

## A New Species of *Caenis* Stephens (Ephemeroptera: Caenidae) from Taiwan

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### ABSTRACT

A new species, *Caenis yangi* Kang and Yang, is described and illustrated from nymphal and egg specimens collected in Taiwan. With its nymph possessing a distinct emargination on the posterior margin of the hypopygium and the egg lacking a polar cap, this species is easily distinguished from other known *Caenis* species of this area.

**Key words:** Caenidae, *Caenis*, new species, egg, Taiwan.

### Introduction

The mayfly family Caenidae was very poorly known in the Oriental region until we published our work on 7 species of Caenidae of Taiwan (Kang & Yang, 1994). Recently, we rechecked our collection and found that 5 nymphs collected from high mountains are a new species of the genus *Caenis* that we name *C. yangi* sp.n.

In the present work, the description is based on mature nymphs and eggs. *The egg materials acquired from 1 mature female nymph* (with black wing pads) have been examined by scanning electron microscope.

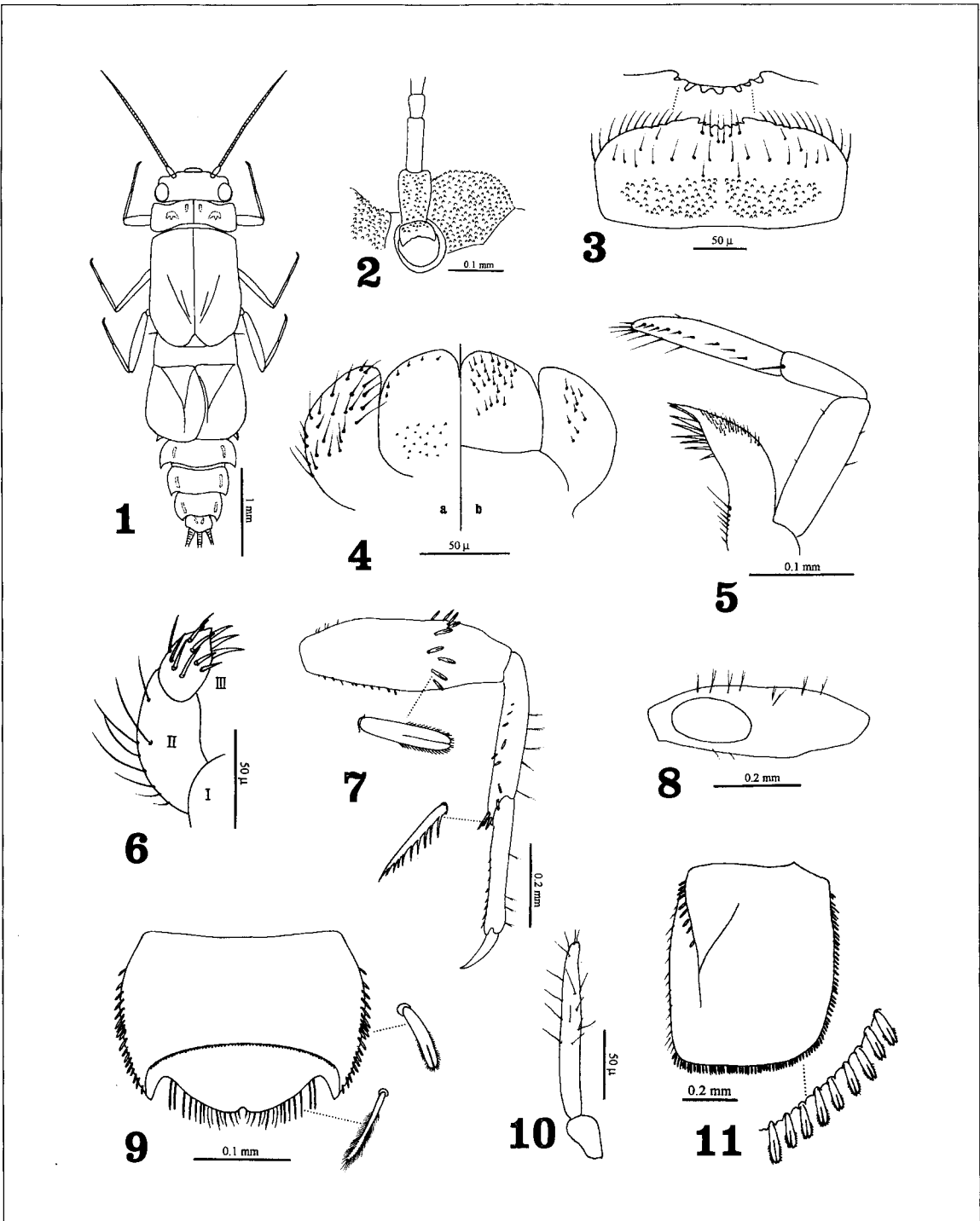
#### *Caenis yangi* Kang and Yang, sp.n.

##### Figs. 1-14

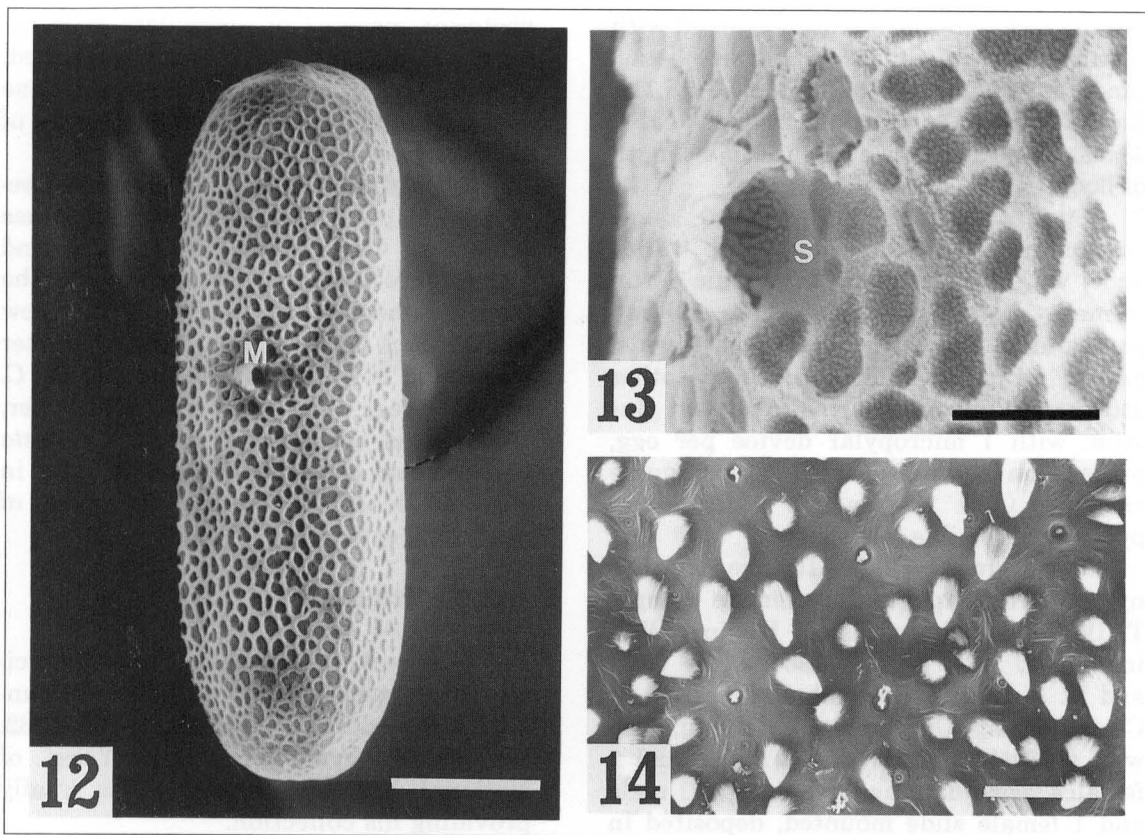
**Mature nymph** (in 70% alcohol, Figs. 1-11). Body length, female 4.5-4.7mm (n=2), male 3.5-3.7mm (n=2). General color uniform brown, surface of the whole body scattered with conical tubercles.

**Head:** Head capsule scattered with conical tubercles; genae round, convex (Fig. 2). Antennae (Fig. 2): length ca. 0.44x width of head capsule; scape with fine tubercles on apical half; pedicel scattered with fine tubercles and without setae. Labrum (Fig. 3): width ca. 0.3x as wide as head; anteromedial margin with a shallow emargination and with 6 blunt denticles; dorsum with fine setae on apical half and tubercles on basal half. Mandibles: basal half scattered with tubercles; outer incisor of right mandible tri-forked apically, inner four-forked; outer incisor of left mandible biforked apically, inner tri-forked. Maxillae (Fig. 5): galea-laciniae with tufty, fine setae near anterior margins; palpi slender, segments I and III subequal in length, segment II ca. 0.55x segment III. Hypopharynx: lingua subquadrate, much larger than superlinguae. Labium: glossae and paraglossae subequal in size (Fig. 4); glossae scattered with fine setae on apical half of venter and with fine scales on basal half

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Figs. 1-11. Nymph of *Caenis yangi*. 1, body, dorsal; 2, antenna and gena, dorsal; 3, labrum, dorsal; 4, glossa and paraglossa, (a, dorsal; b, ventral); 5, maxilla, ventral; 6, labial palpus, dorsal; 7, foreleg, dorsal; 8, fore femur, ventral; 9, abdominal segment IX (segment X been moved), dorsal; 10, gill I; 11, gill II (operculate gill).



Figs. 12-14. Scanning electron micrographs of *Caenis yangi*. 12, egg, general view (M: micropylar device); 13, egg, magnification (S: sperm guide); 14, surface of gill II (operculate gill). [Scales: Fig. 12, bar=30 $\mu$ ; Fig. 13, bar=5 $\mu$ ; Fig. 14, bar=20 $\mu$ ]

of dorsum; paraglossae with acute setae on dorsum and with fine setae on venter; labial palpi 3-segmented, segment III small, apex acute, dorsum with 3 oblique rows of acute setae (Fig. 6).

**Thorax:** Pronotum with 4 shagreened areas, 2 anteromedial and 2 submedial; anterolateral corners of pronotum produced anteriorly. Legs (Fig. 7): femora scattered with conical tubercles; fore femora with a longitudinal row of pinnate, biforked, clavate setae, venter with large, oval, membranous area on proximal half (Fig. 8); fore tibiae with 1-2 acute, pectinate setae at apex; fore tarsi ca. 0.78 x fore tibiae and ca. 0.60x fore femora; claws without denticles on inner margins.

**Abdomen:** Segments IV-IX with posterolateral projections, largest on segment VII. Terga: posterior margin of each tergum with denticles and without setae, tergum II with an acute, posteromedial projection; lateral margins of terga IV-IX fringed with setae, terga IV-VI with acute setae, terga VII-I with pinnate, biforked, clavate setae (Fig. 9); terga VII-X each with 2 shagreened strips (Fig. 1); posterior margin of hypopygium with distinct emargination and fringed with pinnate setae (Fig. 9). Gills: 6 pairs, present on abdominal segments 1-6; gills I reduced, 2-segmented (Fig. 10); operculate gills (gills II) subrectangular, dorsa with numerous conical tubercles (Fig. 14),

lateral and posterior margins fringed with regular, pinnate, biforked, clavate setae, inner margins with fine setae (Fig. 11). Caudal filaments: terminal filament ca. 1.33x as long as cerci and ca. 0.85x length of body.

**Eggs** (Figs. 12, 13): General shape cucumiform, 135-150 $\mu$  long and 42-52 $\mu$  wide; without polar cap. Chorionic surface meshy by reticular ridges (Fig. 12) and particulate (Fig. 13), ridges ca. 1 wide; except reticular ridges, without other attachment structures. **Micropylar device**: with 1 micropylar device per egg, present on equatorial area; sperm guide cave-like (Fig. 13), ca. 4-5 wide; micropylar canal visible but short.

**Type material**: All are mature nymphs. Holotype: mature female nymph, TAIWAN: Taichung Hsien, Hoping, Wuling Farm, 1,420 m, 17-V-1986, P. S. Yang and K. J. Huang, in alcohol, deposited in Chung Hsing University, Taichung, Taiwan (**NCHU**). Paratypes: 2 males and 2 females, same data as for holotype, 1 male and 1 female slide mounted, deposited in NCHU, remainder in alcohol and deposited in National Museum of Natural Science, Taichung, Taiwan (**NMNS**).

**Etymology**: Named after Prof. Ping-Shih Yang who kindly sent us the specimens for this work.

**Remarks**: Nymphs of this new species can be differentiated from known *Caenis* spp. of Taiwan by using the following characters: (1) hypopygium with a small but clear emargination on posteromedial margin; (2) lateral and

posterior margins of operculate gills fringed with regular, pinnate, biforked, clavate setae; (3) pedicels of antennae without setae and (4) posterior margin of each tergum without setae.

Eggs of most species of *Caenis* possess 1 or 2 polar caps composed of dense filaments, (Malzacher, 1982; Kang and Yang, 1994), like most species of the family Ephemerellidae, eggs of this new species lack a polar cap. This character was found only in a European species, *C. robusta* (egg described by Malzacher, 1982). This new species and *C. robusta* both possess reticular ridges but differ in size and density of meshes and shape of the whole egg.

## Acknowledgments

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# 臺灣產細蜉蝣科(蜉蝣目)一新種

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## 摘 要

本文描述分布於台灣的細蜉蝣科(Caenidae)一新種*Caenis yangi* Kang and Yang。此新種的描述是根據其稚蟲及卵的特徵。和本地區已知種類最主要區別是其稚蟲肛下片具有一凹口，及其卵無卵蓋。

**關鍵詞：**細蜉蝣科、細蜉蝣屬、新種、卵、台灣