Key discovery

Chemical Transmission of Nerve Impulses: A Historical Sketch. By Z. M. Bacq. Pp. 106. (Pergamon: Oxford and New York, 1975.) £6 net.

THIS translation of Professor Bacq's book was distributed by the publishers free of charge (in a paper-bound version) to 500 participants at the Dale Centennial Symposium of the Physiological Society in 1975. It is a pity that the hardback volume now published is so expensive and that the paperback version has not been made generally available, because the book is a delight to read and is more important than its small size implies. The discovery of the chemical transmission of nervous impulses must surely rank as one of the major discoveries in the biological sciences and so a brief account of the experiments and personalities behind the discovery is very welcome. Professor Bacq was himself involved in some of the early work with Cannon, Fredericq and Dale, and so his book is of especial value. He frankly admits that he is writing a personal view and I suspect that others who were involved in the research would not always agree with him. The virtue of this slightly subjective view of history, however, is that it involves the reader in the spirit of the time and gives him a real feeling for the excitement of discovery.

The first two very short chapters introduce the topic for the non-biologist; then we are told a little about the early workers who clearly expressed the hypothesis of chemical transmission but were unable to do experiments that satisfied the sceptics of the time.

In his description of the discovery of cholinergic transmission, the author raises a few doubts about some aspects of the autobiographical sketch which Loewi wrote in 1960 (at the age of 80). Bacq goes on to state: "The great merit of this exceptional man [Loewi] was his ability to follow a logical course and to accumulate convincing experimental evidence without paying too much attention to the criticisms of his theory". A few of Feldberg's beautiful experiments are then described, which are as convincing as any of Loewi's and which were carried out on the living animal.

Credit for the first experiment which showed that a chemical substance is involved in transmission of impulses from one nerve to another nerve (in the superior cervical ganglion) is given to Kibjakow (1933). Kibjakow's elegant experiment did not, however, throw any light on the nature of the substance released from the preganglionic fibre; it was Feldberg and Gaddum who proved that it is acetylcholine. Bacq's account of transmission to striated muscle is strangely incomplete, for he does not mention the critical experiments of Dale, Feldberg and Vogt (1936) in which they identified acetylcholine in the perfusates from several voluntary muscles after stimulation of the motor nerves.

The account of the author's own experiments with Cannon on adrenergic transmission is not only fascinating but serves to correct those who judge Cannon's work only by his entanglement in the erroneous hypothesis (attributed by Bacq to Rosenbluth) concerning 'sympathin E and I'.

Perhaps the most amazing story in the book is to be found in the chapter describing the opposition by Eccles and Heymans to the idea of chemical transmission. The reader becomes a little sceptical about Eccles' use of Popper's philosophy to 'explain' his reluctance to accept sound experimental evidence over almost a decade.

Bacq's book should be read by all students of physiology, especially those intending to do research in the neurosciences. It is not, and does not pretend to be, a complete and objective history of the subject. One can only hope that this vivid account will provoke others who participated in the research to write down their recollections. Then, one day, the full story of this key discovery of modern biology will perhaps be written.

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Classic physics

Three Phases of Matter. By Alan J. Walton. Pp. xiii+492. (McGraw-Hill: London and New York, June 1976.) Hardcovers £15; softcovers £5.95.

THIS text is suitable for students embarking on science courses with a major or minor element of physics at University (or equivalent) level. It had its origins at Sussex where—I must here declare my interest—I worked briefly with the author in a lecturing double-act. Many of the arguments developed in the book had already taken shape then (1969) but the experience of the Open University, with its disciplines of clarity of presentation, has had a strong and beneficial effect.

The subject matter is the classic, if recently less fashionable, one of solids, liquids and gases. The style (quasi-conversational he calls it) is inimitable Walton. It is used to convey the impression that the author stands outside the 'establishment' as a sort of wise uncle always trying to bring an argument down to earth by relating it to everyday experience. "As is often the case," he says, "one can learn much from analogues." In fact the dependence on analogues and other physical models is very great.

Much basic groundwork is covered in the first three chapters (the p–V–T surface, characterising atoms, temperature) before the three phases (three chapters on gases, four on solids, two on liquids) are discussed. Very little previous physical knowledge is assumed or needed and the mathematics is kept to a minimum, although even that minimum is in places demanding as, for example, in the one-dimensional coupled oscillator model of a solid. There are liberal supplies of exercises and problems, with comments and/or answers.

The extreme care with which physical ideas are usually introduced and used is a feature of the presentation. I can't say that I would always agree with the author, and I feel that most readers will find parts which they find unnecessarily idiosyncratic and perhaps condescending. I read the book from cover to cover and I liked it. I hope there is a market for it.

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