

Dedicated to the memory of Dr. T. T. Macan

Baetidae from Taiwan with remarks on *Baetiella* UENO, 1931 (Insecta, Ephemeroptera)

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With 19 figures in the text

Abstract

A small collection of baetine mayfly nymphs from Taiwan is studied. Six new species in three baetid genera are described in detail. The species are: *Baetis taiwanensis* sp.n., *Baetis tatuensis* sp.n., *Baetis pseudofrequentus* sp.n., *Pseudocloeon latum* sp.n., *Pseudocloeon ultimum* sp.n. and *Neobaetiella macani* sp.n. A new species group within *Pseudocloeon*, the *latum* group, is proposed. The newly described species of *Baetis* and *Pseudocloeon* are the first nymphal species records of these genera from Taiwan. The genus *Baetiella* UENO, 1931, is discussed. The type species *Baetiella japonica* IMANISHI, 1930, is transferred to *Pseudocloeon*, hence *Baetiella* became a junior synonym of *Pseudocloeon*. The new genus *Neobaetiella* is established; it includes *Baetiella japonica* na IMANISHI, 1940 (nymph), *Baetiella* sp. UENO, 1955 (nymph) and the herein described *Neobaetiella macani* sp.n. *Baetiella japonica* na is the type species of *Neobaetiella* and its name is replaced by *Neobaetiella uenoi* comb. nov.

Introduction

The Ephemeroptera fauna and particularly the baetid fauna of Taiwan is hitherto very poorly known. ULMER (1912) in his study on "H. SAUTER's Formosa-Ausbeute" mentioned nine species, two of which are *Cloeon* species, i. e. adults of *C. marginale* HAGEN and *C. virens* Klapálek. No *Baetis*, *Pseudocloeon* or *Baetiella* species are recorded by ULMER (1912) and except for *Baetiella* sp. UENO, 1955, no baetid nymphal descriptions exist from Taiwan. Therefore the results of the study of this small collection of baetid nymphs from Taiwan, collected by Dr. G. F. EDMUNDS, Jr. & C. H. EDMUNDS in 1978, is an important contribution to our knowledge of the baetid fauna of this island. Three new species of *Baetis*, two new species of *Pseudocloeon* and one new species of *Neobaetiella* new genus are described herein. *Cloeon* nymphs are not represented in Dr. EDMUND's collection. All nymphs studied were contained in a single vial.

The material studied, including the type specimens, is returned to Dr. G. F. EDMUNDS, Jr., Department of Biology, University of Utah, Salt Lake City, U. S. A.

1. *Baetis taiwanensis* sp.n.

Figs. 1, 7, 14

Material: 5 nymphs

Description: Body length (mature ♀ nymph) 3.5 mm, cerci 1.5 mm, terminal filament only slightly shorter than cerci. — Color pattern on pronotum and dorsum of abdomen as in Fig. 7. Caudal filaments creamy with dark band behind middle. — Dorsal surface and posterior margin of terga as in Fig. 14. — Labium: 3rd segment of labial palpus rather straight on outer margin; paraglossa apically with two unregular rows of submarginal long bristles. — Hind wing pads well developed. — Gills: 7 pairs developed, 1st gill very small compared to rest. — Legs: all three segments covered with scales and scale bases, claws with a row of ca. 11–12 denticles.

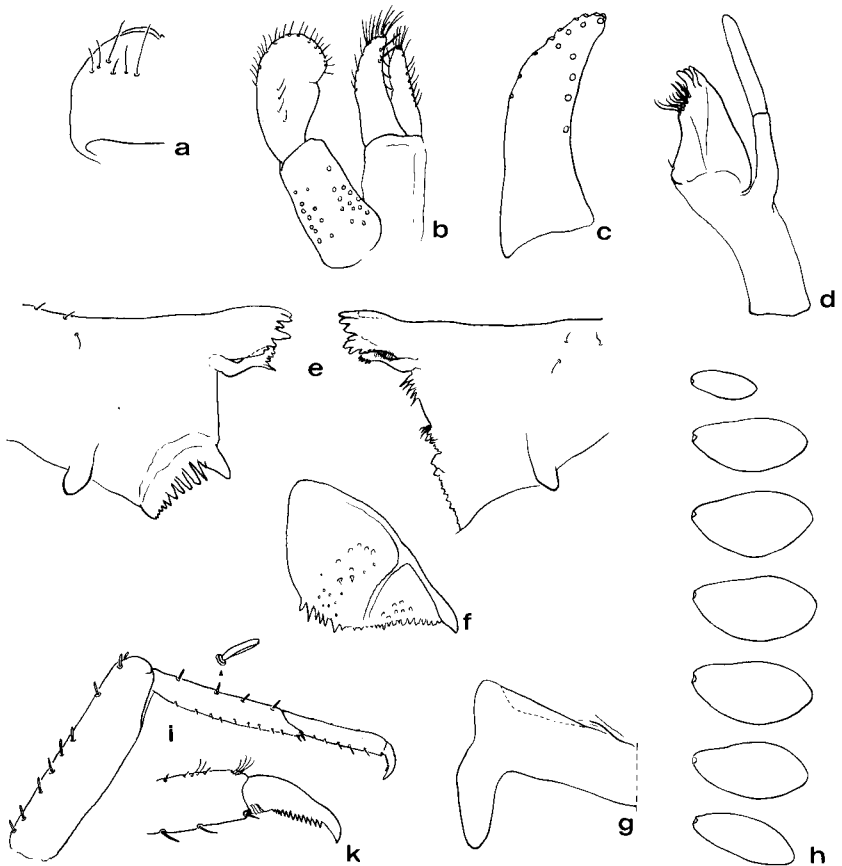


Fig. 1. Nymph of *Baetis taiwanensis* sp.n.: a) left half of labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) right maxilla; e) canini and molar area of left and right mandible; f) paraproct; g) left half of metanotum; h) gills I–VII; i) leg; k) claw.

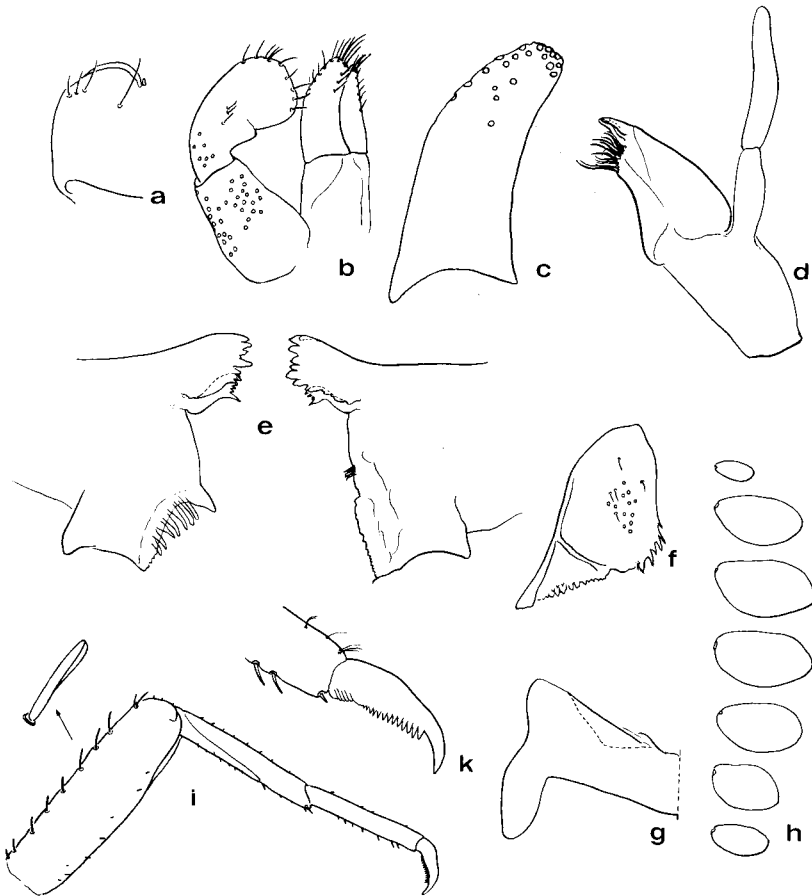


Fig. 2. Nymph of *Baetis tatuensis* sp.n.: a) left half of labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) right maxilla; e) canini and molar area of left and right mandible; f) paraproct; g) left half of metanotum; h) gills I—VII; i) leg; k) claw.

Holotype: Mature ♀ nymph on slide preparation: Taiwan. Ta-Tu-River, 4 km N. of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — **Paratypes:** 2 slide preparations of whole nymphs, 1 slide preparation of metanotum with hind wing pads, 1 maxilla and paraproct; 2 nymphs in alcohol.

By the following characteristics *Baetis taiwanensis* sp.n. shows a certain similarity to *B. ideii* from W. Malaysia (MÜLLER-LIEBENAU 1984 a): 1) the color pattern on the pronotum and on dorsum of abdomen; 2) the spines on posterior margin of terga which appear in both species transparent; 3) labrum; 4) mandibles; 5) paraproct; and 6) largely developed hind wing pads. Differences are mostly seen in the 3rd segment of the labial palpus which is rounded in *B. ideii*

but rather straight in *B. taiwanensis* sp.n.; small bristles on outer margin of tibia as in *B. ideii* are not developed in *B. taiwanensis* sp.n.

Both *B. ideii* and *B. taiwanensis* sp.n. are at present not included in any species group.

2. *Baetis tatuensis* sp.n.

Figs. 2, 8, 15

Material: 2 nymphs

Description: Body length (mature ♀ nymph): 3.4 mm, cerci ca. 2.2 (tips are broken off), terminal filament 1.6 mm. — Color pattern of pronotum and dorsum

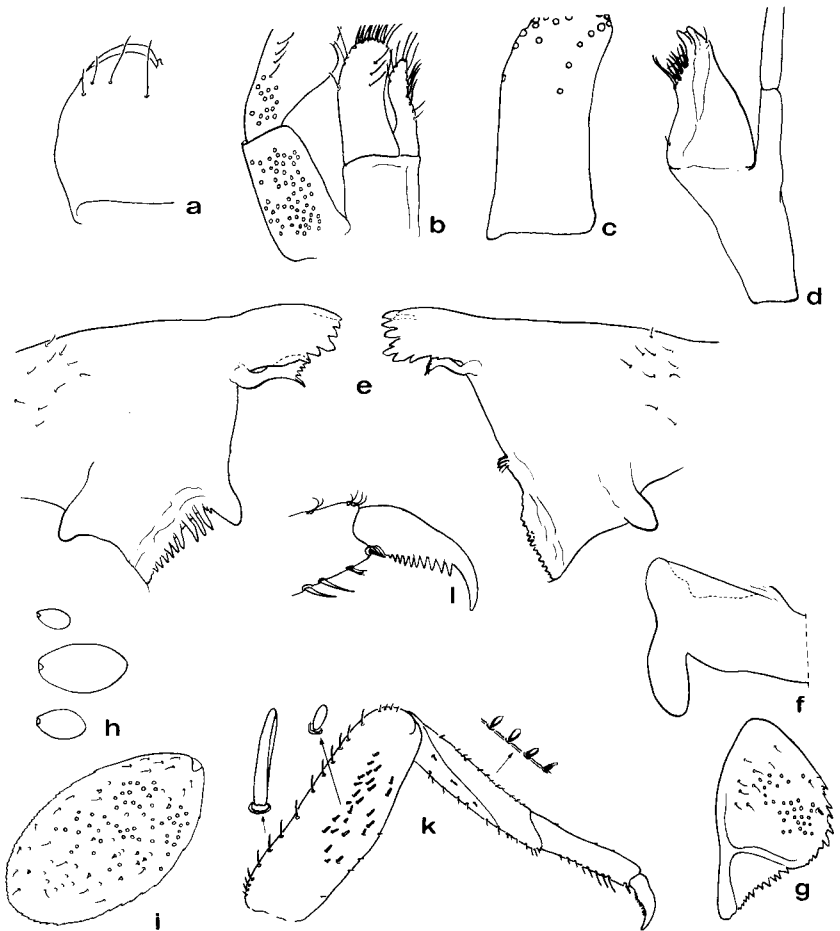


Fig. 3. Nymph of *Baetis pseudofrequentus* sp.n.: a) left half of labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) right maxilla; e) canini and molar area of left and right mandible; f) left half of metanotum; g) paraproct; h) gills of segment I, IV and VII; i) gill of segment IV at higher magnification; k) leg; l) claw.

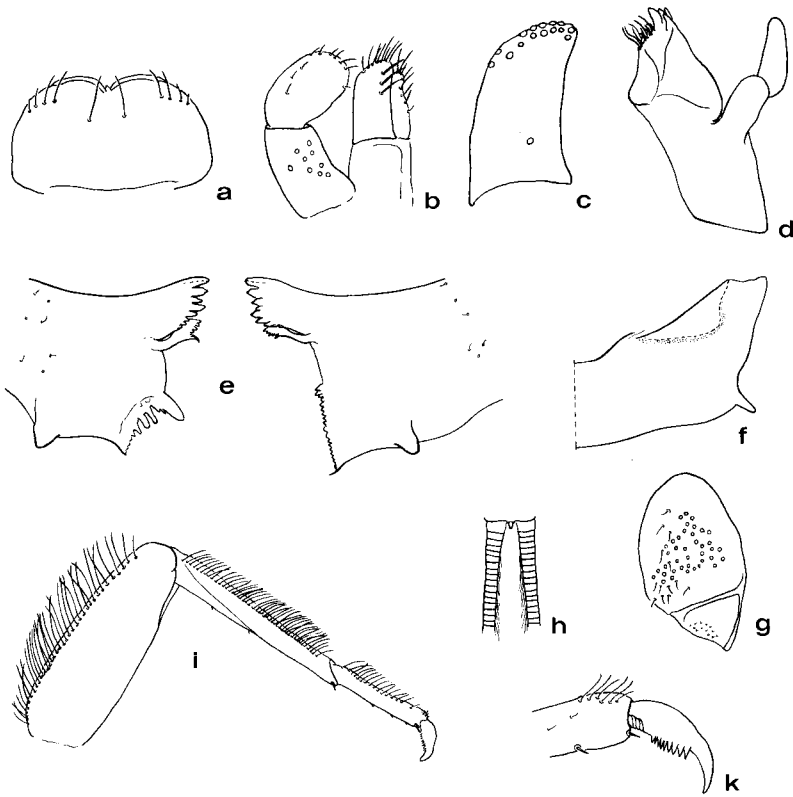


Fig. 4. Nymph of *Pseudocloeon latum* sp.n.: a) labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) right maxilla; e) canini and molar area of left and right mandible; f) right half of metanotum; g) paraproct; h) base of caudal filaments; i) leg; k) claw.

of abdomen as in Fig. 8. Caudal filaments uniformly light brownish or creamy. — Dorsal surface and posterior margin of terga as in Fig. 15. Spines on posterior margin of terga I—VI almost lacking, on terga VI—X developed and pointed. — Labium: inner apical lobe of 2nd segment only slightly developed; apical bristles on ventral surface of paraglossa rather single, no regular row. — Gills: 7 pairs developed. — Hind wing pads well developed. — Legs: outer margin of tibia of all legs with an unregular number (1—5) of clavate bristles; claws with about 10 denticles of nearly same length; all three leg segments covered with scales and scale bases; tibial seam hardly recognisable.

Holotype: Mature ♀ nymph on slide preparation: Taiwan. Ta-tu-River, 4 km N of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — **Paratype:** 1 slide preparation of mature nymph.

Baetis tatuensis sp.n. shows a certain similarity to *B. laetificus* from W. Malaysia (MÜLLER-LIEBENAU 1984 a) based on the posterior margins of terga: both species have no or at least tiny spines on posterior margins of segment I to V or

VI, whereas, the spines are clearly developed on the posterior segments. The scale bases on the terga are somewhat trapezoid in both species. *B. laetificus* is easily separated from *B. tatuensis* sp.n. by the divided prostheca of the right mandible and the tongue-like prolongation at the inner apical margin of the paraproct (both characteristics are typical for the European *muticus* species group). *B. tatuensis* is not associated with any known species group.

3. *Baetis pseudofrequentus* sp.n.

Figs. 3, 9, 16

Material: 9 nymphs

Description: Body length (mature ♂) 3.1 mm, cerci 2.9 mm, terminal filament 1.4 mm. — Color pattern of pronotum and dorsum of abdomen as in Fig. 9. Caudal filaments light brownish with even lighter band behind middle. Femur with dark area near middle of dorsal surface. — Dorsal surface and posterior margin of terga as in Fig. 16. Labium: inner apical lobe of 2nd segment slightly developed. — Maxilla with one (or more) fine bristle on outer margin near base of apical teeth (this bristle is very difficult to recognise and is therefore not used as a character state). —

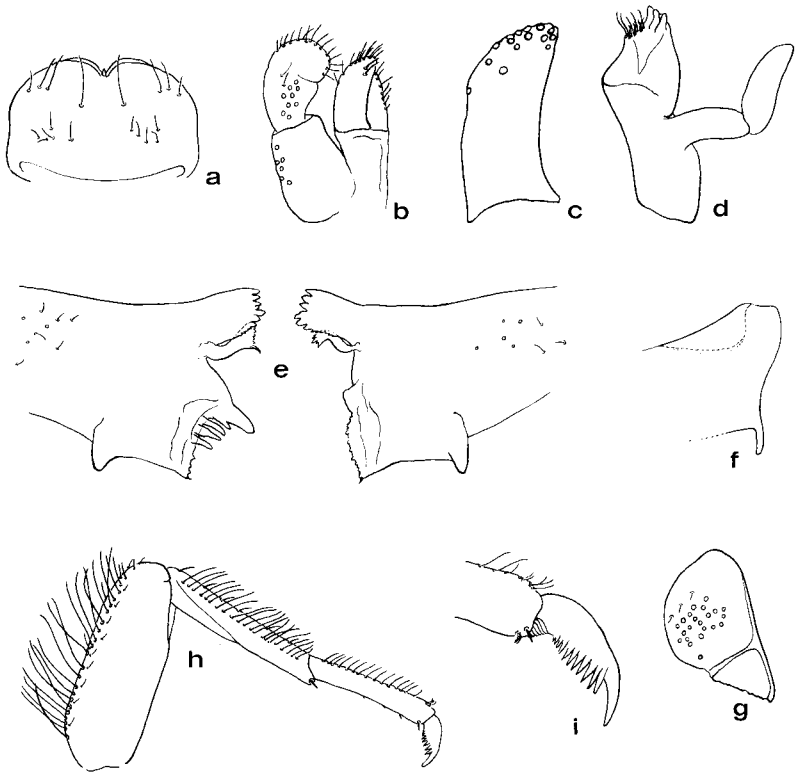


Fig. 5. Nymph of *Pseudocloeon ultimum* sp.n.: a) labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) right maxilla; e) canini and molar area of left and right mandible; f) right half of metanotum; g) paraproct; h) leg; i) claw.

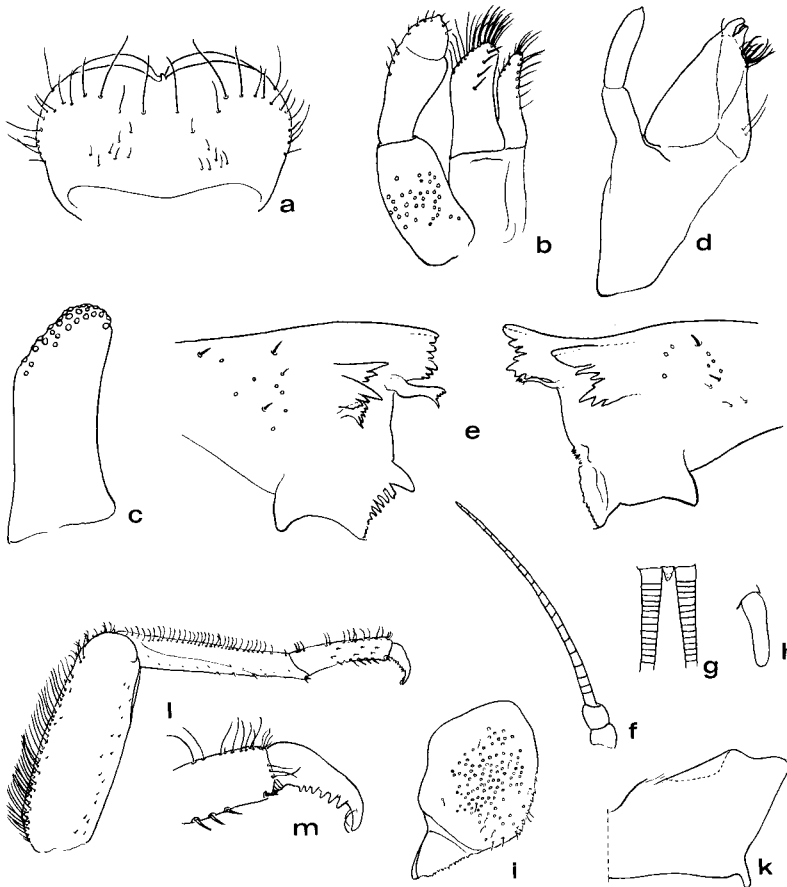


Fig. 6. Nymph of *Neobaetiella macani* sp.n.: a) labrum; b) left half of labium; c) paraglossa at higher magnification, ventral; d) left maxilla; e) canini and molar area of left and right mandible; f) antenna; g) base of caudal filaments; h) coxal gill; i) paraproct; k) right half of metanotum; l) leg; m) claw.

Gills: 7 pairs of gills developed, first gill considerable smaller than rest. — Hind wing pads well developed. — Legs: dorsal surface of femur with a number of clavate bristles, tibia with same kind of bristles near tibial seam; tibia near outer margin with clavate bristles that appear splitted in slide preparation (Fig. 3 k), no scales or scale bases on dorsal surface of legs.

Holotype: mature male nymph on slide preparation: Taiwan, Ta-tu-River, 4 km N of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — Paratypes: 1 slide preparation of ♂ nymph, 7 nymphs in alcohol.

The nymph of *B. pseudofrequentus* sp.n. appears closely related to *B. frequentus* from Sri Lanka (HUBBARD & MÜLLER-LIEBENAU, in press). This relationship is most evident by the mouthparts and the bristling on the legs. Also the color pattern on pronotum and dorsum of abdomen as well as the dorsal

surface and posterior margin of terga are very similar. Differences are seen in the labium with labial palpus, glossa and paraglossa more elongate than in *B. pseudofrequentus* sp.n.

It might be interesting to mention that *B. frequentus* in the collection from Sri Lanka is by far the most frequent species of all species studied from there. In the small collection from Taiwan, contained in a single vial, altogether 19 baetid nymphs of 5 species are determined. Out of these, *B. pseudofrequentus* sp.n. is represented by 9 specimens. If this small collection is looked at as a cross section of the baetid species from that location, *B. pseudofrequentus* sp.n. actually is the most frequent species, as is *B. frequentus* in the collection from Sri Lanka.

4. *Pseudocloeon latum* sp.n.

Figs. 4, 10, 17

Material: 2 nymphs

Description: Body length: mature ♀ 3.2 mm, cerci 2.8 mm, terminal filament only 1 segment. — Color pattern of pronotum and dorsum of abdomen as in Fig. 10. Terga dorsally curved and therefore extremely wide especially in anterior segments (approximately twice as wide as corresponding sternum) (Fig. 10); tergum I more than twice as wide as tergum X. — Dorsal surface and posterior margin of terga shown in Fig. 17. — Labrum slightly wider at base than in frontal part and about twice broad as long, ventrally directed. — Labium: inner apical lobe of 2nd segment weakly developed, shorter than broad, in combination with 3rd segment rather eggshaped. — Antennae: Basal segments covered by head capsule; inner margin of segments not serrated. — Caudal filaments at inner margin fringed with swimming bristles, terminal filament reduced to one segment only. — Legs: femur without small submarginal bristles, tibia of all three legs with only 1 row of long bristles, tarsus without long subapical bristle near inner margin (see Verification Table in MÜLLER-LIEBENAU 1982: 296).

Holotype: mature ♀ nymph on slide preparation: Taiwan, Ta-tu-River, 4 km N of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — Paratype: 1 nymph in alcohol.

Pseudocloeon latum sp.n. is not associated to any *Pseudocloeon* species group proposed by MÜLLER-LIEBENAU (1982). From these species it differs mainly by the lack of a long subapical bristle on tarsus near inner margin, further by having only one row of long bristles on tibia of 3rd leg, (except *P. atoki*, Philippines, with also only 1 row of such bristles).

5. *Pseudocloeon ultimum* sp.n.

Figs. 5, 11, 18

Material: 1 ♂ nymph, 1 ♀ nymph

Description: Body length: ca. 2.8 mm, length of cerci not known (broken off), terminal filament reduced to 29 segments, which is somewhat longer than usual in *Pseudocloeon*. — Color pattern on pronotum and dorsum of abdomen as in Fig. 11. The pattern on the pronotum rather undefined and the clear pattern as usual in *Pseudocloeon* (and *Acentrella*) nymphs is not developed. Terga of normal width, not extremely



Fig. 7

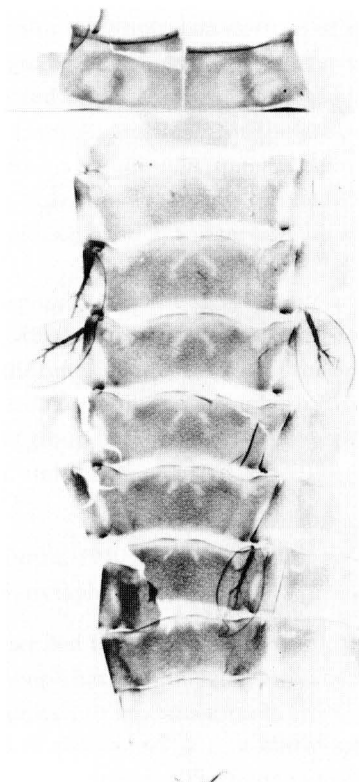


Fig. 8

Fig. 7. Nymph of *Baetis taiwanensis* sp.n.: color pattern of pronotum and dorsum of abdomen.

Fig. 8. Nymph of *Baetis tatuensis* sp.n.: color pattern of pronotum and dorsum of abdomen.

wide in anterior segments as in *P. latum* sp.n. Cerci brownish. — Dorsal surface and posterior margin of terga as in Fig. 18. — Labrum equal at base and in frontal part, about twice as broad as long. — Labium: 3rd segment of labial palpus shorter than broad. — Antennae: flagellum of the single specimen with 14 segments, inner margin not serrated. — Hind wing pads reduced, narrow, about three times as long as wide. — Gills: 7 pairs of abdominal gills developed. — Legs: outer margin of tibia of third leg with one row of long bristles, inner margin of tarsus without subapical long bristle near apex. — Terminal filament fringed with swimming bristles on both margins (probably the cerci are fringed with swimming bristles at inner margin).

Holotype: ♂ nymph on slide preparation: Taiwan, Ta-tu-River, 4 km N of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — Paratype: 1 ♀ nymph in alcohol.

Pseudocloeon ultimum sp.n. shows a certain similarity in the color pattern to *P. proximum* from Sabah (MÜLLER-LIEBENAU 1984b): in both species the typical *Pseudocloeon* (and *Acentrella*) basic pattern on pronotum is not de-

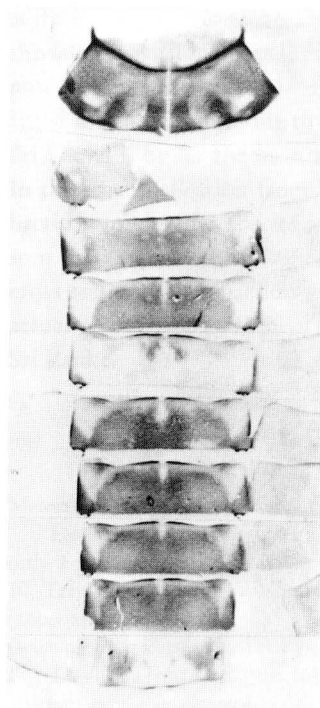


Fig. 9

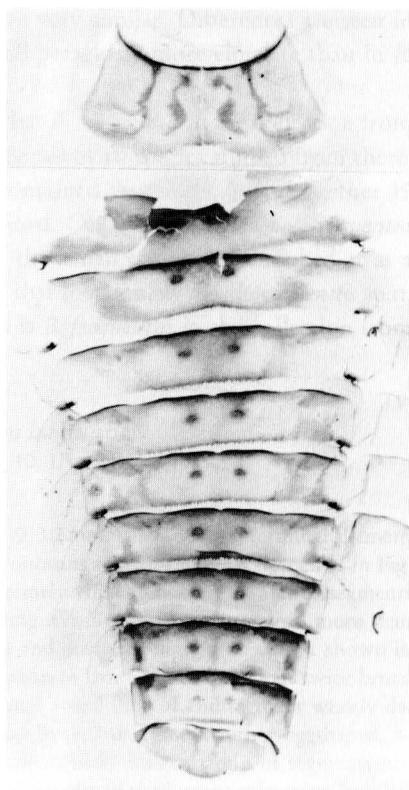


Fig. 10

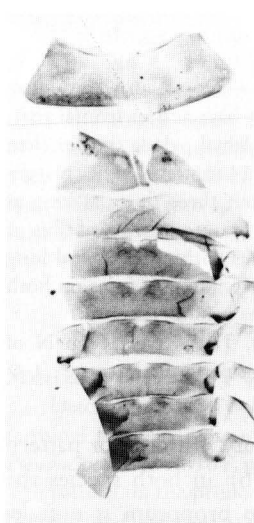


Fig. 11

Fig. 9. Nymph of *Baetis pseudofrequentus* sp.n.: color pattern of pronotum and dorsum of abdomen.

Fig. 10. Nymph of *Pseudocloeon latum* sp.n.: color pattern of pronotum and dorsum of abdomen.

Fig. 11. Nymph of *Pseudocloeon ultimum* sp.n.: color pattern of pronotum and dorsum of abdomen.

veloped (Fig. 11) but is more undefined; also the pattern on dorsum of abdomen is very similar in both species. Regarding morphological character states both species have in common the short and broad 3rd segment of the labial palpus. *P. ultimum* sp.n. differs clearly from *P. proximum* in the following morphological characteristics: in opposite to *P. ultimum* sp.n. as described above *P. proximum* has the inner margin of antennal segments serrated, outer margin of tibia of 3rd leg with two rows of long bristles, and tarsus with a long subapical bristle near apex.

As the preceding *Pseudocloeon latum* sp.n., *P. ultimum* sp.n. is not placed in any known *Pseudocloeon* species group (MÜLLER-LIEBENAU 1982). Based on the lack of a second row of long bristles on the outer margin of tibia of the 3rd leg and the lack of a long submarginal bristle on tarsus near apex in both *P. latum* sp.n. and *P. ultimum* sp.n. another species group in *Pseudocloeon* is established: the *latum* group, including *P. latum* sp.n. and *P. ultimum* sp.n.

Neobaetiella new genus.

= *Baetiella japonica* na IMANISHI, 1940, nymph

= *Baetiella* sp. UENO, 1955, nymph.

UENO (1928: 51–52, Fig. 18 a–k) described the nymph of a baetid species from Japan as ?*Acentrella* (sp.n.?). This nymph has no hind wing pads and has a reduced terminal filament. The nymph appears to be *Pseudocloeon*.

IMANISHI (1930) gave the description of the ♂ and ♀ of a baetid species from Japanese torrents which were reared from nymphs. The front wings have the intercalaries in pairs. IMANISHI referred to UENO's (1928) nymphal description and named his species *Acentrella japonica*. He also referred to BENGSSON's (1912) original description of *Acentrella*, but pointed out that his species from the Hira-Gawa River has no hind wings. Therefore this species also appears to be *Pseudocloeon* (*Acentrella* has well developed hind wings which are smaller than "normal", and smaller in ♀ than in ♂, and the hind wings have no costal projection. Until now *Acentrella* has been known only from the European area of the Palaearctic Region).

UENO (1931: 220–222) in his original description of the genus *Baetiella* remarked that the nymph of his genus was already treated by him as an undetermined form of *Acentrella*? (UENO 1928). UENO (1931) transferred IMANISHI's (1930) *Acentrella japonica* to the new genus *Baetiella*. UENO remarked: "The most important characteristics of this new genus are as follows: (i) absence of hind wings, (ii) caudal setae of the nymphs are 2, (iii) last joint of the labial palpus obtusely conical". All these characters are also true for *Pseudocloeon*, and UENO also pointed to a close relationship between *Baetiella* and *Pseudocloeon* of which the imagos of the latter have marginal intercalaries in pairs as does *Baetiella*. — Neither UENO (1928, 1931) nor IMANISHI (1930) referred to any dorsal tubercles or coxal gills in the nymphs (coxal gills are present in *Neo-*

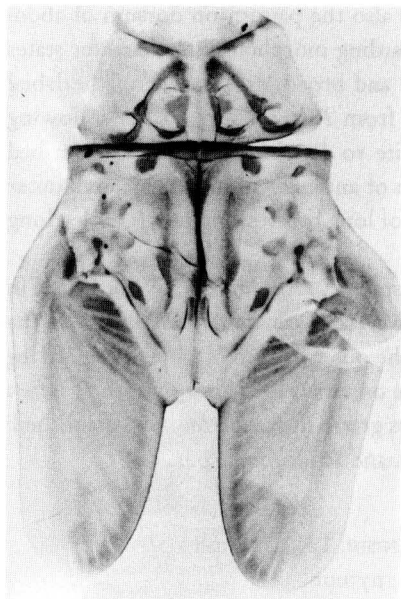


Fig. 12

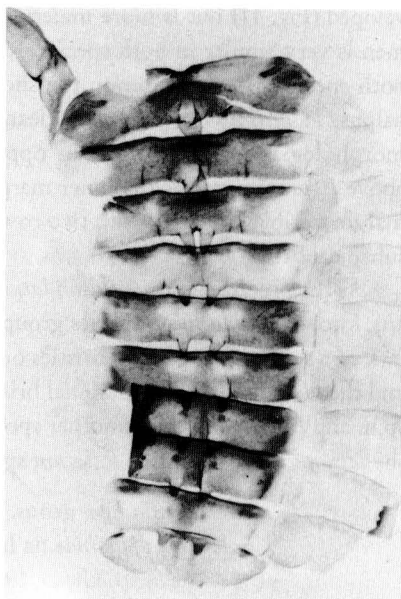


Fig. 13

Fig. 12. Nymph of *Neobaetiella macani* sp.n.: color pattern of pronotum and mesonotum.

Fig. 13. Nymph of *Neobaetiella macani* sp.n.: color pattern of dorsum of abdomen.

baetiella macani sp.n.). The abdominal gills are present on segments I—VII. UENO'S (1931) *Baetiella japonica* has to be treated as *Pseudocloeon japonicum* new comb.¹

In 1940, IMANISHI gave a report on Ephemeroptera on Manchoukuo, Inner Mongolia, Chosen (Korea) and Saghalien. Among the Baetidae he found the nymphs of three *Baetiella* species and referred to them as *B. japonica* nx, *B. japonica* na and *Baetiella* nX. Unfortunately the paper is written in Japanese and does not include a summary in any western language. *Baetiella japonica* nx (Fig. 26)² and *Baetiella* nX (Fig. 28)² do not show any tubercles on the terga, and as discussed by UENO (1955: 307—308) both IMANISHI'S (1940) nx type of *Baetiella japonica* and *Baetiella* nX have the hind wing pads developed. Both species have to be referred to *Baetis*. *Baetiella japonica* na (Fig. 27)² has small single triangu-

¹ In their study comparing the nymphs of *Acentrella* and *Pseudocloeon* BOGOESCU & TABACARU (1957: 483) pointed out: L'espèce japonaise *Baetiella japonica* (IMAN.), décrite d'abord d'après la nymphe sous le nom d'*Acentrella* (n.sp.?) UENO, est, selon nous, également une espèce de *Pseudocloeon*, le genre *Baetiella* étant probablement synonyme de *Pseudocloeon* KLAPÁLEK.

² "Fig." 26, 27, 28 refers to IMANISHI (1940).

lar median elongations on the posterior margins of terga on abdominal segments I—VIII; no hind wing pads are present and 7 pairs of abdominal gills are developed. This is the first note on any tubercles on the dorsum of the abdomen of any nymph, and *Baetiella japonica* na appears to be the only true *Baetiella*.

UENO (1955: 306) mentioned a *Baetiella* sp. nymph from Nepal “with a median dorsal tooth of each abdominal segment” (I—X) on the posterior margin (Figs. 56, 60, 61 on Plate 6, UENO 1955); these are backwardly directed, rather pointed and decreasing in length on the posterior segments. Seven pairs of gills are developed. — UENO (1955) pointed out that the nymph of his *Baetiella* sp. agrees closely with *B. japonica* na IMANISHI (1940: 122), but has a long median dorsal tooth on abdominal segments I—X, *Baetiella* sp. UENO (1955) from Nepal differs from IMANISHI’s (1940) *B. japonica* na nymph only by the small triangular teeth on segments I—VII, which often are lacking either in the first segment of IMANISHI’s (1940) Saghalian race or in the seventh segment of IMANISHI’s (1940) Korean race. UENO (1955: 308) “is of the opinion that *Baetiella* represents an independent genus, to which the Nepalian nymphs may be referred, though they were not reared. According to this view, the genus seems to be distributed rather widely in Asia, from the Himalayas to Korea, Saghalian and the Japanese Islands. Its nymph has a peculiar appearance and is a typical torrent inhabitant”.

Another baetid nymph from the “Angara River and its tributaries” with small median teeth on the posterior margin on abdominal segment II—VII is mentioned by SUKACKENE (1962; this paper is written in Russian with a summary only in Lithuanian language). In Fig. 1 on Table 1 the photograph of a nymph shows clearly developed small teeth on abdominal segments II—VII. This nymph is named “*Pseudocloeon* sp. 3 (= *Baetiella japonica* “na” IMAN.)”. All the median teeth on segments II—VII appear smaller than in UENO’s forementioned *Baetiella* sp., and those on middle segments appear largest. Therefore the species corresponds to IMANISHI’s *Baetiella japonica* na, Saghalian race. Fig. 2 on Table 1 in SUKACKENE (1962) shows a nymph which is named “*Ps.* sp. Nr. 2 (= *Baetiella* nX)”; no tubercles on the posterior margins of terga are recognisable.

KAZLAUSKAS (1963: 586—588) gave the nymphal description of a new *Pseudocloeon* species: *Pseudocloeon* (*Baetiella*) *tuberculatum*, from the River Irkut. Judging from KAZLAUSKAS’ Fig. 25 this nymph has small teeth on the posterior margin of abdominal terga II—VI, and 7 pairs of gills are developed. KAZLAUSKAS’ Fig. 26 shows a front wing (probably drawn from the front wing pad) without intercalaries at the margin. KAZLAUSKAS (1963: 593, english summary) synonymised *Baetiella japonica* na IMANISHI, 1940, with his species and distinguished his species from *B. japonica* na IMANISHI: “*Pseudocloeon* (*Baetiella*) *tuberculatum* sp.n. (= *Baetiella japonica* “na” IMANISHI, 1940 syn. nov.)

from the Irkut Riv. differs from *P. (B.) japonica* IMANISHI in the presence of tubercles on the abdominal tergites, in the pattern etc.”

The question of the number of intercalaries in the front wings is not yet clear. As far as known to me no imagines were ever reared from a true *Neobaetiella* nymph. The nymph described by KAZLAUSKAS might be a true *Neobaetiella*. KAZLAUSKAS (1963) showed the front wings of “*Pseudocloeon (Baetiella)*” *tuberculatum* (Fig. 26) without intercalaries. Otherwise KAZLAUSKAS showed the front wings of his species *Pseudocloeon fenestratum* (Fig. 36) also without intercalaries and synonymised *Baetiella* nX IMANISHI (1940) with his *Pseudocloeon fenestratum*. As stated above *Baetiella* nX has hind wings and probably is a *Baetis* species. *Pseudocloeon* is defined to have 2 intercalaries. The front wings in both Fig. 26 and Fig. 36 in KAZLAUSKAS appear to be drawn out from the wings pads of the nymphs. Thus KAZLAUSKAS’ *Pseudocloeon (Baetiella) tuberculatum* remains doubtful but appears to be related to *Neobaetiella*. The question on how many intercalaries are in the front wings of *Neobaetiella* has to be left open until imagines are reared from nymphs.

Fig. 14. *Baetis taiwanensis* sp.n.: surface and posterior margin of nymphal tergum.

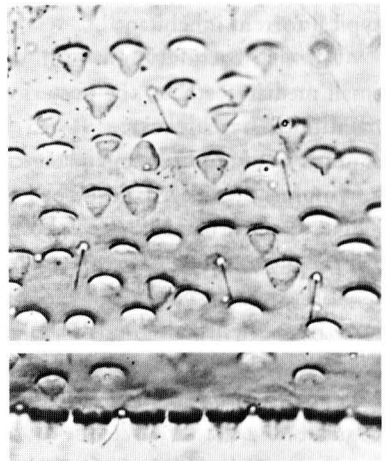
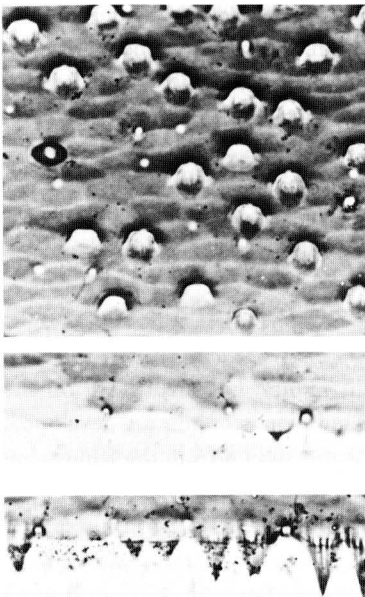


Fig. 15. *Baetis tatuensis* sp.n.: surface and posterior margin of nymphal tergum.

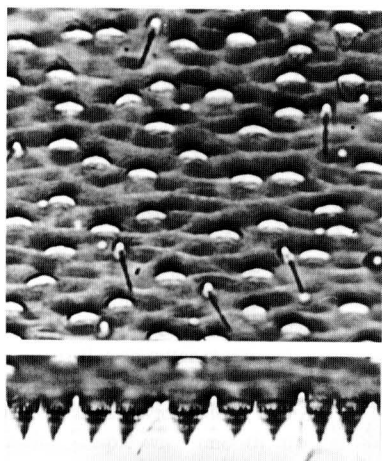


Fig. 16

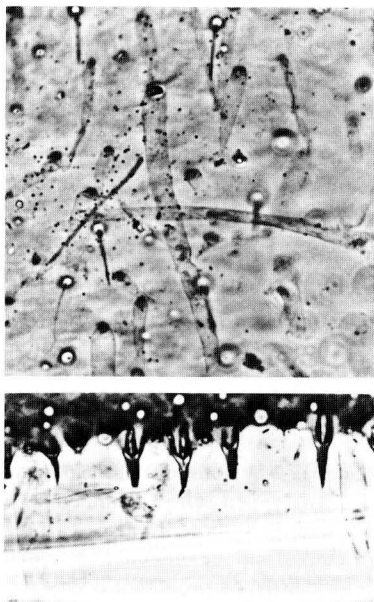


Fig. 17

Fig. 16. *Baetis pseudofrequentus* sp.n.: surface and posterior margin of nymphal tergum.

Fig. 17. *Pseudocloeon latum* sp.n.: surface and posterior margin of nymphal tergum.

UENO (1969) gave the description of the male and female of *Baetiella japonica* (IMANISHI) from Taiwan and other places in Southeast Asia. The forewings have paired intercalaries on hind margin and the hind wings are completely absent. UENO referred to *Acentrella japonica* IMANISHI, 1930, and *Baetiella japonica* UENO, 1931. Therefore this species has also to be treated as *Pseudocloeon*.

The type species of *Baetiella*, *Baetiella* (*Acentrella*) *japonica* IMANISHI, 1930 is now referred to *Pseudocloeon* and hence *Baetiella* UENO, 1931 is a junior synonym of *Pseudocloeon* KLAPÁLEK, 1905. The new genus *Neobaetiella* gen.nov. is established. The described new species *macani* sp.n. is placed in the genus *Neobaetiella* gen.nov. To *Neobaetiella* also belong *Baetiella* UENO, 1955, and the type species *Baetiella japonica* na = *Neobaetiella uenoi* comb. nov.

Based on the above statements the taxonomic situation is as follows:

Pseudocloeon KLAPÁLEK, 1905

Acentrella (n.sp.?) UENO, 1928 (nymph)

Acentrella japonica IMANISHI, 1930 (♂ and ♀); type species of *Baetiella*

Baetiella japonica: sensu UENO, 1931 (♂, ♀, nymph) = *Pseudocloeon japonicum* new comb.

Baetiella sp. UENO, 1969 (♂, ♀)

Neobaetiella new gen.

Baetiella japonica na IMANISHI, 1940 (nymph); type species = *Neobaetiella uenoi* comb. nov.

Baetiella sp. UENO, 1955 (nymph)

Neobaetiella macani sp.n.

Gen.sp. (?*Baetis*)

Baetiella japonica nX IMANISHI, 1940 (nymph)

Baetiella nX IMANISHI, 1940 (nymph)

Gen.sp. ?*Neobaetiella*

Pseudocloeon (Baetiella) tuberculatum KAZLAUSKAS, 1963 (nymph)

6. *Neobaetiella macani* sp.n.

Figs. 6, 12, 13, 19

Material: 2 nymphs, one of them mature, one not fully mature

Body length: 3.1 mm, cerci 3.5 mm, terminal filament reduced to one segment, but with indication of one or two segmentations (Fig. 6g). — Color pattern on pronotum and mesonotum and on dorsum of abdomen as in Figs. 12 and 13. The basic color pattern on pronotum is very similar to that of *Pseudocloeon* and *Acentrella*. Dark longitudinal markings on dorsal surface of femur. Cerci brownish. — Body not flattened dorsoventrally. Dorsum of body with a number of tubercles or elevations of different size. Pronotum: two anterior elevations on both sides near median line, four elevations in a horizontal row near posterior margin, the lateral ones smaller than the median ones, two very small elevations in the middle of posterior margin of pronotum. Mesonotum: eight elevations in symmetrical order, four on each half, two small tubercles tightly side by side on posterior margin on middle of base of inner margin of front wing pads. Metanotum and terga of segment I and II of abdomen with a single median tu-

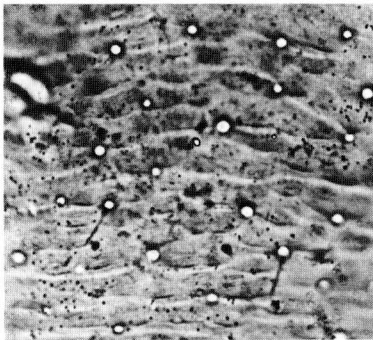


Fig. 18

Fig. 18. *Pseudocloeon ultimum* sp.n.: surface and posterior margin of nymphal tergum.

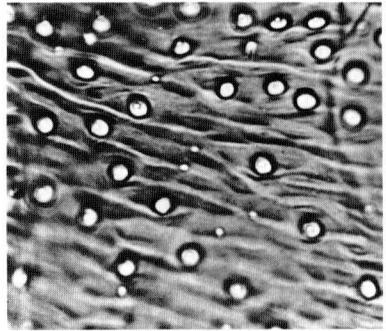


Fig. 19

Fig. 19. *Neobaetiella imanishii* sp.n.: surface and posterior margin of nymphal tergum.

bercle, whereas, the tubercle of metanotum is the largest, the two following decreasing in size. On abdominal segment III—IX two tubercles, one on each side of a median line, X. segment without tubercles. — *Antennae* short, flagellum with about 22 segments. — *Mandibles* with two groups of canini (in Fig. 6e the new mandibles are seen inside the exuvia of more or less worn mandibles). — *Labrum*: submarginal bristles fine, single, 1 + 6 (7). — *Labium*: 3rd segment of palpus conical, symmetrically rounded, with small tip at apex, inner apical lobe of 2nd segment slightly developed. Paraglossa with three subapical rows of bristles on ventral surface. — *Maxillary palpus* hardly reaching apex of galea-lacinia. Outer margin of galea-lacinia near base of apical teeth with a fine bristle. — *Legs*: all three pairs of legs with a single coxal gill; outer margin of femur with a regular dense row of long fine bristles; outer margin of tibia also with a regular row of fine bristles, less long and less dense than on femur; same kind of fine bristles on outer margin of tarsus, but less tightly arranged. — *Claw* with two fine apically bowed bristles near apex, reaching to apex of claw. — *Hind wing pads* reduced, about twice as long as broad. — *Gills* developed on segments I to VI only, gill lamellae simple with smooth margin. — *Dorsal surface of terga* with pores and fine bristles, no scales or scale bases. Posterior margin of terga with numerous apically blunt spines, similar to the kind of spines in *Pseudocloeon* species. — *Cerci* without swimming bristles.

Holotype: ♂ nymph of slide preparation: Taiwan. Ta-tu-River, 4 km N of Tsaotun. 11. 10. 1978. leg. G. F. EDMUNDS, Jr. & C. H. EDMUNDS. — *Paratype*: 1 nymph in alcohol, same location as holotype.

Neobaetiella macani sp.n. differs from the closely related *Neobaetiella uenoi* comb. nov. (= *Baetiella japonica* na IMANISHI 1940) mostly in having two tubercles on terga III—IX; whereas, *N. uenoi* has only a single tubercle on dorsum I—VIII. The nymph of *Baetiella* sp. UENO, 1955, has a single, elongate and rather pointed tubercle on terga I—X.

Neobaetiella macani sp.n. is dedicated to the late friend and colleague Dr. T. T. MACAN.

Zusammenfassung

Eine kleine Sammlung von Baetiden-Larven aus Taiwan wurde in der vorliegenden Arbeit untersucht. Sechs neue Arten aus drei Baetiden Gattungen werden vergleichend morphologisch beschrieben. Es sind die Arten *Baetis taiwanensis* sp.n., *Baetis tatsuensis* sp.n., *Baetis pseudofrequentus* sp.n., *Pseudocloeon latum* sp.n., *Pseudocloeon ultimum* sp.n. und *Neobaetiella macani* sp.n. Innerhalb der Gattung *Pseudocloeon* wird die *latum*-Gruppe als neue Artengruppe aufgestellt, welche die beiden neuen Arten *P. latum* sp.n. und *P. ultimum* sp.n. umfaßt (S. 103). Die neu beschriebenen Arten der Gattungen *Baetis* und *Pseudocloeon* sind die ersten Larven-Beschreibungen dieser Gattungen von Taiwan. Die Gattung *Baetiella* UENO, 1931, wird ausführlich besprochen. Die Typus-Art *Baetiella japonica* IMANISHI, 1930, wird in die Gattung *Pseudocloeon* gestellt und wird somit ein jüngeres Synonym von *Pseudocloeon*. Die Gattung *Neobaetiella* wird neu aufgestellt; sie umfaßt *Baetiella japonica* na IMANISHI, 1940 (Larve), *Baetiella* sp. UENO, 1955 (Larve) und die obenbeschriebene *Neobaetiella macani* sp.n. *Baetiella japonica* na ist die Typus-Art von *Neobaetiella*, ihr Name wird ersetzt durch *Neobaetiella uenoi* comb. nov.

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