

more information about the circumstances in which it was found. At Hasanlu, for example, there was a wonderful opportunity to investigate strata in which a highly distinctive form of pottery belonging to the early centuries of the first millennium occurs. The chance has been missed, and the publication of the pottery itself can only be called inadequate. Sir Aurel should have allotted more

space to Mr. Andrews for technical descriptions, in the manner which can alone satisfy scientific requirements.

On the whole, then, this book from a veteran's hand will prove a disappointment to students; lovers of travellers' books will find it admirable. The publishers have made it a pleasant book to handle and read. SIDNEY SMITH.

## CELL "RADIATIONS"

### The Secret of Life

Cosmic Rays and Radiations of Living Beings. By Georges Lakhovsky. Translated from the French by Mark Clement. Pp. viii + 201. (London: William Heinemann (Medical Books), Ltd., 1939.) 10s. 6d. net.

GEORGES LAKHOVSKY is an engineer who, struck by the idea that radiation might be concerned in the peculiar phenomena of life, formulated a hypothesis and has collected evidence in support of his views. Reduced to its simplest terms his theory is that the cell, as the unit of life, is an electromagnetic resonator, capable of emitting and absorbing radiations of very high frequency, that life is the harmony of multiple radiations of all the cells in a body reacting upon one another, and that disease is a disequilibrium introduced from outside into the cell-harmony.

There is evidence that certain creatures are susceptible to vibrations beyond human sensitivity, and even that some may emit such vibrations; but the author's knowledge of animal life is so limited that improbable examples are mixed indiscriminately with probable. For example, he suggests that lemmings occasionally require fishes for food, and on that assumption he explains the migrations of lemmings, which may reach the sea, as being the response to radiations from shoals of marine fishes (p. 36). Response is due to auto-electricity produced by an animal when it waves its tail in the air; the lemmings would have difficulty in performing that feat. The zoological standard is suggested by "amongst nocturnal birds let us take the bat as an example" (p. 35), or by the inaccurate statement that terns (called sterns) perform a series of circular movements in the air before alighting to fish in the waves (p. 46), though the translator is responsible for the "alighting", which is not expressed in the original text.

The theory, however, is based upon the structure of the cell and by that must be tested. The nucleus is said to be the seat of radiation. This is

due to the chromosomes or nuclear filament, described as tubular, composed of a core of organic materials or mineral conductors surrounded by an insulating membrane of cholesterol, plastin and other dielectric substances; so that the twisted coil constitutes an electric circuit endowed by construction with self-inductance and capacity, which may be compared to an oscillating circuit. The description is so far removed from known facts, and the illustrations of chromosomes which accompany it are so crude, that even in this matter, all-important from the point of view of the hypothesis, the knowledge of the author becomes suspect; and the suspicion is confirmed almost on the next page where a description and a figure said to be of *Corynactis viridis*, a "marine organism measuring but 0.1 mm.", is no more than part of a stinging cell of that sea-anemone, and the "oscillating circuits" are the thread of the enidocyst, the primary purpose of which has certainly nothing to do with emitting radiations.

It may be that cells emit and receive radiations, but the hypothesis is not substantiated by these tenuous speculations. Since the basis of the theory fails, it seems unnecessary to examine the other claims of its author. His multiple wave oscillator, to which a special appendix is given, may work and apparently has worked marvellous cures in cases of cancer, goitre and enlarged prostate, but that does not prove that its electric radiations acted upon hypothetical cell-oscillations; nor is his statement that fever causes the death of cells by "melting" the insulating membrane of nuclear filaments likely to be taken seriously.

We have discussed the weaknesses of this revelation of the secret of life at more length than may seem necessary, because the author and his translator consider that biologists and particularly British biologists have neglected the theory. The translator suggests that the backing of Prof. d'Arsonval indicates exceptional merits in the work; but it is only fair to say that d'Arsonval's preface is frankly non-committal.

JAMES RITCHIE.