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【Research report】

中國產彈尾目 (昆蟲綱) 之系統研究I. 臺灣產四新種與三新記錄種【研究報告】

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Abstract

摘要

本文報導臺灣產之彈尾目昆蟲7屬11種，其中包含4新種3新記錄種：Callyntrura spinid-entata n. sp., C. affinis n. sp., Scira oligoseta n. sp., Salina mutabilis n. sp., Sinella curuiseta Brook, 1882, Homidia socia Denis, 1929 和 Willowsia jacobsoni Börner, 1913。因此，已知之臺灣之長角跳蟲科共有8屬16種。本文並討論與中國大陸、日本、韓國之地緣關係。

Key words:

關鍵詞:

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SYSTEMATIC STUDIES ON CHINESE COLLEMBOLA (INSECTA), I. FOUR NEW SPECIES AND THREE NEW RECORDS OF ENTOMOBRYIDAE FROM TAIWAN

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ABSTRACT

This study deals with 11 species in 7 genera including 4 new species, 3 new records from Taiwan. The new ones are *Callyntrura spinidentata* n. sp., *C. affinis* n. sp., *Seira oligoseta* n. sp., *Salina mutabilis* n. sp., *Sinella curviseta* Brook, 1882, *Homidia socia* Denis, 1929 and *Willowsia jacobsoni* Börner, 1913. The Entomobryidae fauna of Taiwan accordingly is listed as 16 species in 8 genera. The biogeographic affinities with the mainland, Japanese and Korea faunae are discussed.

INTRODUCTION

The collembolan fauna of Taiwan has been examined by only a few workers, firstly by Denis (1929a, b), Yosii (1940, 1963, 1965a, 1977) and Uchida (1943, 1956). These resulted in enumeration of 26 species of Collembola falling into 20 genera in 8 families and a general list of the Taiwanese Collembola was made by Chi (1981).

The present study is dealing with the family Entomobryidae and to this group only minor contribution to our understanding has so far been made by Denis (1929a), Yosii (1940, 1965a) and Uchida (1943), reporting one, four and four species respectively. This, therefore, is putting merely nine species in six genera on the familial list.

Our study is based on collections made by the senior author in December 1982 and one of his graduate students, Mr. J.T. Kim (to be cited as K.J.T. in the text), in March 1988, from 10 different localities of the island (Fig. 1).

The taxonomical study of the materials has given rise to four new species to science as well as three new records for the island in addition to four species already on record. Descriptions, revisions and some systematic accounts were given as follows.

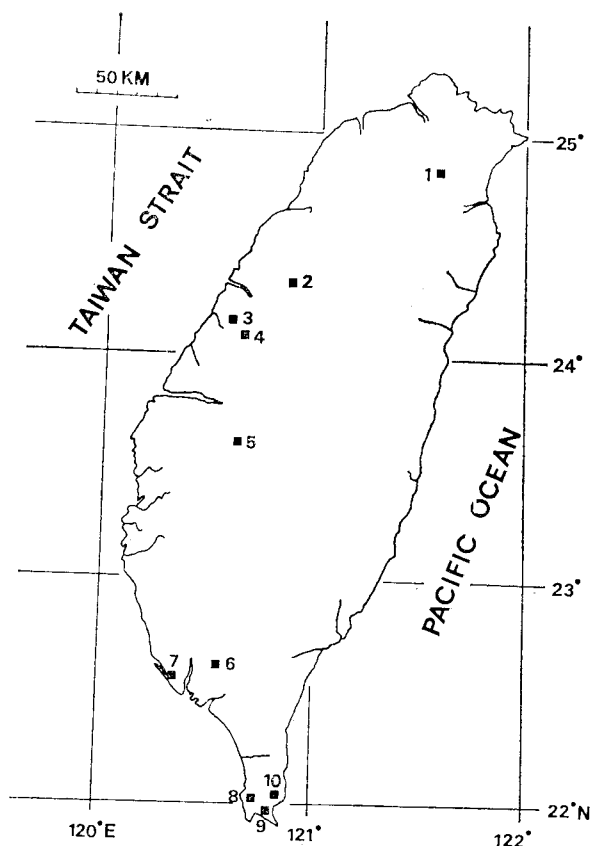


Fig. 1. Collection localities of Entomobryidae from Taiwan. 1: Wulai, 2: Kantaoshan, 3: Tunghai University, 4: Chung Hsing University, 5: Chitou, 6: Pingtung, 7: Chung Shan University, 8: Hengchun, 9: Kenting Park, 10: Manchou.

Type specimens are to be retained in the Insect Collection of the Department of Biology Education, Jeonbug National University, Jeonju 560-756, Korea. Some paratypes, have been deposited in the Department of Entomology, National Chung Hsing University, Taichung 40227, Taiwan, the Republic of China.

DESCRIPTIONS

Callyntrura (Gunungphysa) spinidentata n. sp.

(Fig. 2 A-N; Fig. 7E, F)

Body length up to 4.4 mm. Ground color pale yellow. Head patched on the fore margin, antennal basis, labral basis and along the sides. On the trunk lateral margin of Th. II to Abd. III darkly shadowed and along the median of Th. III to Abd. III diffusely dark. Abd. IV diffusely pigmented on its post-lateral part. Similar coloration observed on Abd. V and VI. Antennae brownish throughout the length. Legs banded. Coxal basis, coxa and trochanter mottled. Femur and

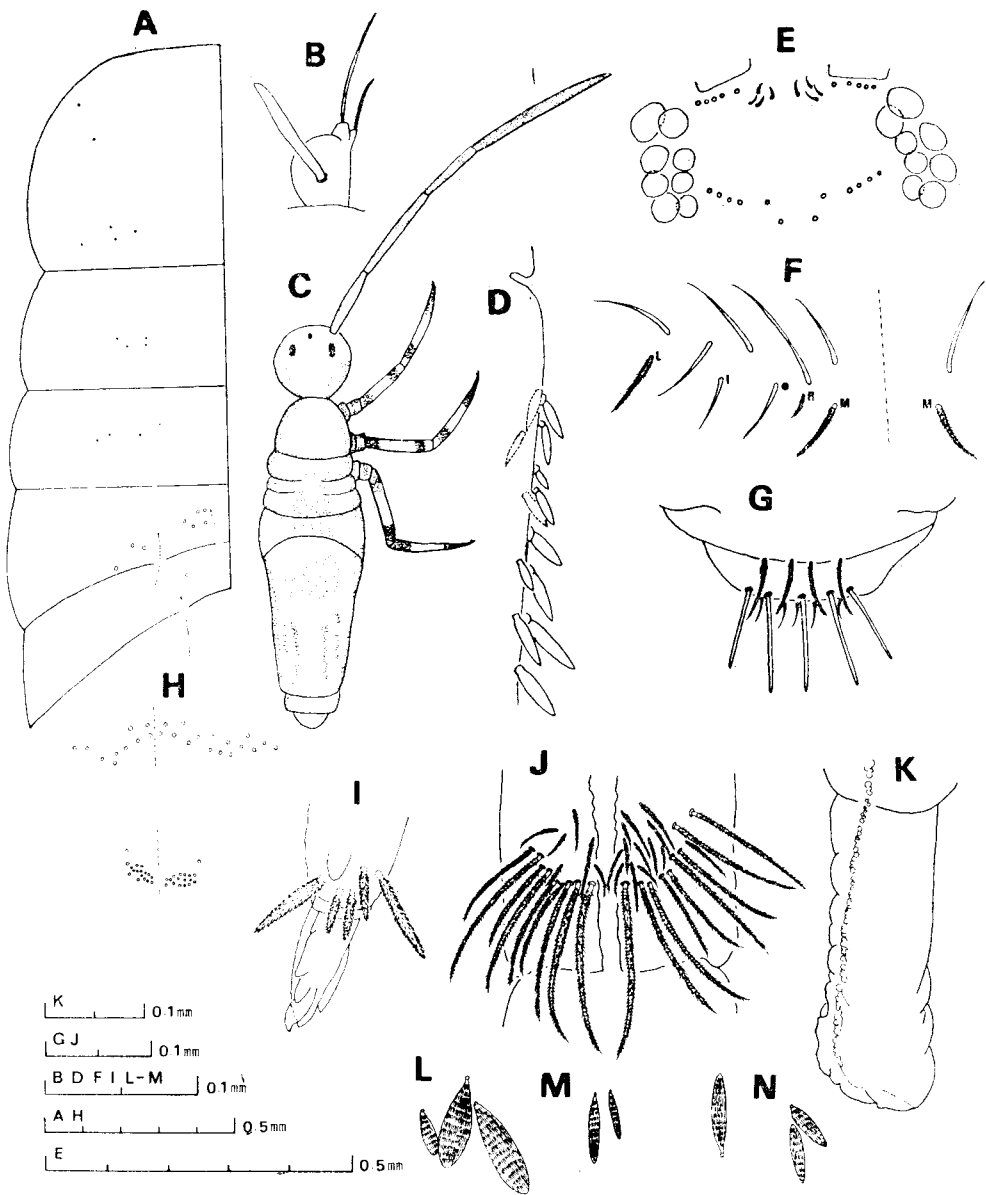


Fig. 2. *Callyntrura (Gunungphysa) spinidentata* n. sp. A: chaetotaxy of Th. II-Abd. III, B: outer ramus of maxilla, C: body pattern, D: dental spines, E: chaetotaxy of head, F: labial chaetotaxy, G: labral chaetotaxy, H: chaetotaxy of Abd. IV, I: distal part of dens and mucro, J: setae on anterior part of ventral tube, K: terminal tubule of ventral tube, L: scales on Abd. II, M: scales on Ant. I, N: scales on manubrium.

tibiotarsus bearing two dark brown bands (Fig. 2C). Ventral tube with a dark brown pigment on the upper side. Furcula not colored.

Antennae, legs and furca scaled (Fig. 2M, N; Fig. 7F). Antennae very long, 1.5 times as long as the body. Ant. I: head as 19:10, antennal segment ratio

as 10:9:6:18. Ant. IV elongate. Labral setae 4/5, 5, 4, prelabrals barbed. All five setae of the first row modified, but a little more slender (Fig. 2G). Basal seta of the outer maxillary ramus ending blunt (Fig. 2B). Labral basis with setae as MRe/1L (Fig. 2F). Eyes 8+8, black (Fig. 7E). Frontal setae 4+4, short and brownish (Fig. 2E).

Tibiotarsus has a slight subsegmentation at about distal 1/3 where 2 larger setae occur. Trochanteral organ well developed, composed of more than 100 stiff, short spines. Tenent hair distally inflated. Unguis carinate with a pair of lateral and two small inner teeth. Unguiculus truncate. Ventral tube with many anterior setae, distal ones larger (Fig. 2J). Posterior face having many long setae and none of them s. s-like. Lateral flap with smooth and ciliate setae. Each terminal tubule with a granulate streak (Fig. 2K).

Furca with manubrium:dens as 10:13. Dens with spines along inner side near the basis (Fig. 2D). Terminal vesicle small, but distinct. Mucro with six teeth in normal arrangement (Fig. 2I).

Chaetal pattern much reduced. The head V-group deficient of V_0 and V_3 (Fig. 2E). On Th. II-Abd. I no macrosetae and there are only very small sockets to accomodate microsetae whose arrangement quite variable. Thus the chaetal pattern is as follows (Fig. 2A, H):

Head: V_0 , V_3 absent

Th. II-Abd. I: none

Abd. II: s/5/s/3

Abd. III: dors. 2/s

Abd. IV: med. in two transverse level

post. ca. 18+18

Type data: Holotype ♀, Chitou, Nan-Tou; collection no. 88-16-1, from litter and soil of mixed arboreal vegetation, 21 III 1988. Paratypes: 10, same data as holotype. ♂♂ and ♀♀ specimens collected same data as holotype.

Remarks: This species strongly resembles *Callyntrura* (*Gunungphysa*) *microphysarum striata* Yosii, 1965 from Taiwan by sharing body pattern, and especially distinct pattern of the leg. However, it is definitely separated from the cited species by the reduced chaetotaxy of Th. II-Abd. I and, moreover, by having dental spines and paler coloration.

***Callyntrura* (*Gunungphysa*) *affinis* n. sp.**

(Fig. 3A-L)

Body length up to 3.1 mm. Ground color pale yellow. Head patched on the fore margin. Trunk deeply pigmented laterally along the margin on anterior half of the trunk from Th. II to Abd. II. Abd. II with a pair of patch laterally. Abd. III with a deep transverse band dorsally and a pair of lateral patch. Abd. IV patched in the middle and posterior part. Abd. V with patches laterally. Antennae dark. Legs dark on distal parts (Fig. 3B, C). Ventral tube and furca pale.

Antenna very long, 1.4 times as long as the body and totally scaled. Ant. I: head as 16:10, antennal segment ratio as 10:10:7:18. Labrum with setae 4/5, 5, 4, prelabrals barbed. All five setae of the first row erecting, but not very thick. Labral margin without papillae (Fig. 3D). Basal seta of outer maxillary ramus blunt and large (Fig. 3K). Setae of labial basis as MRe/1L (Fig. 3E). Eyes 8+8, subequally large.

Unguis carinate, with a pair of lateral and two small inner teeth. Unguiculus

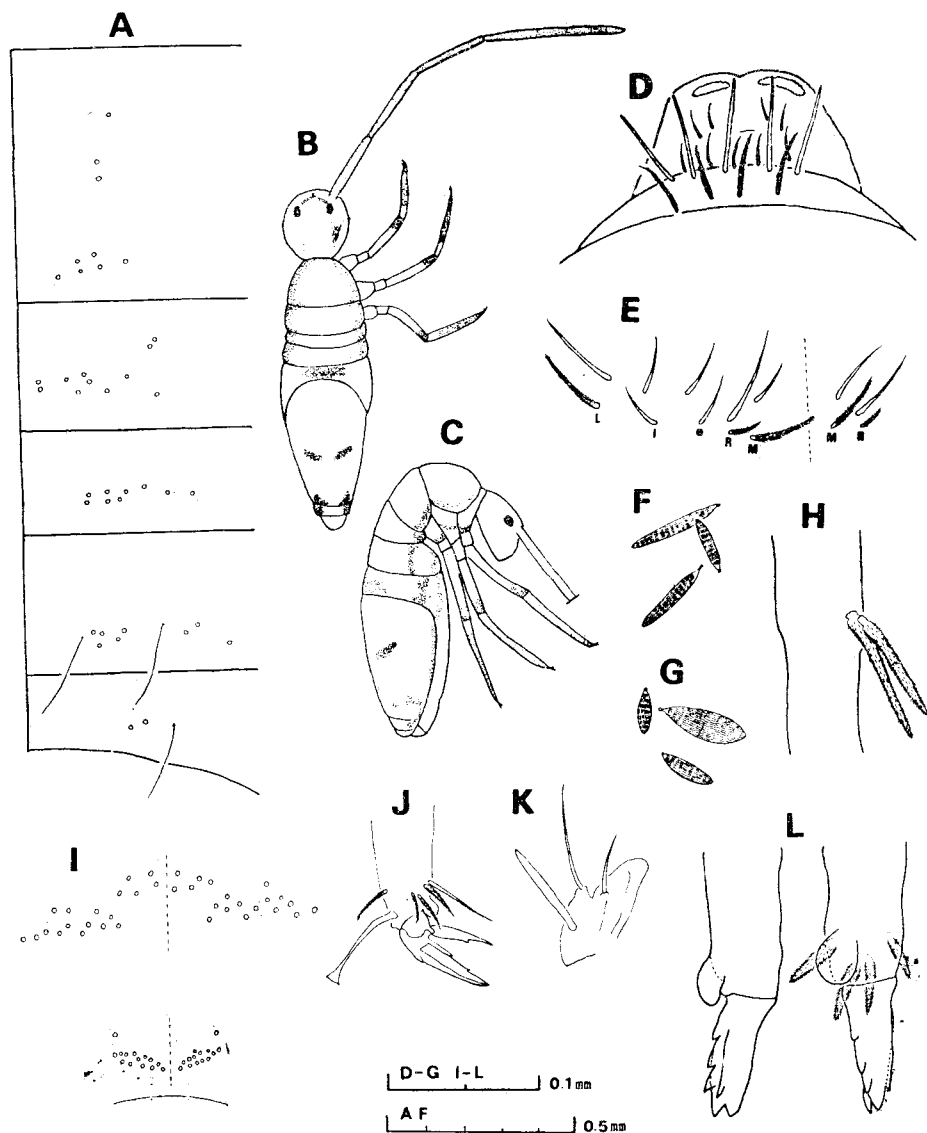


Fig. 3. *Callyntrura* (*Gunungphysa*) *affinis* n. sp. A: chaetotaxy of Th. II-Abd. III, B: body pattern (dorsal view), C: body pattern (lateral view), D: labral chaetotaxy, E: labial chaetotaxy, F: scales on dens, G: scales on Abd. II, H: subsegment on tibio-tarsus, I: chaetotaxy of Abd. IV, J: hind claw, K: outer ramus of maxilla, L: distal part of dens and mucro.

acute and truncate (Fig. 3J). All tibiotarsus with a slight subsegmentation at about distal 1/3 where some larger setae observed (Fig. 3H). Trochanteral organ composed of more than 60 stiff and short spines. Ventral tube elongate, with many ciliate setae anteriorly and the distally located setae larger and thicker. Posterior face with many filiform setae, but without s. s-like ones. Lateral flap bearing smooth and ciliate setae. Terminal tubule with a granulate streak.

Furca with manubrium:dens as 13:10. Manubrium distally and dens on proximal half, with many seta-like, spindle-shaped scales on ventral side (Fig. 3F). Dens without spines but with spine-like setae on the inner side on its proximal half. Distal end with a large vesicular appendix. Mucro with 6 teeth (Fig. 3L).

Chaetal pattern is poorly developed in general (Fig. 3A, I). On the head V-group is reduced, V_0 and V_3 missing.

Th. II: ant. 2, 1, 0; post. 1, 2, 2, 1

Th. III: ant. 2, -, -; post. 2, 1, 3, 2

Abd. I: 2, 2, 3, (1), (1)

Abd. II: s/5/s/3

Abd. III: dors. 2/s

Abd. IV: med. many setae in two levels

post. ca. 16+16

Type data: Holotype ♀, Manchou, Pintung; collection no. 88-12, from dry soil of scrub trees, 17 III 1988. Paratypes: 5, same data as holotype. ♀♀ specimens were only collected.

Additional materials examined: numerous specimens, Kenting Park, Pintung; collection no. 82-45-1, from poor soil of scrub trees, 19 XII 1982; 7, Kenting Park, Pintung; collection no. 88-11-1, 16 III 1988.

Remarks: This species seems mostly closely related to *Callyntrura* (*Gunungphysa*) *microphysarum* Yosii, 1965 by apparently sharing body chaetotaxy. However, detailed examination of Th. II-Abd. I reveals some differences in chaetotaxy of the two forms in addition to body patterns.

***Callyntrura* (*Gunungphysa*) *microphysarum* Yosii, 1965**

Callyntrura microphysarum Yosii, 1965: 42, Fig. 28(A-E); Yosii, 1982: 7, Fig. 5(A-E).

The present material conforms to the description made by Yosii (1965, 1982), based on his specimens from Wulai, Taipei.

Materials examined: 3, Chitou, Nan-Tou; collection no. 82-44-1, from litter and soil of mixed arboreal vegetation, 17 XII 1982; 49, Wulai, Taipei; collection no. 88-17-2, on mosses and under stones, 25 III 1988; 3, Manchou, Pintung; collection no. 88-12, from dry soil of scrub tress, 17¹/₂ III 1988.

Distribution: Taiwan.

***Callyntrura* (*Gunungphysa*) *microphysarum striata* Yosii, 1965**

Callyntrura microphysarum striata Yosii, 1965: 44, Fig. 28(F-H); Yosii, 1982: 9.

Our collections agreed well with descriptions of Taiwanese materials (Yosii, 1965, 1982).

Materials examined: 3, Kantaoshan, Nan-Tou; collection no. 88-15, from litter and soil of acorn stands. 20 III 1988.

Remarks: Due to the distinct color pattern this form is clearly differentiated from the nominal species. The same features in chaetotaxy, labral setae and others, however, make it difficult at the moment to separate them as different taxon, on as already referred to by Yosii in his original description.

Distribution: Taiwan.

***Callyntrura (Gunungphysa) taiwanica* Yosii, 1965**

Callyntrura taiwanica Yosii, 1965: 45, Fig. 28(I-K); Yosii, 1982: 9, Fig. 5(F-K).

We find most major characters of the present material are same as those described by Yosii with materials from Taiwan (Yosii, 1965, 1982).

Materials examined: 6, Wulai, Taipei; collection no. 88-17-2, on mosses and under stones, 25 III 1988.

Distribution: Taiwan.

***Seira oligoseta* n. sp.**

Fig. 4A-H)

Body length up to 1.7 mm. Ground color pale yellow. Oval shaped brownish scales covering the whole body (Fig. 4G). Antennae diffusely pigmented along their whole length. Head with a black stripe between the two eye patches. A longitudinal stripe runs along the side from the mesothorax up to Abd. I. Abd. III and the posterior of Abd. IV with black patterns laterally. The posterior of Abd. V black. Legs pigmented on the distal part of femur and all tibiotarsus (Fig. 4B). Ventral tube and furca pale.

Antennae relatively short, about 2.5 times as long as the head diagonal. Antennae segment ratio as 10:17:19:31. Antennae IV with two obscure apical bulbs. Scales on the antenna occurring up to the proximal portion of Ant. III. Eyes 8+8, black, unequal in diameter. Labral setae 4/5, 5, 4, prelabral setae barbed. Labral margin with four conical papillae, each armed with a minute, sharply pointed process at the tip. Labial basis with setae as MREL₁L₂.

Legs scaled up to the end of the tibiotarsus. Trochanteral organ of the hind leg composed of ca. 13 stiff, short setae. Claws the same as in *Entomobrya* with two inner teeth in unguis and a clavate tenent hair. Unguiculus lanceolate and untoothed. Ventral tube anteriorly with 3, 3+3, 3 macrosetae and ca. 5+5 spiny setae (Fig. 4C). Posterior face having 1+1 terminal seta and 3+3 short setae (Fig. 4E).

Manubrium and dens ventrally scaled and dorsally with many, long, ciliated setae. Dental annulation abruptly ending and mucro falciform (Fig. 4H).

Arrangement of larger body setae is as in Fig. 4A, F.

Type data: Holotype ♀, Henchun, Pintung; collection no. 88-11-2, from thicket

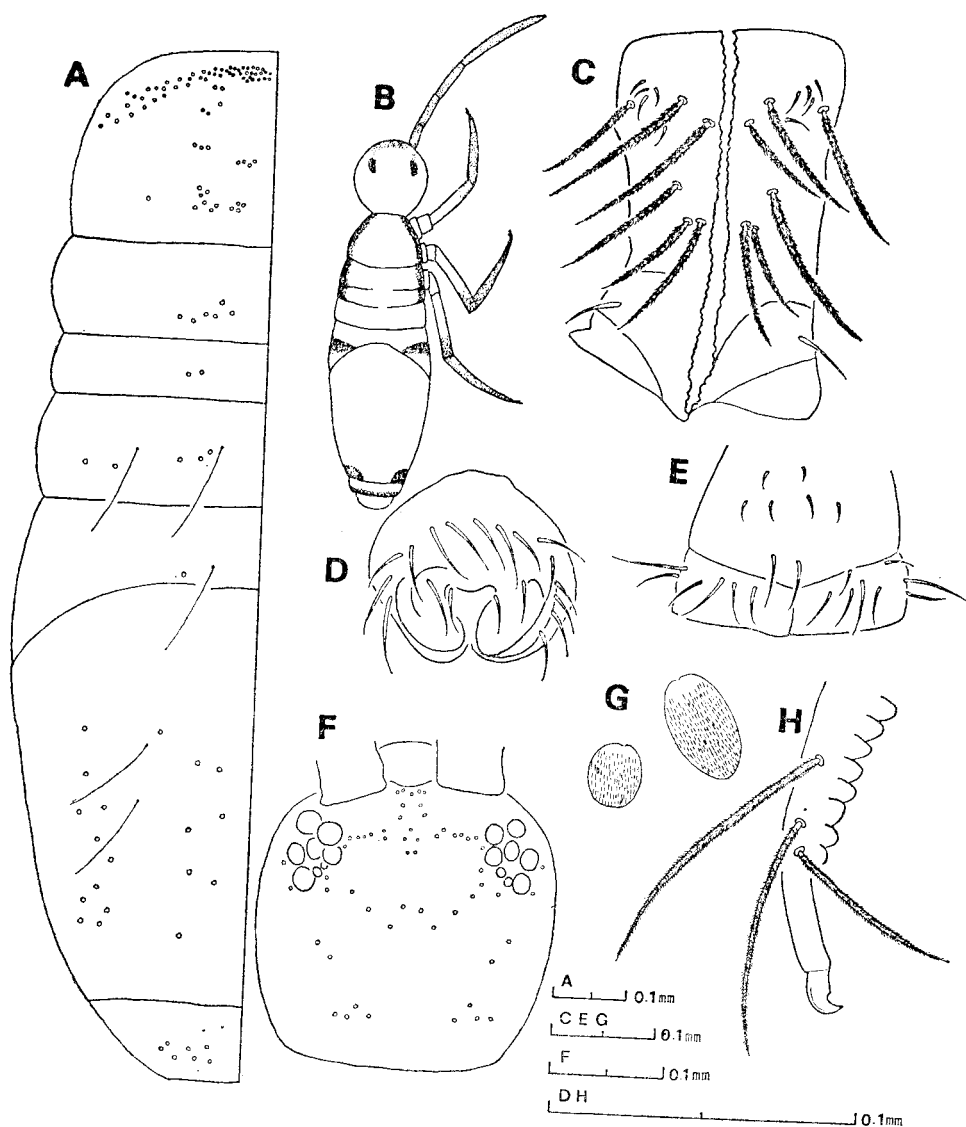


Fig. 4. *Seira oligoseta* n. sp. A: chaetotaxy of thoracic and abdominal tergites, B: body pattern, C: setae on anterior face of ventral tube, D: male genital organ, E: setae on posterior face of ventral tube, F: chaetotaxy of head, G: scales on Abd. III, H: distal part of dens and mucro.

of a sugar cane, 16 III 1988. Paratypes: 9, same data as holotype. ♂♂ and ♀♀ specimens were collected, same data as holotype.

Additional materials examined: 3, Chung Hsing University, Taichung; collection no. 88-9, from litter of bamboo forest, 11 III 1988; 5, Tunghai University, Taichung; collection no. 88-10-1, from lawn, 14 III 1988; 2, Chung San University, Kaohsiung; collection no. 88-14, from poor soil of scrub trees, 18 III 1988.

Remarks: This species is similar to *Seira indica* (Ritter, 1911) from India in

chaetotaxy of anterior part of ventral tube. However, body patterns and chaetotaxy differentiate them definitely.

We find our materials are provided, on the head, with macrosetae fewer in number than in European species of *Seira* by missing setal groups in the vertical area between basal parts of the two eye patches (Dallai, 1973).

***Salina mutabilis* n. sp.**

(Fig. 5A-I; Fig. 7D)

Body length up to 2.6 mm. Ground color pale yellow and faintly black along the side of Th. II to Abd. I. In small individuals all the body pale yellow except for a black patch between two eyes. Legs, furca and ventral tube pale (Fig. 5E). Eyes 8+8, black, arranged in two rows and equally large (Fig. 5C). Antennae very long, 1.4 times as long as the body. Ant. I: head as 15:10. Antennal segment ratio as 10.0:13.8:10.5:13.8. Ant. III organ with two sensory rods. Apical bulb of Ant. IV unilobed. Labral setae as 4/5, 5, 4, prelabral ones barbed, but others not modified. Setae of labial basis ME/LL (Fig. 5G).

Unguis, unguiculus and tenent hair not different from those of other species of the genus *Salina* (Fig. 5I). Trochanteral organ composed of ca. 40 spiny setae (Fig. 5H). Tenaculum quadridentate, with one large anterior seta. Ventral tube anteriorly with 13+13 long ciliate setae, the distal 3+3 large (Fig. 5D). Posterior face asymmetrically ca. 19 ciliate setae. Lateral flap bears smooth and ciliate setae. Lateral flap bears smooth and ciliate setae.

Furca with manubrium:dens as 10:13. Dens without spines. Distal appendix very large. Mucro broadly elongate and with three teeth (Fig. 5F; Fig. 7D).

Body without scales. On the head 1+1 frontal spines, but chaetal pattern different from *S. celebensis* (Fig. 5C). Chaetal pattern in general rather variable, but the median group of Th. II consistent (Fig. 5A, B).

Type data: Holotype ♀, Chitou, Nan-Tou; collection no. 88-16-1, from litter soil of mixed arboreal vegetation, 21 III 1988. Paratypes: 11, ♂♂ and ♀♀ specimens were collected, same data as holotype.

Additional materials examined: 1, Chung Hsing University, Taichung; collection no. 88-9, from soil of bamboo, 11 III 1988; 14, Chitou, Nan-Tou; collection no. 88-16-1, from litter and soil of mixed arboreal vegetation, 21 III 1988; 2, Wulai, Taipei; collection no. 88-17-1, from litter of bamboo leaves and under stones, 24 III 1988.

Remarks: The present material is characteristic in body chaetotaxy and thus differentiated from *Salina affinis* (Folsom, 1899) from Japan (Yosii, 1983).

***Salina celebensis* (Schaeffer, 1898)**

Cremastocephalus celebensis Folsom, 1924: 510, Pl. 3, Figs. 28-29.

Salina pallida var. *punctata* Uchida, 1943: 8, Pl. V, Figs. A-F.

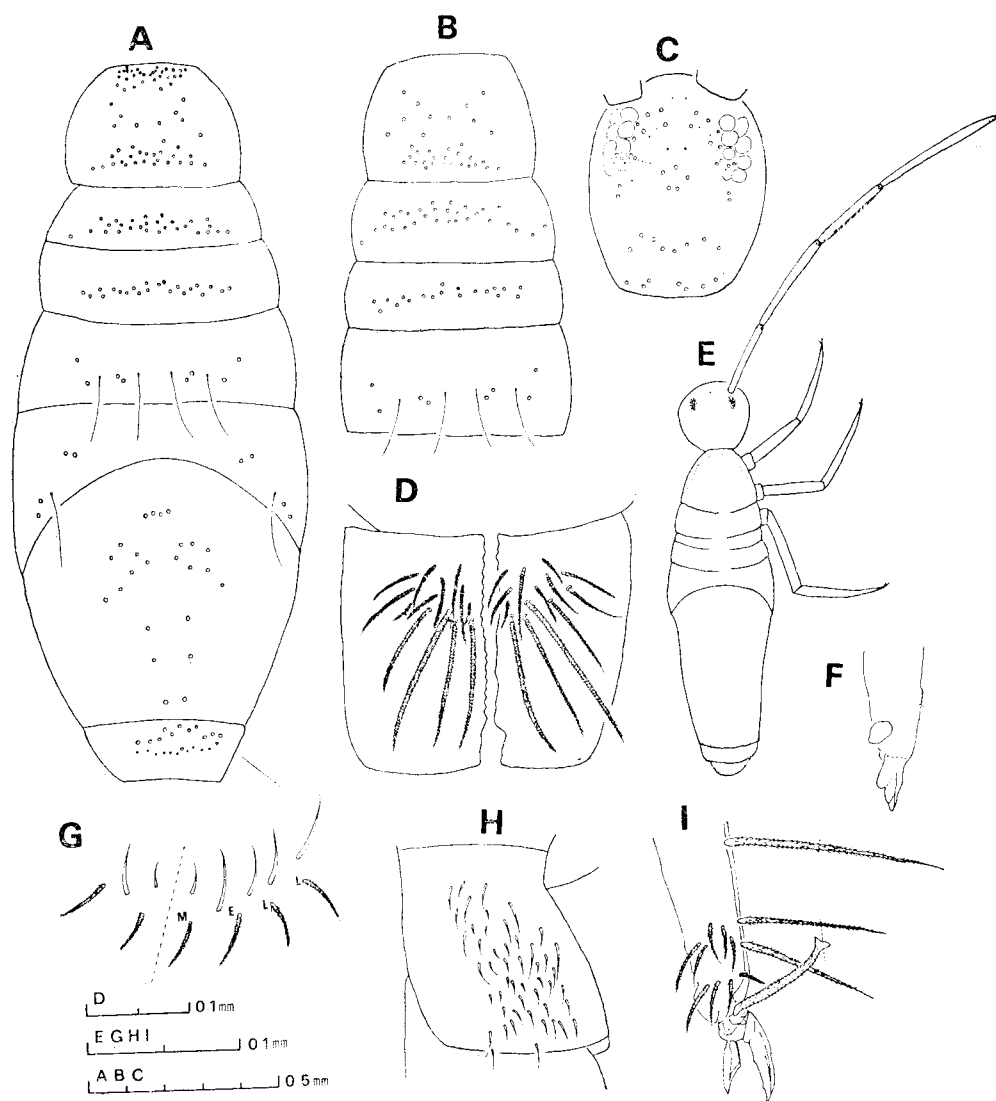


Fig. 5. *Salina mutabilis* n. sp. A: chaetotaxy of thoracic and abdominal tergites, B: chaetotaxy of Th. II-Abd. II, C: chaetotaxy of head, D: setae on anterior part of ventral tube, E: body pattern, F: distal part of dens and mucro, G: labial chaetotaxy, H: trochanteral organ, I: hind claw.

Salina celebensis Denis, 1948: 285, Fig. 34; Yosii, 1959: 42-44, Fig. 25(A-F); Yosii, 1981: 47, Fig. 25(A-F); Yosii, 1983: 17, Fig. 10(A-F); Cassagnau, 1963: 131, Fig. 2(A-E).

This species is widely distributed over various tropical countries. Our collection agreed well with the description by Yosii (1959, 1981, 1983) except the present one has two bands on the tibiotarsus whereas the Yosii's specimens include the form with only one band. Moreover our material, of spotted form has the chaetal pattern as follows.

Th. II-Abd. II 1, 2, 2, s/2/s/1

Abd. V 3/2

Since the present species shows some variations in chaetotaxy according to localities further study on the variability may be needed to confirm any speciation which might have occurred along different regions.

Materials examined: 29, Manchou, Pintung; collection no, 88-12, from dry soil of scrub trees, 17 III 1988; 4, Wulai, Taipei; collection no. 88-17-2, on mosses and under stones, 25 III 1988.

Distribution: Japan, Taiwan, Honkong, Philippines, Malaya, Borneo, Celebes, Ceylon, South America, Sabah.

Acanthurella bicolor (Yosii, 1965)

(Fig. 6A-G; Fig. 7B, C)

Acanthocyrtus bicolor Yosii, 1965: 37, Fig. 25.

Body length up to 4.7 mm. Ground color yellow with dark brown or black pigment. Antennae brownish. The lateral and proximal part of mesothorax, all the abdomens II, III and the posterior part of abdomen IV with black patches. Fore and midleg dark brown up to the femur and that of hindleg black.

Antennae rather long, slightly shorter than body (5:6). Ant.: head as 53:10, and segment ratio as 10:13:11:20. Ant. I, II with scales. Apical bulb of Ant. IV bilobed. Ant. III organ with two sensory rods. All antennal segments with short spiny setae together with usual ciliated ones (Fig. 7C), but spiny setae becoming numerous toward the apex of antenna. Labrum with setae 4/5, 5, 4, prelabrals smooth and without labral papillae (Fig. 6D). Eyes 8+8, black.

Table 1. A comparison of the present materials and original description of *A. bicolor*

	Original description	Present materials
Body size	2.7-3.0 mm	3.7-4.7 mm
Ant.: Hd.	22 : 10	53 : 10
Body chaetotaxy		
Th. II	7 macrosetae	24 macrosetae
Th. III	10	13
Abd. I	4	3
Antenna-spiny setae	only on Ant. III, IV	all antennae segments
Scales	only on body & manubrium	body manubrium of furca Ant. I, II coxa to femur of leg
Trochanteral organ	40 spiny setae	66-118 spiny setae
Ventral tube	2+2 terminal macrosetae	4+4 terminal macrosetae

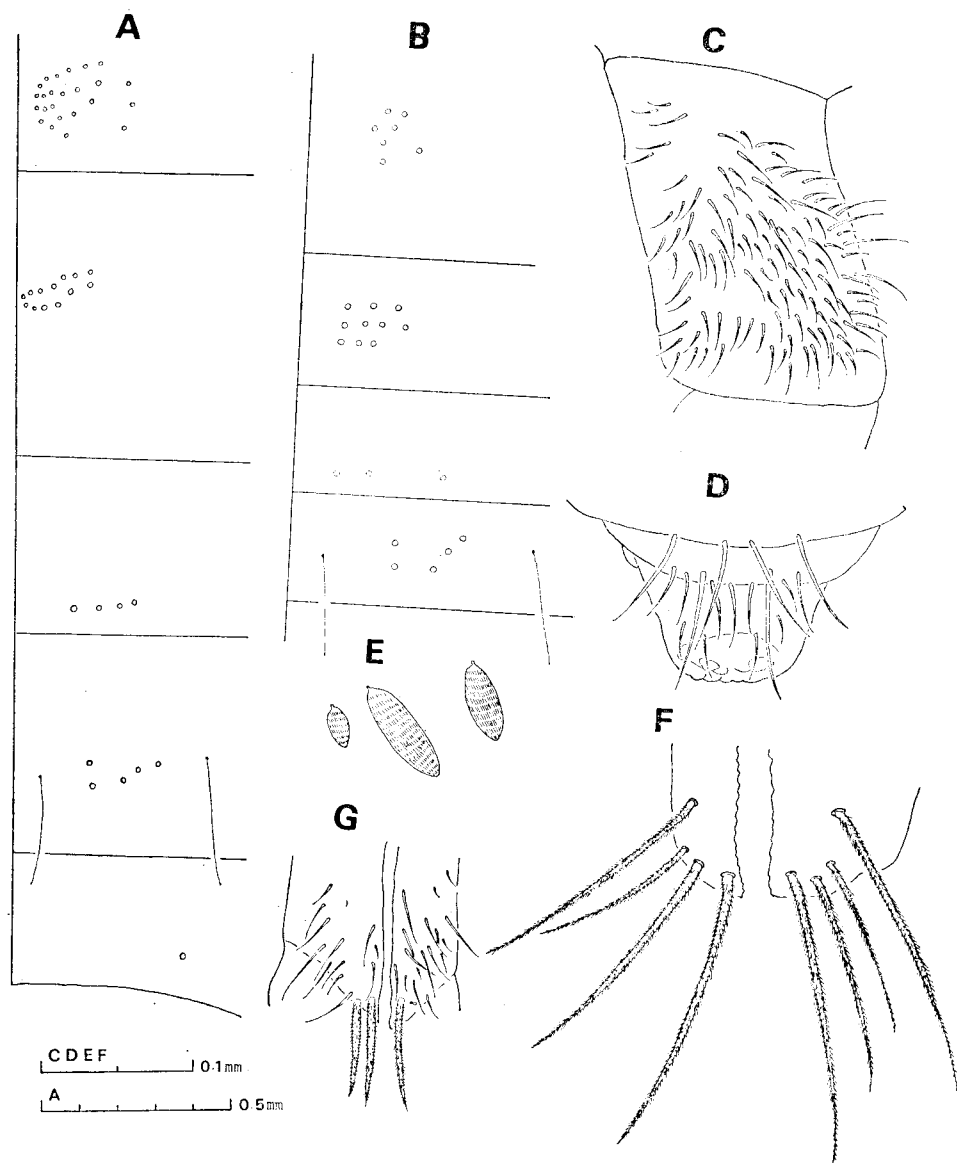


Fig. 6. *Acanthurella bicolor* (Yosii, 1965) A: chaetotaxy of Th. II-Abd. III, B: chaetotaxy of Th. II-Abd. II (original description), C: trochanteral organ, D: labral chaetotaxy, E: scales on Abd. II, F: setae on anterior part of ventral tube (distal part), G: setae on anterior part on ventral tube (original description).

Leg scales occurring up to femur. Unguis carinate, with a pair of lateral and two small inner teeth. Unguiculus acutely lanceolate and not dentated. Tenent hair long, slender and distally inflated. Trochanteral organ much developed, composed of 66 to 118 stiff and short spines (Fig. 6C). Ventral tube anteriorly with many small setae and 4+4 distal ones much larger than others (Fig. 6F). Posterior face has one or two large median seta about the middle of the length. Other setae very slender but not strong.

Furca with manubrium:dens as 10:11. Manubrium dorsally with many ciliated setae. Ventral side has proximally long, fusiform scales which are becoming smaller distally. Dens with a row of stout spines along the inner side, more than ca. 60+60. Ventral side with many small setae, but none of them scale-like. Mucro bidentate, apical tooth smaller than the anteroapical and with a basal spine. Body scales fusiform and brownish (Fig. 6E; Fig. 7B).

Arrangement of larger body setae is as in Fig. 6A.

Redescription based on specimens from Taiwan (collected by K. J. T.).

Materials examined: 5, Kantaoshan, Nan-Tou; collection no. 88-15, from litter and soil of acorn stands, 20 III 1988; 6, Wulai, Taipei; collection no. 88-17-2, on mosses and under stones, 25 III 1988.

Remarks: In the present materials almost all the quantitative characters showed greater values than those in the original description as in the Table 1. Other character states, however, were found to be equal. It seems highly probable that our collection represents adult forms whereas, those of the original descriptions were based on young individuals considering their quantitative differences.

Distribution: Taiwan.

***Willowsia jacobsoni* (Börner 1913)**

(Fig. 7A)

Sira jacobsoni Uchida, 1944: 4, Pl. III, Figs. 1-7; Pl. I, Figs. 1-5; Uchida, 1955: 205, Fig. 3; Uchida, 1958: 13; Denis, 1948: 240, Fig. 19(a-e).

Willowsia jacobsoni Mari Mutt, 1981: 361-373, Pls. I-V, Figs. 1-40.

Our collection agreed well with the description by Mari Mutt (1981), based on his material from Puerto Rico.

Materials examined: 2, Chung Hsing University, Taichung; collection no. 82-43-2, from soil of bamboo leaves, 15 XII 1982; 2, Chitou, Nan-Tou; collection no. 82-44, from litter and soil of mixed arboreal vegetation, 17 XII 1982; 2, Kenting Park, Pintung; collection no. 82-45-1, from poor soil of scrub trees, 17 XII 1982; numerous specimens, Pintung, collection no. 88-13, from the outer layer of banana trees, 17 III 1988; 2, Kantaoshan, Nan-Tou; collection no. 88-15, from litter and soil of acorn stands, 20 III 1988; 3, Wulai, Taipei; collection no. 88-17-2, on mosses and under stones, 25 III 1988.

Remarks: This species includes three varieties with different color patterns according to Uchida (1944) and Denis (1948) and our specimens contained *W. jacobsoni* var. *indra* as well as *W. jacobsoni* var. *lipostrophia* after their designation. The former, however, has been confirmed to be all females from our observation of 20 individuals whereas the latter type included mostly males, that is, 12 individuals out of 15. This apparent sexual distinction, to our surprise however, had already been smartly examined by Mari Mutt with the material from Puerto Rico and confirmed to be sexual dimorphism of a full species (Mari Mutt, 1981).

Distribution: Java, Sumatra, Ceylon, Vietnam, Cambodia, Philippine Islands

(Luzon), Micronesia (Mariana and Caroline Islands), Marcus Island, Hawaii (Oahu), New Guinea, Australia (North Queensland, Victoria), Ivory Coast, Madagascar, Puerto Rico, Taiwan (new record).

***Sinella curviseta* Brook, 1882**

Sinella curviseta Uchida, 1957: 43; Yosii, 1956: 66-67. Pl. XXXVII, Fig. 220; Pl. XL, Fig. 228; Yosii, 1964: 32; Stach, 1964: 17; Stach, 1965: 356, Pl. XXXIII, Figs. 8, 9; Christiansen & Bellinger, 1980: 909, Fig. 745; Lee & Park, 1984: 178.

The species is almost cosmopolitan in distribution. No variations were observed in chaetotaxy between the present materials and other descriptions based on those from Japan (Yosii, 1956), North America (Christiansen and Bellinger, 1980), and Korea (Lee and Park, 1984).

This is a new record from Taiwan.

Materials examined: 4, Chitou, Nan-Tou; collection no. 82-44, from litter and soil of mixed arboreal vegetation, 17 XII 1982; 3, Kenting Park, Pintung; collection no. 82-45-1, from poor soil in scrub trees, 19 XII 1982; 2, Manchou, Pintung; collection no. 88-12, from dry soil in scrub trees, 17 III 1988; 4, Kantaoshan, Nan-Tou; collection no. 88-15, from litter and soil of acorn, 20 III 1988; 8, Chitou, Nan-Tou; collection no. 88-16-2, from litter layer of a forest of diverse arboreal composition, 29 III 1988.

Distribution: China, North America, Costa Rica, India, Japan, Europe, Russia, North Vietnam, Java, Korea, Taiwan (new record).

***Homidia socia* Denis, 1929**

Homidia socia Yosii, 1942: 476, Fig. 10; Yosii, 1956: 72; Stach, 1964: 19, Pl. X, Fig. 2; Stach, 1965: 359, Pl. XXXII, Figs. 1-6; Christiansen and Bellinger, 1980: 885, Fig. 727.

Body length up to 2.3 mm. Ground color yellow and with distinct black longitudinal stripe along the lateral edge of the head and trunk, and a middorsal stripe on Th. II to Abd. III.

Labral setae: 4/5, 5, 4, prelabral ones smooth. Labral seta: a_2 shorter and thinner than a_1 , but longer than b_2 . Labral margin with 4 minute papillae.

Thoracic tergites with numerous clavate collar setae forming a mans, general chaetotaxy the same as described by Christiansen and Bellinger (1980). Macrosetal formul of coxae, $3/4+1$, $3/4+2$. Anterior face of ventral tube with $3+3$ macrosetae, external two in parallel positions as to median furrow and the posterior side with differentiated setae.

Furcal segments ratio, manubrium: dens+mucro=10:11, Basal setae of dens pointed and ciliated.

Redescription based on specimens from Taiwan (collected by K. J. T.).

This is a new record from Taiwan.

Materials examined: 4, Kenting Park, Pintung; collection no., 82-45-1, from

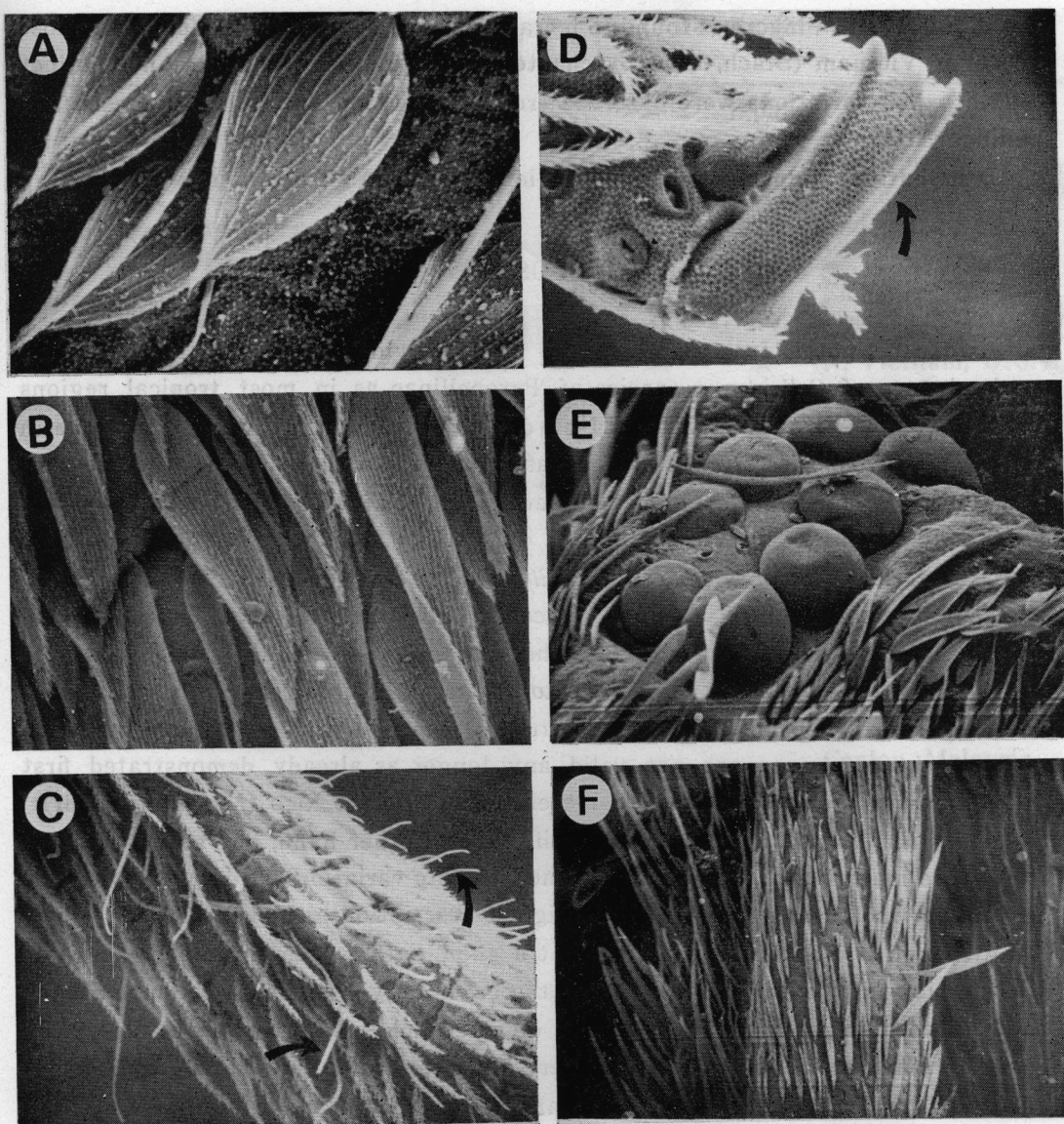


Fig. 7. SEM photos of Entomobryidae. A: scales on abdomen of *Willowsia jacobsoni*, B: scales on abdomen of *Acanthurella bicolor* (Yosii, 1965), C: setae on Antenna of *A. bicolor* (Yosii, 1965) (spiny setae indicated by arrows), D: mucro of *Salina mutabilis* n. sp., E: eye of *Callyntrura* (*Gunungphysa*) *spinidentata* n. sp., F: scales on dens of *C. spinidentata* n. sp.

soil in scrub trees, 19 XII 1982; 2, Chung Hsing University, Taichung; collection no. 88-9, from dry soil of bamboo leaves, 11 III 1988; 11, Tunghai University, Taichung; collection no. 88-10, from lawn, 14 III 1988; 5, Henchun, Pintung; collection no. 88-11-2, from thicket of a sugar cane leaves, 16 III 1988; 8, Pintung, collection no. 88-13, from forest of *Aphanamixis*, 17 III 1988.

Remarks: As compared with individuals from Japan (Yosii, 1942) the ratio of

manubrium: dens+mucro is found to be rather small. They also differ from those of North Vietnam (Stach, 1965) by chaetotaxy of Abd. I. However, no distinct chaetotaxical variations were observed from those from U.S.A. (Christiansen and Bellinger, 1980).

Distribution: Japan, China, North Vietnam, U.S.A., Taiwan (new record).

DISCUSSION

As can be noted from the list the entomobryid fauna is characterized by predominance of *Callyntrura* species of Paronellinae as in most tropical regions (Yosii, 1983). The regressive trend of chaetal arrangement was remarkable in the *Callyntrura* species from the island as compared to those from other regions and it may be one of the features characterizing *Callyntrura* fauna of the island as already suggested by Yosii (1965a).

One of the entomobryid member, *Willowsia jacobsoni* (Börner, 1913), was known to occur in most tropical and subtropical islands and it is also identified from the present material as new record for the island. The sexual dimorphism observed in the present materials by different color pattern, however, was very interesting and accordingly, the different nomenclature of the two varieties which had been given to the two sexes are not valid any longer as already demonstrated first and confirmed by Mari Mutt in his material from Puerto Rico (Mari Mutt, 1981).

Concerning *Acanthurella bicolor* (Yosii), on the other hand, our study with the Taiwanese material certainly helped demonstrating variation of adults as compared to younger individuals on which the original description must have based.

Although it may be too early to get a good outline view of the make up as well as biogeographical distribution of the entomobryid fauna, at the moment, an attempt to analyze them may worth doing which may give some suggestion characterizing the fauna (Table 2). Here from the Table 2, we find that 9 out of all the 16 species are endemic to Taiwan. Those occurring in both Taiwan and mainland China are represented by only 2 species and it strongly contrast with 6 species in 6 genera common to Taiwan and Japan, thus suggesting a strong affinity between the two insular countries. It is quite noticeable that out of the 16 species only one is a cosmopolitan, meanwhile the remaining 15 have so far been located from tropical and subtropical area and especially insular environments.

Eventually we are impressed with a strong endemicity of the Taiwanese fauna as well as its close affinity to Japanese elements. These features are apparently related with topography of the island as well as oceanographic and climatic connection of the two regions.

Taiwan is located between about 22 and 25 north latitude, having a number of alpine summits of more than 3,000 m above sea level. The high mountain

Table 2. Geographical Distribution of Taiwanese Entomobryidae (Collembola)

Taxa	Taiwan	Korea	China	Japan	Remark
<i>Sinella curviseta</i> Brook, 1882	×	×	×	×	Cosmopolitan
<i>Homidia sauteri formosana</i> Uchida, 1943	×				Endemic
<i>Homidia nigrocephala</i> Uchida, 1943	×				Endemic
<i>Homidia socia</i> Denis, 1929	×		×	×	N. Vietnam, U. S. A.
<i>Willowsia jacobsoni</i> (Börner, 1913)	×				Tropical, subtropical regions
<i>Willowsia formosana</i> (Denis, 1929)	×			×	
<i>Seira oligoseta</i> n. sp.	×				Endemic
<i>Achanturella bicolor</i> (Yosii, 1965)	×				Endemic
<i>Salina celebensis</i> (Schaeffer, 1898)	×			×	Honkong, Malaya, Philippines, Borneo, Celebes, Ceylon, Malaysia, America
<i>Salina mutabilis</i> n. sp.	×				Endemic
<i>Callyntrura japonica</i> (Kinoshita, 1917)	×			×	
<i>Callyntrura microphysarum</i> <i>microphysarum</i> Yosii, 1965	×				Endemic
<i>Callyntrura microphysarum</i> <i>striata</i> Yosii, 1965	×				Endemic
<i>Callyntrura taiwanica</i> Yosii, 1965	×				Endemic
<i>Callyntrura spinidentata</i> n. sp.	×				Endemic
<i>Callyntrura affinis</i> n. sp.	×				Endemic
<i>Cyphoderus javanus</i> Börner, 1906	×			×	

ranges with its complicated topographies, naturally, contain a variety of environments and include tropical, subtropical, temperate, alpine forests areas (Lin and Tsai, 1984). Furthermore, Taiwan is a member of the Rhyukyu-Taiwan-Philippine island arc chain, lying between two branches of the warm Kuroshio currents. In addition the winter northeast monsoon as well as the typhoon connect quite often Taiwan and Japan. All the components, described above, in terms of geographic location, topographic characteristics and climatological connections must be supporting the high endemism of the Collembolan fauna and its close relations

with the Japanese fauna. A similar interpretation has already successfully justified some floristic character and distribution on the island (Lin and Tsai, 1984).

In view of the geographic characterization as mentioned above it is highly probable that Collembolan fauna would be represented by additional hundreds of species, far exceeding those known up to the present from the island.

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中國產彈尾目（昆蟲綱）之系統研究

I. 臺灣產四新種與三新記錄種

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本文報導臺灣產之彈尾目昆蟲 7 屬 11 種，其中包含 4 新種與 3 新記錄種：*Callyntrura spinidentata* n. sp., *C. affinis* n. sp., *Seira oligoseta* n. sp., *Salina mutabilis* n. sp., *Sinella curviseta* Brook, 1882, *Homidia socia* Denis, 1929 和 *Willowsia jacobsoni* Börner, 1913。因此，已知之臺灣之長角跳蟲科共有 8 屬 16 種。本文並討論與中國大陸、日本、韓國之地緣關係。