Prof. Otto Toeplitz

PROF. OTTO TOEPLITZ, who died on March 15 in Jerusalem, was one of that rare type of scholars who combine with a high standard of specialized research a deep interest in the history of their science and its bearing on general questions. Toeplitz, born at Breslau in 1881, studied mathematics in Breslau and Berlin, became *Privatdozent* at Göttingen in 1907, professor of mathematics at Kiel in 1920 and at Bonn in 1928. In 1935 he was dismissed in consequence of the racial laws of the Nazi Government and went in 1939 to Palestine as scientific adviser to the administration of the Hebrew University.

Toeplitz's mathematical interest was wide and covered all branches of research, but was deeply rooted in algebra. He liked to consider analysis as an algebra of an infinite number of variables, an example of which was given by Hilbert's treatment of integral equations as special cases of linear equations and quadratic forms of infinite sets of variables. Most of his papers deal with problems of this type—infinite matrices and the corresponding bilinear and quadratic forms. His great knowledge and thorough insight in this subject is testified by the article on integral equations in the "Mathematical Encyclopædia" (1928) written in collaboration with E. Hellinger. But Toeplitz's general attitude to mathematics, which he preferred to consider more as an art than as a science, is more clearly visible in his quasi-popular book "Von Zahlen und Figuren", written with Rademacher in 1930, which seems to me a masterpiece of that class of scientific literature which attempts to instruct a wider public in the fundamental ideas of science. It is not easy, but certainly fascinating reading.

In later years Toeplitz's interest went more and more to the history of mathematics. He was a classical scholar able to read Greek texts and he knew his Plato just as well as his Gauss and Weierstrass. Together with Neugebauer and Stenzel, he founded the periodical *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik*, to which he contributed several articles, chiefly concerned with mathematical ideas in Plato's work.

Toeplitz had no intimate relation to physics, but had nevertheless some indirect influence in its development, the present writer being the link. As a student in Breslau, I was much under the influence of Toeplitz, who was my senior by one year, and though my interest in algebra was not great he insisted on my learning matrix calculus properly and occasionally refreshed my knowledge when we were together again as young teachers in Göttingen. This turned out to be a great advantage to me, first in developing Minkowski's form of relativity, then for the study of vibrations in crystals, which are determined, indeed, by a quadratic form of a (practically) infinite number of variables, but decidedly at the birth of quantum mechanics. When Heisenberg expressed the relations between the quantized amplitudes of atomic vibrations as a kind of symbolic product, the recollection of Toeplitz's instructions enabled me to recognize them as matrix products and (with Jordan) to work out the principal features of quantum mechanics. Though this is only a purely formal step beyond Heisenberg's idea it is perhaps not quite trivial, as shown by the fact that Dirac, in independently developing Heisenberg's idea, invented a new formalism, his q-number calculus, without immediately recognizing the identity of Heisenberg's process with matrix products. Toeplitz himself regarded this unexpected application of his beloved matrices with some suspicion, and rightly from the point of view of the conscientious rigorous mathematician. But he nevertheless continued to give me his advice on special questions.

Toeplitz was devoted to teaching and spent much time and work on it. He was a faithful friend, a man of extreme kindness, but also of strong character and courage. This he amply proved during the hard years of Nazi rule, when he worked with all his force on the problem of saving young non-Aryans from Nazi persecution.

M. BORN.

Prof. Alexandre Besredka

THE recent death of Prof. A. Besredka at the age of seventy deprives France of yet another member of that sadly diminished group of scientific workers whose names are associated with the brilliant and provocative work produced in the early days of the Pasteur Institute. The mention of Besredka's name immediately evokes the whole conception of local as opposed to general or humoral immunity; a conception which has given rise to considerable controversy and thus provoked much fruitful experimental work on the nature of inflammation and the reaction of the body to infection. No memoir would, however, be complete which failed to pay tribute to Besredka's pioneer work in many fields of bacteriology and immunology. During his early days in Paris he was assistant to Metchnikoff. He applied the methods of this master to an illuminating study of the reaction of phagocytes to bacterial exotoxins and endotoxins and to the injection of mineral poisons. Later, Besredka made important contributions to the development of specific immunization against infection, notably in his studies on streptolysin and the use of sensitized vaccines. Anaphylactic shock, which is an abnormal and sometimes disastrous immune response to the injection of foreign protein, also claimed Besredka's attention.

The later years of Besredka's life were devoted to the study of local immunity to infection. He believed that immunity depends upon a state of resistance residing locally in those tissues that are attacked by an infection, and denied the importance of the general immune response of the body and the antibodies circulating in the blood stream. According to Besredka, all attempts at immunization should be applied locally to the susceptible tissue and should aim at modifying the reaction to the noxious agent. His experimental work was mainly confined to infections of the skin, such as anthrax and the staphylococcus, and to intestinal infections, such as typhoid and dysentery. In order to obtain immunity