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## FIG INSECTS FROM ALDABRA (HYMENOPTERA, CHALCIDOIDEA)

by

**J. T. WIEBES**

Afdeling Systematische Dierkunde der Rijksuniversiteit,  
p.a. Rijksmuseum van Natuurlijke Historie, Leiden

With 40 text-figures

Aldabra, a group of coral reefs situated to the north of the Mozambique Channel, has been extensively studied by the 1967-68 Expedition of the Royal Society of London. For general information I refer to the volume that resulted from this expedition (see the reference to Renvoize, 1971).

Recently, Dr. S. R. J. Woodell sent several samples of insects, collected by him from the sycones of three species of figs. The material is preserved in the collections of the Leiden museum (RMNH). The fig wasps, belonging to the Chalcidoid families Agaonidae and Torymidae, are described below, following a list and a short discussion of the collections made by Dr. Woodell.

*Ficus nautarum* Bak.: *Allotriozoon heterandromorphum* Grandi; *Crossogaster* cf. *atratus* Masi.

*Ficus reflexa* Thunb.: *Elisabethiella reflexa* spec. nov.; *Crossogaster* spec.; *Sycobia orientalis* spec. nov.

*Ficus avi-avi* Bl.: *Nigeriella avicola* spec. nov.; *Sycoryctes caelebs* spec. nov.

There are no other records for any of the wasps from *Ficus reflexa* and *F. avi-avi*. The *Allotriozoon* from *F. nautarum* is known from several localities all over Africa and Madagascar (Wiebes, 1974b). Renvoize (1971: 231) listed *F. nautarum* with the species known from Aldabra and the Seychelles, and not found elsewhere. Although of a slightly different form, the *Allotriozoon*-wasps from Aldabra and those I have seen from Madagascar (from the sycones of *Ficus baroni* Bak.) and the Comores, are conspecific with those from Kenya, Zaire, and West Africa (from *Ficus vogelii* Miq.). This raises the question as to the specific distinction of the figs.

The Sycoecine wasps from the samples with *Allotriozoon* seem to be con-

specific with *Crossogaster atratus* Masi (1917: 125-126, fig. 3) from the Seychelles. Its relatives include *C. triformis* Mayr from Socotra, *C. silvestrii* Grandi from Senegal, and *Phagoblastus barbarus* Grandi from Cape Province, South Africa. *C. triformis* and *P. barbarus* were reared from figs inhabited by Agaonidae of the genus *Elisabethiella* Grandi<sup>1)</sup>, while *C. atratus* and *C. silvestrii* — judging from their localities — may be symbionts of *Allotriozoon heterandromorphum*. Both are characterized by the bilobed epistomal margin; it is straight in the other species. A discussion of the status of *Crossogaster* Mayr and *Phagoblastus* Grandi, beyond the remarks by Grandi (1955: 101, nota), would result in a reappraisal of the whole group. I leave it to Dr. Hill, who will revise the African Sycoecini.

#### AGAONIDAE

#### **Allotriozoon heterandromorphum** Grandi

Material. — 12 ♀, Bassin Cabri, Platin limestone, 10.iii.1974, ex *Ficus nautarum* (no. 3) (RMNH 2468).

7 immature ♀, Isle Michel, 9.ii.1974, ex *Ficus nautarum* (no. 6) (RMNH 2470).

4 ♀, Takamaka Grove, 10.ii.1974, ex *Ficus nautarum* (no. 9) (RMNH 2476, one ♀ slide-mounted).

#### **Elisabethiella reflexa** spec. nov.

(figs. I-I I)

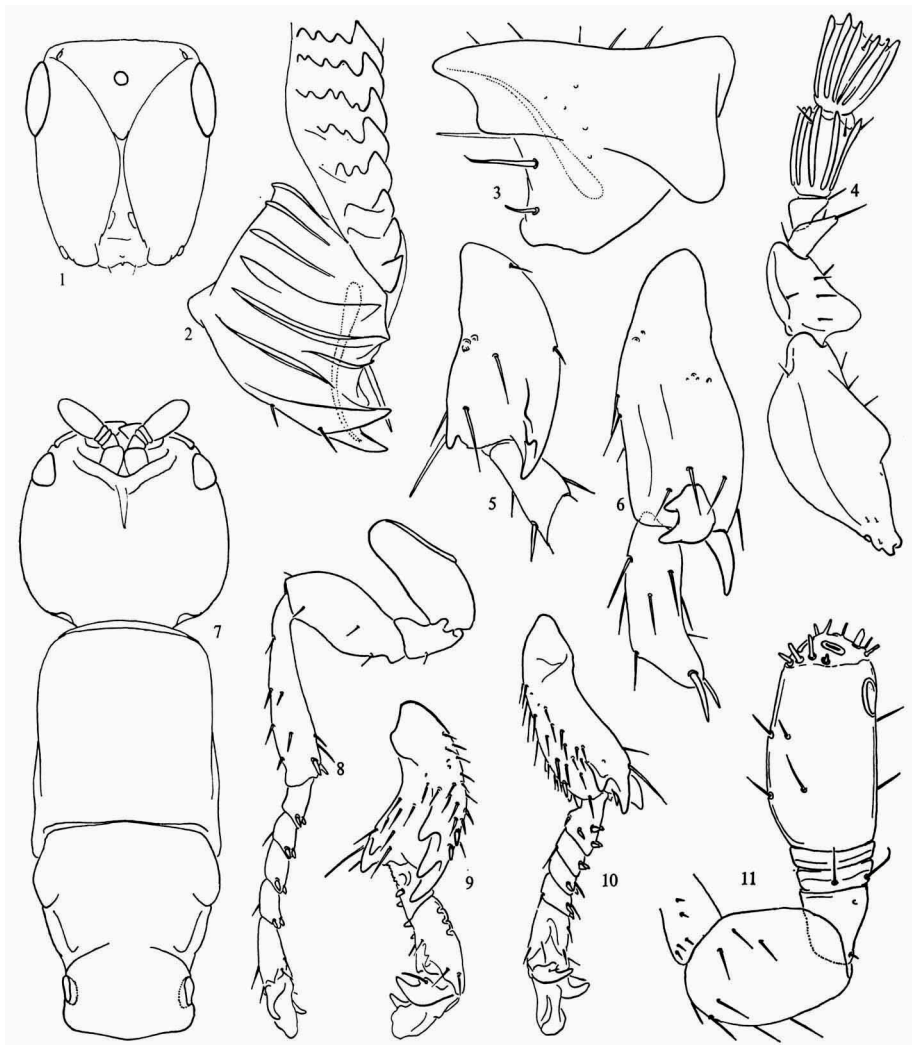
Material. — 8 ♀ 20 ♂, Anse Mais, 21.ii.1974, ex *Ficus reflexa* (no. 8) (RMNH 2474, ♀ holotype and ♀ ♂ paratypes slide-mounted).

Female. — Head (fig. 1) longer than wide across the compound eyes (6:5); the longitudinal diameter of the eye two-thirds of the length of the cheek. Three ocelli. Antenna (fig. 4) eleven-segmented; the pedicel longer than wide, angular in outline; the third segment short and blunt, reaching to the apex of the fourth; the fifth to eleventh subequal, with up to nine linear sensilla. Mandible (fig. 2) with two large apical teeth and about six ventral lamellae; the appendage with twenty rows of four or five rather large denticulations, less at the base and apex. Labium and maxillae with one (sub-)apical seta.

Thorax. Pronotum divided by a longitudinal groove; mesosternum with pollen pocket. Fore wing (2:1), 0.7 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 9:3:3:4; the hind

1) The apterous male of *C. triformis* Mayr, redescribed by Grandi (1928: 206-209, fig. 43), belongs to a species of *Alfonsiella* Waterston. There are already several instances known of a species of *Alfonsiella* developing in the same fig receptacle with a species of *Elisabethiella* (see Wiebes, 1972: 321).

wing (5:1), 0.5 mm long. Fore tibia (fig. 5) with a dorsal comb of three teeth, the apical one of which is large and prominent, the other two smaller; the ventral armature consisting of one tooth and a spur; the tarsal segments approximately in ratio 5:4:4:4:8. Mid leg: tarsal ratio 8:6:4:5:7. Hind leg: the tibia (fig. 6) with a bidentate antiaxial spur and a longer simple



Figs. 1-11. *Elisabethiella reflexa* spec. nov. 1, 2, 4-6, female; 3, 7-11, male. 1, head; 2, female mandible; 3, male mandible; 4, basal segments of antenna, axial aspect; 5, fore tibia and metatarsus, antiaxial aspect; 6, hind tibia and metatarsus, antiaxial aspect; 7, head and thorax; 8, mid leg; 9, fore tibia and tarsus, antiaxial aspect; 10, hind tibia and tarsus, antiaxial aspect; 11, antenna, dorsal aspect. Figs. 1, 7,  $\times 105$ ; 2, 3, 5, 6, 11,  $\times 420$ ; 4, 8-10,  $\times 210$ .

axial; the tarsal segments approximately in ratio 12:6:6:5:7, with a thin plantar fringe.

Gaster: the hypopygium with two long setae close to the blunt apex, the spine rather short; the spiracular peritremata of the eighth urotergite small, ovoid in outline; the pygostyle much as in fig. 14.

Length (head, thorax, and gaster), ca. 1.0 mm, the ovipositor 0.7 mm. Colour brown.

Male. — Head (fig. 7) as long as wide. Eyes approximately one-sixth of the length of the head. Antennae (fig. 11) situated in a common groove, consisting of five distinct segments, the third and fourth of which are anuli-form; the club is slightly over twice as long as wide. Mandible (fig. 3) unidentate, with a ventral subapical prominence; one gland; other mouth-parts atrophied.

Thorax, fig. 7. Pronotum about as long as wide posteriorly, almost as long as the combined lengths of the mesonotum, metanotum and propodeum, which appear approximately of equal length when measured laterally; the propodeum with rather short peritremata occupying about half of the length of the propodeum. Fore tibia (fig. 9) with three dorsal teeth, and several stout spines, the ventral angle with two teeth; the tarsal segments approximately in ratio 7:12, with dorsal indications of the original pentamerous condition; ventrally, either segment bears two conical spines. Mid leg (fig. 8): the femur almost  $2\frac{1}{2}$  times as long as the trochanter, twice as long as wide; the tibia as long as the femur and trochanter combined; the tarsal segments (with ventral, apical spines) approximately in ratio 6:5:6:5:9. Hind tibia (fig. 10) with two ventral, apical teeth, both of which are bicuspidate; the tarsal segments (with ventral spines) approximately in ratio 10:4:4:4:10.

Gaster. The genitalia simple.

Length (head and thorax), ca. 0.8 mm. Colour yellow-brown.

Remarks. — The new species appears to belong to the species-group of *Elisabethiella allotriozoonoides* (Grandi, 1917: 4-15, figs. 1-2). The female shows a distinctly bidentate mandible as, e.g., also depicted for *E. dyscritus* (Waterston, 1921, fig. b), and it has a low number of denticulations in the rows of the mandibular appendage. In a short table, the number of denticulations (counted at half length of the appendage) are mentioned for the four species:

|                                      |           |       |
|--------------------------------------|-----------|-------|
| <i>E. allotriozoonoides</i> (Grandi) | . . . . . | 11-12 |
| <i>E. socotrensis</i> (Mayr)         | . . . . . | 7-8   |
| <i>E. dyscritus</i> (Waterston)      | . . . . . | 6-7   |
| <i>E. reflexa</i> spec. nov.         | . . . . . | 4-5   |

The relatively long head distinguishes *E. reflexa* from *E. dyscritus*, which it otherwise seems to resemble. The total length of *E. dyscritus* (head and body, ca. 2 mm) is much larger than that of *E. reflexa*.

The male is easily distinguished by the short propodeal peritremata (but the male of *E. dyscritus* is not known).

***Nigeriella avicola* spec. nov.**

(figs. 12-21)

Material. — 30 ♀ 20 ♂, Bassin Cabri, 25.ii.1974, ex *Ficus avi-avi* (no. 10) (RMNH 2473, ♀ holotype and ♀ ♂ paratypes slide-mounted).

10 ♀ 40 ♂, Cinq Cases, Platin limestone, 8.ii.1974, ex *Ficus avi-avi* (no. 7) (RMNH 2471).

Female. — Head (fig. 16) longer than wide across the compound eyes (6:5); the longitudinal diameter of the eye almost two-thirds of the length of the cheek. Three ocelli. Antenna (fig. 20) eleven-segmented; the scape large and robust, with a strong ventral prominence; the pedicel small; the third segment small, its appendage blunt, reaching almost to the apex of the fourth segment; the other funicular segments subequal in length, with setae and linear sensilla; the three apical segments shaped so as to form a club. Mandible (fig. 15) with six ventral lamellae; the appendage with eleven ridges axially produced into a distinct tooth. Labium and maxillae much as in *N. letouzeyi* Wiebes, with two (sub-)apical setae.

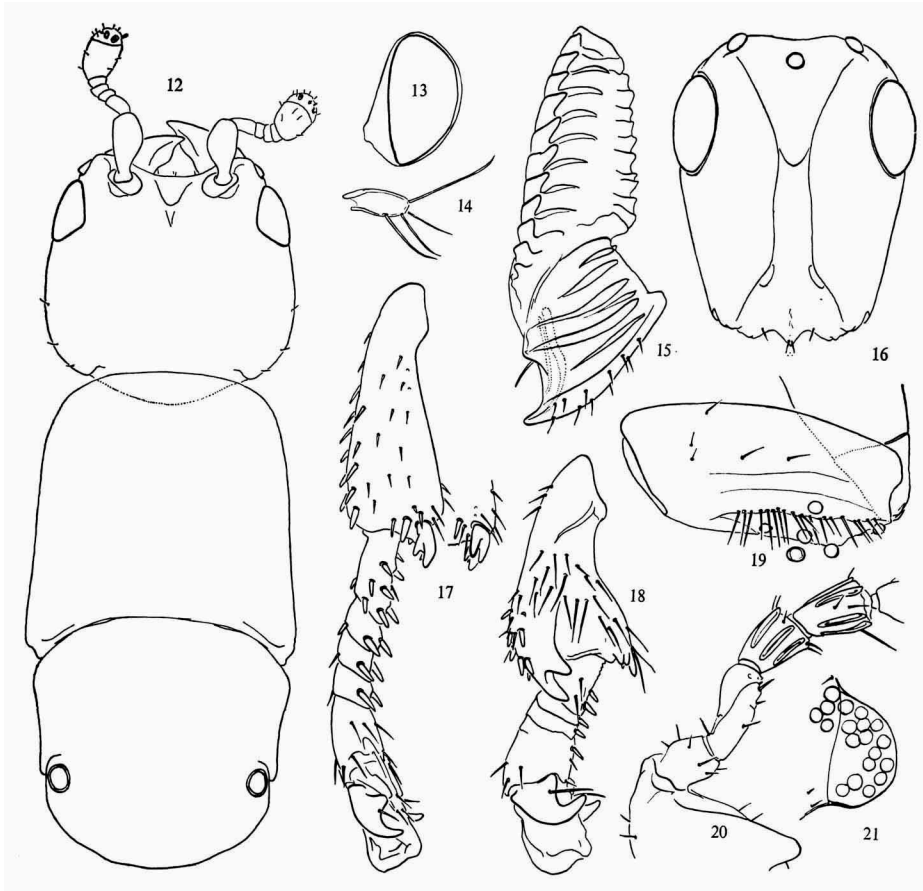
Thorax: pronotum entire, mesosternum with pollen pocket (fig. 21). Fore wing (2:1), 1.0 mm long; the submarginal, marginal, stigmal, and post-marginal veins approximately in ratio 20:10:6:5; the hind wing (5:1), 0.6 mm long. Fore coxa (fig. 19) with pollen pocket; the tibia with two dorsal teeth as in *N. letouzeyi*, and one ventral spur; the tarsal segments approximately in ratio 8:3:3:3:6. Mid leg: tarsal ratio 7:5:4:4:5. Hind leg much as in *N. fusciceps* Wiebes, the tarsal ratio 8:2:2:2:3, the segments with a distinct plantar fringe, and with axial spines.

Gaster: the hypopygium blunt at the apex; the spiracular peritremata (fig. 13) of the eighth urotergite large; pygostyle, fig. 14.

Length (head, thorax, and gaster), ca. 1.5 mm, the ovipositor 0.6 mm. Colour yellowish brown.

Male. — Head (fig. 12) about as long as wide, much as in *N. letouzeyi*. Eyes one-quarter of the length of the head. Antennae in separate sockets; with three anuliform, funicular segments; the club consisting of two distinct segments. Mandible with one gland; the labium and maxillae atrophied.

Thorax, fig. 12. Pronotum about as wide as long, narrowing frontad; the



Figs. 12-21. *Nigriella avicola* spec. nov. 12, 17, 18, male; 13-16, 19-21, female. 12, head and thorax; 13, outline of spiracular peritreme of eighth urotergite; 14, pygostyle; 15, mandible; 16, head; 17, hind tibia and tarsus, axial aspect, and detail in anti-axial view; 18, fore tibia and tarsus, anti-axial aspect; 19, pollen pocket of fore coxa, axial aspect; 20, basal segments of antenna, anti-axial aspect; 21, pollen pocket of mesosternum, ventral aspect. Figs. 12, 16,  $\times 105$ ; 13-15, 17-21,  $\times 210$ .

mesonotum and metanotum fused, and also the propodeum for the greater part connected to the metanotum, being separate only laterally. Fore tibia (fig. 18) with two large dorsal teeth and (indistinctly) three or four ventrals, the dorsal margin with stout spines; the tarsus consisting of four distinct segments, approximately in length ratio 5:1:1:5, the dorsal margin of the distal segment showing an indication of its composition of two segments, with ventral spines. Mid tarsi in ratio 8:4:4:5:10. Hind tibia (fig. 17): the apical armature consisting of two ventral, tricuspidate teeth accompanied

by strong spines, and a row of such spines along the dorsal margin; the tarsal segments approximately in ratio 13:5:4:4:10, with ventral and apical spines.

Gaster. The genitalia simple.

Length (head and thorax), ca. 0.9 mm. Colour uniform yellowish.

Remarks. — *Nigeriella avicola* differs most obviously from the two other species (see Wiebes, 1974a: 36-41) in several aspects of the female head e.g., the shape of the antennal sensilla, and the shape and number of the ridges on the mandible and its appendage. The male has three funicular segments as has *N. fusciceps*, but there are no elevated ridges on the head; moreover, the ventral armature of the hind tibia is heavier than in both *N. fusciceps* and *letouzeyi*.

#### TORYMIDAE, Sycophaginae

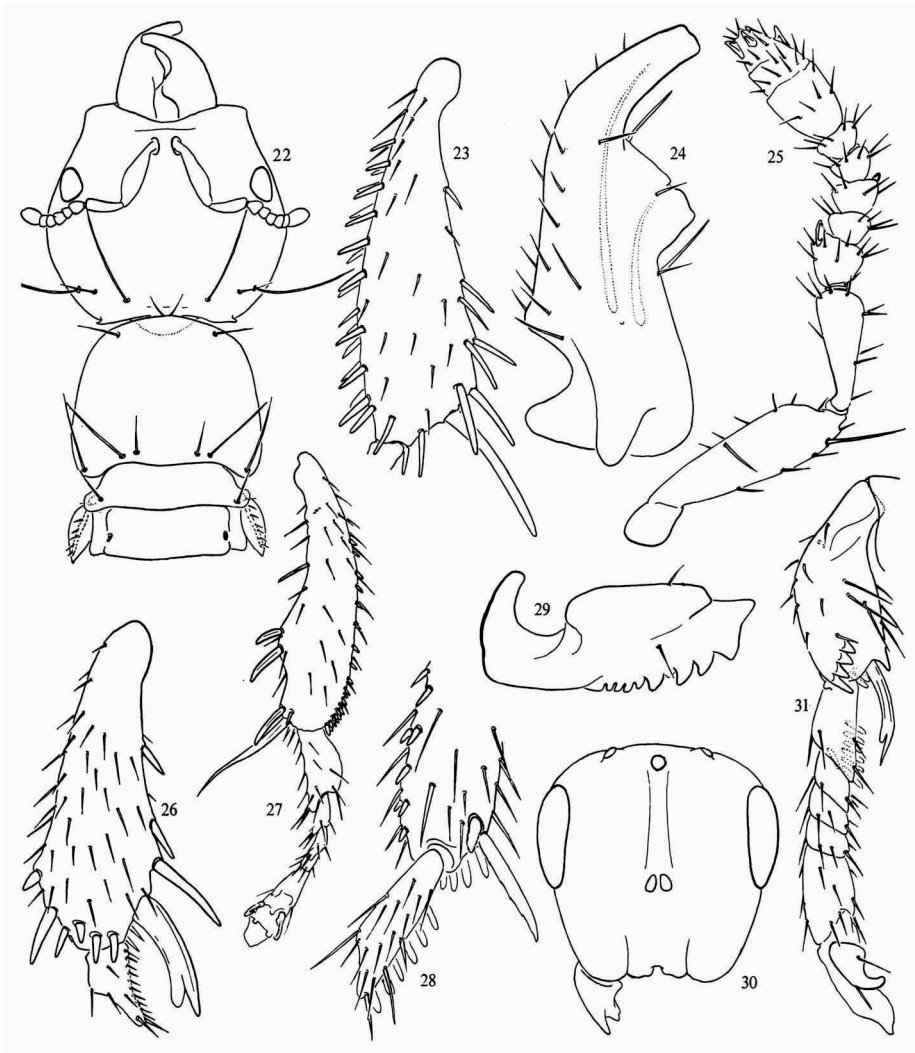
#### **Sycoryctes caelebs** spec. nov.

(figs. 22-27)

Material. — 8 ♂, Cinq Cases, Platin limestone, 8.ii.1974, ex *Ficus avi-avi* (no. 7) (RMNH 2472, ♂ holotype and a paratype slide-mounted).

Male. — Head (fig. 22) shorter than wide (17:19). Eyes small, half as long as the cheek, and about one-seventh of the length of the head. Antennal toruli spaced for a distance equal to their own width, the distance to the epistomal edge as long as their length. The head capsule bears long setae in the posterior part, and patches of shorter setae. Antenna (fig. 25): scape rather long and slender, twice as long as the pedicel; two indistinct anuliform segments; the first funicular segment larger than the other four; the club large, three-segmented. Mandible (fig. 24) large and falcate, with two glands; the labium and maxillae with two segments in the labial palpus (5:4) and four in the maxillary palpus (3:4:1:2).

Thorax, fig. 22. Pronotum wider than long (5:4); the mesonotum and propodeum subequal in length; the lateral edges of the two posterior sclerites hyaline, partly covering the wing-remnants; the propodeal spiracles small, subcircular. Long setae are visible on the pronotum and the mesonotum. Fore tibia (fig. 26) with six stout spines in the dorsal and apical angles, one ventral spur reaching beyond the apex of the metatarsus, and three spines situated along the ventral margin proximad of the spur; the tarsal segments approximately in ratio 10:7:6:6:12. Mid tibia (fig. 23) with rows of many spines along the dorsal margin, and some pairs of spines along the ventral next to the long ventral spur; the tarsal segments approximately in ratio



Figs. 22-27. *Sycoryctes caelebs* spec. nov., male. 22, head and thorax; 23, mid tibia, anti-axial aspect; 24, mandible; 25, antenna, dorsal aspect; 26, fore tibia and metatarsus, anti-axial aspect; 27, hind tibia and tarsus, anti-axial aspect. Figs. 28-31, *Crossogaster* cf. *atratus* Masi, female. 28, apex of hind tibia, and metatarsus, anti-axial aspect; 29, mandible, seen from the same direction as in Grandi's fig. 4 (1955, fig. viii); 30, head; 31, fore tibia and tarsus, anti-axial aspect (axial peg-like spines seen by transparency).

Figs. 22, 30,  $\times 65$ ; 23-26, 28, 29, 31,  $\times 210$ ; 27,  $\times 105$ .



14:8:5:5:11. Hind tibia (fig. 27) with a dorsal armature consisting of small spines increasing in number distad, stout spines along the ventral margin and one long spur; the metatarsus expanded, the length ratio of the tarsal segments approximately as 10:5:4:2:6.

Gaster: the claspers of the genitalia with three small claws.

Length (head and thorax), ca 1.0 mm. Colour yellow-brown.

Remarks. — In many aspects, this male is similar to *Sycoryctes lomaensis* Wiebes (1971: 367-369, figs. 1-10; arguments for its inclusion in *Sycoryctes* on p. 369). The new species is mainly distinguished by its larger head, almost circular in outline, and by the configuration of the spines on the tibiae. *Sycoryctes sebertianus* Masi (1917: 126), a possible relative, was described in the female sex only, and for that reason cannot be compared.

### **Crossogaster cf. atratus** Masi

(figs. 28-32)

Material. — 1 ♀, Depression NW of Cinq Cases, 8.iii.1974, ex *Ficus nautarum* (no. 2) (RMNH 2467).

28 ♀, Bassin Cabri, Platin limestone, 10.iii.1974, ex *Ficus nautarum* (no. 3) (RMNH 2469, one ♀ slide-mounted).

4 ♀, Takamaka Grove, 10.ii.1974, ex *Ficus nautarum* (no. 9) (RMNH 2477, one ♀ slide-mounted).

Female. — Head (fig. 30) a little shorter than wide across the compound eyes (18:19); the longitudinal diameter of the eye about as long as the cheek. Three ocelli. Antenna eleven-segmented, the second anuliform segment twice as long as the first, much as depicted by Grandi (1916, fig. 42, 1) for *C. silvestrii*. Mandible (fig. 29) bidentate at the apex, with two glands; the ventro-lateral edge with a row of about nine small teeth. The labial palpus has two segments (1:2), the maxillary palpus three (3:1:3).

Thorax. Fore wing (5:2), 1.2 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 14:6:5:1; the disc with sparse microtrichiae. Hind wing (4:1), 0.9 mm long; the marginal vein distinct over its whole length i.e., until the hamuli. Fore tibia (fig. 31) with a dorsal comb of four teeth, and with one ventral tooth next to the spur; the tarsal segments approximately in ratio 12:6:4:5:13, the metatarsus with axial, peg-like spines. Mid leg: tarsal ratio 12:7:6:6:5. Hind tibia with about ten conical spines along the distal half of the dorsal edge, next to several long, acute spines; the ventral armature (fig. 28) consisting of a long spur and a stout spine; the tarsal segments approximately in ratio 12:7:6:5:7, the metatarsus with axial, peg-like spines.

Gaster: the hypopygium (fig. 32) with a short spine, with warts and setae along the arms of the narrow V-shaped ridges; the spiracular peritremata small, subcircular; the pygostyle small, with four setae.

Length (head, thorax, and gaster), ca. 1.8 mm, the ovipositor 0.25 mm. Colour dark brown to black, the legs much lighter.

**Crossogaster** spec.

Material. — Fragments of 8 ♀, Anse Mais, ex *Ficus reflexa* (no. 8) (RMNH 2484, slide-mounted).

These specimens are fragmented to such a degree that a full description is impossible. I refrain from naming the species. In several characters it resembles *Phagoblastus barbarus* Grandi e.g., in the situation of the eyes about half-way the length of the face (but the head is much longer), the shape of the epistomal edge, the dimensions of the antennal anuli, the configuration of the teeth of the mandible, and the number of segments of the maxillary and labial palpi. The dorsal comb of the fore tibia has three teeth; the hind tibia bears one stout spine next to the spur, and dorsal cones, much as in *C. cf. atratus*.

TORYMIDAE, Epichrysomallinae

**Sycobia orientalis** spec. nov.

(figs. 33-40)

Material. — 2 ♀ 2 ♂, Anse Mais, 21.ii.1974, ex *Ficus reflexa* (no. 8) (RMNH 2475, ♂ holotype and ♀ paratype slide-mounted).

Female. — In most characters similar to the holotype male, described below. Head (fig. 39) shorter than wide across the compound eyes (9 : 11); the longitudinal diameter of the eye longer than the cheek (8 : 7). Antenna (fig. 40): there seem to be two, indistinctly separate, anuliform segments; the funicular segments have full rows of linear sensilla.

Length (head, thorax, and gaster), ca. 2 mm.

Male. — Head (fig. 34) distinctly longer than wide across the compound eyes (9 : 7); the longitudinal diameter of the eye longer than the cheek (4 : 3), and about twice as long as the temple. Three ocelli. The antennal toruli situated rather close to the epistomal edge. Antenna (fig. 33) ten-segmented, the club evidently composed of three fused segments; the scape twice as long as the pedicel, the funicular segments subequal in length, each sheathing the next in a short collar, with setae and few sensilla. Mandible

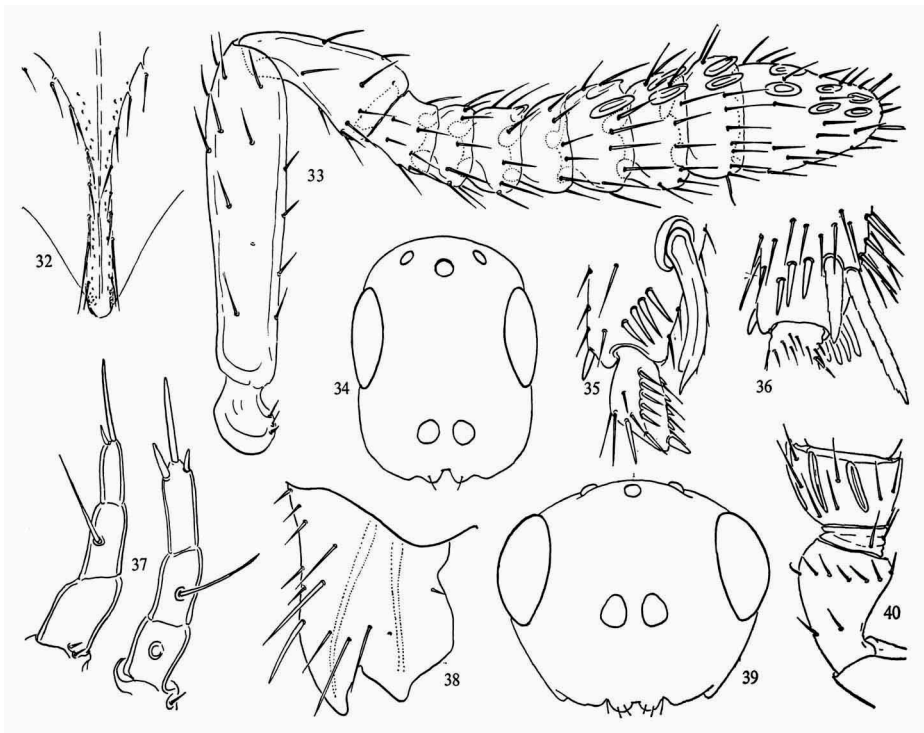


Fig. 32. *Crossogaster* cf. *atratus* Masi, female hypopygium. Figs. 33-40. *Sycobia orientalis* spec. nov. 33-38, male; 39, 40, female. 33, antenna, axial aspect; 34, head; 35, apex of fore tibia, and metatarsus, axial aspect; 36, apex of hind tibia, antiaxial aspect; 37, left labial and maxillary palpi, ventral aspect; 38, mandible; 39, head; 40, basal segments of antenna, axial aspect. Figs. 32,  $\times 105$ ; 33, 35, 36, 38, 40,  $\times 210$ ; 34, 39,  $\times 65$ ; 37,  $\times 420$ .

(fig. 38) bidentate, with two glands. Labial and maxillary palpi (fig. 37) three-segmented, in length ratio 6 : 6 : 5, and 4 : 5 : 7, respectively.

Thorax much as in *Sycobia africana* Wiebes. Fore wing (5 : 2), 1.5 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 10 : 3 : 2 : 1; the hind wing (5 : 1), 1.0 mm long. Fore tibia (fig. 35) with one ventral spur, and with a conical spine at the dorsal apex; the tarsal segments approximately in ratio 7 : 6 : 5 : 4 : 10. Mid leg: tarsal ratio 8 : 4 : 3 : 3 : 5. Hind tibia (fig. 36) with two spurs and several spines; the tarsal segments approximately in ratio 10 : 4 : 3 : 2 : 4.

Gaster as in *S. africana*: the pygostyle with four long setae, the parameres with two setae, and the claspers of the genitalia with three claws.

Length (head, thorax, and gaster), ca. 1.8 mm. Colour yellowish brown.

Remarks — The new species differs from *Sycobia africana* Wiebes (1971: 381-382, figs. 74-87) in several characters e.g., the male head is longer; there are no anuliform segments in the male antenna, but two in the female antenna; the armature of the fore and hind tibiae is heavier. *S. africana* is appreciably longer (2.5-4 mm).

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