

II. NOTE ON THE SPECIES OF FLEAS FOUND UPON RATS, *MUS RATTUS* AND *MUS DECUMANUS*, IN DIFFERENT PARTS OF THE WORLD, AND ON SOME VARIATIONS IN THE PROPORTION OF EACH SPECIES IN DIFFERENT LOCALITIES.

BY THE HON. N. CHARLES ROTHSCHILD, M.A., F.L.S.

*Ceratophyllus fasciatus*¹ is the flea usually found on *Mus decumanus* in Great Britain, and this is also the case, apparently, throughout Northern and Central Europe. The common house mouse, *Mus musculus*, occasionally harbours this parasite also, though its usual flea is *Ctenopsylla musculi*.

Mus rattus is a rare animal in the British Islands, and on the few occasions on which I have had an opportunity to examine fleas taken from it, they have been *C. fasciatus*.

Ctenopsylla musculi, which has already been referred to, lacks an eye but has a comb of spines on the head and prothorax. It is common on the house mouse (*Mus musculus*) in Great Britain and Ireland, and is sometimes present on rats in considerable quantity.

Another species of flea, which although extremely rare in Northern Europe (Lt.-Col. Giles secured a single specimen from port rats at Plymouth in 1905) appears to be one of the commonest of the fleas found upon rats in warmer climates, is *Pulex cheopis*. This flea was first described by me (1903) from specimens taken from various hosts (*Acomys witherbyi*, *Gerbillus robustus*, *Arvicanthis testicularis*, *Dipodillus watersi*, *Dipus jaculus*, and *Mus gentilis*). It is a non-pectinated flea belonging to a group of which the first species was described by Taschenberg in 1880 from specimens captured on *Herpestes ichneumon*

¹ Taschenberg, in his monograph *Die Flöhe*, published in 1880, gives as the host of *Ceratophyllus fasciatus* a number of different animals. Since his time, however, it has been shown that several of the fleas which Dr Taschenberg considered to belong to this species are really quite distinct from each other.

and called by him *Pulex pallidus*. *P. cheopis* is not, however, the same species as the one first described by Taschenberg as *P. pallidus*, but as the description given by him was incomplete it has accordingly been found capable of embracing not only the flea first taken by Taschenberg in 1880 but all the species of this group which have since been discovered upon various animals.

Tiraboschi (1904) found a flea belonging to this group to be a common denizen of the rats in Italy (Caserta, Treviso, Venetia, Genoa, etc., especially frequent in the last place, where it formed 40 per cent. of fleas on the ship rats) and described it under the name of *Pulex murinus*. *P. murinus* of Tiraboschi is identical with *P. cheopis*, Rothschild.

Tidswell (1903) described the common flea taken from rats in Sydney and Brisbane as *P. pallidus*. This insect constitutes 80—90 per cent. of the flea population which infest rats in these towns. Specimens of this so-called *P. pallidus* which have been forwarded to me I find to be identical with *P. cheopis*. That this flea should have been diagnosed by Tidswell as *P. pallidus* is only natural, for reasons mentioned above. Since then a number of species belonging to this group have been taken from various animals in different parts of the world.

Gauthier and Raybaud (1903) found a species of flea similar to *P. pallidus*, Taschenberg, to constitute 25 per cent. of the flea population upon ship rats at Marseilles. Specimens of this flea which I have examined I also find to be *P. cheopis*. These authors found that *P. cheopis* rapidly became scarcer as the distance of the locality from the docks increased.

Herzog (1904 and 1905) took 42 fleas from 150 rats (*Mus rattus* and *Mus decumanus*) in Manila and found that they all belonged to one species, but that they did not correspond to any of the fleas usually described as infesting rats. He gave a description of this flea and named it *Pulex philippinensis*. From his description it is evident that this flea is identical with *P. cheopis*.

Rats from Cape Town, of which only a few were examined, were infested with *Ceratophyllus fasciatus*.

In South America, near Valparaiso, large quantities of *Pulex cheopis* have been secured.

From specimens received from India, *Pulex cheopis* seems to be far the commonest species of rat flea; only a very small proportion of these insects which have from time to time been secured from rats have

shown themselves to be distinct from *cheopis*. Occasionally, however, specimens of *Ceratophyllus fasciatus* and *Pulex felis* have been secured.

Specimens of *Pulex irritans*, the flea commonly found on man, the previously mentioned *Ctenopsylla musculi* and *Pulex felis*, the species found on the cat, have also occurred upon these animals in Southern Europe.

Pulex cheopis occurs in the Soudan and has also been recorded from Pretoria. In the latter place specimens were secured from *Mus rattus*, which animal also yielded an example of *Pulex felis* and *Ctenopsylla musculi*.

In conclusion I may say that the opinion I have formed with regard to the different species of fleas that are found on house and port rats all over the world, is that except in Northern and Central Europe *Pulex cheopis* is the commonest rat flea and in some localities is almost the only flea found upon rats.

It may be incidentally pointed out that we have not yet examined fleas taken from rats in Northern or Central America.

REFERENCES.

- GAUTHIER and RAYBAUD (1903), Recherches expérimentales sur le rôle des parasites du rat dans la transmission de la peste. *Revue d'Hygiène*, xxv. p. 426.
- GILES, G. M. (1905), *Pulex cheopis*, Rothschild, in England. *Entomol. Monthly Mag.* vol. xli. p. 139.
- HERZOG, M. (1904), The Plague: Bacteriology, Morbid Anatomy and Histopathology, including a consideration of insects as plague carriers. *Manila Government Bulletin*, No. 25483.
- (1905), Zur Frage der Pestverbreitung durch Insecten. *Zeitschr. f. Hygiene*, vol. li. p. 268.
- ROTHSCHILD (1903), New species of Siphonaptera from Egypt and the Sudan. *Entomol. Monthly Mag.* vol. xxxix. p. 83.
- TIDSWELL, F. (1903), Report on the Second Outbreak of Plague at Sydney, 1902, by Ashburton Thompson, p. 71.
- TIRABOSCHI, C. (1904), Les Rats, les Souris et leurs parasites cutanes dans leurs rapports avec la propagation de la peste bubonique. *Archives de Parasit.* vol. viii. p. 161.