Pakistan J. Sci. Ind. Res., Vol. 17, No. 6, December, 1974

MORPHOLOGICAL STUDIES OF SECOND INTERINSTAR OF SARCOPHAGA HAEMORRHOIDALIS (FALLEN) (DIPTERA: SARCOPHAGIDAE) A CAUSATIVE AGENT OF WOUND MYIASIS IN DOG IN KARACHI

M.A. JABBAR KHAN

Department of Zoology, University of Karachi, Karachi 32

(Received September 12, 1973)

Abstract. During April 1973 a case of wound myiasis caused by *Sarcophaga haemorrhoidalis* (Fallen) in an street dog in Karachi University Campus has been recorded. The important morpholigical features of only second-interinstar (intermediate stage) of this species has been studied.

The genus *Sarcophaga* Meigen 1826, is a follower of man and, therefore, widely distributed throughout the world. Especially in the warmer human dwellings, and has frequently been found to cause an intestinal and traumatic myiasis in man. The larvae of *Sarcophaga* are saprophagous or more or less specialized parasites of various invertebrates, for instance, caterpillars and earthworms. There are hundreds of species which develop in excrement, carrion, or any kind of decomposing organic matter, and many of them may, therefore, be expected to be occasionally involved in myiasis in man and animals.[3]

The taxonomy of the *Sarcophaga* larvae has hardly been touched at all. As Knipling[2] has shown with American species, differentiating features are present, even in the first larval stages, but this work has yet to be done on the species of other zoogeographical regions particularly of Oriental region.

During last week of April 1973 the author obtained some of the dipterous larvae from a gun-shot wound of street dog in Karachi University campus. In the key to the dipterous larvae found in dermal layers given by Zumpt,[3] the larvae belong to the genus *Sarcophaga* Meigen, and they were identified as *Sarcophaga haemorrhoidalis* (Fallen). This collection includes second and third instars and second interinstars (intermediate stage) as well. The first instar larvae has been fully described and figured by Knipling.[1] The second and third instars particularly first and second interinstars have not yet been described by any previous workers. Therefore, at present the author has studied the morphological features of second interinstar (transitory stage at the time of ecodysis) in detail.

Material and Method

The host (dog) was brought to the Zoological laboratories by the field attendants where it was chloroformed. Later on the gun-short wound heavily invaded by the sarcophagid larvae were treated by pouring glycerine on the wound. In the wound containing larvae, the larvae were suffocated, this causing them to emerge from the host tissues, whereupon they were transferred by means of blunt forceps to 6 in petri dishes lined with blotting paper. Gentle shaking of the dish allowed the larvae to roll about, this removing the glycerine from the body surface, especially from the spiracular plates. The larvae were then dipped in normal saline solution for a few seconds before being placed in empty bottles. Label recording the host, locality, date and the part of the body from which the larvae were recovered, was placed in the bottle. The largest larvae, those considered to be fully grown, were transferred within an hour of their recovery to large, wide-mouthed bottles containing a layer of moist soil on the bottom. The bottle was covered with a cotton-gauze top held in place by a rubber band to prevent the larvae and the hatched flies from escaping.

The larvae of the second. third and interinstars were not killed in alcohol, but rather by dropping them into hot water just below boiling point. This prevents any shrinkage and any possible damage caused by their movements as when killed in alcohol. All specimen were then preserved in 70% alcohol and passed through 50 and 30% alcohol and then through distilled water. A small slit was made along the mid-line of the larval body, and the larvae was then boiled in 10% KOH solution until all the soft tissues had dissolved. Each larva, together with its cephaloskeleton, was then washed with distilled water until all the KOH had been removed. The larval skin was then passed successively through 30, 50, 70, 90% and absolute alcohol. After it had been in the last solution for about 3 hr, the skin was cleared in carbol–xylol and mounted in Canada balsam on a glass slide. Each larva thus treated was mounted laterally (in some cases dorsoventrally and vice versa). All the folds in the larval skin were smoothed out as much as possible and the cover glass placed very lightly on the mount so as not to distort the shape of the caphalopharyngeal sclerites. Mounts of posterior peritremes and mouth parts were also made.

The investigations of second interinstar resulted in the following findings:

Second Interinstar of S. haemorrhoidalis (*Falleh*). The second interinstar is creamy white, tapering anterioly and truncated posteriorly. The length of the body ranges from 10–12 mm. The skin covered with small, blunt and colourless tubercles.

In this stage of development the double structure of anterior spiraches (Fig. 1) of 2nd and third instars

are distinct. The end of the spiracles and felt chamber is wide. Equal number (13) of the digits or processes of spiracles of second and third instars are present which are short and crowded together. The size of the anterisa spiracle of developing third instar is double the size of the spiracle of second instar.

In this stage the stigmal field (Fig. 2) occupies the dorsal half of the posterior end and is outlined by double ridges, one within the other. The outer ridge, the posterior end of the 12th segment bears the tubucles. The inner ridge is the edge of the stigmal field and is smooth. The ventral half of the inner ridge is high and curves dorsally over the stigmal field and thus conceals the lower part of the spiracles. At this stage the double structure of posterior spiracles of second and developing third instar within a deep cavity only visible from the caudal view. Posterior spiracle of second instar consist of two pairs of oval opening with an incomplete peritreme. The peritreme is narrow and scalloped on the inside by a projection between the slits. In the same stage the developing posterior spiracular structures of third instar are visible. The lightly chitinized, unscalloped very thin and rounded peritremes sloping slightly towards each other and there is a wide gap in the peritreme at the inner edge ventrally. The button is absent which is indistinct in late third instar. The slits are large, narrow and delicate, The perispiracular glands are absent which are distinct in late third instar.

Cephaloskelaton (Fig. 3) comprises on fully developed sclerites of second instar and incompletely developed sclerites of third instar. At this stage only slightly sclerotized labial sclerites of the third instar are present, and the rest of the skeleton is underdevelopment. The distinct pharyngeal sclerite of second instar is short and wide, and the incision at the posterior end between the cornua is deep and wide. The outer edges of the cornua are only lightly sclerotized. The ventral cornua are much shorter than the dorsal, and the dorsal cornua are straighter on the inner edge and rather narrower. The pharynx is ribbed and there is a pair of projecting rods at the anterior end of the sclerite. The hypopharyngeal sclerite is wide and strong, with the typical calliphorid ventral hump. The oral hooks are rather short, pointed and curved at the end. The dental sclerite is irregularly shaped and narrow.

Conclusion

In the second interinstar before ecdysis all the well-developed morphological features of second instar are present while features concerned to the

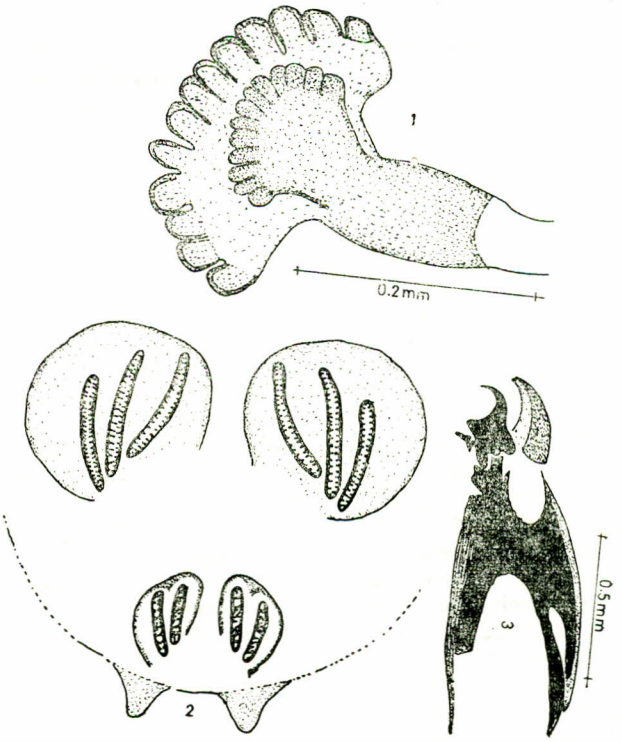

Fig. 1. Anterior spiracles (10×40); Fig. 2. Posterior spiracle (10×40); Fig. 3. Cephaloskeleton (10×10).

third instar are partially represented only because it is still under the process of development and metamorphosis at this intermediate stage. Anterior and posterior spiracles of second and third instars are present while well-developed cephaloskeleton of only second instar is represented at this stage.

The larvae of this species have been reported as causing semiobligate myiasis in dogs.

Acknowledgement . I wish to thank to Dr. M.A.H. Qadri, Professor of Zoology, University of Karachi, for providing the necessary research facilities and for suggestions during the progress of this work. I also thank Dr. Rana Jabbar Khan for her drawings.

References

1. E.F. Knipling, J. Parasit., **22,** 417 (1936).
2. E.F. Knipling, Ann. Entomol. Soc. Am., **32,** 3764 (1939).
3. F.Zumpt, *Myiasis in Man and Animals in the Old World* (Butterworth, London, 1965), pp. 267.