Fresh swine thyroids were used and the isolations were made according to the method of DOUNCE AND BEYER[6] which was modified for the present purposes. Individual fractions containing pure nuclei, mitochondria, visible microsomes, and cytoplasm were isolated by differential centrifugation in a series of experiments. Thyroxine, diiodotyrosine, both pentose and desoxypentose nucleic acid (PNA and DNA) were found to be present in variable amounts within all the fractions. In respect of the percentage distribution, the majority of thyroxine and diiodotyrosine are held in the cytoplasmic fraction, but both compounds are present in greater quantity inside of the nucleus as in the chondriome:

TABLE I

Fraction	Thyroxine mg/100 g of dry gland	Diiodotyrosine mg/100 g of dry gland
Nuclei	4.85	8.07
Total chondriome	0.97	1.04
Cytoplasm	145.12	165.52

From this fact some conclusions concerning the origin of the secretion and the rôle of the cell nucleus in sense of the "nuclear theory" can be drawn. These conclusions will be given together with a detailed description of the present experiments in a subsequent paper.

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QUATERNARY AMMONIUM SALTS AS INHIBITORS OF ACETYLCHOLINESTERASE

by

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Previous investigations on acetylcholinesterase[1,2,3] have revealed that the active surface of the enzyme contains an "esteratic" group, surrounded by—at least—two negative charges of unit magnitude. This led us to the assumption that the esteratic group is similar in all esterases and that the specificity of the true choline esterase is a result of the strong negative field at the active surface. This has now been tested by comparing various types of inhibitors on the latter enzyme and on liver esterase. Quaternary ammonium salts which act on cholinesterase as reversible, competitive inhibitors by blocking the approach of acetylcholine to the negative sites, are ineffective on liver esterase,

irrespective of the charged or uncharged character of the substrate. On the other hand, organic phosphates (TEPP) behave similarly towards both enzymes. This again led to the prediction that quaternary ammonium salts should be non-competitive inhibitors for ACh esterase, when a neutral ester is used as substrate. Experiments with tetraethylammonium bromide as inhibitor for the hydrolysis of diacetine or ethyl acetate reveal, however, that the opposite is true: inhibition even in this case is clearly competitive.

A clue to this paradoxical behaviour lies in the observation that tetraethylammonium is about 4 times more effective than the tetramethyl derivative, although Coulombic forces are much stronger for the smaller ion. It is concluded that unspecific Van der Waals-type forces play a decisive role in the combination of quaternary ammonium salts with ACh esterase. This leads to a new conception of the function of cholinesterase in the nerve membrane during the conductive process.

A full account of this work will appear in this Journal.

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BOOK REVIEWS

Cell Physiology and Pharmacology by J. F. DANIELLI, Elsevier Publishing Co., New York, Amsterdam, 1951. x and 156 pp., 22 tables, 30 illustrations, $ 3.00.

Professor DANIELLI's book *Cell Physiology and Pharmacology* is the result of his great experience as a scientist: during the war of 1939–1945, he had to face the practical problems encountered when a search is being made for a new drug and he felt how necessary it is—both for chemists and biologists—to have a knowledge of the biological aspect of the question of drug action, in order to avoid a waste of time in synthesizing and testing inactive compounds.

In the first chapter of his book, the author gives as a definition of the living cell: "a dynamic system organised for a constant activity and not a static system of a definite microscopical structure" and considers it as a physico-chemical unit. Then in the 2nd, 3rd, 4th, and 5th chapters, he describes the action of drugs on the cell. He first considers the cell in the toxic medium and shows the action of the drug on the external surface of the cell (surface reactions), the penetration of the drug through the cellular membranes (connections between membrane permeability and physico-chemical structure of the drug), and finally the access of the drug to the organs. In the cell, the drug then acts on the enzymic systems, that is to say that practically all the physiological activity of the cell is involved. All these problems are illustrated by a great number of examples, chosen from the author's own researches or taken from the most recent scientific data of other workers; the theories concerning the action of vesicants and narcotics in particular are set out in detail.

In the last chapter, the author comes to the nature of the biological response of cells to drugs and he stresses the fact that the response of a cell or a tissue to a great number of stimulating agents (still acting on different cellular systems) is characteristic of the particular design of the cell involved and not necessarily of the nature of the stimulus. He examines in detail a number of types of biological response: Artificial parthenogenesis, mitotic abnormalities, response of genetic systems to drugs. All these examples concern problems which are actually at the centre of scientific interest and form a fascinating last chapter for this book.

In our present state of the knowledge, when many kinds of biological problems may be capable of study at cell level, such a book had to be written and we must be grateful to Professor DANIELLI for this one. It will certainly be very helpful for the scientist interested in new drugs, but above all, it will be of especial value for biologists who will find in it many original ideas and hypotheses for their work. The direct and living form of this book will be greatly appreciated, due to the fact that the author constantly refers to concrete examples and experimental results, Only a great scientific culture and extensive experience in research has made it possible.

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