

XIX. NOTES ON THE LARVÆ OF *TOXORHYNCHITES IMMISERICORS*, Wlk.

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In the course of a "census" of the mosquitoes of Calcutta that is being undertaken by the Indian Museum, I have been able to make the following notes on the larvæ of *Toxorhynchites immisericors*, Wlk., which are very common in some parts of the fringe area of the town, especially in the months of June and July. Large numbers of the larvæ and pupæ of this species have been found in earthen pots.

Mr. E. E. Green of Ceylon, in his paper on the development of this mosquito, on p. 161 of the *Spolia Zeylanica*, vol. ii (1905), mentions that its larva is carnivorous and feeds on the larvæ of *Culex*. He mentions also that the larva feeds on others of its own species, the largest and strongest being the only survivor. Mr. Green never found more than one larva at a time. The breeding places where he discovered these larvæ were hollow stumps of the giant bamboo and small pools in the angles of the branches of other trees. Larvæ of *Toxorhynchites* have not yet been found in such places in Calcutta, but in earthen pots not only single individuals have been found, but as many as nine and ten together. In such cases no larvæ of any other mosquito have been found.

As it was suspected that the larvæ must have devoured those of *Stegomyia fasciata* that are usually common in earthen pots, and to prove that *Stegomyia* larvæ were palatable to them, on the 16th July, 1910, a number of *Stegomyia* larvæ were introduced into a bottle containing about half a dozen *T. immisericors* larvæ. Not a minute elapsed after the former larvæ were put into the bottle, before each *T. immisericors* larva had seized one of them and was devouring it with apparent relish. The way the prey is seized seems interesting. It must first be remarked that the larvæ of *T. immisericors* are very sluggish and cannot swim very fast.

Mr. Green mentions that although he watched a larva of *T. immisericors* seizing a *Culex* larva he was unable to see the exact method of catching the larva. He, however, discovered that the falcate lamellæ, which are situated on each side of the head, were the organs of prehension. Each of these lamellæ, according to Mr. Green, is minutely toothed at its extremity. The mode of capture, as has been noticed in the specimens kept under observation in the Indian Museum, is as follows:—

The larvæ of *T. immisericors* lie quietly at the surface of the water, with their bodies generally in a vertical position, and the

Stegomyia larvæ move about quite rapidly. The moment a *Stegomyia* larva comes swimming about near a larva of *T immisericors*, the latter makes a slight, sharp, sideward jerky movement of the head, which enables it to seize its prey, if within reach. The captured larva struggles for some time to extricate itself.

The large larvæ are not always successful in catching the *Stegomyia* larvæ, as it often happens that the *Stegomyia* larvæ are quite prepared for the attack, and any slight movement on the part of their enemy is sufficient warning to make them sink below "catching range." Larvæ of *T immisericors* have been seen to devour each about half a dozen *Stegomyia* larvæ within an hour.

The *Stegomyia* larvæ do not leave their enemies in peace. They get near the body of the larger larva, especially the hind portion, and keep nibbling at the bristles that grow on each abdominal segment. This seems to annoy the other larva and with a jerky movement of its body it disperses the *Stegomyia* larvæ, which come back swimming over its head. The first *Stegomyia* larva that comes within reach is instantly seized and sucked quite dry. The empty larval skin is then rejected by the larva of *T immisericors* by a backward movement of the forepart of the body. This empty skin seems to be sought for by the other *Stegomyia* larvæ, who devour it quite greedily. So occupied was one *Stegomyia* larva in devouring one of these empty larval skins that it did not notice that it had drifted towards a larva of *T immisericors*. As soon as the former came within reach, the larva of *T immisericors* seized it and killed it. Many *Stegomyia* larvæ are killed by the larvæ of *T immisericors* simply because they come and annoy the larger larvæ when they are resting quietly at the surface of the water.

The larvæ of *T immisericors* do not usually only suck the larvæ of *Stegomyia*. When they are hungry they generally eat them up entirely. In the course of one night over one hundred *Stegomyia* larvæ, besides three larvæ of *T immisericors*, were eaten up by three other larvæ of *T immisericors*. In the evening of the 19th July, 1910, the same three larvæ were left in a finger-bowl of water with about twenty *Stegomyia* larvæ. Evidently during the night two of these larvæ of *T immisericors* had pupated, and the third larva, after it had finished all the *Stegomyia* larvæ, and finding nothing to eat the next morning, seized one of the pupæ and had sucked it nearly dry by 10 A.M. The pupa was seized on the left side of the head, nearer the eye, but between the eye and the respiratory syphon. The larva had got such a firm hold of it that it had some difficulty in getting rid of the empty case. It wriggled about a great deal, till at last it was able to cast away the empty pupal case.

Although it had had such a large supply of food at 10 A.M., it was again ready for some more. At 11 A.M. some twenty larvæ of *Desvoidea obturbans*, from a cess-pool, were introduced into the bowl, as well as another larva of *T immisericors*, which had been starving all the previous night. Within a couple of minutes each

larva of *T immisericors* had taken possession of a *Desvoidea* larva. They could not eat these larvæ as fast as they ate the *Stegomyia* larvæ, and although the greater portion of one *Desvoidea* larva had been sucked quite dry, its head and tail wriggled about as if it (the *Desvoidea* larva) wanted to extricate itself from the clutches of the other larva. In most cases the *Desvoidea* larvæ are seized just behind the head, which renders them helpless to attack their enemies, as these larvæ, too, have been observed to eat other mosquito larvæ.

The larvæ of *T immisericors* will eat any mosquito larvæ. Larvæ of *Culex* and *Myzomyia* were also put into the bowl together with eleven additional larvæ of *T immisericors* in different stages of growth and evidently hungry, for they seized whatever came in their way first. One small larva of *T immisericors* did not take more than a minute to finish a larva of *Myzomyia rossii*. On the evening of the 20th July, 1910, over fifty larvæ consisting of *Culex*, *Desvoidea* and *Myzomyia* were placed in the same bowl, with twelve larvæ of *T immisericors*. By 10 A.M. of the following day there was no trace of a single living larva of any of the three kinds in the bowl. Moreover, a large larva of *T immisericors* had also been half eaten by another of nearly the same size as itself. I have preserved it in this condition in alcohol, as well as another larva of *T immisericors* in the act of devouring a *Desvoidea* larva.

One peculiarity about the larvæ of *T immisericors* and their selection of their prey with regard to its size, is that if various sizes of larvæ are placed in the receptacle in which they are, the larger larvæ of *T immisericors* will first devour all the other large larvæ of other mosquitoes, leaving the smaller ones to the last. The smaller larvæ of *T immisericors* will seize those of the smaller kind, but they do not hesitate to tackle a *Desvoidea* larva, although they are very slightly bigger than *Desvoidea* larvæ themselves. I have not yet observed a larva of *T immisericors* devour another of its own kind when there is a plentiful supply of other larvæ in the receptacle in which it is. In fact it seems to be its last resource when no other larvæ can be had. Otherwise, when the larvæ of *T immisericors* are confined to small receptacles of water, they will eat any kind of larvæ they get. They display no choice with regard to their food, and as they are carnivorous in habit, they will readily eat whatever larvæ come in their way. If five or six specimens of this larva are put each into a pot or pan containing water and in which there are mosquito larvæ, it will be found that within one night all the other larvæ will be devoured. The carnivorous larvæ seem to be plentiful enough round Calcutta and may also be found within the limits of the town itself, as adult specimens have been found in numbers in a garden centrally situated in Calcutta.

It has been found, as is shown by these notes, that the larvæ of *T immisericors* feed greedily on the larvæ of *Stegomyia*, and as *S. fasciata*, the yellow fever mosquito, is very common in earthen

pots round Calcutta, one is justified in assuming that *T immiseri-*
cors plays an important part in its destruction, in a manner which
would be of great moment in the event of yellow fever being intro-
duced into this country.
