

PLAGUE

R. POLLITZER

WORLD HEALTH ORGANIZATION

PLAGUE

R. POLLITZER, M.D.

formerly of the

Division of Epidemiological and Health Statistical Services,
World Health Organization



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PALAIS DES NATIONS

GENEVA

1954

A French edition of this monograph is in preparation.

NOTE

*Authors alone are responsible for views
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Preface

In reviewing the history of plague research from the discovery of *Pasteurella pestis*, in 1894, to the present day, one cannot fail to perceive that, although work in this field of applied science was carried on assiduously the whole time, the greatest progress was made at the beginning and at the end of this sixty-year period. During the twenty years immediately following the isolation of the causative organism, the work of such pioneers as Yersin, Simond, Albrecht, and Ghon, together with the comprehensive studies of the Plague Research Commission in India, laid a secure foundation for future investigations; and it was also in this period that plague vaccination was introduced by Haffkine and, thus, the first milestone on the road to effective plague-control was reached. But it is only within the last decade that treatment with sulfonamides and antibiotics, on the one hand, and the application of potent insecticides—particularly DDT—on the other, have rendered plague both a normally curable and a thoroughly controllable disease.

The last publication in the English language to deal comprehensively with the plague problem was a manual compiled in 1936 by Wu Lien-teh, J. W. H. Chun, R. Pollitzer, and C. Y. Wu. Appearing as it did before the spectacular advances in the treatment and control of the disease had begun, this work, while still appreciated as a reference-book, has become rather outmoded. For this reason, and because he was the only one of the four authors who had remained active in plague research, the present writer was repeatedly urged to bring out a second edition. However, quite apart from the fact that the writer's work on plague and cholera control occupied the major part of his time both during and immediately after the second World War, several considerations militated against a re-edition of the 1936 manual. In the first place, the book was written primarily for workers in China, and contains some sections of little interest for the general reader. Secondly, as already indicated, the parts concerned with treatment and with the control of rats and fleas have become so obsolete as to be of historical rather than practical importance.

Hence, it became clear that it would be far better to publish an entirely new monograph, dealing with the plague problem as it exists today, than to attempt a revision of the 1936 manual.

It was therefore decided that, initially, a number of studies, dealing successively with all aspects of plague, should be published in the *Bulletin of the World Health Organization*, and that, eventually, these individual studies should be grouped and reprinted in book form. The first study was published in November 1951, the last in September 1953. Before publication in the present monograph, the studies were carefully revised and brought up to date. It is hoped that the final result will be of real assistance to workers engaged in plague research.

ACKNOWLEDGEMENTS

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The George Williams Hooper Foundation, University of California Medical Center, San Francisco, Calif., USA (fig. 5-9, 15-23, and 32);

The Institut Pasteur, Paris, France (fig. 11 and 12) and the Institut Pasteur, Madagascar (fig. 33 and 34);

The Wellcome Museum for Medical Science, London, England, Dr. G. Robertson, Capetown, Union of South Africa, and Colonel P. V. Karanchandani, Madras, India (fig. 28-31);

The Haffkine Institute, Bombay, India (fig. 24-26); and

Ciba Aktiengesellschaft, Basle, Switzerland (fig. 1, 2 and 10).

Others have been reproduced, by kind permission of the editors, from the following publications :

Indian Journal of Medical Research, 1939/40, 27, 325, 326—fig. 13 and 14 (by permission of the Indian Council of Medical Research);

Rat-borne disease : prevention and control, 1949, pp. 55, 60, 61, 266 (United States Public Health Service, Communicable Disease Center, Atlanta, Ga.)—fig. 27, 36, 37, and 39;

Control of rats and mice, 1948, pp. 20, 25 (University of California, College of Agriculture, Agricultural Extension Service Circular 142)—fig. 35 and 38.

Finally, the author wishes to express his gratitude to Dr. G. Girard, Chef du Service de la Peste, Institut Pasteur, Paris, who, besides rendering valuable help in other ways, has undertaken the onerous task of translating the studies into French. Thanks to his work, the readership of the monograph will be greatly increased.

Chapter I

HISTORY AND PRESENT DISTRIBUTION OF PLAGUE

HISTORICAL SUMMARY

Dealing with the historical aspects of the plague problem in 1936, Wu Lien-teh¹⁶⁰ maintained that the disease had been present since time immemorial in the areas within or near the Central Asiatic plateau which he considered as the original home of the infection. He noted that some authors were inclined to place this in Central Africa but, though the focus existing there was undoubtedly of very old standing, Wu Lien-teh was in agreement with the statement of Payne¹¹¹ that "possibly, if we could follow the history far enough back, we might find that the African was a colony of the Asiatic plague".

Basing his statement upon the authority of Sticker,¹⁴¹ Wu Lien-teh maintained that the first plague epidemic on actual record was the outbreak among the Philistines in 1320 B.C. which, as described in the Bible (I Samuel, v and vi), was characterized by the appearance of "emerods in their secret parts".

As claimed by some recent writers, this interpretation of the biblical text has become untenable. Dealing with this subject in 1942, Neustätter¹⁰⁶ pointed out the interesting fact that the identity of the emerods with plague boils had been mentioned already in a marginal note to the revised version of the Bible appearing in 1885, that is, at a time when people in Europe paid little, if any, attention to the subject of plague. It seemed, however, that the 1885 compilers had followed the lead of the Bible commentator Thenius who had asserted the plague nature of the Philistine outbreak about 50 years earlier. Thenius in his turn had probably been influenced by the writings of J. J. Scheuchzer (1672-1733), doctor of medicine and

professor of mathematics and physics at Zürich, Switzerland, referring to the 1720 epidemic in Marseilles, France.

While not definitely committing himself as to the real nature of the biblical outbreak, Neustätter concluded "that the version hemorrhoids, untenable as it is, comes nearer to . . . the truth than plague-boils". Shrewsbury¹³⁶ and Girard³⁷ felt certain that the emerods were really haemorrhoids because they considered that the disease decimating the Philistines was bacillary dysentery. However, this assumption was vigorously opposed by MacArthur,⁸⁰ who asserted the plague nature of the Philistine outbreak on historio-epidemiological and philological as well as on clinical grounds and, in a further note,⁸¹ also adduced evidence putting "the great antiquity of the rat [*Rattus rattus*] in Palestine beyond question".

A further, generally accepted, record testifying to the existence of plague in the West during the pre-Christian era is contained in a fragment from the writings of Rufus, physician at Ephesus about A.D. 100, who noted the occurrence of fatal bubonic plague in Libya, Egypt, and Syria during and before his time, apparently as far back as about the end of the third century B.C. (Wu Lien-teh¹⁶⁰).

Whether this scanty information refers to occasional manifestations of the disease which remained localized, or whether some of these outbreaks were episodes of an early pandemic, it is impossible to decide. It is certain that the first really satisfactory evidence regarding the prevalence of plague concerns a pandemic commencing in the fifteenth year of the Emperor Justinian's reign (A.D. 542), which was voluminously dealt with by contemporaneous writers. In the opinion of most of these chroniclers, the pandemic had started at Pelusium in Lower Egypt, but probably this port served merely as the distributing centre of an infection derived from an endemic focus. The contention of Evagrius that the plague had come from Ethiopia might suggest a Central African origin of the pandemic during Justinian's reign (Wu Lien-teh¹⁵⁸).

Lasting for a period of fifty to sixty years, the pandemic gradually spread, as one of the chroniclers put it, "to the ends of the habitable world". Usually seaports were invaded first, the infection then progressing inland and eventually involving even the most sequestered localities (Procopius, quoted by Gibbon³³). It was estimated at the time that the number of victims might have reached a total of one hundred million and Gibbon, when scrutinizing the records of the contemporaneous writers, considered this figure as "not wholly inadmissible". Certainly the outbreak of plague in Justinian's time which, as deplored by the chronicler Warnefried, "depopulated towns, turned the country into a desert, and made the habitations of men to become the haunts of wild beasts" was one of the worst calamities that ever befell mankind. As Hirsch⁵⁴ points out, it is possible that the simultaneous presence of other epidemic diseases partly accounted for this death-toll, but the contemporaneous records leave no