

**Observations on *Lucilia sericata* and *Chrysomya albiceps*
(Diptera: Calliphoridae) Third Stage Larvae By
Using Scanning Electron Microscopy**

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ABSTRACT

In the present study, scanning electron microscope examination of third stage larvae of *Lucilia sericata* and *Chrysomya albiceps* was investigated. Details of the outer surface of both types of larvae including the cephalic region with the anterior spiracles and the caudal region with the posterior spiracles were presented and discussed.

INTRODUCTION

Myiasis, the invasion of human or animal tissues with larvae of Diptera is of worldwide distribution and affects the human welfare directly or indirectly. *Lucilia sericata* and *Chrysomya albiceps* are a common causes of myiasis in farm animals in different localities in Egypt (1-4). For taxonomic studies of myiasis, accurate identification of myiasis specimens especially the larvae is required. Some of myiasis larvae are difficult to be separated by the traditional microscopical examination, for example, separation of the closely related pair, *Chrysomya albiceps* and *Chrysomya rufifacies* which could result in taxonomic errors (5, 6).

This study was conducted to observe in details the diagnostic morphological characteristics of third stage larvae of *Lucilia sericata* and *Chrysomya albiceps* recovered from bovines in Egypt using the scanning electron microscope.

MATERIALS AND METHODS

Lucilia sericata and *Chrysomya albiceps* third stage larvae were collected from infested cutaneous wounds of cattle and buffaloes, respectively. The larvae were cleaned from debris with a fine brush and fixed in an aqueous solution of 4% glutaraldehyde and 1% osmium tetroxide for 24 hours. After washing, the larvae were dehydrated in ascending grades of alcohol and a final one of amylacetat. Critical point of drying was carried out using carbon dioxide

followed by coating the specimens with gold palladium in a sputtering device. Examination and photographing the specimens were done using a scanning electron microscope (Jeol, JXA, 840A electron probe microanalyzer, Japan) at the National Research Center, Dokki, Egypt.

RESULTS

Observations on the surface structure of the investigated specimens using the scanning electron microscopy can be summarized as following:

A) *Lucilia sericata* (Plate 1):

The body of third stage larvae appeared smooth, consisting of 12 segments, with a tapered anterior end and a broad posterior one (Plate 1, A). The segments were separated with a transverse band of several rows of minute intersegmental spines which characterized by a simple non denticulate tips (Plate 1, B). Magnifying the anterior end of the larvae (Plate 1, C), showed a pair of mouthhooks, a pair of short antennae adjacent to a pair of a dome-shaped maxillary palps. As shown in Plate 1, D, the anterior spiracle displayed eight papillae arranged in a single row. Observation of the caudal region of the larva (Plate 1, E) showed a pair of posterior spiracles which encircled in a closed peritreme and 9 - 10 tubercles surrounding the spiracular area. Magnification of the posterior spiracles (Plate 1, F) clearly showed that each spiracle is surrounded with a closed peritreme and contains a three straight spiracular slits with an outer posterior spiracular hairs.

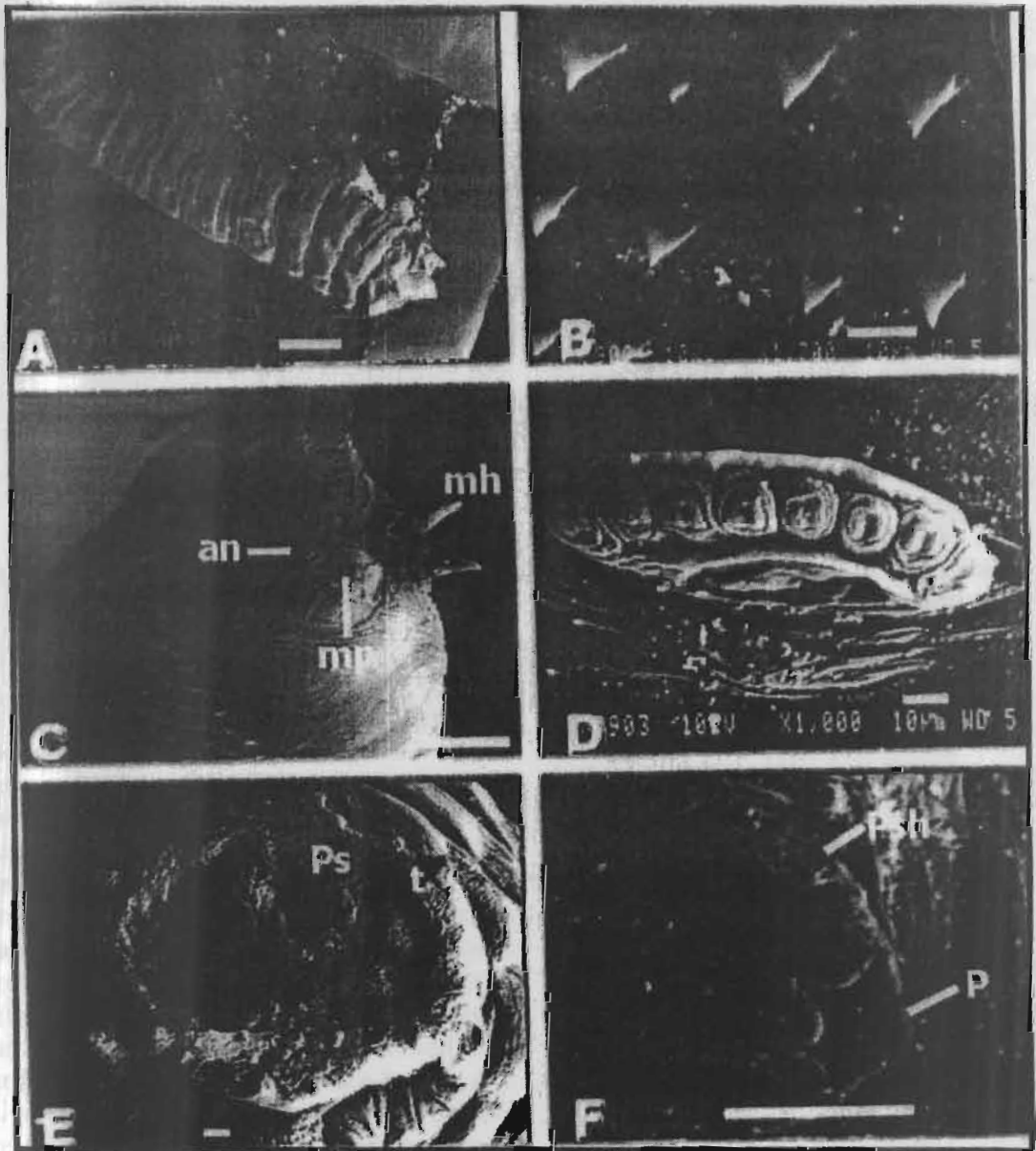


Plate 1: Scanning electron micrographs of *Lucilia sericata* third stage larva: A) The complete specimen; B) The intersegmental spines; C) The anterior end showing the antennae (an), maxillary palps (mp) and the mouthhooks (mh); D) The anterior spiracle showing eight papillae; E) The caudal end of the larva showing a pair of posterior spiracles (ps) and the tubercles (t) surrounding the spiracular area; F) Magnified posterior spiracle showing the closed peritreme (p) and the posterior spiracular hairs (psh).

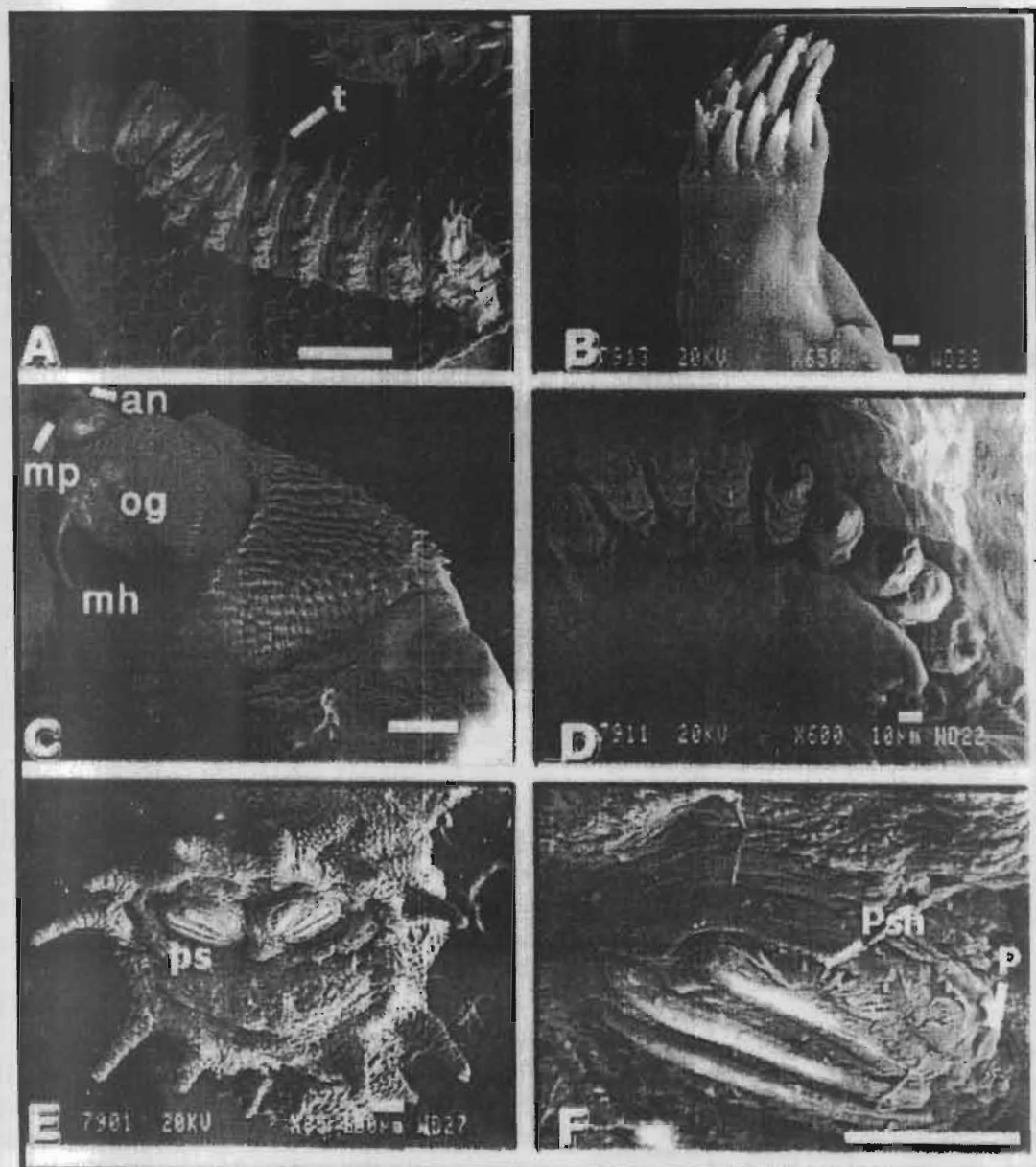
B) *Chrysomya albiceps* (Plate 2):

Plate 2: Scanning electron micrographs of *Chrysomya albiceps* third stage larva: A) The complete specimen showing the body tubercles (t); B) Magnification of a body tubercle showing the spiny tip and bare stalk of the tubercle; C) The anterior end showing antenna (an), maxillary palp (mp), the mouthhooks (mh) and the oral grooves (og); D) The anterior spiracle showing nine papillae; E) The caudal end of the larva showing a pair of converging posterior spiracles (ps); F) Magnified posterior spiracle showing the closed peritreme (p) and the posterior spiracular hairs (psh).

Third stage larvae of *Chrysomya albiceps* showed the typical muscoid shape with a pointed anterior end. The larvae presented a long tubercles or papillae on the dorsal, lateral and ventral surfaces on each segment (Plate 2, A). Spines of different lengths pointing toward the center of the tubercle were present on the tip while absent from the stalk of all tubercles (Plate 2, B). Observation of the anterior end of the larvae revealed the cephalic segment with a pair of robust mouthhooks, a pair of antennae, a pair of maxillary palps and a broad area of oral grooves with transverse ridges (Plate 2, C). Plate 2, D, displays an anterior spiracle with a single row of nine papillae. Focusing on the posterior end of the larvae presented a pair of converging posterior spiracles (Plate 2, E). Each spiracle (Plate 2, F) was surrounded with an incompletely closed peritreme and contained three straight spiracular slits that fringed on the outer surface with posterior spiracular hairs.

DISCUSSION

Identification of the third stage larvae of *Lucilia sericata* and *Chrysomya albiceps* in Egypt was carried out in most cases depending on the light microscopical examination. The current study clarify more detailed morphological characteristics of the third larval stages of both species collected from bovines in Egypt by using the scanning electron microscope. Observations on the anterior end of *Lucilia sericata* presented a pair of short antennae and maxillary palps. Although, these sensory structures were not presented in the previous scanning descriptions of this species (7, 8), similar structures were founded in third stage larvae of *Chrysomya nigripes* and *Chrysomya bezziana* (9, 10). The intersegmental spines of the third instars used as an important taxonomic feature. Observation of these spines in *Lucilia sericata* showed that it is non denticulated. On contrary to this characteristic spine feature, the dorsal spines of the closely related species, *Lucilia cuprina*, were of denticulate tips (7). This study clearly showed that the number of the anterior spiracle papillae of *Lucilia sericata*

was eight. This is in a complete agreement with that described previously (7). Magnification of the posterior spiracles revealed the presence of posterior spiracular hairs on the outer margins of the spiracular slits. Similar finding was reported in *Lucilia sericata* third stage larvae obtained from a patient in Korea (8).

Regarding the hairy third stage larvae of *Chrysomya albiceps*, observations on the anterior end from scanning electron microscopy revealed the presence of short antennae, maxillary palps and oral grooves. Similar findings were reported in the description of third larval stages of other *Chrysomya* species such as *Chrysomya nigripes* and *Chrysomya bezziana* (9, 10). The dorsal tubercles on the body segments is one of the important differential morphological characteristic features of the closely similar species, *Chrysomya rufifacies* and *Chrysomya albiceps*. While in *Chrysomya rufifacies*, these tubercles are provided with spines on both the stalk and tips of at least some papillae (7), in *Chrysomya albiceps*, according to this study and as previously described (11), all tubercles consisted of a bare stalk and spiny tips. Although some *Chrysomya albiceps* third stage larvae which collected from Alexandria, Egypt showed spines on the shaft of dorsal tubercle (5), direction of the tubercle spines toward the center of the tubercle tip as displayed in this study and the other studies (5, 12) support identification of these larvae as *Chrysomya albiceps*. Magnification of the anterior spiracles of *Chrysomya albiceps* showed nine papillae in each spiracle which coincide with the earlier description (7).

REFERENCES

- 1- Morsy, T.A.; Fayad, M.E.; Salama, M.M.; Sabry, A.H.; el-Serougi, A.O. and Abdallah, K.F. (1991): Some myiasis producers in Cairo and Giza abattoirs. J. Egypt. Soc. Parasitol., 21 (2): 536-546.
- 2- Shams-El-Din, H.M.H. (1994): Studies on Diptera affect farm animals in Egypt with special reference to those producing myiasis. M.V.Sc. thesis, Cairo University.

- 3- **Amin, A.R.; Shoukry, A.; Morsy, T.A. and Mazyad, S.A. (1997):** Studies of wound myiasis among sheep and goats in North Sinai Governorate, Egypt. J. Egypt. Soc. Parasitol., 27 (3): 719-737.
- 4- **Amin, A.R.; Morsy, T.A.; Shoukry, A. and Mazyad, S.A. (1998):** Studies on myiasis producing flies collected by bait traps at Al Marg (Qalyobia Governorate), Egypt. J. Egypt. Soc. Parasitol., 28 (1): 45-51.
- 5- **Tantawi, T.I. and Greenberg, B. (1993):** *Chrysomya albiceps* and *C. rufifacies* (Diptera: Calliphoridae): contribution to an ongoing taxonomic problem. J. Med. Entomol., 30 (3): 646-648.
- 6- **Schroeder, H.; Klotzbach, H.; Elias, S.; Augustin, C. and Pueschel, K. (2003):** Use of PCR-RFLP for differentiation of calliphorid larvae (Diptera, Calliphoridae) on human corpses. Forensic Sci. Int., 132 (1): 76-81.
- 7- **Spradbery, J.P. (1991):** A manual for the diagnosis of screw-worm fly. Commonwealth Scientific and Industrial Research Organization (CSIRO) Division of Entomology, Canberra, Australia.
- 8- **Joo, C.Y. and Kim, J.B. (2001):** Nosocomial submandibular infections with dipterous fly larvae. Korean J. Parasitol., 39 (3): 255-260.
- 9- **Sukontason, K.L.; Vogtsberger, R.C.; Boonchu, N.; Chalwong, T.; Sripakdee, D.; Ngern-Klun, R.; Piangjai, S. and Sulontason, K. (2005):** Larval morphology of *Chrysomya nigripes* (Diptera: Calliphoridae), a fly species of forensic importance. J. Med. Entomol., 42 (3): 233-240.
- 10- **Sukontason, K.L.; Piangjai, S.; Boonsriwong, W.; Bunchu, N.; Ngern-Klun, R.; Vogtsberger, R.C. and Sukontason, K. (2006):** Observations of the third instar larva and puparium of *Chrysomya bezziana* (Diptera: Calliphoridae). Parasitol. Res., 99 (6): 669-674.
- 11- **Queiroz, M.M.C.; de-Mello, R.P. and Lima, M.M. (1997):** Morphological aspects of the larval instars of *Chrysomya albiceps* (Diptera, Calliphoridae) reared in the laboratory. Mem. Inst. Oswaldo Cruz. 92 (2): 187-196.
- 12- **Wells, J.D.; Byrd, J.H. and Tantawi, T.I. (1999):** Key to third-Instar Chrysomyinae (Diptera: Calliphorinae) from Carrion in the continental United States. J. Med. Entomol., 36 (5): 638-641.

الملخص العربي

ملاحظات على الطور اليرقي الثالث لليوسيليا سيريكاتا و كرايزوميا ألبيسبس باستخدام الميكروسكوب الإلكتروني الماسح

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في هذه الدراسة تم فحص الطور اليرقي الثالث لليوسيليا سيريكاتا و كرايزوميا ألبيسبس باستخدام الميكروسكوب الإلكتروني الماسح. وقد أظهرت الدراسة تفاصيل السطح الخارجي شاملا منطقة الرأس والمنطقة الخلفية وكذلك الفتحات التنفسية الأمامية والخلفية لهذه اليرقات ومناقشة تلك النتائج.