

## Chapter 11

# Two New Species of *Simulium* (Diptera: Simuliidae) from the Réserve Naturelle Intégrale d'Andringitra, Madagascar

Jean-Marc Elouard, Théogène Pilaka,  
and Fabienne Ranaivoharindriaka

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### Abstract

Two new species of *Simulium* (Diptera: Simuliidae), *Simulium metecontae* and *S. brunhesi*, are described from the Réserve Naturelle Intégrale d'Andringitra based on pupae.

### Résumé

Deux nouvelles espèces de Simulies (Diptera: Simuliidae), *Simulium metecontae* et *S. brunhesi*, provenant de la Réserve Naturelle Intégrale d'Andringitra sont décrites en se fondant sur les nymphes.

### Introduction

Female *Simulium* (Diptera: Simuliidae) are hematophagous and generally dependent on specific vertebrates for their feeding regime. Collection of females in the wild that are not anthropophagous is extremely rare. Male *Simulium* are floricolous, thus making capture infrequent. Further, adult *Simulium* are generally diurnal; therefore collection at night by light traps is rare and generally confined to cases when they are disturbed in their resting places.

In contrast, collecting aquatic stages (larva and pupae) is relatively easy. For pupae, varying shapes of gills or respiratory filaments are the easiest and most frequently used characteristics for specific determination. Further, the number and shape of dorsal and ventral hooks (thoracic and abdominal), as well as the shape and structure of the cocoon, provide diagnostic characters. Correlation between pupae and imagos can generally only be established after pupae have been reared.

Morphological characters used to determine the species of larvae are more difficult than those for pupae, and they are largely based on mandibles, the post-genal bridge, and overall chaetotaxy. Correlation between these two stages is established by uncoiling seventh-stage larval gills, which often parallel the structures in the future pupae. Larvae at their last stages are not always found associated with pupae. For these reasons, *Simulium* is a genus for which systematic characters are mainly based on pupal morphology.

Two new *Simulium* species were discovered in November 1993 during the inventory of the Réserve Naturelle Intégrale (RNI) d'Andringitra. One species was found in the humid forest zone on the eastern slope of the massif, whereas the other was discovered in streams running through the high plateau on the western slope. For information on collection localities, stations, and stream order, see Chapter 9.



## Description

*Simulium metecontae* Elouard & Pilaka, new species  
(Fig. 11-1a-e)

**HOLOTYPE**—Currently only known from the pupae. The cocoon is simple, without heel or projection (Fig. 11-1e). The overall weft of the cocoon is quite loose. Gills of pupae are made up of two filaments originating from a common stem and curving toward one another. Stem and gills together are lyre-shaped (Fig. 11-1c). Four finer filaments originate from the stem and gill complex. Two of these filaments make an apical tip, and the other two filaments branch between two-thirds and three-quarters of their length from the apex. The surface of the gill filament creases (Fig. 11-1d). Dorsal fangs are arranged in series of four or five (Fig. 11-1a). Ventral fangs are thick but not numerous (Fig. 11-1b).

Smete-1 (one tube containing the body of the pupa preserved in 70% alcohol and slide Smete-1.1, with gills treated with Euparal) is designated as the holotype. It was collected in Fianarantsoa Province, approximately 45 km S Ambalavao, RNI d'Andringitra, station 4, on the Sahanivoraky River, at 735 m and 22°13'S, 47°01'E. It is deposited at Muséum National d'Histoire Naturelle (MNHN), Paris. The original collection sample station number is P0168 of the LRSAE collection field series (P0xxx refers to sampled stations in the general CNRE/ORSTOM program—Biodiversity and Biotypology of Malagasy Waters).

**PARATYPES**—Station 1 (P0167), one pupa; station 9 (P0171), nine pupae; station 11 (P0175), one pupa. All were in the RNI d'Andringitra (see Chapter 9 for details of sites). Paratypes are deposited in the Centre National de Recherches sur l'Environnement (Antananarivo), ORSTOM collection, Montpellier, MNHN, and the Field Museum of Natural History (FMNH).

**ETYMOLOGY**—This species is dedicated to Mrs. Sophie Metecont, entomologist and friend.

**BIOLOGICAL NOTES**—This species was found in small freshwater rivers (16°–18°C at time of sampling) at altitudes ranging from 500 to 1600 m. Pupae colonize herbaceous substrates in water. Pupae were located as single individuals; this fact may emphasize their relative rarity or their wide spatial distribution. Pupae of *S. metecontae* were always associated with other species, although this varied between stations. Sympatric species included *Simulium gyas*, *S. pentaceros*, and *S.*

*iphias* 10f. See Chapter 9 for further details on the ecology of this genus in the RNI d'Andringitra.

*Simulium brunhesi* Elouard & Ranaivoharindriaka, new species  
(Fig. 11-2a-f)

**HOLOTYPE**—Currently only known from the pupae. The cocoon has no heel, but a structure protecting the upper part of the head (Fig. 11-2e and 11-2f). The weft of the cocoon is quite fine. Pupa has four subequal gill filaments originating from a common stem (Fig. 11-2c). Each of these branches terminates in a fine flagellated extremity. Cuticle of branchial arm is reticulate (Fig. 11-2d). These gill filaments have a discontinuous and irregular reticulation when magnified. Backside fangs are set on first abdominal segments (segments 2–4) (Fig. 11-2a). The eighth abdominal segment has a pecten composed of fine fangs. In contrast, ventral fangs are set on median segments (Fig. 11-2b).

Sbrun-1 (one tube containing the body of the pupa preserved in 70% alcohol and slide Sbrun-1.1, with gills treated with Euparal) is designated as the holotype. It was collected at station no. 14 at 1900 m (see Chapter 9) and is deposited at MNHN. The original collection sample station number is P0179 of the LRSAE field series.

**PARATYPES**—Zomandao River, effluent of the Mangoky Basin on the Andringitra Massif, station no. 14 (P0178), seven pupae; station no. 15 (P0179), two pupae, all collected in the RNI d'Andringitra (see Chapter 9 for details on collection stations). Paratypes deposited in Centre National de Recherches sur l'Environnement (Antananarivo), ORSTOM collection, Montpellier, MNHN, and FMNH.

**ETYMOLOGY**—This species is dedicated to Dr. Jacques Brunhes, a researcher at ORSTOM.

**TAXONOMIC NOTES**—Several African *Simulium* species have gills consisting of four filaments. In Madagascar, *S. tolongoinae* has an arrangement similar to *S. brunhesi*, with four gill filaments and a reticulated pattern. However, in *S. tolongoinae* the gill filaments become progressively narrower and are not made up of finer filaments, as in *S. brunhesi*. Two African species, *S. nigratarsis* and *S. katangae*, have the same number and gill filament arrangement, but without the flagellated tips.

**BIOLOGICAL NOTES**—*Simulium brunhesi* was found above 1800 m on the high plateau of the

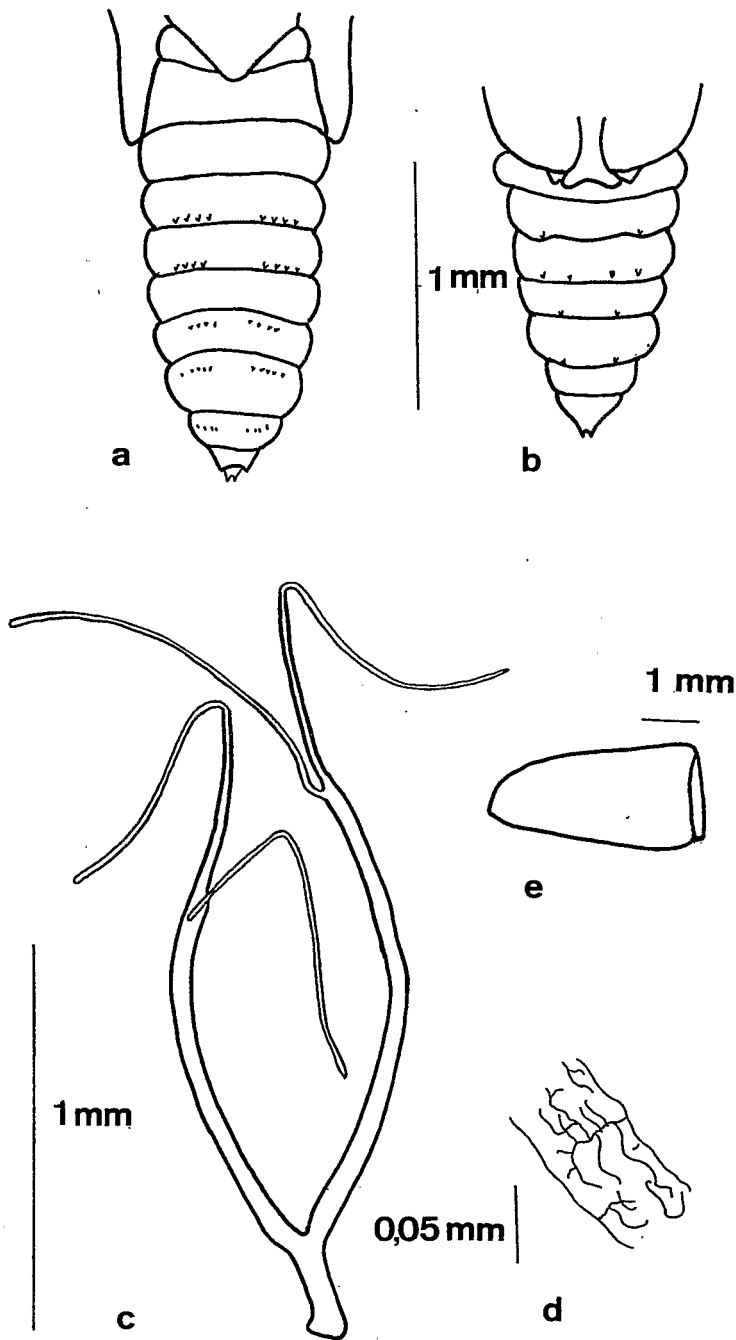


FIG. 11-1. Pupae of *Simulium metecontae*. a: abdomen in dorsal view; b: abdomen in ventral view; c: gill; d: ornamentation of the gill; e: cocoon in lateral view.

RNI d'Andringitra, near the source of the Zomandao River, Mangoky Basin. Waters in this area of the Andringitra Massif are warmer (19°–19.5°C at the time of sampling) at 1900 m compared to wa-

ters on the eastern slopes (11°–16.5°C). At station 14, *S. brunhesi* was associated with *S. imerinae* and with *S. iphias* 8f; at station 15 it was associated only with *S. iphias* 8f. For more informa-

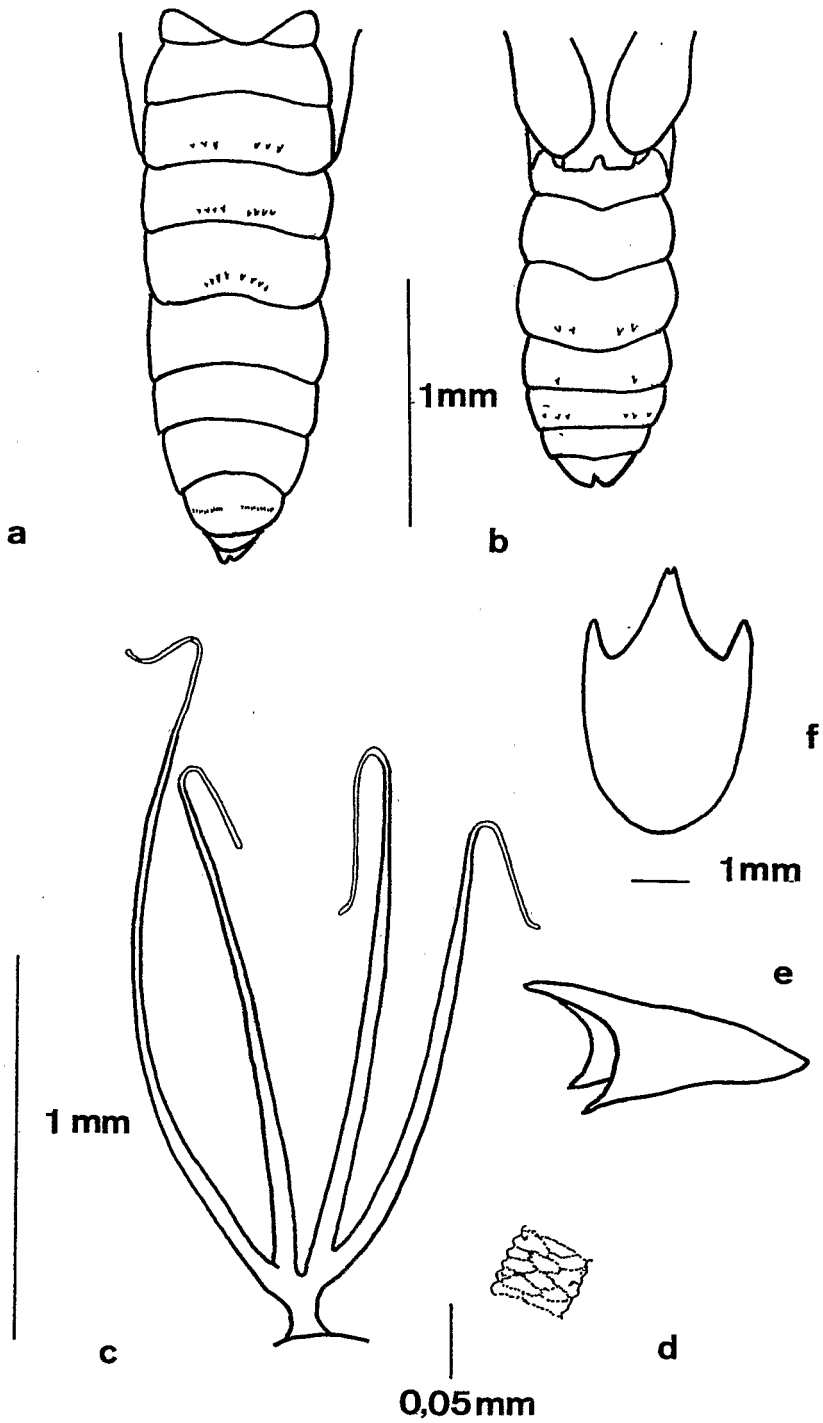


FIG. 11-2. Pupae of *Simulium brunhesi*. a: abdomen in dorsal view; b: abdomen in ventral view; c: gill, d: ornamentation of the gill; e: cocoon with lateral view, f: cocoon in dorsal view.

tion on the ecology of RNI d'Andringitra *Simulium* see Chapter 9.

Pupae of three Malagasy *Simulium* (*S. metacontae*, *S. brunhesi*, and *S. starmuhlneri*) have thin gill filaments supported by thicker filaments. *Simulium* species belonging to the continental African Medusiforme group possess parallel filament structure. However, in this group the number of thin filaments is greater and the overall shape of gills is very different from the three Malagasy species. It is still premature to discuss the evolutionary history of the three species, but the shape of fine secondary filaments is probably an important character to discern relationships. At this

stage, it is not clear if these species belong to the same group or imago subgenus, or if the filament characters are convergent.

### Acknowledgments

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Field Museum of Natural History  
Roosevelt Road at Lake Shore Drive  
Chicago, Illinois 60615  
U.S.A.*

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