MIND AND MATTER

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To
my famous and
beloved friend
HANS HOFF
in deep devotion

CHAPTER I

The Physical Basis of Consciousness

THE PROBLEM

The world is a construct of our sensations, perceptions, memories. It is convenient to regard it as existing objectively on its own. But it certainly does not become manifest by its mere existence. Its becoming manifest is conditional on very special goings-on in very special parts of this very world, namely on certain events that happen in a brain. That is an inordinately peculiar kind of implication, which prompts the question: What particular properties distinguish these brain processes and enable them to produce the manifestation? Can we guess which material processes have this power, which not? Or simpler: What kind of material process is directly associated with consciousness?

A rationalist may be inclined to deal curtly with this question, roughly as follows. From our own experience, and as regards the higher animals from analogy, consciousness is linked up with certain kinds of events in organized, living matter, namely, with certain nervous functions. How far back or 'down' in the animal kingdom there is still some sort of consciousness, and what it may be like in its early stages, are gratuitous speculations, questions that cannot be answered and which ought to be left to idle dreamers. It is still more gratuitous to indulge in thoughts about whether perhaps other events as well, events in inorganic matter, let alone all material events, are in some way or other associated with consciousness. All this is pure fantasy, as irrefutable as it is unprovable, and thus of no value for knowledge.

He who accepts this brushing aside of the question ought to

be told what an uncanny gap he thereby allows to remain in his picture of the world. For the turning-up of nerve cells and brains within certain strains of organisms is a very special event whose meaning and significance is quite well understood. It is a special kind of mechanism by which the individual responds to alternative situations by accordingly alternating behaviour, a mechanism for adaptation to a changing surrounding. It is the most elaborate and the most ingenious among all such mechanisms, and wherever it turns up it rapidly gains a dominating role. However, it is not *sui generis*. Large groups of organisms, in particular the plants, achieve very similar performances in an entirely different fashion.

Are we prepared to believe that this very special turn in the development of the higher animals, a turn that might after all have failed to appear, was a necessary condition for the world to flash up to itself in the light of consciousness? Would it otherwise have remained a play before empty benches, not existing for anybody, thus quite properly speaking not existing? This would seem to me the bankruptcy of a world picture. The urge to find a way out of this impasse ought not to be damped by the fear of incurring the wise rationalists' mockery.

According to Spinoza every particular thing or being is a modification of the infinite substance, i.e. of God. It expresses itself by each of his attributes, in particular that of extension and that of thought. The first is its bodily existence in space and time, the second is – in the case of a living man or animal – his mind. But to Spinoza any inanimate bodily thing is at the same time also 'a thought of God', that is, it exists in the second attribute as well. We encounter here the bold thought of universal animation, though not for the first time, not even in Western philosophy. Two thousand years earlier the Ionian philosophers acquired from it the surname of *hylozoists*. After Spinoza the genius of Gustav Theodor Fechner did not shy at attributing a soul to a plant, to the earth as a celestial body, to the planetary system, etc. I do not fall in with these fantasies, yet I should not like to have to pass judgment as to who has

come nearer to the deepest truth, Fechner or the bankrupts of rationalism.

A TENTATIVE ANSWER

You see that all the attempts at extending the domain of consciousness, asking oneself whether anything of the sort might be reasonably associated with other than nervous processes, needs must run into unproved and unprovable speculation. But we tread on firmer ground when we start in the opposite direction. Not every nervous process, nay by no means every cerebral process, is accompanied by consciousness. Many of them are not, even though physiologically and biologically they are very much like the 'conscious' ones, both in frequently consisting of afferent impulses followed by efferent ones, and in their biological significance of regulating and timing reactions partly inside the system, partly towards a changing environment. In the first instance we meet here with the reflex actions in the vertebral ganglia and in that part of the nervous system which they control. But also (and this we shall make our special study) many reflexive processes exist that do pass through the brain, yet do not fall into consciousness at all or have very nearly ceased to do so. For in the latter case the distinction is not sharp; intermediate degrees between fully conscious and completely unconscious occur. By examining various representatives of physiologically very similar processes, all playing within our own body, it ought not to be too difficult to find out by observation and reasoning the distinctive characteristics we are looking for.

To my mind the key is to be found in the following well-known facts. Any succession of events in which we take part with sensations, perceptions and possibly with actions gradually drops out of the domain of consciousness when the same string of events repeats itself in the same way very often. But it is immediately shot up into the conscious region, if at such a repetition either the occasion or the environmental conditions met with on its pursuit differ from what they were on all the previous incidences. Even so, at first anyhow, only

those modifications or 'differentials' intrude into the conscious sphere that distinguish the new incidence from previous ones and thereby usually call for 'new considerations'. Of all this each of us can supply dozens of examples out of personal experience, so that I may forgo enumerating any at the moment.

The gradual fading from consciousness is of outstanding importance to the entire structure of our mental life, which is wholly based on the process of acquiring practice by repetition, a process which Richard Semon has generalized to the concept of *Mneme*, about which we shall have more to say later. A single experience that is never to repeat itself is biologically irrelevant. Biological value lies only in learning the suitable reaction to a situation that offers itself again and again, in many cases periodically, and always requires the same response if the organism is to hold its ground. Now from our own inner experience we know the following. On the first few repetitions a new element turns up in the mind, the 'already met with' or 'notal' as Richard Avenarius has called it. On frequent repetition the whole string of events becomes more and more of a routine, it becomes more and more uninteresting, the responses become ever more reliable according as they fade from consciousness. The boy recites his poem, the girl plays her piano sonata 'well-nigh in their sleep'. We follow the habitual path to our workshop, cross the road at the customary places, turn into side-streets, etc., whilst our thoughts are occupied with entirely different things. But whenever the situation exhibits a relevant differential – let us say the road is up at the place where we used to cross it, so that we have to make a detour – this differential and our response to it intrude into consciousness, from which, however, they soon fade below the threshold, if the differential becomes a constantly repeated feature. Faced with changing alternatives, bifurcations develop and may be fixed in the same way. We branch off to the University Lecture Rooms or to the Physics Laboratory at the right point without much thinking, provided that both are frequently occurring destinations.

Now in this fashion differentials, variants of response, bifurcations, etc., are piled up one upon the other in unsurveyable abundance, but only the most recent ones remain in the domain of consciousness, only those with regard to which the living substance is still in the stage of learning or practising. One might say, metaphorically, that consciousness is the tutor who supervises the education of the living substance, but leaves his pupil alone to deal with all those tasks for which he is already sufficiently trained. But I wish to underline three times in red ink that I mean this only as a metaphor. The fact is only this, that new situations and the new responses they prompt are kept in the light of consciousness; old and well practised ones are no longer so.

Hundreds and hundreds of manipulations and performances of everyday life had all to be learnt once, and that with great attentiveness and painstaking care. Take for example a small child's first attempts in walking. They are eminently in the focus of consciousness; the first successes are hailed by the peformer with shouts of joy. When the adult laces his boots, switches on the light, takes off his clothes in the evening, eats with knife and fork . . ., these performances, that all had to be toilsomely learnt, do not in the least disturb him in the thoughts in which he may just be engaged. This may occasionally result in comical miscarriages. There is the story of a famous mathematician, whose wife is said to have found him lying in his bed, the lights switched off, shortly after an invited evening party had gathered in his house. What had happened? He had gone to his bedroom to put on a fresh shirt-collar. But the mere action of taking off the old collar had released in the man, deeply entrenched in thought, the string of performances that habitually followed in its wake.

Now this whole state of affairs, so well known from the *ontogeny* of our mental life, seems to me to shed light on the *phylogeny* of unconscious nervous processes, as in the heart beat, the peristalsis of the bowels, etc. Faced with nearly constant or regularly changing situations, they are very well and reliably practised and have, therefore, long ago dropped from the sphere of consciousness. Here too we find intermediate grades,

for example, breathing, that usually goes on inadvertently, but may on account of differentials in the situation, say in smoky air or in an attack of asthma, become modified and conscious. Another instance is the bursting into tears for sorrow, joy or bodily pain, an event which, though conscious, can hardly be influenced by will. Also comical miscarriages of a mnemically inherited nature occur, as the bristling of the hair by terror, the ceasing of secretion of saliva on intense excitement, responses which must have had some significance in the past, but have lost it in the case of man.

I doubt whether everybody will readily agree with the next step, which consists in extending these notions to other than nervous processes. For the moment I shall only briefly hint at it, though to me personally it is the most important one. For this generalization precisely sheds light on the problem from which we started: What material events are associated with, or accompanied by, consciousness, what not? The answer that I suggest is as follows: What in the preceding we have said and shown to be a property of nervous processes is a property of organic processes in general, namely, to be associated with consciousness inasmuch as they are new.

In the notion and terminology of Richard Semon the ontogeny not only of the brain but of the whole individual soma is the 'well memorized' repetition of a string of events that have taken place in much the same fashion a thousand times before. Its first stages, as we know from our own experience, are unconscious – first in the mother's womb; but even the ensuing weeks and months of life are for the greatest part passed in sleep. During this time the infant carries on an evolution of old standing and habit, in which it meets with conditions that from case to case vary very little. The ensuing organic development begins to be accompanied by consciousness only inasmuch as there are organs that gradually take up interaction with the environment, adapt their functions to the changes in the situation, are influenced, undergo practice, are in special ways modified by the surroundings. We higher vertebrates possess such an organ mainly in our nervous system. Therefore consciousness is associated with those of its

functions that adapt themselves by what we call experience to a changing environment. The nervous system is the place where our species is still engaged in phylogenetic transformation; metaphorically speaking it is the 'vegetation top' (*Vegetationsspitze*) of our stem. I would summarize my general hypothesis thus: consciousness is associated with the *learning* of the living substance; its *knowing how* (*Können*) is unconscious.

ETHICS

Even without this last generalization, which to me is very important but may still seem rather dubious to others, the theory of consciousness that I have adumbrated seems to pave the way towards a scientific understanding of ethics.

At all epochs and with all peoples the background of every ethical code (*Tugendlehre*) to be taken seriously has been, and is, self-denial (*Selbstüberwindung*). The teaching of ethics always assumes the form of a demand, a challenge, of a 'thou shalt', that is in some way opposed to our primitive will. Whence comes this peculiar contrast between the 'I will' and the 'thou shalt'? Is it not absurd that I am supposed to suppress my primitive appetites, disown my true self, be different from what I really am? Indeed in our days, more perhaps than in others, we hear this demand often enough mocked at. 'I am as I am, give room to my individuality! Free development to the desires that nature has planted in me! All the shalls that oppose me in this are nonsense, priests' fraud. God is Nature, and Nature may be credited with having formed me as she wants me to be.' Such slogans are heard occasionally. It is not easy to refute their plain and brutal obviousness. Kant's imperative is avowedly irrational.

But fortunately the scientific foundation of these slogans is worm-eaten. Our insight into the 'becoming' (*das Werden*) of the organisms makes it easy to understand that our conscious life – I will not say shall be, but that it actually is necessarily a continued fight against our primitive ego. For our natural self, our primitive will with its innate desires, is obviously the

mental correlate of the material bequest received from our ancestors. Now as a species we are developing, and we march in the front-line of generations; thus every day of a man's life represents a small bit of the evolution of our species, which is still in full swing. It is true that a single day of one's life, nay even any individual life as a whole, is but a minute blow of the chisel at the ever unfinished statue. But the whole enormous evolution we have gone through in the past, it too has been brought about by myriads of such minute chisel blows. The material for this transformation, the presupposition for its taking place, are of course the inheritable spontaneous mutations. However, for selection among them, the behaviour of the carrier of the mutation, his habits of life, are of outstanding importance and decisive influence. Otherwise the origin of species, the ostensibly directed trends along which selection proceeds, could not be understood even in the long spaces of time which are after all limited and whose limits we know quite well.

And thus at every step, on every day of our life, as it were, something of the shape that we possessed until then has to change, to be overcome, to be deleted and replaced by something new. The resistance of our primitive will is the psychical correlate of the resistance of the existing shape to the transforming chisel. For we ourselves are chisel and statue, conquerors and conquered at the same time – it is a true continued 'self-conquering' (*Selbstüberwindung*).

But is it not absurd to suggest that this process of evolution should directly and significantly fall into consciousness, considering its inordinate slowness not only compared with the short span of an individual life, but even with historical epochs? Does it not just run along unnoticed?

No. In the light of our previous considerations this is not so. They culminated in regarding consciousness as associated with such physiological goings-on as are still being transformed by mutual interaction with a changing environment. Moreover, we concluded that only those modifications become conscious which are still in the stage of being trained, until, in a much later time, they become a hereditarily fixed,

well-trained and unconscious possession of the species. In brief: consciousness is a phenomenon in the zone of evolution. This world lights up to itself only where or only inasmuch as it develops, procreates new forms. Places of stagnancy slip from consciousness; they may only appear in their interplay with places of evolution.

If this is granted it follows that consciousness and discord with one's own self are inseparably linked up, even that they must, as it were, be proportional to each other. This sounds a paradox, but the wisest of all times and peoples have testified to confirm it. Men and women for whom this world was lit in an unusually bright light of awareness, and who by life and word have, more than others, formed and transformed that work of art which we call humanity, testify by speech and writing or even by their very lives that more than others have they been torn by the pangs of inner discord. Let this be a consolation to him who also suffers from it. Without it nothing enduring has ever been begotten.

Please do not misunderstand me. I am a scientist, not a teacher of morals. Do not take it that I wish to propose the idea of our species developing towards a higher goal as an effective motive to propagate the moral code. This it cannot be, since it is an unselfish goal, a disinterested motive, and thus, to be accepted, already presupposes virtuousness. I feel as unable as anybody else to explain the 'shall' of Kant's imperative. The ethical law in its simplest general form (be unselfish!) is plainly a fact, it is there, it is agreed upon even by the vast majority of those who do not very often keep it. I regard its puzzling existence as an indication of our being in the beginning of a biological transformation from an egoistic to an altruistic general attitude, of man being about to become an *animal social.* For a solitary animal egoism is a virtue that tends to preserve and improve the species; in any kind of community it becomes a destructive vice. An animal that embarks on forming states without greatly restricting egoism will perish. Phylogenetically much older state-formers as the bees, ants and termites have given up egoism completely. However, its next stage, national egoism or briefly nationalism, is still in full swing with them. A

worker bee that goes astray to the wrong hive is murdered without hesitation.

Now in man something is, so it seems, on the way that is not infrequent. Above the first modification clear traces of a second one in similar direction are noticeable long before the first is even nearly achieved. Though we are still pretty vigorous egoists, many of us begin to see that nationalism too is a vice that ought to be given up. Here perhaps something very strange may make its appearance. The second step, the pacification of the struggle of peoples, may be facilitated by the fact that the first step is far from being achieved, so that egoistic motives still have a vigorous appeal. Each one of us is threatened by the terrific new weapons of aggression and is thus induced to long for peace among the nations. If we were bees, ants or Lacedaemonian warriors, to whom personal fear does not exist and cowardice is the most shameful thing in the world, warring would go on for ever. But luckily we are only men – and cowards.

The considerations and conclusions of this chapter are, with me, of very old standing; they date back more than thirty years. I never lost sight of them, but I was seriously afraid that they might have to be rejected on the ground that they appear to be based on the 'inheritance of acquired characters', in other words on Lamarckism. This we are not inclined to accept. Yet even when rejecting the inheritance of acquired characters, in other words accepting Darwin's Theory of Evolution, we find the behaviour of the individuals of a species having a very significant influence on the trend of evolution, and thus feigning a sort of sham-Lamarckism. This is explained, and clinched by the authority of Julian Huxley, in the following chapter, which, however, was written with a slightly different problem in view, and not just to lend support to the ideas put forward above.