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1 • Sherringtonian Alternatives—Two Fundamental Elements or Only One?

My professional career was shaped, I suppose, in the neurophysiological laboratory of Professor Sherrington at Oxford. Eventually it was continued in the wards and operating rooms of the Montreal Neurological Institute. Other preoccupations were many and varied, but beneath them all was the sense of wonder and a profound curiosity about the mind. My planned objective, as I turned from studying the animal brain to that of man, was to come to understand the mechanisms of the human brain and to discover whether, and perhaps how, these mechanisms account for what the mind does.

My teacher, Sir Charles Sherrington, received the Nobel Prize for his studies of reflexes and his analysis of the integrative action of the nervous system. His interest had been focused largely on the inborn reflexes, but, on retiring from the Chair of Physiology at Oxford in 1935, at the age of seventy-eight, he turned from animal experimentation to a scholarly and philosophical consideration of the brain and the mind of man.*

In the end, he could only say that “we have to regard the relation of mind to brain as still not merely unsolved, but still devoid of a basis for its very beginning.” In June 1947, he wrote a foreword to his book, *The Integrative Action of the Nervous System*, which was then being republished in his honor by the Physiological Society.³² The

* In 1937–1938, he delivered the Scottish Gifford Lectures, and published them in 1940 under the title *Man—On His Nature*.³¹ (Throughout the book, these superscript numerals refer to the numbered entries in the Bibliography, which follows the Afterthoughts.)

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last paragraph of his foreword expresses his conclusion of it all:

That our being should consist of two fundamental elements offers, I suppose, no greater inherent improbability than that it should rest on one only.

It is a quarter of a century since Sherrington wrote these words. We have learned a good deal about man since then, and it is exciting to feel, as I do, that the time has come to look at his two hypotheses, his two “improbabilities.” Either brain action explains the mind, or we must deal with two elements.*

Perhaps we may take a step toward understanding, if we strive to fit each of the two hypotheses in turn to the physiological evidence that presents itself today. A good scientist is neither a monist nor a dualist while conducting his research. His chosen task is to explain everything he can by critical examination of nature and of the brain, and by planned experimentation. He will account, thus, for what he can about the universe and about man himself, having put his preconceptions out of mind. But he must stop to reconsider, too, and to rationalize from time to time.

Lord Adrian, who shared the Nobel Prize with Sherrington, spoke as a neurophysiologist in 1966 when he said: “As soon as we let ourselves contemplate our own place in the picture, we seem to be stepping outside of the boundaries of natural science.” I agree with him; nevertheless, we must step across that boundary from time to

* Sherrington did not consider the third hypothesis, proposed by Bishop Berkley, that there was only one element, the mind, which explained all. The Berklian explanation assumed that matter had no existence except for its place in the mind.

time, and there is no reason to assume that critical judgment does not go with us.

Writing this book presents the author with a very exciting challenge. Accepting this, I can only give an account of my own experience, describing it simply for the clinician, the physiologist, the philosopher, and the interested layman, with apologies to each for the fact that I have not written for him separately.

A remarkable body of material has come into my hands and I have stumbled on exciting discoveries. I did summarize the material and I recorded it during and at the close of my professional career. But I turned then with great enthusiasm to authorship of another sort, perhaps unwisely. Perhaps it is one's duty to do more than make a record. In answer, I may plead that I can see it all in more mature perspective after an interval, even in the seventh and eighth decades. Is it an effort, if I may paraphrase Hamlet, to lay a "flattering unction to my soul"?

However that may be, as I turn back now to the material and reconsider a life's experience, I seem to see more clearly and understand a little better. So, I shall give the reader a brief account of this pilgrim's progress. It is a story of stumbling upon unexpected revelations, of consequent puzzlement and misconception, and of reaching higher ground to look out on thrilling new vistas of understanding. In the end I shall draw conclusions that are scientific, and present hypotheses that are obvious. After that, because these data are important in other disciplines of thought, I shall pass on to rationalization and a consideration of man's being from the point of view of a layman, and, as far as I can understand it, the point of view of philosopher and even theologian.

Can the brain explain the man? Can the brain achieve by neuronal action all that the mind accomplishes? The

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evidence that a clinical physiologist can gather should help to answer these questions in the end.

To see the problem of the nature of the mind more clearly, consider with me this universe of ours in long perspective. It was only after the middle millennia that life appeared—first in unicellular organisms, then gradually in more and more complicated forms, first in the sea and then on the land. It was a very recent event, as seen in this long perspective, when evidence appeared of the individual's self-awareness and purpose. Today man, with his amazing mind and his vastly complicated brain, seeks to understand the universe about him, and even the nature of life and of consciousness.

Physiologists have thrown what light they could on these things from their study of mechanisms within the body and the brain in higher and lower living organisms. They have studied sensation and movement, reflex action, and memory and behavior. Karl Lashley⁷ spent thirty years of his industrious life striving to discover the nature of the "memory trace" in the animal brain, beginning with experimental investigations of the rat's brain and ending with the chimpanzee. He was hunting for the engram, the record; that is to say: "the structural impression that psychical experience leaves on protoplasm." He failed to find it and ended by laughing cynically at his own effort and by pretending to question whether, after all, it was possible for animals or even man to learn at all.

But consciousness and the relationship of mind to brain are problems difficult to study in animals. Clinical physicians, on the other hand, in their approach to man, may hope with reason to push on toward an understanding of the physiology of memory and the physical basis of the mind and of consciousness.

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