

DESCRIPTION OF THE THIRD INSTAR LARVA OF SARCOPHAGA
AFRICA (= S. HAEMORRHODALIS) FALL. (DIPTERA:
SARCOPHAGIDAE)

Razzaq SH. Augul
Iraqi Natural History Museum

ABSTRACT

Sarcophaga africa Fall. considered to be medical and veterinary importance, therefore, its third larval instar was described by digital camera under compound and dissecting microscope. This description includes spines type, shaped and cephalopharyngeal skeleton. Furthermore the anterior and posterior spiracles were also studied.

INTRODUCTION

The immature stages of the majority of dipterous families remain poorly known (Henning, 1968). In the case of the Sarcophagidae relatively few papers have appeared dedicated to the larval morphology of the family (Zumpt, 1965; Aspoas, 1991; Ebejer, 2000; Kirk-Spriggs, 2000). The larval stages of many species of Sarcophagidae are necrophagous and for this reason those species termed "flesh – flies" are significant in forensic entomology (Sukontason et al. 2001).

Larvae normally develop in decaying meat but are also known as parasitoids of various animals (Povolny and Verves, 1997). Flies belonging to the sarcophagidae have received much attention due to their myiasis potential and vector for pathogens (Greenberg, 1971).

The larvae present a number of useful characters which aid in distinguishing the species; one has only to compare the structure of the cephalopharyngeal sclerites of the different known species to appreciate the morphological variations of this structure in sarcophagid group. The more important characters used in the descriptions, in addition to the cephalopharyngeal skeleton, are: size and general appearance of the larvae; shape, size and distribution of spines and size, and shape of posterior spiracles. Other less important diagnostic characters are the size of the posterior cavity and size and number of the papillae on the border, general appearance of anal area, and structure of the first apparent or cephalic segment (Kinpling, 1936, Zumpt, 1965).

Recently, attention has been focused on the sarcophagidae because of their use in medico-criminal entomology (Byrd and Bulter, 1998; Introna *et al.* 1998; Benecke, 1998; Wells *et al.* 2001).

In Iraq this species was reported by Derwesh (1965) and Kaddou (1967); in addition to that studies on this species in Iraq is very scarce.

As a result to the above; this study was suggested.

MATERIALS AND METHODS

(a) Specimens collection

As bait we employed rabbit carcass; it was placed in a metal cage and left out in the garden of Iraqi Natural History Museum. This bait was placed directly on the soil which is put in the

Description of the Third Instar Larva

container; the bait attracted sarcophagid and other flies for deposit eggs or larvae (especially Sarcophagid females).

After larval development on carcass was complete, maggots left the carcass and drop its self on the soil, then penetrated to few millimeter for pupation. These larvae were collected by forceps and put it in test tube. Larvae brought to the laboratory and divided in to (2) lots: One was fixed in hot water (40 – 50 Co) to avoid shrink, when it will be stored in alcohol. The other lot was placed in container (Full by Sand) to obtain the pupae. These pupae were reared in incubator at (30±1 Co) and relative humidity (r. h.) 70% (according to Peterson (1953)). After adults emerged from these pupae, the adult and larva specimens were identified according to, Roback (1951) Zumpt (1965) and Salem (1936).

(b)Taxonomic aspect of 3rd instar larvae:

The larvae were cleared in boiling 10% KOH and stored in lactophenol for detailed study of cephalopharyngeal skeletons, spine bands and spine types, anterior and posterior spiracles, and tubercle size and arrangement; the description above of the characters were supply be camera digital and lucida under compound and dissecting Microscope.

RESULTS AND DISCUSSION

The results indicated that the length of postfeeding larvae was 1.82 cm in average (1.5-2.2 cm). Larvae appeared to have 12 segments; spines of each segments (2-12) are similar and they were 2-12 (figure 1,2), shortly unpigmented and toward to anal. Segment-1 (head region) have a rows of feeble spines (figure 3), darkling and strong, around ending area of head segment.

Segment-2 have anterior spinuos annuli only; the spines are similar to those of head segment and have pair of anterior spiracles. In other segments 3-12 have densely spinulose in dorsal and lateral view but in ventral view this spines are found in anterior and posterior region only; this characters were in agreement with Zumpt (1965) observation, distributed of these spines are equal, except in near of tubercles area; we found no spines.

In dorsal view, segments 3-11 have six small tubercles (figure 2) three on each side of the median line, which are close together on the more anterior segments but spread a part posteriorly, especially on segments 10 and 11, and larger tubercles on each side of the median group and separated from it by a distinct interval. The lateral group consists of two tubercles, a smaller dorso-lateral and a larger lateral. In ventral view, the tubercles are found on segment (4-11), these tubercles are very similar to those found in dorsal view.

Anterior spiracles (figure 4) with short stalk and consist from 11-14 branches (mostly 13 branched), these result assured by Walker (1937). Figure (5) showed the posterior spiracles; surrounded by incomplete ventrally, lightly sclerotized peritreme; it is nearly straight on the mesial side, but is strongly curved or bent laterally, in addition to, the peritreme without button, also its extended between slits in upper region, the slits are not straight.

The posterior spiracles pit is deep (figure 6), surrounded by a thick ended ridge bearing six pairs of tubercles, three above and three below, of the three upper pairs are equal in size and distance between one to other, while the tubercles below are deferent in size; outer and median are equal and largest if compared with the inner tubercles. The distance between inner tubercles in above and below is equal. On the other hand the pit surrounded by rows of spines pigmented and feeble or needled shaped (singles and groups) (figure 3) also the spines are similar to the spines in head region. In posterior view of ending larvae, showed that larvae consist in ventral region from pair of anal protuberance; these anal protuberance are covered by spines as similar to these spines which are found on other segments.

The cephalopharyngeal skeleton as showed in fig.7,8 that have been already described by Zumpt (1965) but in shortly, in this present study refigured in detail, the mouth hooks arise

R. Sh. Augul

each form a thick base with a prominent dorsal angle and a blunt ventral process. The rudiment of the dental sclerite is seen just behind the ventral process. The hypostomal sclerite is H-shaped as viewed dorsally. The parastomal sclerites are seen in lateral view, there have a two slender rods projecting forward from the pharyngeal sclerite over the hypostomal sclerite.

The pharyngeal sclerite, as indicated by the broader lateral plates and heavily sclerotized dorsal and ventral cornua and bifid clearly in dorsal cornua, while in ventral cornua; the bifid is not clearly, this result is in agreement with Zumpt (1965). On the other hand, the bifid is very clearly in *Wohlfahrtia* sp. (Walker, 1937).

LITRETATURE CITED

- Aspoas, B. R. 1991. Comparative micromorphology of third instar larvae and the breeding biology of some Afrotropical Sarcophaga (Diptera : Sarcophagidae). *Medical and Veterinary Entomology*, 5: 437-445.
- Benecke, M. 1998. Six forensic Entomology cases: description and commentary. *J. Forensic Sci*: 43: 797-805.
- Byrd, J. H. and Bulter, J. F. 1998. The effects of temperature on *S. haemorrhoidalis* (Diptera; Sarcophagidae) development. *J. Med. Entomol.* 35: 694-698.
- Derwesh, A. I. 1965. A preliminary list of identified insects and some arachnids of Iraq. *Direct. Gen. Agr. Res. Pro. Baghdad, Bulletin*, No. 121: 1-123.
- Ebejer, M. J. 2000. Description of third instar larva and puparium of *Blaesoxipha calliste* Pape (Diptera:Sarcophagidae). *Studia dipterologica*, 7(1): 121-124.
- Grenberg, B. 1971. *Flies and disease*. vol.11: Biology and disease transmission. Princeton (NJ): Princeton University press.
- Hennig, W. 1968. *Die larvenformen der Dipteren, Einebersicht ber die bisher bekannten Jugendstadien der zweiflgeligen Insekten*. 3. Teil. Akademie Verlag Berlin, (vii) + 628pp.
- Introna, F., Campobasso, C. P. and Di-Fazio, A. 1998. Three cases studies on forensic Entomology from southern Italy. *J. Forensic Sci.*, 43: 210-214.
- Kaddou, I. K. 1967. Check – list of some insect fauna of Iraq. *Biological Res. Centre*, No.1.: 1- 44.
- Kinpling, E. F. 1936. A comparative study of the first –instar larvae of the genus *Sarcophaga* (Calliphoridae, Diptera), with notes on the biology. *The Journal of Parasitology.*, 22(5): 417-454.
- Kirk-Spriggs, A. H. 2000. The immature stages of *Sarcophaga forceps* Blackith (Diptera Sarcophagidae), reared from the flesh of a decomposing cowrie shell in Sulawesi, Indonesia. *Studia dipterologica*.
- Peterson, A. 1953. *A manual of entomological techniques*, 7th ed., Edward Brothers, INC., Michigan (USA).

Description of the Third Instar Larva

- Povolny, D. and Verves, Y. 1997. The flesh flies of central Europe (Insecta: Diptera; Sarcophagidae). *Spixiana* suppl. 24: 217-218 (cited in: Awad A.; Abdel – Salam, S.; Abou El-Ela, R.; Abdel-A. and Mohamed, D. 2003. Ultra structure comparison of the sensory morphology of the first– and third– instar larvae of *Parasarcophaga argyrostoma*, (Robineau–Desvoidy), (Diptera : Sarcophagidae). *Egyptian J. of Biology*, 5: 148-154.
- Sukontason, K.; Sukontason, K. L. and Piangjai, S. 2003. Scanning electron microscopy of third-instar sarcophagid (Diptera : Sarcophagidae) recovered from a mummified human corpse in Thailand. *Rev. Inst. Med. Trop. Sao. Paulo*, 45: 95-98.
- Walker, E. M. 1937. The larval stages of *Wohlfahrtia vigil* (Walker). *J. of Parasitology*, Vol. 23: 163-174.
- Wells, J. D.; Pape, T. and Sperling, F. A. H. 2001. DNA – based identification and molecular systematic of forensically important Sarcophagidae. *J. forensic Sci.*; 46(5): 1098-1102.
- Zumpt, F. 1965. *Myiasis in Man and animals in the world*, London: Butterworth's.

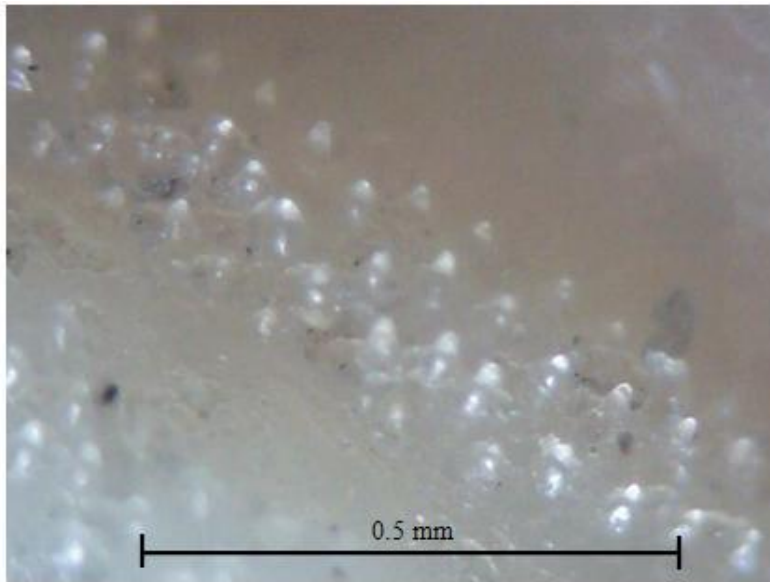


Figure (1) Show the spines that found around thoracic region

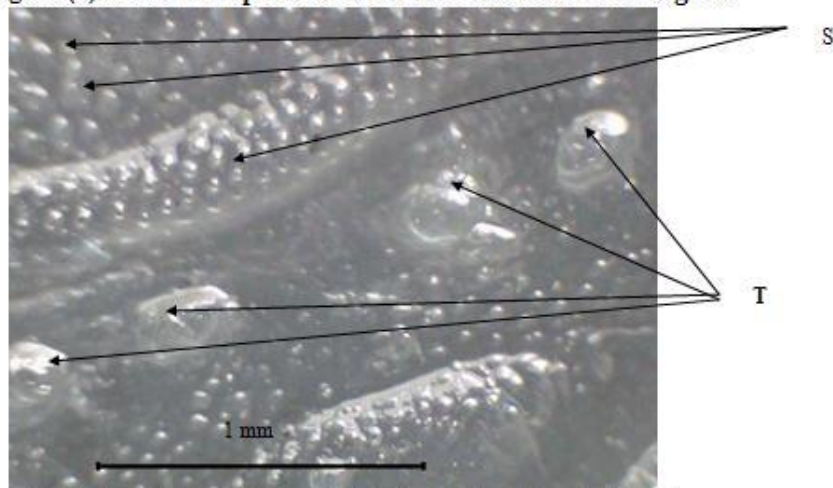


Figure (2) Spines (S) and tubercles (T) found in abdominal region

Description of the Third Instar Larva

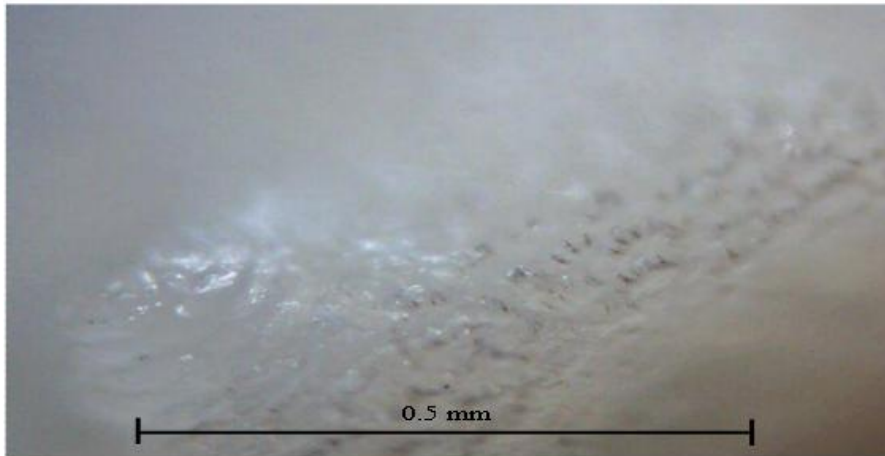


Figure (3) Represent the spines that found around posterior pit

R. Sh. Augul

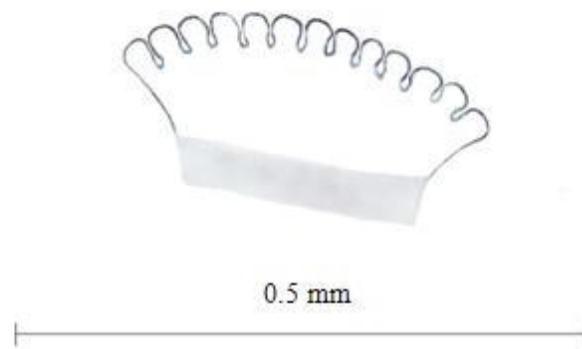


Figure (4) Anterior spiracle

Description of the Third Instar Larva



Figure (5) Posterior spiracles (Sps;spiracle slit ,P;peritreme)

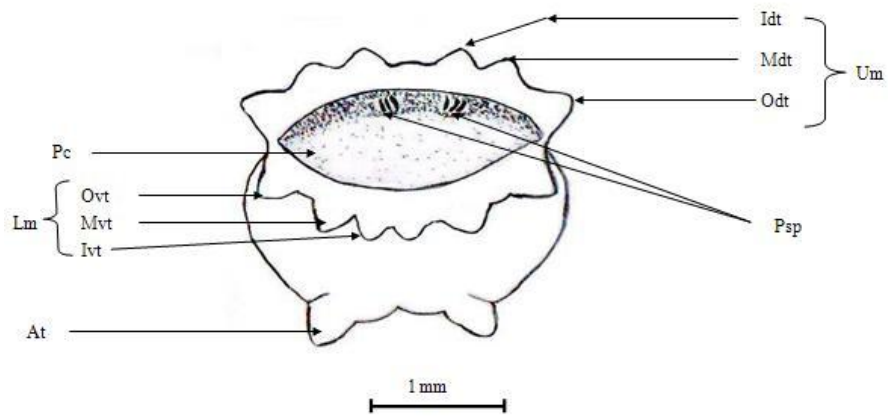


Fig. (6) Show posterior view of larva

Psp : posterior spiracles ; Pc :posterior cavity ; At : anal tubercles (protuberance) ; Um: upper margin ; Odt ; Outer dorsal tubercles; Mdt: median dorsal tubercles; Idt: dorsal tubercles; Lm;lower margin; Ovt; outer ventral tubercles; Mvt : median ventral tubercles; Iv : inner ventral tubercles

Description of the Third Instar Larva

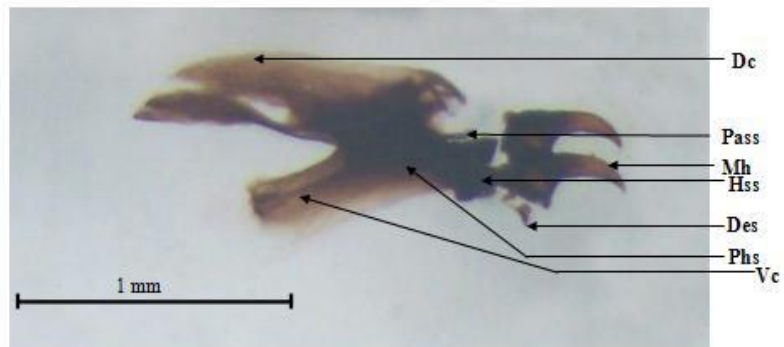


Fig. (7) Cephalopharyngeal skeleton (lateral view)
Mh: mouth hooks ; Pbs : pharyngeal sclerite ; Dc : dorsal cornu ; Vc : ventral cornu ; Des : dental sclerite; Pass : parastomal sclerite ; Hss: hypostomal sclerite

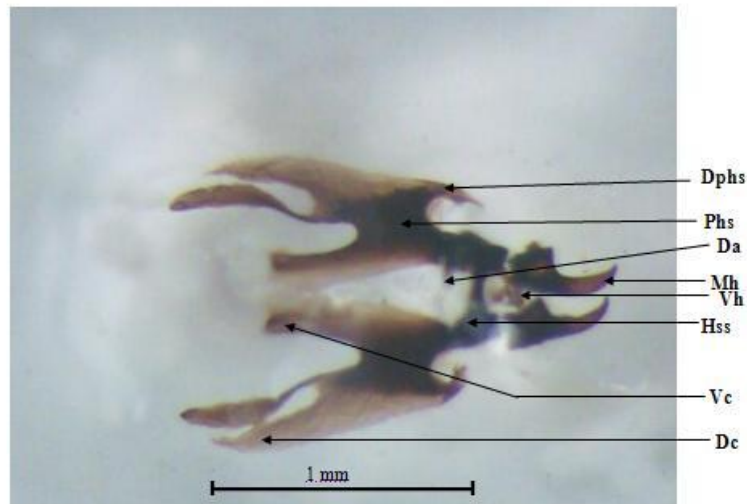


Fig. (8) Cephalopharyngeal skeleton (dorsal view)
(Mh: mouth hooks ; Pbs : pharyngeal sclerite ; Dc : dorsal cornu ; Vc : ventral cornu ; Dphs : dorso-pharyngeal sclerite ; Vh: ventral hook; Da : dorsal arch ; Hss: hypostomal sclerite)

Description of the Third Instar Larva

Bull. Iraq nat. Hist. Mus.
(2008)10 (3): 9-20

مجلد ١٠ ، العدد ٣ ، السنة ٢٠٠٨
Sarcophaga africa Fall. المذلت لثالث و التناق ف صو .
(Sarcophagidae Diptera;)

المركز العلمي لدراسات الحشرات ،

جامعة بغداد ، بغداد

الخلاصة

مجلد ١٠ ، العدد ٣ ، السنة ٢٠٠٨ ، اقتُرحت هذه الدراسة لوصف يرقات الطور الثالث باستخدام كاميرا رقمية و لوسيدا تحت المهر المركب و التشريحي. تضمن الوصف : نوع الأشوك و توزيعها ، الهيكل البلعومي الرأسي بالإضافة إلى الفتحات التنفسية الأمامية و الخلفية.