

## Three New Species of the Genus *Caenis* from Hong Kong, China (Ephemeroptera: Caenidae)

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**Abstract:** Three new species of the genus *Caenis* (Ephemeroptera, Caenidae), *Caenis aspera* sp. nov., *Caenis bicornis* sp. nov. and *Caenis lubrica* sp. nov., are described from Hong Kong, China. All type specimens are deposited in the Insect Collection of Department of Entomology, South China Agricultural University, China.

**Key words:** Ephemeroptera; Caenidae; *Caenis*; New species; China; Hong Kong

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## 中国香港细蜉属三新种记述 (蜉蝣目：细蜉科)

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**摘要:** 记述了来自中国香港的细蜉科 Caenidae, 细蜉属 *Caenis* 3 新种: 点刻细蜉 *Caenis aspera* sp.nov.、双突细蜉 *Caenis bicornis* sp.nov. 和光滑细蜉 *Caenis lubrica* sp.nov.。模式标本均保存在中国广州华南农业大学昆虫学系昆虫标本室。

**关键词:** 蜉蝣目; 细蜉科; 细蜉属; 新种; 中国; 香港

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The genus *Caenis* Stephens is almost cosmopolitan (excluding Australia and New Zealand), but has received little attention in Asia (Kang & Yang, 1994). For example, only two species, *Caenis nigropunctata* Klapalek and *C. nigroforceps* Zhou *et al.* are known from mainland China (Hsu, 1936-37; You & Gui, 1995; Zhou *et al.*, 1997). Kang & Yang (1994, 1996) have described 8 new species of *Caenis* from Taiwan, while *Caenis nishinoae* Malzacher and two undetermined species of *Caenis* are known from Japan (Gose, 1985; Malzacher, 1996), and three others from Korea (Hwang & Bae, 1999). *Caenis* is widespread and abundant in Hong Kong (Dudgeon, 1990); some species are parthenogenetic (Dudgeon, 1999). The larvae occur in a wide variety of habitats, sprawl on the mud and sediment on the bottom of standing waters, and present especially in silty areas of stony streams. Members of the genus are among the more pollution-tolerant of Hong Kong mayflies (Dudgeon, 1990). In this paper, three new species of *Caenis* from Hong Kong, China, are described. All type specimens are deposited in the Insect Collection of Department of Entomology, South China Agricultural University (SCAU), Guangzhou, China.

### 1 *Caenis aspera* sp.nov. (Figs.1-10)

#### 1.1 Larva

Body length 2.5-3.0 mm. Cerci approximately 2 mm long.

Head Dorsum grey-brown with numerous pale dots on vertex. Antennal pedicle with 4 long, robust setae. Head capsule surface densely covered with

rounded granules. Labrum (Fig.2) yellow-brown and subrectangular dorsally with numerous long, robust setae on anterior half and anteromedian margin with a shallow emargination; width of labrum approximately 2.2 times length. Mandibles (Fig. 3): basal half of dorsum densely covered with rounded granules, and bearing a few long, fine setae. Maxillary palp (Fig.1) 3-segmented, segment 1 subequal to terminal segment in length, segment 2 approximately 2/3 length of terminal segment. Labium; glossae with tuft of long, fine, acute setae dorsally, ventral surface of glossae smooth; paraglossae covered with numerous long, robust, pointed setae; palps 3-segmented, segment 1 subequal to segment 2 in length, segment 3 conical and shorter, approximately 1/3 length of segment 2.

Thorax Pronotum (Fig.4) yellow-brown densely covered with rounded granules. Meso- and metanota yellow-brown, densely covered with rounded granules; anterolateral corner of mesonotum without process (Fig.8). Forefemora with a transverse row of 8-10 stout, long, clavate setae on distal 1/3, and with long, robust, acute dorsal setae; surface of forefemora covered with dense network of wrinkles except for ventral surface that has a large smooth area basally; foretibiae and foretarsi smooth with robust, acute setae near ventral apex; tarsal claws slender without denticles. Mid- and hind legs similar to foreleg but lacking a transverse row of long, stout femoral setae.

Abdomen Abdominal terga 1-6 light yellow with diffuse black marks, terga 7-10 yellow-brown; posterior margin of tergum 2 with a triangular process medially; terga 4-9 with posterolateral projections;

lateral margins of segments 3–10 with long, acute setae. Operculate gills (Figs.5–6): uniform brown, dorsal surface densely covered with rounded granules, and bearing long, robust, acute lateral setae; Y-shaped ridge with long, robust, clavate setae on inner ridge; ventral surface with row of microtrichiae near outer margin and posterior margins. Cerci with whorls of long, acute setae on articulations and with 1–2 long, acute intersegmental setae (Fig.10).

### 1.2 Etymology

The epithet *aspera* from the Latin meaning rough.

### 1.3 Distribution

Hong Kong, China.

### 1.4 Material examined (in alcohol)

Holotype: mature larva (in SCAU), nr. Lam Kam Road, Ma Po Mei section, Lam Tsuen River, Lam Tsuen Valley, Hong Kong, China, 22 - X - 1997, coll. TONG Xiao-li. Paratype: 1 larva, locality, date and coll. as holotype.

### 1.5 Remarks

This new species resembles *Caenis argillosa* from Taiwan (Kang & Yang, 1994), but can be distinguished from the latter by the following characters: ① head capsule surface densely covered with rounded granules; ② labrum (Fig.2) yellow-brown and subrectangular with numerous long, robust setae on dorsal anterior portion, with a shallow emargination on the anteromedian margin; width of labrum approximately 2.2 times length; ③ pronotum (Fig.4) yellow-brown, densely covered with rounded granules; ④ operculate gills (Figs.5–6) brown, dorsal surface densely covered with rounded granules; and ⑤ cerci with whorls of long, acute setae on articulations and with 1–2 long, acute intersegmental setae (Fig.10).

## 2 *Caenis bicornis* sp.nov. (Figs.11–20)

### 2.1 Larva

Body length 2.5–3.8 mm. Cerci 1.0–1.8 mm long.

Head Dorsum brown. Antennal pedicle with 4–6 long, robust setae. Surface of head capsule surface densely covered with rounded granules. Labrum

yellow-brown and subrectangular with numerous long, robust setae on dorsal anterior half, and anteromedian margin with a shallow emargination; width of labrum approximately 2.0 times its length. Mandibles (Figs.11–12): basal half of dorsum densely covered with rounded granules and long, pinnate setae laterally. Maxillary palp (Fig.13) 3-segmented, terminal segment approximately 1.6 times longer than segment 2, segment 1 slightly longer than terminal segment. Labium (Fig.14): glossae with numerous long, fine, acute dorsal setae; ventral surface of glossae with some short, robust apical setae and numerous denticles basally; paraglossae covered with numerous long, robust, pointed setae; palps 3-segmented, segment 1 subequal to segment 2 in length, segment 3 conical and shorter, approximately 1/2 length of segment 2.

Thorax Pronotum (Fig.17) yellow-brown covered with rounded granules. Meso- and metanota yellow-brown with a pair of pale spots submedially, anterolateral corner of mesonotum with a distinct process (Fig.20). Forefemora (Fig.19) with a transverse row of 6–8 stout, long, clavate setae on distal 1/3, and with long, robust, acute dorsal setae; foretibiae with long, acute ventral setae; foretarsi with long, fine setae and short, robust setae ventrally, and with long, fine dorsal seta; tarsal claws with 3 small denticles basally.

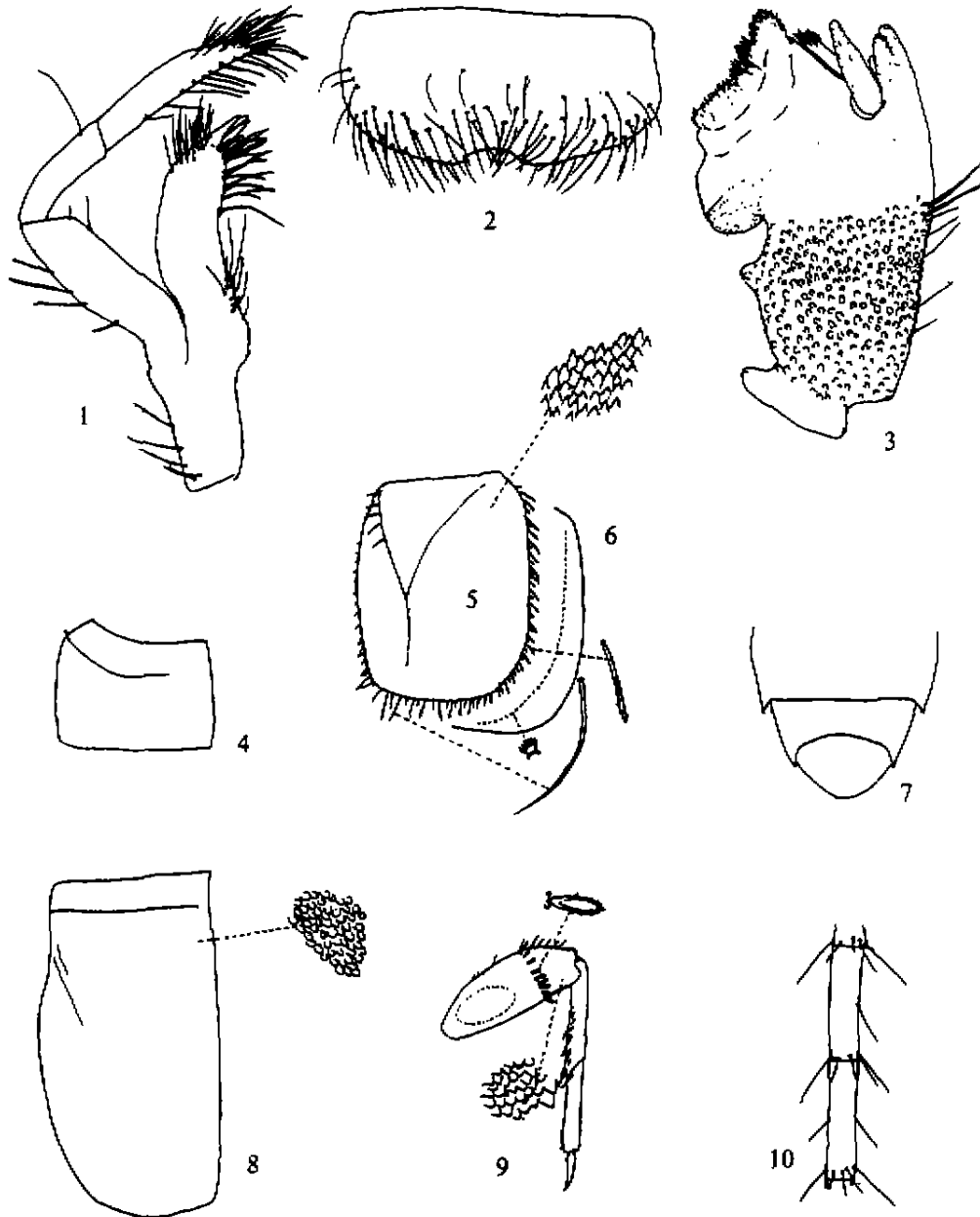
Abdomen Abdominal terga 1–6 light yellow, terga 7–10 yellow-brown; posterior margin of tergum 2 with a triangular process medially; terga 2–9 with posterolateral projections; lateral margins of segments 3–10 with long, acute setae. Operculate gills (Figs.15–16): uniform brown, and bearing long, robust, acute lateral setae; Y-shaped ridge with long, robust, clavate setae on inner ridge; ventral surface with row of microtrichiae near outer margin.

### 2.2 Etymology

The epithet *bicornis* from the Latin referring to the process on each anteriorlateral corner of the mesonotum.

### 2.3 Distribution

Hong Kong, China.



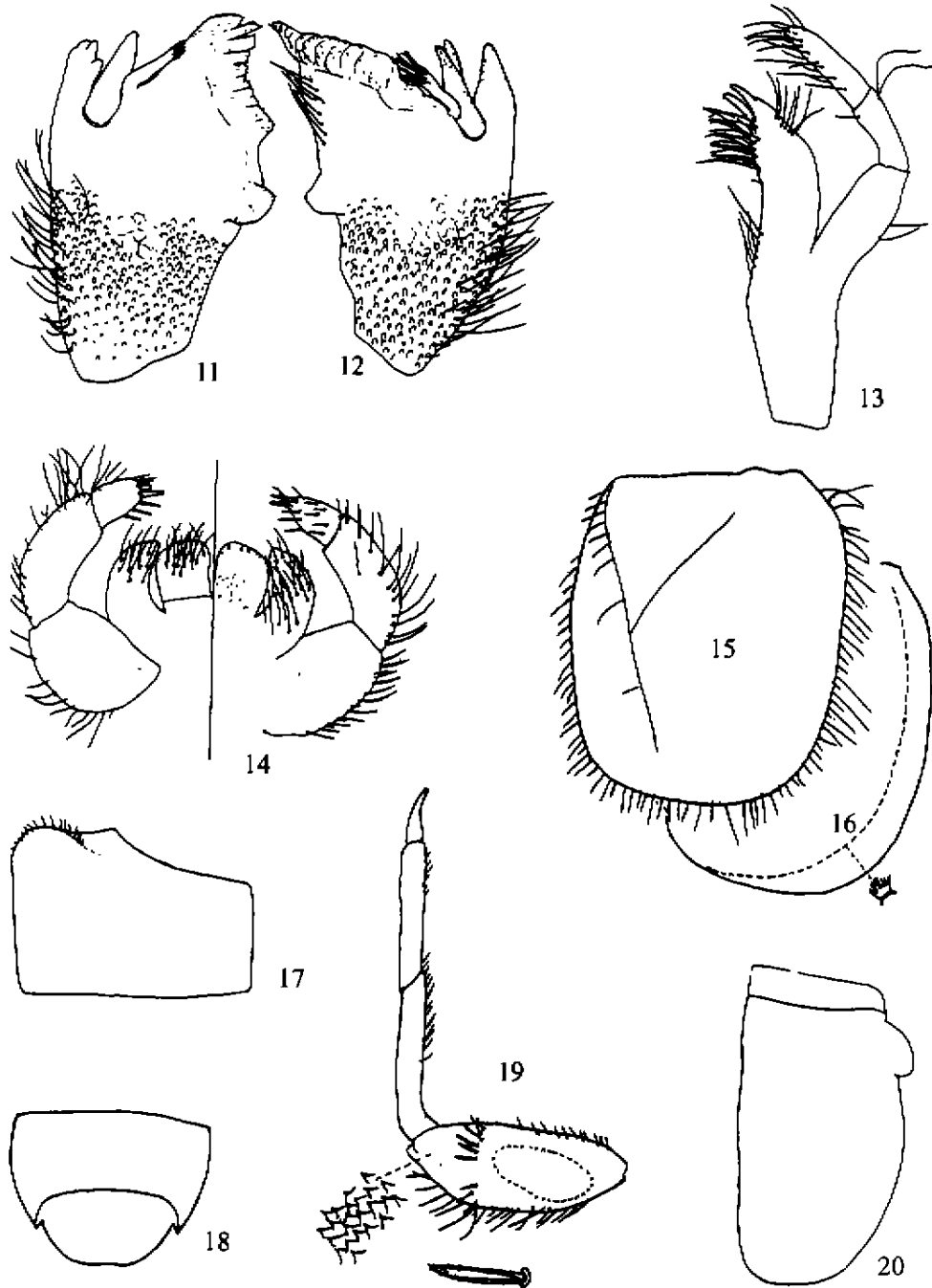
Figs. 1-10 Larva of *Caenis aspera* sp. nov.

1. Maxilla; 2. Labrum; 3. Right mandible; 4. Left half of pronotum; 5. Right operculate gill; 6. Posterolateral margin of operculate gill, ventral view, showing row of microtrichia; 7. Abdominal segments 8 and 9, dorsal view; 8. Thoracic nota; 9. Foreleg; 10. Part of cerci.

#### 2.4 Material examined (in alcohol)

Holotype: mature larva (in SCAU), nr. Tong Ming Tsuen, Lam Tsuen River, Lam Tsuen Valley, Hong Kong, China, 25 - V - 1998, coll. TONG Xiao-li. Paratypes: 52 larvae, locality, date and coll. as holotype; 15 larvae, Pokfulam, Hong Kong Is., 25 - IV - 1993, coll. Tony CHAN; 3 larvae, Shek Mun

Kap, Lantau Is., 10 - VII - 1996, coll. TONG Xiao-li; 1 larva, nr. Tung Chung Road, Wang Lung Hang, Lantau Is., 30 - VII - 1997, coll. TONG Xiao-li; 1 larva, Sha Kok Mei, Sai Kung, 6 - VIII - 1997, coll. TONG Xiao-li; 5 larvae, nr. Tong Min Tsuen, Lam Tsuen River, 19 - IX - 1997, coll. TONG Xiao-li; 3 larvae, nr. Lam Kam Road, Ma Po Mei, Lam Tsuen



Figs. 11-20 Larva of *Caemis bicornis* sp. nov.

11. Left mandible; 12. Right mandible; 13. Maxilla; 14. Labium, left: ventral view, right: dorsal view; 15. Right operculate gill; 16. Posterolateral margin of operculate gill, ventral view, showing row of microtrichia; 17. Right half of pronotum; 18. Abdominal segment 9, dorsal view; 19. Foreleg; 20. Thoracic nota.

River, Lam Tsuen Valley, 22 - X - 1997, coll. TONG Xiao-li; 1 larva, Ha Wun Yiu, Tai Po, 4 - XI - 1997, coll. TONG Xiao-li; 12 larvae, nr. San Tong, Lam Tsuen River, 12 - XI - 1997, coll. TONG Xiao-li; 5 larvae, Shek Shan Tsuen, Lam Tsuen Val-

ley, 12 - XI - 1997, coll. TONG Xiao-li; 30 larvae, Chuen Lung, 20 - I - 1998, coll. TONG Xiao-li; 1 larva, nr. Ng Uk, Tan Shan River, 13 - II - 1998, coll. TONG Xiao-li; 2 larvae; near Chuen Lung, 12 - III - 1998, coll. TONG Xiao-li; 6 larvae, Tan Chuk

Han, 18 - III - 1998, coll. TONG Xiao-li; 2 larvae, Ho Chung, Sai Kung, 31 - III - 1998, coll. TONG Xiao-li; 6 larvae, downstream of Pak Ngau Shek, Ma Po Mei Tsuen, Lam Tsuen Valley, 21 - V - 1998, coll. TONG Xiao-li; 1 larva, Tai Mong Tsai, Sai Kung, 9 - VII - 1998, coll. TONG Xiao-li; 1 subimago, Ham Tin, Sai Kung, 16 - I - 1999, coll. TONG Xiao-li.

### 2.5 Remarks

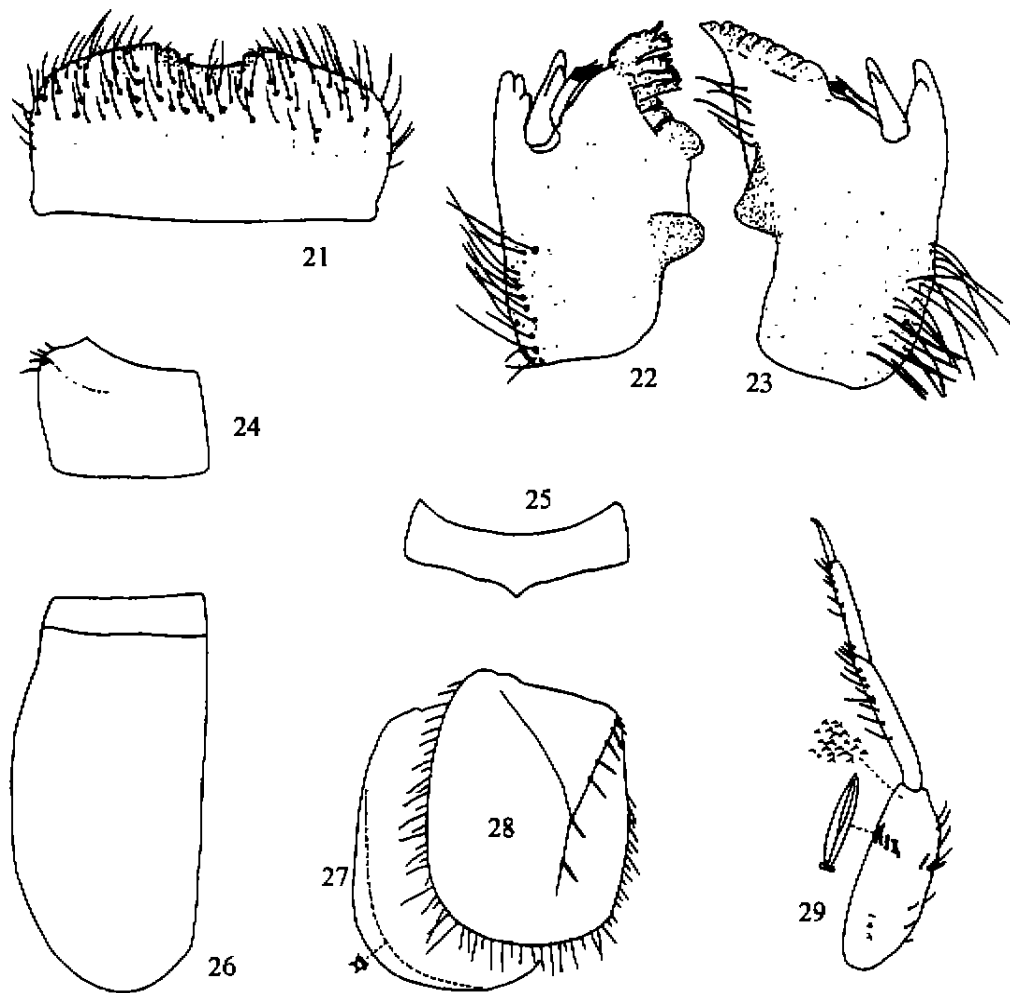
This new species resembles *Caenis montana* from Taiwan (Kang & Yang, 1994), but can be distinguished from *C. montana* by the following characters: ①maxillary palp (Fig.13) 3-segmented, approximately 1.6 times length of segment 2, segment 1 slightly

longer than terminal segment; ②forefemora (Fig.19) with a transverse row of 6-8 stout, long, clavate setae on distal 1/3, and with long, robust, acute dorsal setae; foretibiae with long, acute ventral setae; and ③abdominal terga 1-6 light yellow, terga 7-10 yellow-brown; posterior margin of tergum 2 with a triangular process medially. *Caenis bicornis* is widespread in Hong Kong streams, but tends to favour areas of slow current or quiet water.

### 3 *Caenis lubrica* sp.nov. (Figs.21-29)

#### 3.1 Larva

Body length 2.7-3.7 mm. Cerci 1.6-2.6 mm long.



Figs.21-29 Larva of *Caenis lubrica* sp.nov.

21. Labrum; 22. Left mandible; 23. Right mandible; 24. Left half of pronotum; 25. Posterior margin of abdominal tergum 2; 26. Thoracic nota; 27. Posterolateral margin of operculate gill, ventral view, showing row of microtrichia; 28. Left operculate gill; 29. Foreleg.

**Head** Dorsum of head capsule brown with irregular pale marks. Antennal pedicle with 3–6 long, robust setae. Head capsule surface covered with tiny, somewhat acute granules. Labrum (Fig.21) yellow-brown and subrectangular dorsally with numerous long, robust setae on anterior half; anteromedian margin with a shallow emargination; width of labrum approximately 2.2 times length. Mandibles (Figs.22–23): basal half of dorsum with long, pinnate lateral setae. Maxillary palp 3-segmented, segment 1 slightly longer than terminal segment, segment 2 approximately 3/4 length of terminal segment. Labium: glossae with numerous long, fine, acute dorsal setae, ventral surface of glossae smooth; paraglossae covered with numerous long, robust, pointed setae; palps 3-segmented, segment 1 subequal to segment 2 in length, segment 3 conical and shorter, approximately 1/3 length of segment 2.

**Thorax** Pronotum (Fig.24) yellow-brown; surface with small granules and wrinkles. Meso- and metanota yellow-brown, anterolateral corner of mesonotum without a distinct process (Fig.26). Forefemora (Fig.29) with a transverse row of 6–8 stout, long, clavate setae on distal 1/3, and with long, robust, acute dorsal setae; foretibiae with long, acute ventral setae; foretarsi with long, fine setae and short, robust setae ventrally, and with long, fine dorsal setae; tarsal claws with 3 small denticles basally.

**Abdomen** Abdominal terga 1–6 light grey-yellow, terga 7–10 yellow-brown; posterior margin of tergum 2 with a triangular process medially (Fig.25); terga 2–9 with posterolateral projections; lateral mar-

gins of segments 3–10 with long, acute setae. Operculate gills (Figs.27–28): uniform brown with paler margins, and bearing long, robust, acute setae laterally; Y-shaped ridge with long, robust, clavate setae on inner ridge; ventral surface with row of microtrichiae near outer and posterior margins.

### 3.2 Etymology

The epithet *lubrica* from the Latin meaning smooth.

### 3.3 Distribution

Hong Kong, China.

### 3.4 Material examined (in alcohol)

Holotype: mature larva (in SCAU), Tan Chuk Han, Fan Ling, Hong Kong, China, 18–III–1998, coll. TONG Xiao-li. Paratypes: 3 larvae, locality, date and coll. as holotype; 3 larvae, Ho Chung, Sai Kung, 31–III–1998, coll. TONG Xiao-li; 4 larvae, Tai Mong Tsai, Sai Kung, 9–XII–1998, coll. TONG Xiao-li; 3 larvae, Bride's Pool, 18–IV–1999, coll. TONG Xiao-li.

### 3.5 Remarks

This new species resembles *Caenis bella* from Taiwan (Kang & Yang, 1994), but can be distinguished from the latter by the following characters: ① surface of head capsule covered with tiny, somewhat acute granules; ② forefemora (Fig.29) with a transverse row of 6–8 stout, long, clavate setae on distal 1/3, and with long, robust, acute dorsal setae; and ③ abdominal terga 1–6 light grey-yellow, terga 7–10 yellow-brown; posterior margin of tergum 2 with a triangular process medially (Fig.25).

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