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An updated taxonomic account of the Cladocera (Crustacea: Branchiopoda: Anomopoda and Ctenopoda) of Panay Island, Philippines

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Abstract. Recent advancements in the taxonomy and systematics of freshwater Cladocera in Southeast Asia have increased the number of known species in the region. However, in the Philippines, there are still some areas that are considered 'terra incognita' when it comes to freshwater zooplankton research. In this study, we re-surveyed the island of Panay to update the diversity and distribution of freshwater cladocerans in the Visayas Region. We collected samples from 47 inland water bodies, from permanent water bodies to temporary pools. Conical tow and hand plankton nets of various mesh sizes (50, 75, and 95 µm) were used to collect water samples. A total of 14 species were identified, 13 of which are newly recorded for the island of Panay. 10 of the 14 species were observed to inhabit littoral, benthic, and temporary habitats. In total, these represent at least 30% of cladoceran species recorded in the country. Our re-survey of inland water bodies of Panay Island shows the importance of sampling inland water bodies that are seldom studied such as littoral zones, rice fields, marshes, and temporary water bodies, and deployment of appropriate sampling methods for different microhabitats. Further studies on freshwater zooplankton in the Visayas region and other islands are needed to increase our knowledge of the freshwater biodiversity of the Philippine archipelago.

Key words. Diplostraca, freshwater microcrustaceans, zooplankton, new species distribution record, tropical Asia

INTRODUCTION

Studies on the diversity of cladocerans in Southeast Asia have continuously increased in the last few decades (Korovchinsky, 2013; Sinev & Yusoff, 2018). Continuous re-surveys, reviews, and other studies have been done in the region, especially in countries in mainland Asia such as Thailand and Vietnam (Van Damme et al., 2013; Choedchim et al., 2017; Choedchim & Maiphae, 2023). These studies have increased our understanding of the diversity and distribution of species from not only Southeast Asia but also in tropical regions in general. However, cladoceran faunas on archipelagos in the region remain understudied, with fewer data compared to those from the mainland. Studies in the Philippines and the Indonesian archipelago are sparse and many of the islands have yet to be surveyed or need to be re-surveyed for their cladoceran diversity (Sinev & Yusoff, 2015; Lopez et al., 2017b; Sinev & Yusoff, 2018).

Current data from the Philippines suggests that there are at least 55 recorded cladoceran species, with only one possibly endemic species in the country (Mamaril, 2001; Lopez et al., 2017b). Past and recent studies have mainly focused on the islands of Luzon and Mindanao. In contrast, recent surveys such as those of Pascual et al. (2014), Dela Paz et al. (2016), Lopez et al. (2017a), and Dela Paz et al. (2018), have done intensive sampling on lakes, rivers, and other larger bodies on limited areas of the Philippine archipelago. Thus, there is a need to survey and re-survey parts of the archipelago to fully document the diversity of cladoceran fauna in the country. The inland waters of the Visayas region (central Philippines) have yet to be fully explored for cladoceran diversity. Panay Island, with an area of approximately 11,809.64 square kilometers, is in the western portion of the Visayan Islands in the central Philippines. It is surrounded by the Sibuyan, Visayan, and Sulu seas, while the Guimaras Strait to the southeast serves as its boundary with Negros Island. The island is administratively divided into the provinces of Aklan, Antique, Capiz, and Iloilo. The island is relatively under-explored for cladoceran diversity. For example, the survey of Pascual et al. (2014) did not record any cladoceran species in the region while a re-survey of Dela Paz et al. (2016) only recorded one cladoceran, *Diaphanosoma excisum*. Though devoid of large natural lakes, the islands in the Visayas have plenty of inland water bodies such as

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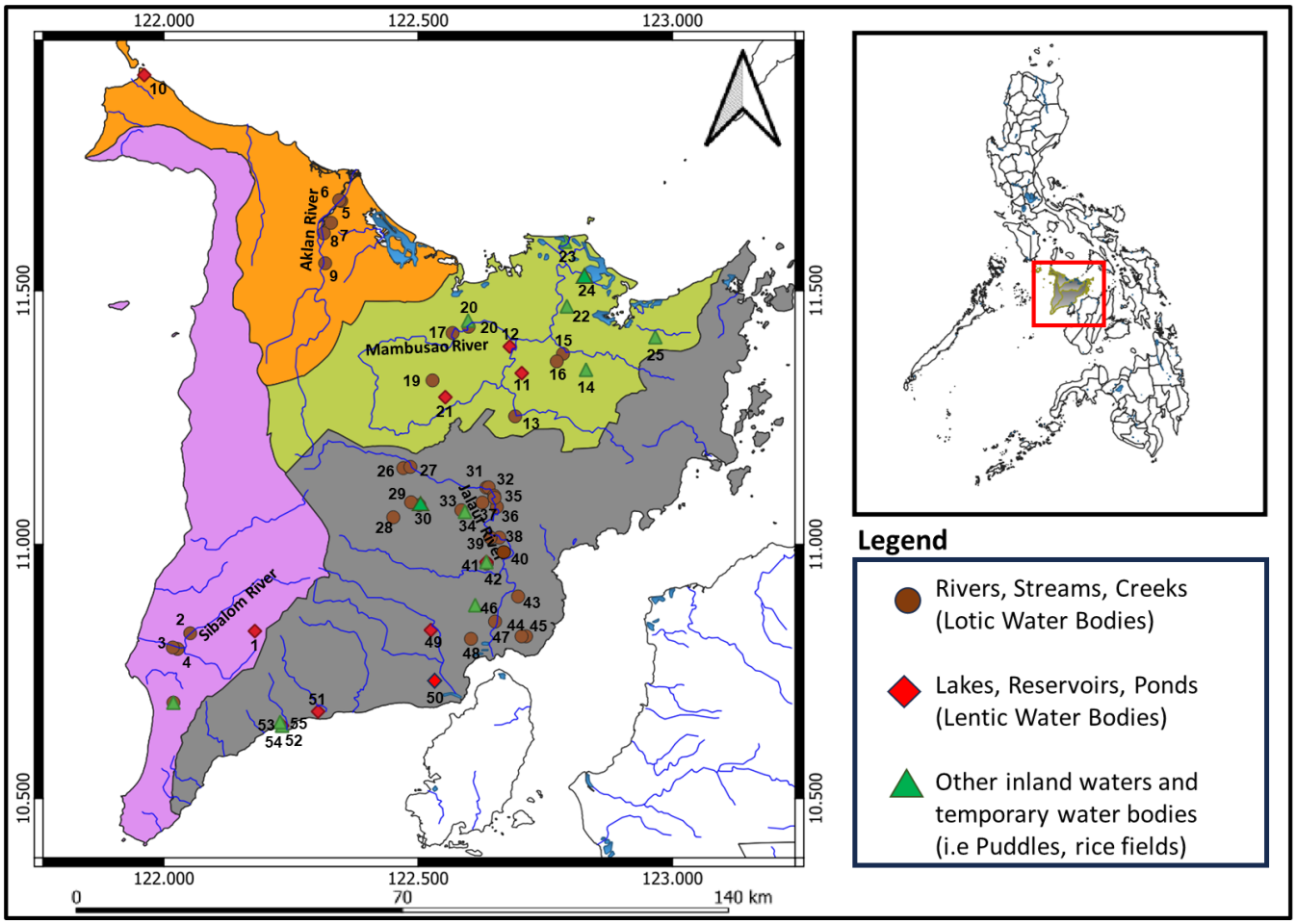

Fig. 1. Map of selected sampling localities in Panay Island. Refer to Table 1 for details on each sampling site. Colour legends for provinces: Aklan, orange; Capiz, green; Iloilo, grey; Antique, purple.

large river basins, paddy fields, and streams that may hold potential in discovering more cladoceran species.

The present study aimed to re-investigate the cladoceran fauna of the island of Panay, the sixth largest island in the Philippines. Inland water bodies in the Panay Island include numerous river systems, ephemeral water bodies, fish ponds for aquaculture, and river impoundments. The study also aims to update taxonomic information and the distribution of cladocerans on the island.

MATERIAL AND METHODS

Study sites and field sampling. 47 inland waters (with a total of 55 sampling points) were sampled (Fig. 1, Table 1) covering diverse habitats such as temporary ponds, lakes, rivers, reservoirs, marshes, and irrigation canals in rice fields. Samples were collected from March 2022 to February 2024 using hand/dip nets for shallow waters such as temporary pools and conical tow nets for lentic water bodies such as ponds and dams with mesh sizes of 50, 75, and 95 µm. Samples were fixed in the field using 96% ethanol. The samples were stored initially in 100ml bottles at the Panay Plankton Reference Collection of the Zooplankton Ecology, Systematics & Limnology Laboratory, University of the Philippines Visyas, in Miagao, Iloilo, Philippines. Material examined were assigned catalogue numbers starting with 'PRC' for slide-mounted specimens, and 'PRC-VS' for voucher specimens kept in 25-ml glass vials.

Laboratory processing and examination of collected specimens. Samples were sorted and dissected using Euromex EduBlue ED1805-S binocular dissecting microscope. Specimens were dissected using tungsten needles in a drop of glycerin in a glass slide and fixed permanently using a transparent nail varnish for further examination and identification following the techniques in Dumont & Negrea (2002) and Papa et al. (2012). Key morphological features crucial for identifying each species, such as those of the antennae, valves, eyes, carapace, postabdomen, and appendage and setae counts were examined using Olympus CX21 and Euromex EBB-4260-E BioBlue binocular compound microscopes. Documentation and species identification were supplemented with hand-drawn illustrations through a Nikon Eclipse 80i microscope with a drawing tube attachment and micrographs of representative specimens. Specimens were identified to species level with the help of standard literature and taxonomic keys for cladocerans (Goulden, 1968; Dumont & Negrea, 2002; Fernando, 2002; Petersen, 2009; Papa et al., 2012; Pascual et al., 2014; Dela Paz et al., 2016; Korovchinsky, 2018). Key

Table 1. List of selected zooplankton sampling sites in Panay Island, Philippines. Asterisk (*) indicates site where cladocerans were present.

Site No.	Water Body	Municipality/City	Province
1*	Lake Danao	San Remigio	Antique
2–4	Sibalom River	Sibalom	Antique
5–9	Aklan River	Kalibo	Aklan
10*	Lake Lupo-Lupo	Malay	Aklan
11*	Pond in Barangay Nagba	Cuartero	Capiz
12*	Lake Dao	Dao	Capiz
13*	Stream in Barangay Codingle	Dumarao	Capiz
14*	Rice field in Barangay Ilawod	Maayon	Capiz
15*	Creek in Barangay Tepacla	Maayon	Capiz
16	Creek in Barangay Salgan	Maayon	Capiz
17, 18*	Mambusao River	Mambusao	Capiz
19	Rice field in Barangay Bula	Mambusao	Capiz
20*	Creek in Barangay Tanza Norte	Panay	Capiz
21*	Lake Marugo	Tapaz	Capiz
22*	Rice field in Baranagy Conciencia	Panitan	Capiz
23*	Marsh near Culajao Mangrove Eco Park	Roxas City	Capiz
24*	Creek in Barangay Tanza Norte	Panay	Capiz
25*	Temporary pool in Barangay Bayuyan	Pres. Roxas	Capiz
26	Alibunan River	Calinog	Iloilo
27	Jalaur River section in Barangay Banban Pequeno	Calinog	Iloilo
28, 29	Tampucao River	Lambunao	Iloilo
30*	Temporary pond near Tampucao River	Lambunao	Iloilo
31*	Jalaur River section near a residential area in Barangay Gines Viejo	Passi	Iloilo
32	Jalaur River section near a bridge in Barangay Gines Viejo	Passi	Iloilo
33	Jalaur River section near DENR monitoring station	San Enrique	Iloilo
34	Jalaur River section near public market	San Enrique	Iloilo
35	Laglag River	Dueñas	Iloilo
36*	Temporary pool near Laglag River	Dueñas	Iloilo
37*	Moroboro Dam	Dingle	Iloilo
38*	Creek near Moroboro Dam	Dingle	Iloilo
39*	Jalaur River - dike near Moroboro Dam	Dingle	Iloilo
40*	Jalaur River section near a bridge in Barangay Bagacay	Pototan	Iloilo
41*	Temporary pond near rice fields in Barangay Macatol	Pototan	Iloilo
42	Pond in Malusgod, Pototan	Pototan	Iloilo
43	Jalaur River - bridge near Municipal Hall	Barotac Nuevo	Iloilo
44*	Jalaur River tributary near public market	Dumangas	Iloilo
45	Jalaur River section - bridge in Barangay Balabag)	Dumangas	Iloilo
46*	Jalaur River section - bridge in Barangay Malunang	Zarraga	Iloilo

Site No.	Water Body	Municipality/City	Province
47	Jalaur River section - near school in Barangay Sigangao	Zarraga	Iloilo
48*	Jalaur River section in Barangay Nabitasan	Leganes	Iloilo
49*	Rice field in Barangay Dawis Norte	New Lucena	Iloilo
50	Pond in Barangay Quezon	Iloilo City	Iloilo
51*	Pond in Barangay Particion	Guimbal	Iloilo
52*	Temporary pool inside University of the Philippines Visayas campus	Miagao	Iloilo
53*	Freshwater pond inside the University of the Philippines Visayas campus	Miagao	Iloilo
54	Sapa Creek	Miagao	Iloilo
55	Tinagong Dagat Lake	Miagao	Iloilo

diagnostic morphological characteristics are here provided for each identified species. The distribution of identified species was noted and compared with those from previous studies.

RESULTS

Cladocerans were found in 29 out of 47 sampling localities. Details on the distribution of observed cladocerans per site are summarised in Table 2. Among the sampling localities, shallow creeks and ponds with the presence of macrophytes and temporary water bodies host the highest number of observed species (4–6 species per site), while the lowest number of species was observed in large river sections, river impoundments, and dams and aquaculture ponds (1–3 species per site). We observed a total of 14 species in six families: four species in three genera (4:3) were observed from Family Sididae; two species in two genera (2:2) from Family Moinidae; one species (1:1) from Family Daphniidae; four species in three genera (4:3) from Family Chydoridae; two species in one genus (2:1) from Family Macrothricidae (2:1); and one species (1:1) for Family Ilyocryptidae. Of all the recorded species, 13 were new records for Panay Island. Of the 14 recorded species, only 3 are true planktonic species while the remaining 11 are substrate-associated species. The taxonomic comments and notes on the genera and species are provided below.

TAXONOMIC ACCOUNTS

Class Branchiopoda Latreille, 1817

Superorder Diplostraca Gerstäcker, 1866

Order Anomopoda G.O. Sars, 1865

Family Daphniidae Straus, 1820

Genus *Ceriodaphnia* Dana, 1853

Remarks. One of the smallest daphniids, they are usually less than 1 mm in length (Sharma, 2014). The species of the genus are cosmopolitan in distribution. Three species are recorded in the Philippines, with *Ceriodaphnia cornuta* being the most common species inhabiting lentic water bodies. Further studies on their taxonomy and systematics have been suggested, as many identified species are possible species-complexes (Sharma & Kotov, 2013).

Ceriodaphnia cornuta G.O. Sars, 1885
(Fig. 3)

Material examined. 8 parthenogenic females. 4 mounted specimens (PRC 0020–0023, Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo, coll. EV Diaz et al., February, 2024) and 4 preserved in absolute ethanol as voucher specimens (PRC VS 0024).

Distribution. Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo (10.81° N, 122.60° E) [Fig. 3].

Diagnosis. Body length between 0.5–0.6 mm**.** Head small, flattened, rounded on the top, with clear separation from body by deep cervical notch (Fig. 2A). Beak-like structure present just above antennule. Carapace globular, with deep cervical sinus. Swimming antennae short relative to body size (Fig. 2B). Postabdominal claws gently curved, with secondary teeth at base (Fig. 2C, D).

Remarks. It has a cosmopolitan distribution and is relatively common in tropical and subtropical inland waters, especially in littoral zones with plenty of macrophytes. The species is recorded throughout Southeast Asia. It has been previously recorded in the islands of Luzon, Leyte, Cebu, Negros, and Mindanao (Brehm, 1938; Uéno, 1966; Mamaril & Fernando, 1978; Petersen & Carlos, 1984; Mamaril, 1986, 2001; Aquino et al., 2008; Papa & Zafaralla, 2011; Papa et al., 2012). This is the first record on the island of Panay.

Table 2. Distribution of Cladocera in studied water bodies in Panay Island, Philippines. For site number, refer to Table 1; SO - total number of site occurrences.

Species Name no.	Site Number																													
	1	**10**	**11**	**12**	**13**	**14**	**15**	**17,18**	**20**	**21**	**22**	**23**	**24**	**25**	**30**	**31**	**36**	**37**	**38**	**39**	**40**	**41**	**44**	**46**	**48**	**49**	**51**	**52**	**53**	**SO**
Ceriodaphnia cornuta																								+						1
Moina micrura		+	+		+	+	+	+			+						+	+			+	+	+	+		+		+	+	**16**
Moinodaphnia macleayi															+		+		+			+			+					5
Pleuroxus quasidenticulatus	+	+																												2
Kurzia brevilabris			+			+	+		+																					4
Kurzia longirostris			+			+			+			+																		4
Oxyurella singalensis			+								+																			2
Ilyocryptus spinifer																	+		+			+			+					4
Macrothrix triserialis	+		+			+													+			+		+				+		7
Macrothrix spinosa																	+		+	+		+		+	+					6
Latonopsis australis						+																				+				2
Diaphanosoma excisum		+	+							+		+				+		+						+		+	+	+		10
Diaphanosoma sarsi		+		+		+	+					+	+	+		+		+								+	+			11
Pseudosida szalayi																			+						+					2
Total no. of species per site	2	4	6	1	1	6	3	1	2	1	2	3	1	1	1	2	4	3	5	1	1	5	1	5	4	4	2	3	1	

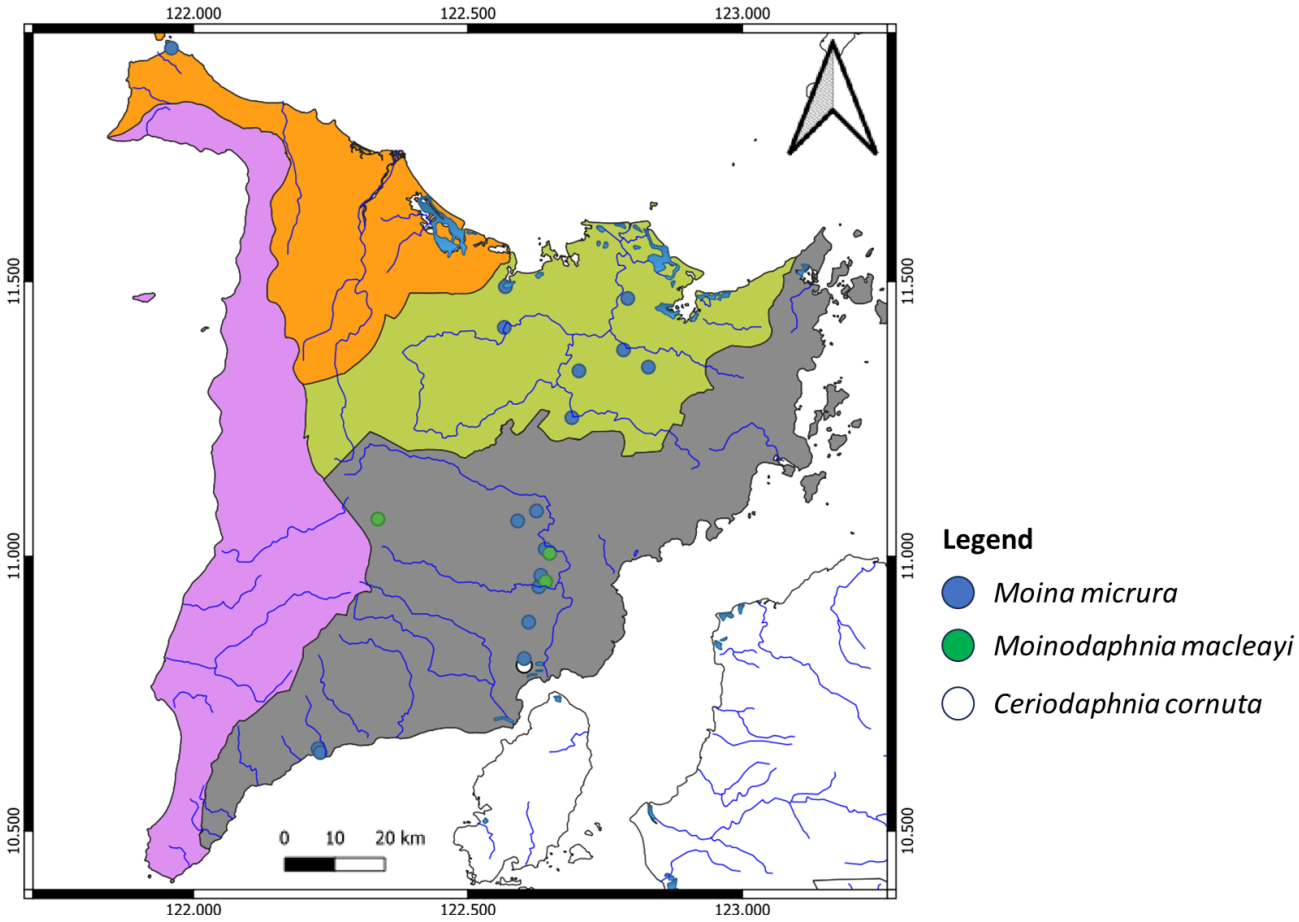

Fig. 2. Distribution map of planktonic anomopods (Family Daphniidae and Moinidae) in Panay Island.

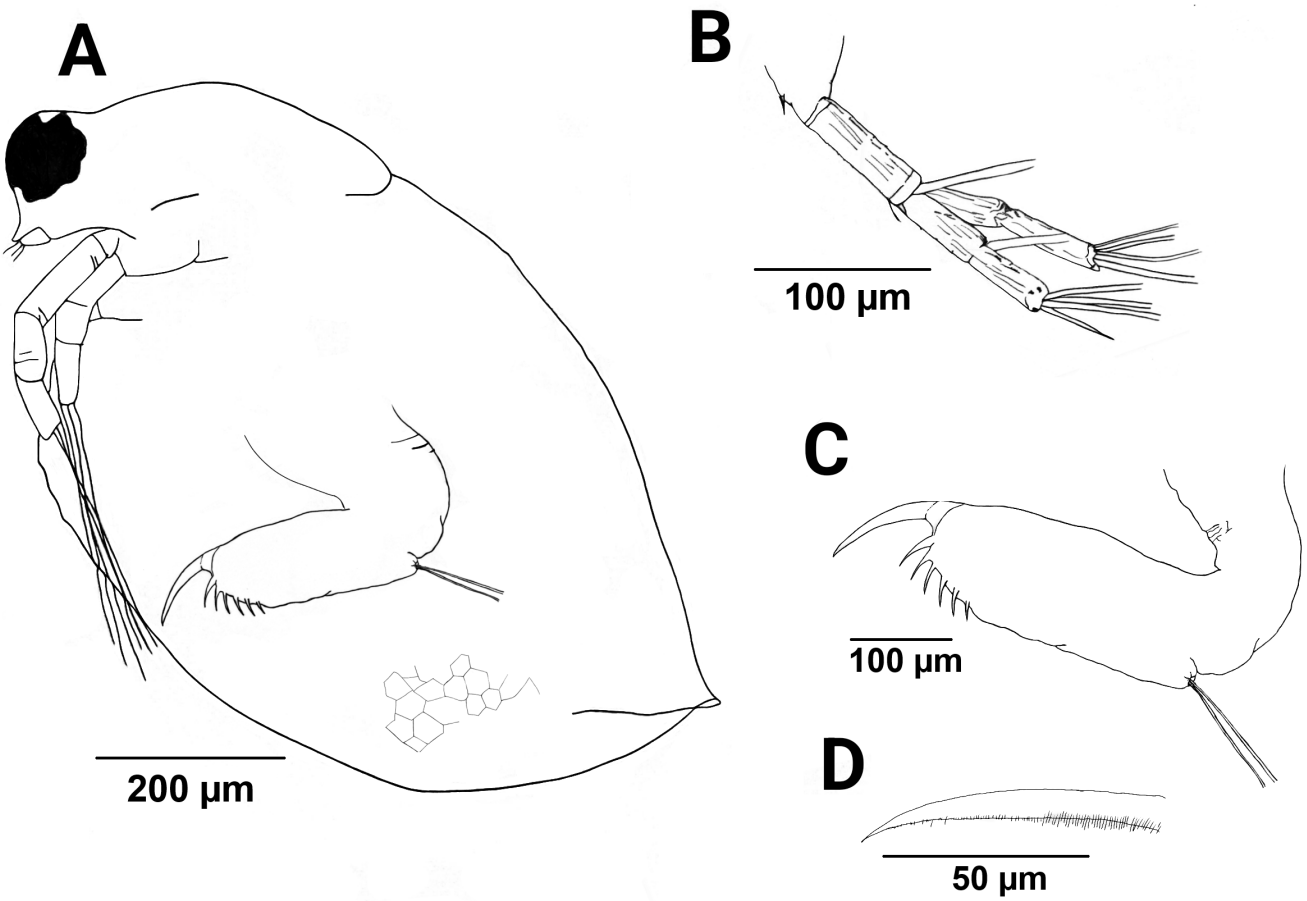

Fig. 3. *Ceriodaphnia cornuta*, parthenogenic female (PRC 0020). A, habitus, left lateral view; B, left swimming antenna; C, postabdomen; D, postabdominal claw.

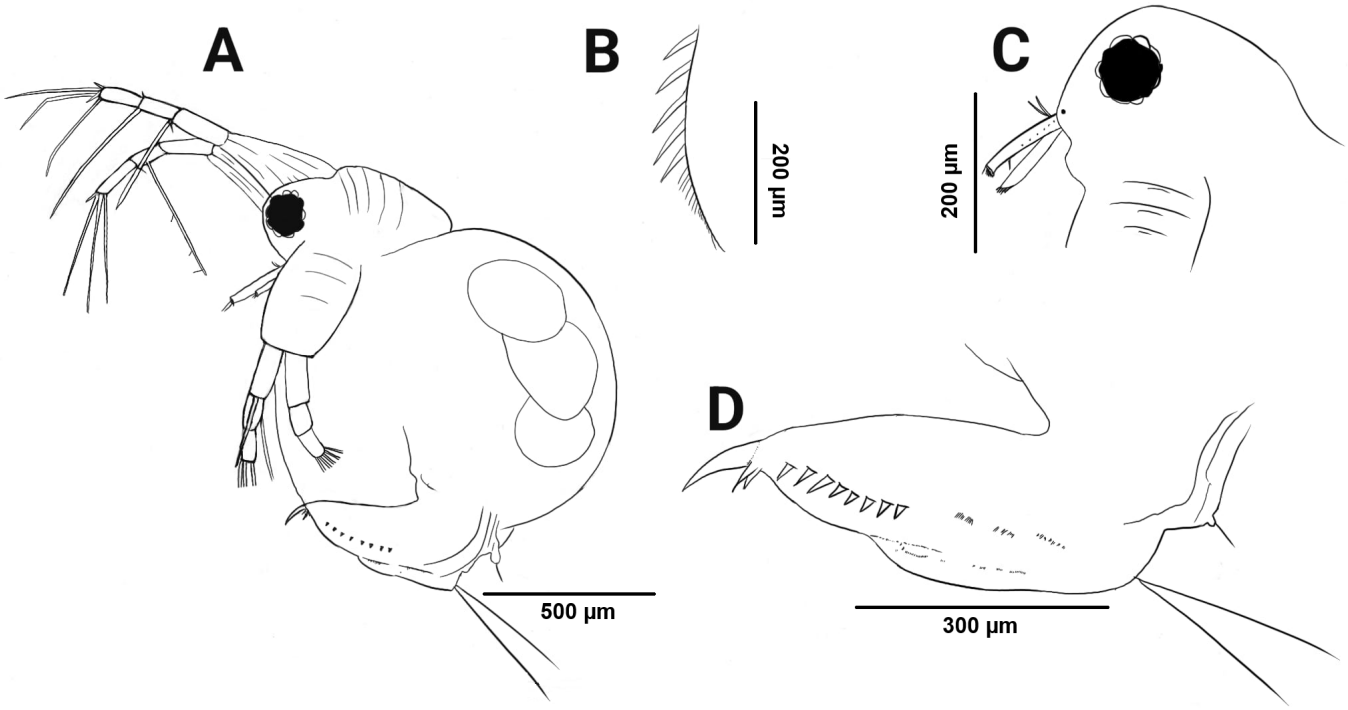

Fig. 4. *Moina micrura* parthenogenic female (PRC 0037). A, habitus, left lateral view; B, ventral margin of the carapace; C, postabdomen; D, postabdominal claw.

Family Moinidae Goulden, 1968

Genus *Moina* Baird, 1850

Remarks. Usually found in small to large temporary water bodies and seldom found in permanent water bodies. Most *Moina* species are found in hypereutrophic waters, making them very common in subtropical and tropical inland waters (Goulden, 1968).

***Moina micrura* Kurz, 1875**
(Fig. 4)

Material examined. 25 parthenogenic females. 12 mounted specimens (PRC 0035, dissected specimen, temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo, coll. SK Guinto et. al., November 2022; PRC 0036, Rice field in Barangay Conciencia, Panitan, Capiz, coll. EV Diaz, October 2023; PRC 0037, pond in Barangay Nagba, Cuartero, Capiz, coll. EV Diaz, October 2023; PRC 0038 & PRC 0042, rice field in Barangay Ilawod, Maayon, Capiz, coll. EV Diaz, October 2023; PRC 0039, Mambusao River, Mambusao, Capiz, coll. EV Diaz, October 2023; PRC 0040 & PRC 0043, creek in Barangay Tepacla, Maayon, Capiz, coll. EV Diaz, October 2023; PRC 0041, temporary pool near Laglag River, Dueñas, Iloilo, coll. EV Diaz et al., February 2024; PRC 0044, temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo, coll. MV Niño & EZC Rizo, November 2023; PRC 0045 & PRC 0046, dissected specimen, temporary pool near Laglag River, Dueñas, Iloilo, coll. EV Diaz et al., February 2024). 13 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0022).

Distribution. Lake Lupo-lupo, Malay, Aklan (11.92° N, 121.96° E); Mambusao River, Mambusao, Capiz (11.42° N, 122.57° E); rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.83° E); creek in Barangay Tepacla, Maayon, Capiz (11.38° N, 122.78° E); rice field in Baranagy Conciencia, Panitan, Capiz (11.47° N, 122.79° E); pond in Barangay Nagba, Cuartero, Capiz; pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E); stream in Barangay Codingle, Dumarao, Capiz (11.42° N, 122.57° E); Jalaur River section near a bridge in Barangay Bagacay, Pototan, Iloilo (10.95° N, 122.63° E); temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo (10.97° N, 122.63° E); Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section- bridge in Barangay Malunang, Zarraga, Iloilo (10.81° N, 122.60° E); Jalaur River section near public market, San Enrique, Iloilo (11.08° N, 122.63° E); temporary pool near Laglag River, Dueñas (11.06° N, 122.59° E), Iloilo rice field in Barangay Dawis Norte, New Lucena, Iloilo (10.88° N, 122.61° E); temporary pool inside University of the Philippines Visayas, Miagao, Iloilo (10.64° N, 122.23° E); freshwater pond inside the University of the Philippines Visayas, Miagao, Iloilo (10.65° N, 122.22° E) [Fig. 2]

Diagnosis. Small species ranging from 0.5 to 1.2 mm in length (Fig. 4A). Head large, rounded, characterised by well-developed supra-ocular depression with large eye almost near margin (Fig. 4C). Posterior part with row of marginal denticles, organised in groups of 7–10 (Fig. 4B). Postabdomen cone-shaped, short (only ¼ of total length), slender. Distal part of postabdomen has 3–11 feathered teeth (Fig. 4D).

Remarks. A widely distributed species observed from subtropical to tropical regions of Asia, the Americas, Africa, and Europe. Commonly found in lakes, reservoirs,

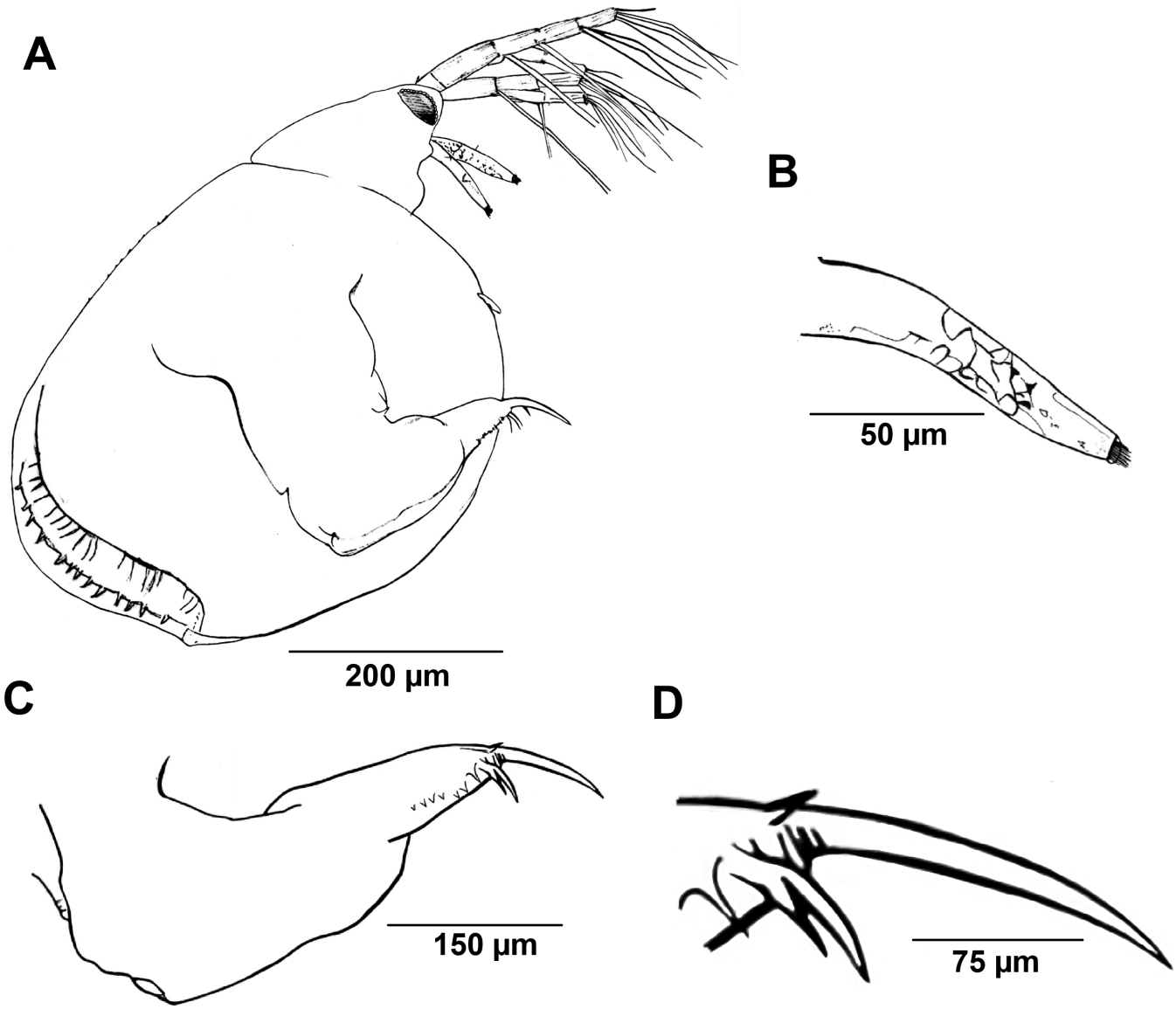

Fig. 5. *Moinodaphnia macleayi* parthenogenic female (PRC 0049). A, habitus, left lateral view; B, antennule; C, postabdomen; D, postabdominal claw.

and temporary water bodies such as ponds and rice fields**.** Previously recorded in the islands of Luzon, Mindoro, Negros, and Mindanao (Cheng & Clemente, 1954; Petersen & Carlos, 1984; Mamaril, 1986; Mamaril, 2001; Aquino et al., 2008; Pascual et al., 2014; Dela Paz et al., 2016). Some Philippine specimens were often misidentified as *Moina macrocopa* (Pascual et al., 2014; Lopez et al., 2017b). Though a common cladoceran in Philippine inland waters, this is the first record of the species in the island of Panay.

Genus *Moinodaphnia* Herrick, 1887

Remarks. A monotypic genus, it differs from the genus *Moina* in its mode of life, being a substrate associated species rather than planktonic (Goulden, 1968).

Moinodaphnia macleayi (King, 1853)
(Fig. 5)

Material examined. 15 parthenogenic females. 10 mounted specimens (PRC 0049–0052, temporary pool near Laglag River, Dueñas, coll. MN Niño & EZC Rizo, May 2023; PRC 0053, temporary pond near Tampucao River, Lambunao, Iloilo, coll. MN Niño & EZC Rizo, May 2023; PRC 0054–0058, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz et al., January 2024) and 5 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0017).

Distribution. Temporary pond near Tampucao River, Lambunao, Iloilo (11.08° N, 122.33° E); temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo (10.97° N, 122.63° E); temporary pool near Laglag River, Dueñas, Iloilo (11.06° N, 122.59° E; creek near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section in Barangay Nabitasan, Leganes, Iloilo (10.79° N, 122.64° E) [Fig. 2]

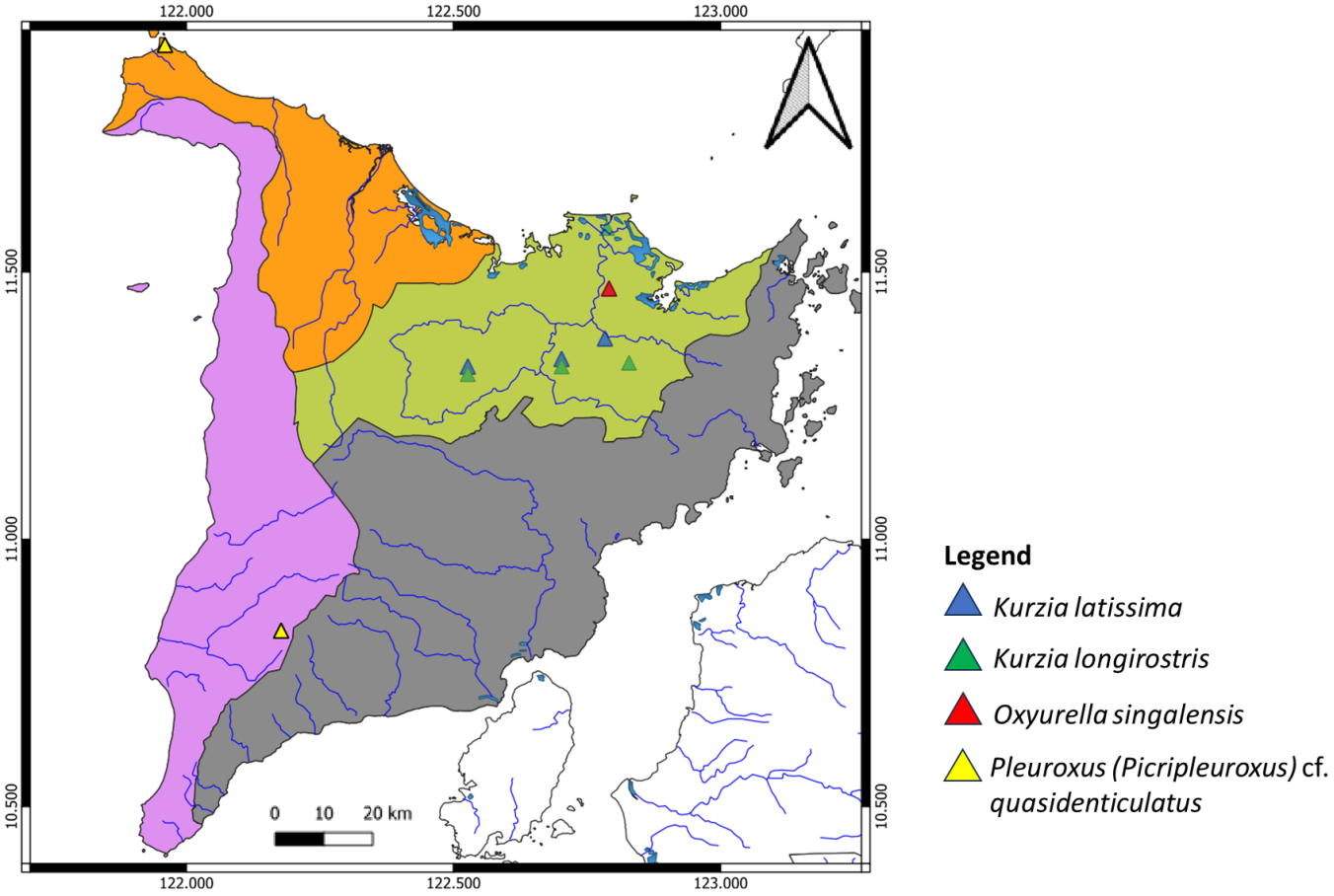

Fig. 6. Distribution map of family Chydoridae in Panay Island.

Diagnosis. Head (Fig. 5A) triangular in shape with eye filling its tip, one ocellus below it; without supra-ocular depression. Antennule long, thin (Fig. 5B). Postabdomen containing 10 or 11 feathered teeth, postabdominal claw with fine short hairs (Figs. 5C, D).

Remarks. Observed in humid tropical regions in Asia, Africa, Australia, South America, and the Caribbean Islands (Korovchinsky, 2013, Kotov et al., 2013). Found near sediments or macrophytes of shallow water bodies. Recorded on the islands of Luzon, Cebu, Negros, and Mindoro (Petersen & Carlos, 1984; Mamaril, 1986; Mamaril, 2001; Pascual et al., 2014). This is the first record of the species in the island of Panay (Lopez et al., 2017b).

Family Chydoridae Dybowsky & Grochowski, 1894, emend. Frey, 1967

Subfamily Chydorinae Dybowsky & Grochowski, 1894, emend. Frey, 1967

Genus *Pleuroxus* Baird, 1843

Subgenus *Picripleuroxus* Frey, 1993

Remarks. The only taxonomically accepted subgenus of the genus *Pleuroxus*, *Picripleuroxus* includes species in the "*laevis*"-group. There are seven recognised species in the subgenus (Smirnov, 1996).

***Pleuroxus* (*Picripleuroxus*) *quasidenticulatus* (Smirnov, 1996)**
(Fig. 7)

Material examined. 3 parthenogenic females. 2 mounted specimens (PRC 0076, Lake Danao, San Remigio, Antique, coll. SK Guinto & EZ Rizo, May 2022; PRC 0077, Lake Lupo-lupo, Malay, Aklan, coll. SK Guinto & EZ Rizo, May 2022) and 1 specimen preserved in absolute ethanol as voucher specimen (PRC VS 0001).

Distribution. Lake Danao, San Remigio, Antique (10.83° N, 122.18° E); Lake Lupo-lupo, Malay, Aklan (11.92° N, 121.96° E) [Fig. 6]

Diagnosis. Body moderately compressed laterally; ventral margin with convex anterior, straight posterior, with numerous (~70) setae of different sizes. Carapace oval with high lateral portion (Fig. 7A). Postero-ventral corner of valves with broad bases, relatively short. Antennae with spine on apical ends of antennal segments (Fig. 7B). Labral plate triangular (Fig. 7C), ventral margin with numerous setae of different size in different areas. Length of rostrum 2–3 times length of antennules. Keel of labrum narrow, with acute apex. Postabdomen slightly elongated, narrowing distally, with postanal margin bearing 8–11 groups of denticles; postabdominal claw irregularly curved, shorter than preanal portion of postabdomen (Fig. 7D).

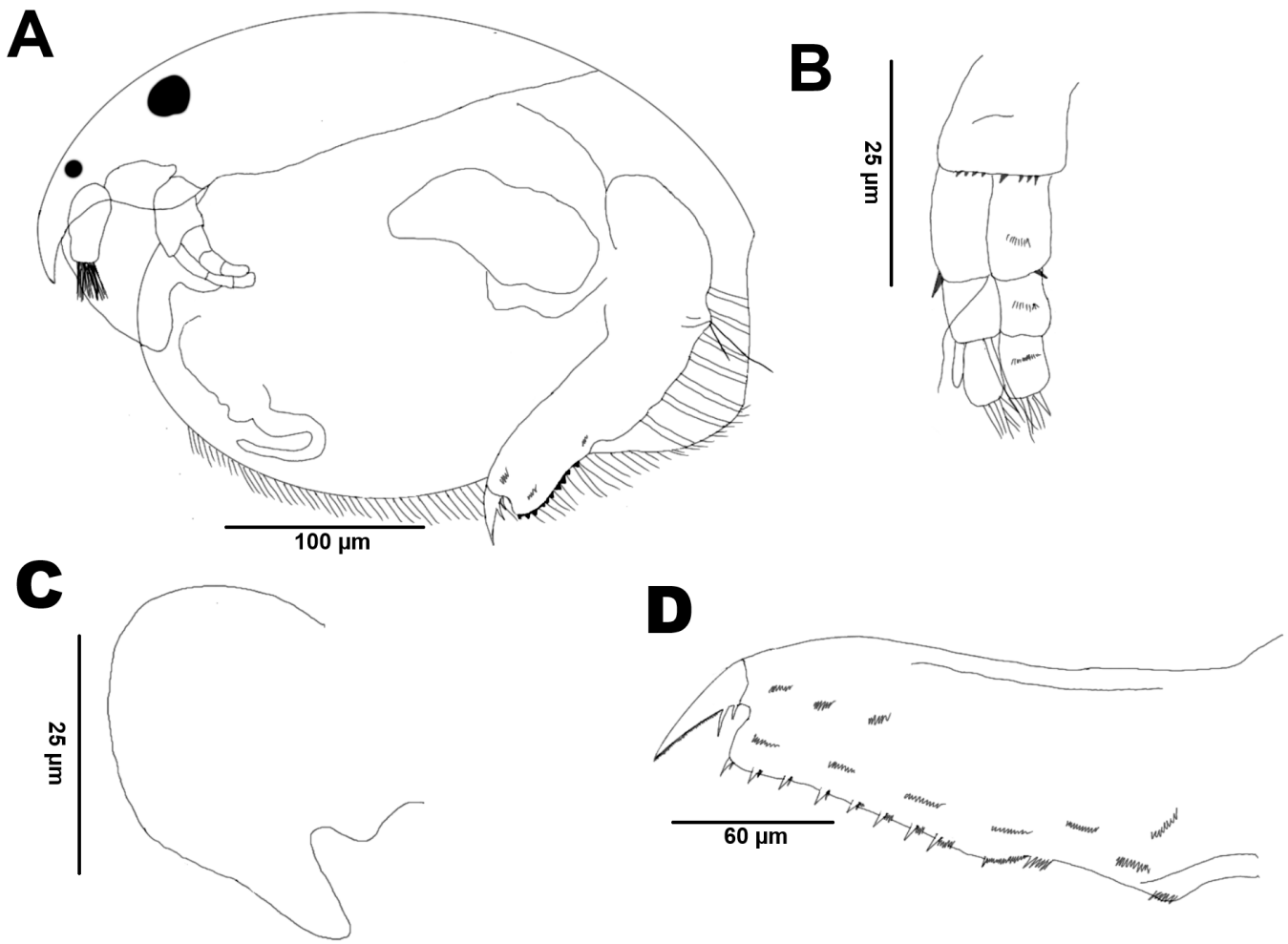

Fig. 7. *Pleuroxus* (*Picripleuroxus*) *quasidenticulatus* parthenogenic female (PRC 0076). A, habitus, left lateral view; B, swimming antennae; C, labrum; D, postabdomen.

Remarks. Found in littoral zones of ponds, lakes and streams. Also recorded in Thailand and possibly present throughout mainland Southeast Asia (Korovchinsky, 2013; Choedchim & Maiphae, 2023). Previously recorded in the island of Luzon (Sinev & Sanoamuang, 2013; Pascual et al., 2014; Lopez et al., 2017b)

Subfamily Aloninae Dybowski & Grochowski, 1894, emend. Frey, 1967

Genus *Kurzia* Dybowski & Grochowski, 1894

Remarks. The genus *Kurzia* includes eight species and is found worldwide. Sinev (2016) provided an updated diagnosis for this genus. Re-evaluation on many distribution records have been noted by past and current studies to be needed as many species of family Chydoridae exhibit continental endemism (Rajapaksa & Fernando, 1986; Hudec, 2000; Sinev, 2016).

***Kurzia brevilabris* Rajapaksa & Fernando, 1986**
(Fig. 8)

Material examined. 8 parthenogenic females. 4 mounted specimens (PRC 0004, pond in Barangay Nagba, Cuartero, Capiz, coll. EV Diaz, October 2023; PRC 0005, creek in Barangay Tepacla, Maayon, Capiz, coll. EV Diaz, October 2023; PRC 0006, creek in Barangay Tanza Norte, Panay, Capiz, coll. EV Diaz, October 2023; PRC 0007, rice field in Barangay Ilawod, Maayon, Capiz, coll. EV Diaz, October 2023) and 4 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0013).

Distribution. Pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E); creek in Barangay Tepacla, Maayon, Capiz (11.38° N, 122.78° E); rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.83° E); creek in Barangay Tanza Norte, Panay, Capiz (11.32° N, 122.53° E) [Fig. 6]

Diagnosis. Body subrectangular (Fig. 8A). Ocellus about half size of compound eye. Short rostrum with antennules almost reaching rostral tip. Antennule of moderate size, with thin aesthetascs almost as long as antennule (Fig. 8B). Labral keel subtriangular in shape, with blunt end, undulate anterior margin (Fig. 8C). Valve with marginal setules along posteroventral angle and submarginal setules on posterior margin relatively equal in size, widely spaced. Postabdomen long, narrow, tapering distally. Postanal margin bearing 10–14 grouped denticles. Postabdominal claw with small basal spine; long, slightly curved distally with two groups of fine setules on concave surface (Fig. 8D).

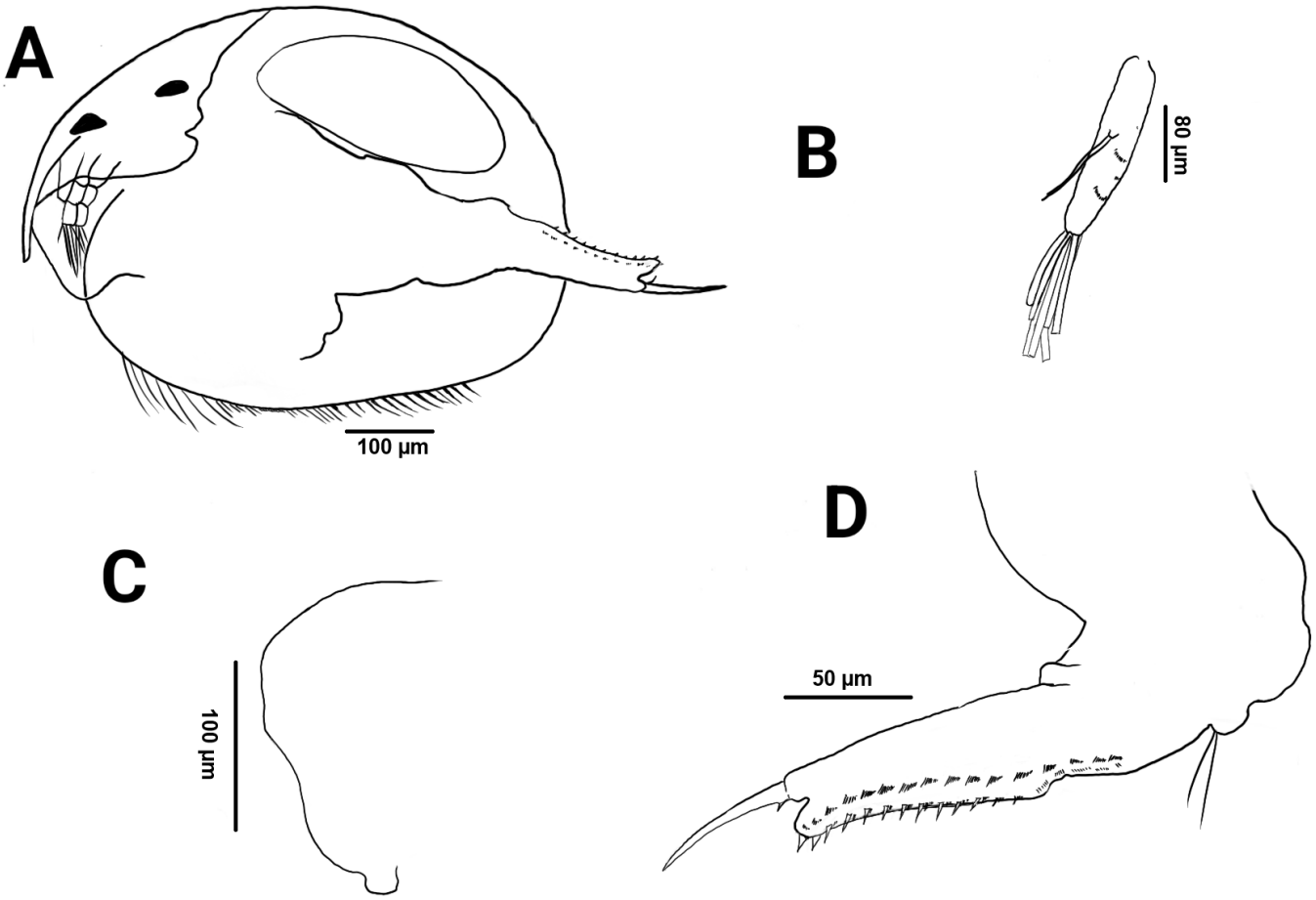

Fig. 8. *Kurzia brevilabris* parthenogenic female (PRC 0005). A, habitus, left lateral view; B, antennule; C, labrum; D, postabdomen.

Remarks. Typically found on freshwater habitats including lakes, ponds, and slow-moving streams, and other water bodies where there is abundant vegetation (Rajapaksa & Fernando, 1986). It can be distinguished from *K. longirostris* using the configuration of head pores, labrum structure, and the arrangement of the setules along the submargin of the posteroventral corner of the carapace. Many records of *K. longirostris* in the region needs to be further evaluated as previous observations have been re-evaluated as *K. brevilabris*. Specimens from this study have shown similar morphological characters, such as the subtriangular labrum and equal submarginal setules on posterior margin from observations in mainland Southeast Asia (Rajapaksa & Fernando, 1986; Hudec, 2000; Sharma & Sharma, 2012, 2017; Chatterjee et al., 2013; Korovchinsky, 2013; Kotov et al., 2013; Sinev et al., 2015; Sinev, 2016; Sinev & Yusoff, 2018; Tiang-Nga et al., 2020; Choedchim & Maiphae, 2023). Previously recorded from a single locality on the island of Luzon, this is a new record for the island of Panay. Our observations also confirm their co-occurrence with *K. longirostris* on Philippine inland waters (Rajapaksa & Fernando, 1986; Lopez et al., 2017b).

Kurzia longirostris (Daday, 1898)
(Fig. 9)

Material examined. 15 parthenogenic females. 8 mounted specimens (PRC 0010 & 0014, rice field in Barangay Ilawod, Maayon, Capiz, coll. EV Diaz, October 2023; PRC 0008–0009 & PRC 0016, marsh near Culajao Mangrove Eco Park, Roxas City, Capiz, coll. EV Diaz, October 2023; PRC 0011, creek in Barangay Tanza Norte, Panay, Capiz, coll. EV Diaz, October 2023; PRC 0012 & PRC 0015, pond in Barangay Nagba, Cuartero, Capiz, coll. EV Diaz, October 2023) and 7 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0012).

Distribution. Pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E); rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.23° E); creek in Barangay Tanza Norte, Panay, Capiz (11.32° N, 122.53° E); marsh near Culajao Mangrove Eco Park, Roxas City, Capiz (11.60° N, 122.79° E) [Fig. 6]

Diagnosis. Rostrum long, ocellus approximately half size of compound eye (Fig. 9A). Antennules narrow, elongated, more than half length of rostrum. Spine on basal segment of swimming antennae exopodite very short (Fig. 9B). Labrum triangular, with slightly curved anterior margin, relatively even ventral margin (Fig. 9C); tip mostly containing minute processus. Marginal setules along posteroventral corner of the valves relatively long, submarginal setules on posterior margin of the valves of similar size. Distal corner of postabdomen with narrow lobe that extends beyond terminal claw, with slightly curved dorsal margin containing thick, long denticles and groups of minute spines (Fig. 9D). Postabdominal claws long, slightly curved, with two rows of uniform minute setae reaching almost to tip. Short basal

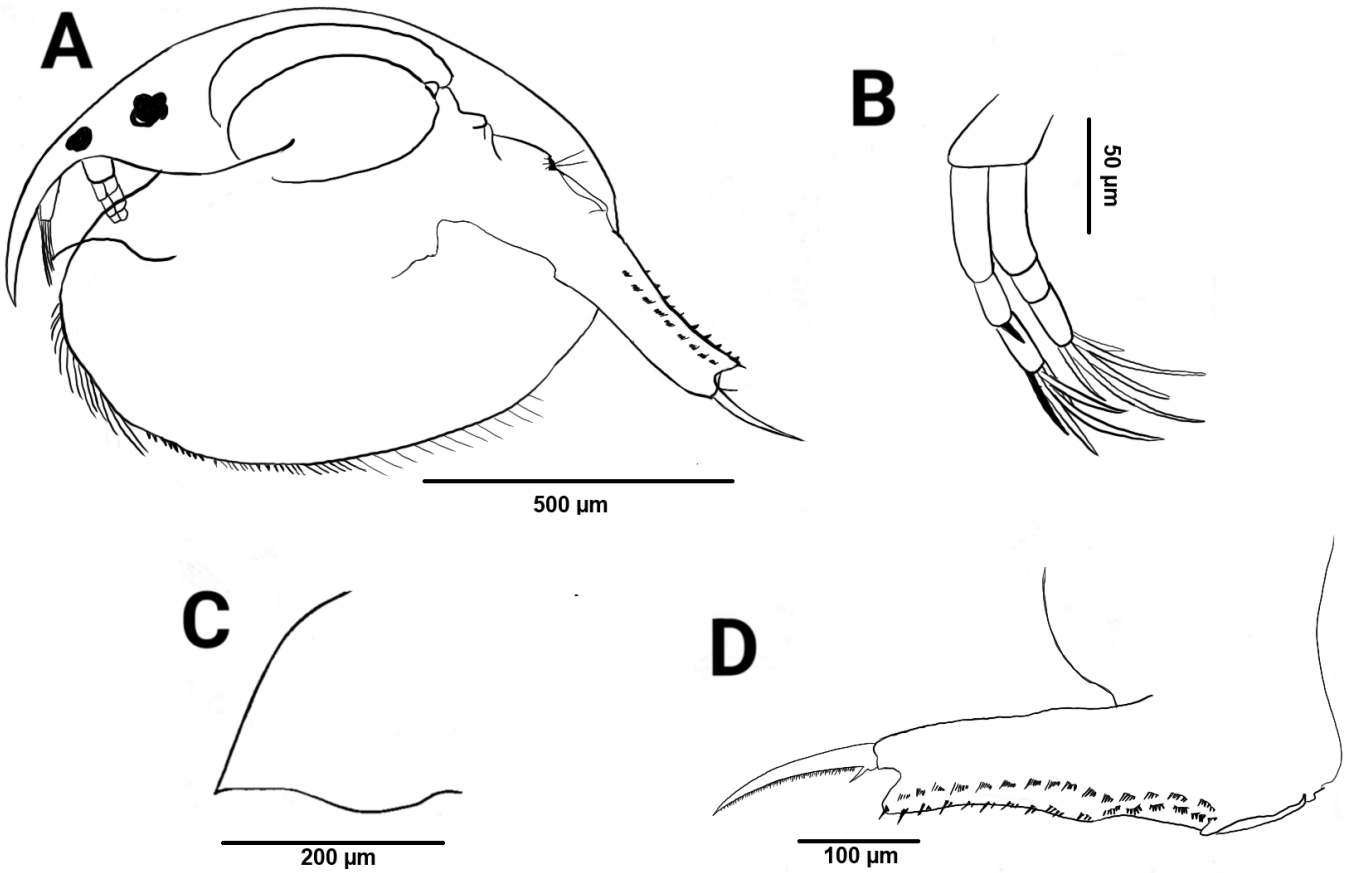

Fig. 9. *Kurzia longirostris* parthenogenic female (PRC 0010). A, habitus, left lateral view; B, swimming antennae; C, labrum; D, postabdomen.

spine, serrated on dorsal margin; branches of soft setae present on basal margin of the claws.

Remarks. Commonly found in lakes, ponds, and reservoirs, as well as lotic water bodies such as streams and small rivers (Rajapaksa & Fernando, 1986). Found throughout Southeast Asia but has a wider distribution compared to *K. brevilabris* which is restricted to the Oriental region. First recorded in the island of Luzon (Mamaril, 1986, 2001). Observation is the first record on Panay Island.

Genus *Oxyurella* Dybowski & Grochowski, 1894

Remarks. One of the most understudied genera of subfamily Aloninae. Only one species can be found in the Oriental region, *Oxyurella singalensis* (Smirnov, 1971).

Oxyurella singalensis (Daday, 1898)
(Fig. 10)

Material examined. 3 parthenogenic females. 1 mounted specimen (PRC 0074, Rice field in Barangay Conciencia, Panitan, Capiz, coll. EV Diaz, October 2023), 1 specimen preserved in absolute ethanol (PRC VS 0011), and 1 damaged specimen disposed of after observation.

Distribution. Rice field in Barangay Conciencia, Panitan, Capiz (11.47° N, 122.79° E); pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E) [Fig. 6]

Diagnosis. Body oval-oblong in shape. Carapace with no keel. Antennule extending to the tip of rostrum (Fig. 10A). Aesthetascs of antennule relatively long, almost two-thirds length of antennule (Fig. 10B). Postabdomen relatively long, narrow, with denticles decreasing in size distally from postabdominal claw (Fig. 10C).

Remarks. It is common in stationary water bodies but not widely observed in lotic ecosystems. The species is recorded throughout Southeast Asia. However, their rarity in many collections suggests that the species may need further re-evaluation (Sinev, 2016). Rare in the presently sampled ecosystems with very few observed individuals. Previously recorded in the islands of Luzon, Leyte, Mindoro, and Mindanao (Mamaril, 1986, 2001; and Pascual et al., 2014.) First record on the island of Panay.

Family Ilyocryptidae (Smirnov, 1976)

Genus *Ilyocryptus* G.O. Sars, 1861

Remarks. Family Ilyocryptidae is a monogeneric family (*Ilyocryptus*). Though relatively well-studied in the temperate regions, cosmopolitan and oriental taxa need to be further evaluated for the presence of possible new species and redescription of cryptic/species groups (Kotov & Stifter, 2006; Jeong et al., 2012)

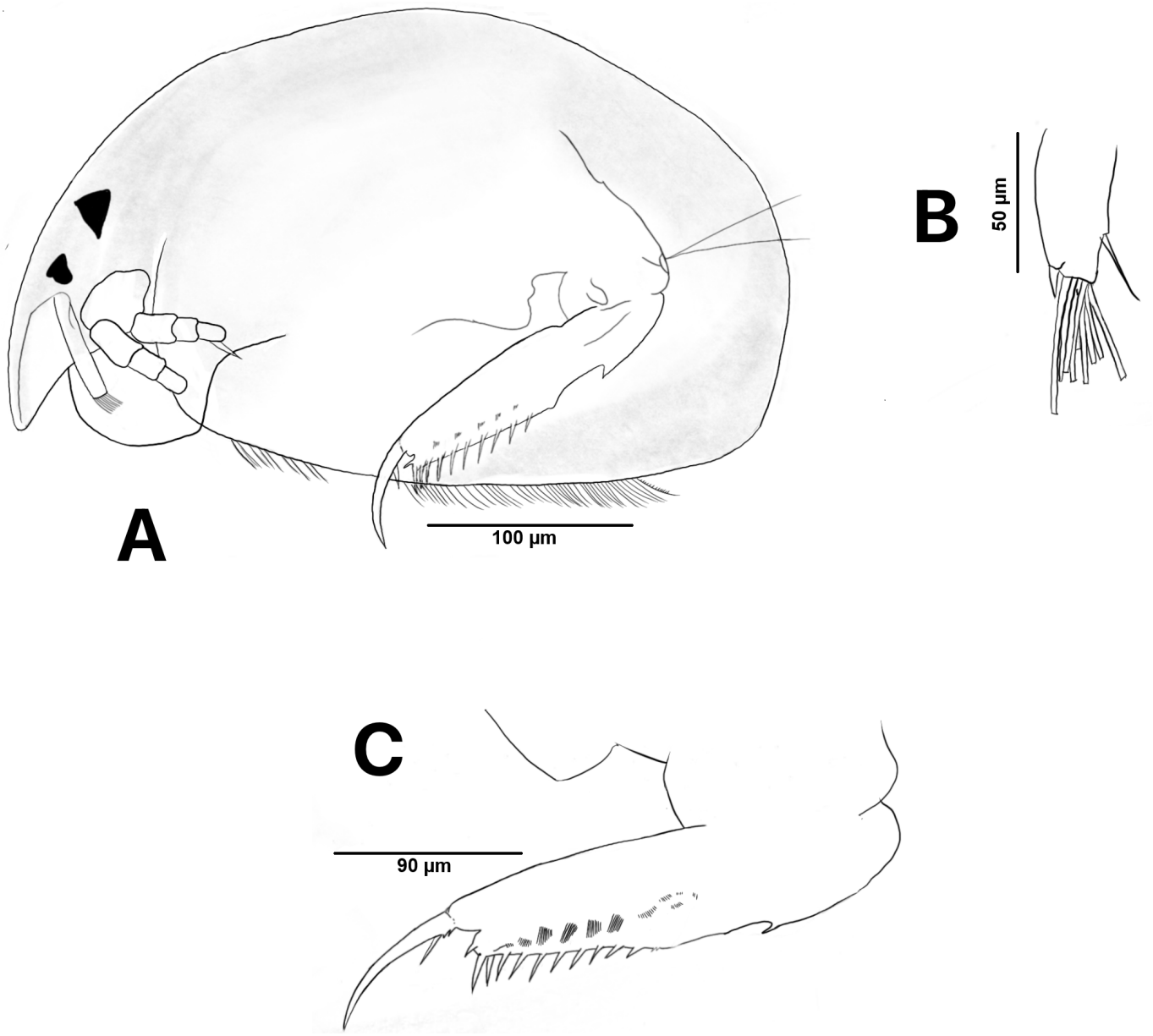

Fig. 10. *Oxyurella singalensis* parthenogenic female (PRC 0074). A, habitus, left lateral view; B, antennule; C, postabdomen.

***Ilyocryptus spinifer* Herrick, 1882**
(Fig. 12)

Material examined. 8 parthenogenic females. 3 mounted specimens (PRC 0017, dissected specimen, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz et al., January 2024; PRC 0018, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz et al., January 2024; PRC 0019, temporary pool near Laglag River, Dueñas, coll. EV Diaz et al., February 2024). 5 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0017).

Distribution. Temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo (10.97° N, 122.63° E); temporary pool near Laglag River, Dueñas (11.06° N, 122.59° E); creek near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section in Barangay Nabitasan, Leganes, Iloilo (10.79° N, 122.64° E) [Fig. 11]

Diagnosis. Body subovoid to triangular-ovoid; compressed laterally with incomplete moulting (Fig. 12A). Swimming antennae with large, spine-like setule on each seta at posterior margin (Figure 12B). Postabdomen with 5–11 preanal teeth, increasing in size proximally. Lateral seta of postabdomen far from anus. Postabdominal claw long, slightly bent, with 2–9 tiny denticles on distal portion, with short setules on its base (Fig. 12C). Antennule bi-segmented, with proximal segment bearing 5 or 6 rows of denticles (Fig. 12D).

Remarks. Common in majority of inland water bodies of the tropics and subtropics. It has been recorded throughout Southeast Asia. Though our specimens currently conform with the current description of *I. spinifer*, current studies and revision of *spinifer*-like specimens show possible cryptic speciation and may need molecular analyses to further distinguish separate species (Kotov & Dumont, 2000; Kotov & Williams, 2000; Kotov & Stifter, 2006). *Ilyocryptus spinifer* prefers to inhabit benthic environments with loose

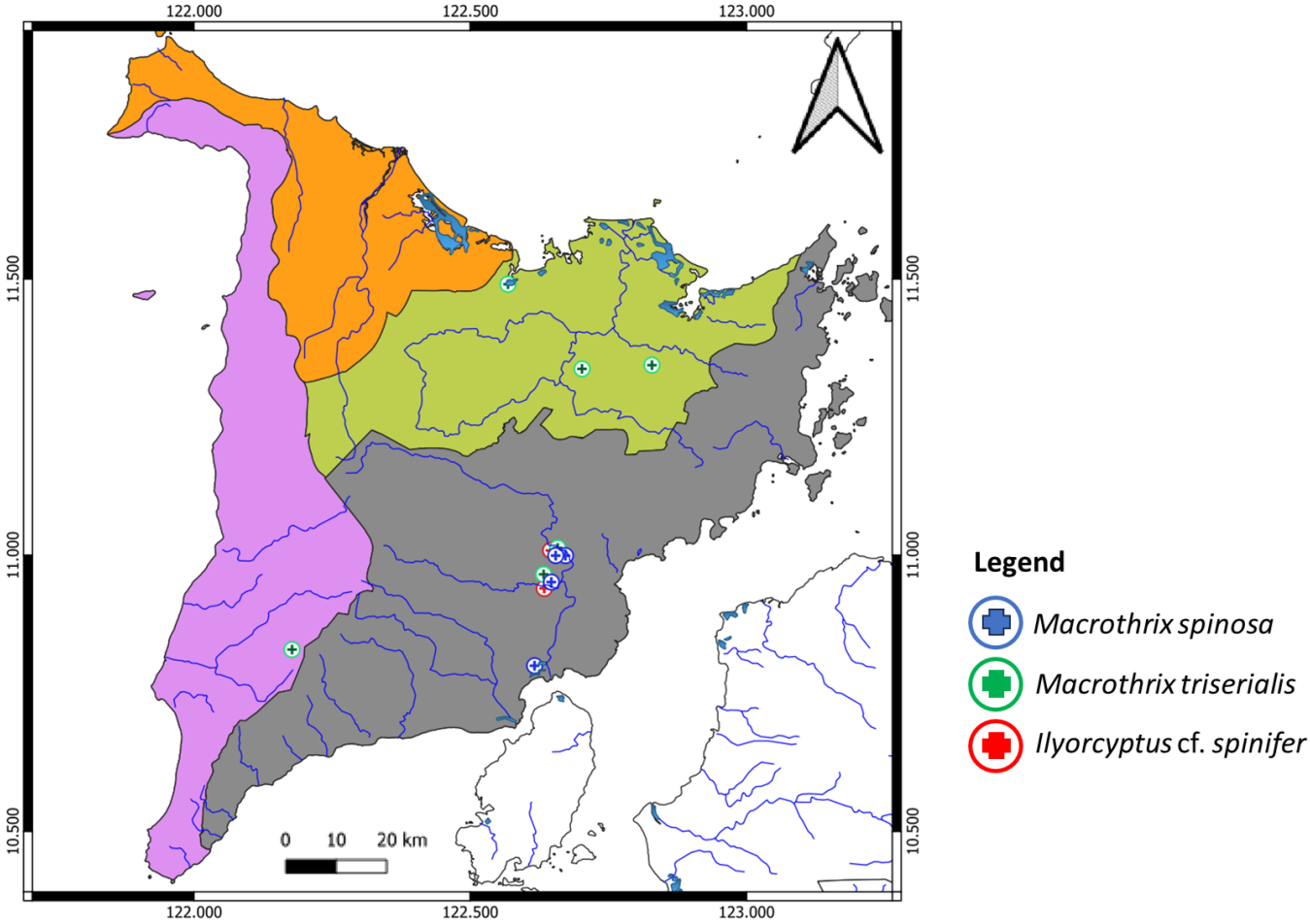

Fig. 11. Distribution map of families Macrothricidae and Ilyocryptidae in Panay Island.

sediments or mud (Kotov & Sanoamuang, 2005; Kotov & Stifter, 2006). Recorded in the islands of Luzon, Negros, and Mindanao (Mamaril, 1986, 2001). First record on the island of Panay.

Family Macrothricidae Norman & Brady, 1867

Genus *Macrothrix* Baird, 1843

Species of family Macrothricidae are commonly found in water bodies with plenty of vegetation (Smirnov, 1992; Dumont & Silva-Briano, 1998). The genus *Macrothrix* is the most speciose in the family, with at least 50 valid species recorded globally. Revisions in the *-triserialis* and *-rosea* group have shown need for re-evaluation of records in Southeast Asia (Dumont et al. 2002).

Macrothrix triserialis Brady, 1886
(Fig. 13)

Material examined. 8 parthenogenic females. 4 mounted specimens (PRC 0031), pond in Barangay Nagba, Cuartero, Capiz, coll. EV Diaz, October 2023; PRC 0032, Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0033, temporary pool inside University of the Philippines Visayas, Miagao, Iloilo (10.64° N, 122.23° E), coll. EZ Rizo, September 2024; PRC 0034, dissected specimen, Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024). 4 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0028).

Distribution. Lake Danao, San Remigio, Antique (10.83° N, 122.18° E); Pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E); temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo (10.97° N, 122.63° E); rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.23° E); creek near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo (10.81° N, 122.60° E); temporary pool inside University of the Philippines Visayas, Miagao, Iloilo (10.64° N, 122.23° E) [Fig. 11]

Diagnosis. Dorso-posterior corner of carapace pointed, dorsal margin with fine serulations (Fig. 13A, B). Antennule with small indentations anteriorly, few spines distally. Largest antennal seta with two larger spines in area between proximal and distal segments, distally followed by many small spines. Setae natatoriae with short distal segment (Fig. 13C). Postabdomen oval, with spines increasing in size towards seta.

Remarks. Commonly found in tropical and subtropical inland waters and recorded throughout Southeast Asia (Korovchinsky, 2013). Prefers loose-bottomed sediments as

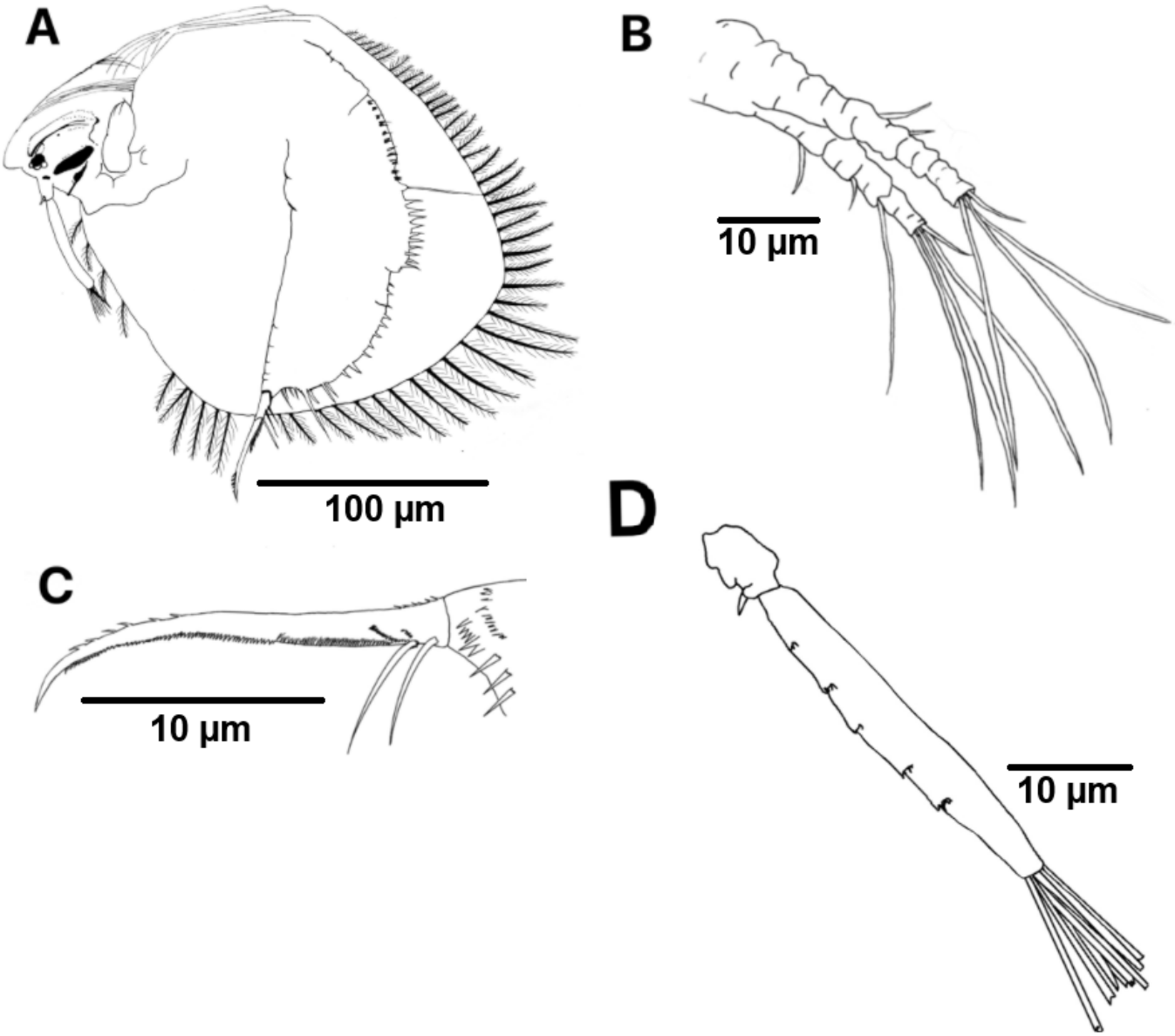

Fig. 12. *Ilyocryptus spinifer* parthenogenic female (PRC 0018). A, habitus, left lateral view; B, right swimming antennae; C, postabdominal claw; D, antennule.

habitat**.** Previously recorded in the islands of Luzon, Mindoro, and Mindanao (Brehm, 1938; Cheng & Clemente, 1954; Mamaril, 1986, 2001). First record on the island of Panay.

***Macrothrix spinosa* King, 1853**
(Fig. 14)

Material examined. 15 parthenogenic females. 7 mounted specimens (PRC 0024, temporary pool near Laglag River, Dueñas, coll. MV Niño and EZ Rizo, May 2023; PRC 0025, Creek near Moroboro Dam, Dingle, Iloilo, coll. MV Niño and EZ Rizo, August 2023; PRC 0026–0027, PRC 0030, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0028 & PRC 0029, temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, February 2024). 8 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0019).

Distribution. Temporary pond near rice fields in Barangay Macatol, Pototan, Iloilo (10.97° N, 122.63° E); temporary pool near Laglag River, Dueñas (11.06° N, 122.59° E); creek near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E) Jalaur River– dike near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo (10.81° N, 122.60° E); Jalaur River section in Barangay Nabitasan, Leganes, Iloilo (10.79° N, 122.64° E) [Fig. 11]

Diagnosis. Ventral margin of head relatively convex. Dorsal margin of valve with fine serrulations (Fig. 14A). Middle of ventral margin of the valves subangulated, obliquely ascending posteriorly, with distinct, short protrusion at posterior end (Fig.14B). Setae natatoriae very short (Fig. 14 C). Postabdomen short with only slight depression in anal aperture. Pre-anal lobe with setae increasing in size proximally.

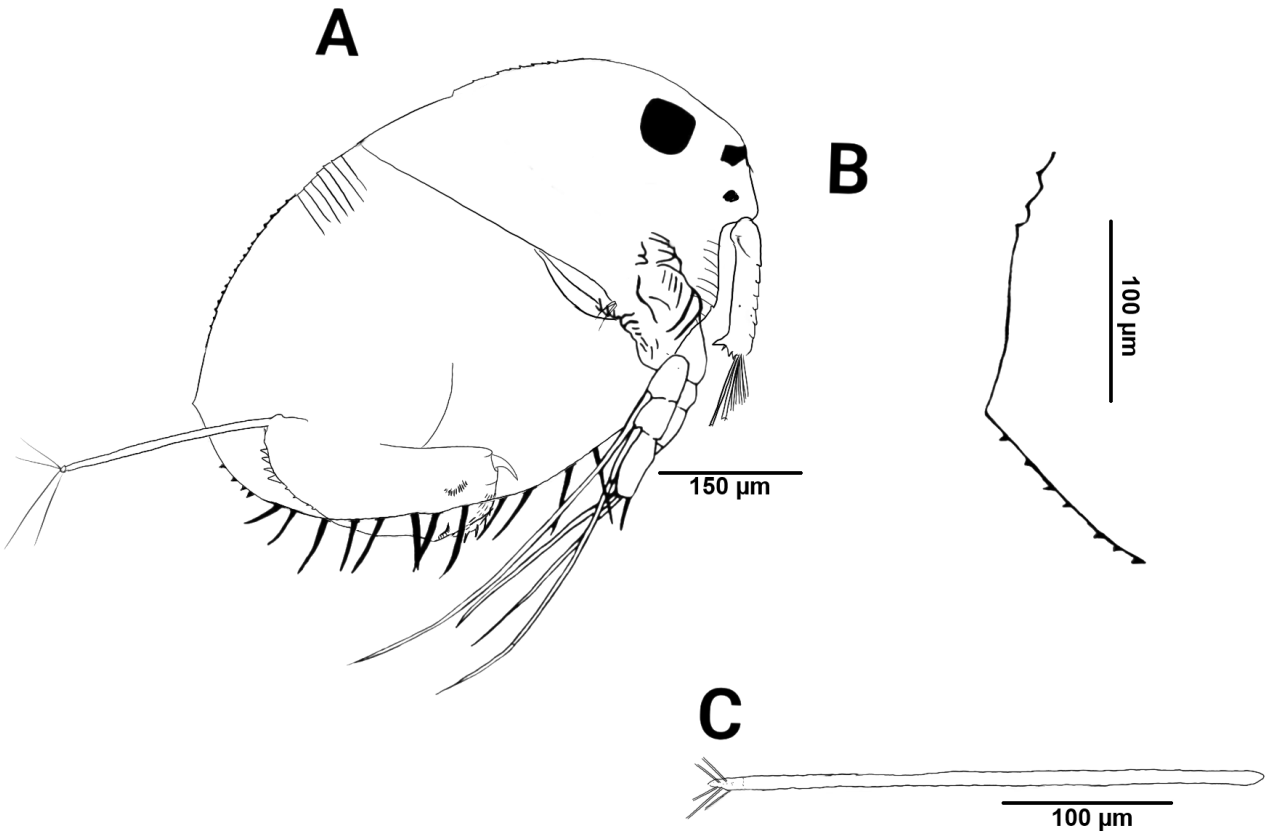

Fig. 13. *Macrothrix triserialis* parthenogenic female (PRC 0031). A, habitus, right lateral view; B, antennule; C, ventral margin of the carapace.

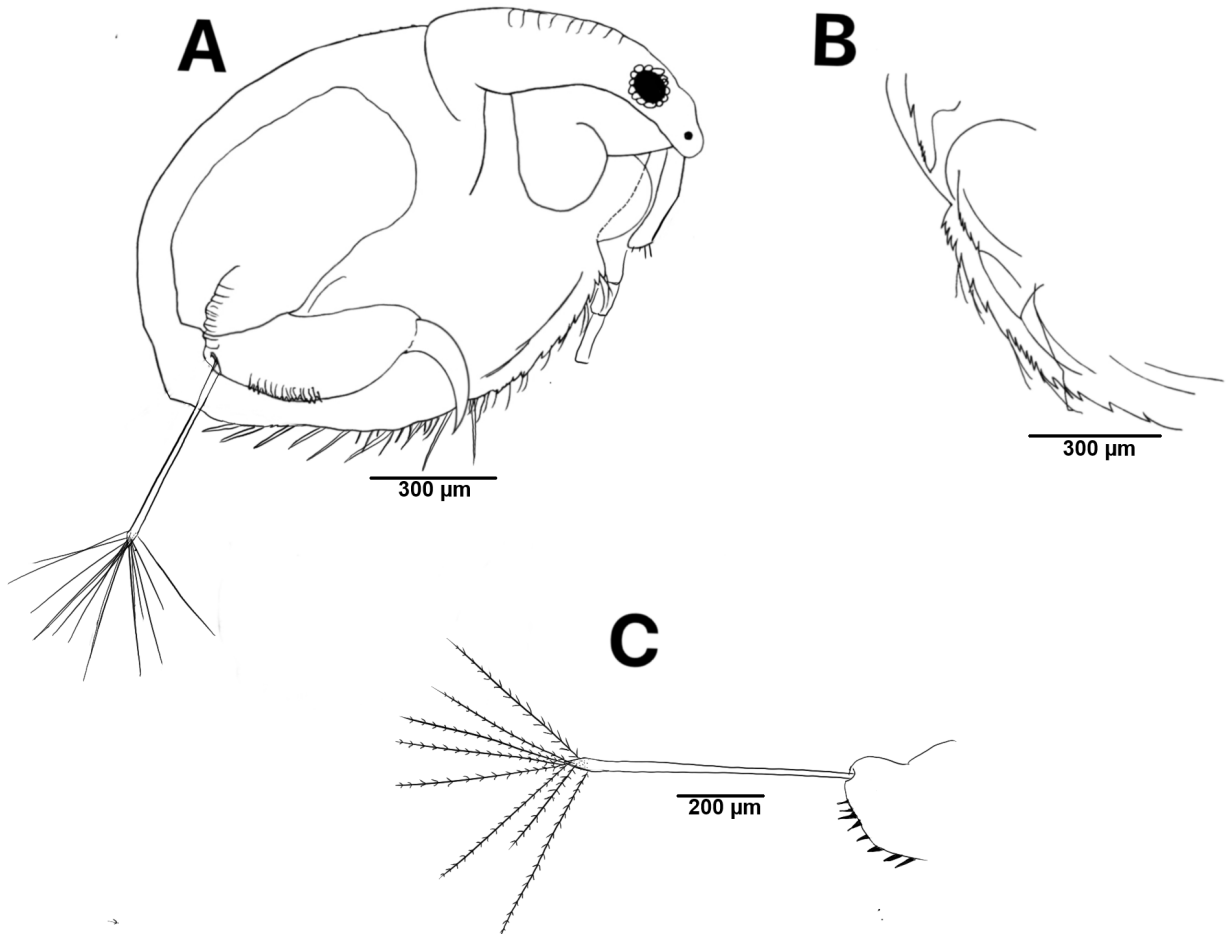

Fig. 14. *Macrothrix spinosa* parthenogenic female (PRC 0024). A, habitus, right lateral view; B, ventral margin of the carapace; C, setae natatoriae.

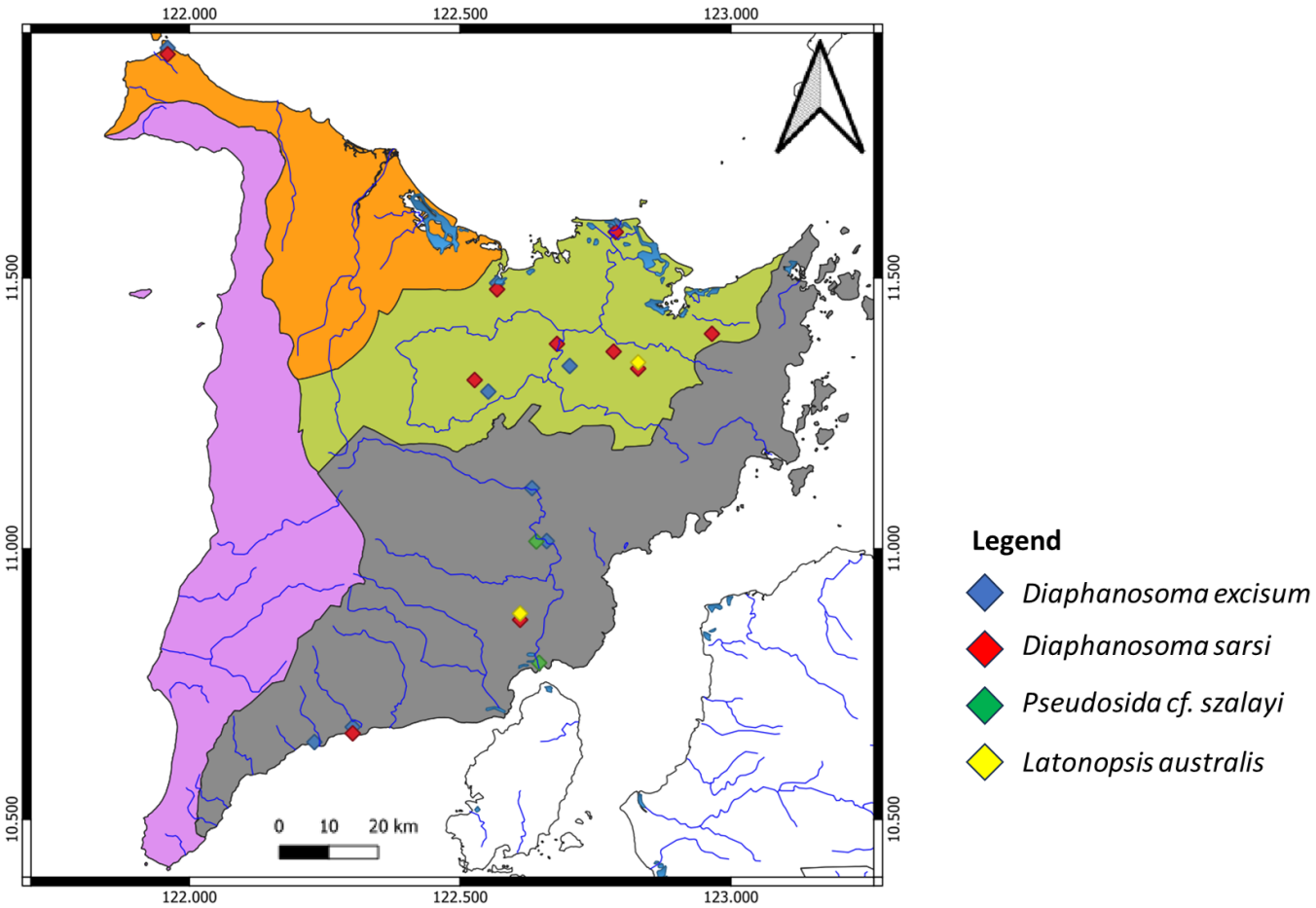

Fig. 15. Distribution map of family Sididae in Panay Island.

Remarks. Found across tropical and subtropical regions in water bodies with thick vegetation. Recorded across Southeast Asia and previously recorded in the islands of Luzon, Mindoro, and Mindanao (Brehm, 1938; Woltereck, 1941; Mamaril, 1986, 2001). First record on the island of Panay.

Order Ctenopoda G.O. Sars, 1865

Family Sididae Baird, 1850

Genus *Latonopsis* Sars, 1888

Remarks. The genus is widely distributed in the tropics and subtropics but is also present in southern areas of the temperate region. The genus is poorly studied with the -*australis* group needing further re-evaluatiom (Korovchinsky, 2018).

***Latonopsis australis* Sars, 1888**
(Fig. 16)

Material examined. 4 parthenogenic females, one mounted specimen (PRC 0075, rice field in Barangay Ilawod, Maayon, Capiz, coll. EV Diaz, October 2023). 3 specimens damaged and disposed of after observation.

Distribution. Rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.23° E); rice field in Barangay Dawis Norte, New Lucena, Iloilo (10.88° N, 122.61° E) [Fig. 15]

Diagnosis. Body length 1.7–1.9 mm. Head not distinctly separated from body, rounded in shape, pointed at apex. Eye situated close to dorsal aspect of head, relatively small to medium in size (Fig. 16A). Sensory seta of antennule exceeding length of its basipodite (Fig. 16B). Distal end of basipodite of swimming antennae with prominent, large spine (Fig. 16C). Ventral edge carapace bearing numerous setae (Fig 16D). Postabdomen relatively diminutive, with few anal spines; terminal claws curved, accompanied by two basal spines.

Remarks. Previously recorded in the inland waters of the islands of Luzon, Leyte, Palawan, and Mindanao (Brehm, 1938; Uéno, 1966; Mamaril & Fernando, 1978; Mamaril, 1986, 2001; and Pascual et al., 2014.). New record for the island of Panay and the Visayas Region. *Latonopsis australis* is a common and widely distributed subtropical-tropical species in Southeast Asia. Usually found in littoral zones of lakes, reservoirs, and water bodies that are well-vegetated (Harding & Petkovski, 1963). They prefer to swim near the substrate of their habitats.

Genus *Diaphanosoma* Fischer, 1850

Remarks. Species of the genus are usually identified/ delimited by the shape of their head. *Diaphanosma* species usually replace *Daphnia* as the largest planktonic species in lentic water bodies in the tropics and subtropics (Korovchinsky, 2018).

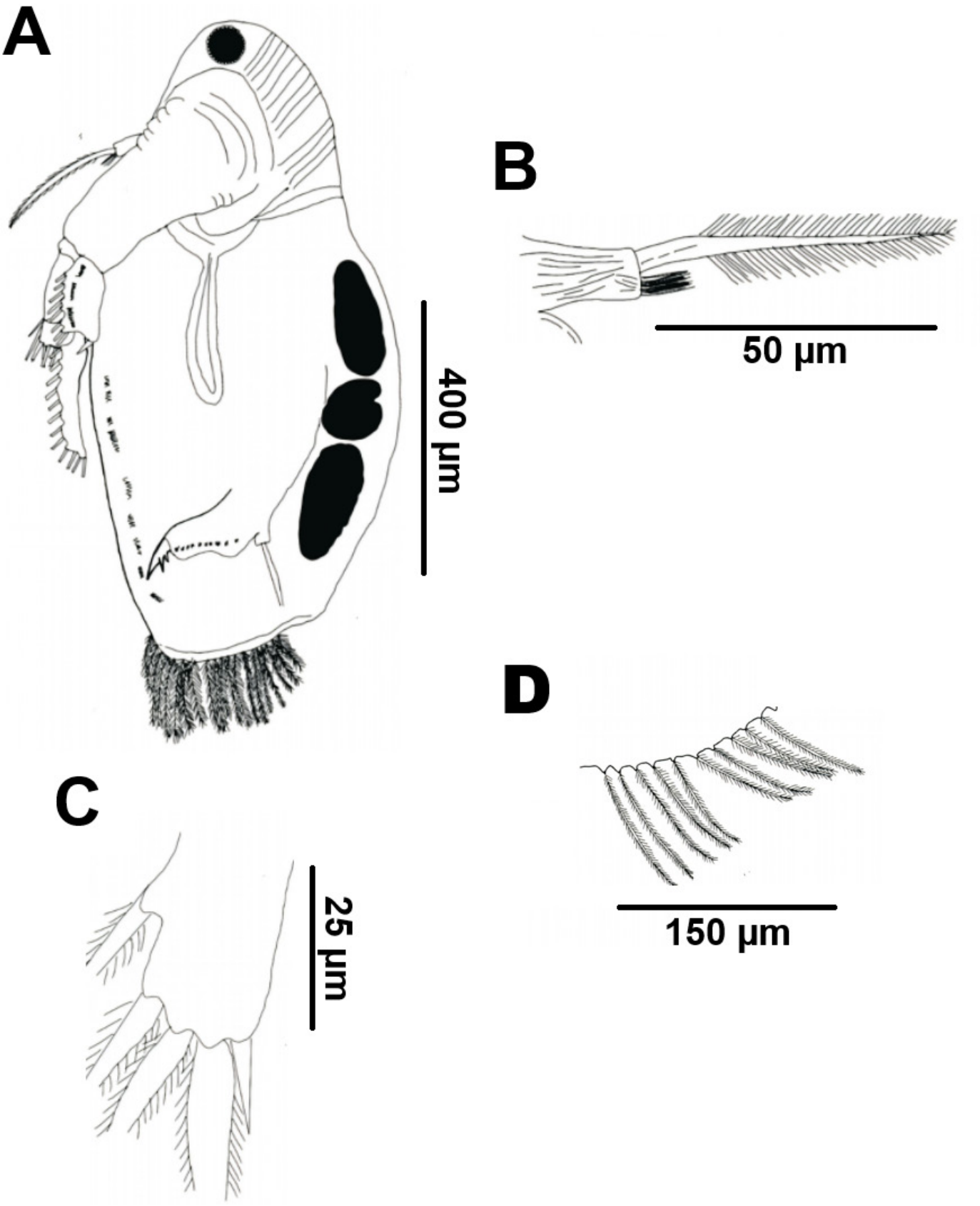

Fig. 16. *Latonopsis australis* parthenogenic female (PRC 0075). A, habitus, left lateral view; B, antennule; C, distal part of first segment of upper 2-segmented antennal branch; D, postabdomen

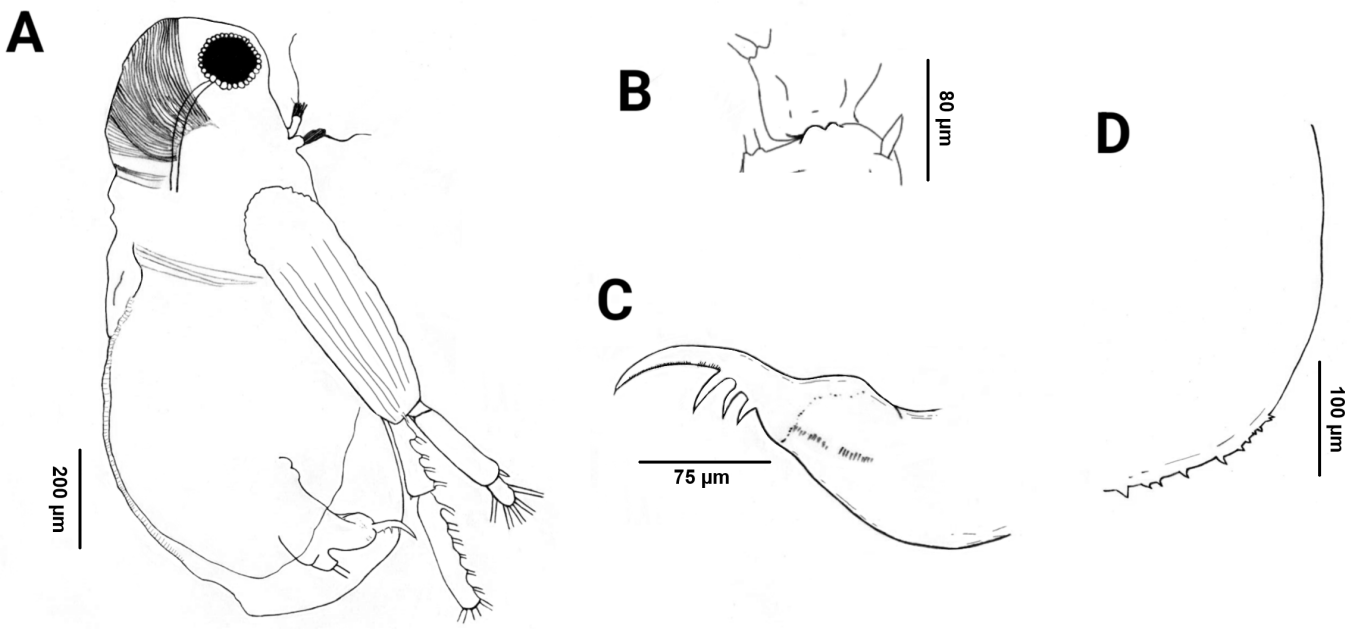

Fig. 17. *Diaphanosoma excisum* parthenogenic female (PRC 0059). A, habitus, right lateral view; B, distal part of first segment of upper 2-segmented antennal branch; C, postabdomen; D, postero-ventral margin of the carapace.

***Diaphanosoma excisum* Sars, 1885**
(Fig. 17)

Material examined. 10 parthenogenic females, 4 mounted specimens (PRC 0059 & PRC 0060, Lake Marugo, Tapaz, Capiz, SK Guinto and EZ Rizo, May 2022; PRC 0061, Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0062, Moroboro Dam, Dingle, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024). 6 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0010).

Distribution. Lake Lupo-lupo, Malay, Aklan (11.92° N, 121.96° E); Lake Marugo, Tapaz, Capiz (11.29° N, 122.55° E); marsh near Culajao Mangrove Eco Park, Roxas City, Capiz (11.60° N, 122.79° E); pond in Barangay Nagba, Cuartero, Capiz (11.34° N, 122.70° E); rice field in Barangay Dawis Norte, New Lucena, Iloilo (10.88° N, 122.61° E); Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section– near residential area in Barangay Gines Viejo, Passi City, Iloilo (11.11° N, 122.63° E); Jalaur River section– bridge in Barangay Malunang, Zarraga, Iloilo (10.81° N, 122.60° E); temporary pool inside University of the Philippines Visayas, Miagao, Iloilo (10.64° N, 122.23° E); pond in Barangay Particion, Guimbal, Iloilo (10.67° N, 122.30° E) [Fig. 15]

Diagnosis. Head rectangular, with strongly developed dorsal part (Fig. 17A). Eye size moderate to large, occupying almost 75% of head. Carapace oblong-oval in shape, with ventral parts forming narrow free flap. Distal part of second segment of upper 2-segmented antennal branch with short spine (Fig. 17B). Postabdominal claws with two proximal spines relatively similar in size (Fig. 17C.) Valve margins bearing large sharp denticles (Fig. 17D).

Remarks. *Diaphanosoma excisum* are very tolerant of the water quality and are observed to be a dominant cladoceran in fish ponds and other water bodies that are exposed to anthropogenic activities. A common species of sidid in the Philippines (Mamaril & Fernando, 1978; Petersen & Carlos, 1984; Mamaril, 2001; Papa & Zafaralla, 2011; Papa et al., 2012 and Pascual et al., 2014.) They can also co-exist with other limnetic cladocerans and are known to survive even brackish waters. Well distributed across tropical and subtropical regions. A study by Dumont et al. (2021) suggests cryptic speciation across *D. excisum* populations in Asia and Africa**.** Distribution in Panay Island is well recorded (Dela Paz et al., 2016) and this species is commonly found in rivers, fish ponds, and reservoirs in the provinces of Aklan, Antique, Capiz, and Iloilo.

***Diaphanosoma sarsi* Richard, 1894**
(Fig. 18)

Material examined. 10 parthenogenic females, 4 mounted specimens (PRC 0063, Lake Dao, Dao, Capiz, coll. EV Diaz, October 2023; PRC 0064, Moroboro Dam, Dingle, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0065, rice field in Barangay Ilawod, Maayon, Capiz, coll. EV Diaz, October 2023; PRC 0066, Jalaur River, Passi City, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, February 2024). 6 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0004).

Distribution. Lake Lupo-lupo, Malay, Aklan (11.92° N, 121.96° E); rice field in Barangay Ilawod, Maayon, Capiz (11.34° N, 122.23° E); creek in Barangay Tepacla, Maayon, Capiz (11.38° N, 122.78° E); marsh near Culajao Mangrove Eco Park, Roxas City, Capiz (11.60° N, 122.79° E); creek in Barangay Tanza Norte, Panay, Capiz (11.32° N, 122.53° E); temporary pool in Barangay Bayuyan, President Roxas, Capiz (11.41° N, 122.97° E); Lake Dao, Dao, Capiz (11.39°

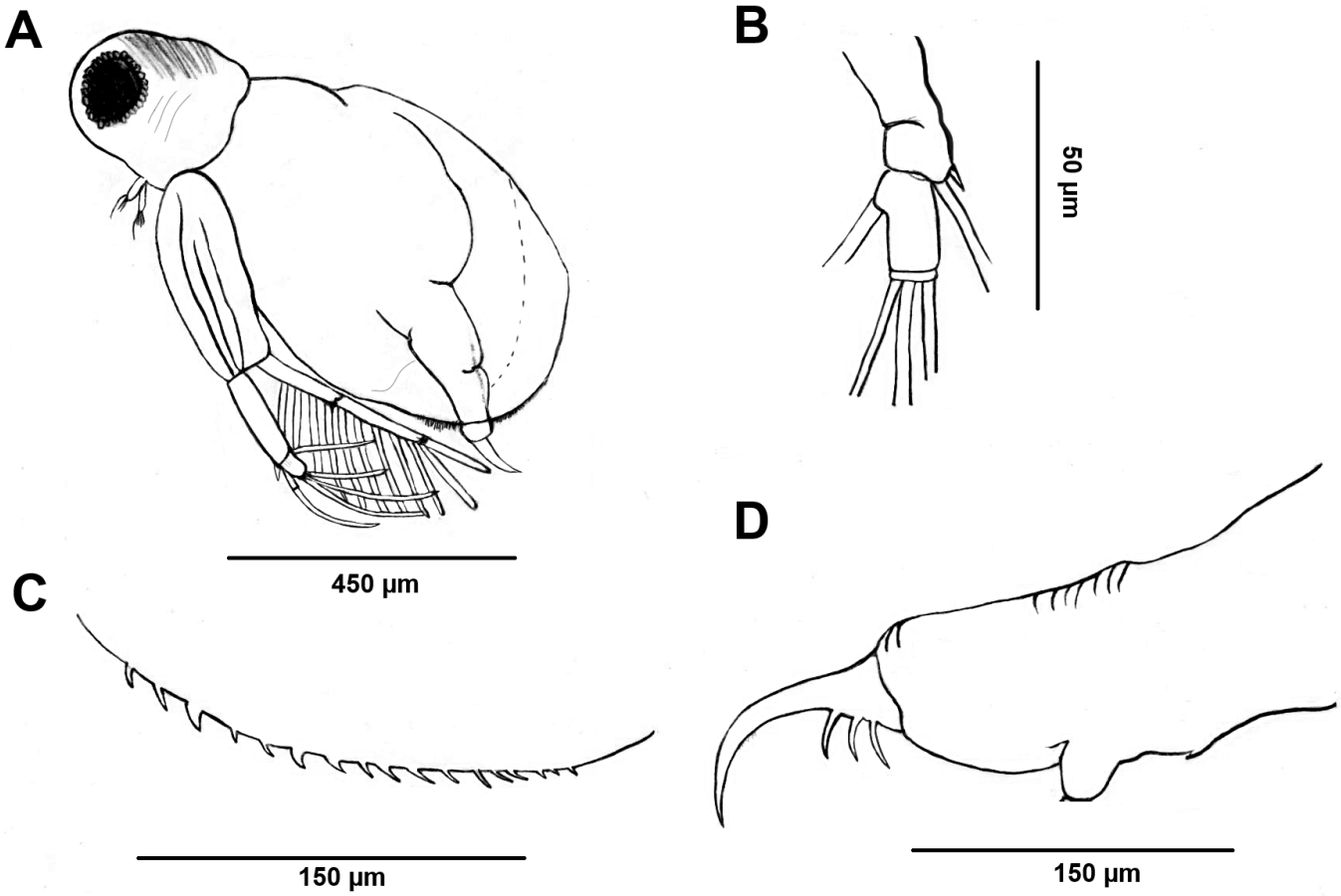

Fig. 18. *Diaphanosoma sarsi* parthenogenic female (PRC 0064). A, habitus, left lateral view; B, distal part of first segment of upper 2-segmented antennal branch; C, postero-ventral margin of the carapace; D, postabdomen.

N, 122.68° E); Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section– near residential area in Barangay Gines Viejo, Passi City, Iloilo (11.11° N, 122.63° E); pond in Barangay Particion, Guimbal, Iloilo (10.67° N, 122.30° E); rice field in Barangay Dawis Norte, New Lucena, Iloilo (10.88° N, 122.61° E) [Fig. 15]

Diagnosis. Small roundish rectangular head with sloping dorsal side (Fig. 18A). Large eye almost occupying whole head. Carapace situated high on body, with broad ventral free flap. Distal part of second segment of upper 2-segmented antennal branch with spine (Fig. 18B). Ventral margins of the valves with 13–40 small denticles (Fig. 18C). Postabdominal claws with 3 relatively long, thin basal spines (Fig. 18D).

Remarks. This species is recorded throughout tropical and subtropical Asia and Africa (Korovchinsky, 2018). Widely distributed in the Philippines, found in most islands in the archipelago (Brehm, 1938; Woltereck, 1941; Mamaril & Fernando, 1978; Petersen & Calos, 1984; Mamaril, 2001; Aquino et al., 2008; Papa & Zafaralla, 2011; Papa et al., 2012; and Pascual et al., 2014). It can be found in a wide variety of water bodies from large lakes to temporary pools. Though found to co-exist with other sidids, they are noted to be more sensitive to physico-chemical parameters/water quality and prefer shallow waters with significant macrophytes/vegetation cover (Korovchinsky, 2018). Newly recorded species in the island of Panay. It usually co-occurs with *D. excisum* but is less abundant than that species (Pascual et al., 2014; Korovchinsky, 2018)

Genus *Pseudosida* Herrick, 1884

Remarks. The genus is widely distributed in tropical and subtropical regions. *Pseudosida* species prefer to inhabit water bodies with rich vegetation, such as littoral zones of lakes (Korovchinsky, 2018).

Pseudosida szalayi Daday, 1898
(Fig. 19)

Material examined. 15 parthenogenic females. 6 mounted specimens (PRC 0067–0069, creek near Moroboro Dam, Dingle, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0070 & PRC 0072, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024; PRC 0071, dissected specimen, Jalaur River section in Barangay Nabitasan, Leganes, Iloilo, coll. EV Diaz, MV Niño, and EZ Rizo, January 2024). 3 specimens damaged and disposed of after observation. 6 specimens preserved in absolute ethanol as voucher specimens (PRC VS 0019).

Distribution: Creek near Moroboro Dam, Dingle, Iloilo (11.01° N, 122.64° E); Jalaur River section in Barangay Nabitasan, Leganes, Iloilo (10.79° N, 122.64° E) [Fig. 15]

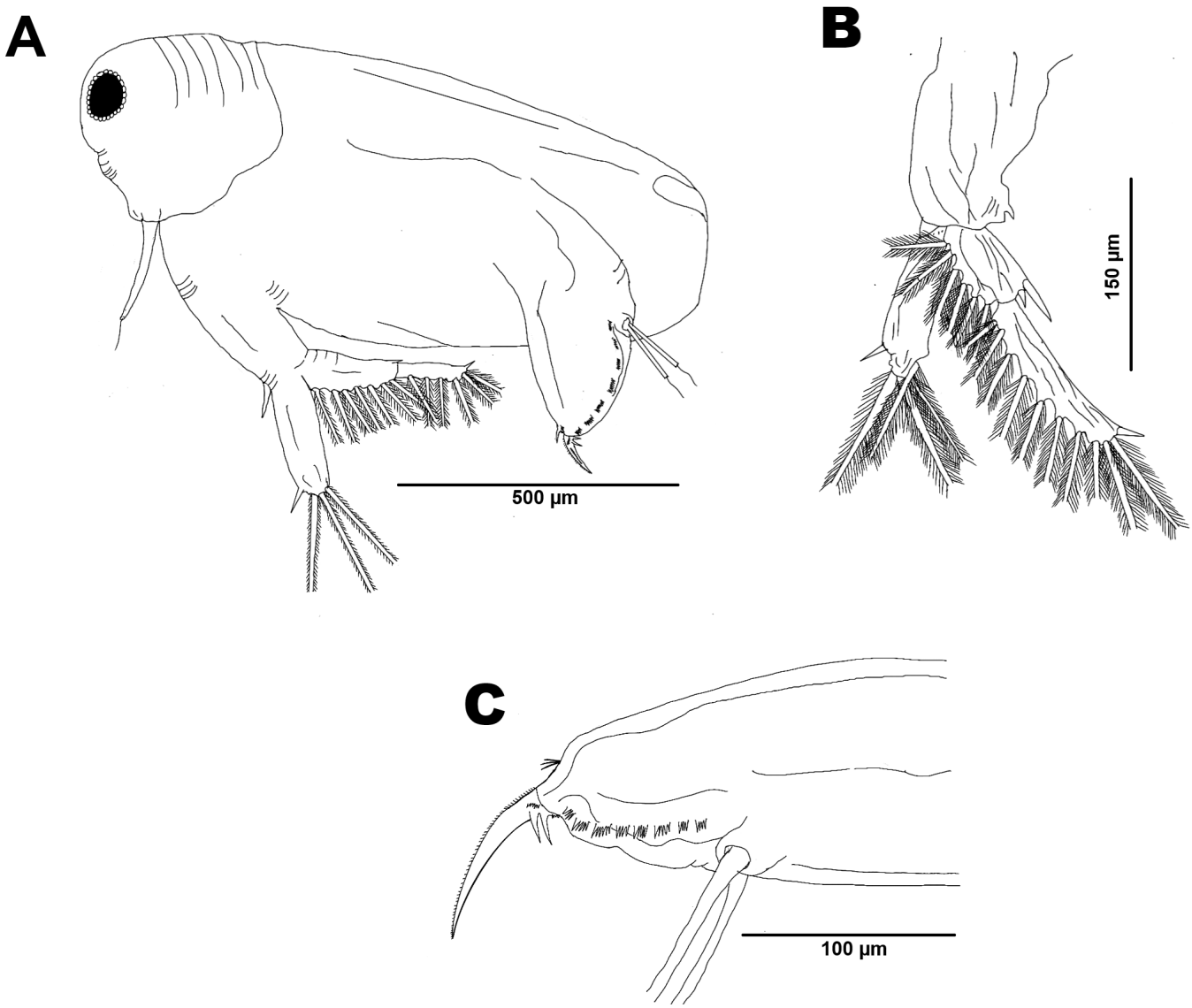

Fig. 19. *Pseudosida szalayi* (PRC 0070) parthenogenic female. A, habitus, left lateral view; B, left swimming antennae; C, postabdomen.

Diagnosis. Body oval, elongated in shape, with relatively small head (28–35% of body length) (Figure 19A). Antennule long, with sensory papillae on basal part. Spine at end of first segment of antennal branch much longer compared to other proximal spines with small seta on the terminal segment of the lower antennal branch (Figure 19B). Postabdominal claw thin with small denticles along convex ventral side with a terminal outgrowth (Figure 19C).

Remarks. Found in tropical and subtropical Asia (Korovchinsky, 2010, 2013). Primarily found in river channels, swamps, marshes, and other well-vegetated water bodies. It has only been previously recorded in Southeast Asia in Thailand and Indonesia. Previous records of *P. bidentata* in the Philippines such as in the islands of Luzon, Leyte, and Mindanao may have been *P. szalayi* based on the recent taxonomic revision and observed distribution of the species (Korovchinsky, 2010). Though relatively understudied, *P. bidentata* seems to be limited to the western hemisphere, compared to *P. szalayi*. Morphological differences are also apparent in our observed specimens in comparison with previous observations in the country (Korovchinsky, 2010). A new record for the island of Panay.

DISCUSSION

The lack of freshwater studies and surveys in the Visayas region (i.e., the central Philippines) has become a handicap to fully mapping and understanding the diversity and distribution of freshwater zooplankton, especially microcrustaceans, in the Philippines (Papa & Mamaril, 2011; Papa & Briones, 2014; Magbanua et al., 2017). The current re-survey of the inland waters of the island of Panay has improved our understanding of the species distribution and richness of freshwater zooplankton in the Visayas. Our study has increased the number of known Cladocera in the island, from just a single species to 14 species. The increase in the number of observed species shows the importance of multiple sampling efforts, especially in different types of water bodies (Korovchinsky, 2013; Sinev & Yusoff, 2018; Choedchim & Maiphae, 2023). However, our re-survey is

Table 3. List of species per major island in the Visayas Region based on published literature (also summarised in Lopez et al. (2017b). New records for the island of Panay are indicated by an asterisk (*).

Panay	Negros	Cebu	Bohol	Leyte
**Ceriodaphnia cornuta*	*Ceriodaphnia cornuta*	*Ceriodaphnia cornuta*	*Diaphanosoma excisum*	*Ceriodaphnia cornuta*
**Moina micrura*	*Moina micrura*	*Guernella raphaelis*	*Diaphanosoma sarsi*	*Moina micrura*
**Moinodaphnia macleayi*	*Ilyocryptus spinifer*	*Moinodaphnia macleayi*		*Latonopsis australis*
**Pleuroxus (Picripleuroxus) quasidenticulatus*	*Diaphanosoma sarsi*			
	Bosmina fatalis			
	Bosmina longirostris			
**Kurzia brevilabris*	*Alonella excisa*			
**Kurzia longirostris*	*Ephemeroporus barroisi*			
**Oxyurella singalensis*				
**Ilyocryptus spinifer*	*Dunhevedia crassa*			
**Macrothrix triserialis*	*Dunhevedia serrata*			
**Macrothrix spinosa*	*Ceriodaphnia pulchella*			
**Latonopsis australis*	*Scapholeberis kingii*			
Diaphanosoma excisum	*Guernella raphaelis*			
**Diaphanosoma sarsi*				
**Pseudosida szalayi*				

characterised by low densities of specimens in our samples, which is relatively common with tropical populations due to a high number of predators; and this may, in turn, have affected the total number of observed species (Dumont, 1994). Species richness in our study is highest in waterbodies with macrophytes. The presence of submerged macrophytes may offer a variety of ecological niches and shelter from predation (Dumont, 1997; Eitam et al., 2004; Maiphae et al., 2008). Increasing the sampling scope and effort on small and medium-sized water bodies suitable for cladoceran fauna, such as rice fields, slow-moving streams, and other inland water bodies with submerged macrophytes, is expected to increase the number of observed species in the island. On the other hand, the lowest species diversities were observed in aquaculture ponds, river tributaries, and river impoundments. The relatively fast-flowing waters and disruptions from flooding, as well as high densities of potential fish predators in these localities do not make them a suitable habitat for cladocerans, primarily due to their poor swimming ability and relatively weak motility (Smirnov, 2014; Rizo et al., 2017, 2019).

Although there is an increase in the number of observed species in Panay Island, the island is significantly less diverse compared to larger islands in the Philippines such as Luzon and Mindanao (Lopez et al., 2017b). The low number of species in Panay may be attributed to the lack of large natural lakes, which typically hold the highest cladoceran diversity (Forro et al., 2008; Korovchinsky, 2013). Large water bodies on the island are limited to recently constructed dams, reservoirs, and river impoundments. Additionally, compared to water bodies in mainland Asia, water bodies in insular Southeast Asia are relatively young and are subjected to high predation pressure. Nonetheless, the observed number of species in our study is comparable to what has been observed in other islands of almost similar size and geological history in the Visayas, such as the neighboring Negros Island (Table 3). The two islands share at least four species between them, namely: *Moina micrura*, *Ceriodaphnia cornuta*, *Diaphanosoma sarsi*, and *Ilyocryptus spinifer* (Lopez et al., 2017b). These species are relatively common in the archipelago and are commonly associated with small lotic ecosystems such as aquaculture ponds. Substrate-associated species found in Negros Island are likely to be also found in Panay Island as they are commonly recorded in other islands in the Philippines. However, the absence of *Bosmina*, a common planktonic genus, in Panay is notable and should be further investigated, as it is present in Negros.

More than half of our observed species are substrate-associated, viz. *Moinodaphnia macleayi*, *Pleroxus quasidenticulatus*, *Kurzia brevilabris*, *K. longirostris*, *Oxyurella singalensis*, *Ilyocryptus spinifer*, *Macrothrix triserialis*, *M. spinosa*, *Latonopsis australis*, and *Pseudosida bidentata*. Most of the identified species were observed in water bodies with submerged aquatic macrophytes and temporary water bodies such as paddy fields and shallow river impoundments. This observation coincides with other studies in island freshwater ecosystems (Korovchinsky, 2001; Shabetsberger et al., 2009; Sinev et al., 2015; Sinev & Yusoff, 2018). Many planktonic genera such as *Bosmina*, *Scapholeberis*, and *Simocephalus* are absent in Panay Island thus far. The general lack of large lentic water bodies has probably had an influence on the overall number of observed planktonic species on the island. All of the species we have recorded are widely distributed in tropical regions, especially in Southeast Asia. 11 out of 14 recorded species are found to be widely distributed across both tropical and temperate regions. Only three of the recorded species (viz. *K. brevilabris*, *O. singalensis*, and *P. szalayi*) have limited ranges that includes the Oriental region. Widely distributed cladoceran species are usually observed to have higher tolerance to fluctuations in their environment, thus giving them the ability to colonise the limited range of suitable waterbodies on islands (Smirnov, 2014; Van Damme & Kotov, 2016).

This study serves as an update on the species composition of microcrustaceans in Philippine inland waters. Our re-survey

of the cladocerans of Panay dispels previous observations that the Visayas region is species-poor for cladocerans. Furthermore, our results highlight the need to re-evaluate the diversity and distribution of freshwater microcrustaceans such as cladocerans in the Philippines, especially in localities beyond the islands of Luzon and Mindanao. Apart from the general absence of large natural lakes and ponds, the presence of aquaculture and other industries in the proximity of freshwater habitats in Panay may have influenced the diversity of large planktonic cladocerans in our study sites. The rapid development and increase in anthropogenic activities on the island and across the Philippine archipelago may eventually lead to a decline in freshwater species (Magbanua et al., 2017; Papa & Briones, 2014). Increasing domestic and industrial activities in the region will eventually impact cladoceran communities especially species that are sensitive to biotic & abiotic changes in their habitat (Dudgeon, 2019). Further studies on the diversity and distribution of Philippine cladocerans, particularly littoral species, are needed to increase the understanding of inland aquatic biodiversity and biogeographic patterns for microcrustaceans in tropical and subtropical Asia.

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