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SCANNING ELECTRON MICROSCOPY OF THE MALE GENITALIA OF SARCOPHAGIDAE (DIPTERA)

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The male genitalia of nine species of Sarcophagidae (Diptera) – Goniophyto honsuensis *Rohdendorf, 1962,* Tricharaea brevicornis *(Wiedemann, 1830),* Chaetoravinia derelicta *(Walker, 1852),* Austrohartigia spinigena *(Rondani, 1864),* Chrysagria duodecimpunctata *Townsend, 1935,* Boettcheria bisetosa *Parker, 1914,* Lipoptilocnema lanei *Townsend, 1934,* L. crispina *(Lopes, 1938) and* Euboettcheria alvarengai *Lopes & Tibana, 1982 – were examined by scanning electron microscope (SEM) and the main morphological features are described.*

Key words: Diptera – Sarcophagidae – male genitalia – scanning electrom microscope

Following the previous studies of male genitalia of Sarcophagidae under SEM (Leite & Williams, 1988; Leite & Lopes, 1989), the present paper shows the main morphological characters of male genitalia of nine other species of this family. The male genitalia were obtained of specimens from the collection of National Museum of Rio de Janeiro State. The male genitalia were dissected and processed for SEM studies in the manner described by Leite & Williams (1988). The scanning figures show some important details relevant to the systematics of the species studied.

Genus *Goniophyto* Townsend, 1927

Goniophyto Townsend, 1927: 281 [type species, *G. formosensis* Townsend, (Taiwan)].

In addition to the type species, *G. bryani* Lopes, 1938 (Hawaii); *G. boninensis* Lopes, 1958 (Boni Is.); *G. honsuensis* Rohdendorf, 1962 and *G. yaeyamaensis* Kano & Shinonaga, 1964 (Ryu-Ryu Is.) have been described. Rohdendorf (1967) proposed the subtribe *Goniophytoina* for a single genus composed of small flies confined to sea shores of the "extreme southeastern Asia and northern Oceania" that he considered as a relic. Rohdendorf point out the plesiomorphic features of the species: insignificant sexual dimorphism, wings long and with little costalized veins, ribbon like phallosome and hind spiracles of larvae on the surface, without respiratory fossa; living on decaying animal substances (carrion, escrement).

Ishijima (1967) described third instar larvae of *G. honsuensis*, "commonly found in swampy area around the mouth of rivers and adult flies swarm in dead animals. The larvae are easily reared on fish or horse flesh in laboratory". The description do not refer to the respiratory fossa but the fig. 5 of plate 12 seems to show a small aperture of the fossa. In the Sarcophaginae only *Sarathromyina* larvae present posterior spiracles on the surface, without respiratory fossa. In the Miltograminae, Allen (1926) described species of *Senotaina* with spiracular depressions of different depths. The depressions are situated below the stigmal plates (pl. 5, Figs 27, 35). *Amobia aurifacies* (Seguy, 1931), a common Brazilian species shows a very deep depression, the stigmal plates are situated on the dorsal margin of the depression. We examined one puparium of *Amobia pelopei* (Rondani, 1859) (a paratype of *A. alienus* Dodge, 1953) from Hawaii. The posterior end of the puparium is convex, without a spiracular fossa. *Goniophyto* belongs to the Paramacronychiinae, characterized by two row of bristles on the first genital segment.

Goniophyto honsuensis Rohdendorf, 1962 (Figs 1 to 3)

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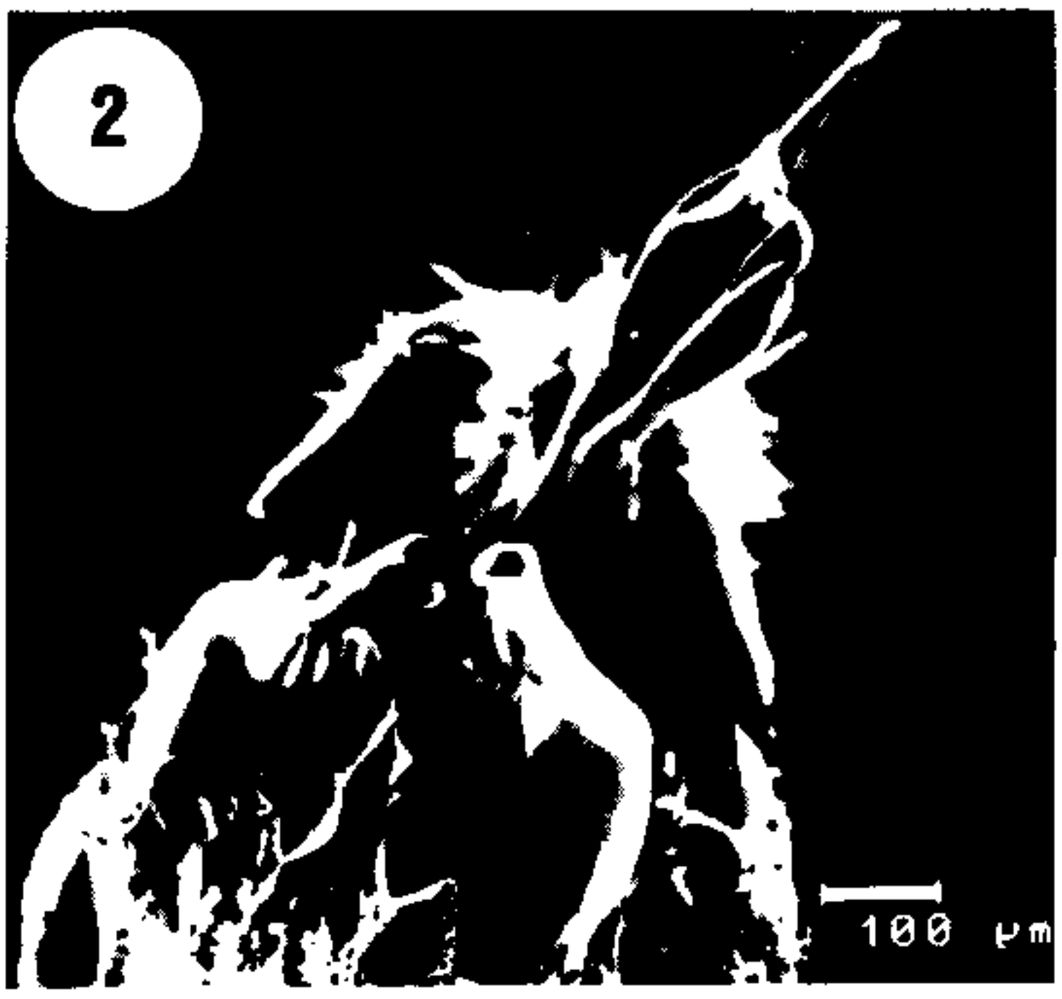
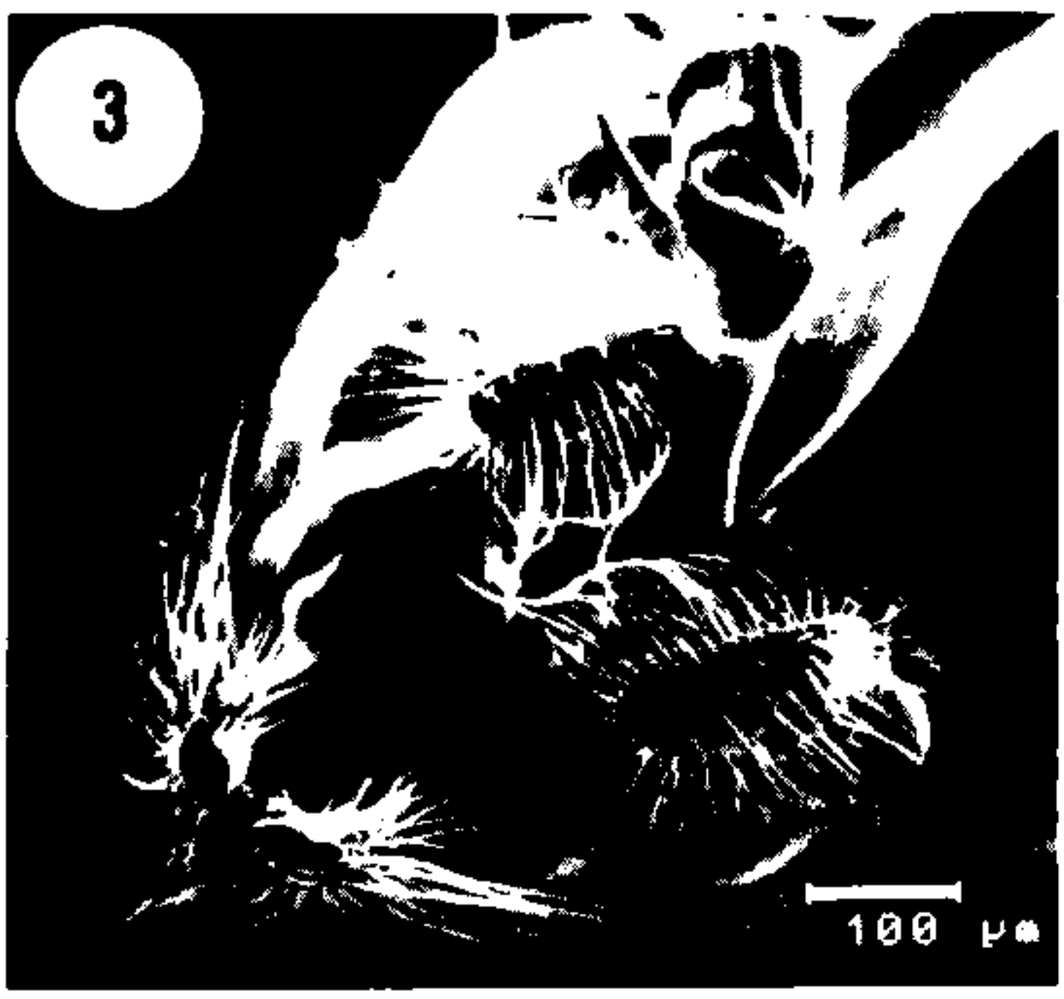
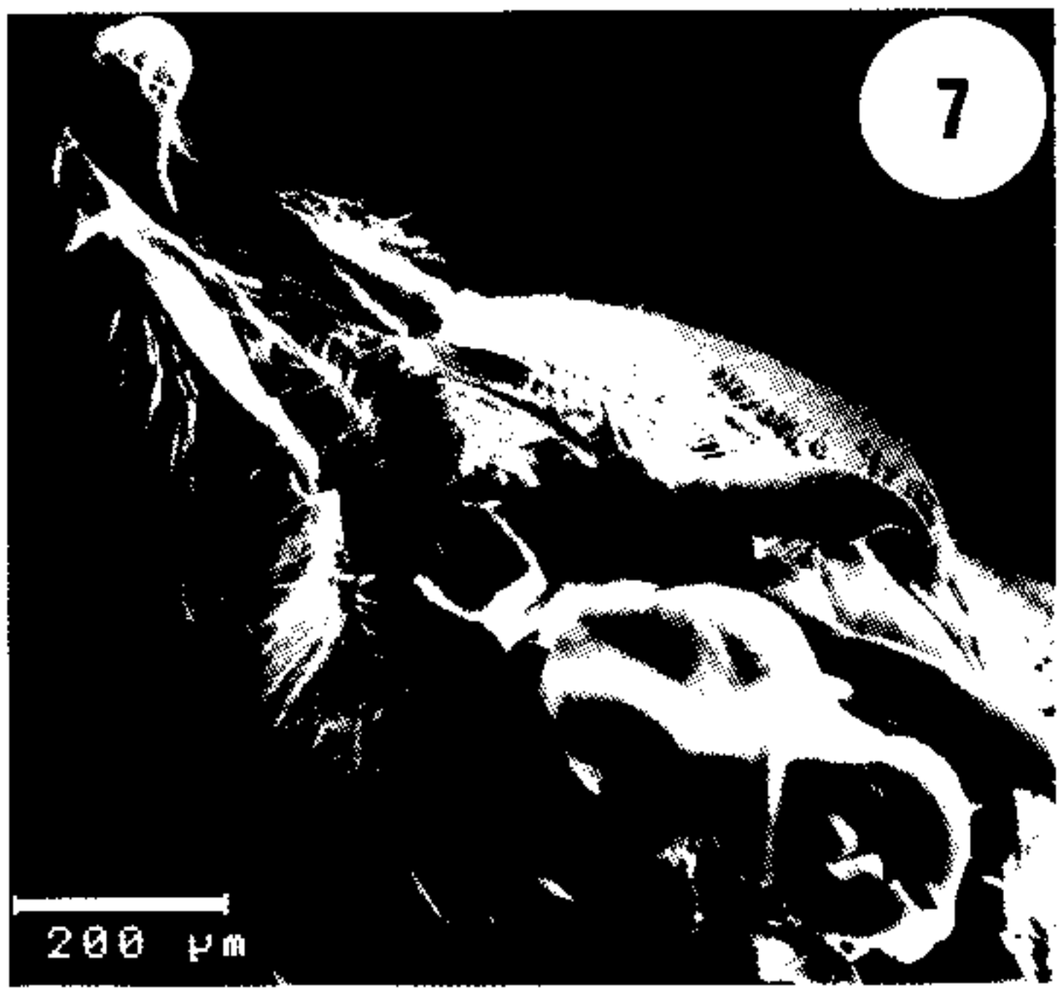
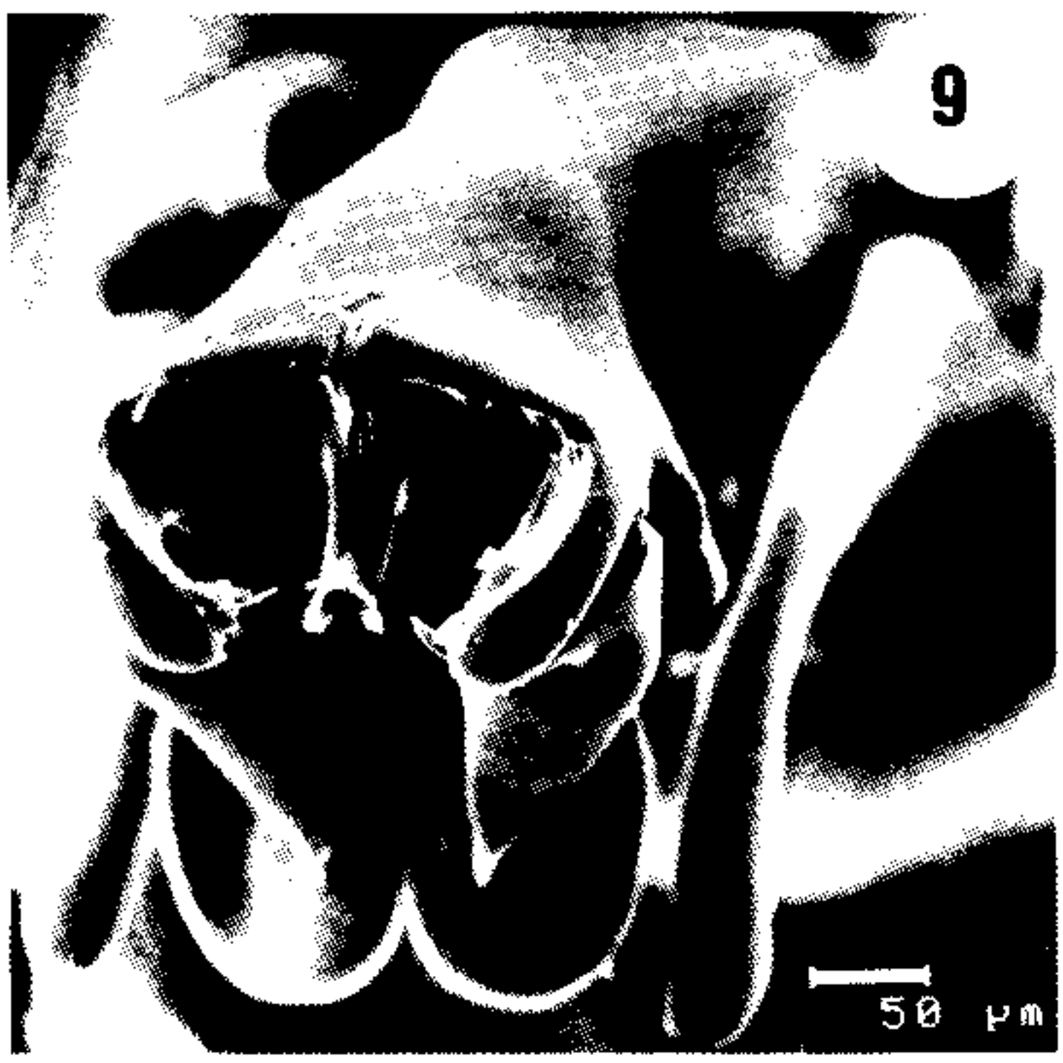
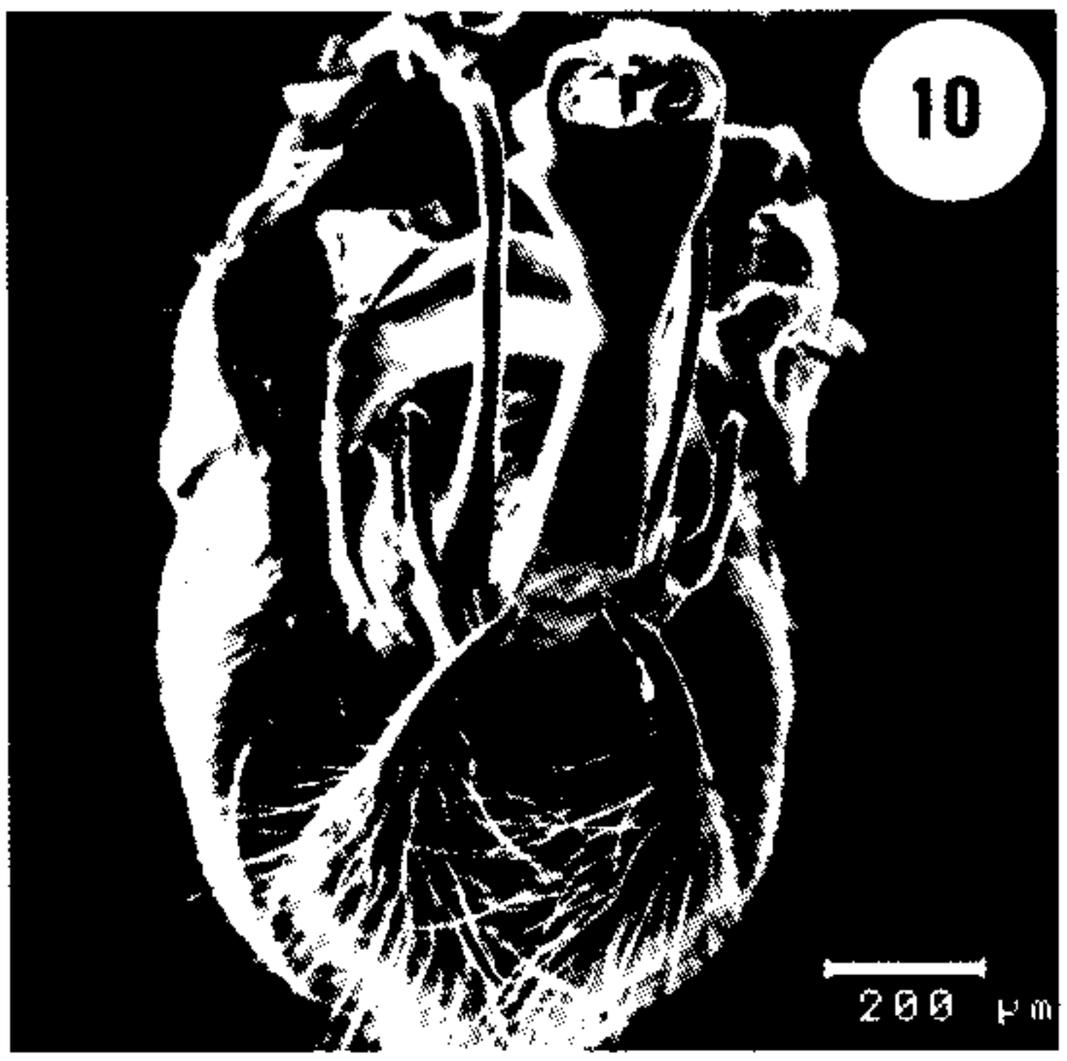




SEM photographs of the male genitalia of Sarcophagidae. *Goniophyto honsuensis* – Fig. 1: penis, ventral view. Fig. 2: genitalia, ventral view. Fig. 3: cerci and surstyli, apical view. *Tricharaea brevicornis* – Fig. 4: genitalia, oblique view. Fig. 5: penis, lateral view. Fig. 6: penis, ventral view.







SEM photographs of the male genitalia of Sarcophagidae. *Chaetoravinia derelicta* – Fig. 7: genitalia, apical view. Fig. 8: genitalia, lateral view. Fig. 9: penis and palpi genitalium, apical view. Fig. 10: genitalia, dorsal view. *Austrohartigia spinigena* – Fig. 11: genitalia, dorsal view. Fig. 12: penis and palpi genitalium, oblique view.

Goniophyto honsuensis Rohdendorf, 1962: 937, Figs 5, 6.

Cerci and surstyli covered with long hairs, the apices of cerci a little curved forwards, the surstyli largely curved backward (Fig. 3); palpi genitalium very broad, twisted, with anterior folds (Fig. 2); penis with dorsal long, slender, pointed structure, evidently the glans; ventrally a conspicuous assymetrical lobe, somewhat membranous (Fig. 11). Three of the five species of the genus show a long slender penis, only *G. bryani* and *G. honsuensis* present the ventral lobe, a structure similar to the ventralia of the more derived forms; however the first refered species is characterized by more slender ventral lobe and curved glans, not as straight as that of *G. honsuensis*.

Tricharaea brevicornis (Wiedemann, 1830)
(Figs 4 to 7)

Sarcophaga brevicornis Wiedemann, 1830: 299; Aldrich, 1925: 467 (type examined).

The species of the genera *Tricharaea* and *Sarothromyia* live exclusively on beaches, mostly sea beaches. *T. brevicornis* also lives on river beaches, including the beaches of small rivers.

Cerci with long hairs, the apices with rounded external lobes; surstyli broad, pointed, with long hairs limited to the anterior part (Figs 4, 7); the apical plates of paraphallus is a membranous structure that encircles the glans which is partially seen apically, especially a pair of pillows in all figures now published; on sides, anteriorly, the apical plate is covered by a tomentum, long basally, anteriorly, some striae are seen, mostly internally. The ventralia is a complicate structure, strongly convex, with a pair of small distal apophyses bearing lateral borders very much sclerotized (Figs 5, 6).

Chaetoravinia derelicta (Walker, 1852)
(Figs 8 to 10)

Sarcophaga derelicta Walker, 1852: 322; Lopes, 1977: 43, figs 1-6. *Helicobia quadrisetosa* Coquillett, 1901: 17; Aldrich, 1916: 296, fig. 143.

This is the type species of *Chaetoravinia* Townsend, 1917: 190, 193, 195, a species living in the USA, from Man. to N. J., Mexico and Florida. Cerci with slender and convergent distal parts, covered with long hairs; forcipes interiores short with anterior hairs, palpi genitalium exceedingly long, curved and slender (Figs 8, 9); suture between theca and paraphallus not evident, apical plate of paraphallus composed of a pair of convergent flat arms around the very much conspicuous tubular median process of glans; the styli resting between the arms of lateral plates and the median process are not evident (Fig. 9); the lateral plates, showing two slender points each (Figs 8, 9); the large rounded lobes of ventralia are well evident (Fig. 9).

Austrohartigia spinigena (Rondani, 1864)
(Figs 11 to 13)

Sarcophaga spinigena Rondani, 1864: 26 (Chile: Valdivia).

Brachicoma ruficauda Aldrich, 1928: 10 (Chile: Angol).

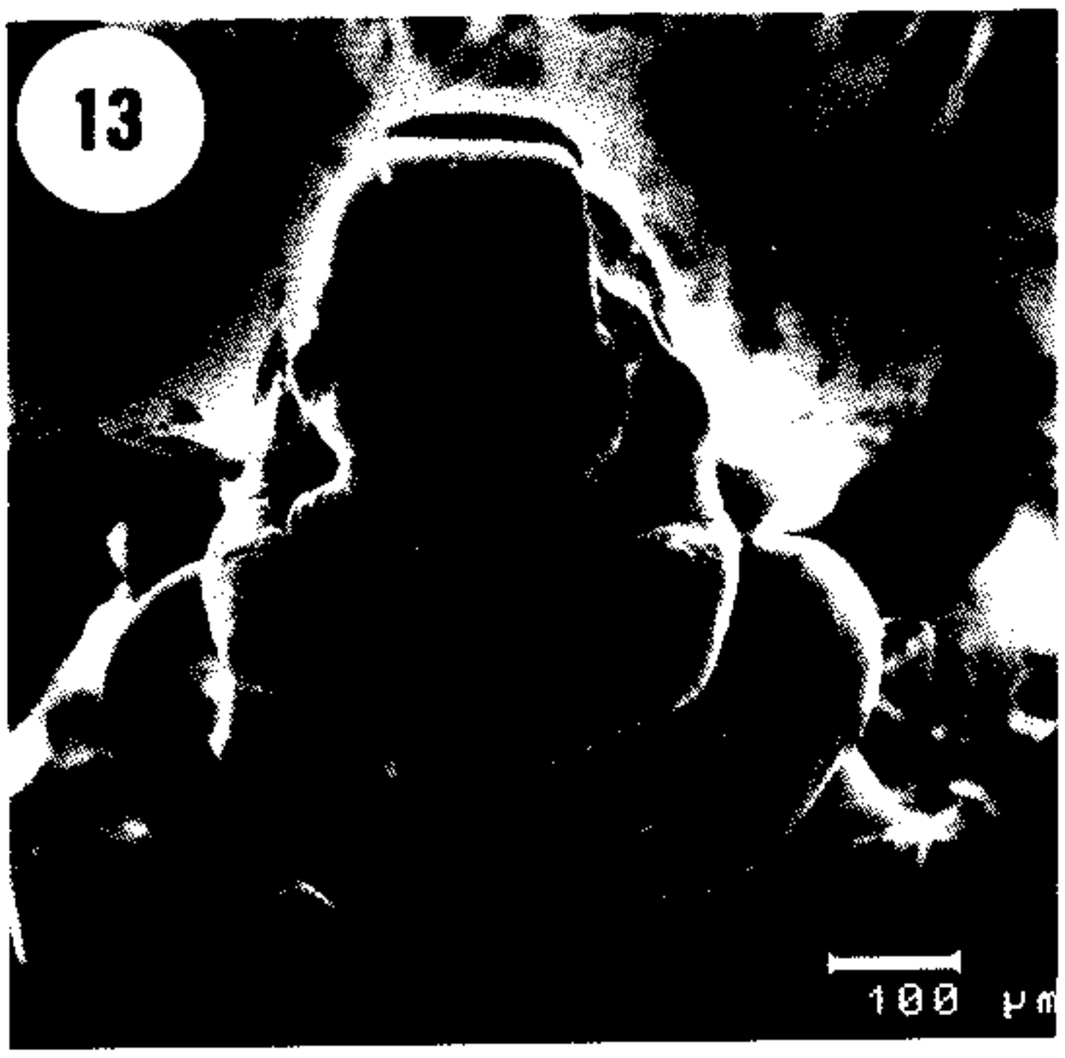
Austrohartigia megellanica Townsend, 1937: 116 (Chile: Punta Arenas); Lopes, 1968: 57, figs 28-30 (paratype examined).

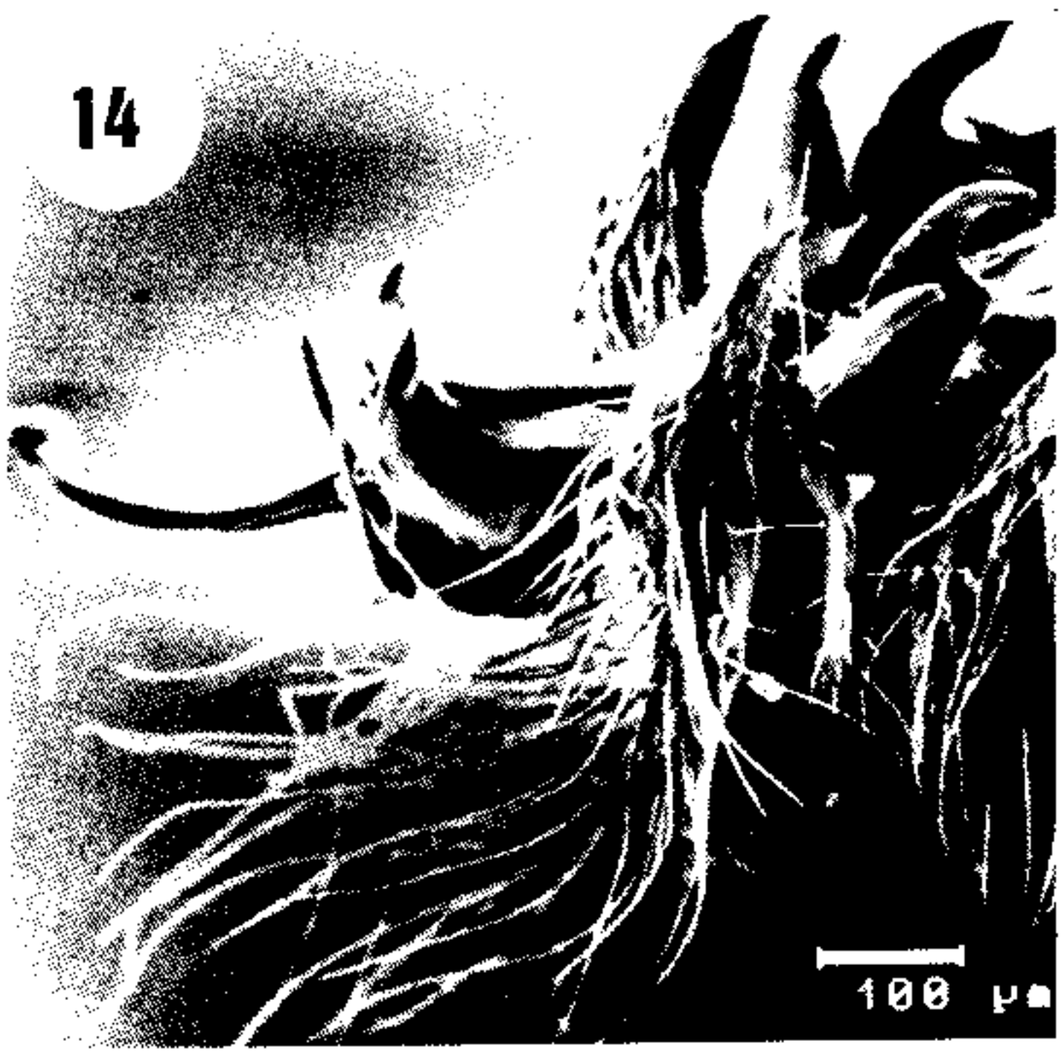
Phaeosarcophaga aldrichi Hall, 1937: 350, 352, figs 67 a-b (new name for *ruficauda* Aldrich).

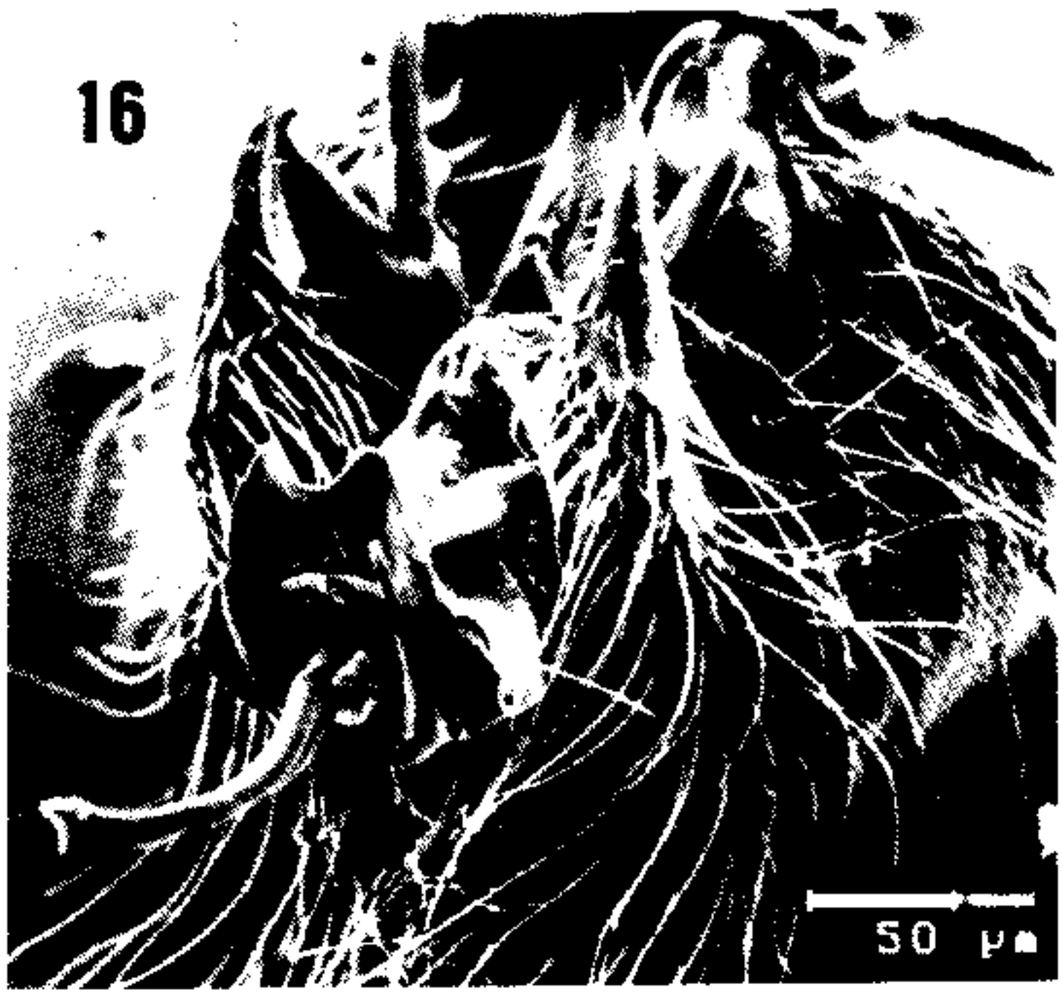
Doringia subandina Blanchard, 1938: 377, fig. 6 (Argentina: Mendoza).

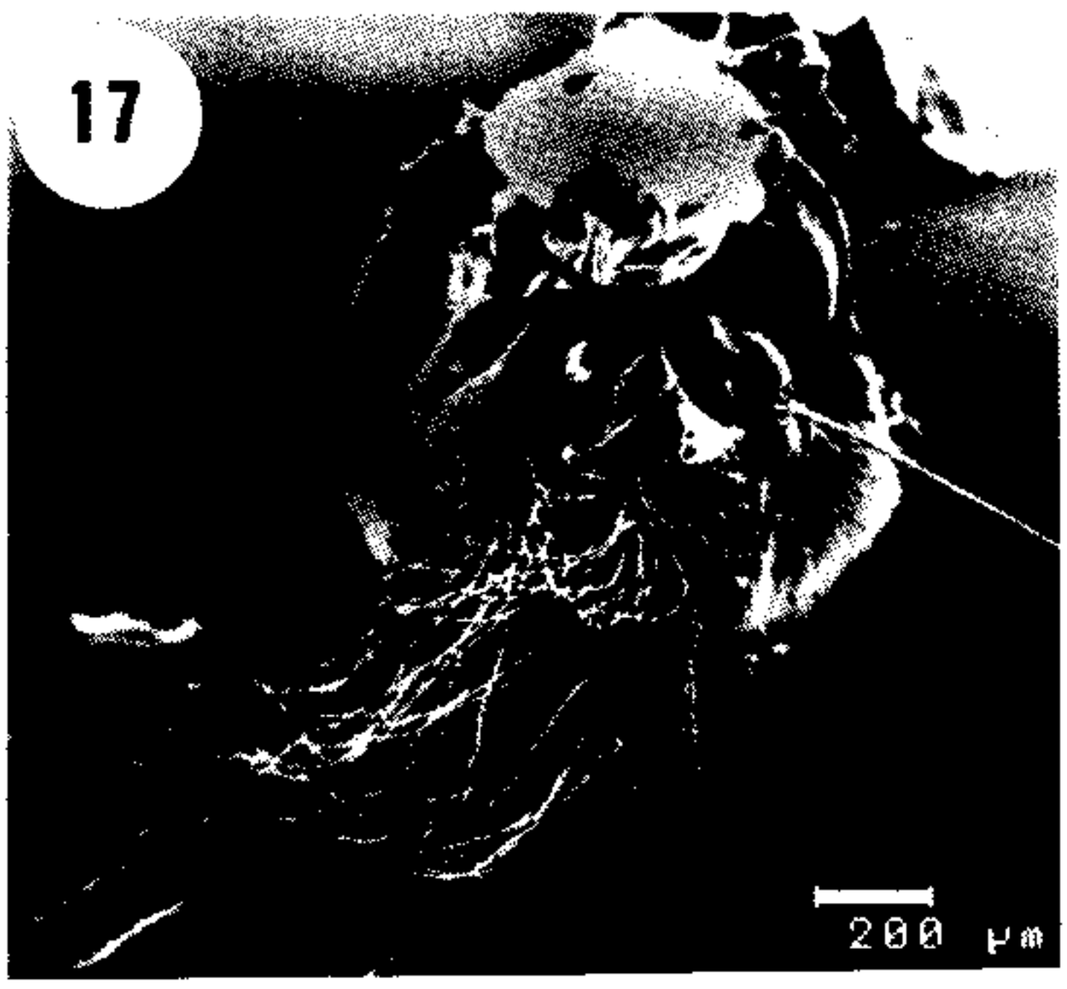
This very common species in South Chile is the type species of *Austrohartigia* Townsend, revised by Lopes (1981). Specimens with hairy or bare R1 are present in the collection. Cerci slightly curved forwards, not convergent, with long hairs; the forcipes interiores with a long basal bristle, the apices appearing between the cerci, in dorsal view (Fig. 11); the palpi genitalium is very long, robust, the apices are convergent (Figs 11-13); apical plate of paraphallus showing conspicuous basal suture (Fig. 12), longitudinal lines and apical curved apophyses distally (Figs 12, 13); the large ventralia is composed of two concave plates, united only on base, showing rounded anterior lobes (Fig. 13). In the figures, the glans and the dentated plates do not appeared.

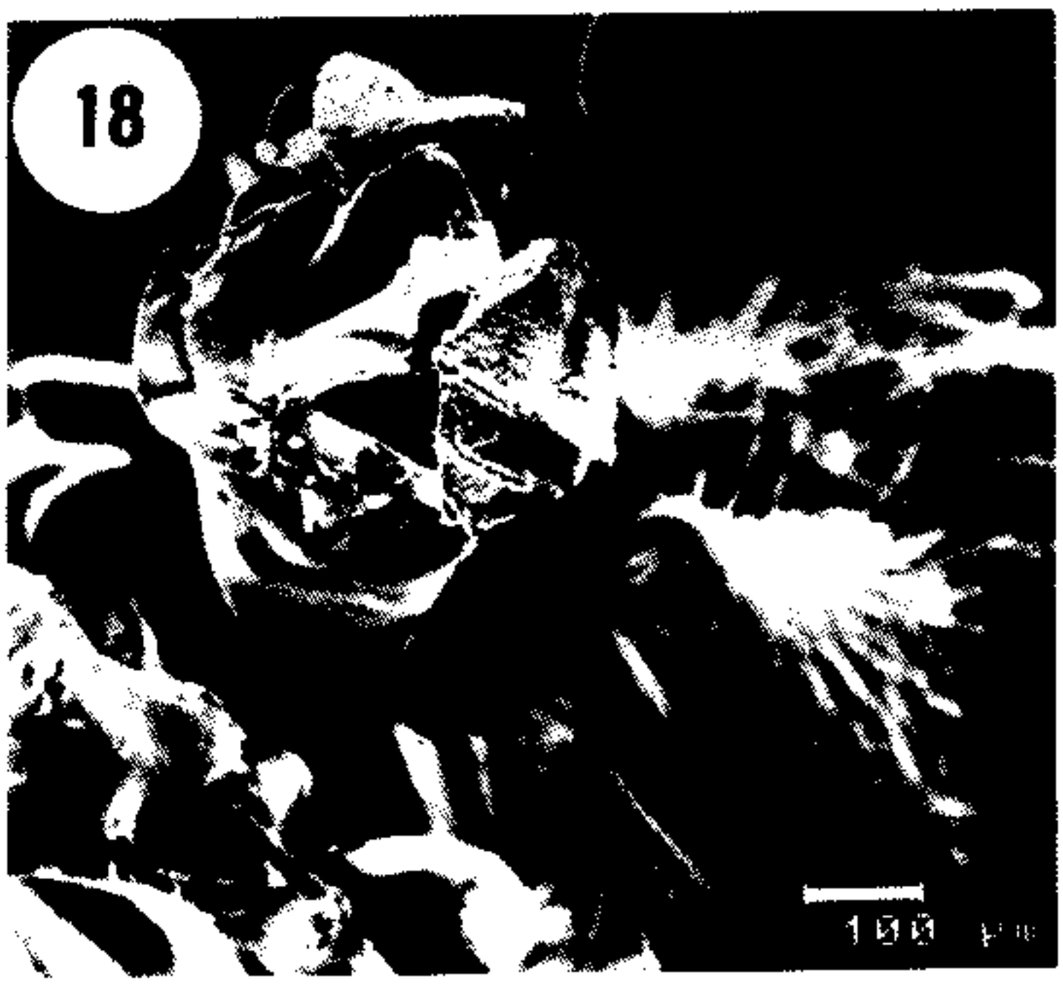
Chrysagria duodecimpunctata Townsend, 1935
(Figs 14 to 16)



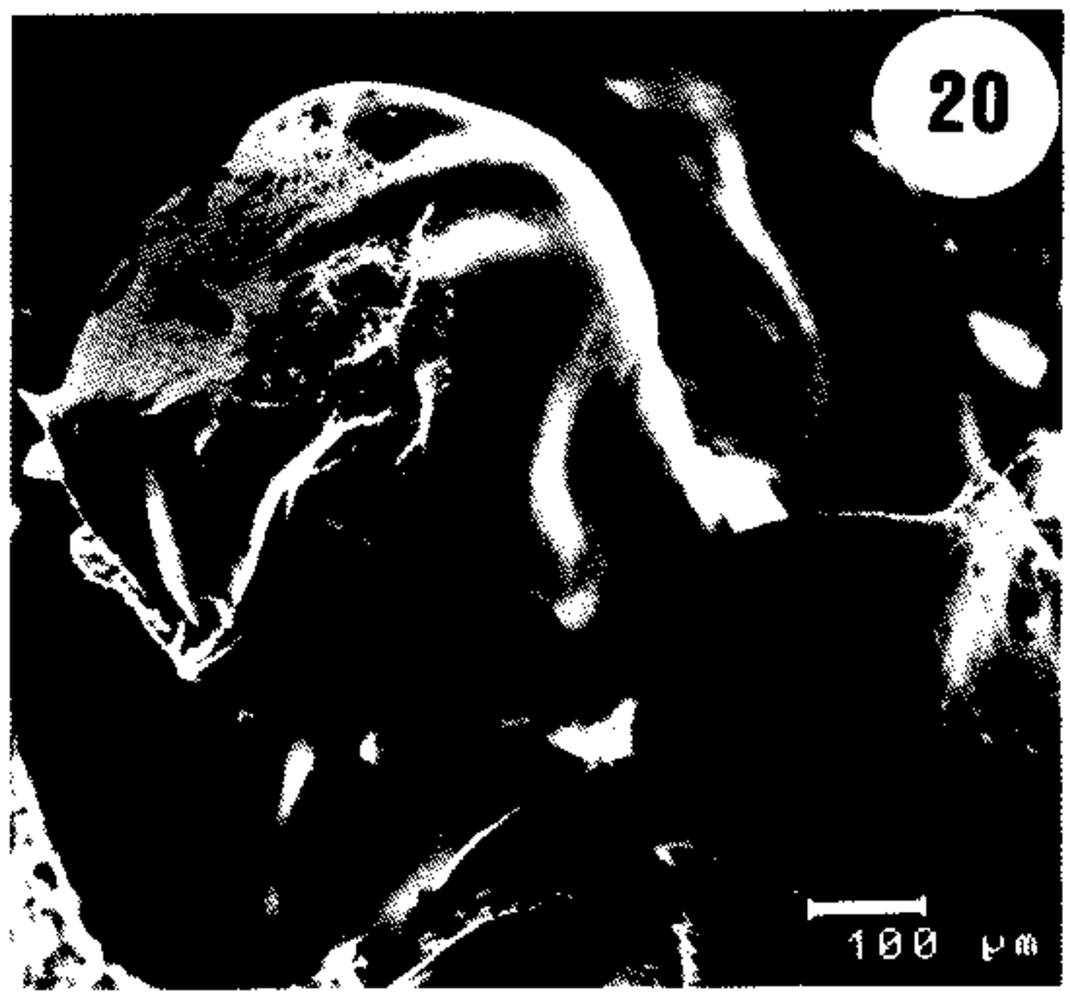


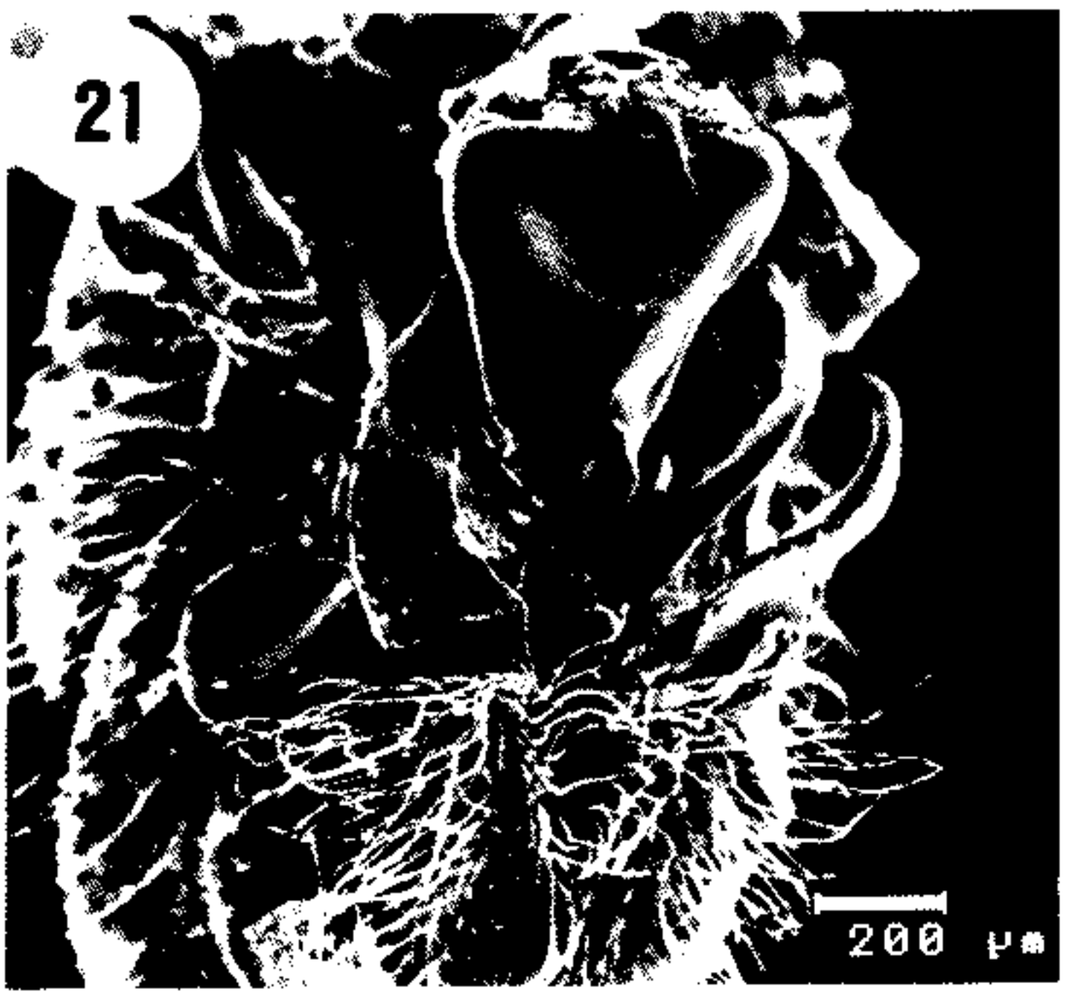


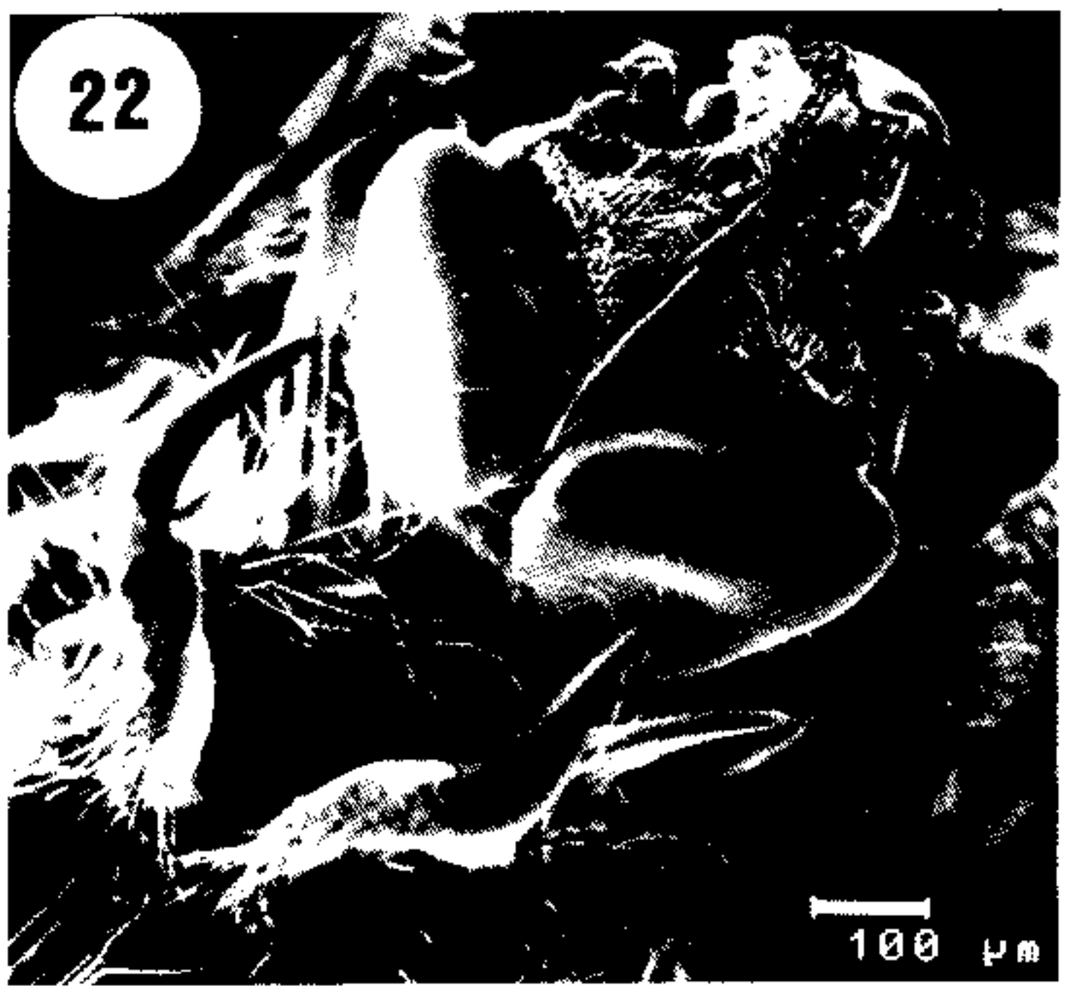


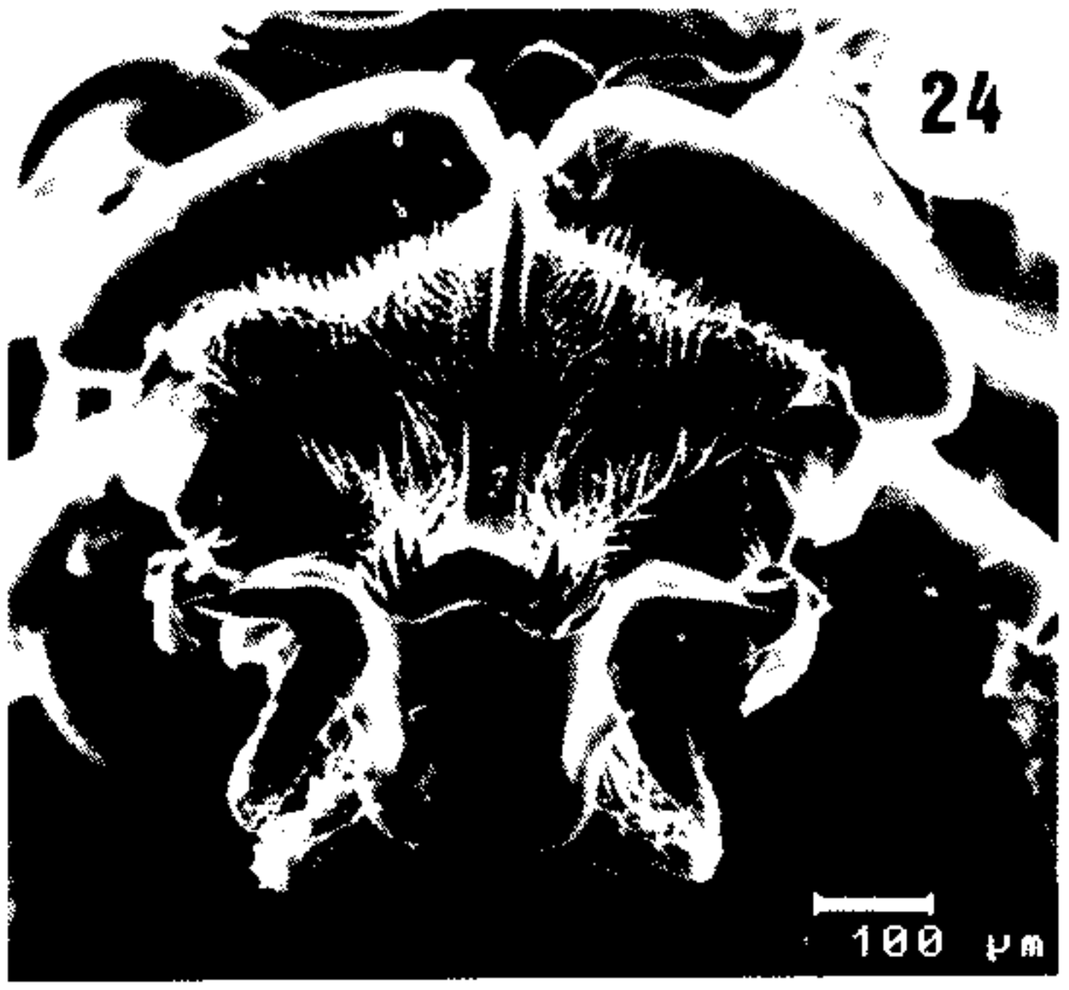


SEM photographs of the male genitalia of Sarcophagidae. *Austrohartigia spinigena* – Fig. 13: genitalia, apical view. *Chrysagria duodecimpuctata* – Fig. 14: genitalia, lateral view. Fig. 15: genitalia, dorsal view. Fig. 16: apex of the penis, oblique view. *Boettcheria bisetosa* – Fig. 17: genitalia, dorsal view. Fig. 18: genitalia, ventral view.









SEM photographs of the male genitalia of Sarcophagidae. *Boettcheria latisterna* – Fig. 19: penis, ventral view. *Lipoptilocnema lanei* – Fig. 20: genitalia, lateral view. Fig. 21: genitalia, dorsal view. *L. crispina* – Fig. 22: cerci and penis, dorsal view. Fig. 23: genitalia, oblique view. Fig. 24: penis, apical view.

SEM photographs of the male genitalia of Sarcophagidae. *Euboettcheria alvarengai* – Fig. 25: genitalia, apical view. Fig. 26: genitalia, oblique view.

Chrysagria duodecimpunctata Townsend, 1935: 72 (Brazil: Pernambuco); Lopes, 1971: 227, figs 1-11.

Sarcofahrtimyia tenta Hall, 1937: 353, fig. 62 (Argentina: Missionis).

This species, distributed from USA to Argentina, living on semi-aquatic vegetation, in swamps, with behavior similar to the species of Sciomyzidae, very probably pradator of fresh water Basomatophora, belongs to the Microcerellini. Cerci slightly curved forwards, show very long hairs; the very elongated surstyli present scattered hairs; penis near the base of palpi genitalium is covered with minute hairs (Figs 14, 15); apical plate of paraphallus composed of a pair of slender arms and, between them, lie the very long pair of free styli, evidently tubular and presenting conspicuous terminal expansions (the right one is broken in the specimen studied); the ventralia, bilobed, is readily observed (Figs 14, 15, 16).

Boettcheria bisetosa Parker, 1914
(Figs 17 to 19)

The genus *Boettcheria* is characterized by an exceedingly developed ventralia with reduction of the apical plate of paraphallus. *B. bisetosa* shows very long hairs on basal part of cerci (Fig. 17); the terminal margins of the reduced apical plate is turned backwards, median glabrous lobe of ventralia strongly concave, lateral spinous lobe each with three lobules, the ventral one more developed, short robust styli directed outwards, the apices showing circular openings; internally, near each stylus, conspicuous curved, long parts of the median process of glans united by a small plate (Figs 18, 19).

Lipoptilocnema lanei Townsend, 1934
(Figs 20 to 21)

Lipoptilocnema lanei Townsend, 1934: 111; Lopes, 1988: 133, figs 26, 27.

Parapeltopyga liguloides Blanchard, 1939: 845, fig. 16.

The species of Lipoptilocnema present a very much peculiar fifth sternite, female syntergite VI + VII very much reduced and spermatheca with many proximal folds, belong to the Sarcophagini and is also characterized by the very much elongated larva. Rohdendorf & Gregor (1973) erected *Lipoptilocnema*. Interesting features are easily seen in the figures: cerci with basal lobes covered with densely inserted, long hairs, free part strongly bent backwards, apically enlarged, with the points inwards directed, surstyli flat, mostly bare, the hairs limited to apices (Fig. 20); paraphallus very much sclerotized, apical plate with conspicuos, median, longitudinal crest, with terminal small spines. The cerci are densely pilose; the apical plate presents a proximal

fold, very characteristic of the species of the genus, forming a bridge from one lateral plate to the other, this bridge more or less triangular, with lateral points; the lateral plates are bare and curved below apical plates.

Lipoptilocnema crispina (Lopes, 1938)
(Figs 22 to 24)

Sarcophaga crispina Lopes, 1938: 282, pl. 1, Fig. 5, pl. 2, figs 1, 2.

The cerci are strongly bent backwards, with apical part broad but with long slender, inwardly directed point; paraphallus with apical furrows from which a conspicuous crest of apical plate is born, the crest presents some lateral foldings, and finish in long conspicuous spines; on the sides, the apical plate of paraphallus is covered with long pile; the proximal bridge of apical plate is almost quadrangular, the apical margin is concave and, on each side, there are conspicuous spines; lateral plates curved; styli broad, spinous (Figs 22, 23, 24).

Euboettcheria alvarengai Lopes & Tibana, 1982
(Figs 25 to 26)

Euboettcheria alvarengai Lopes & Tibana, 1982: 294, figs 31-35.

The cerci are apically smooth, anteriorly bearing large, numerous long and moderate spines, palpi genitalium broad and curved forwards, penis tubular with apical plate incorporated to paraphallus, bearing apically a pair of lobes which have small lobules; along the apical plate, the lateral lobules are divided from the median part. On the limits of paraphallus and apical plate there are a curious feature not seen by light microscopy: a median broad lobe which is slender and long apically (Figs 25, 26).

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