

BLACK FLIES, SIMULIIDAE (DIPTERA, NEMATOCERA) FROM MADEIRA AND THE AZORES ¹

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With 8 figures

In March and April 1957 a Lund University Expedition, composed of Dr. and Mrs. Per Brinck and Dr. and Mrs. Erik Dahl, visited Madeira and the Azores where they brought together a collection of black flies. Until now only a few species have been recorded from these islands, viz. *Simulium equinum* Linné and *S. beckeri* Roubaud from São Miguel (Azores) (Séguy 1936, Frey 1945) and *Simulium annulipes* Becker and *S. ornatum* var. *fasciatum* Meigen from Madeira (Frey 1936). Of these species, *S. beckeri* and *S. annulipes* are considered synonyms of *S. ruficorne* Maquart by Grenier 1953, p. 152. Rubzov 1962, p. 360-363, supposes *beckeri* to be a synonym of *ruficorne*, but *annulipes* a distinct species. None of these species is represented in the present material, which may be due to the fact that it was collected early in the year. On the other hand the material contains two species which seem to be undescribed.

I am indebted to Dr. Per Brinck for his permission to work out the material and for his kind assistance with the preparation of my manuscript.

MATERIAL EXAMINED

Simuliidae from Madeira

Two species were collected by the Swedish Expedition, viz., *Eusimulium azorense* n. sp. and *Odaqmia maderensis* n. sp.

1) Report No. 33 from the Lund University Expedition in 1957 to the Azores and Madeira.

2) Ringstorpsv. 53, Hälsingborg, Sweden.

Odagmia maderensis n. sp.

Taxonomy. *Odagmia maderensis* is closely related to other species in the *Odagmia ornata*-complex, especially to the species *O. pratorum* Friedr. and *O. nitidifrons* Edw. The female is relatively easy to recognize by her shining front (like *nitidifrons* but unlike all other species in the *ornata*-complex) and coxa₁₊₂, which are yellowish white. The male and female genitalia are so different from those of other species of the *ornata*-group, that we must consider *maderensis* a distinct species.

Description. (♀ based on material from Madeira, Santa Cruz, Ribeira da Boaventura, pupa, larva and ♂ from pupa from Terreiro da Luta, stream). ♀ holotype in the Entomological Museum, University, Lund; ♀ paratype, locality as holotype.

Larvae (fig. 1)

Mature specimens about 9 mm. Head capsule with brown spots which are relatively constant in shape but may vary in distinctiveness in colour (fig. 1a). Throat cleft broad and shallow, usually somewhat notched

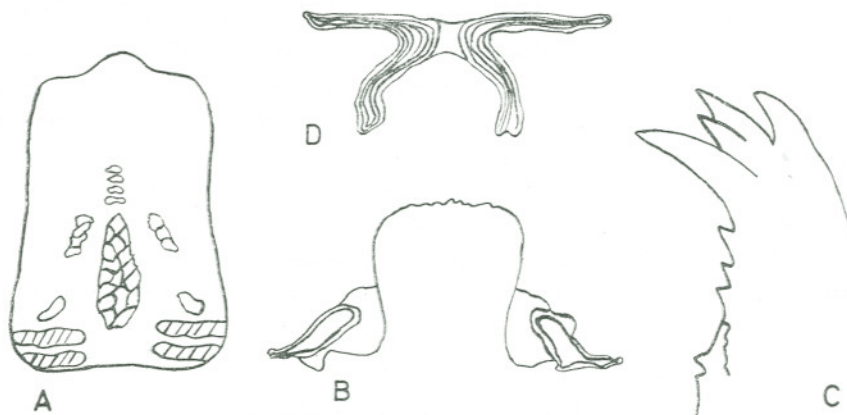


Fig. 1. — *Odagmia maderensis* larva. A. Head spots of mature larva, viewed from above and somewhat diagrammatic. B. Throat cleft. C. Mandibular ridge. D. Anal cross-piece.

on anterior margin (fig. 1 b), extending half way to the posterior part of the submentum. The latter has 9 somewhat indistinct teeth, the middle one and the outermost teeth are largest (as is usual in the *ornata*-complex).

Inner subapical margin of mandible characteristically toothed; the marginal «lower» (German: Randzähne) teeth are weakly developed (fig. 1c). Antennae long and slender, 4-segmented. Each cephalic fan with about 40 big rays. Pupal respiratory histoblast with 8 filaments. No ventral papillae, though in some specimens there are smaller tubercles. Anal gills without branches. Anal cross-piece rather well sclerotized (fig. 1d), ventral arms longer and more narrow than dorsal ones.

Variations: Especially the colour of the head spots varies a great deal, but also the anterior margin of the throat cleft which may be more or less «notched». The mandibles were nearly identical in the investigated specimens.

Pupae (fig. 2)

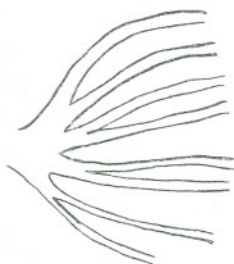


Fig. 2. — *Odagmia maderensis*. Basis of pupal respiratory organs, viewed from the side to show the branching.

Length about 3.5 mm. Respiratory organ consists of 8 filaments, about 2 mm in length, arranged in 4 pairs, each with a very short common stalk. Lower pairs distinctly narrower than upper 2 pairs (fig. 2). Dorsum of thorax with smooth, long, simple trichomes. No terminal hooks. Cocoon reaching to the middle of the thorax of the pupa or somewhat longer. It is relatively toughly woven, without openings and with rim thickened. No dorsal projection.

Variations: Especially in the length of the common stalks of the respiratory organ, most evident in *Mermis*-infected pupae.

Females (fig. 3)

General colour brownish black. Length of body about 3 mm. *Head*: front shining black. Face blackish grey, dull, covered with a grey pruinosity. Antennae brownish black, except the two basal segments which are brownish yellow; 2nd (pedicel) and 3rd segments largest, as broad as long. Palpus black, last (4th) segment very long and slender, longer than 2nd + 3rd together (fig. 3a). Mouth-parts with strong teeth on mandibles and maxillae. *Thorax*: dorsum shining black with only a few very small hairs which are silvery. Distinct silvery markings of common *ornata* pat-

tern (fig. 3 b). Mesopleural membranous area with some hairs. Radial sector unforked; basal section of radius naked; costa with spine-and hairlike macrotrichia; no basal cell. Halteres yellowish white. Legs mainly brownish black with distinct silvery pattern on basal 4/5 of tibia₁; the following are yellowish white: coxa₁₊₂, trochanter₁₊₂₊₃, basal 1/2 of femur₁, basal 1/3 of femur₂, basal 1/6 of femur₃, basal 2/3 of tibia₂, basal 1/2 of

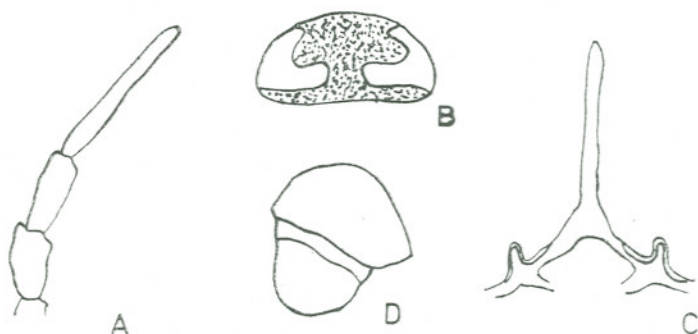


Fig. 3. — *Odagmia maderensis*, female. A. Palpus. B. Thorax viewed from in front, showing the silvery markings. C. Genital fork. D. Cercus + anal lobe.

tibia₃, basal 1/3-1/2 of basitarsus₂, basal 2/3-3/4 of basitarsus₃. In all cases there are no distinct border lines between the different colours. Basitarsus₁ distinctly flattened, basitarsus₃ not so. Tibia₃ markedly swollen distally. Calcipala and pedisulcus well developed. Claw curved with a distinct tooth near base. *Abdomen*: brownish black dorsally, paler ventrally. Tergites 6 to 9 shining. Cercus and genital fork characteristically shaped (fig. 3 c-d).

Males (fig. 4)

No male was collected. The male genitalia, however, are well developed in mature pupae and fig. 4 (drawn from males in pupae) shows that there are distinct differences between *Odagmia maderensis* and other species of *Odagmia*.

Distribution. Terreiro da Luta, 850 m a. s. l., stream, loc. 112, 20.IV.1957, 10 pupae (9 of which contain *Mermis* sp.) + 21 larvae in the 3 last stages (4 of which contain *Mermis* sp.): Arieiro Mts. Rib. das Cales,

1300 m, loc. 113, 21.IV.1957, ♀ newly emerged + 15 pupae (6 of which contain *Mermis* sp.) + 34 larvae (9 of which contain *Mermis* sp.); 22 larger and 12 smaller; Ribeiro Frio, 860 m, 7 km SW of Faial, loc. 115, 21.IV.1957,

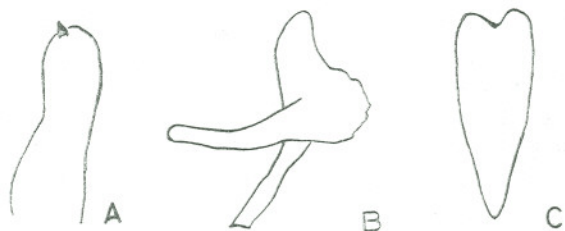


Fig. 4. — *Odagmia maderensis*, male (from pupa).
A. Clasper. B. Phallosome. C. Aedeagus.

pupa (*Mermis*-infected) + 2 larvae; Santa Cruz, loc. 118, 22.IV.1957, 2 ♀♀; Rib. dos Touros da Solveira, Casa das Queimadas, loc. 124, 24.IV.1957, 2 somewhat doubtful larvae; Rib. do Lapa, E of Pico do Serrado, 900 m, loc. 132, 27.IV.1957, 4 larvae (penultimate stage).

Eusimulium azorense n. sp.

Taxonomy. Specimens of *Eusimulium azorense*, collected in Madeira, agree almost entirely with specimens of the species from the Azores, in all circumstances in characters which can be considered to be stable. In this case a stable character is a character which does not vary within a population, such as the inner subapical margin of the mandible. Instable characters vary within the populations, e. g. larval spots of the head capsule.

Description: see below p.

Distribution. Terreiro da Luta, 850 m, stream, loc. 112, 20.IV.1957, pupa + 12 big larvae (2 of which contain *Mermis* sp.); Ribeiro Frio, 860 m, 7 km SW of Faial, loc. 115, 21.IV.1957, 1 larva.

Simuliidae from the Azores

One species only was collected in these islands, viz., *Eusimulium azorense* n. sp.

Eusimulium azorense n. sp.

Taxonomy. *Eusimulium azorense* is related to *E. aureum* Fries and *E. brachyantherum* Rubz. There are distinct differences between *azorense* and other hitherto described species of *Eusimulium*, especially in the genitalia. The variations within the population of *azorense* are markedly striking, however, these variations diverge on all sides from the type, described below, and also the most extreme variants differ from other described species.

Description. (♀, pupa, larva and ♂ from mature pupa, based on material from the Azores, Flores, Ribeira d'Além da Fazenda). The ♀ holotype is in the Entomological Museum, Lund; two ♀♀, paratypes, locality as holotype.

Larvae (fig. 5)

Mature specimens 8-9 mm. Head capsule with distinct brown spots which vary considerably (fig. 5 a). Throat cleft broad, shallow, extending to the middle or less of the distance to the posterior part of submentum.

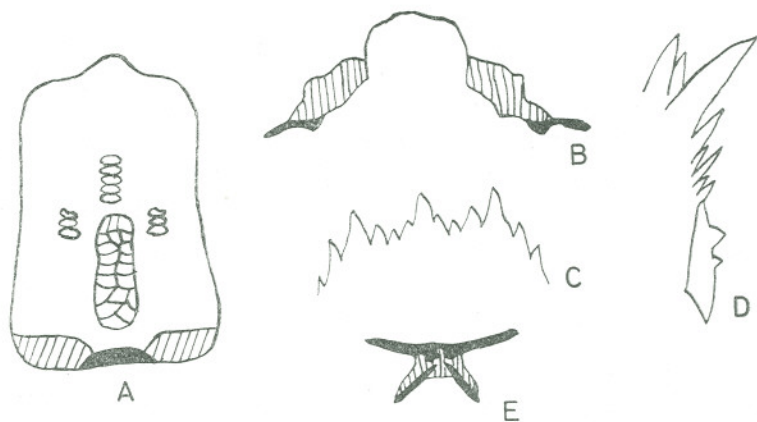


Fig. 5. — *Eusimulium azorense*, larva. A. Head spots of mature larva, viewed from above and somewhat diagrammatic. B. Throat cleft. C. submentum. D. Mandibular ridge. E. Anal cross-piece.

(fig. 5 b). Submentum with strong teeth, also along the lateral margins (fig. 5 c). Inner subapical margin of mandible characteristically toothed (fig. 5 d). Antennae long and slender, 4-segmented. Each cephalic fan

with about 60 big rays. Pupal respiratory histoblast with 4 filaments, already in larvae markedly bent (fig. 6 a). Anal cross-piece rather well sclerotized, with areas between arms moderately sclerotized (fig. 5 e). Ventral papillae usually well developed; this structure varies considerably, from very large and dark-coloured tubercles to small, yellowish ones. Anal gills without branches, sometimes the base is markedly swollen.

Variations: There is a considerable variation within the population, also in specimens from the same locality. The colour of the body varies from light yellow to dark-brown; all transitions occur, although the lighter forms are more common (ratio about c 2:1), and they are usually some instars before the dark-coloured ones in their development. Head spots, ventral papillae and anal gills also vary considerably. The inner subapical margin of the mandible, submentum, throat cleft and anal cross-piece, however, seem to be more constant. In some dark forms the throat cleft is somewhat serrated at the anterior margin.

Pupae (fig. 6)

Length about 3.2 mm. The respiratory organ consists of 4 filaments, arranged in two groups. Upper pair with a distinct common stalk before the two filaments diverge. Lower pair without common stalk, the two filaments diverging from the base of the respiratory organ (fig. 6a). Lower pair distinctly narrower than upper one, which is characteristically bent. Length of respiratory filaments 2.2-3 mm. Dorsum of thorax with smooth, long, simple trichomes. No terminal hooks. Cocoon entirely covering the pupa. It is toughly woven with thickened rim but without any dorsal projection.



Fig. 6. — *Eusimulium azorense*. Basis of pupal respiratory, viewed from the side to show the branching.

Females (fig. 7)

General colour brownish black. Length of body about 3 mm. *Head*: face and front brownish black, dull, sparsely covered with a grey pruinosity. Antennae black with exception of the 2nd segment (pedicel), which is brown, not thicker than the others. Palpus nearly black; last (4th) segment long and slender, as long as 2nd+3rd together or nearly so (fig. 7a). Biting mouth-parts. *Thorax*: dorsum brownish black, dull,

sparsely covered with silver-gleaming small hairs. Mesopleural membranous area naked. Radial sector unforked; basal section of radius with hairs above; costa with spine- and hairlike macrotrichia; no basal cell. Halteres white with brown base. Legs mainly brownish black. The following segments are yellowish brown; coxa₁, trochanter_{1,2+3}, femur₁, basal 2/3 of femur₂, basal 1/3-1/2 of femur₃, tibia₁, in the middle 1/3, basal 2/3 of tibia₂₊₃ (fig. 7 b). In all cases there are no distinct border lines between the different colours. Basitarsus₁ somewhat flattened, though not so much as in the genera *Schönbaueria*, *Odaqmia*, *Gnus* and *Simulium* (s. str.). Calcipala and pedisulcus well developed. Claw curved with a

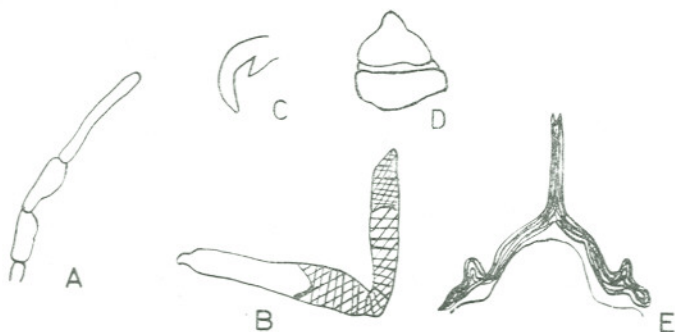


Fig. 7. — *Eusimulium azorense*, female. A. Palpus. B. Tibia₃ + metatarsus₃. C. Claw. D. Cercus. E. Genital fork.

large tooth near base (fig. 7 c). Abdomen: black dorsally, somewhat lighter ventrally. The first abdominal segment with long, yellow hairs, the others with shorter, yellow hairs, though not so many and not so large as in *Eusimulium aureum*. Each of the lateral arms of cercus most characteristically conical (fig. 7 d). The genital fork bears a «bump», directed forward (fig. 7 e).

Males (fig. 8)

No male was collected, but the male genitalia are well developed in mature pupae and fig. 8 (drawn from males in pupae) shows that there are distinct differences between *E. azorense* and other species of *Eusimulium*.

Distribution. São Miguel, valley of Ribeira Quente, 2 km SE of

Furnas, loc. 23, 11.III.1957, 3 pupae (2 of which contain *Mermis* sp.) + 25 larvae (2 contain *Mermis* sp., 7 belong to the dark form); São Miguel, Furnas, loc. 24, 11.III.1957, larva; São Miguel. Caldeiras, SE of Ribeira Grande, 14.III.1957, pupa; São Miguel. Ribeira Grande, loc. 29, 14.III.1957, 15

larvae (4 belong to the dark form); São Miguel, Ribeira das três Voltas near Ribeira Chã, loc. 35, 16.III.1957, 4 larvae; São Miguel, River NW Água Retorta, loc. 57, 23.III.1957, 22 larvae (3 contain *Mermis* sp., 6 belong to the dark form, small to medium-sized, the other 16 «lighter», medium-sized to large); Santa Maria, Águas dos Morros, SE of Pico Alto, loc. 43, 19.III.1957, 4 pupae + larva; Santa Maria, Valverde, loc. 49, 20.III.1957, pupa (*Mermis*-infected) + 9 larvae (3 contain *Mermis* sp., 7 are mature); Faial, Nasce Água, 3 km S of Cedros, loc. 93, 5.IV.1957, ♀ + 31 pupae (13 contain *Mermis* sp.) + 31 larvae (6 contain *Mermis* sp., 6 contain *Serumsporidium* sp., 13 belong

to the dark form); Faial Caldeira, loc. 105, 10.IV.1957, 9 pupae (8 contain *Mermis* sp.) + 21 larvae (3 contain *Mermis* sp., 1 contains *Serumsporidium* sp. 4 belong to dark form, medium-sized, the other 17 «lighter», large); Flores, Ribeira d'Além da Fazenda, loc. 108, 14.IV.1957, 3 ♀♀ + 4 pupae + 78 larvae (about 10% *Mermis*-infected, 23 belong to dark form, usually medium-sized, the others medium-sized to large); Flores, central plateau, S and SE Caldeira Comprida, loc. 109, 14.IV.1957, ♀).

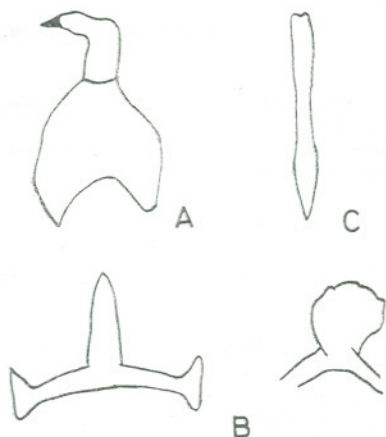


Fig. 8. — *Eusimulium azorense*, male (from pupae). A. Clasper + coxite. B. Phallosome. C. Aedeagus.

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