

BOMBAY.

The rats of Bombay have been fully dealt with by Captain Liston and the workers of the Plague Commission. Judging from several specimens lent by the Bombay Natural History Society, I conclude that the three kinds of *Mus rattus*, the black, the brown and the brown white-bellied, are commonly found there.

In concluding this systematic account I must express my thanks to all those gentlemen who have contributed measurements and specimens. Thanks are especially due to Captain G. I. Davys, I.M.S., who, aided by his assistant, H. A. Khazan Chand, has sent over one thousand. The extent of their work can only be properly appreciated by any one who has measured and skinned even twenty rats in a hot climate.

Although I have not always agreed with Dr. Hossack's conclusions, I have never been able to dispute his observations; and I must repeat my thanks to him for introducing me to the subject, and for establishing the precedent of examining rats in large numbers.

Finally, my thanks are especially due to Dr. Annandale not only for the interest he has shown in the work day by day but for his steadying influence among the perplexity of sports and races, as well as for the liberal way in which, as Editor of the *Indian Museum Records*, he has allowed me to express views which are not quite in accordance with museum traditions.

APPENDIX I.

THE BEARING OF THE ENQUIRY ON PLAGUE DISSEMINATION.

Since it has been recognised that rats are important factors in the dissemination of plague, the attention of many has been turned towards these rodents. In consequence it became evident that we knew little of the distribution of their several races in India, and that some of the hitherto accepted statements in regard to them must be looked upon doubtfully. It was shown that mole-rats, which were considered solely as dwellers in the fields, could, in some circumstances, become intimately associated with man; while in other circumstances house rats might establish themselves in the fields. Doubt was felt as to the extent to which the wandering grey rat (*Mus decumanus*) prevailed in India. It was shown that the races of rats infesting Calcutta and Bombay were remarkably different from one another, so that it became desirable to compare them with those of other ports. The present enquiry is an attempt to throw light on some of these questions.

The extermination of rats has been largely carried out in many districts in India as a means of directly diminishing plague mortality. Such measures are perhaps partly of an experimental nature; the question of their efficacy cannot be discussed here,—

it is one for sanitary science to deal with. It was clear, however, that this attempted rat extermination provided an opportunity of gaining information regarding the distribution of the various kinds of rats throughout the country, since large numbers of them could be collected from different localities and compared; from this comparison information of direct or indirect practical importance might be gained. It has been kept well in view that to obtain such information was the purpose of the present inquiry. Although the practical value of the information may not seem great, it is hoped that the facts themselves will be of suggestive value to those more acquainted with the ætiology of plague than the writer.

A COMPARISON BETWEEN RATS FOUND IN THE PORTS OF BOMBAY, CALCUTTA, MADRAS AND RANGOON.

This question is of importance, for as a rule the sea-ports are the doors by which the infection of plague enters a country. In all probability plague entered the Bombay Presidency and Upper India by the port of Bombay, and it certainly entered Burma through Rangoon.

In comparing the rodents of the four great ports, one important fact stands out. *Mus decumanus* is common both in Bombay and Calcutta; it is not uncommon in Rangoon, but it is absent from the city of Madras. There must be a definite cause to account for this. There is another peculiarity in the rodents of Madras. The bandicoot is very rarely found in Bombay. It is uncommon in Calcutta, where it is occasionally found burrowing near the numerous tanks of that city. It is absent from Rangoon; a smaller sort of bandicoot is common there. In Madras, however, the large bandicoot is so common that the populace can kill as many as one hundred of them daily, although it is too large to enter traps and has to be killed by blows from sticks. The Madras bandicoot is an outdoor rat, a dweller in drains and outhouses, having a total length of about two feet; it would not be tolerated in the houses, where it could not move without detection. Its mode of life is therefore essentially the same as that of *Mus decumanus*. The rodent fauna of Madras is therefore peculiar in two ways, in the presence of the bandicoot and in the absence of *Mus decumanus*. These two peculiarities are obviously associated with one another. The bandicoot occupies exactly the same position among the rats of Madras that *Mus decumanus* occupies among the rats of Bombay and Calcutta, and since the bandicoot is much more powerful even than *Mus decumanus*, there is no place for this latter rat in Madras unless it can change its habits entirely. A consideration of the rodents of Rangoon lends support to this view. In Rangoon *Mus decumanus* is to be found, but it is much less common than in Bombay or Calcutta; this may be due to the presence of the small bandicoot, *Gunomys varius*, which is, like *Mus decumanus*, an essentially outdoor rat, and must compete with this latter species. Since the