

First record of *Curtonotum simile* Tsacas, 1977 (Diptera: Curtonotidae) on rabbit carcass from Jeddah, Kingdom of Saudi Arabia

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Abstract: Adult of acalyprate fly *Curtonotum simile*, were collected from rabbit carcass in desert area in Jeddah city, west region of the Kingdom of Saudi Arabia. The fly was obtained at autumn season. The details of morphological characters were detected and photographed. This knowledge is essential to build up database about dipteran diversity in Jeddah biogeoclimatic zone.

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Keywords: Curtonotidae, *Curtonotum simile*, Diptera, Jeddah.

1. Introduction

Curtonotidae is a family of acalyprate flies in the Ephydroidea, a superfamily that also includes the Drosophilidae. Curtonotids superficially resembling drosophilids and previously treated as a subfamily of Drosophilidae by Hendel (1917, 1928, 1932), Sturtevant (1921), Malloch (1930) and Curran (1933, 1934a,b). Although, Enderlein (1914, 1917) treated this group as a subfamily of Ephydriidae, but Duda (1924) and Okada (1960, 1966) treated *Curtonotum* Macquart and related genera as part of the Diastatidae. In 1934, Duda placed them in their own family (Curtonotidae) and this has been widely accepted in later works (Hackman, 1960; Hennig, 1973; Tsacas, 1974, 1977; Kirk-Spriggs, 2008). Recently, the superfamily Ephydroidea is considered to comprise five families, the well-known Drosophilidae (vinegar flies), the ubiquitous Ephydriidae (shore flies), Curtonotidae, the smaller and lesser known families Diastatidae (including Campichoetinae) and Camillidae (Hennig, 1958; Chandler, 1987; McAlpine, 1989; Grimaldi, 1990). The Curtonotidae is a relatively species-rich family that occurs predominantly in Africa, currently this genus comprises 93 species in four genera. The genera are *Axinotavan* der Wulp, 1886 (12 species in Asia, the Middle East, and Afrotropical region), *Tigrisomyia* Kirk-Spriggs, 2010 (4 species from Afrotropical forests of East Africa), *Curtonotum* Macquart, 1844 (73 species, from all regions, except Australasia, Pacific Oceania and Antarctica and the only genus known in the New World) and *Cyrtona* Séguy, 1938 (5 species from the Afrotropical region) Grimaldi & Kirk-Spriggs, 2012).

The recent study aims to record *Curtonotum simile* Tsacas, 1977 for the first time in Jeddah city, and to study the morphological characters for adult

stage. This study is essential to build up database about dipteran diversity in the kingdom of Saudi Arabia particularly in Jeddah biogeoclimatic zone.

2. Materials and Methods

Fly specimens for this study were collected from domestic rabbit carcass placed in desert area in Jeddah city at December 2015. Jeddah city is located on the west coast of the Kingdom of Saudi Arabia, at the middle of the eastern shore of the Red Sea. The temperature and relative humidity at the time of collecting flies were varied from 23.23 °C to 28.13 °C and 36.09 % to 60.91 %, respectively. The carcass was in fresh stage of decomposition. The flies were examined with the aid of dissecting stereomicroscope from Leica Company (Leica M205 C stereomicroscope). Digital photographs were taken with Leica IC80 HD camera adapted to a Leica M205 C stereomicroscope. Terminology applied here follows the original concept of Kirk-Spriggs (2011); Grimaldi and Kirk-Spriggs (2012). The material is stored in 95% ethyl alcohol and kept in the Biology department of the King Abdulaziz University, Faculty of Science.

3. Results

During this study adult flies were obtained from domestic rabbit carcass located in desert area at Jeddah city, kingdom of Saudi Arabia. The carcass was in fresh stage of decomposition. The fly species which collected from the carcass was *Curtonotum simile* Tsacas, 1977, belong to family Curtonotidae, from superfamily Ephydroidea. Family Curtonotidae can be defined by the following (fig.1): orbital plate with bristles distinct from the anterior margin of the eye. Thorax strongly arched, and costal vein with break.

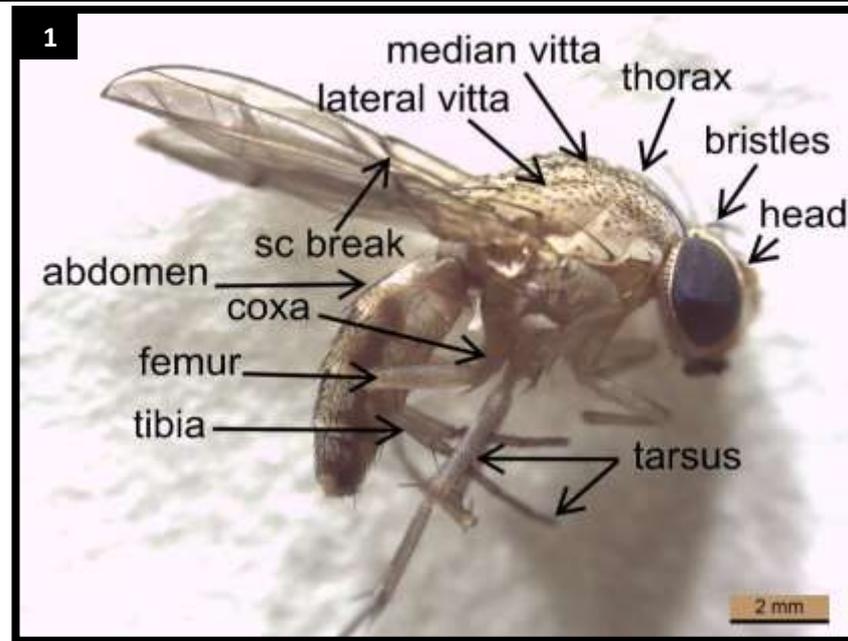


Fig 1. Lateral view of *Curtonotum simile* showing parts of the body, distinct bristles on orbital plat. arched thorax . break in costal vein.

Morphological characters of adult fly *Curtonotum simile* Tsacas, 1977:

The head (fig.2) with large compound eye, egg shaped in lateral view, nodifferentiation of facets. Frons with golden color, and there are different long setae on orbital plates (fig2). Bases of orbital setae position on posterior $\frac{1}{3}$ of frons, near vertex. Bases of proclinate and posterior reclinate setae very close together. Proclinate and posterior reclinate large and thick, anterior reclinate minute, lying medial position between posterior reclinate and proclinate setae (fig.3). Ocellar setae well developed, tips extend to level of lunule; bases lying in middle of ocellar triangle. Inner vertical setae very long and the tip pointed internally, but outer vertical setae shorter with tip pointed externally. Relative lengths of large orbital setae: inner vertical >ocellar> posterior reclinate = outer vertical >proclinate>postocellar (fig.2). Face slightly bulging medially with broad silver fascia (adjacent to eye margin) (fig. 3). There is row of parafacial setae on lower ventral half of face, and pair of parafacial upturned vibrissa slightly thicker and ca. 2 x lengths of other ventral parafacial setae (fig.4). Gena narrow, 1 pair weak vibrissa inserted on posterior lateral margin and 8 much finer setae bordering genal groove (fig5).Antennal scape and pedicel pale brown, flagellomere 1 with golden color, longer than wide, with evenly pointed apex, arista with 7–8 long dorsal branches and 3 or 4 ventral branches in addition to terminal fork (fig.6).Facial carina developed as a low ridge, palpus cylindrical brown with microtrichose, labella large and setose (fig.7).

The thorax is hunchbacked, light gold color, with four broad parallel chestnut-brown vittae on

dorsal surface, 2 median vittae extending from anterior margin to region of anterior dorsocentral seta, 2 lateral vittae shorter extending from $\frac{2}{3}$ length to region of posterior dorsocentral seta (fig.1).The thorax holds macrosetae (fig.8). They are 3 large notopleural setae (equal in size, 2 just above notopleural suture, 1 dorsal), 2 pairs of dorsocentral setae (posterior very long and strong, anterior shorter and finer), 1 pair acrostichal setae finer but as long as anterior dorsocentral seta, 1 strong supra-alar seta slightly exceeding length of posterior dorsocentral seta. Anepisternum with 2 strong anepisternal setae and 2 moderately strong intermediate setae, with 11 fine setulae scattered across surface. Scutellum (fig.9) light gold color, clothed in black, irregular setulae with 2 pairs of strong scutellar setae (postalar setae) moderately strong, same size as acrostichalsetae.Meron silver-grey, katepisternum with 1 katepisternal seta (fig.10).

Legs of *Curtonotum simile* have coxae with pale yellow color. Fore coxa with two moderately strong, ventrally-directed preapical setae and comb of finer setulae medially on anterior surface (fig.11). Mid coxa with 2 very strong, lateral, ventrally-directed setae and comb of finer setulae medially (fig.12).Hind coxa with 1 weaker lateral seta (fig.13), 1 ventral setula and one strong ventral seta (fig.14). Femora, tibia and tarsi uniform pale yellow (fig.1). Fore tibia with variable number of strong setae on lateral margin (fig.15).

The wing (fig16)is long, relatively broad, tip evenly-rounded, veins chestnut-brown,very slightly darker in region of dm–cu cross vein with medial angle; cua1 relatively long; anal fold extending as long as cua1; anal lobe broad, squarely rounded.

Costal vein with prominent costal spines in basal four-fifths from costal break (fig.17). Halter pale

yellow (fig7).

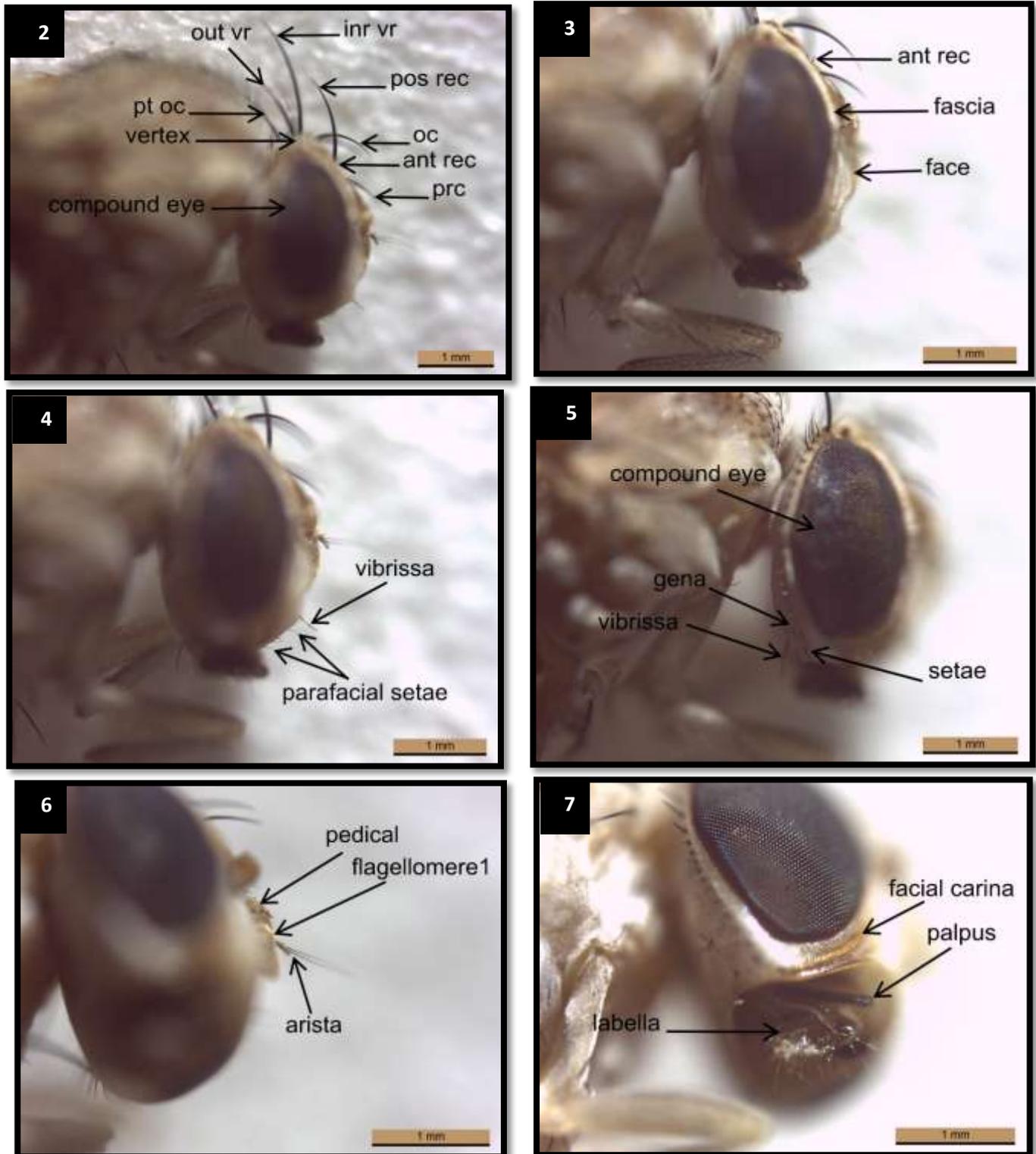


Fig 2-7. Lateral view of *Curtonotum simile* headshowing: **2.** position of different orbital plate setae. **3.** fascia and bulging face. **4.** parafacial setae and vibrissa. **5.** gena, genal setae and vibrissa. **6.** parts of antenna. **7.** facial carina and some component of mouth parts. pos rec: posterior reclinate seta. ant rec: anterior reclinate seta. prc: proclinate seta. oc: ocellar seta. inrvr: inner verticale seta. outvr: outer vertical seta. ptoc: postocellar seta.

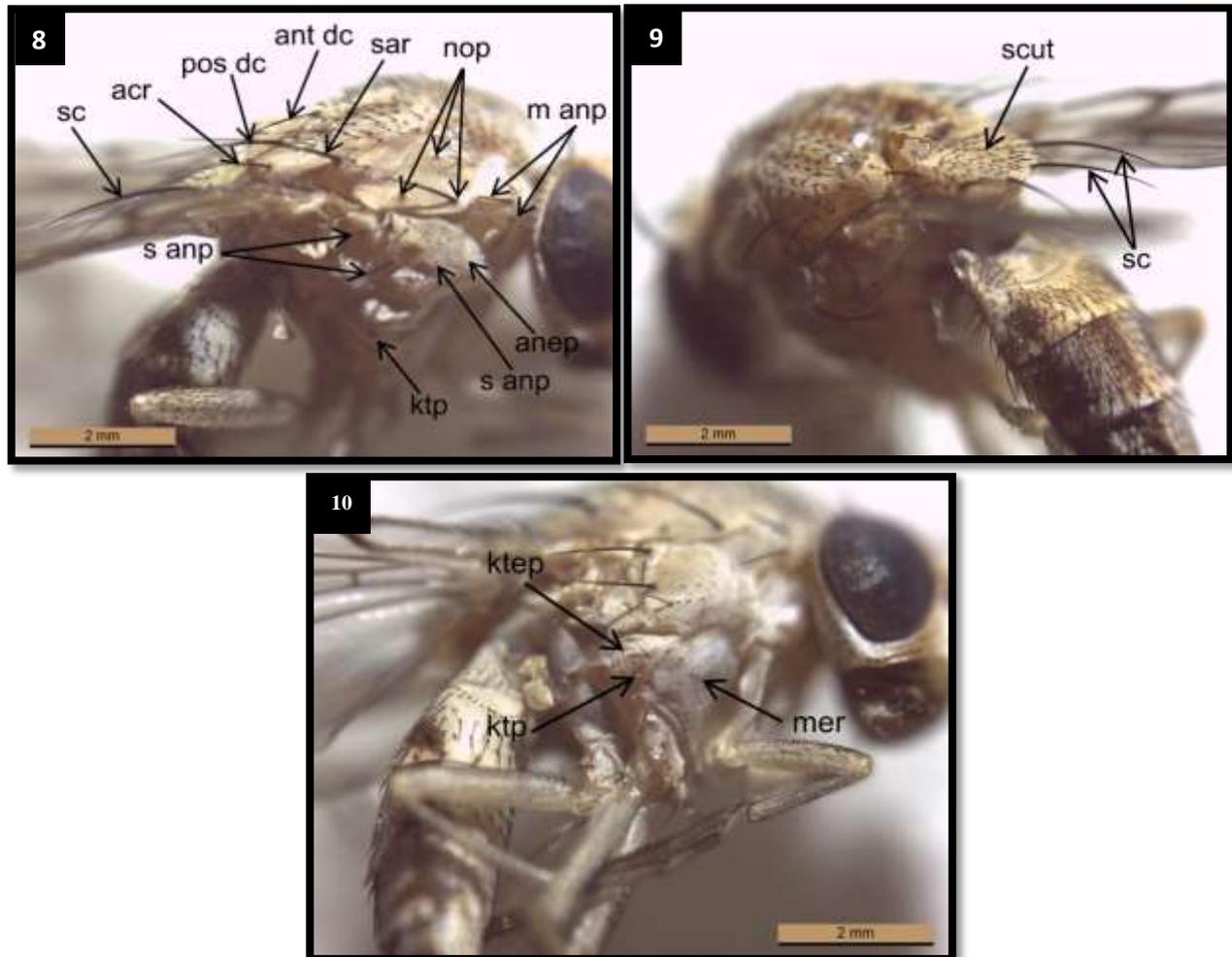


Fig 8-10: 8. Lateral view of *Curtonotum simile* thorax showing macrosetae. 9. posterior view of *Curtonotum simile* thorax showing acutellum and scutellar setae. 10. latero-ventral view of *Curtonotum simile* thorax. nop: notopleural setae. sar: supra-alar seta. ant dc: anterior dorso-central seta. pos dc: posterior dorco-central seta. acr: acrostical seta. manp: moderately strong anepisternal setae. sanp: strong anepisternal setae. anep: anepisternum. ktp: katepisternal seta. ktep: katepisternum. scut: scutellum. sc: scutellar setae. mer: meron.

The abdomen with gold color, clothed in relatively long black, overlapping setulae, arranged in regular rows, those at apical margins longer and stronger. Tergite 1 simple, devoid of maculae. Tergite 2 with elongate, narrow brown lateral macula on either side only. Tergites 3–5 with narrow, brown median fascia and brown dorsolateral maculae, all well separated from median fascia.

4. Discussion

In this study *Curtonotum simile* Tsacas, 1977 was collected from rabbit carcass in desert area at Jeddah city, kingdom of Saudi Arabia. Insects of genus *Curtonotum* was recorded previously in Asia continent in Japan by Okada (1960). Also, Kirk-Spriggs (2008) reported this genus in Mali and Oman. Whereas, Carles-

Tolrá(1994) reported genus *Curtonotum* among a list with 353 dipterous species (and subspecies) belong to 34 families of the Acalyptrata group in Catalonia (northeast of Spain). *Curtonotum* was collected from the Russian Far East by Ozerov (2007). The species *Curtonotum simile* extends northwards into Israel in the Palaearctic (Kirk-Spriggs and Freidberg, 2007).

By studying the morphological aspect of *Curtonotum simile* in this research it was cleared that genus *Curtonotum* can be defined by presence of bristles on head which distinct from the orbital plate, thorax strongly arched, costal vein with break, and the body color was gold to dull gray. Wirth (1977) and Wirth & Tsacas (1980) proved that most species of genus *Curtonotum* are small to medium sized (3-11 mm), dull gray to brownish, and hump-backed.

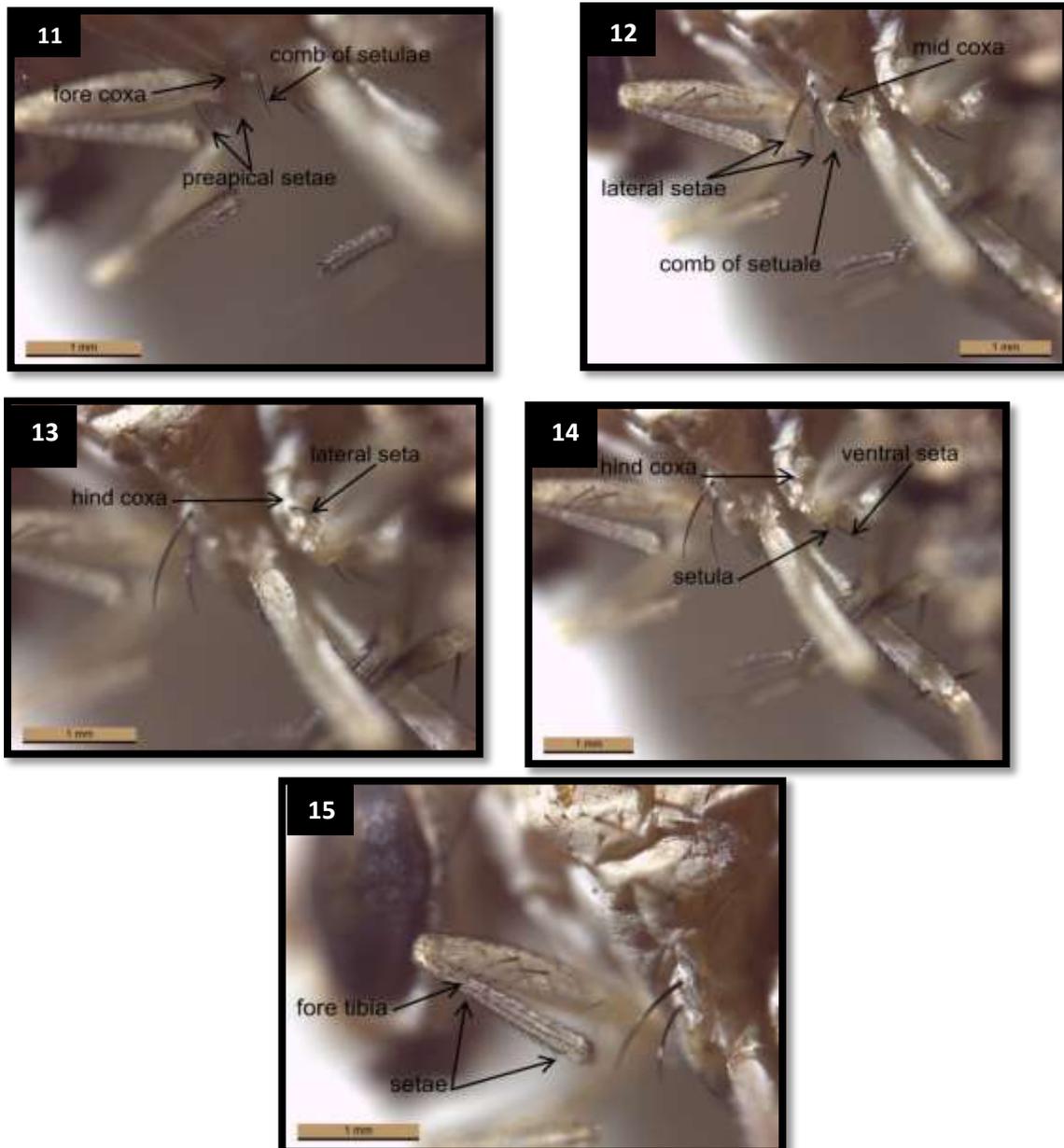


Fig 11-15: 11. Lateral view of *Curtonotum simile* fore leg. 12. Lateral view of *Curtonotum simile* mid leg. 13, 14. Lateral view of *Curtonotum simile* hind leg. 15. Lateral view of *Curtonotum simile* fore leg showing tibia.

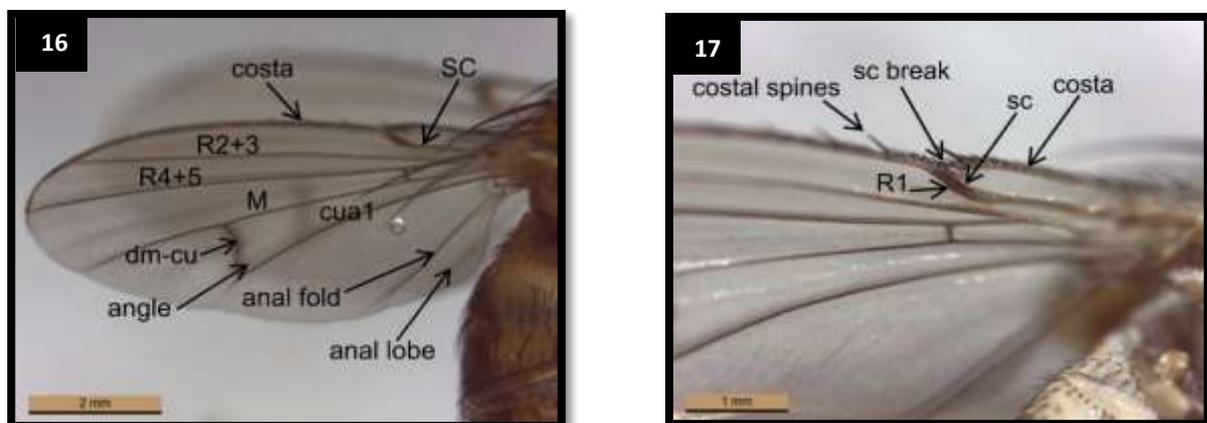


Fig 16-17: 16. Structure of *Curtonotum simile* wing.

17. Magnified view of *Curtonotum simile* wing.

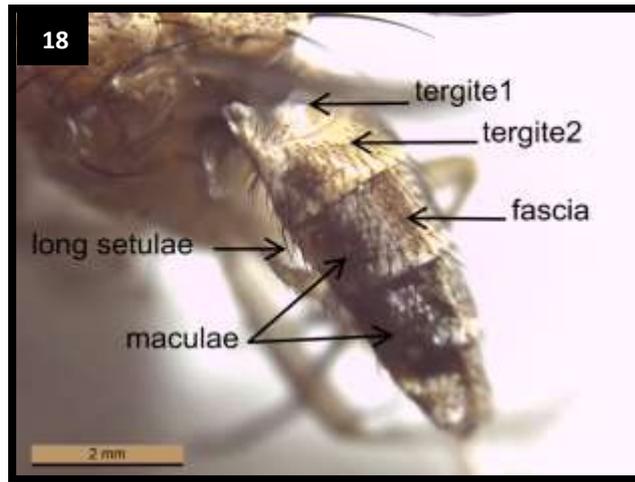


Fig 18. dorsal view of *Curtonotum simile* abdomen.

The little is known about the life histories of genus *Curtonotum*. Several Afrotropical species have been bred as scavengers in locust and grasshopper egg pods (Greathead, 1958; Kirk-Spriggs, 2008) and a Nearctic species has been reared under laboratory conditions on the same substrate (Meier *et al.*, 1997). The adults of some Neotropical species were attracted to dung, and a species from Peru was bred from a nest of the sphecid wasp *Philanthus* (Hymenoptera: Crabronidae) that was stocked with bee prey (Klymko and Marshall, 2011).

Conclusion:

In the kingdom of Saudi Arabia, there are rarely studies on carrion flies. The recent study proved that *Curtonotum simile*, acalyptrate flies attracted to the rabbit carcass at the fresh stage of decomposition, in desert area in Jeddah city. The details of morphological characters were detected and photographed. This knowledge is essential to the progress of forensic entomology in the country.

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