

rattus, but never a sport. However, this assertion may at any moment be proved to be erroneous.

This idea of the relations of the many races of Oriental rats to one another has not the merit of simplicity, and is not in accordance with the Linnean system of nomenclature.

In concluding this appendix, I must acknowledge that as regards many of the ideas expressed in it I am much indebted to a book by R. K. Lock, entitled "Variation, Heredity and Evolution" (1907), which contains a clear exposition of the teachings of Mendel, Bateson and De Vries, teachings which seem more in accordance with nature than those usually expounded as Darwinism.

Lest it may seem that I have been unduly biassed by Mr. Lock's book I hasten to add that "Mutation, Mendelism and Natural Selection," by Professor E. B. Poulton (1908), has also been read. The author of this essay considers that a natural consequence of such ideas as those expressed in Lock's book is "a widespread belief among the ill-informed that the teaching of the founders of modern biology are abandoned."

These opinions, therefore, are put forward with diffidence, and I have felt the need of that criticism and discussion which are so necessary to temper fresh ideas.

APPENDIX III.

ENMITY BETWEEN THE VARIOUS RACES OF RATS.

The question of the cause of the ascendancy of particular races is important. It has been assumed that the absence of *Mus decumanus* from Madras is due to the fact that in its habits this rat resembles *Bandicota indica*, and that since the bandicoot is much the more powerful rat, it can secure the drains of the city for itself alone. This raises the question as to whether special enmity between particular races exists. Some evidence has been obtained and more might be the outcome of simple experiment.

The subject was first brought to my notice by Captain Davys, who found that if a living shrew were placed in a cage with a young living *Mus rattus*, the shrew seized the head of the rat with its powerful incisor teeth and after biting through the skull devoured the brains. I was subsequently reminded of this habit of the shrew when at Rangoon. It happened that a cage containing a living shrew (the grey "musk rat" *Crocidura cærulea*) was placed in contact with a pile of dead *Mus concolor*. The shrew dragged the foot of one of the rats through the bars of the cage and commenced devouring it. The dead body of the rat was placed inside the cage. The shrew continued to devour it, applying itself to the extremities, the snout, muzzle, ears and feet in succession. Six living *Mus concolor* were placed in a cage with one shrew; without a moment's delay they combined forces against the shrew. The fact that they

were all captives in the cage did not deter them from showing their natural antipathy. The shrew betook itself to a corner of the cage and faced its aggressors who seemed unable to accomplish anything against the shrew's powerful incisor teeth. One adult *concolor* and a shrew were then placed together in a cage; the shrew became the aggressor at once and pursued the other vigorously for about five minutes. An adult *concolor*, however, is a most active rat, and the experiment ended by both coming to rest in opposite corners of the cage.

On the other hand, it was often noticed that if *Mus concolor* and the white-bellied *Mus rattus* of Rangoon were placed together in a cage they showed no signs of antipathy. Members of these two races are sometimes caught together in the same trap.

In continuation of the subject I will quote a letter received from Captain Davys.

"Have you ever noticed that if a big *Gunomys* and *Gerbillus indicus* are put into a cage together, the *Gunomys* at once attacks and kills the *Gerbillus*, or *Gerbilli*. Even when the cage is being carried by a man the *Gunomys* does this. He seems to have a special hatred of the *Gerbillus*. Last night I put three *Mettada* and three *Gerbillus* into a cage with one *Gunomys*. The *Gunomys* killed all the three *Gerbilli* within ten minutes, but did not interfere with the *Mettada*." It may be mentioned that *Mus mettada* is a much smaller rat than *Gerbillus*.

It seems therefore that special enmity exists between particular races of rats.

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