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Notes on Paronellid Collembola of Southeast Asia

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ABSTRACT The present report is based on materials mainly collected by myself in the year 1965 sponsored by the Centre for Southeast Asian Studies of the Kyoto University. From the collection various species have been detected, some are new to science, but others are the recognition of those already described and for the latters the new diagnosis is given. The most impressive finding is *Callyntrura lineata* (Parona, 1892), on which the subgenus *Handschinphysa* Paclt, 1945 is based. Besides, the subgenus *Sultanaphysa* Yoshii, 1982 is more intensively characterized and a Burmese species, *C. elongata* (Carpenter, 1917) is recovered.

KEY WORDS Collembola/ Southeast Asia/ taxonomy

***Callyntrura* (*Borneaphysa*) *hutan* sp. n.** Fig. 1

BORNEO: Sepilok nr. Sandakan, Sabah (7 ex. 5. IX 1976, m.)

Body length up to 2.0 mm. Pale species with faint patch along the side margin

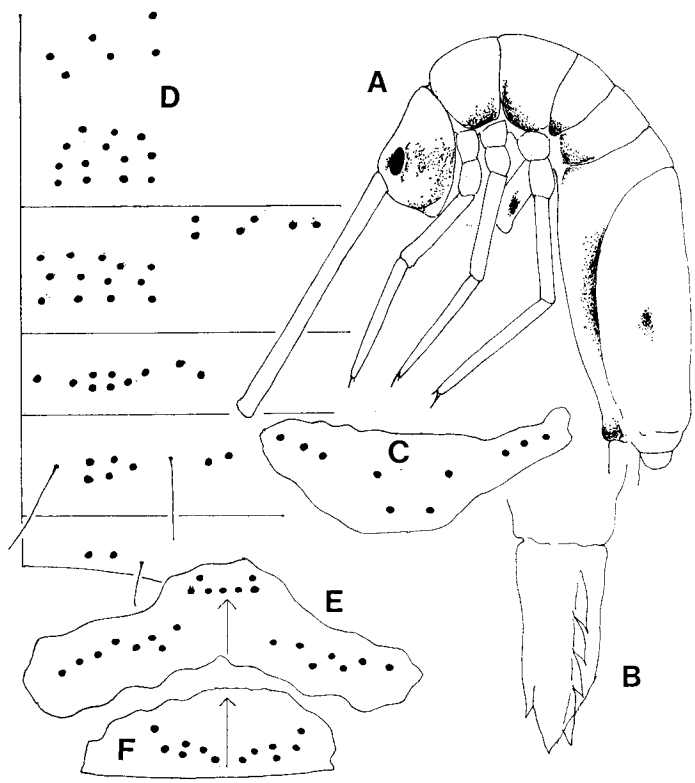

Fig. 1. *Callyntrura* (*Borneaphysa*) *hutan* sp. n. A: habitus, B: mucro, C, D, E, F: chaetal pattern of v-group, th. II-abd. III, abd. IV, median and posterior group.

of th. II, III and of abd. I, II. A narrow patch is along the elongation of abd. III and a pair of slight spot may be present near the middle of abd. IV. Besides the body is brownish by the scales. Antennae and legs faintly dark. Furca pale. Antennae very long, much longer than the body and ant. I: head is ca. 25: 10, without scales. Labrum typically of *Borneaphysa* type, all setae of the first row being thick, blunt and ciliated. Labral margin without structures. Outer maxillary ramus normal. Labial setae of the basis as MRe/1L. Legs unscaled, unguis and unguiculus normal for the group. Trochanteral organ is ca. 25 spiny setae in a triangular area. Ventral tube has s.s.-like setae on posterior face. Terminal tubule is without granular streak. Furca long, ventrally not scaled. Dens has no terminal vesicle and no spines. Mucro is elongate type. Chaetal pattern is rather reduced as follows:

head: v-group without v_0, v_3, v_4.
th. II: ant. 2/2/2, post. ca. 4, 4, 3, 2.
th. III: ant. 2/2/2, post. ca 1, 3, 3, 3, 3.
abd. I: 1/1, 2, 2, 1/2.
abd. II: s/5/s/2. abd. III: dors. 2/s.
abd. IV: med. ca. 25 setae in two levels, post. ca. 6+6.

Although the species is alike to *C. borneensis* Ys. in outlook, it is near to *C. pulchra* Ys. by the reduced chaetal pattern of the trunk, above all by that of abd. II. All examples at hand are quite the same in these features. Hutan means "forest" in Malayan.

***Callyntrura* (*Gunungphysa*) *malayana* Yosii, 1962** Fig. 2

MALAYA: Penang Hill (5 ex. 23. III 1965, m.)

The new examples coincide well with the type in the colour pattern. Chaetal pattern is also alike to the type except the posterior group of th. II, but concordant in other parts. That of abd. I with 4 lateral group is peculiar and overall formula is as:

head: v-group complete
th. II: ant. 4/4/2, post. 5, 5, 5, 2/1.
th. III: ant 3/2/–, post. 5, 3, 4, 4, 4/1.
abd. I: 3(2)/2, 2, 2, 2, 2, 1/4.
abd. II: s/8/s/3. abd. III: dors. 2/s.
abd. IV: med. ca 42 in one level. post. ca. 7+7.

Ant. I, legs and furca with filiform scales. Labral setae 4/5, 5, 4, prelabrals barbed and all setae of the first row are modified, blunt ending. Outer maxillary ramus normal. Setae of labial basis as Mre/11. Ventral tube without s.s.-like setae, but with granulate streak on terminal tubule. Dens with ca. 20 dental spines and terminal vesicle is of moderate size. Mucro as in the type.

From *C. pahangensis* Ys., 1982 of Malaya it may be divided by the body colour pattern and by the serrate labral setae of the first row.

Distribution: Malaya

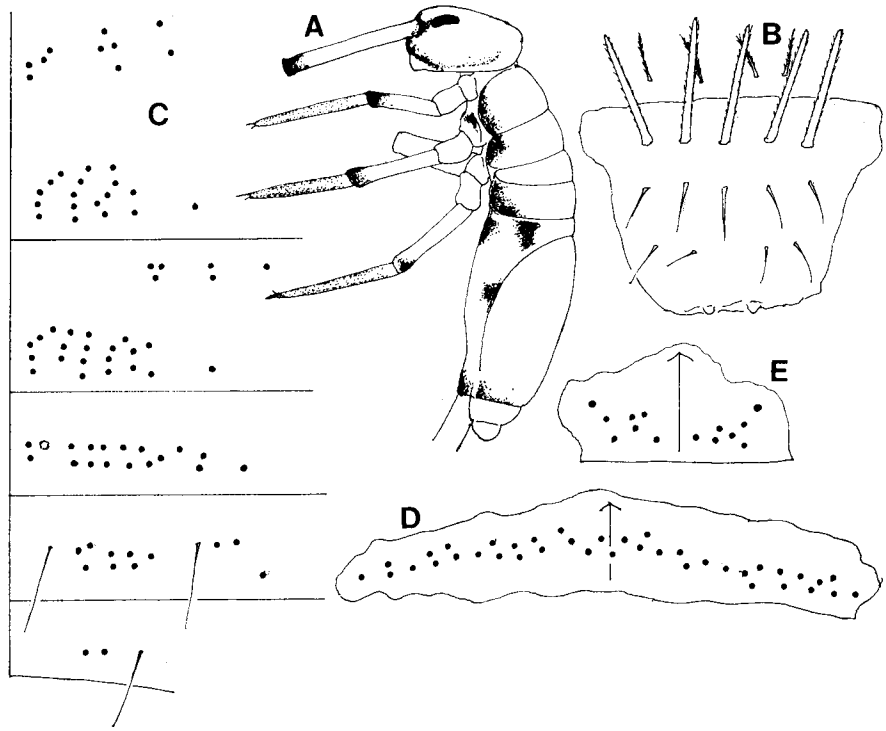

Fig. 2. *Callyntrura* (*Gunungphysa*) *malayana* Yosii from Penang Hill. A: habitus, B: labrum, C, D, E: chaetal pattern of th. II-abd. III, abd. IV median and posterior group.

***Callyntrura* (*Gunungphysa*) *elongata* (Carpenter, 1917)** Fig. 3

Paronella elongata: Carpenter 1917
THAI: Khao Chong National Park (3 ex. 29. III 1965, m.)

Body length up to 4.0 mm. Ground colour pale white, but brownish all over by the heavily pigmented scales of the body. Head is diffusely dark, deeper on the sides. Trunk has a conspicuous longitudinal band laterally to each side leaving the median dorsum without pigments. Antennal segments are deeply bluish pigmented near the basis and at the distal end. Legs are faintly dark on tibiotarsus. Ventral tube and furca quite pale. Antennae elongate, ant. I: head being 27: 10 and all segments are heavily scaled. Labral setae 4/5, 5, 4, prelabrals barbed, all five setae of the first row are enlarged and blunt ending. Labral margin with two minute granules. Outer maxillary ramus normal for the genus. Setae of labial basis as MRe/11. Legs elongate, scaled up to the tiobiotarsus. Trochanteral organ is ca. 100 smooth spiny setae in a quadrangle. Ventral tube is without s.s.-like setae. Lateral flap only with smooth setae and terminal tubule is with a granulate streak all along the length. Furca very long. Dens with some setae converted to spines proximally along the inner side and with a large terminal vesicle near distal end. Mucro is typically arranged. Chaetal pattern is rather reduced and represented as:

head: v-group is without v_3.

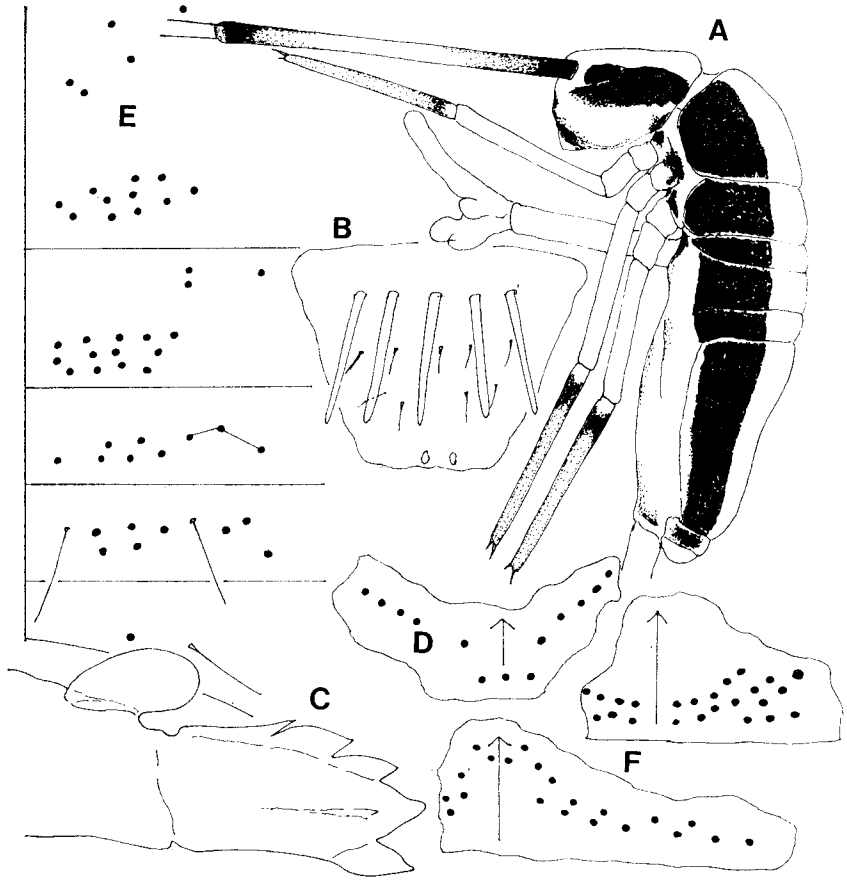

Fig. 3. *Callyntrura (Gunungphysa) elongata* (Carpenter) from Khao Chong, Thailand. A: habitus, B: labrum, C: mucro, D, E, F: Chaetal pattern of v-group, th. II-abd. III, abd. IV, median gr. and posterior group.

th. II: ant. 2/2/1, post. ca. 2, 3, 3, 2, 1=13.
th. III: ant. 2/1/–, post. ca. 3, 3, 3, 3, 1=13.
abd. I: ca. 1, 2, 2, 2, 1, 1=9.
abd. II: s/5/s/3. abd. III: dors. 1/s.
abd. IV: med. obscurely in two levels, post. ca 16+16.

C. elongata is described after one example from Myawadi (ca. 50 km. east of Moulmein, Burma). This is the second report. The species can be identified easily by its peculiar colour pattern and with its labral structure, granulated stripe of terminal tubule etc., the species is to be included in *Gunungphysa* without doubt.

Distribution: Burma, Thailand

subg. *Callyntrura* (s. str.)

The subgenus is strongly specialised in Southeast Asia into various species and their identification is not very easy. Especially in Java they represent strong variability

and not yet fully well studied. Antennae, legs and furca are setose and unscaled as defined in Yoshii 1982, p. 10, but sometimes, these setae are very narrowly flattened, although never rounded on apex.

***Callyntrura* (*Callyntrura*) *obscuriventris* Yoshii, 1982**

THAI: Khao Chong National Park (8 ex. 30. III, m.), MALAYA: Penang Hill (3 ex. 23. III 1965, m.), Tapah, Perak (7 ex. 21. III 1965, m.), Berinchang, Perak (12 ex. 21. III 1965, m.)

These examples coincide well with my previous description of the species from Malaya. Ventral side of the head and abdomen has dispersed black pigments alike to *Salina celebensis*. Chaetal pattern is characteristically reduced. It is as follows in one example from Khao Chong.

head: v-group without v_0.
th. II: ant. nil, post. 2, 3, 3.
th. III: ant. 1/0/0, post. 3, 2, 3, 2.
abd. I: 1, 2, 2, 1. abd. II: s/3(4)/s/1.
abd. III: dors. 1/s.
abd. IV: med. in two levels, post. ca. 10+10.
Distribution: Malaya, Thailand (nov.)

***Callyntrura* (*Callyntrura*) *chibai* sp. n.** Fig. 4

MALAYA: Tapah, Perak (31 ex. 21. III 1965, m.), Kuala Lipis, Negri Sembilan (3 ex. 11. VIII 1972, S. Chiba)

Body length up to 3.0 mm. Ground colour unifomly dark white, antennae dark near distal end of I, II and throughout on III, IV. Lateral margin of each body segments are faintly pigmented. Legs and furca are dark on distal segment. Antennae short, ant. I: head being ca. 17: 10. Ant. I only with scaly setae. Labral setae 4/5, 5, 4, the median three on the first row are thicker, straight and lightly blunt. Labral margin with 2+2 small tubercles. Outer maxillary ramus normal. Setae of labial basis as Mre/11. Legs quite unscaled. Trochanteral organ is ca. 100 spiny setae in a quadrangle. Ventral tube without s.s.-like setae and terminal tubule is with warty streak. Furca also with only scaly setae. Dens has some 20 smooth, transparent dental spines and with a small terminal vesicle. Mucro is not very elongate. Chaetal pattern is as:

head: v-group complete.
th. II: ant. 5/4/2, post. ca. 5, 5, 5, 6 (=21)
th. III: ant. 3/2/1, post. ca. 6, 4, 5, 5, 5 (=25)
abd. I: 3/2, 2, 2, 2, 1/4.
abd. II: s/8/s/3.
abd. III: 2/s.
abd. IV: med. ca. 25 in one level, post. ca. 12+12.

From the colour pattern the species seems to be a pale form of *C. thoyaopongi* m. in appearance. Actually it is alike to it in many details of the body and may be divided by the setal pattern of the anterior group of th. II, which is constant in all 5 examples

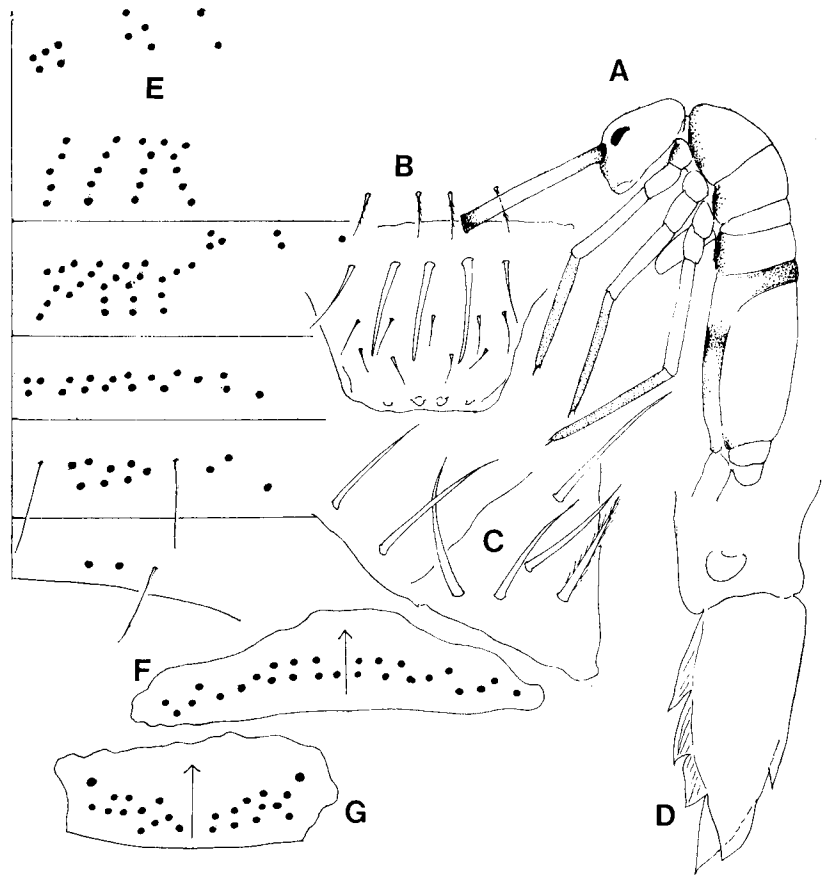

Fig. 4. *Callyntrura* (*Callyntrura*) *chibai* sp. n. A: habitus, B: labrum, C: labial basis, D: mucro, E, F, G: chaetal pattern of th. II-abd. III, abd. IV, median and posterior group.

examined. This is the only species of the subgenus having such number of setae on the place. The species is dedicated to Mr. Shigeo Chiba of the Hirosaki University, who has cultured the species to measure the development during IBP programme.

Callyntrura (*Callyntrura*) *thoyaopongi* Yoshii, 1982

THAI: Khao Chong National Park (52 ex. 28. III 1965, m.), Trang, southern Tahiland (34 ex. 29. III 1965, m.) MALAYA: Tanah Rata, Cameron Highland (6 ex. 19. III, 1965, m.), Berinchang, Perak (45 ex. 19–20. III 1965, m.)

The examples of Cameron Water Fall are more deeply coloured. Not only th. III is diffusely pigmented, the antennae are banded on proximal two segments and distal two are quite dark. Legs are diffusely dark. Chaetal pattern is just as in the typical form. As they are quite alike to *C.* (*Istanaphysa*) *apiana* Ys., 1981 in appaerance, the Bornean cited species has been checked once again without finding any trace of dental vesicle. The subgenus *Istanaphysa* m. is restricted to Borneo and Philippine at present.

***Callyntrura* (*Murphysa*) *vestita* (Handschin, 1925)**

JAVA: Kaliurang (1 ex. 11. VIII 1965, m.), Dieng Plateau (3 ex. 4. VIII 1965, m.), Nusa Kambangan (6 ex. 7. VIII 1965, m.)

Distribution: Java

***Callyntrura* (*Murphysa*) *tarsata* (Börner, 1906)**

JAVA: Kaliurang (28 ex. 11. VIII 1965, m.), Dieng Plateau (1 ex. 5. VIII 1965, m.), Nusa Kambangan (18 ex. 7. VIII 1965, m.)

In the Kaliurang examples the body pattern is more deeply developed, the sides are patched irregularly from th. II to abd. III and, in some cases, 2–3 longitudinal streaks may appear on anterior part of abd. IV. Legs may have two bands on femur and tibiotarsus. Coxa and trochanter may also be patched. But other details including chaetal pattern are just as already reported in Yoshii 1982. This is probably a form reported as *P. tarsata* in Börner 1913 from Semarang, Java.

subg. *Handschinphysa* Paclt, 1945

Microphysa Handschin, 1925 junior homonym
Phorophysa Salmon, 1945 junior synonym
Type species: *Entomobrya lineata* Parona, 1892

The actuality of this problematic taxon has found its final solution by the recovery of the type species from the vicinity of the type locality. The subgenus is near *Japonphysa* Ys., 1982, but the basal seta of outer maxillary ramus is setaceous, pointed and not blunt ending just as in *Dicranocentroides*. Besides, labrum has a special median swelling on distal part.

***Callyntrura* (*Handschinphysa*) *lineata* (Parona, 1892)** Fig. 5

Entomobrya lineata: Parona 1892
Paronella lineata: Schött 1903
THAI: Kangchanaburi (2 ex. 4. IV 1965, m.)

Body length ca. 2.5 mm. Ground colour whitish. Antennae diffusely dark on I and II. Head with a dark band connecting eyes. Th. II, III, abd. II, III are with broad lateral band stretching to the extension of the latter. Abd. IV has a series of longitudinal streaks on its anterior half and there is a broad lateral band on posterior part of it. There are also obscurely pigmented area distally including 2+2 small spots. Abd. V and VI are again broadly patched laterally. Legs are darkly pigmented uniformly excepting the pale articulations. Ventral tube is lightly obscured anteriorly. Furca is pale on manubrium and dark on dens. Scales are present on ant. I, II, tibiotarsi and on ventral side of furca. Eyes 8+8. Labral setae 4/5, 5, 4, prelabrals serrate and all setae of the first row are not modified. Labral margin has many small granules in 4 groups and there is a rounded median swelling between the setae of the third row. From the outer ramus of maxillae the basal seta is setaceous and not modified. Setae of labial basis is as MRe/l–, where R is smaller than M. Unguis, unguiculus are slender, the latter is lanceolate. Trochanteral organ well developed, but not especially

diversed. Ventral tube is not well investigated, but possibly without s.s.-like setae and without granulate streak. Furca ventrally with many narrow scales. Dens is with a terminal vesicle, but without dental spines. Mucro is rather short and normally toothed. Chaetal pattern is not well observed the example being poorly chitinized, possibly it is as:

head: v-group complete.
Th. II: ant. 1/2/–, post. 1, 2, 2/L.
Th. III: ant. 1/–/–, post. 3, 3, 2/L.

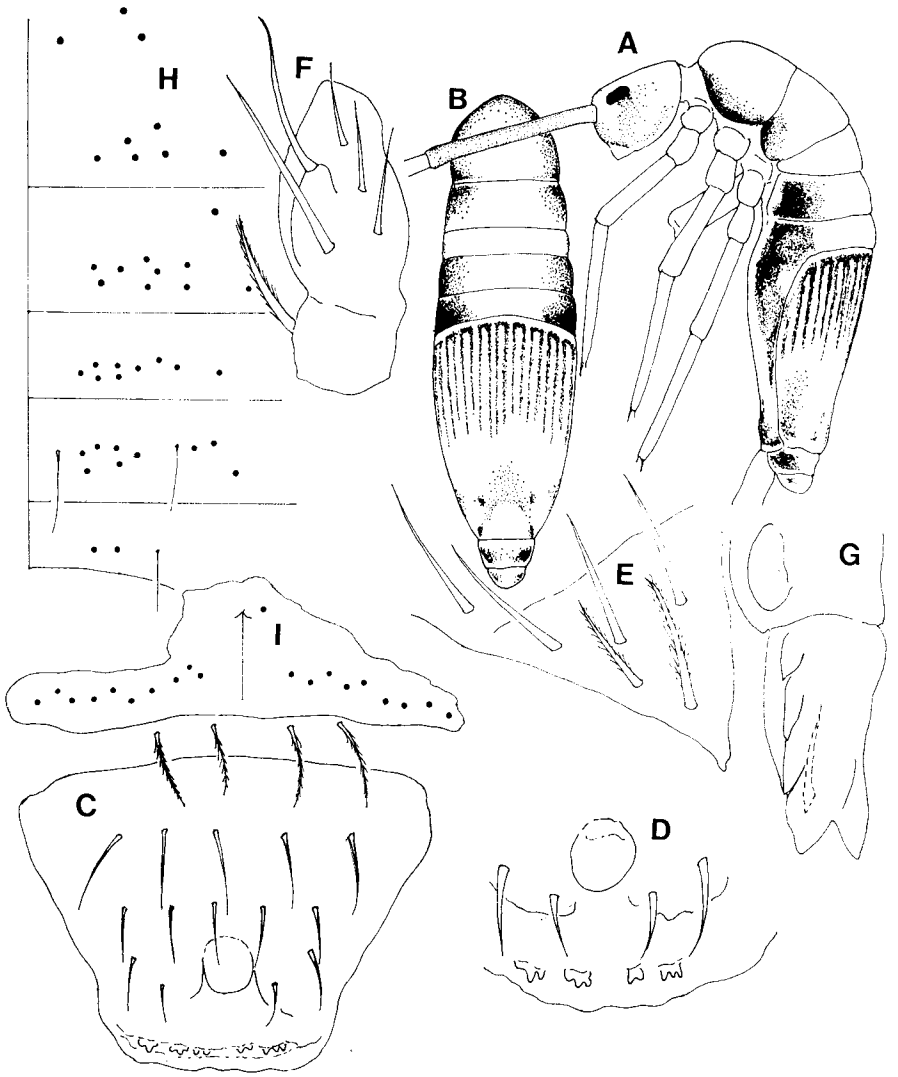

Fig. 5. *Callyntrura* (*Handschinphysa*) *lineata* (Parona) from Kangchanaburi A, B: habitus, C: labrum, D: labral margin of another example, E: labial basis, F: outer maxillary ramus, G: mucro, H, I: chaetal pattern of th. II-abd. III and abd. IV, median group.

abd. I: 1, 2, 2, 1/3. abd. II: s/6/s/3.
abd. III: dors. 2/s.
abd. IV: med. in two levels?, post. ca. 10+10.

As the examples are still juvenil, the chaetal pattern may be more complicated when fully matured.

In colour pattern the examples are very near *Entomobrya lineata* Parona, 1892 of Lower Burma and especially akin to the figures given by Schött 1903, by which the longitudinal stripes of abd. IV are less developed than in Parona's figure. However, the legs and antennae are not banded in my examples. For exact identity the richer materials are in need.

Handschinphysa belongs to *Callyntrura* in general facies, but the basal seta of the outer maxillary ramus is not blunt, but setaceous as in case of *Dicranocentroides*, although prelabral setae are serrate in contrast to it. As the first row of labral setae are not modified, it is alike to *Japonphysa* together with the presence of the dental vesicle and absence of dental spines. But they are absolutely different by the basal seta as above mentioned. Special structure of labrum with a smooth median swelling is characteristic.

Callyntrura (*Kudatphysa*) cf. *kudatensis* Yoshii, 1981

THAI: Sareka Falls near Bangkok (28 ex. 19. VII 1965, m.), Khao Chong Nat. Park (1 ex. 30. III 1965, m.), MALAYA: Tapah, Perak (2 ex. 21. III 1965, m.), Berinchang, Perak (2 ex. 21. III 1965, m.) JAVA: Gunung Riung (2 ex. 25. VII 1965, m.)

As indicated above the species seems to be widely distributed in the tropical Asia. Compared to the Bornean examples their body length is smaller, being ca. 2.5 mm. Colour pattern is fixed on anterior body segments, but variable on abd. IV in each locality. Thus in Thai and Javanese examples the posterior half of abd. IV is uniformly and deeply pigmented, while in Malayan examples the place is diffusely and poorly pigmented or only laterally patched. When the pigmented patch is more reduced or somewhat otherwise patched it may be near *P. attygalei* Fernando, 1957 of Ceylon, *Microphysa escheri* Handschin, 1927 and *C. prabhooi* Mitra, 1974 of India.

Callyntrura (*Kudatphysa*) *bimaculata* Yosii, 1959

C. bimaculata: Yosii 1959, 1982
THAI: Bangkok (5 ex. 10. VIII 1983 m.)

In the colour pattern having a pair of patches on the middle of abd. IV the species is identical with the Malayan examples. Details of the body including the labral structure and mucronal form are concordant. Commentary notes are the followings: Antennae and legs dark, deeper on distal part of the segments. Setae of labial basis as MRe/11. Chaetal pattern the Thai examples coincides well with my previous note in the presence of one L on th. II, III and of three L on abd. I laterally as well as by the presence of 4 setae laterally on abd. II. However, the anterior group of th. II is as 4, 3, 2 in stead of 3, 3, 2 and there are 2 setae dorsally on abd. III in spite of 1 seta in the previous report. The former seems to be within the variability of the species, while the latter may be the local difference. Overall formula of the chaetal pattern of the

Thai example is as:

Th. II: ant. 4/3/2, post. ca. 5, 6, 6, 4 (=21)/L.
Th. III: ant. 3, 2, 1, post. ca. 4, 6, 4, 5, 6 (=25)/L.
Abd. I: ca. 2, 2, 3, 3, 3, 2 (=15)/L, L, L.
abd. II: s/8/s/4.
abd. III: dors. 2/s. abd. IV: med. in two levels.
Distribution: Singapore and Bangkok.

***Callyntrura* (*Kudatphysa*) *marginata* Yosii, 1961** Fig. 6

Callyntrura marginata Yosii, 1961
THAI: Bangkok (2 ex. 11. VIII 1983, m.)

The species is based by one example from the northern region of Thailand to

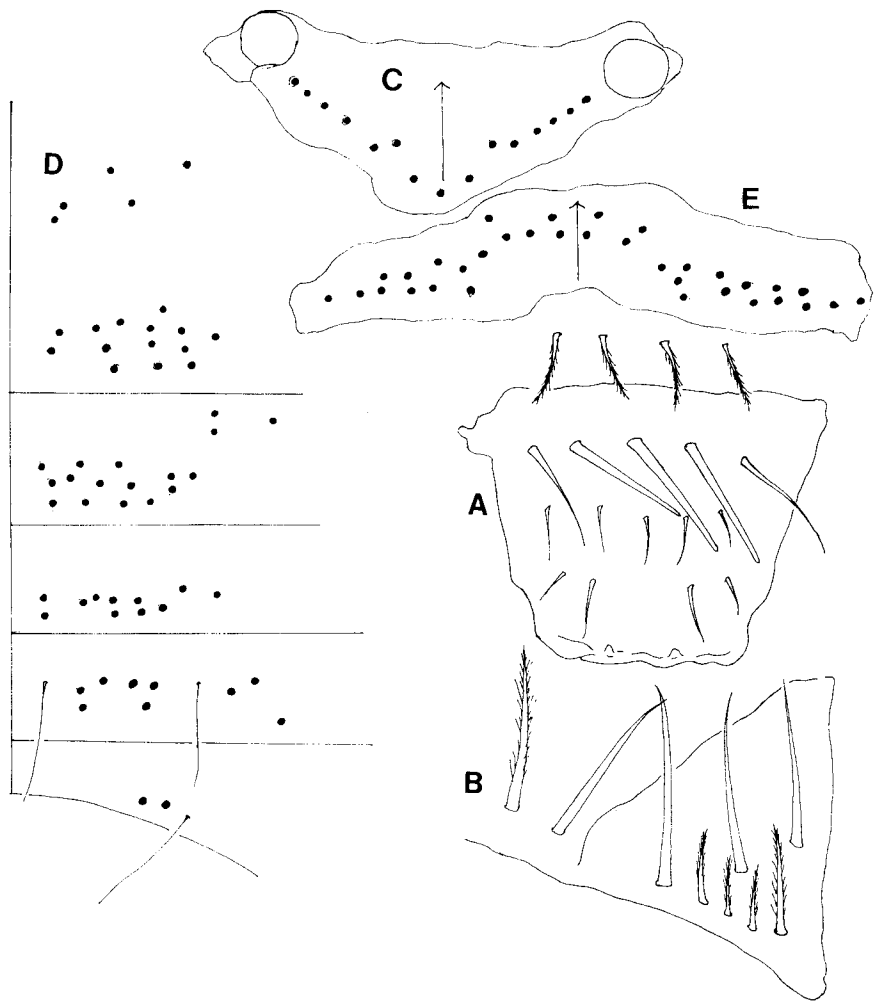

Fig. 6. *Callyntrura* (*Kudatphysa*) *marginata* Yosii from Bangkok. A: labrum, B: labial baiss, C, D, E: chaetal pattern of v-group, th. II-abd. III and abd. IV, median group.

which the new examples correspond well in the colour pattern and in the main feature of chaetal pattern as well. In inspecting them in detail it has been proved the species belongs to *Kudatphysa* in all respects and following comments must be added for the species.

Antennae scaled throughout. Labrum with setae 4/5, 5, 4, prelabrals barbed, the median three of the first row are long and blunt ending. Labral margin with two minute tubercles. Outer maxillary ramus normal. Setae of labial basis as MMMRe/1L in one example on both sides. Chaetal pattern is relatively reduced.

head: v-group complete.
Th. II: ant. 2, 2, 1, post. ca. 2, 3, 3, 3, 1=12.
Th. III: ant. 2, 1, –, post. ca. 3, 3, 3, 2, 2, 1=14.
Abd. I: 2/2, 2, 2, 1, 1, 1. Abd. II: s/5/s/3.
Abd. III: 2/s.
Abd. IV: med. in two levels, post. ca. 23+23.

Morphologically the species is peculiar by the number of setae on lateral group of abd. II which is 3 in number. The key for the subgenus *Kudatphysa* in Yosii 1982, p. 22 must be replaced by the following.

1. Median group of abd. IV in one level...(*kudatensis gr.*) 2
   Median group of abd. IV in two levels...(*musarum gr.*) 4
2. Lateral group of abd. I is 3 in number .....*C. modesta* sp. n.
   Lateral group of abd. I is 4 in number 3
3. Mucro almost parallel, Body banded .....*C. tamparuliana* m.
   Mucro converging. Two tone coloured .....*C. kudatensis* m.
4. Lateral group of abd. I is 3 in number .....*C. marginata* m.
   Lateral group of abd. I is 4 in number.....5
5. Th. II and III with one L. Banded species 6
   Th. II and III with several L. Pale species .....*C. musarum* m.
6. Anterior dorsum heavily pigmented .....*C. pilippinae* m.
   Anterior dorsum lightly dark, without forming dorsal streak .....*C. bimaculata* m.

***Callyntrura* (*Kudatphysa*) *modesta* sp. n.** Fig. 7

THAI: Sarika Falls, ca. 70 km. northeast of Bangkok (10 ex. 19. VII 1965, m.)

Body length ca. 2.3 mm. Ground colour brownish white and diffusely patched. Antennae almost pale, but slightly darker distally. Faintly pigmented are antennal basis, lateral part of th. II to abd. III and a transverse band of abd. IV at about the middle as well as the posterior corner of the same segment. Legs are also obscurely dark on femur and in form of two bands on tibiotarsus. Furca dark on dens. Antennae fully scaled, ant. I: head as 18: 10. Labral setae 4/5, 5, 4, prelabrals barbed. Setae of the first row are very long and three median ones are blunt ending. Labral margin with two small tubercles. Outer ramus of maxilla normal for the genus. Setae of labial basis as MRe/1L, where R is smaller than M. Legs scaled up to the basal part of tibiotarsus. Trochanteral organ well developed. Ventral tube without s.s.-like setae, with only smooth setae on lateral flap and without granular streak on terminal tubule. Furca well extended, with elongate setae on ventral side. Dens is with some setae converted to blunt spines proximally on inner side. Terminal vesicle conspicuous.

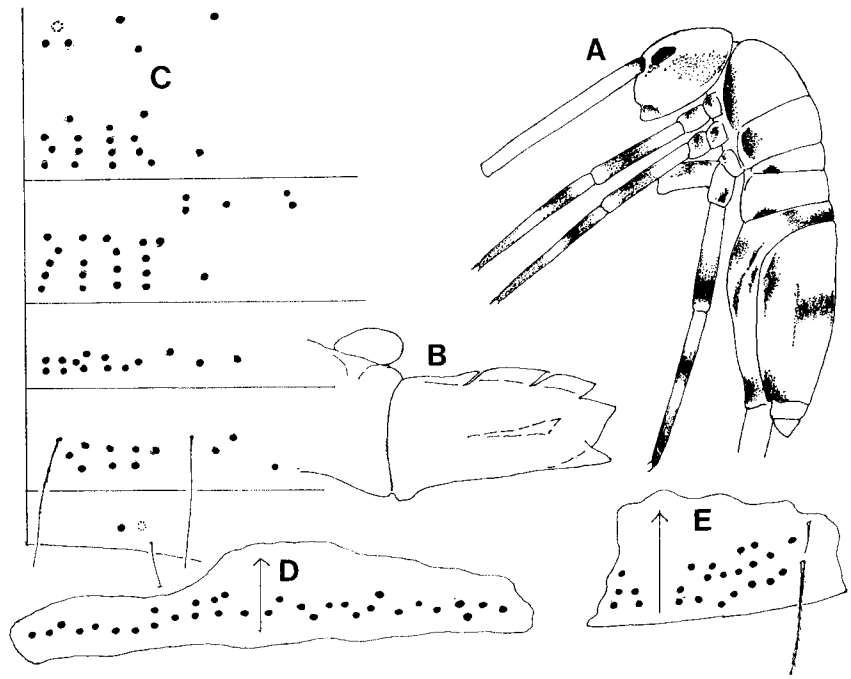

Fig. 7. *Callyntrura* (*Kudatphysa*) *modesta* sp. n. A: habitus, B: mucro, C, D, E: chaetal pattern of th. II-abd. III, abd. IV, median and posterior group.

Mucro not elongate and 6 toothed. Chaetal pattern is as:

head: v-group complete.
Th. II: ant. 2(3)/2/1, post. 3, 4, 4, 4/L.
th. III: ant. 2/1/2, post. 5, 5, 4, 5/L.
abd. I: 2, 2, 3, 2, 2/L_1 L_2 L_3.
abd. II: s/8/s/3. abd. III: dors. 1(2)/s.
abd. IV: med. ca. 17+17 in one level, post. ca. 16+16.

The species is near *Call. tamparuliana* Ys., 1981 of Borneo in colour and chaetal pattern. But the pigmentation is not so well developed and lateral group of abd. I is 3 instead of 4 of the cited species. Some of the figures given in Denis 1948 on Vietnamese examples named as *Microphysa lineata* (Parona) (1. c. fig. 29 in p. 273–276) seems to be near this species. Four examples among my material are more intensively pigmented, i.e. the colour pattern is enhansed and ventral tube is dark, although the chaetal pattern is the same.

***Callyntrura* (*Japonphysa*) *semilineata mediopunctata* ssp. n.** Fig. 8

THAI: Khao Chong National Park (6 ex. 30. III 1965, m.), MALAYA: Penang Hill (1 ex. 23. III 1965, m.)

Body length up to 3.0 mm. Ground colour whitish. From the antennal basis there is a broad lateral band deeper on abd. III. Abd. IV has some two pairs of short longitudinal streak anteriorly, one deeply pigmented spot at about the middle of the

segment and some obscure lateral patches posteriorly. Abd. V is also laterally pigmented. Antennal segments are lightly pigmented distally. On the legs femur and tibiotarsi are each with two deep bands and trochanter is also patched. Furca is pale and faintly dark on distal half of dens. Antennae scaled and relatively short, ant. I: head being 16: 10 in length. Labral setae 4/5, 5, 4, prelabrals barbed and all setae of the first row are not modified. Labral margin is with many minute granules. Outer maxillary ramus normal i.e. the basal seta is thick, but pointed distally. Labial basis with setae as MRe/1L. Legs scaled up to the basis of tibiotarsus. Ventral tube is without s.s.-like setae, but with a row of granulate streak on the terminal tubules. Dens is with a row of smooth dental spines on basal inner side. Terminal vesicle large. Mucro is not elongate type. Chaetal pattern is as follows:

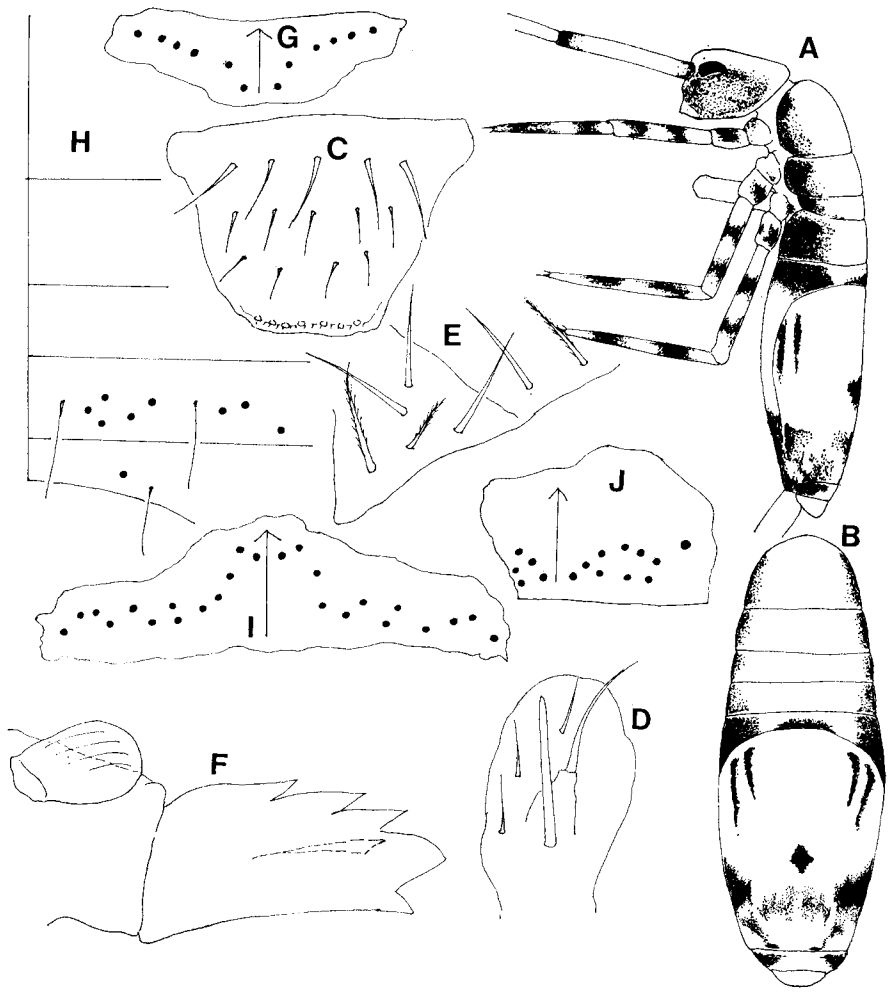

Fig. 8. *Callyntrura* (*Japonphysa*) *semilineata mediopunctata* ssp. n. A, B: colour pattern, C: labrum, D: outer maxillary ramus, E: labial basis, F: mucro, G, H, I, J: chaetal pattern of v-group, th. II-abd. III, abd. IV, median and posterior group.

head: v-group without v_0 nor v_3.
th. II-abd. I: none
abd. II: s/5/s/3. abd. III: dors. 1/s.
abd. IV: med. in two levels, post. ca. 10+10.

Thus the chaetal pattern and other main features are just the same with *C. semilineata* Ys., 1961 (rev. Yoshii 1982) of northern Thailand. The difference is the colour pattern of abd. IV, which has one conspinuous median spot, which is constantly present in all examples. The other small difference is the dorsal group of abd. III, which is 1/s and not 2/s. Whether they may be separated specifically or to be regarded a local form may be decided after more examples from various localities are available. Penang example is exactly the same as above and more intensely pigmented.

Typus: One specimen from Khao Chong.

subg. *Sultanaphysa* Yoshii, 1982

The subgenus is established for *C. sultana* Ys. of *Callyntrura* by which the prelabral setae are not serrated. Later inspection has revealed more specific characters, namely the frontal margin of the head has 3+3 spiny setae instead of 4+4 spinules of the frontal area, serrate mucro and slender unguis of the fore legs. Thus *C. spinifera* Ys., 1961 of northern Thailand and *P. fissimucronata* Denis, 1948 of Vietnam may be regarded the members of this subgenus.

***Callyntrura* (*Sultanaphysa*) *putera* sp. n.** Fig. 9

THAI: Khao Chong National Park (3 ex. 30. III 1965, m.)

Body length up to 2.2 mm. Ground colour whitish, with blackish patches. Antennae diffusly dark throughout. Head lightly shadowed ventrally. Lateral margin of th. II-abd. I narrowly patched. Abd. II pale. Abd. III has a conspicuous transverse band and its extension has a patch at the middle. Abd. IV is almost pale except near the posterior corner. Abd. V, VI are with a small spot laterally. Legs are faintly dark on tibiotarsus and there is a heavy longitudinal band on femur of hind legs. Ventral tube and furca quite pale. Antennae rather long, ant. I: head being ca. 27: 10. No scales are observed in all segments. Frontal margin of the head capsule has no usual spine, but, instead with 3+3 short spines along the margin and, together with some macrosetae of the place, the feature is as in Fig. D, which is quite different from the other group of *Callyyntrura*. Labral setae 4/5, 5, 4, prelabrals not barbed and all labral setae are not modified. Labral margin without granules. Outer maxillary ramus normal. Setae of labial basis as mmre/11, all subequally large. Legs are quite unscaled. Unguis is slender on fore-legs and usually broad in others. Unguiculus are of truncate type in all of them. Trochanteral organ is composed of ca. 20 short conical spines, which are smooth and not ciliate. Ventral tube is without s.s.-like setae, lateral flap only with smooth setae and terminal tubule is without granulate streak. Furca is well extended, but no scales has been observed on the ventral side. Dental spines and terminal vesicle absent and, instead, 4 setae near the mucronal end of the inner side are

larger than others. Mucro is irregularly toothed, its dorsal ridge is especially with many teeth, so that it is almost serrate. Inner lateral tooth is existing. Chaetal pattern is reduced, macrosetae are not so large as usual and in one example at hand it is as:

head: v-group is without v_0, v_3, v_4.

th. II: ant. 0/1/0, post. 1, 2 (=3).

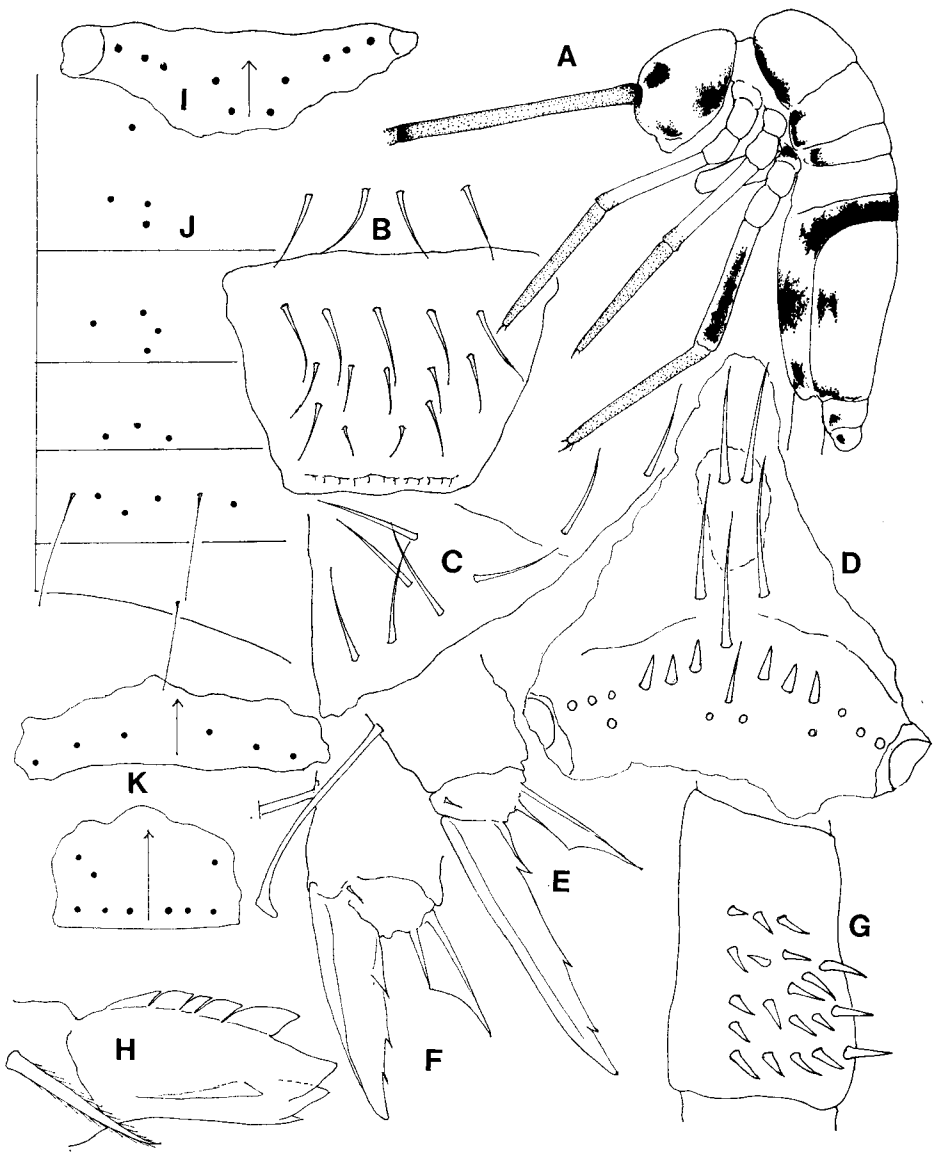

Fig. 9. *Callyntrura (Sultanaphysa) putera* sp. n. A: habitus, B: labrum, C: labial basis, D: fore margin of head and clypeal area, E: fore claw, F: hind claw, G: trochanteral organ, H: mucro, I, J, K: chaetal pattern of v-group, th. II-abd. III, abd. IV, median and posterior group.

th. III: ant. nil, post. 1, 3 (=4).
abd. I: 1, 1, 1 (=3).
abd. II: s/3/s/1.
abd. III: dors. 0/s.
abd. IV: med. 3+3 in one level, post. ca. 4+4.

The species belongs to *Sultanaphysa* without doubt by the character of labral setae and differs from *C. sultana* m. by the presence of some macrosetae on th. II-abd. I. Also in the colour pattern the head is not so deeply pigmented and abd. IV has no transverse patches. Longitudinal patch of femur of hind legs is characteristic. Putera means "prince" in Malayan.

Troglopedetes Absolon, 1907

Although it is strongly modified by the subterranean life the genus may be placed in Paronellidae together with *Oncopodura* representing subfamilies of their own. The genus *Troglopedetes* may be divided into 3 subgenera in the following way.

1. Ant. IV is divided at the middle into two subsegments 2
   Ant. IV is not subdivided ..... *Cyphoderopsis* Carp. 1917
2. Without eyes ..... *Troglopedetes* (s. str.)
   With eyes ..... *Troglopedetina* Delam. 1945

Subgenus *Cyphoderopsis* may be divided in two groups in the following way.
Ceylonicus group: With one row of dental spines.

T. ceylonicus (Ys. 1966), *T. laticlavus* Stach, 1960, *T.* 6-*ocellatus* (Ys. 1966)

Kempi group: With two rows of dental spines.

T. kempi Carp., 1917, *C. gracilis* Carp., 1924, *T. lamottei* Delam., 1950, *T. decemoculatus* (Prabhoo, 1971)

Troglopedetes (*Cyphoderopsis*) *kempi* (Carpenter, 1917) Fig. 10

MALAYA: Berinchang, Perak (6 ex. 21. III 1965, m.)

Body length ca. 1.4 mm. Totally white. ant.: head as 14.10. ant. segm. ratio as 10: 13: 10: 22. Ant. I, II dorsally with scales. Ant. III-organ is two short rods and a small, blunt seta near by. Ant. IV is not subdivided, with many curving sensory setae, but without apical bulb. Eyes absent. Setae of anterior margin of head as in Fig. D and that of the frontal (=facial) area as 3, 4, 2, all of which are ciliated. Labral setae 4/5, 5, 4, prelabrals barbed. Median intrusion is very narrow and labral margin is strongly rounded. Outer maxillary ramus has, beside the papillated seta and its basal seta, with two peripheral setae. Setae of labial basis as MM-e/L (1), where 1 is vestigial. Legs are with scales throughout. Unguis is with a pair of unequally broad inner proximal and one small distal tooth. Unguiculus is lanceolate. Tenent hair is long and apically spathulate. Trochanteral organ is ca 20 small setae in L-shape arrangement. Ventral tube is very long, with 3+3 long, ciliate setae anteriorly (Fig. G) and with ca. 25 long setae posteriorly, which are symmetrically arranged including 5 median ones (Fig. H). Lateral flap bears ca. 9 smooth setae. Trunk is without macrosetae and covered with hyaline round scales. Manubrium is scaled ventrally

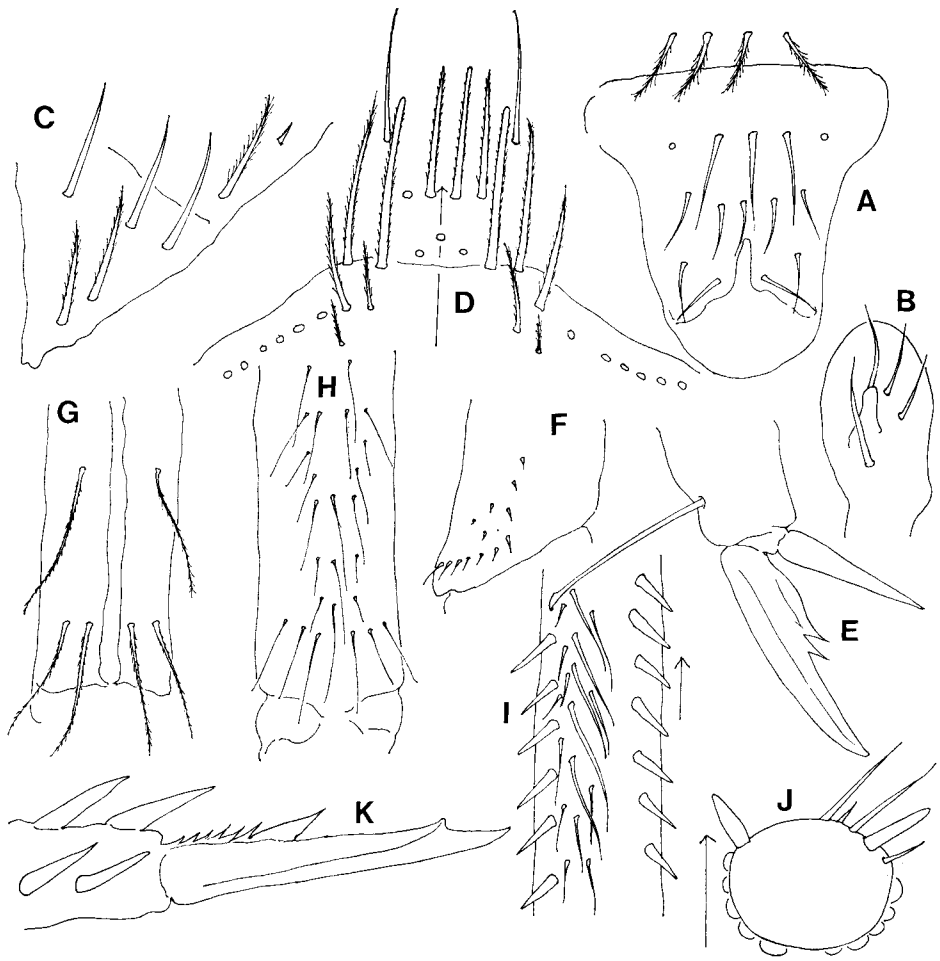

Fig. 10. *Troglopedetes* (*Cyphoderopsis*) *kempi* (Carpenter) from Berinchang, Perak, Malaya. A: labrum, B: outer maxillary ramus, C: labial basis, D:clypeal area, E: hind claw, F: trochanteral organ, G, H: ventral tube, anterior and posterior face, I: dental spines, J: diagramatic section of the middle of dens, K: mucro.

and with many ciliate setae dorsally leaving a median glabrous streak. Some setae along the lateral border are smooth. Dens is lightly tapering, ventrally scaled and with two rows of short spines throughout. Long, ciliate setae are present only along the outer side of dens and the diagramatic section of dens may be as in Fig. J. Mucro is elongate, bidentate apically and with a third tooth at one third of the length, whose proximal ridge is minutely serrated. The anteapical tooth has also a ridge running toward the basis.

The species is described by one example from Assamm to which the Malayan examples coincide very well.

Distribution: Assam, Malaya

Literatures

Refer to:
Yoshii, R. 1981. Paronellid Collembola of Sabah, *Ent. Rep. Sabah Forest Res. Centre*, no. 3, 52 pps.
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