

Dr. Brill admitted that the cases he described were not to be distinguished from classical typhus in respect of their symptoms. But he was impressed by the facts that none were fatal and that there was no evidence of contagion amongst them. Curiously enough, Brill, while emphasizing the latter point, entitled his paper "An acute infectious disease of unknown origin" (the italics are mine).

The so-called "tropical" typhus was also separated from classical typhus by its mildness and apparent non-infectivity. But Fletcher and Lesslar, who first drew attention to it, admitted that as regards the symptoms it could not be distinguished from classical typhus. Yet since they first described it in the Federated Malay States the disease has become as fatal there, if not more so, than classical typhus used to be in England. During the year April 1st, 1930, to March 31st, 1931, there were notified in those States 106 cases with fourteen deaths, which gives a fatality of 13.2 per cent. I may add that fatal cases of Brill's disease have been observed to occur in the United States of America. Since typhus ceased to be epidemic or endemic in London, isolated cases have from time to time appeared in that city.

May I take this opportunity of drawing the attention of those who are interested to another question—namely, What value is to be attached to the figures of the notifications and deaths in various diseases which appear in the Monthly Epidemiological Reports of the Health Section of the Secretariat of the League of Nations? The typhus returns for the Federated Malay States are a case in point. They were first given in No. 119 (October 15th, 1928). They related to notified cases dating back to the second quarter of 1927. I have extracted the figures as they are given in the Monthly Reports from No. 119 onwards, and from them it appears that there were no cases during the last three quarters of 1927, and only one during the year 1928. Yet according to a table given on page 479 of No. 133 (a number which contained a special article on typhus), confirmed by a statement made on page 493, there were eighty-four cases notified during 1927, and fifty-seven during 1928. It is disconcerting to find such discrepancies in an official publication of so important a body as the League of Nations. I may add that I received private information a year or two ago that the League's returns relating to small-pox in a certain African territory were by no means to be relied upon.—I am, etc.,

West Hampstead, N.W., Nov. 16th.

E. W. GOODALL.

#### "WHAT IS LIFE?"

SIR,—I have tried to point out in my little book, the *Philosophy of a Biologist*, that loss and replacement ceaselessly go on, both in living and in dead substances. If the organisms of a species show individualism, so do atoms; chemical and physical constants are merely statistical averages of an infinite number of individuals summarizing a variable population. Atoms, no less than organisms, may retain their identity in spite of ceaseless change; each instant activity of either atom or living cell is creative; the identity swings about a mean and is never the same for two moments. To the claim that "there is present in the living thing an active principle organizing it to carry out a set of self-interested purposive actions" science answers: Can we deny self-interested purposive action to the spontaneous emission of alpha particles from radium and the play of protons and electrons? Professor Haldane himself has said that "modern physical investigation of the atom and molecules seemed to be endowing them with something very like an individual life." Each atom of a crystal or of a drop of water is complex, active, evolving, unknowable in ultimate nature as is a living cell. Progress is made and tested

by experimental operations, and theory based on operation and observation has led astronomers, physicists, and biologists over and over again to fresh operation and observation and to new discovery. Let us, while reverencing the infinite unknowable "power behind the sun," get on with our operations and observation which yield fruitful results alike for dead and living substances.—I am, etc.,

LEONARD HILL.

#### INJECTION OF LIPIODOL

SIR,—I can fully endorse Messrs. Philip Franklin and Alexander Orley regarding the advantages of their method of injecting lipiodol into the bronchi (November 7th, p. 847). When watching Mr. I. W. Magill administer an intratracheal anaesthetic on one of the patients I was struck by the ease with which he introduced a soft catheter into the trachea, via the nose, without any apparatus or preparation, except spraying the nasal passage and pharynx with cocaine solution. For the past three or four months I have been using this method for introducing lipiodol, and my house-physician, Mr. N. S. Plummer, has also used the method on a number of patients at Guy's Hospital. The method has proved easy and successful in dealing with men, but we have found it more difficult in the case of women, and have once or twice failed, probably because the passages in their upper respiratory tracts are smaller. In general, I find that this method causes the patient less discomfort and tedium than any of the others that I have employed.—I am, etc.,

London, W.1.

GEOFFREY MARSHALL.

#### TOXINS AND ENZYMES

SIR,—In Dr. Woodcock's interesting letters on the distinction between toxins and enzymes a definition of a "true toxin" is attempted. In his letter published on October 17th a "true toxin" is described as "poisonous" and "deadly," and the further statement is made that a toxin cannot be regarded "as imposing an altered mode of functioning upon a cell; it just poisons it, kills it, and that is the end." This rather arbitrary summing-up leaves us still unenlightened as to the mode of death of the cell. If the inquest on the cell is pursued a little further, fresh light is shed on the relation between toxins and enzymes.

Coca (*Journ. Infect. Dis.*, 1915) has shown that the haemolytic toxin of cobra venom is a fat-splitting enzyme—a lipase. This lipase breaks up the lecithin of the red blood corpuscle into oleic acid and desoleolecithin; both these substances disrupt the blood cell. Dr. Woodcock suggests that bacteriolysin may be classed as an "abnormal" enzyme. It may be claimed that toxins can also be grouped under the heading of enzymes, their peculiar or "abnormal" feature being the production of antibodies when injected into animals. Anti-enzymes as well as antitoxins exist naturally; witness the anti-trypsin in normal serum. There is some evidence that anti-enzymes appear after the injection of enzymes into animals (Luers and Albrecht, 1926), but the work is not accepted as free from error by Haldane (*Enzymes*, p. 165).

Locke and Main (*Journ. Infect. Dis.*, 1931) have pointed out that selective specificity is characteristic of both enzymes and toxins. They have demonstrated the resemblance between the properties of neurotoxin, oxidase, and erepsin on the one hand, and haemotoxin, dehydrogenase, and papain on the other. They have also shown that some bacterial toxins may owe their poisonous characters to their copper-carrying respiratory enzyme,