

**BAETIELLA (EPHEMEROPTERA: BAETIDAE)
IN HONG KONG, WITH DESCRIPTION
OF A NEW SPECIES¹**

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ABSTRACT: A new species of *Baetiella* (Ephemeroptera: Baetidae), *B. trispinata*, from Hong Kong, China is described and illustrated based on adult and larval material. The first adult description of *B. pseudofrequenta* (Müller-Liebenau) and new distributional records for *B. bispinosa* (Gose) and *B. pseudofrequenta* in China are provided.

Baetiella Uéno is a poorly defined genus distributed in the Palearctic and Oriental Regions. The genus frequently has been considered as a subgenus of *Pseudocloeon* (e.g., Kazlauskas, 1963; Braasch, 1978; Kluge, 1983), a synonym of *Pseudocloeon* (e.g., Gose, 1980; Müller-Liebenau, 1985), or treated as *Baetis* (e.g., Kazlauskas, 1963; Braasch, 1978; Müller-Liebenau, 1985). Waltz and McCafferty (1987) gave a generic diagnosis for *Baetiella* and listed 12 species within the genus. The genus is now clearly known to be distinct from *Pseudocloeon* (Lugo-Ortiz, McCafferty and Waltz, 1999). Waltz and McCafferty (1997) added three species to the genus that had been placed in *Baetis* (*Tenuibaetis*) by Kang et al. (1994). In this paper, a new species of *Baetiella*, *B. trispinata*, from Hong Kong, China is described based on adult and larval material. The first adult description of *Baetiella pseudofrequenta* and new distributional records for *B. bispinosa* (Gose) and *B. pseudofrequenta* (Müller-Liebenau) in China are also provided.

Abbreviations used for deposition of types are as follows: the insect collection of the South China Agricultural University, Guangzhou, P. R. China (SCAU); Department of Ecology & Biodiversity, The University of Hong Kong (HKU); the insect collection of the Agriculture and Fisheries Department of Hong Kong Government (AFDHK); the collection of Florida A & M University, Tallahassee, Florida (FAMU); and Purdue Entomological Research Collection, West Lafayette, Indiana (PERC).

***Baetiella bispinosa* (Gose, 1980)**

Pseudocloeon bispinosus Gose, 1980: 211.

Neobaetiella macani Müller-Liebenau, 1985: 108.

Neobaetiella imanishii Müller-Liebenau, 1985: 108, fig. 19.

Baetiella bispinosa (Gose): Waltz and McCafferty, 1987: 563.

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Larva. Adequately described and illustrated by Müller-Liebenau (1985).
Adult. Unknown.

Material examined. CHINA: Hong Kong: 4 larvae, Lantau Island, Shek Mun Kap, 17-XII-1996, Xiaoli Tong, in HKU; 1 larva, Hok Tau, 18-X-1998, Xiaoli Tong, in AFDHK. CHINA: Guangdong Province: 1 larva, Nankunshan Nature Reserve, near the Middle School, 16-IX-1994, Xiaoli Tong, in SCAU; 2 larvae, Nankunshan Nature Reserve, Stone River, 11-III-1995, Xiaoli Tong, in SCAU; 11 larvae, Yangshan, Chengjia Nature Reserve, Lutian, 15-VII-1996, Xiaoli Tong, in SCAU.

Distribution: Japan; China: Guangdong, Hong Kong and Taiwan.

Baetiella pseudofrequenta (Müller-Liebenau, 1985)
(Figs. 15-20)

Baetis pseudofrequentus Müller-Liebenau, 1985: 98.

Baetis (Tenuibaetis) pseudofrequentus Müller-Liebenau: Kang et al., 1994: 26.

Baetiella pseudofrequenta (Müller-Liebenau): Waltz and McCafferty, 1997: 136.

Larva. Adequately described and illustrated by Müller-Liebenau (1985) and Kang et al. (1994).

Male adult (in alcohol, reared from larvae in the laboratory). Body length 4.1 mm, forewing 4.4 mm; cerci 10.0 mm. Turbinate eyes well developed (Figs. 19-20), orange with light cream margins apically. Antennae shorter than head capsule; flagella gray; pedicels light yellow; scapes light yellow with rust colored markings basely. Meso- and metanota pale or gray-yellow dorsally and dark brown laterally; thorax ventrally dark brown. Forewings (Fig. 18) hyaline; longitudinal veins and paired marginal intercalaries gray; pterostigma areas with 5-7 slanting veinlets. Hindwings (Fig. 15) with acute costal process and two longitudinal veins. Forefemora straw colored with rust preapical markings (Fig. 17); foretibiae and foretarsi gray. Length of foreleg segments (mm): femora 7.80, tibiae 1.00, tarsal segments 0.08, 0.38, 0.29, 0.18, and 0.12. Other legs gray or light gray-yellow. Abdominal terga 1-6 translucent, whitish to light yellow dorsally and with rust colored markings laterally; terga 7-8 light brown-green; terga 9-10 whitish; terga 1-9 with single purple-red transverse streak posteriorly. Genital forceps (Fig. 16) with basal segments 1-2 whitish; terminal segments 3-4 gray-brown. Cerci gray with purplish annulations at apex of each segment.

Female adult (in alcohol, reared from larvae in the laboratory). Body length 3.5 mm; forewing 4.4 mm; cerci 7.8 mm. Vertex light yellow or yellow. Pronotum with red-brown streak anteriorly, a pair of oblique red-brown dashes submedially. Thorax except foreleg as in male. Abdominal terga 1-10 whitish to yellow dorsally, light brown-green tinted rust laterally. Cerci as in male.

Material examined. CHINA: Hong Kong: 2 larvae, Shing Mun, 12-XI-1996, Xiaoli Tong, in HKU; 4 larvae, Tai Po Kau Forest Stream, 19-XI-1996, Xiaoli Tong, in SCAU; 91 larvae, Lam Tsuen River near Tong Min Tsuen, 6-I-1997, Xiaoli Tong, in SCAU; 36 larvae, Pak Ngau Shek, 13-I-1997, Maria Salas, in HKU; 2 larvae, Ma Po Mei near Lam Kam Road, 7-X-1997, Xiaoli Tong, in HKU; 56 larvae, 5 male adults and 4 female adults, Ha Wan Yiu, 4-XI-1997, Xiaoli Tong, in SCAU; 2 larvae, Tan Shan River near Ng Uk, 13-II-1998, Xiaoli Tong, in AFDHK; 4 larvae, Tan Chuk Han, 18-III-1998, Xiaoli Tong, in HKU; 14 larvae, Ho Chung, 1-

IV-1998, Xiaoli Tong, in HKU; 2 male and 2 female adults, Nam Chung River, near Luk Keng Lam Uk, 5-III-1999, Xiaoli Tong, in SCAU.

Distribution. China: Hong Kong and Taiwan.

***Baetiella trispinata* Tong & Dudgeon, NEW SPECIES**

(Figs. 1-14, 21-22)

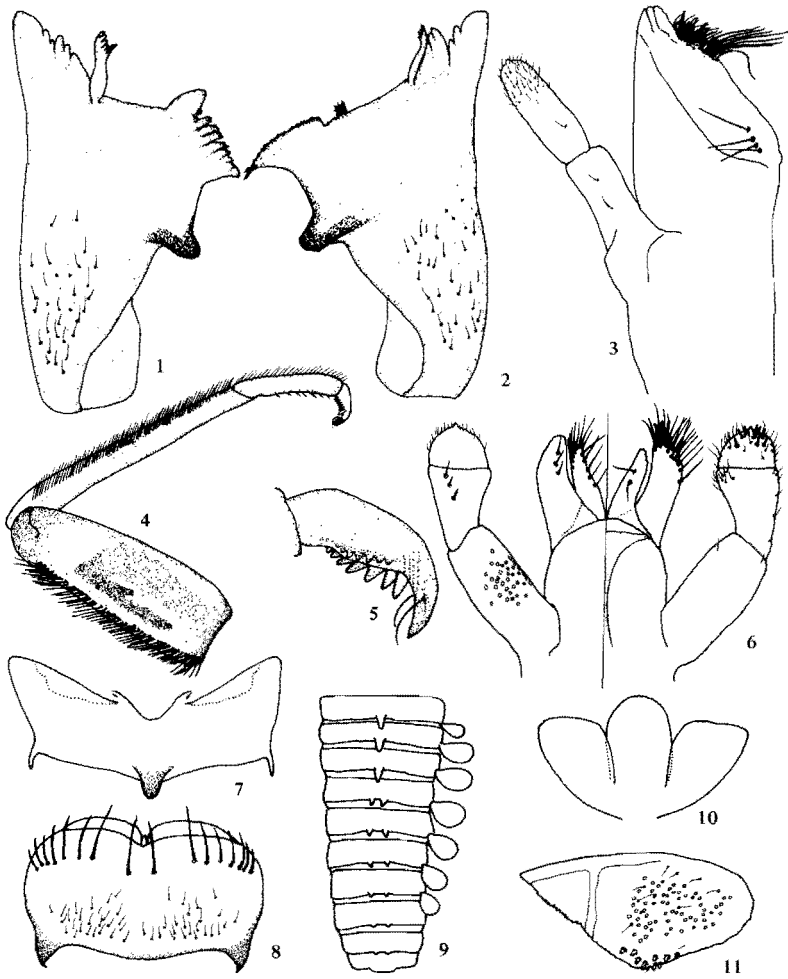
Larva. Body length 4.6-5.4 mm; cerci 5.0-7.0 mm. Head: Head capsule yellow-brown. Labrum (Fig. 8) approximately 2.0 times wider than long, deeply cleft anteromedially, dorsally with submedial pair of long, robust, simple setae and anterior submarginal row of 7-8 long, robust, simple setae. Hypopharynx as in Figure 10. Left mandible (Fig. 1) with incisors with 6 denticles; marginal lateral denticle enlarged. Right mandible (Fig. 2) with incisors with 6 denticles; marginal lateral denticle enlarged. Maxillae (Fig. 3) with 4 denticles on galealaciniae and 4-5 fine, simple setae on medial hump; maxillary palpi 2 segmented; terminal segment with small apical tip. Labial palpi (Fig. 6) 3 segmented; terminal segment conical, with tiny apical tip.

Thorax: Thorax yellow-brown, with irregular brown markings medially; mesonotum with two longitudinal, yellow narrow stripes on both sides near median line. Pro- and mesonota with numerous tubercles. Metanotum (Fig. 7) with single long tubercle medially. Hindwing pads (Fig. 7) reduced, approximately 2-3 times longer than wide. Legs (Fig. 4) paler than thorax, femora with brown longitudinal markings on dorsal surface and with row of long, relatively robust, simple setae dorsally; tibiae with row of dense, fine, simple setae dorsally; tarsi with row of sparse, fine, simple setae dorsally. Tarsal claws (Fig. 5) with subapical pair of long, fine, simple setae and 2 rows of 7-8 denticles (one of the rows vestigial). All legs lacking coxal gills. **Abdomen:** Generally yellow-brown, with medium brown to brown markings. Segments 2-6 with pair of oblique brown dashes anteriorly, segments 7-9 with pair of small specks in anterior half. Posterior margins of terga 1-3 with single median dorsal tubercles; terga 4-9 with paired dorsal tubercles posteriorly, decreasing in size towards abdomen, on tergum 9 dorsal tubercles reduced (Fig. 9). Gills whitish and untracheated, present on segments 1-7; gill surface with numerous pores, margin smooth with fine, simple setae. Paraprocts as in Figure 11. Cerci yellow-brown; median terminal filament reduced to one segment.

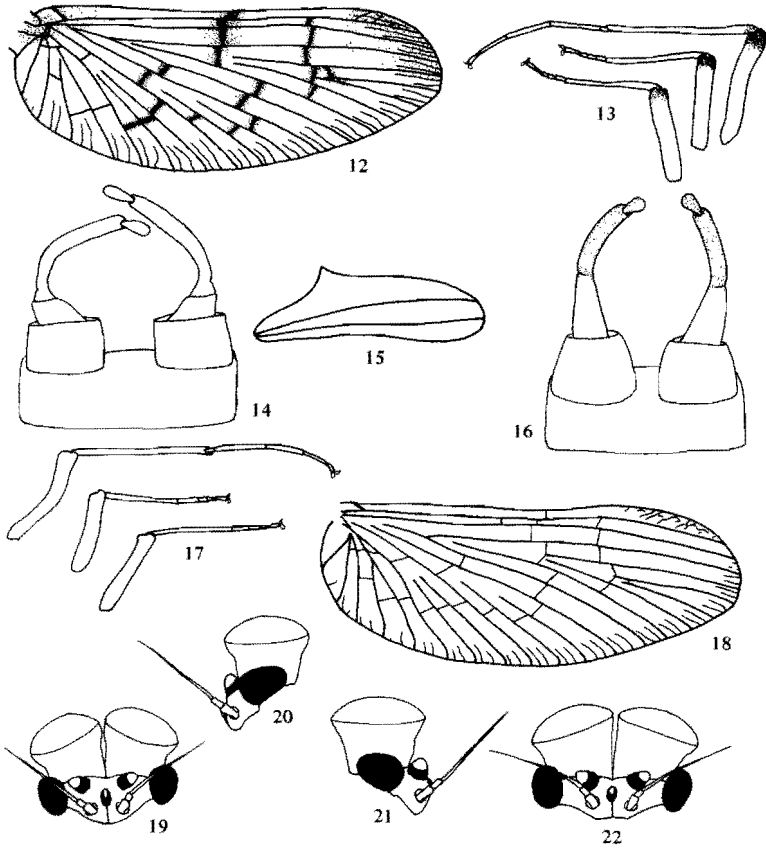
Male adult (in alcohol, reared from larvae in the laboratory). Body length 4.0-4.8 mm, forewing 4.4-4.8 mm, cerci 11.5 mm. Head yellow-brown. Antennae approximately 1.5 times length of head capsule; flagella pale brown; scapes yellow-brown; pedicels red-brown. Upper portion of compound eyes orange, extremely large (Figs. 21-22); lower portion black. Ocelli whitish with black basal rings. Thorax light brown. Forewings (Fig. 12) hyaline, basal portions and pterostigma areas tinted with brown; longitudinal veins and paired marginal intercalaries light brown, with distinctly brown pigmented areas adjoining and including crossveins. Hindwings absent. Legs (Fig. 13) whitish, femora with brown marking apically; foretibiae with light brown basal macula. Length of foreleg segments (mm): femora 1.00, tibiae 1.50, tarsal segments 0.08, 0.50, 0.45, 0.27, and 0.15. Abdominal segments 1-6 opaque, cream; segments 7-10 light brown; terga 1-9 with single pale brown streak posteriorly. Genital forceps (Fig. 14) whitish, arched. Cerci whitish.

Female adult (in alcohol, reared from larvae in the laboratory). Body length 4.4 mm, forewing 5.0 mm. Head yellow-brown; flagella light purple-red; scapes light yellow; pedicels purple-red. Pronotum light yellow-brown with 3 longitudinal brown markings. Abdominal terga 1-7 and 10 yellow-brown; terga 8-9 yellow. Other characters as in male except for the usual sexual differences.

Material examined. Holotype: Mature male larva (in alcohol), CHINA, Hong Kong: Ma Po Mei, Lam Tsuen River near Lam Kam Road, 29-X-1997. Xiaoli Tong, in SCAU. Paratypes (in



Figs. 1-11. Larva of *Baeitiella trispinata*, new species. 1. Left mandible. 2. Right mandible. 3. Maxilla. 4. Foreleg. 5. Tarsal claw. 6. Labium. 7. Metanotum. 8. Labrum. 9. Abdominal terga. 10. Hypopharynx. 11. Paraproct.



Figs. 12-14, 21-22. Adult of *Baetiella trispinata*, new species. 12. Forewing. 13. Legs. 14. Genitalia. 21. Head, lateral view. 22. Head, anterior view.

Figs. 15-20. Adult of *Baetiella pseudofrequenta* (Müller-Liebenau) 15. Hindwing. 16. Genitalia. 17. Legs. 18. Forewing. 19. Head, anterior view. 20. Head, lateral view.

alcohol), CHINA, Hong Kong: 1 female, 2 male adults and 7 larvae, locality and date as holotype, in SCAU; 1 larva, Ng Tung Chai, 25-II-1997, Xiaoli Tong, in AFDHK; 2 larvae, Shing Mun, 27-VIII-1997, Xiaoli Tong, in HKU; 2 larvae, Ma Po Mei, Lam Tsuen River near Lam Kam Road, 22-X-1997, Xiaoli Tong, in HKU; 9 larvae, Lantau Island, Pui O, near Water Station, 23-VI-1998, Xiaoli Tong, 5 in PERC, 4 in FAMU; 2 larvae, Tai Po Kau Forest Stream, 25-II-1999, Xiaoli Tong, in SCAU. CHINA, Guangdong Province: 6 larvae, Nankunshan Nature Reserve, near the Middle School, 16-IX-1994, Xiaoli Tong, in SCAU; 2 larvae, Nankunshan Nature Reserve, Stone River, 11-III-1995, Xiaoli Tong, in PERC; 3 larvae, Yangshan, Chengjia Nature Reserve, Lutian, 15-VII-1996, Xiaoli Tong, in SCAU.

Etymology. The epithet *trispinata* is from the Latin words: *tri-* meaning three and *spinatus* meaning having spines, thus referring to abdominal terga 1-3 of the larvae having 3 median dorsal tubercles.

Distribution. China: Hong Kong and Guangdong Province.

Remarks. The larva of *Baetiella trispinata* can be distinguished from all other species of *Baetiella* by the following combination of characters: (1) posterior margin of metanotum having a single long tubercle medially; (2) hindwing pads present; (3) legs lacking coxal gills; (4) abdominal terga 1-3 having a single median dorsal tubercle and terga 4-9 having a pair of dorsal tubercles posteriorly, decreasing in size towards abdominal end; (5) the gills present on abdominal segment 1-7; and (6) median terminal filament reduced to one segment.

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