# Taxonomy of Chydoridae (Crustacea: Branchiopoda: Cladocera) from Taiwan

# 台灣產盤腸溞科(甲殼動物亞門，鰓足綱，枝角目)

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## Abstract

This paper describes and illustrates 19 species of freshwater cladocerans belonging to 14 genera of the family Chydoridae collected from Taiwan in 1997 to 2006. They are consisted of 12 species that are new records to Taiwan and seven species that have been known previously. The new records are *Kurzia* longirostris Daday, 1898; *Camptocercus uncinatus* Smirnov, 1971; *Monospilus dispar* Sars, 1862; *Leydigia ciliate* (Gauthier, 1939); *Oxyurella singalensis* (Daday, 1898); *Karualona karua* (King, 1853); *Dunhevedia crassa* King, 1853; *Ephemeroporus barroisi* (Richard, 1894); *Alonella excisa* (Fischer, 1854); *Pleuroxus trigonellus* (Müller, 1785); *Disparalona leei* (Chien, 1970); and *D. hamata* (Baird,1835). The known species are *Acroperus harpae* (Baird, 1835); *Alona diaphana* King, 1853; *A. rectangular* Sars, 1862; *A. costata* Sars, 1862; *A. affinis* (Leydig, 1860); *A. quadrangularis* (Müller, 1785); *Chydorus sphaericus* (Müller, 1785). A key to the species is provided.

## 摘 要

台灣地區淡水枝角類分類研究，共發現 14 屬 19 種盤腸溞科(Chydoridae)物種，其中 12 種爲新紀錄種，分別是*Kurzia longirostris* Daday, 1898; *Camptocercus uncinatus* Smirnov, 1971; *Monospilus dispar* Sars, 1862; *Leydigia ciliate* (Gauthier 1939); *Oxyurella singalensis* (Daday 1898); *Karualona karua* (King 1853); *Dunhevedia crassa* King, 1853; *Ephemeroporus barroisi* (Richard 1894); *Alonella excisa* (Fischer 1854); *Pleuroxus trigonellus* (Müller 1785); *Disparalona leei* (Chien 1970); and *D. hamata* (Baird 1835). 其他 7 種爲舊有紀錄種，其分別是 *Acroperus harpae* (Baird 1835); *Alona diaphana* King, 1853; *A. rectangular* Sars, 1862; *A. costata* Sars, 1862; *A. affinis* (Leydig 1860); *A. quadrangularis* (Müller 1785); 及 *Chydorus sphaericus* (Müller 1785).

文中除敘述各種的形態特徵之外，並且具備屬和種的檢索表及外部形態的描繪。



**Key words:** freshwater zooplankton, Chydoridae, taxonomy, Taiwan, Biodiversity

**關鍵詞：**淡水浮游動物、 盤腸溞科、分類學、臺灣、生物多樣性

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## Introduction

Taxonomy of cladocerans (*Crustacea*: *Branchiopoda*: *Cladocera*) of Taiwan were studied early by Ueno (1935b, 1938a, 1938b) and Harada (1933, 1943a, 1943b). They reported 22 species for the order Cladocera with nine species in the family Chyodridae. In 1997 to 2006, we collected samples of cladocerans from inland freshwaters of Taiwan, and have reported 26 species for the families Sididae, Bosminiidae, Daphniidae, Moinidae, Ilyocryptidae, and Macrothricidae (Young and Tuo 2011). This paper reports 19 species for the family Chydoridae, the largest family of the order Cladocera (Korovchinsky 1996). Many of the chydorid cladocerans in Taiwan are less than 1 mm in body length. They are bottom dwellers in littoral areas, but occasionally planktonic. The specimens collected were mainly from shallow water areas and some from benthic substrates.

## Materials and methods

Chydorid cladocerans were collected from quite inland freshwaters throughout the island of Taiwan (Fig. 1), such as reservoirs, pools, ponds, paddy fields, ditches and sinks (Appendix 1). The reservoirs and lakes described by Chen and Wang (1997) were the key collection sites. A conical plankton net was used to collect planktonic species. It was 30 cm long with a 55-$\mu$m stretch size, and had a 15 cm wide opening and a small collection

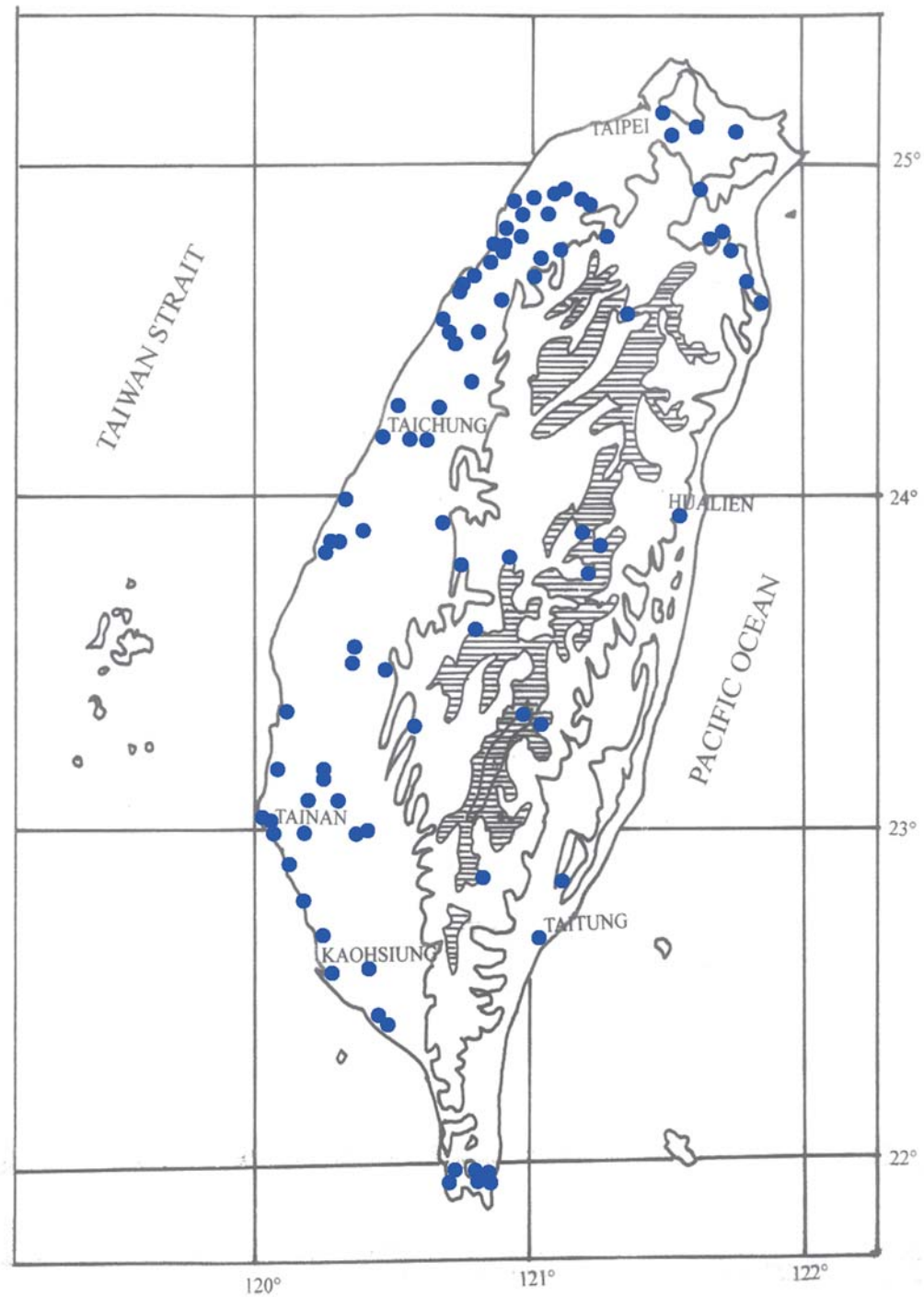


**Fig. 1.** Collection sites (solid circles) of Chydorid cladocerans from Taiwan.

**Appendix 1.** The 51 collection sites of 19 species of the family Chydoridae.

| Collection sites | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Alona rectangula* | *Alona costata* | *Alona quadrangularis* | *Alona diaphana* | *Alona affinis* | *Karualona karua* | *Oxyurella singalensis* | *Monospilus dispar* | *Acroperus harpae* | *Kurzia longirostris* | *Alonella excisa* | *Camptocercus uncinatus* | *Leydigia ciliata* | *Dunhevedia crassa* | *Disparalona hamata* | *Disparalona leei* | *Pleuroxus trigonellus* | *Chydorus sphaericus* | *Ephemeroporus barroisi* |
| 1. National Hsinchu University of Education (sink) | Hsinchu City | | * | | | | * | | | | | | | | | | | | * | |
| 2. Cemetery (garden pond) | Hsinchu City | * | * | | | | | | | | | | | | | | | | | |
| 3. Pao-shan reservoir | Hsinchu County | | | | | | | | | | | | | | | | * | | | |
| 4. Hsin-fong (irrigation pond No. 5) | Hsinchu County | | * | * | | | | | | | | | | | | | | | * | |
| 5. Pao-shan reservoir | Hsinchu County | | | | | | | | | | | | | | | * | | | * | |
| 6. Bei-pu (cold spring) | Hsinchu County | | | | | | * | | | | | | | | | | | | | |
| 7. Hu-kou (fish pond 1) | Hsinchu County | * | * | | | | | | | | | | | | | | | | | |
| 8. Hu-kou (fish pond 2) | Hsinchu County | * | | | | | | | | | | | | | | | | | | |
| 9. Hu-kou (fish pond 3) | Hsinchu County | | * | | | | | | | | | | | | | | | | | |
| 10.Hu-kou (paddy irrigation ditches) | Hsinchu County | * | * | | | | | | | | * | | | | | | * | | * | |
| 11. Cin-pu (lily pond) | Hsinchu County | | | * | | | | | | | | | | * | | | | * | | |
| 12. E-mei (fish pond) | Hsinchu County | * | | | | | | | | | | | | | | | | | | |
| 13.Yuan-yang-hu (high land lake) | Ilan County | | | | | | | | | | | * | | | | | | | * | |
| 14. Shuang-lian-bei (lake) | Ilan County | | * | | | | | * | | * | | | | | | | | | * | * |
| 15. Su-yao (shrimp pond) | Ilan County | | | | * | | | | | | | | | | | | | | | |
| 16. Dong-shih (irrigation ditches) | Jaiyi County | | | | * | | | | | | | | | | | | | | | |
| 17. Jhong-liao (pond) | Jaiyi County | | | | | | | | | | | | | | * | | | | | |
| 18. Lan-tan (reservoir) | Jaiyi County | * | * | | * | | | | | | | | | * | | | * | | * | |
| 19. Min-syong (pond) | Jaiyi County | | | | | | | | | | | | | * | | | | * | | |
| 20. Hou-long (fish pond) | Maioli County | | | | | | | | | | * | | | | | | | | | |
| 21. Min-de reservoir | Maioli County | * | * | | | | | | | | | | | | | | | | | |
| 22. Li-yu-tan reservoir | Maioli County | | * | | | | | | | | | | | | | | | | | |
| 23. Zao-ciao; Long-hu-gun (fish pond) | Maioli County | | * | | | | | | | | * | | * | | | * | | | * | |

**Appendix 1.** The 51 collection sites of 19 species of the family Chydoridae. (Cont)

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24. Zao-ciao; Long-hu-gun (garden pond) | Maioli County | | | | | | | | | | | | * | | | | * | | | |
| 25. Zao-ciao (marsh) | Maioli County | | | | | | | | | | | | | | | | | * | | |
| 26. Tun-siao; flyingcow ranch (garden pond) | Maioli County | * | | | | | | | | | | | | | | | | * | * | |
| 27. Jhu-nan township(marsh) | Maioli County | * | * | | | | | | | | | | | | | | | * | | |
| 28.Bai-shih-chih (high land pond) | Nantou County | | | * | | | | | | | | | | | | | | | | |
| 29. Lien-hua-chuh research center (Taiwan forestry research institute) | Nantou County | | | | | | | | | | | | | | | | | | * | |
| 30. Tun-lu-chih (high land pond) | Nantou County | | | | | | | | | | | | | | | | | | | |
| 31. Heng-chun;Long-liuan-tan (reservoir) | Pindong County | | * | | | | | | | | | | | | | | | | | |
| 32. Man-jhou (gang-kou creek) | Pindong County | | | | | | | | | | | | | | | | | * | | * |
| 33. Da-guei-hu (high land lake) | Pingdong County | | * | | | | | | | | | | | | | | | | * | |
| 34. Jia-min-hu (high land lake) | Taidong County | | * | * | | | | | | | | | | | | | | | | |
| 35. Hsinying (water chestnut field) | Tainan County | | * | | | | * | | | | | | | | | | | | | |
| 36. De-yan-bei (reservoir) | Tainan County | | * | | | | | | | | | | | * | | | | | | |
| 37. Ci-gu (fish pond) | Tainan County | | | | | * | | | | | | | | | | | | | | |
| 38. Yong-kang (fish pond) | Tainan County | | | | | | | | | | | | | | | | | * | | |
| 39. Sih-cao (milkfish pond 1) | Tainan County | | | | * | | | | | | | | | | | | | | | |
| 40. Sih-cao (milkfish pond 2) | Tainan County | | * | | | | | | | | | | | | | | | | | |
| 41. Sih-cao (fish pond irrigation ditches) | Tainan County | * | * | | | | | | | | | | | | | | | | | |
| 42. National Taiwan University (garden pond) | Taipei City | | | | | | | | | | | | | | | | | | * | |
| 43. Meng-huan-hu (pond) | Taipei City | | | | | | | | | | | | | | | | | | * | |
| 44. Jing-long-hu (pond) | Taipei County | * | * | | | | | | | | | | | | | | | | | |
| 45. San-sia; tong-hou-si (creek) | Taipei County | | | | | * | | | | | | | | | | | | | * | |
| 46. Yang-mei (fish pond) | Taoyuan County | * | | | | | * | | | | | | * | * | | | | * | * | |
| 47. Long-tan, De-long elementary school (garden pond) | Taoyuan County | | * | * | | | | | * | | | | * | | | * | | * | * | |
| 48. Long-tan ( fish pond) | Taoyuan County | * | * | | | | | | | | | | | * | | | | * | | |
| 49. Long-tan; De-long-gong (lily pond) | Taoyuan County | * | * | | | | | | | | | | * | | | | | | * | |
| 50. Long-tan-da-chi (reservoir) | Taoyuan County | * | * | | | | | | | | | | | | | | | | | |
| 51. Freeway Si-luo resting areas (garden pond) | Yunlin County | * | | | | | | | | | | | | | | | | | | |

bucket at the cod-end. For shallow water in paddy fields and littoral zone of open water bodies, the water was stirred with a wood stick, scooped with a cup, and then filtered with the plankton net. The samples were fixed in the 5% formalin-water solution in the field, brought back to the laboratory for sorting and identifying under a stereomicroscope, and then preserved in the 70% ethanol-water solution. Appendages were dissected, mounted on microscopic slides, tinted with polyvinyl lactophenol, and then covered with a cover glass. Line drawings were made using a camera Lucida. Measurement and observation were aided by a computerized image analysis system. Average and standard deviations (SD) of body lengths were based on the measurements of 15 or more specimens. The terminology and abbreviations used in the morphological descriptions (Fig. 2) followed those of Chiang and Du (1979) and Smirnov (1996).

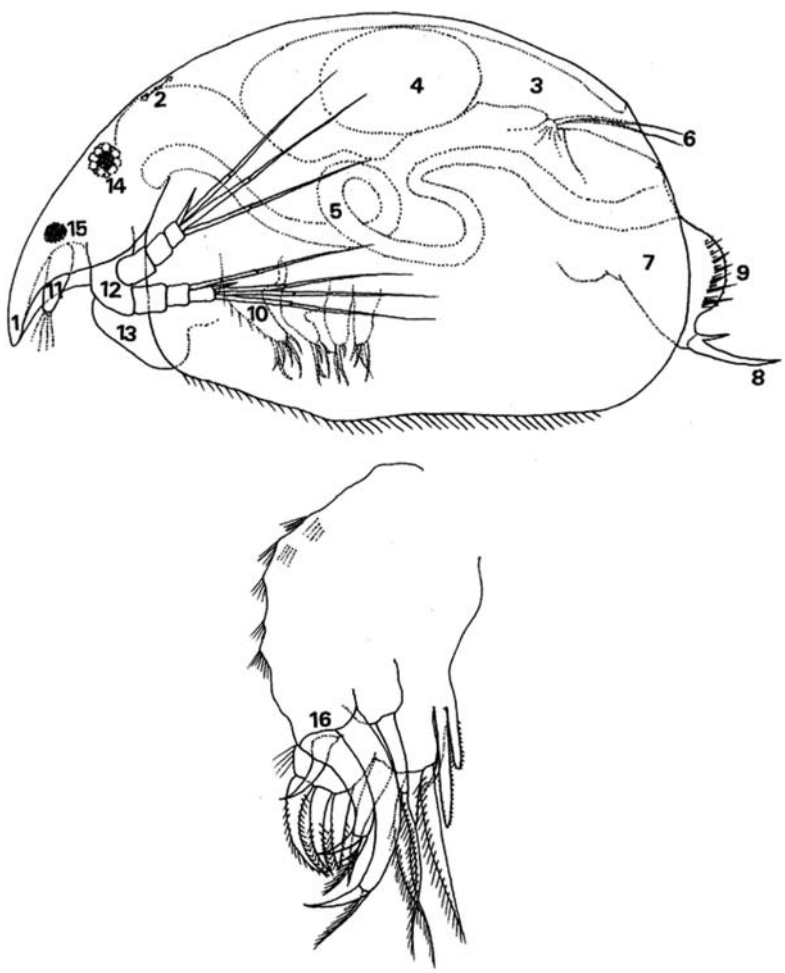


**Fig. 2.** General morphological descriptions of Chydoridae (1, rostrum; 2, head pores; 3, brood pounch; 4, egg; 5, gut; 6, setae natatoriae; 7, postabdomen; 8, claw; 9, anal teeth; 10, thoracic limb; 11, antennules (AI); 12, antenna (AII); 13, labral plate; 14, compound eye; 15, occellus; 16, inner distal lob (IDL) of thoracic limb I).

## Results

We collected 19 species of cladocerans belonging to 14 genera of the family Chydoridae. Of them 12 species are found to be the new records to Taiwan. These were *Kurzia longirostris* Daday, 1898; *Camptocercus uncinatus* Smirnov, 1971; *Monospilus dispar* Sars, 1862; *Leydigia ciliate* (Gauthier, 1939); *Oxyurella singalensis* (Daday, 1898); *Karualona karua* (King, 1853); *Dunhevedia crassa* King, 1853; *Ephemeroporus barroisi* (Richard, 1894); *Alonella excisa* (Fischer, 1854); *Pleuroxus trigonellus* (Müller, 1785); *Disparalona leei* (Chien, 1970); and *Disparalona hamata* (Baird, 1835). They are small, mostly benthic, and inhabiting in shallow water.

**A key to the genera and species of Chydoridae from Taiwan:**

1a. Posterior margin of valve high, nearly to the highest part of valve; claw with 1 basal spine (*Oxyurella* with 2-3 spines) (Aloninae).....2

1b. Posterior margin of valve low, usually not reaching the middle of the valve; claw with 2-3 basal spines (*Dunhevedia* with a spine) (Chydorinae).....13

2a. Inner side of claw with a backward large spine in the middle.....3

2b. Inner side of claw without backward large spine in the middle.....5

3a. AI short; tip reaching middle of rostrum.....*Kurzia longirostris*

3b. AI long; tip exceeding middle or reaching near the distal end of rostrum.....4

4a. Postabdomen slender; anal spines inserted on dorsal margin (*Camptocercus*).....*Camptocercus uncinatus*

4b. Postabdomen rectangular; anal spines inserted on lateral side near dorsal margin (*Acroperus*).....*Acroperus harpae*

5a. Head with ocellus but no compound eye (*Monospilus*).....*Monospilus dispar*

5b. Head with ocellus and compound eye.....6

6a. Postabdomen enlarged and semi-circular; lateral side with at least 10 bundles of larger anal spines and more than 15 bundles of smaller anal spines (*Leydigia*).....*Leydigia ciliata*

6b. Postabdomen rod-shaped, not enlarged; lateral side with less than 10 bundles of weak anal spines .....7

7a. Claw with 2-3 basal spines (*Oxyurella*).....*Oxyurella singalensis*

7b. Claw with a basal spine.....8

8a. Posterior corner of ventral valve with 2-3 denticles (*Karualona*).....*Karualona karua*

8b. Posterior corner of ventral valve without denticles (*Alona*).....9

9a. Anal spines on the dorsal margin in a bundle.....*Alona diaphana*

9b. Anal spines on the dorsal margin not in a bundle.....10

10a. Lateral anal spines stronger than dorsal anal spines.....*Alona rectangul*a

10b. Lateral anal spines weaker than dorsal anal spines.....11

11a. Posterodorsal corner of postabdomen triangular.....*Alona costata*

11b. Posterodorsal corner of postabdomen rounded.....12

12a. Inner side of basal spine on distal end of claws ciliated; dorsal with 2 major head pores.....*Alona affinis*

12b. Inner side of basal spine on distal end of claws usually non-ciliated; dorsal with 3 major head pores .....*Alona quadrangularis*
13a. Postabdomen boot-shaped (*Dunhevedia*).....*Dunhevedia crassa*
13b. Postabdomen rod-shaped.....14
14a. Postabdomen length less than twice of the height.....15
14b. Postabdomen length more than twice of the height.....16
15a. Labral plate with serration; posterior corner of ventral valve with a denticle (*Ephemeroporus*)..... .....*Ephemeroporus barroisi*
15b. Labral plate without serration; posterior corner of ventral valve smooth without denticles (*Chydorus*) .....*Chydorus sphaericus*
16a. Rostrum length less than twice of AI length (*Alonella*).....*Alonella excisa*
16b. Rostrum length more than twice of AI length.....17
17a. Distal end of rostrum straight (*Pleuroxus*); posterior corner of ventral valve with 1-3 denticles..... .....*Pleuroxus trigonellus*
17b. Distal end of rostrum curved inward; posterior corner of ventral valve without denticles (*Disparalona*) .....18
18a. Posterior valve slightly concave at posterodorsal corner; IDL with 3 setae, length of the shortest seta two-thirds of the longest seta.....*Disparalona leei*
18b. Posterior valve not concave at posterodorsal corner; IDL of thoracic I with 2 setae, proximal seta hook-shaped.....*Disparalona hamata*

## Descriptions of the Species

### *Kurzia longirostris* Daday, 1898
### (Fig. 3: A~D)

*Alona longirostris* Daday, 1898: 34.
*Pseudalona longirostris* Brehm, 1933b: 34-40.
*Kurzia longirostris* Smirnov, 1974: 490-491; Chiang and Du, 1979: 202-203; Michael and Sharma, 1988: 217-219; Hudec, 2000: 175-176.

**Female:** Body lengths 0.54 - 0.69 (0.60 ± 0.05) mm [ranges (mean + SD) mm]. Preserved specimens whitish or tinted yellow in color. Body roughly square laterally; dorsal margin convex; ventral margin with setae in middle region; posterodorsal corner slightly pointed, tip of the corner slightly below level of maximum height; posteroventral corner rounded without spine. Valve surface marked with distinct longitudinal ridges crossed with weak ridges to form a square grid.

Head shield with a long rostrum. Labral plate cuneiform with pointed tip. Ocellus located anteriorly to the area between base of rostrum and AI; its diameter equivalent to a half of that of the compound eye. AI tip not extending beyond middle of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen long and narrow, slightly tapering distally, with 10-13 major marginal anal spines. Claw with a basal spine, a row of small spines on inner margin, and a backward large spine at middle.

Ephippium of female valve darker in color with the surface marked with reticular grid lines. The other structures similar to those of parthenogenetic females.

**Male:** Body length about 0.46 mm, smaller than females. Body structure similar to that of parthenogenetic females. A few specimens were collected.

**Collection sites:** Collected in April and Sepember from a rice paddy irrigation ditch in Hsinchu County (site 10) and fish ponds in Mailoi County (20, 23) (Apendix 1). Benthic or planktonic in littoral areas.

### *Camptocercus uncinatus* Smirnov, 1971 (Fig. 3: E-G)

*Camptocercus uncinatus* Smirnov, 1974: 101, 535-537; 1998: 76-77.

**Female:** Body lengths 0.56 - 0.68 (0.610 ± 0.033) mm. Preserved specimens whitish or tinted yellow in color. Body long and oval laterally; dorsal margin archly rounded; ventral margin with setae in middle region; posterodorsal corner of valve rounded, slightly below level of maximum height; posteroventral corner rounded without spines. Valve surface marked with longitudinal ridges.

Head shield with a blunt rostrum and three main head pores. Labral plate cuneiform without marginal teeth. IDL of limb I with three digitiform lobes; proximal lobe as hard as a hook spine; two longer lobes at distal end with a plumose brush on base of distal spine. Ocellus smaller than compound eye, located anteriorly to the area between base of rostrum and AI. Tip of AI reaching near apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen long and narrow, slightly tapering distally, with 15-17 groups of marginal anal spines and a row of spine groups laterally along the margin. Claw with a basal spine, a row of small spines on inner margin, and a backward large spine in the middle.

**Male:** Not found.

**Collection sites:** Collected in January to September from Maioli country (sites 23, 24) and Taoyuan County (47, 48, 49) (Appendix 1). Benthic or planktonic in littoral areas.

**Remarks:** C. uncinatus is distinguishable from other congeners by the presence of digitiform lobes on IDL of thoracic limb I. It is easily confused with C. rectirostris by having similar valve shape (Tang et al. 1963; Chiang and Du 1979; Hann 1981; Michael and Sharma 1988).

### *Acroperus harpae* (Baird 1835) (Fig. 4: A~C)

*Lynceus harpae* Baird, 1835: 100.

*Acroperus harpae* Baird, 1843: 91; Ekman, 1905: 23-24; Ueno, 1930b: 446; Smirnov, 1974: 495-500; Chiang and Du, 1979: 202-203; Michael and Sharma, 1988: 189-192; Duigan, 1992: 9-10.

**Female:** Body lengths 0.50-0.59 (0.550 ± 0.064) mm. Preserved specimens whitish or tinted yellow in color. Body prolonged oval laterally; dorsal margin archly rounded; ventral margin with setae along middle region; posterodorsal corner rounded with 1-3 denticles, its height slightly less than the maximum height. Valve surface marked with longitudinal ridges.

Head shield with a broad but short rostrum. Labral plate cuneiform. Ocellus small, its diameter 1/2 of that of compound eye, located anteriorly

to the area between the base of rostrum and AI. AI rod-shaped; tip almost reaching to tip of rostrum. Three transverse rows of setae on proximal, middle and distal parts of rostrum, respectively. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen rectangular. No marginal anal spines; 12 groups of lateral spines linearly arranged on the lateral side. Claw with a basal spine, a row of small spine-like denticles on inner margin, and a backward large spine in the middle.

**Male:** Not found.

**Collection sites:** Collected in June to July in Ilan County (site 14) (Appendix 1). Benthic or planktonic in littoral areas.

### *Monospilus dispar* Sars, 1862
### (Fig. 4: D, E)

*Monospilus dispar* Sars, 1862: 165; Ueno, 1935a: 90-91; Smirnov, 1974: 620-623; Chiang and Du, 1979: 234-235; Duigan, 1992: 32-34; Masson and Amoros, 1992: 145-148.

**Female:** Body length 0.31 mm. Preserved specimens white or tinted yellow in color. Body globular in lateral view; dorsal margin semicircular; setae along whole ventral margin. Posterodorsal and posteroventral corners of valve rounded and smooth. Molting incompletely; the remaining part of old valve covering the new valve surface. Each valve surface marked with circular pits as many dimples on the water surface when viewed under microscope.

Head shield with a short rostrum with pointed distal end. Labral plate cuneiform. Head with an ocellus located anterior to the area between base of rostrum and AI. Compound eye not found. AI not extending over middle of rostrum. AII setae formula: 0-0-3/0-1-3.

Postabdomen short with several linear bundles of setae along lateral side. Preanal angle prominent. Anal teeth 5-7. Claw with a large basal spine and a row of small hair-like setae on inner margin.

**Male:** Not found

**Collection sites:** A single specimen of *M. dispar* was collected in January from Taoyuan County (47) (appendix 1). Benthic or planktonic in littoral areas.

**Remarks:** The female *M. dispar* specimen collected had no eggs or ephippium and its valve had only two layers. The number of layers on the valve surface increased with the number of molts.

### *Leydigia ciliata* (Gauthier 1939)
### (Fig. 5: A-C)

*Leydigia propinqua* var. *ciliata* Gauthier, 1939: 168; Dumont, 1981: 99; Dumont *et al*., 1981: 165.

*Leydigia ciliata* Smirnov, 1974: 557-561; Dumont *et al*., 1984: 167-168; Chen, 1993: 14.

**Female:** Body lengths 0.67-0.90 (0.770 ± 0.068) mm. Preserved specimens whitish or tinted yellow in color. Body oval laterally; dorsal margin arched and slightly rounded; ventral margin with a linear row of long setae. Length of posterior valves equal to body height; posterodorsal corner distinct; posteroventral corner rounded and smooth. Valve surface marked with longitudinal lines on the dorsal part and curved lines parallel to the margin of the posteroventral corner.

Head shield with a broad and short rostrum. Labral plate broadly cuneiform; front margin with setae. Ocellus slightly larger than compound eye, located anteriorly to the area between proximal base of AI and rostrum. Tip of AI reaching apex

of rostrum; front with 3 transverse groups of setae on posterior surface. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen broader than a third of body height; posteroventral margin with two notches and three oblique rows of setae on lateral side near ventral margin. Anal depression prominent; along the dorsal margin with 20-24 groups of lateral spines decreasing in size proximally. Claw with a tiny basal spine (invisible in some specimens). A row of small hair-like setae on inner margin of claw.

**Male:** Not found.

**Collection sites:** Collected in January and February from Hsinchu County (site 11), and Jaiyi County (18,19), Tainan county (36), Taoyuan county (46, 48) (Appendix 1). Benthic or planktonic in littoral areas.

### *Oxyurella singalensis* (Daday 1898) Fig. 5: D, E)

*Alonopsis singalensis* Daday, 1898: 43; Stingelin, 1905: 348; Brehm, 1933a: 700;

*Oxyurella singalensis* Rzoska, 1952: 472; Smirnov, 1974: 607-609; Chiang and Du, 1979: 233-234; Michael and Sharma, 1988: 212-214.

**Female:** Body lengths 0.51- 0.70 (0.580 ± 0.075) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin archly rounded; ventral margin with setae from middle to posterior end; posterodorsal corner rounded, slightly below level of maximum height; posteroventral corner rounded and smooth. Posterior valve surface marked with lines parallel to ventral margin.

Head shield with a long rostrum. Labral plate broad with smooth margin. Ocellus smaller than compound eye, located between rostrum and the proximal base of AI. Tip of AI exceeding the middle of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen slightly tapering distally; dorsal margin with 14 anal spines, the spine at the distal end small and the other 13 spines decreasing in size proximally. Lateral setae in groups arranging in a row along dorsal margin. Claw large with a slender basal spine and 1-2 additional small spines at the proximal base.

**Male:** Not found.

**Collection sites:** Collected in July from Ilan County (site 14) (Appendix 1). Benthic or planktonic in littoral areas.

### *Karualona karua* (King, 1853) (Fig. 6: A, B)

*Alona karua* King, 1853: 260; Sars, 1916: 337-338; Stingelin, 1905: 352; Ueno, 1936: 518; Tang *et al*., 1963: 145; Chiang and Du, 1979: 215-216.

*Alonella karua* Sars, 1901: 59; Stingelin, 1905: 352-353; Gurney, 1916: 336.

*Biapertura karua* Smirnov, 1974: 587-588; 1988: 74-76; Michael and Sharma, 1988: 207-209.

*Karualona karua* Dumont and Silva-Briano, 2000: 61.

**Female:** Body length 0.35-0.43 (0.38 ± 0.02) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin archly rounded; ventral margin with setae; posterodorsal corner distinct, below level of maximum height, and about 1/3 of body height; posteroventral corner of valves distinct with 2-4 denticles. Valve surface marked with lines crossing each other in a hexagonous grid.

Head shield with a long rostrum; dorsal head with two major head pores. Labral plate broad

with smooth margin. Ocellus smaller than compound eye, located posteriorly to the area between proximal base of AI and rostrum. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/0-1-3.

Postabdomen short, slightly oblong. Preanal angle small and anal teeth 7-8. Lateral setae in linear groups along dorsal margin, extending beyond the margin of postabdomen; first seta of each group large. Claw large with a small basal spine.

**Male:** Not found.

**Collection sites:** Collected in January to October from Hsinchu City (site 1), Hsinchu County (6), Taoyuan County (46) and Tainan County (35) (Appendix 1). Benthic or planktonic in littoral areas.

### *Alona diaphana* King, 1853
### (Fig. 6: C, D)

*Alona diaphana* King, 1853: 260; Ueno, 1938a: 130; 1938b: 167; 1938c: 286; Chiang and Du, 1979: 222-223; Brancelj, 1990: 14; Frey, 1991: 13-23.

*Alona davidi* Stingelin, 1905: 352; Smirnov, 1974: 451-453.

*Alonella diaphana* var. *punctata* Gurney, 1911: 30.

*Alonella diaphana* Gurney, 1927: 74; Jenkin, 1929: 248; Brehm, 1933a: 734.

**Female:** Body lengths 0.38-0.51 (0.450 ± 0.028) mm. Preserved specimens whitish or tinted yellow in color. Body oval laterally; dorsal margin archly rounded with a linear row of setae along almost the whole ventral margin; posterodorsal corner distinct, below the maximum height and about 1/3 of body height; posteroventral corner rounded and smooth. Valve surface smooth with no distinct markings.

Head shield with a short and pointed rostrum. Plate of labrum broad with smooth margin. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen moderately oblong with a rounded posterodorsal corner, 9-14 groups of anal teeth on dorsal margin, and 7-8 groups of lateral setae. Claw with a basal spine and a row of setae on inner margin.

**Male:** Not found.

**Collecion sites:** Collected in February to August from Ilan County (site 15), Jaiyi county (16,18) and Tainan County (39) (Appendix 1). Benthic or planktonic in littoral areas.

### *Alona rectangula* Sars, 1862
### (Fig. 6: E, F)

*Alona rectangula* Sars, 1862: 160; Daday, 1904: 60-61; Schiklejew, 1930: 342; Ueno, 1935c: 298; Harada, 1943a: 191; Smirnov, 1974: 425-428; Chiang and Du, 1979: 224-225; Rajapaksa and Fernando, 1982: 52, 64; Sabater, 1987: 54-55; Michael and Sharma, 1988: 171-173; Duigan, 1992: 22-24.

*Alona intermedia* Gurney, 1927: 72.

**Female:** Body lengths 0.32-0.38 (0.35 ± 0.02) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin archly rounded with a linear row of setae along almost whole ventral margin; posterodorsal corner distinct, slightly below the maximum height; posteroventral corner rounded and smooth. Posterior valve surface marked with longitudinal lines.

Head shield with a short and broad rostrum.

Labral plate broad with smooth margin. Ocellus smaller than compound eye, located in the area with an equidistance to compound eye and to proximal base of AI. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/0-1-3.

Postabdomen short and broad with a round posterodorsal corner. Preanal angle distinct; dorsal margin with 8-10 anal teeth and a linear row of 10 groups of lateral setae that are longer than marginal teeth. Claw large, base with a spine.

**Male:** Not found.

**Collection sites:** Collected in January to September from Taipei County (site 44), Taoyuan County (46, 48, 49, 50), Hsinchu city (2), Hsinchu County (7, 8, 10, 12), Maioli County (21, 26, 27), Yunlin County (51), Jaiyi County (18), and Tainan County (41) (Appendix 1). Benthic or planktonic in littoral areas.

### *Alona costata* Sars, 1862
### (Fig. 7: A, B)

*Alona costata* Sars, 1862: 286; Smirnov, 1974: 456-460; Frey, 1965: 160-162; Chiang and Du, 1979: 228-229; Michael and Sharma, 1988: 177-180; Duigan, 1992: 16-17.

**Female:** Body lengths 0.35-0.53 (0.430 ± 0.042) mm. Preserved specimens whitish or tinted yellow in color. Body oval laterally; dorsal margin slightly arched; ventral margin lined with setae; posterodorsal corner rounded, slightly below the maximum height; posteroventral corner rounded and smooth without denticles. Posterior valve surface marked with longitudinal lines.

Head shield with a short and broad rostrum. Labral plate broadly rounded with smooth margin. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong; dorsal and ventral margins almost parallel. Preanal angle distinct. Posterodorsal corner of postabdomen sharply pointed. Anal teeth 11-13; lateral side of postabdomen near the anus with a linear row of about 11 groups of setae. Claw large with a basal spine and smooth inner margin.

**Male:** Not found.

**Collection sites:** Collected in January to October from Taipei County (site 44), Taoyuan County (48, 49, 50), Hsinchu County (4, 7, 9, 10), Ilan county (14), Maioli County (21, 22, 23, 27), Jaiyi County (18), Tainan County (35, 36, 40, 41), Pingdong County (31, 33), and Taidong County (34) (Appendix 1). Benthic or planktonic in littoral areas.

### *Alona affinis* (Leydig 1860)
### (Fig. 7: C, D)

*Lynceus affinis* Leydig, 1860: 223.

*Alona affinis* Sars, 1916: 331,332; Chiang and Du, 1979: 220-221; Duigan 1992: 24-27.

*Biapertura affinis* Smirnov, 1974: 572-579; Michael and Sharma, 1988: 205-207.

**Female:** Body lengths 0.67-0.92 (0.780 ± 0.068) mm. Preserved specimens whitish or tinted yellow in color. Body oval laterally; dorsal margin arched slightly; a linear row of setae along almost whole ventral margin; posterodorsal corner rounded, slightly below level of maximum height; posteroventral corner rounded, smooth without denticles. Posterior valve surface marked with longitudinal lines.

Head shield with a short and broad rostrum; dorsal with two major head pores. Labral plate

broad and rounded without teeth on margin. Ocellus diameter equal to or slightly longer than that of compound eye; located in the area between proximal base of AI and rostrum. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong, slightly dilated distally. Preanal angle distinct. Posterodorsal corner rounded. Anal teeth 10-15; lateral side with more than 15 groups of setae along dorsal margin. Claw large with one basal spine. A short row of setae at the base of basal spine.

**Male:** Not found.

**Collection sites:** Collected in July from Taipei County (site 45) and Tainan County (37) (Appendix 1). Benthic species in littoral areas.

**Remarks:** Fryer (1999) considers this species to be under the genus *Biapertura*, but we consider it to be under the genus *Alona*, based on the shell and postabdomen structures. Fryer's (1999) description of "*Biapertura*" merely emphasizes the head pores but neglects its similarities in the important shell and postabdomen structures to those of the genus *Alona*.

### *Alona quadrangularis* (Müller 1785)
### (Fig. 7: E, F)

*Lynceus quadrangularis* Müller, 1785: 72.

*Alona quadrangularis* Baird, 1843: 92; Ueno, 1930a: 42; Tang *et al*., 1963: 144; Smirnov, 1974: 417-419; Chiang and Du, 1979: 219-220; Michael and Sharma, 1988: 170; Duigan 1992: 23-26.

**Female:** Body lengths 0.36-0.51 (0.460 ± 0.068) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin arched; almost whole ventral margin with a linear row of setae; posterodorsal corner almost rounded, slightly below level of maximum height; posteroventral corner rounded with smooth margin. Posterior valve surface marked with longitudinal lines.

Head shield with a short and broad rostrum; dorsal with three major head pores. Labral plate broad and rounded with smooth margin. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. Tip of AI almost reaching apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong, slightly dilated distally. Preanal angle prominent; posterodorsal corner of the postabdomen rounded; anal teeth 15-18; lateral side with more than 10 groups of setae along dorsal margin. Claw large with a basal spine.

**Male:** Not found

**Collection sites:** Collected in January, April, and July from littoral areas of high mountain ponds in Taoyuan County (site 47), Hsinchu County (11), Nantou County (28), and Taidong County (34) (Appendix 1).

**Remarks:** Chiang and Du (1979) distinguish *Alona quadrangularis* from *A. affinis* based on setae on postabdomen and basal spine of claw. Duigan (1992) found that his specimens are not distinguishable between the two species by the same traits described by Chiang and Du (1979). Our samples of the two species are distinguishable by setae of postabdomen, basal spine of claw, and number of head pores.

### *Dunhevedia crassa* King, 1853
### (Fig. 8: A, B)

*Dunhevedia crassa* King, 1853: 261; Stingelin, 1905: 357; Sars, 1916: 343-344; Jenkin 1929: 248; Smirnov, 1966: 183; 1969: 555; 1974: 390-394; 1996: 166-167; Chiang and Du,

1979: 242-244; Michael and Sharma, 1988: 157-159.

**Female:** Body lengths 0.41-0.44 (0.420 ± 0.011) mm. Preserved specimens whitish or tinted yellow in color. Body oval shape laterally; anterior and posterior parts of ventral margin with setae on inner face of valve near margin; middle part of ventral margin with setae; posterodorsal corner distinct, slightly below level of maximum height; posteroventral corner with a distinct sub-terminal denticle on ventral valve.

Head shield with a short and narrow rostrum, sharply pointed terminally. Labral plate cuneiform; margin smooth, without teeth. Ocellus smaller than compound eye, located in the area between proximal base of AI and rostrum. Tip of AI reaching apex of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen boot-shaped; dorsal margin with 13-14 anal teeth; lateral side scattered with several rows of short setae. Claw with a basal spine.

**Male:** Not found.

**Collection sites:** Collected in July from Jaiyi County (17) (Appendix 1). Benthic species in littoral areas.

### *Ephemeroporus barroisi* (Richard 1894) (Fig. 8: C-F)

*Pleuroxus barroisi* Richard, 1894: 375-377; Dumont *et al*., 1981: 165, 174-175.

*Chydorus barroisi* Sars, 1904: 636; 1916: 339-340; Stingelin, 1905: 358; Gurney, 1916: 336; Johnson, 1953: 928; Smirnov, 1974: 367-372; Chiang and Du, 1979: 257-258; Michael and Sharma, 1988: 149-151.

*Alonella barroisi* Schiklejew, 1930: 344-345.

*Ephemeroporus barroisi* Frey, 1982: 234-237, 266-267; Smirnov, 1996: 156-159.

**Female:** Body lengths 0.25-0.32 (0.270 ± 0.026) mm. Preserved specimens whitish or tinted yellow in color. Body almost circular in lateral view but dorsal margin semicircular. Anterior ventral margin of valve arched without setae; posterior margin of ventral valve straight with setae on inner surface; posterodorsal corner of valve rounded, halfway below level of maximum height; posteroventral angle of valve sharply pointed with a denticle. Valve surface smooth or with faint markings.

Head shield with a short and sharp rostrum. Labral plate broadly cuneiform with four denticular notches on outer margin. Ocellus smaller than compound eye, located in the area between proximal base of AI and rostrum. Tip of AI extending to middle of rostrum. Setal formula of AII: 0-0-3/0-1-3.

Postabdomen moderately oblong with distinct preanal angle; dorsal margin with two groups of anal teeth, an anterior group with three larger spines and a posterior group with seven smaller spines. Claw with two basal spines; proximal spine smaller than distal spine.

**Male:** Not found.

**Collecion sites:** Collected in April and July from Ilan County (site 14) and Pingdong County (32) (Appendix 1). Benthic species in littoral areas.

**Remarks:** According to Frey (1982), *E. barroisi* has a denticle on posteroventral angle of valve and denticular notches on outer margin of labral plate, and should be assigned to the genus *Ephemeroporus* rather than to the genus *Pleuroxus* (Dumont *et al*. 1981).

### *Chydorus sphaericus* (Müller 1785) (Fig. 8: G, H)

*Lynceus sphaericus* Müller, 1785: 71.

*Monoculus sphaericus* Jurine, 1820: 157.

*Chydorus sphaericus* Baird, 1843: 89; Pratt, 1898: 471; Steuer, 1902: 127; Stingelin, 1905: 359; Tang *et al*., 1963: 145; Smirnov, 1974: 342-346; 1996: 101-104; Chiang and Du, 1979: 253-254; Duigan and Murray, 1987: 113-124; Michael and Sharma, 1988: 139-142; Duigan, 1992: 55-61; Brancelj, 1996: 45-59.

**Female:** Body lengths 0.32-0.39 (0.360 ± 0.019) mm. Preserved specimens whitish or tinted yellow in color. Body circular in lateral view; dorsal margin arched to semicircular. Posterior margin of ventral valve with setae on inner surface of shell; posterodorsal corner of valve rounded, conspicuously below level of maximum height; posteroventral corner rounded, smooth without denticles. Valve surface with lines crossing each other to form a polygon grid.

Head shield with an acute rostrum. Labral plate cuneiform; outer margin smooth. Ocellus smaller than compound eye, located in the area between proximal base of AI and rostrum. AI short, 2/3 length of rostrum; tip not extending over apex of rostrum. Setal formula of AII: 0-0-3/0-1-3.

Postabdomen short and wide. Preanal angle distinct; posterodorsal corner rounded. Dorsal margin with 8-10 anal teeth. A row of minute lateral setae lined along the posterior end. Claw with two basal spines; inner margin with a row of setae.

**Male:** Not found.

**Collection sites:** Collected in late Winter to early Spring in January to April and late Summer to Autumn in July to October from Taipei City (sites 42, 43), Taipei County (45), Taoyuan County (46,47,49), Hsinchu City (1), Hsinchu County (4, 5, 10), Ilan County (13, 14), Maioli County (23, 26), Jaiyi County (18), Nantou County (29) and Pingdong County (33) (Appendix 1). Benthic species in littoral areas but occassionally found in planktonic collections.

### *Alonella excisa* (Fischer 1854) (Fig. 9: A-C)

*Lynceus excisus* Fischer, 1854: 428.

*Alonella excisa* Stingelin, 1905: 355; Gurney, 1916: 336; Sars, 1916: 338-339; Ueno, 1966: 97; Smirnov, 1966: 184; 1969: 550; 1974: 317-321; 1996: 90-92; 1998: 210; Chiang and Du, 1979: 239-240; Michael and Sharma, 1988: 135-136; Duigan, 1992: 35-37; Hudec, 1998: 210.

**Female:** Body lengths 0.26-0.32 (0.290 ± 0.025) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin arched; a row of setae along ventral margin. Posterodorsal corner of valve distinct, conspicuously below level of maximum height; posteroventral angle distinct with a blunt process. Valve surface with many lines crossing one another to form a polygon grid, each grid having small striations inside.

Head shield with a sharp rostrum. Labral plate broad with blunt apex; outer margin smooth. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. Tip of AI reaches pass middle of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong. Preanal angle rather distinct; dorsal margin with 9-11 anal teeth; lateral side with a row of 11 setae near dorsal margin. Claw with two basal spines; proximal spine smaller.

**Male:** Not found.

**Collection sites:** Collected in September from Ilan County (site 13) (Appendix 1). Benthic

species in littoral areas, sometimes found in planktonic collections.

### *Pleuroxus trigonellus* (Müller 1785) (Fig. 9: D-F)

*Lynceus trigonellus* Müller, 1785: 74.

*Pleuroxus trigonellus* Baird, 1843: 93; Ueno, 1935b: 212; Smirnov, 1966: 177, 180, 188; 1974: 276; 1996: 38-40; Chiang and Du, 1979: 247-248; Michael and Sharma, 1988: 125-127; Duigan, 1992: 41-43; Frey, 1993: 134-135.

**Female:** Body lengths 0.42-0.49 (0.450 ± 0.021) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin arched; almost whole ventral margin with setae. Posterodorsal corner of valve rounded, conspicuously below level of maximum height; posteroventral corner distinct, angle with denticles varying in size and number.

Head shield with a long and narrow rostrum. Labral plate cuneiform; front margin smooth. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. AI and AII short; tip (not including setae) of AI not reaching beyond middle of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong, slightly narrowing distally; distal end deeply depressed. Preanal angle distinct; dorsal margin with 12-15 anal teeth. Claw with two basal spines; proximal spine smaller than distal spine.

**Male:** Not found.

**Collection sites:** Collected in January to April, July, and September from Taoyuan County (sites 46, 47, 48), Hsinchu County (11), Maioli County (23, 25. 26, 27), Jaiyi County (19), Tainan County (38), and Pingdong County (32) (Appendix 1). Benthic species in littoral areas.

### *Disparalona leei* (Chien, 1970) (Fig. 10: A-C)

*Alona leei* Chien, 1969: 67-72.

*Alonella leei* Chien, 1970: 536-538.

*Disparalona leei* Michael and Frey, 1984: 95-106; Smirnov, 1996: 79-81.

**Female:** Body lengths 0.38-0.42 (0.400 ± 0.021) mm. Preserved specimens whitish or tinted yellow in color. Body elongate and oval in lateral view; dorsal margin arched; almost entire ventral margin lined with setae. Posterodorsal corner of valve distinct with a shallow depression on posterior valve margin near the corner; posteroventral corner rounded and smooth without denticles. Valve surface marked with longitudinal lines crossing each other, forming a polygon grid.

Head shield with a long and sharp rostrum. Labral plate small and cuneiform; front margin smooth. IDL with three setae; length of the short seta equal about an half of that of the other two setae. Ocellus smaller than compound eye, located in the area between proximal base of AI and rostrum. Tip of AI not extending pass half of rostrum. Setal formula of AII: 0-0-3/0-1-3.

Postabdomen oblong with both dorsal and ventral margins convex. Dorsal margin with 9-11 anal teeth. Claw with two basal spines.

**Male:** Not found.

**Collection sites:** Collected in January and February from Hsinchu County (sites 3, 10), Maioli County (24), and Jaiyi County (18) (Appendix 1). Benthic species in littoral areas.

**Remarks:** Morphologically the valve of *D. leei* is fairly similar to that of *D. rostrata*, so that

many authors have treated *D. leei* as *D. rostrata* without denticles at posteroventral corner (Tang *et al*. 1963; Smirnov 1974; Chiang and Du 1979; Idris and Fernando 1981).

### ***Disparalona hamata* (Baird, 1835)**
### **(Fig. 10: D-F)**

*Lynceus hamatus* Baird, 1835: 100.

*Pleuroxus hamatus* Baird, 1843: 94; Smirnov, 1974: 293-296.

*Pleuroxus hamulatus* Birge, 1879: 22-23; 1910: 1052; Chiang and Du, 1979: 244-246.

*Alonella hamata* Dumont, 1981: 105; Dumont *et al*., 1984: 164.

*Alonella hamulatus* Idris and Fernando, 1981: 241-242.

*Alonella hamulata* Zoppi *de* Roa and Vasquez, 1991: 56.

*Disparalona hamata* Smirnov, 1996: 81-83.

**Female:** Body lengths 0.42-0.55 (0.490 ± 0.037) mm. Preserved specimens whitish or tinted yellow in color. Body oval in lateral view; dorsal margin arched; almost whole ventral margin with a row of setae. Posterodorsal corner of valve rounded, conspicuously below level of maximum height; posteroventral corner rounded and smooth without denticles. Posterior valve surface marked with longitudinal lines.

Head shield with a long and narrow rostrum. Labral plate cuneiform; front margin smooth. Ocellus smaller than compound eye, located anteriorly to the area between proximal base of AI and rostrum. IDL with two setae; the proximal seta hook-shaped. Tip of AI not reaching middle of rostrum. Setal formula of AII: 0-0-3/1-1-3.

Postabdomen oblong; middle of the posterior end depressed. Preanal angle distinct; posterodorsal corner of the postabdomen rounded; dorsal margin with 12-14 anal teeth. Claw base with two basal spines.

**Male:** Not found.

**Collection sites:** Collected in January, August, and September from Taoyuan County (site 47), Hsinchu County (5), and Maioli County (23). Benthic species in littoral areas.

## Acknowledgement

We thank Dr. Chang-Tai Shih for his kind assistance, systematic suggestions and encouragement.

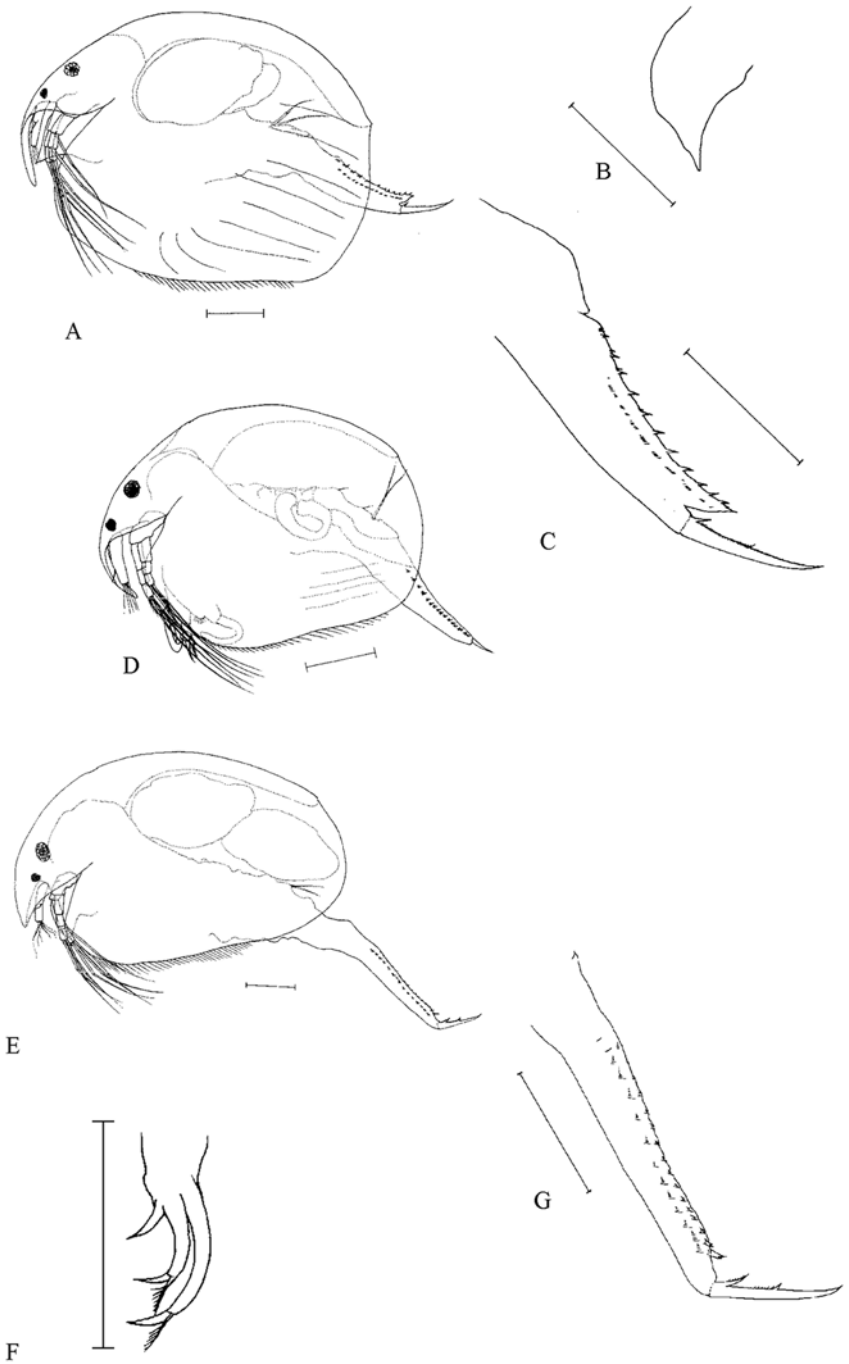


**Fig. 3.** *Kurzia longirostris* Daday, 1898 (adult female: A, lateral view of habitus; B, rostrum plate; C, postabdomen, and adult male: D, lateral view of habitus), and *Camptocercus uncinatus* Smirnov, 1971 (adult female: E, lateral view of habitus; F, setae on inner distal lobe of limb I; G, postabdomen) (Scale bar = 0.1 mm).

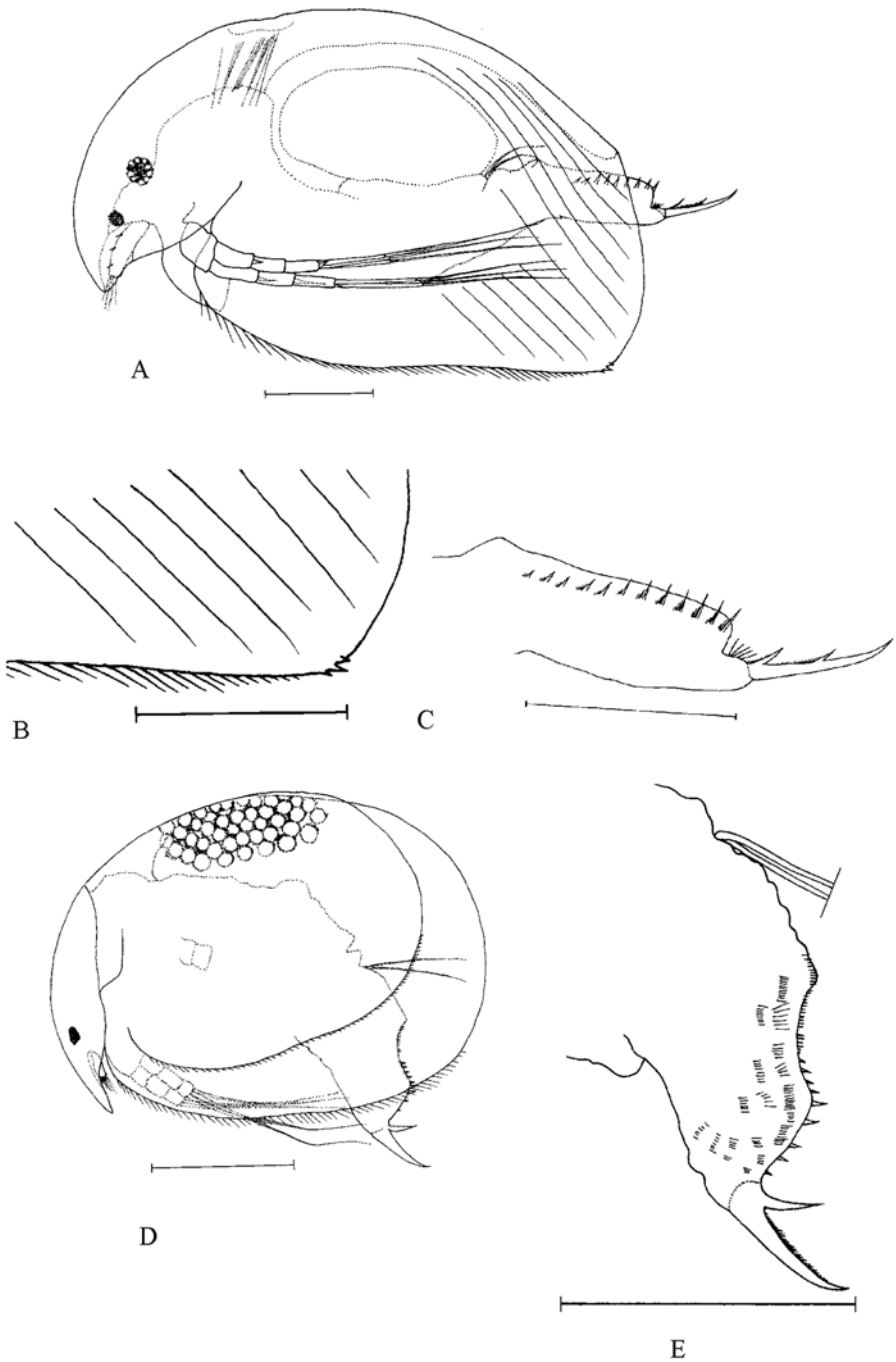


**Fig. 4.** *Acroperus harpae* (Baird 1835) (adult female: A, lateral view of habitus; B, posteroventral angle of valve; C, postabdomen), and *Monospilus dispar Sars*, 1862 (adult female: D, lateral view of habitus; E, postabdomen) (scale bar = 0.1 mm).

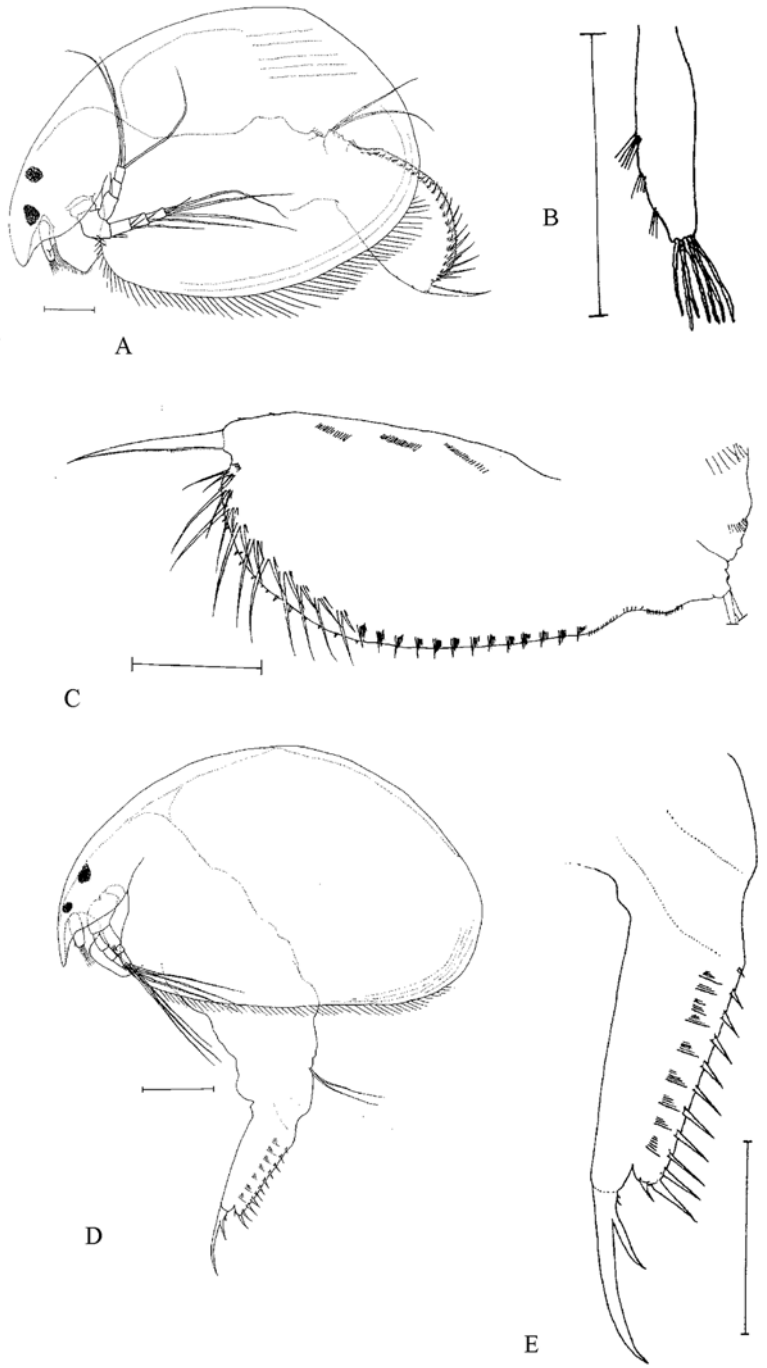


**Fig. 5.** *Leydigia ciliate* (Gauthier, 1939) (adult female: A, lateral view of habitus; B, antennule; C, postabdomen), and *Oxyurella singalensis* (Daday, 1898) (adult female: lateral view of habitus; E, postabdomen) (Scale bar = 0.1 mm).

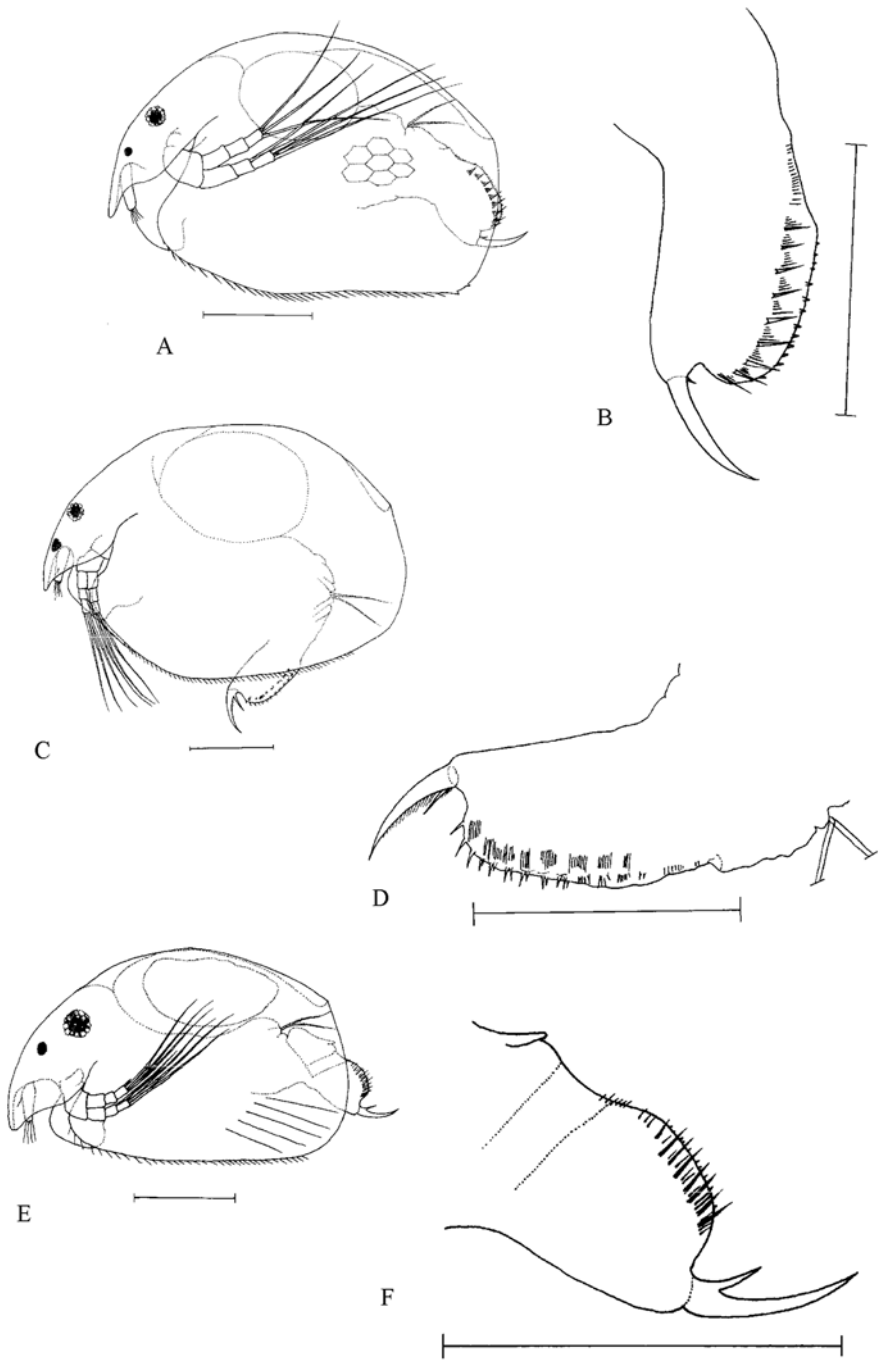


**Fig. 6.** *Karualona karua* (King, 1853) (adult female: A, lateral view of habitus; B, postabdomen), *Alona diaphana* King, 1853 (adult female: C, lateral view of habitus ; D, postabdomen), and *Alona rectangular* Sars, 1862 (adult female: E lateral view of Habitus; F, postabdomen ) (scale bar = 0.1 mm).

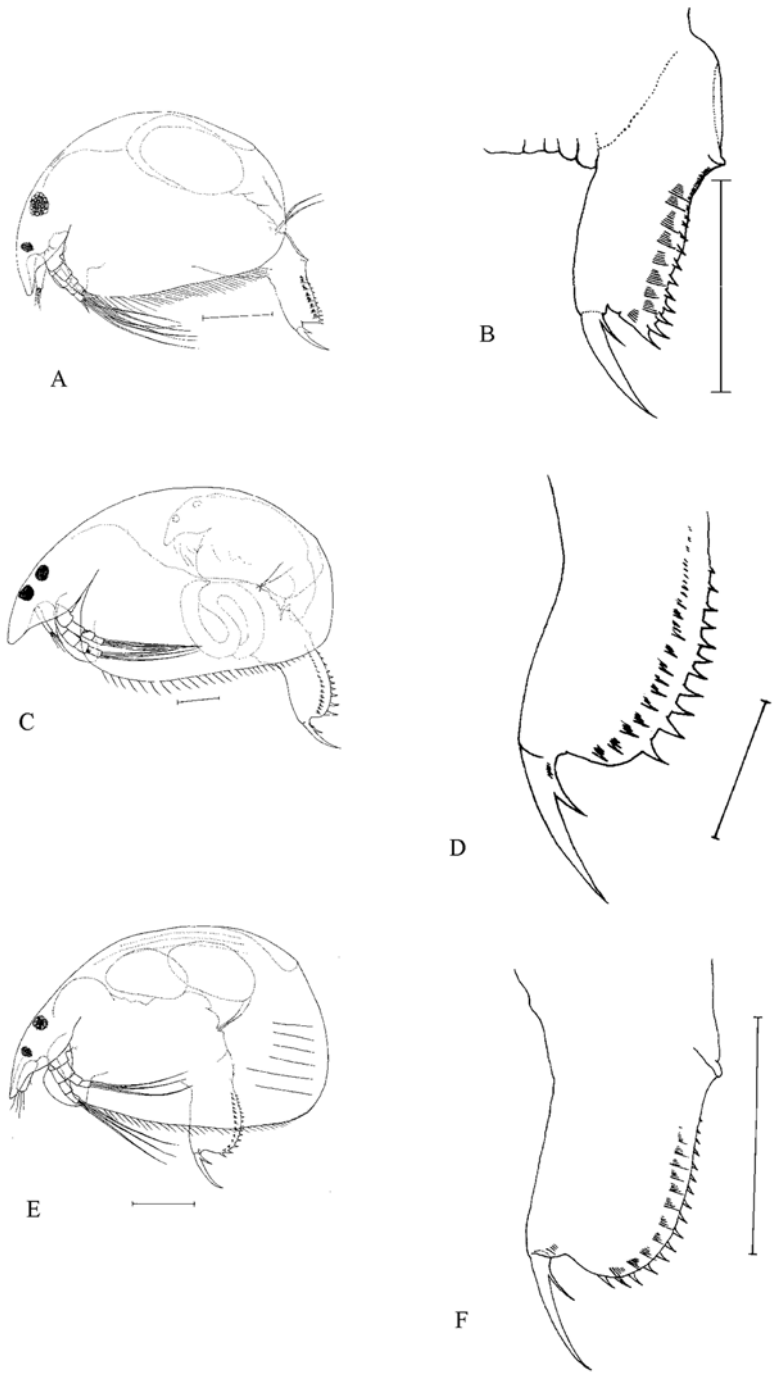


**Fig. 7.** *Alona costata* Sars, 1862 (adult female: A. lateral view of habitus; B, postabdomen), *Alona affinis* (Leydig, 1860) (adult female: C, laeral view of habitus; D, postabdomen), and *Alona quadrangularis* (Müller, 1785) (adult female: E. lateral view of habitus; F, postabdomen) (scale bar = 0.1 mm).

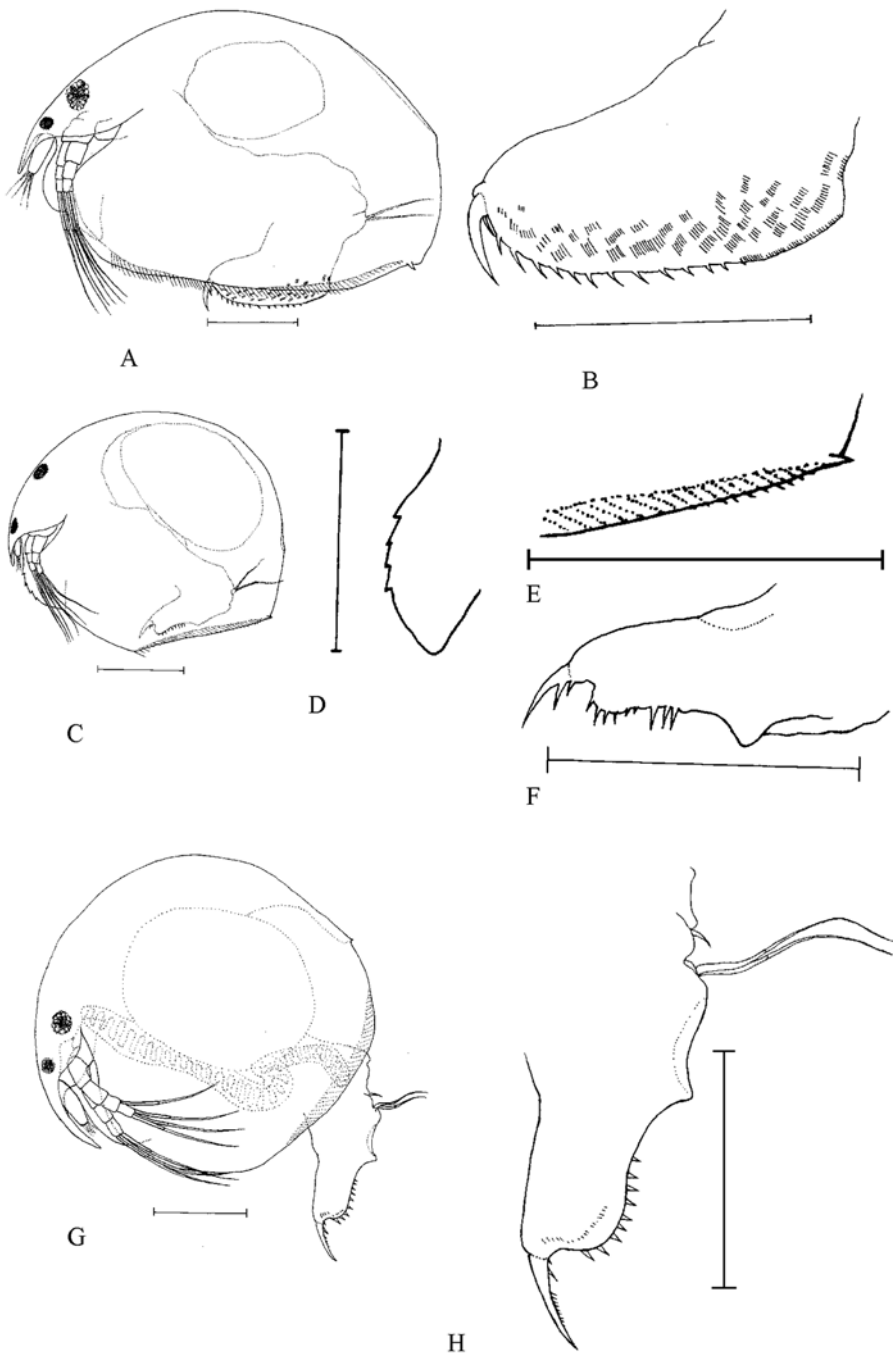


**Fig. 8.** *Dunhevedia crassa* King, 1853 (adult female: A, lateral view of habitus; B, postabdomen), *Ephemeroporus barroisi* (Richard, 1894) (adult female: lateral view of habitus; D, labral plate; E, posteroventral angle of valve; F, postabdomen), and *Chydorus sphaericus* (Müller, 1785) (adult female: lateral view of habitus; H, postabdomen) (scale bar = 0.1 mm).

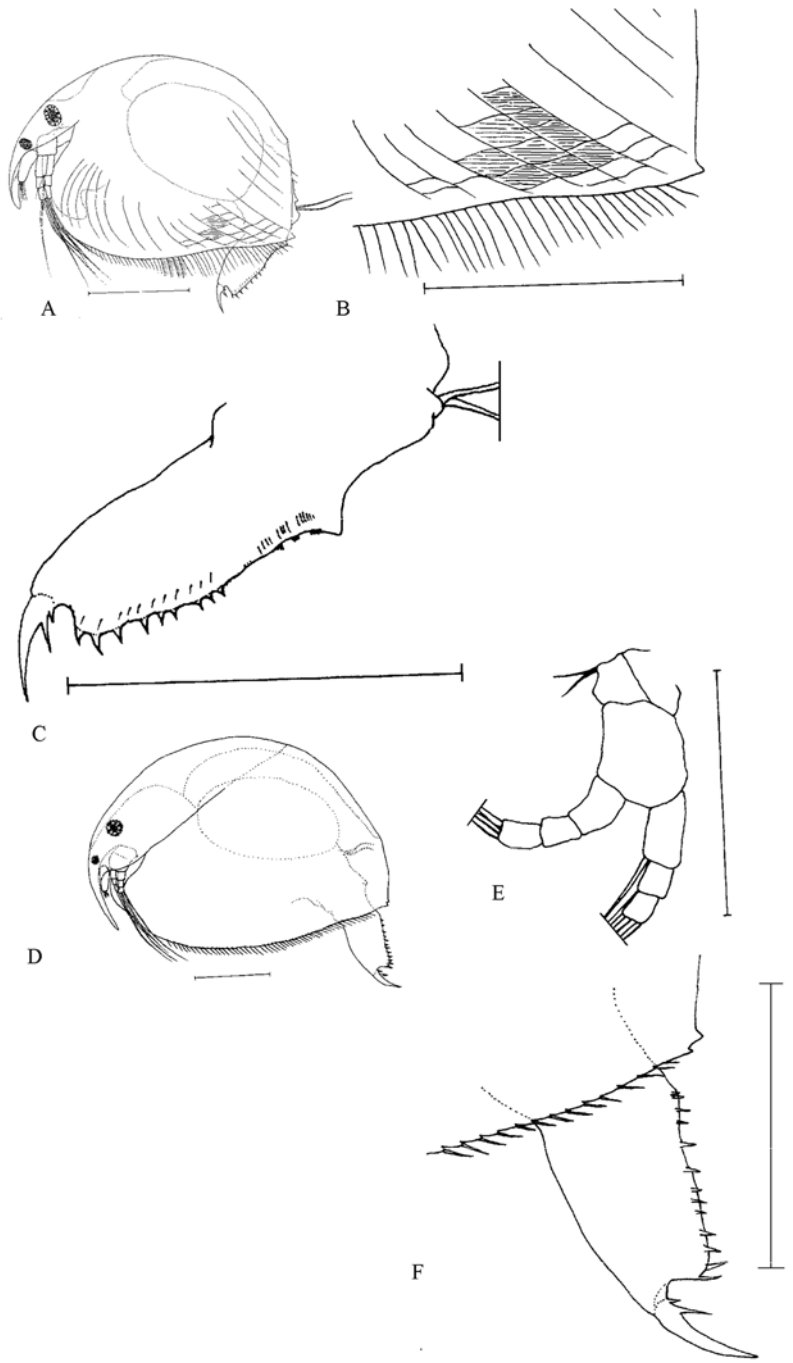


**Fig. 9.** *Alonella excise* (Fischer, 1854) (adult female: lateral view of habitus; B, posteroventral angle of valve; C, postabdomen), and *Pleuroxus trigonellus* (Müller, 1785) (adult female: lateral view of habitus; E, setae on baso-segment of AII; F, postabdomen and posteroventral angle of valve) (scale bar = 0.1 mm).

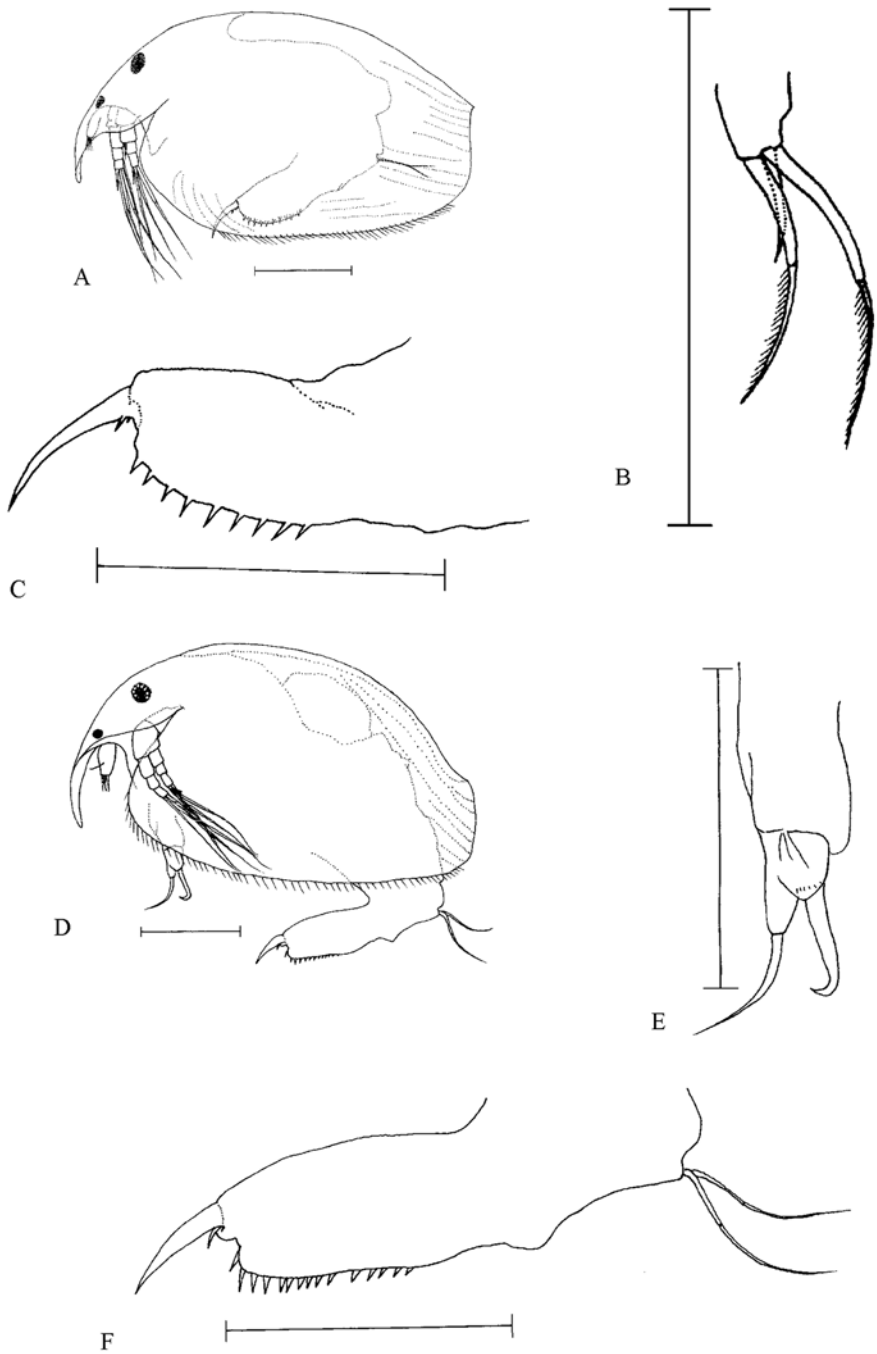


**Fig. 10.** *Disparalona leei* (Chien, 1970) (adult female: lateral view of habitus ); B, setae on inner distal lobe of limb I; C, postabdomen), and *Disparalona hamata* (Baird, 1835) (adult female: lateral view of habitus; E, setae on inner distal lobe of limb I; F, postabdomen) (scale bar = 0.1 mm).

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