

ON A NEW ATELURINAE FROM PRÍNCIPE ISLAND, AND NEW DATA ON THE NICOLETIIDAE (INSECTA: ZYGENTOMA) OF SÃO TOMÉ E PRÍNCIPE

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Abstract: Samples of Nicoletiidae (Insecta: Zygentoma) from the islands of São Tomé and Príncipe are studied. The order is recorded for the first time from Príncipe island, from where a new species of a new genus of Atelurinae is described. Two other species of the same family are recorded from that island, one of them new to the country. Four other Atelurinae already known from São Tomé are again reported from the island.

Key words: Insecta, Zygentoma, Nicoletiidae, new genus, new species, new records, new data, São Tomé e Príncipe.

Sobre un nuevo Atelurinae de la isla de Príncipe, y nuevos datos sobre los Nicoletiidae (Insecta: Zygentoma) de São Tomé e Príncipe

Resumen: Se analizan muestras de Nicoletiidae (Insecta: Zygentoma) obtenidos en las islas de São Tomé y Príncipe. Se cita el orden por primera vez de Príncipe, de donde se describe una especie nueva de Atelurinae perteneciente a un nuevo género. Se registran de aquella isla, además, otras dos especies de la misma familia, una de ellas nueva para el país. Se vuelven a registrar de São Tomé otros cuatro Ateluridae ya conocidos de esta isla.

Palabras clave: Insecta, Zygentoma, Nicoletiidae, género nuevo, especie nueva, novedades faunísticas, nuevos datos, São Tomé e Príncipe.

Sobre um novo Atelurinae da ilha do Príncipe, e novos dados sobre os Nicoletiidae (Insecta: Zygentoma) de São Tomé e Príncipe

Resumo: Estudam-se amostras de Nicoletiidae (Insecta: Zygentoma) provenientes das ilhas de São Tomé e do Príncipe. A ordem é referida pela primeira vez para o Príncipe, de onde se descreve uma espécie nova de Atelurinae pertencente a um novo género. Duas outras espécies da mesma família são registadas para aquela ilha, sendo que uma é nova para o país. Quatro outras espécies de Atelurinae já conhecidas de São Tomé são referidas uma vez mais para esta ilha.

Palavras-chave: Insecta, Zygentoma, Nicoletiidae, género novo, espécie nova, novidades faunísticas, novos dados, São Tomé e Príncipe.

Taxonomy / Taxonomía: *Principella* gen. n. *Principella serranoi* sp. n.

Introduction

Several species of silverfish (Zygentoma), were previously reported from São Tomé and Príncipe by Silvestri, 1908 and by Mendes, 1988a,b,c and 1992(1993) and though some representatives of that Order (part of them endemics) were described or reported from the São Tomé Island, none species was hitherto known from the island of Príncipe.

Thanks to Prof. Artur Serrano (Zoology Department, Faculty of Sciences, Lisbon University - AS in the text), and as result of fieldwork performed by the author in both islands (LM in the text) we present afterwards the description of one new species of Nicoletiidae (Atelurinae) from Príncipe we consider to belong to a new genus, as well as new records and new data on the remaining Zygentoma collected on both, São Tomé and Príncipe Islands. Newly studied samples allow, further, the first citation to the Príncipe of two species of Nicoletiidae already known from the neighbouring islands or from the West Africa mainland, one

belonging to the nominal subfamily, new to the island and to the country (as it happens with its genus), the other, a Nicoletiidae (Subnicoletiinae), previously known from São Tomé. Further, four Atelurinae species already known from S. Tomé were collected in the mountainous central area of this same island (cooler and more rainy than the coastal lower areas), what enlarges their known range in the country and enhances their ecological tolerance.

The studied material was obtained in the Roça Bombaim in the middle of the São Tomé Island, and in the Praia de St.^a Rita and Roça Sundy, both at the northern coast of the Príncipe. The approximate geographical coordinates of the localities from where silverfish were hitherto assigned in the São Tomé (ST) and in the Príncipe (PR – one only Province) Islands (present contribution and previous papers) and their irrespective administrative provinces are, alphabetically ordered, the following ones:

Locality	Island	Province	Latitude	Longitude	Altitude (m)
Água Izé	ST	Cantagalo	00° 13' N	06° 44' E	< 50
Amélia, Lagoa	ST	Mé Zochi	00° 17' N	06° 36' E	1300-1400
Bombaím, Roça	ST	Mé Zochi	00° 15' N	06° 38' E	450-600
Conchas, Praia das	ST	Lobata	00° 25' N	06° 37' E	< 50
Diogo Vaz	ST	Lembá	00° 19' N	06° 30' E	150
Manuel Jorge, Ribeira	ST	Mé Zochi	00° 17' N	06° 44' E	80
Ponta Baleia	ST	Caué	00° 02' N	06° 33' E	< 50
Porto Alegre	ST	Caué	00° 02' N	06° 32' E	< 50
Potó Correia	ST	Mé Zochi	00° 20' N	06° 32' E	300
St. ^a Catarina, Praia de	ST	Lembá	00° 16' N	06° 29' E	< 50
St. ^a Rita, Praia de	PR	Pagué	01° 42' N	07° 24' E	< 50
S. João dos Angolares	ST	Caué	00° 09' N	06° 38' E	100
S. Nicolau	ST	Mé-Zochi	00° 17' N	06° 38' E	900
Sundy, Roça	PR	Pagué	01° 40' N	07° 23' E	ca 100

“Roça” is the local name of the extended cultivated farms, usually with cocoa and coffee trees, to which the main house, the workers houses, and sometimes a school and even one hospital are (were) associated; usually, they preserve some areas of original forest. “Lagoa” is a small lake, “Praia” a beach and “Ribeira” a small river. Both the islands are mountainous and the altitudes presented to each one of the reported localities are approximated to the 50 m.

All studied samples are stored in the entomological collection of the IICT-JBT (the former Centro de Zoologia – CZ in the text).

Taxonomic study

Order ZYGENTOMA

Family NICOLETIIDAE

Subfamily Nicoletiinae

Nicoletia phytophila (Gervais, 1844 *sensu* Wygodzinsky, 1980)

EXAMINED MATERIAL: PRÍNCIPE: Praia de St.^a Rita, marginal forest more or less degraded, slope behind the bungalows, 15-20 m from the sand, 05.11.2005, AS, under rotten logs with *Odontomachus* sp. ants (Ponerinae) and/or with unidentified termites, 16 (partially immature) females, 3 juv. (CZ-5261); id, 06-09.11.2005, AS, with unidentified, non-collected ants locally named “dondo” (Formicinae), 7 (partially immature) females, 1 juv. (CZ-5263). Roça Sundy, 08.11.2005, AS, under stones with unidentified (and not collected) ants, 20 (partially immature) females (CZ-5262).

N. phytophila is known along the tropics (southern North, Central and South America, Hawaii, Indonesia and Africa) and it was assigned from French and Danish greenhouses too, where it has been certainly introduced and from where it is now almost certainly extinct – remaining samples reported from European gardens concern misidentifications of *Coletinia* cf. *maggii*. Genus and species are new to the Príncipe Island and to São Tomé e Príncipe.

Wygodzinsky (1958, as *Nicoletia (Anelpistina) meinerti*) reported the species from Yapó, Ivory Coast, and notes it was, then, newly assigned from Africa; Mendes (2002a) registers the species in the Seychelles (Mahé Island) in what concerns its second and only other previous reference from Africa. The Príncipe specimens agree fairly with the data presented by Wygodzinsky (1980) and are identical to quite numerous females we studied from Central and South America.

Usually found among leaf-litter, under bark or in rotten wood, *N. phytophila* was assigned as a troglaxene in Costa Rica, Venezuela and Peru (Mendes, 1991); it is known, further, with termites in Venezuela (Mendes, 1996b) and from abandoned mounds of *Nasutitermes* sp. in Costa Rica (Paclt, 1974, as *N. meinerti*). This ubiquitous species was never reported, however, as living with ants.

Subfamily Atelurinae

Grassiella modesta (Silvestri, 1908)

EXAMINED MATERIAL: SÃO TOMÉ: Roça Bombaím, meadow marginal to forest, under stones, 23-25.07.2006, LM, 1 female with *Odontomachus* sp. ants (Ponerinae), 1 young female with unidentified Myrmicidae ants (CZ-5268).

Described by Silvestri (1908, sub *Atelura*) from the Bioko Island (as Fernando Póo: Musola, 500-700 m) without further information, the species was redescribed upon material collected with *Odontomachus* sp. in Água Izé and among unidentified Myrmicinae ants in São João dos Angolares (Mendes, 1988c). The species remains known from the Equatorial Guinea (Bioko – from where both sexes were reported) and São Tomé only (from where it remains known by females only).

Santhomesiella thomensis Mendes, 1988

EXAMINED MATERIAL: None.

The species was described from the Praia das Conchas savannah, in the driest northern area of São Tomé where it was collected as an inquiline of Formicinae ants (Mendes, 1988b); it was not found again in the island (not traced in 2005 and 2006) though it has been registered from Cape Verde and from Guinea-Bissau what suggests its eventual accidental introduction in these countries (both sexes are known exclusively in SãoTomé).

Pseudogastrotheus seticeps (Silvestri, 1908)

EXAMINED MATERIAL: SÃO TOMÉ: Roça Bombaím, meadow marginal to forest, under stones, 23-25.07.2006, LM, with unidentified Myrmicinae ants, 4 females (CZ-5268).

Described by Silvestri (1908 sub *Atelura*) from the Cape Verde islands upon the female only, the species is eventually widespread in São Tomé and remains known from these archipelagos only: In São Tomé it was reported from under bark in Água Izé, in decaying tree trunks in Diogo Vaz, in a nest of unidentified ants in the Praia das Conchas and under

stones near the Praia de St.^a Catarina (Mendes, 1988c, sub *Gastrotheus*). The male sex remains unknown what points to the eventuality of being an introduced species in São Tomé e Príncipe.

Lasiotheus brachyurus (Silvestri, 1918)

EXAMINED MATERIAL: SÃO TOMÉ: Roça Bombaim, meadow marginal to forest, under stones, 23-25.07.2006, LM, with unidentified small Myrmicinae ants (*Pheidole* sp. ?), 1 female (CZ-5268).

This western African species was already known in São Tomé, from where it was redescribed upon females collected in a rotten log near Potó Correia and in a nest of *Pheidole* sp. ants (Myrmicinae) sheltered in a log near the Ribeira Manuel Jorge (Mendes, 1988c, sub *Gastrotheus* (*Lasiotheus*)). Male specimens remain unknown.

Lasiotheus nanus (Escherich, 1903)

EXAMINED MATERIAL: SÃO TOMÉ: Roça Bombaim, meadow marginal to forest, under stones, 23-25.07.2006, LM, with unidentified Myrmicinae ants, 2 females (CZ-5268).

The species was formerly reported from Diogo Vaz, from within nest a *Pheidole* sp. (Myrmicinae), and from Porto Alegre, where it was obtained under stones without ants (Mendes, 1988c, sub *Gastrotheus* (*Lasiotheus*)). With a very wide geographical range along the tropics certainly due to involuntary Human action, and known to occur in nests of quite diverse ants, *L. nanus* seems widespread in the São Tomé Island. As it happens with the previously reported taxon (and the only other known species in the genus), the male sex of *L. nanus* (and of *Lasiotheus*) remains unknown.

Luratea aequatorialis Mendes, 1988

MATERIAL EXAMINED: None.

The species remains known by its holotype male only, collected in the Lagoa Amélia forest, a slope of an old crater in the central São Tomé, covered mainly by *Podocarpus* sp. trees, locally known as “pinheiro-da-terra” (Mendes, 1988a).

***Principella* gen. n.**

FEMALE: Small ovoid insects (ca 3 mm) weakly sclerotized, lacking pigment. Thorax as long as wide, not clearly wider than the abdomen base. Body scaly, the setae restricted to the cephalic capsule, to the appendages, and, isolated, to the infralateral and laterotergal areas of the urotergites and to the posterior border of the abdominal sternites. Scales subrectangular, simple, with a small number of rays poorly exceeding their free border and with a clear transverse striation, arranged as very compact, regular transverse rows.

Head exposed, without scales, clearly wider than long and covered with short, delicate setae. Antennae very short, not attaining the posterior border of pronotum, lacking peculiar characteristics. Molar area of mandibles wanting, their incisive part with one long apical tooth. Maxilla elongate, the galea with two apical conules, the prostheca much longer than the apical tooth of lacinia. Maxillary palp delicate, short. Labium with round, smooth, posterolateral areas, the labial palp not preserved.

Nota very big, scaly, straight behind and with thin lateral setae only, the anterior border of pronotum and the posterior

border of all the nota bare. Legs robust, the tibia with one or two apically cleft macrochaetae only; tarsus 4-articled, the praetarsus simple and complete: claws typical, smooth, lacking pulvilli, the empodium very thin, setiform and slightly undulate, as long as the claws.

Urotergites like the nota, densely scaled, with rare infralateral and laterotergal macrochaetae, the X trapezoidal and with a very slight apical depression (almost straight posterior border), with 1+1 infralateral short macrochaetae.

Urosternites like the urotergites, with 1+1 lateral plus 1+1 submedian posterior macrochaetae. Vesicles restricted to the urosternite VI, small and bare; reduced pseudovesicles on the VII. Four pairs of short abdominal stylets, on the VI-IX, the most posterior ones more robust. Subgenital plate short, much wider than long, with some thin marginal setae. Ovipositor short and very stout, round, poorly annulated and with thin setae only; spiny inner area of gonapophyses IX well developed.

Cerci and paracercum very short and robust, without special features.

MALE unknown.

TYPE-SPECIES: *P. serranoi* sp. n.

ETYMOLOGY: The new genus is named after the geographical origin of its only known species, the Príncipe Island in the Guinea Gulf. Gender feminine.

DISCUSSION: *Principella* gen. n. belongs to a group of Ateurinae (*sensu* Mendes, 2001b) genera which includes a number of Neotropical and of Afrotropical genera, most (all ?) of them termitophilous; nine of these genera, those that are more similar to the new one, distribute along Western and Central Africa, and are distinct from *Principella* gen. n. as follows: *Allonychella* (Silvestri, 1918) with two species, from Guinea and from the Ivory Coast, lacks empodium; the paired claws show an atypical pulvilli, the labial posterolateral angles are strongly acute and there are notal and urotergal numerous macrochaetae. *Congoatelura* (Mendes, 1996c) with one only known species from the central Congo Democratic Republic (CDR, former Zaire) has ventrally toothed tarsal claws, developed pulvilli and quite different (distally divergent) mandibles, among other differences. *Dionychella* (Silvestri, 1918) monotypical from Ghana lacks empodium, the claws are dorsally grooved, the posterolateral angles of the labium are sharply acute and the mandibles show a reduced molar area. *Heteronychella* (Mendes, 2001a) endemic from the CDR and known also by one species only, is distinct mainly due to the occurrence of numerous macrochaetae along the thoracic and abdominal tergites and by the modified P III inner praetarsal claw. *Olarthrocer* (Silvestri, 1908) monotypical from the Bioko Island (Equatorial Guinea, formerly Fernando Póo) shows a much more delicate, longer and thinner ovipositor and the maxillary palp is even more reduced. *Olarthroceroides* (Mendes, 2002b) known exclusively by one species from Cabinda (Angola), presents, yonder several other differences, ventrally toothed tarsal claws with rounded, medium-sized, pulvilli; it seems, however, the most similar among the known genera and, as it happens with *Principella* gen. n., its male remains unknown. *Pauronychella* (Silvestri, 1918) with one species only from Ivory Coast and Guinea is quite probably (as emphasized by Wygodzinsky, 1958 and by Mendes, 2001a) a junior synonym of *Dionychella*. *Petalonychia*

(Silvestri, 1908, and Wygodzinsky, 1952 as *Leleupychella* – to the synonymy, see Mendes, 1996a) monotypical from the CDR (Escherich, 1906 sub *Atelura*) is quite distinct due to the presence of developed pulvilli and because of its setose tergal surface. At last *Protonychella* (Mendes, 2001a), known by one only species from CDR, shows different number of abdominal stylets and of vesicular structures yonder other dissimilarities.

***Principella serranoi* sp.n.**

Fig. 1-12.

EXAMINED MATERIAL: Holotype, 1 adult female, entomological collection of the IICT-JBT, Centro de Zoologia (CZ-5261). **PRÍNCIPE:** Praia de St.^a Rita marginal forest more or less degraded, ca 10-15 m from the sand, slope behind the bungalows, 05.11.2005, AS, in rotten wood, with Ponerinae ants (?) or (more probably) with termites – both present under the same log.

DESCRIPTION (HOLOTYPE ♀):

Body length: 3.1 mm; thorax length: 1.2 mm; thorax width: 1.2 mm. Body short, ovoid, without pigment as in the genus description; thorax as long as wide, longer than half the abdomen. Alive specimen with whitish, ivory or very light yellowish scales, these ones very densely arranged along regular, compact transverse rows; each scale is longer than wide and shows a clear transverse striation.

Head completely exposed in dorsal view, with abundant cilia and lacking scales, as in Figs. 1-2. Antennae very short, the flagellum with 9 annuli; first division of flagellum elongate, with numerous trichobothria, two following ones quite short, the median and more distally preserved divisions as long as wide to poorly longer than wide, each one with 2 trichobothria, a few thin setulae and some apical minute, elongate and very thin, sensilla – last one with a feathered apical sensilla also (Fig. 3). Mandibles as reported, thin and without developed molar area, the incisive portion acute and well sclerotized (Fig. 4). Maxillae as in Fig. 5: galea with two apical conules, one smaller than the other, lacinia with the prostheca longer than the sclerotized, acute, apical tooth; maxillary palp typical with a few thin deeply bifid macrochaetae on the ventral area of articles 2 and 3; distal article cylindrical, less than 3 times longer than wide and less than 1.5 times longer than the preceding one. Labium typical, both labial palps lost.

Nota well developed as in the genus description, densely scaled, with straight posterior borders, all with marginal lateral thin (posterolateral and laterotergal) setae only. Legs robust (Fig. 6), the claws typical, smooth, lacking pulvilli, the empodium very thin, setiform and slightly undulate, as long as the claws (Fig. 7).

Urotergites I-IX scaly, with 1-2 infralateral delicate macrochaetae. Urotergite X trapezoidal, with the posterior border almost straight, clearly shorter than wide at base, and with 1+1 posterolateral macrochaetae (Fig. 8). Urosternites also covered by dense scales, the I-II bare, the III-VII with 1+1 infralateral delicate setae plus 1+1 posterior short, submedian (though wide apart), macrochaetae (Fig. 9). Urosternite VI with small, bare vesicles (Fig. 10), the VII with typical pseu-

dovesicles. Abdominal stylets on the abdominal segments VI-IX, delicate. Subgenital plate shorter than wide at base with a few marginal short setae (Fig. 11). Ovipositor very short and stout, round, with thin setae only; gonapophyses VIII (Fig. 12) and IX (Fig. 13) not clearly annulated, last ones with well developed distal, inner, spiny area.

Cerci and paracercum short, without special features.

MALE unknown.

ETYMOLOGY: The species is dedicated to the collector of its holotype, our colleague and a friend Artur Serrano (specialist in coleopterans, mainly Caraboidea).

Subfamily Subnicoletiinae

***Subnicoletia feae* Silvestri, 1908**

MATERIAL EXAMINED: None.

Only the type material (Silvestri, 1908), collected in the Água Izé area, 400-700 m (this altitude corresponds to the forest area) is known. Recent searches in this same area revealed unsuccessful for thysanurans. The holotype is not deposited in the Entomological Institute, in Portici (Viggiani, 1973)

***Hematelura gestroi* (Silvestri, 1908)**

EXAMINED MATERIAL: **PRÍNCIPE:** Praia de St.^a Rita marginal forest more or less degraded, slope behind the bungalows, ca 10-15 m from the sand, 05.11.2005, AS, in rotten logs with *Odontomachus* sp. ants (Ponerinae), 3 females (CZ-5261). Roça Sundry, 08.11.2005, AS, under stones, with ants (eventually *Odontomachus* sp. also, not collected), 2 juv. (CZ-5262).

The species was described from the Bioko Island (Silvestri, 1908 as Fernando Póo, sub *Monachtinella*), reported as eventually present in the Mount Nimba, Guinea based on a single female collected in a termite mound (Wygodzinsky, 1958), and redescribed upon two samples from São Tomé, one obtained in the S. Nicolau forest road, in a rotten log, not far from the local cascade, the other in the “obó” (the secondary forest) of Ponta Baleia in the southernmost area of the island, always within nests of *Odontomachus* sp. ants (Mendes, 1988c). Like it happens with the Guinean sample and with the new Principe material, the Bioko original series was composed by females only (so, the male sex of this species remains unknown), but this species is the only one known in the genus which females have four pairs of stylets (abdominal sternites VI-IX) and lack pegs on the cerci.

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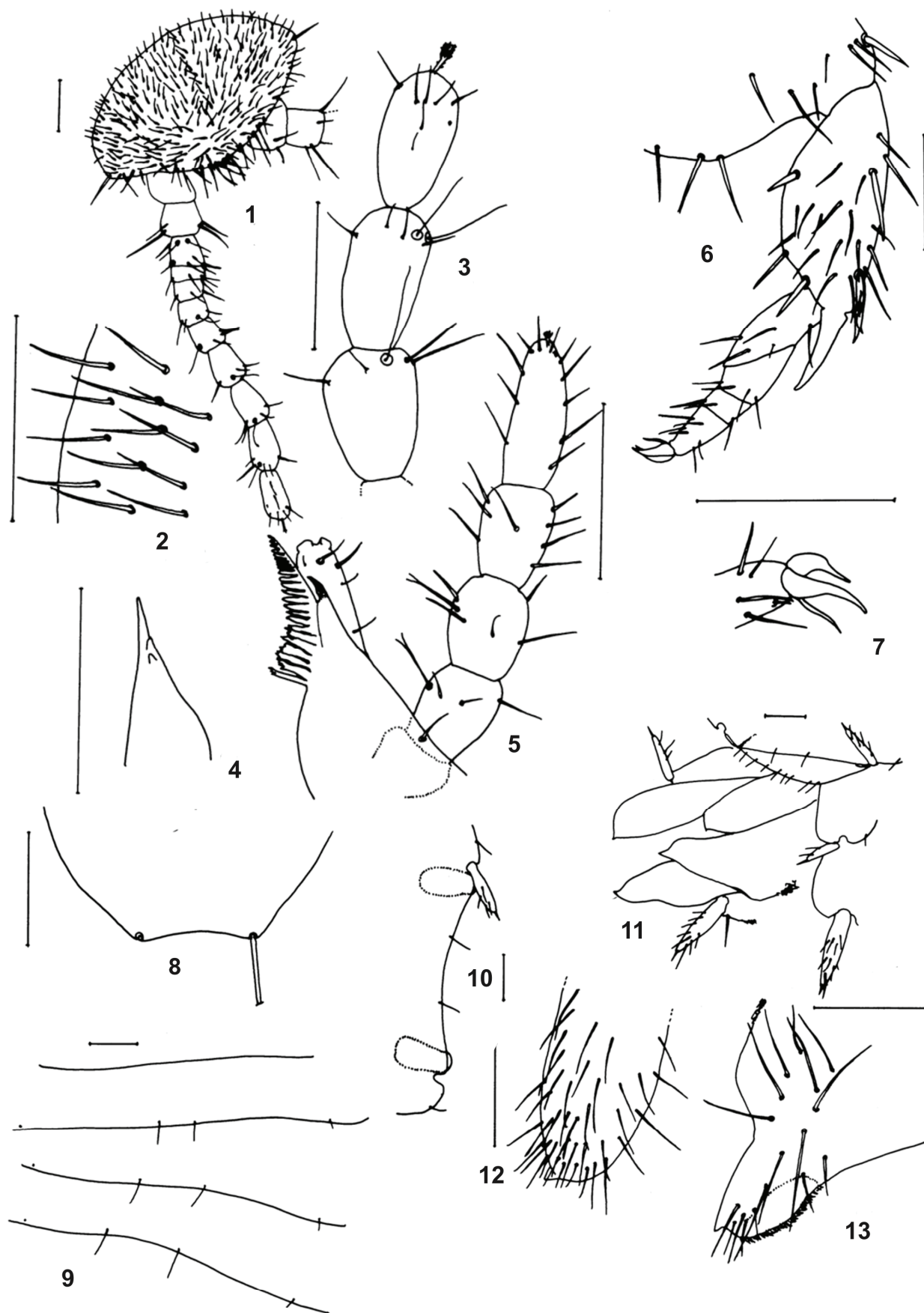


Fig. 1-13: *Principella serranoi* gen. n. sp. n., female. Fig. 1. Head and antenna. Fig. 2. Id, detail of the cephalic chaetotaxy. Fig. 3. Detail of the most apically divisions of antenna. Fig. 4. Mandible. Fig. 5. Maxilla and maxillary palp. Fig. 6. P II. Fig. 7. Id, detail of praetarsus. Fig. 8. Urotergite X. Fig. 9. Urosternites II-IV. Fig. 10. Urosternite VI. Fig. 11. Posterior abdomen, ventral: urosternite VII, subgenital plate, coxites VIII and IX, and ovipositor (distorted). Fig. 12. Gonapophyses VIII. Fig. 13. Gonapophyses IX. Scales: 0.1 mm.

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