the absence of synthetizing process there could be no such thing as a synthetic product. To this we can all, I suppose, subscribe. But why do some of us exclude the psychic entity from any place in what we regard as scientific interpretation? Because it seems to us to be a concept having reference to the Source of the observed synthesis. Because it is put forward as the Agency whose business is that of relating. We again re-echo the words of Henry Sidgwick:—"Why"—*for scientific interpretation*—"Why do the relations want a Source? Why cannot they get on without one?" It is just because Mr. McDougall, as I think, comprises in one synthesis a doctrine of process and a doctrine of its Source, whereas I regard all reference to Source as outside the pale of scientific inquiry, that our conclusions are bound to be widely divergent.

If, then, meaning, in my interpretation, is just

part of process itself, why does it so persistently elude our most patient search for it among the juxtaposed or compounded products of mental process? Because we seek it where it can never be found. Because we look for it among the "eds" of experience. Because, as relating and cognizing, it can never at the same time assume the guise of the related and cognized. As M. Bergson would say, it wholly eludes the photographic camera of the intellectualist. Only through intuition are we directly aware of the flow of process and of the inner nature of experiencing. That is why conation can never be objectified or "ed"ified. It is felt as mental tendency with directed meaning. Its end, as the object of desire which is meant, may be clearly and sharply conceived; but as it streams onward towards that end it is just mental living—it is process glowing with brilliant awareness and enjoyment. Life eludes intellectual thought, save in symbolic concepts, as it eludes the scalpel of the anatomist and all physiological analysis. Meaning and conation are moulded on the very form of life; on life in its highest development. But why should we deny that the process which is life has physiological relationships as well as psychological relationships all along the line? After all, that great body of unitary physiological process which is the functional correlate of the structural complexity of the cortex, with its millions of neurones, must have *some* significance within the ideal construction of the biologist. What precludes us from regarding its imperial business as that of relating the contributory sub-processes within its provincial centres?

The printed letters on this page give rise to discrete and separate stimulations of the retinal cones. The impulses are carried inwards by discrete and separate neuronic fibres. Somewhere in the brain, eventually, let us say, in the occipital lobe of the cortex, there occurs the process of relating these several items hitherto only partially related in lower centres. Is this relating in no sense a physiological process? And where does this physiological process cease? Suppose that instead of the discrete and separate retinal stimulations affecting the visual centre of the occipital lobe, there are allied visual and auditory stimulations affecting the relatively distant centres in the occipital and temporal lobes. Seeing the multiplicity of neuronic connexions throughout the cortex, why should we be told with so much confidence that physiological processes in the brain cannot possibly be the ground of the relating of these sub-processes within its empire? May not the relating activity, so called, be just as reasonably assigned to the physiological process in the cortex and the organism as a whole as to the correlated psychological process, hypostatized as a psychic entity? Is not a denial of brain-process as relating and integrating, just because we cannot at present tell in detail just how sub-process here is correlated with sub-process there, tantamount to a denial that any physiological interpretation of physiological facts can be given? Of course this may be so. But why found so much upon our present physiological ignorance? Why not give physiology just a little longer to try its prentice hand at interpretation?

It seems to me that even now, though we may

still be ignorant of many details, the evidence for physiological solidarity is not inconsiderable. At the one end of the scale of animal life, as Mr. McDougall himself indicates (p. 259), the admirable work of Dr. Jennings on the infusoria leads us to infer that the response of the organism to local stimulation is a "total reaction." And at the other end of the scale I venture to submit that the physiological inference from Mr. McDougall's own striking research on vision and retinal rivalry is that the cortex responds by total reaction.

If a spot of white light be viewed by an observer having a red glass before his left eye and a blue glass before his right eye the spot may appear to be purple. But it may at one moment appear to be red and at another moment appear to be blue. Either colour may pre-dominate or prevail according to the attentive reinforcement or inhibition of the process related to the stimulation in the one retina or the other. So, too, the microscopist learns to use his two eyes separately: and can at will see either the object in the microscope field or the drawing on which his other eye is focussed. "It is difficult," says Mr. McDougall, "to reconcile the alternation of the two colours in consciousness with the view that the excitations of the two optic nerves become physically compounded in visual centres of the cerebrum; and it is still more difficult to reconcile with this view the possibility of reinforcing, by voluntary effort, either process to the exclusion of the other" (p. 290). For Mr. McDougall voluntary attention is an activity of the psychic entity; inhibition a secondary effect thereof. For us such attention is the psychological correlate of

selective processes within the cortex. Both attention and inhibition imply physiological relationships within the context of the nervous system. But this is by the way. Our present concern is with "physical compounding" in a "common centre."

When we look at any illuminated surface with both eyes, it appears no brighter than when it is seen with one eye only. This fact again, according to Mr. McDougall, is incompatible with the common view that the optic nerves transmit their excitations to be summed in a common centre. Other such facts based on his own very careful observations are adduced by Mr. McDougall in support of his conclusion that "the fusion of simultaneous sensory stimuli to a unitary resultant is not a physiological or physical fusion or composition, but a purely psychical fusion . . . for it is clear that these psychical fusions of effects of sensory stimuli obey, or take place according to, purely psychical laws that have no physical counterparts . . . the fusion is a psychical process to which no physical process runs parallel" (p. 293).

Now we are here invited to make election between two alternatives; either (1) purely physical compounding in terms of resultants in some hypothetical nerve-centre; or (2) purely psychical integration in terms of a soul-entity whose integrating power is taken for granted to account for the facts. I am not prepared to accept the limitations of election laid down. I am not prepared to agree that if a process is not interpretable in terms of so-called mechanical summation, then we *must* interpret it in terms of a psychic entity. I have already made confession of my faith that if by vitalism is meant no more than that

there are, in physiological phenomena, organic relationships and modes of synthesis which differ from those in a physico-chemical system, as such, then I am a vitalist. But I may be a vitalist in *this* sense, without subscribing to the doctrine of animism.

Let us, however, scan a little more narrowly inorganic analogies, freely admitting that they are not very close. In the solar system regarded as a gravitative field, there are reciprocal relationships which are the ground of observed attractions. Where is the specific centre in which this ground has its seat? Is it in the sun? Then what about perturbations? Does it not pervade the whole system? Have we not to take into consideration the total configuration? Or take physical phenomena which suggest closer, but still distant, analogies. Two coils in which electrical processes occur, reciprocally influence each other. Is it necessary that there should be a third instrumental centre in which the reciprocal influence shall be collected and compounded? Does not the total field of reciprocal influence suffice?

These are admittedly distant analogies; perhaps it will be said that they are far-fetched. I submit, however, that they suggest that we should not seek in the physiology of the nervous system for an independent centre of summation, but should lay stress upon total reaction—should emphasize the whole field of reciprocal influence within the entire cerebral context.

Am I false to the scientific flag, if I urge that we are still novices in the interpretation of the integrative processes within the cortex, and if I claim that we ought not to found too much on our present

ignorance? No doubt the exact nature of the reinforcing and inhibiting influence of one cortical subprocess on another or others requires further elucidation. Still some of the facts of inhibition of a purely physiological type, say in the spinal cord, are now familiar. A sample of them has been given in our third chapter. Now seeing that it is the normal business of the two eyes to function as one binocular organ, may not the physiological process of one retina be brought into physiological relation with that of the other retina, each normally inhibiting the redundant part of the other, so as to preclude the visual confusion which must arise if there were variable summation of brightness in the course of their joint action? Much more investigation is needed. I am well aware that this is of the nature of a surmise. But can it be asserted that such reciprocal inhibition is physiologically impossible, or even that it is wholly unsupported by physiological analogies? It seems to me that this is the kind of thing that goes on throughout the whole business of the integrative action of the nervous system. And if some such reciprocal inhibition of cortical subprocesses due to the stimulation of the two retinas has been established through natural selection, I see no reason why emphatic blue in the one, supported by psycho-physiological meaning, should not partially or wholly inhibit the sub-processes normally due to the stimulation of the other retina. The whole matter is difficult to interpret. The question is whether any physiological interpretation, correlated with the psychological interpretation, on some such lines as these or better *physiological* lines is a sheer

impossibility. That is Mr. McDougall's contention. It is just because the cortex is one system with a unitary integrative process that the principle of total reaction seems to me to be of the highest physiological importance. The ground of physiological integration correlative with that of psychological integration is to be sought, I conceive, not in some hypothetical summation centre, but in cortical process as a whole. In no cortical centre does physiological change occur without in some measure affecting the total constellation of cerebral changes which in their entirety constitute cortical process. Until such a unitary interpretation is shown to be physiologically unsound in principle, I submit that it should be given further trial before we have recourse to a psychical entity independent of physiological correlates.

But the trouble is that if one brings forward biological and physiological evidence of such total reaction; if one adduces instances of sub-cortical inhibition; if one urges in opposition to extreme vitalistic or animistic interpretation that embryological development proceeds towards an end which *we* can foresee; if one lays stress on the fact that the same organic end is often reached by diverse means; if one turns for illustration to biological evolution; one is met by the assertion (and I regard it as nothing more than a bare assertion) that all this is evidence of the activity of a teleological psychic entity. One is told that "all the wonderful stability and complexity combined with gradual change throughout the ages . . . is in reality an attribute of an enduring psychic existence of which the lives of individual organisms are but successive manifestations" (p. 377). The

same assemblage of facts which I regard as evidence of the instrinsic nature of the organism as a differentiated part of one natural order, is adduced by Mr. McDougall as evidence of the extrinsic inter-action of an animistic principle nowise "mechanistic" but essentially finalistic. So there the matter must rest. One can only say: *Utrum horum mavis accipe.*

We have come back into touch with the problems of mechanism and finalism; for the activity of the psycnic entity is essentially teleological. In three chapters of his work Mr. McDougall urges the inadequacy of mechanism for the interpretation of biological phenomena—in my judgment with complete success, since the term mechanism is restricted within the limits of physico-chemical processes. If the concept of mechanism be thus defined, then I can fully agree with Mr. McDougall and other vitalists that unquestionably a mechanistic interpretation of organic phenomena is inadequate. But it seems to me that there is a great leap from this sound basis to the conception of the soul as an independent psychical entity controlling phenomena—unless it be the leap from the natural ground of phenomena to their Source. In that case the whole problem has to be discussed on a different platform. Here I endeavour to keep on what I conceive to be the plane of scientific interpretation. And just as I hold that the scientific explanation of organic phenomena in terms of physics and chemistry, and in these terms only, is wholly inadequate; so do I regard the explanation of these phenomena in terms of finalism as wholly speculative—especially as Mr. McDougall himself says that "we have to confess that we cannot

form any conception of the way in which this teleological guidance of morphogenesis is affected" (p. 244); and Dr. Driesch tells us that "we are by no means able to understand" it "even in the slightest degree" (op. cit., ii. p. 143). If we could only consent to restrict the term finalism to the interpretation of psychological phenomena in which there is inferential evidence that some pre-perception of end is present, then for scientific interpretation the question would be:—What is the nature and value of such evidence in the case of morphogenesis? Here, of course, there is plenty of room for difference of opinion. But the issue would be clear and nowise ambiguous. As things are at present, an alternative seems to be presented in this form: there must be either mechanism or finalism; in organic phenomena physical and chemical mechanism is insufficient for interpretation; therefore these phenomena must be finalistic. But may there not be a great array of natural phenomena which are neither mechanistic, in the physico-chemical sense, nor finalistic in the sense of involving conscious pre-perception?

That, however, does not satisfy Mr. McDougall. He extends downward the teleological conception and teaches that "not only conscious thinking, but also morphogenesis, heredity and evolution are psycho-physical processes. All alike are conditioned and governed by psychical dispositions that have been built up in the experience of the race" (p. 379). Here the conscious relationship (however we interpret it) is co-extensive with life. As we have already seen, M. Bergson, on the one hand, and Professor Titchener, on the other hand, have given expression

to similar opinions. Paulsen and his school go further. In their doctrine, all modes of natural process involve relationships which, if not conscious, are at any rate of the conscious order. If this be so, "then we may assume that just as a system of impulses with corresponding feelings runs parallel with the vital processes in animal bodies, a similar but less highly developed inner life corresponds to plant life; and furthermore that something akin to this appears in the spontaneous movement of inorganic bodies, in chemical and crystalline processes, in processes of attraction and repulsion."[1]

One may here ask whether the suggested consciousness—or, at any rate, that which is of the conscious order—comprises anything analogous to pre-perception. I urged at the beginning of the fourth chapter, that the scientific evidence for consciousness is closely connected with the evidence for pre-perception, and that, where we may reasonably infer the guidance of behaviour by pre-perception, we may fairly assume conscious perception as its natural precursor. What evidence is there of pre-perception in chemical and crystalline processes, in processes of attraction and repulsion? It may be said that inorganic processes lead up to ends which we can in some measure foresee, and that the Source of these processes must therefore have some teleological pre-perception of the end to which nature is passing on in the course of evolution. That, however, I submit, is not the scientific question. The scientific question is whether in, let us say, the

[1] Paulsen, "Introduction to Philosophy," English translation by Frank Thilly (1907), p. 120.

crystalline process itself, there is a pre-perception of what is just coming based on some prior perception of what on a previous occasion has come. I do not think that we have any such evidence as science must demand, that this is the case. But this is by the way. Let us follow the course of the argument.

Paulsen leads up to his panpsychic doctrine through psychological considerations. I may perhaps be allowed to bring the question into line with my own method of treatment and to put the matter briefly thus:—If experience be a process, wherein lies the essential feature of the process? In experiencing, or in the experienced? In a sense we may reply: In both, since all that is experienced involves the correlative actual or possible experiencing. Now, psychologists tend to become members of one or other of two great schools. The adherents of the one school emphasize the "eds" of experience and are associationists and intellectualists; those of the other school emphasize the "ing" of experience and are, as the phrase goes, voluntaristic. They lay stress on impulse, and will, and conative tendency; they lay stress on the consciousness of process in progress. And this experiencing is, and is felt as, a unitary process in contradistinction to the manifold of "eds," relatively discrete, juxtaposed, or compounded. I hold that the voluntaristic school emphasize a fact of the utmost importance—the fact that we intuitively enjoy experiencing as such; that we are directly aware of the process and flow of the mental life. Paulsen was a voluntarist. And he made this the basis of his panpsychism. He urges that those who lay stress only on what is presented, or conceived or

otherwise knowledged (if I may be allowed the word) "will always find it impossible to conceive plants as psychical beings, or to consider the movements of inorganic beings to be the signs of psychical processes." What does this imply? It implies that all "processing" is of the same order, and always and everywhere of the conscious order—whether it be gravitating, or crystallizing, or organizing, or experiencing as we human folk experience. It involves the assumption that the constitutive ground of the natural order is throughout of such a character as to involve conscious, or quasi-conscious relationships.

Well, it may be so! Who can tell? Most of us have been tempted to indulge in such speculations.[1] But if we come to regard such a doctrine as somewhat too speculative within the bounds of a philosophy founded on science; if we cannot fully subscribe to panpsychism; if we feel that it is safer at present to assume that only some natural processes involve such conscious relationships as those of which we are ourselves aware; nay, more, if we go further and regard provisionally, profiting by experience as the best criterion we have of consciousness as an effective relationship, and believe that, in the higher vertebrates, this is correlated with physiological relationships in the cortex of the brain; may we not incorporate at any rate this result of such considerations as Paulsen voiced:—that just as experiencing is a unitary process, so is living a wider unitary process, and so too is the whole of nature a yet more basal unitary process? If we speak of the conscious relationship as a property of certain organisms under certain

[1] Cf., my "Animal Life and Intelligence" (1890), p. 467.

conditions, we must always remember that it is a consciousness not only of the related, but also of the process of relating. And if, as I have urged, instinctive experience implies the existence of a synthetic group of experienced items; it involves also the correlative synthetic process of experiencing; if it involves a primary form of conscious relationship to a given situation as experienced, it involves also a primary intuition (in M. Bergson's sense of the word) of the process of relating; and if in my interpretation it is based on organic foundations, those foundations are grounded in the constitution of the organism as a visible expression of that unitary process which we name living, as living itself is only a differentiation of that vast unitary process of which the contemplated order of nature is the product.

Further than this in a book the aim of which, however inadequately attained, is to deal with scientific problems in a scientific spirit, I am not prepared to go. Of the Source of phenomena it is not my province to treat. Science deals with process and its products as somehow existent. I have, throughout spoken of existent process as the ground of observed and observable phenomena. But of only one form or mode of process have we any direct conscious awareness—the process which we enjoy as we live. What, then, is the Source of process? That is a question for metaphysics, not for science. Can we identify ground and Source? Can we say that, in the enjoyment of process which is our conscious life, we are in merging unity with the Source of the universe? This metaphysical route leads up to the doctrine of immanence. Or shall we say that process

as given, implies a Source as Give? This route leads up to the doctrine of transcendence. But once more I urge that the man of science should leave these questions to be discussed by metaphysicians. Once more I urge that the more clearly we distinguish the scientific problems from the metaphysical problems the better it will be both for science and for metaphysics.

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