

**RAMBUTSINELLA, A NEW GENUS OF ENTOMOBRYIDAE
(INSECTA: COLLEMBOLA) FROM SOUTHEAST ASIA**

Louis Deharveng and Anne Bedos

ABSTRACT. - Among the Lepidocyrtinae (Collembola), a lineage widespread in Southeast Asia is individualised in a new genus *Rambutsinella*. Two new species are described: *R. honchongensis* from Vietnam and *R. scopae* from Sumatra.

INTRODUCTION

Lepidocyrtinae (Entomobryidae) with reduced eyes are placed in the large genus *Pseudosinella* Schaeffer, 1897, which differs from *Lepidocyrtus* Bourlet, 1839, only by a reduced number of eyes. Da Gama (1984) considered *Pseudosinella* as paraphyletic, derived from different lines of *Lepidocyrtus*, but she did not propose any taxonomic rearrangement of the genus. Conversely, *Lepidocyrtus* has been split in different genera and subgenera (Yosii, 1959; Yoshii & Suhardjono, 1989), which has been questioned by Christiansen & Bellinger (1991). The three species groups of Lepidocyrtinae with reduced eyes that we recognised in Southeast Asia make the matter still more complex. The first group, relatively frequent in the caves and soils of the Sunda islands, includes several blind species probably related to the European *Pseudosinella*. The second group, known from a few localities of north-western Thailand, is characterised by its apical bulb on ant.IV and has both microphthalmic and fully oculated species; if the monophyly of this group is confirmed, a question which will be addressed in further works, the separation of the genera *Lepidocyrtus* and *Pseudosinella* on the classical criterion of eye number would no longer hold. The third group has a very peculiar morphology of ant.IV which deserves the creation of a new genus *Rambutsinella*; it is represented by several species in Southeast Asian soils, of which two are described in this work.

The material is deposited in the collection of the Laboratoire d'Ecologie Terrestre, Université Paul Sabatier, Toulouse (France). Abbreviations used in the text - Abd.II, III, IV: abdominal segment II, III, IV. Ant.I, II, III, IV: antennal segment I, II, III, IV. Ti.III: tibiotarsus of leg III.

Louis Deharveng, Anne Bedos - UMR 5552 du CNRS, Laboratoire d'Ecologie Terrestre, Université Paul Sabatier, 118 route de Narbonne, 31062 Toulouse Cedex, France.

TAXONOMY

Rambutsinella, new genus

Type species - *Rambutsinella honchongensis*, new species

Description. - Small size. Eyes 2 to 4 on each side. Pigment present on the body, sometimes extremely light. Scales hyaline and rounded, without striation. No scales on antennae, legs and ventral tube. Few dorsal macrochaetae. Antennae short, with ant.III shorter than ant.II, and ant.IV very wide, swollen. Ant.IV dorsally with a dense cover of short, curved smooth setae, and no ordinary straight setae except in its basal part. No apical bulb on ant.IV. Four prelabral setae, ciliated. Two sublobal hairs. Mucro bidentate with a simple basal spine. No basal tubercle on dens.

Etymology. - The prefix *rambut* means "hair" in Malay, recalling the dense cover of setae on ant.IV. Gender: feminine.

List of species. - *Rambutsinella honchongensis*, new species (Vietnam)
Rambutsinella scopae, new species (Sumatra)

Discussion. - The species of the genus *Rambutsinella* are extremely common in Thailand, Vietnam and Sumatra where they often dominate the forest soil communities of Collembola. At first sight, they present a very uniform morphology, and are easily characterised by their swollen 4th antennal segment, a striking character unique among Lepidocyrtinae. Specific differentiation is conversely very slight, based on pigmentation, number of eyes or labial formula. We describe two species here, but more can be expected to be recognised from thorough morphological investigations.

Two features characterise the genus *Rambutsinella* compared to *Pseudosinella* (Figs. 2, 3):

- 1) the unusual width of ant.IV,
- 2) its special setae cover, with a multiplication of short curved setae and a restriction of ordinary setae to the basis of the article.

Antennal characters proved to be highly valuable for the supraspecific taxonomy of Poduromorpha (Deharveng, 1981), but they have been rarely used in Entomobryoidea. Chaetal patterns of antennae are more difficult to draw out in this superfamily, because of a much higher number of setae. In the case of *Rambutsinella*, it is the unusual type of dorsal setae that has been used to define the genus rather than their arrangement, together with the hypertrophy of ant.IV. Antennae may therefore also provide efficient taxonomic characters in Entomobryoidea .

From the available set of characters currently used in Lepidocyrtinae taxonomy, *Rambutsinella* would be closest to *Lepidocyrtus* (*Lanocyrtus*) sensu Yoshii & Suhardjono, 1989. However, most characters shared by the two genera (no scales on antennae and legs, no dental tubercle, thorax not humped) are probably plesiomorphic as suggested by the phylogenetic trees proposed by Christiansen & Bellinger (1991). The absence of apical bulb on ant.IV could be apomorphic, but this character, found in the majority of Lepidocyrtinae genera, is poorly informative regarding the affinities of the new genus. The peculiar morphology and setation of ant.IV in *Rambutsinella* cannot be related to comparable feature

of any other Lepidocyrtinae, and the relationships of the new genus remain actually uncertain. The large size of ant.IV in *Rambutsinella* recalls a juvenile character observed in all Entomobryomorpha: the ratio width/length of ant.IV always decreases during ontogeny. Ant.IV may be nearly as large at first instar in short antennae species (*Pseudosinella s.l.*, *Lepidocyrtus s.l.*) as it is in *Rambutsinella*. Thus, the morphology of ant.IV in *Rambutsinella* seems to be a neotenic trait, although its chaetal composition is not.

Two Southeast Asian species of Lepidocyrtinae (*Pseudosinella sensillifera* Yoshii & Suhardjono, 1989, and *Lepidocyrtus (Lanocyrtus) gungum* Yoshii, 1982) have a fourth antennal article similar to that of the genus *Rambutsinella*. Yoshii & Suhardjono (1989) suggested that these species may represent a special line of Lepidocyrtinae, characterised by a very peculiar morphology and chaetotaxy of ant.IV. However, the authors left the question open, keeping the species in the genera *Lepidocyrtus* and *Pseudosinella*. *P. sensillifera* described from Sumatra (known also in Java and Ambon) shares with *Rambutsinella* a reduced number of eyes and the peculiar setation of ant.IV. However, the ant.IV is not broadened and has a kind of apical bulb on the original drawing although described as broad and without apical bulb in the corresponding description. *Lepidocyrtus (Lanocyrtus) gungum* from Sabah (also found in Java) presents a chaetotaxy of ant.IV similar to that of *Rambutsinella*, but with some "usual setae" sparse among the many "sensory setae", at least in the specimens of Java according to Yoshii & Suhardjono (1989). Other differential characters include the presence of 8+8 eyes and a clear apical bulb on ant.IV, recalling a *Lepidocyrtus* like *L. lusitanicus* Da Gama, 1964, from the Iberian Peninsula.

Rambutsinella honchongensis, new species

(Figs. 1-2, 4-9)

Material examined. - Holotype - male (sample HT 19), in soil under *Ficus microcarpa*, 40 m a.s.l., limestone hill of Ba Tai, Hon Chong, Kien Giang province, Vietnam, coll. L. Deharveng & A. Bedos, 21 Dec.1994.

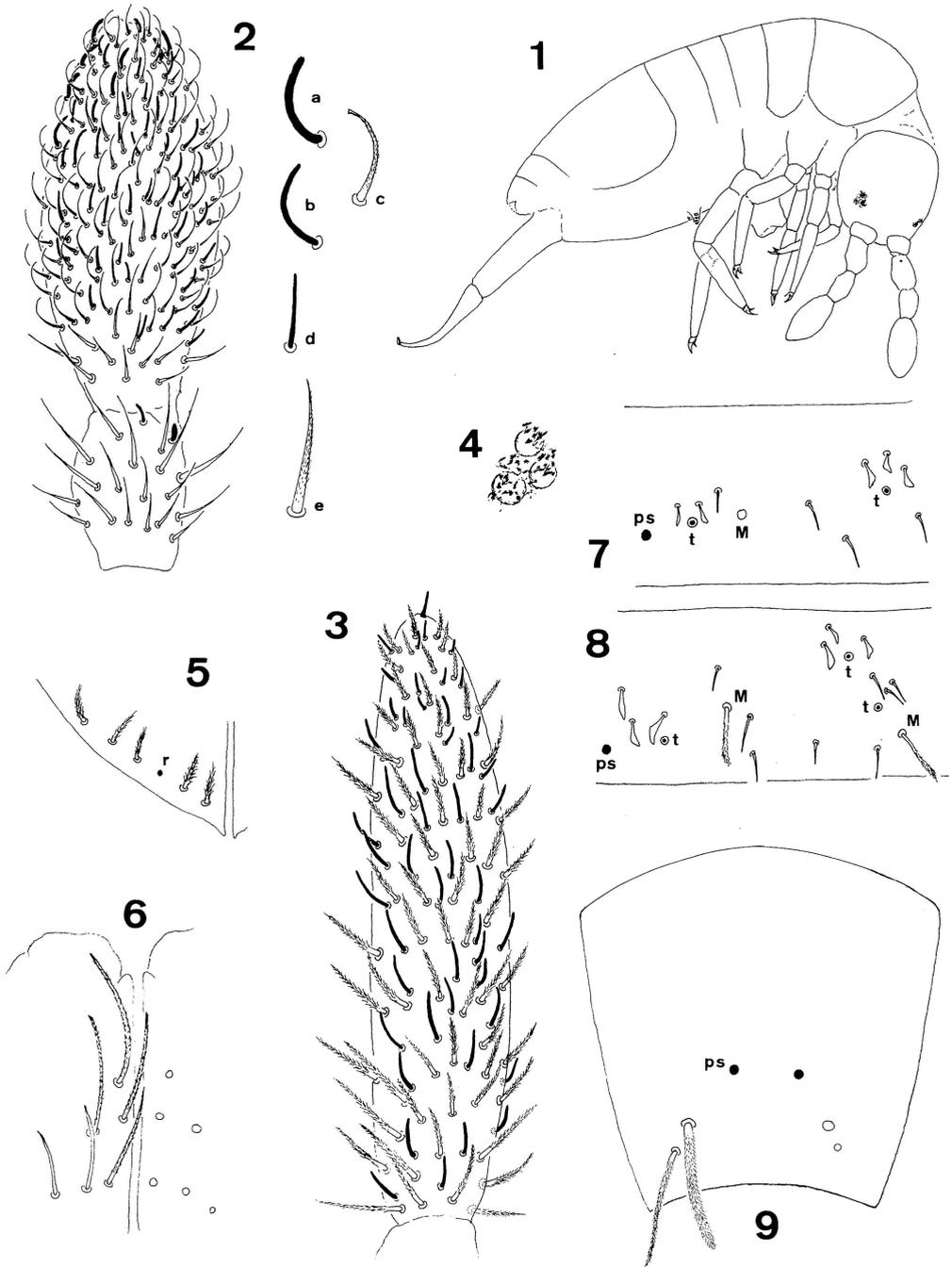
Paratypes - 2 ex. (sample HT 19). — 1 ex. (sample HT 22), in soil under *Ficus subgelderii*, *ibid.*, coll. L. Deharveng & A. Bedos, 21 Dec.1994. — 3 ex. (sample HT 9), in soil under ferns (*Stenochlaena palustris*), 10 m a.s.l., limestone hill of Mo So, *ibid.*, coll. L. Deharveng & A. Bedos, 18 Dec.1994.

Etymology. - The species is named after the Hon Chong residual karst (south-western Vietnam) where it has been found. These seaside limestone hills are programmed to be destroyed by cement exploitation in the coming years, and the species, as many other invertebrates of the area, might be threatened by extinction given the small extent of its karstic habitat.

Description. - Length: 0.75 mm. Colour: white with sparse spots of grey pigment, eye patch black. Antenna / head = 220 μ m/145 μ m; manubrium / dens = 146 μ m/133 μ m.

Antennae. Antennal segment ratio (in μ m): 27/54/39/100. No scales on antennae. Ant.III distinctly shorter than ant.II. Ant.III organ with two small, elliptical-elongate sensory rods. Ant. IV very broad, without apical bulb. Ant.IV covered dorsally with 3 kinds of setae:

- (i) numerous short, minutely ciliated, subequal, strongly bent, feebly capitate or truncate setae on dorsal side;
- (ii) numerous short, smooth s-setae, thin in the proximal part of the article and thicker in its distal part;



Figs. 1-9: Figs. 1-2 and 4-9. *Rambutsinella honchongensis*, new genus and species. 1, habitus; 2, dorsal chaetotaxy of right ant.III-IV (a: dorso-distal s-seta, b: ventral s-seta, c: dorsal bent ordinary seta, d: dorso-proximal s-seta, e: basal straight ordinary seta); 4, ocular plate; 5, basal setae of labium; 6, anterior part of ventral tube; 7, chaetotaxy of abd.II tergite (M: macrochaeta, ps: pseudopora, t: trichobothria); 8, chaetotaxy of abd.III tergite; 9, chaetotaxy of abd.IV tergite. Fig. 3. *Pseudosinella duodecimoculata* Bonet, 1931, from Ariège Pyrenees. Dorsal chaetotaxy of left ant.IV.

- (iii) a few ordinary setae, larger, straight, finely ciliated, limited to the 2 basal rows of the article where (i) and (ii) are absent.

3+3 eyes. Labrum chaetotaxy: 4/5,5,4. Prelabral setae bent, ciliated. External lobe of the maxilla with 2 sublobal hairs. Labial formula: M1M2(r)EL1L2, with r reduced to its socket. Legs without scales. One dorsal tibiotarsal tenent hair short to rather long, acuminate or feebly clavate. One smooth ventral seta present on Ti.III. Short unguis with one pair of strong inner teeth at 2/5 basal and one uneven tooth at 3/5. Unguiculus straight, abruptly pointed, 2/3 of the claw. Trochanteral organ on leg III with 4-7 erect setae.

Ventral tube unscaled, with 6-7+6-7 thin smooth short latero-distal setae, 6+6 anterior setae (of which 4+4 macrochaetae ciliated) and 4+4 long or rather long ciliated posterior setae.

Tenaculum with 4+4 teeth and one seta. Manubrium with numerous ciliated dorsal setae and laterally 4-7 setae usually smaller and smooth. Dens dorsally with large scales. Externally, 2-3 rows of large ciliated setae, the dorso-external with 6-7 setae; internally, 2-3 rows of large ciliated setae, the dorso-internal with 5 setae. Mucro bidentate with a simple basal spine.

Abdominal macrochaetotaxy reduced; head with only the anterior macrochaetae R0 and R1; thoraco-abdominal formula 00/0120+2.

Rambutsinella scopae, new species

Material examined. - Holotype - male (sample SUM 6), in soil from "Damar" plantation (*Shorea javanica*), 70 m a.s.l, Pahmungan, Krui, Lampung province, Sumatra, Indonesia, coll. L. Deharveng, 23 May.1991.

Paratypes - 4 ex. (sample SUM 6). — 2 ex. (sample SUM 5), in litter from "Damar" plantation (*Shorea javanica*), ibid, coll. L. Deharveng, 23 May.1991.

Etymology. - From the Latin word *scopa* which means lamp-brush, after the peculiar aspect of ant.IV.

Description. - Length: 0.75 mm. Colour: white with sparse spots of grey pigment, eye patch black. Antenna / head = 179 μ m/150 μ m. Manubrium / dens = 127 μ m/127 μ m.

Antennae. Antennal segment ratio (in μ m): 21/44/39/75. No scales on antennae. Ant.III distinctly shorter than ant.II. Ant.III organ with two small, elliptical-elongate sensory rods. Ant. IV very broad, its width half as long as its length, without apical bulb. Ant.IV covered dorsally with 3 kinds of setae:

- (i) numerous short, minutely ciliated, subequal, strongly bent, feebly capitate or truncate setae on dorsal side;
- (ii) numerous short, smooth s-setae, thin in the proximal part of the article and thicker in its distal part;
- (iii) a few ordinary setae, larger, straight, finely ciliated, limited to the 2-3 basal rows of the article where (i) and (ii) are absent, and a few more ventrally.

4+4 eyes. Labrum chaetotaxy: 4/5,5,4. Prelabral setae bent, ciliated. External lobe of the maxilla with 2 sublobal hairs. Labial formula: M1M2(r)EL1L2 with r reduced to its socket. Legs without scales. One dorsal tibiotarsal tenent hair rather short, thin and acuminate. One acuminate ventral seta present on Ti.III. Short unguis with one pair of strong inner teeth at 2/5 - 1/2 and one uneven tooth at 3/5. Unguiculus straight, abruptly pointed, 2/3 of the claw. Trochanteral organ on Leg III with 6-7 erect setae.

Ventral tube unscaled, with 7-8+7-8 thin smooth short latero-distal setae, 7+7 anterior setae (of which 4-5+4-5 macrochaetae ciliated) and 4+4 long or rather long ciliated posterior setae.

Tenaculum with 4+4 teeth and one seta. Manubrium with numerous ciliated dorsal setae and laterally 4-7 setae usually smaller and smooth. Dens dorsally with large scales. Externally, 2-3 rows of large ciliated setae, the dorso-external with 9-11 setae; internally, 2-3 rows of large ciliated setae, the dorso-internal with 7-8 setae (observed in 4 adult specimens). Mucro bidentate with a basal spine.

Abdominal macrochaetotaxy reduced; head with only the anterior macrochaetae R0 and R1; thoraco-abdominal formula 00/00(1)0+2; the macrochaetae of abd.III are particularly short.

GENERAL DISCUSSION

Differences between *Rambutsinella honchongensis* and *R. scopae* are summarised in the following table:

| | <i>R. honchongensis</i> | <i>R. scopae</i> |
|---------------------------------|-------------------------|------------------|
| Number of eyes | 3+3 | 4+4 |
| Number of setae on ventral tube | | |
| latero-distal | 6-7+6-7 | 7-8+7-8 |
| anterior | 6+6 | 7+7 |
| Number of setae on dens | | |
| dorso-external row | 6-7 | 9-11 |
| dorso-internal row | 5 | 7-8 |
| Dorsal macrochaetae | | |
| on abd.II | 1+1 | 0 |
| on abd.III | 2+2 | 1+1 short |

ACKNOWLEDGEMENTS

We are grateful to Prof. Le Cong Kiet, botanist, who introduced us to the interesting limestone area of the south of Vietnam. The specimens from Sumatra were collected during the program "Pratiques agroforestières et conservation de la diversité biologique des forêts tropicales humides - exemples indonésiens", granted by the French Environment Ministry, under the supervision of H. de Foresta (ORSTOM).

LITERATURE CITED

- Bonet, F., 1931. Estudios sobre Collembolos cavernícolas con especial referencia a los de la española. *Mem. Soc. española Hist. Nat. Madrid*, **14**: 231-403.
- Bourlet, L'Abbé, 1839. Mémoires sur les Podures. *Mém. Soc. Sc. Agric. Lille*, **1**: 377-417.
- Christiansen, K. A. & P. F. Bellinger, 1991. Phylogeny of Hawaiian species of the genus *Lepidocyrtus* (Collembola, Entomobryidae). *Rev. Ecol. Biol. Sol*, **28**(2): 207-215.
- Deharveng, L., 1981. La chétotaxie dorsale de l'antenne et son intérêt phylogénétique chez les Collemboles Neanuridae. *Nouv. Rev. Ent.*, **11**(1): 3-13.
- Gama, M.M. Da, 1964. Colembolos de Portugal Continental. *Mem. Est. Mus. zool. Univ. Coimbra*, **292**: 1-252.
- Gama, M.M. Da, 1984. Phylogénie des espèces européennes de *Pseudosinella* (Collembola : Entomobryidae). *Annls Soc. r. zool. Belg.*, **114**(1): 59-70.
- Schaeffer, C., 1897. Apterygoten. *Hamburger Magelhaerische Sammelreise*, **2**: 1-48.
- Yosii, R., 1959. Studies on the Collembolan fauna of Malay and Singapore. *Contr. Biol. Lab. Kyoto Univ.*, **10**: 1-65.
- Yoshii, R., 1982. Lepidocyrtid Collembola of Sabah. *Ent. Rep. Sabah For. Res. Cent.*, **5**: 1-47.
- Yoshii, R. & Y. R. Suhardjono, 1989. Notes on the Collembolan fauna of Indonesia and its vicinities. I. Miscellaneous notes, with special references to Seirini and Lepidocyrtini. *A.Z.A.O.*, Jakarta, **1**: 23-90.

Received 09 Nov 1995

Accepted 30 Nov 1995