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The Hillstream Decapod Crustaceans of Shenzhen, China, with Description of a New Species of Freshwater Crab (Crustacea: Brachyura: Potamidae) in the Genus *Megapleonum* Huang, Shih & Ahyong, 2018

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Freshwater decapod crustaceans are often ecologically important keystone species in their habitats. The freshwater hillstream decapods of Shenzhen City, Guangdong, China, were systematically surveyed for the first time from June to September 2019. We identified a total of 19 decapod species from 10 genera and six families. Of these, one *Macrobrachium* species and one potamid species could not be assigned to any known species. The latter clearly belongs to the monotypic genus *Megapleonum* Huang, Shih & Ahyong, 2018, and resembles the type species *M. ehuangzhang* in general external morphology. Striking differences in male gonopodal morphology along with genetic evidence based on mitochondrial 16S rDNA sequences strongly suggest that this species is distinct from the type species and it is herein described as *Megapleonum shenzhen* n. sp. Our survey data sheds light on the biodiversity of hillstream decapods in Shenzhen and highlights areas of conservation interest.

Key words: Aquatic fauna, Decapoda, Freshwater crab, Freshwater shrimp, New species, Potamidae, Systematics.

BACKGROUND

Situated on the east bank of the Pearl River and sharing a border with Hong Kong, Shenzhen is a major city in China and is part of the Huanan freshwater zoogeographical province (Huang et al. 2020a). Despite being a bustling modern city with a population over 12 million, Shenzhen's many intact ecosystems (such Dapeng Peninsula and Wutongshan National Forest Park) and monsoon-influenced humid sub-tropical climate provide favorable conditions for freshwater fauna. In south China, decapod crustaceans are diverse and abundant in hillstreams in the form of shrimps and crabs (Huang et al. 2017 2020b c; Cai and Ng 2018; Wang et al. 2019 2020; Zhang et al. 2020). By acting as grazers, scavengers, opportunistic predators and even a food source for other fauna, these crustaceans are often considered the keystone species of their habitats (Yeo et al. 2008; Cumberlidge et al. 2009). Biodiversity surveys have been conducted in Shenzhen in the past (*i.e.*, Chen et al. 1997; Kadoorie Farm and Botanic Garden 2002), but to the best of our knowledge, none have focused on hillstream decapods. From June to September 2019, we systematically surveyed most of the forested areas of Shenzhen for freshwater hillstream decapods. The survey data is supplemented with data from previous occasional surveys. During these surveys, we recorded and collected a new species of freshwater crab, which

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we introduce below.

The freshwater crab genus *Megapleonum* Huang, Shih & Ahyong, 2018, was erected from its type species and heretofore sole member *M. ehuangzhang* Huang, Shih & Ahyong, 2018, which is currently only known from E'huang Ridge, Yangjiang, Guangdong. In 2018, internet photos of a crab that clearly belonged to the genus *Megapleonum* from Shenzhen caught the attention of the first author. The finder of this crab, Hao-Ran Chen, a native fish enthusiast, kindly provided the authors with the crab's precise locality – a hillstream in Maluan Mountain. During our surveys later that year, with the help of wildlife photographer Hang Zhou, we managed to find and collect this species from multiple localities. The external characters of this species agree well with the definition of the genus and are similar to *M. ehuangzhang*. However, the Shenzhen species can immediately be distinguished by its distinctly different male first gonopod along with other less obvious characters. Genetic divergence rates of the mitochondrial 16S rDNA also support the Shenzhen species as being distinct from *M. ehuangzhang.* As such, it is described herein as new.

MATERIALS AND METHODS

Systematic surveys were carried out from June to September 2019 covering most of the forested areas of Shenzhen *i.e.*, Qiniang Mountain, Paiya Mountain, Tiantou Mountain, Maluan Mountain, Sanzhoutian Reservoir, Yangtai Mountain and Mountain. The four-month surveying period, which is in late summer, is generally when hillstream crustaceans are considered to be most active. Specimens of crabs were collected by hand in both daytime and at night. Rocks in the hillstreams were turned over and mud holes at the bank of the hillstreams were investigated. Specimens of shrimps were collected with a dip net in both daytime and night, but mainly at night when they come out of hiding. Specimens caught were kept in a transparent plastic container for identification before being released back into the original capture site. Those that could not be immediately identified with confidence were preserved in 75% ethanol and taken back to the lab for further identification. Shrimp species were identified mainly by using Liang (2004), Li et al. (2007) and recent taxonomic literature as references with advice from shrimp expert Prof. Zhao-Liang Guo (Foshan University) and enthusiast Hung-Tsun Cheng (Hong Kong). These specimens were then deposited into the Sun Yat-sen Museum of Biology, Sun Yat-sen University, Guangzhou, China (SYSBM). A list of the specimen details is provided in the supplementary materials (Fig. S1 and Table S1). The survey is not exhaustive and does not cover all seasons throughout the year. Therefore, although the results shed light on the hillstream decapod biodiversity of Shenzhen, it may not represent the true extent of its biodiversity. For the taxonomical study, specimens of *Megapleonum shenzhen* n. sp. were deposited into the SYSBM and the Australian Museum, Sydney, Australia (AM). Measurements, in millimetres, are of the carapace width and length, respectively. Other abbreviations are as follows: G1, male first gonopod; G2, male second gonopod; CW, carapace width; P2–P5, pereiopods 2–5. The terminology used primarily follows that of Dai (1999) and Davie et al. (2015). Species used in the molecular comparison include *Megapleonum ehuangzhang* (Genbank accession numbers: LC383794, LC383795) and *M. shenzhen* n. sp. (Genbank accession numbers MZ270565, MZ270566 for specimens SYSBM 001985 and SYSBM 001988, respectively). Sequences of 16S were obtained following Huang (2018), using the primers 1471 and 1472 (Crandall and Fitzpatrick 1996), and aligned with the aid of ClustalW (Thompson et al. 1994) in MEGA X (Kumar et al. 2018), after verification with the complementary strand. The nucleotide pairwise *p*-distance and K2P distance of the 16S gene between *Megapleonum shenzhen* n. sp. and *M. ehuangzhang* were calculated using MEGA X and are 7.00% and 7.39%, respectively.

RESULTS

SYSTEMATICS

Family Potamidae Ortmann, 1896
Subfamily Potamiscinae Bott, 1970 (*sensu* Yeo & Ng 2003)

Megapleonum shenzhen sp. nov.

(Figs. 1–3, 4G, H)

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Material examined: Holotype: SYSBM 001983, male (18.6 × 14.4 mm), Pingpu (22.64°N, 114.53°E), Longgang District, Shenzhen, Guangdong, China, small hillstream, 130 m a.s.l., coll. C. Huang, November, 2018. Paratypes: SYSBM 001984, 1 male (15.9 × 12.4 mm), same data as holotype. SYSBM 001985-001987, 3 females (22.4 × 16.7 mm, 19.2 × 14.2 mm, 15.1 × 10.9 mm), same data as holotype. SYSBM 001988, male (16.2 × 12.4 mm), Maluan Mountain (22.61°N, 114.33°E), Yantian District, Shenzhen, Guangdong, China, small hillstream, 130 m a.s.l., coll.

C. Huang, November, 2018. SYSBM 001989-001990, 2 males (16.6 × 12.8 mm, 15.9 × 12.4 mm), Luowutian Reservoir (22.66°N, 114.46°E), Yantian District, Shenzhen, Guangdong, China, small hillstream, 80 m a.s.l., coll. C. Huang, August, 2019. SYSBM 001991, 1 female (17.0 × 12.6 mm), same data as above. AM P105613, 1 male (17.2 × 13.1 mm), same data as holotype.

Description: Small sized (CW < 30 mm). Carapace broader than long, width 1.3–1.4 × length (n = 10), regions indistinct; dorsal surface finely pitted, convex (Fig. 1). Front deflexed, margin slightly ridged in dorsal view (Fig. 1). Epigastric cristae distinct, separated by narrow gap (Fig. 1). Postorbital cristae sharp, laterally expanded, fused with epigastric cristae but not with epibranchial teeth (Fig. 1). Branchial regions flat; cervical groove shallow; mesogastric region slightly convex (Fig. 1). External orbital tooth granular, indistinct; external orbital angle fused with anterolateral margin with almost no gap (Figs. 1, 2A). Epibranchial tooth granular, indistinct (Fig. 1). Anterolateral margin cristate, lined with 15–19 granules (Fig. 1). Posterolateral margin with lined striae (Fig. 1). Orbits small, supraorbital and infraorbital margins ridged (Fig. 2A). Sub-orbital, sub-hepatic and pterygostomial regions divided by sutures; surfaces pitted (Fig. 2A). Epistome median lobe broadly triangular, posterior margin almost straight (Fig. 2A).

Maxilliped 3 merus width about 1.2 × length; ischium width about 0.7 × length; merus subtrapezoidal with slight median depression; ischium subtrapezoidal, with median sulcus, mesial margin rounded; exopod tapering, reaching to proximal quarter of merus height, flagellum vestigial (Fig. 3A).

Chelipeds slightly unequal (Figs. 1, 3F–G). Merus trigonal in cross section, margins crenulated (Fig. 2A). Carpus with sharp spine at inner-distal angle, spinule at base, dorsal surface with weak striae (Fig. 1A). Major cheliped palm length about 1.4–1.5 × height in males (n = 3), 1.4–1.6 × height in females (n = 3); dactylus 0.9

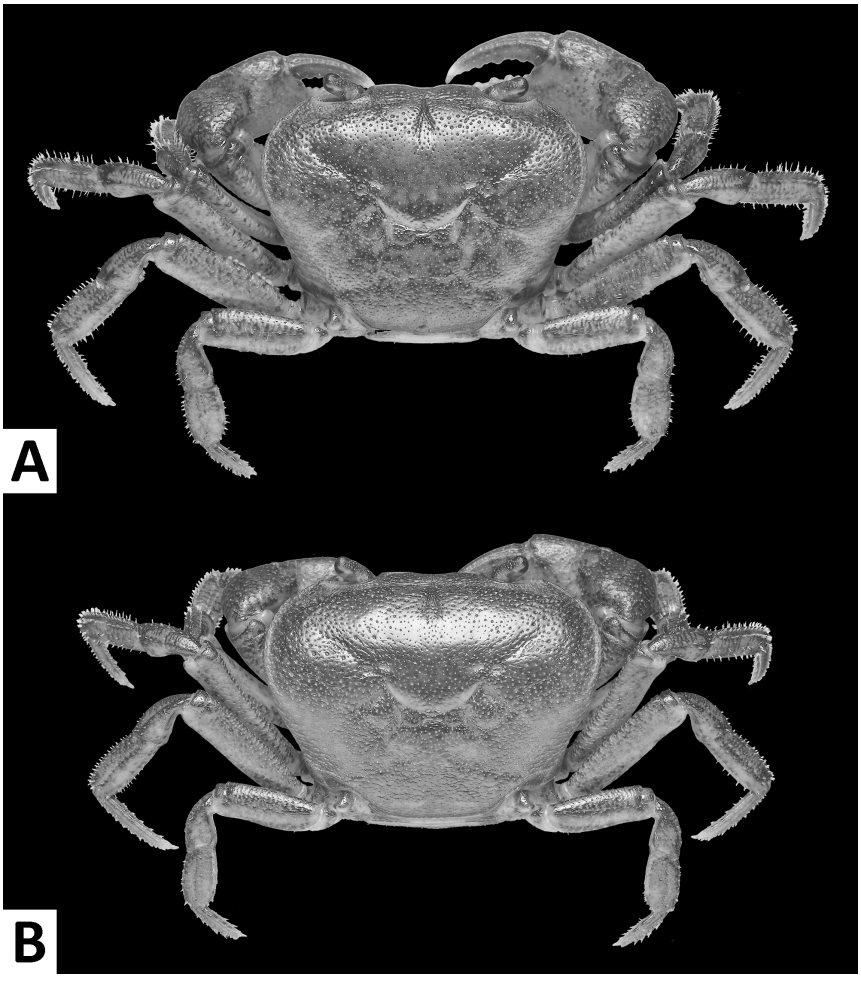

Fig. 1. Dorsal habitus. (A) *Megapleonum shenzhen* n. sp., male holotype (18.6 × 14.4 mm), SYSBM 001983; (B) female paratype (22.4 × 16.7 mm), SYSBM 001985.

× palm length in males (n = 3), 0.7–0.9 in females (n = 3) (Fig. 3F–G). Palm surface generally pitted. Occlusal margin of fingers lined with triangular teeth of different sizes; small gape when closed (Fig. 3F–G).

Ambulatory legs (P2–5) stout, short, carpus with sparse short setae; propodus and dactylus with relatively denser setae (Fig. 1). P3 merus 0.6–0.7 × carapace length in males (n = 3), 0.7 × in females (n = 3). P5 propodus 1.7–1.9 × as long as broad in males (n = 3), and 1.7–2.1 × in females (n = 3), shorter than dactylus (Fig. 1).

Male thoracic sternum generally pitted; sternites 1–4 wide, width about 1.9 × length; sternites 1, 2 fused, forming a triangular structure; sternites 2, 3 fused, separated by a deep transverse sulcus; sternites 3, 4 fused, with median sulcus (Fig. 2B). Male sterno-pleonal cavity reaching anteriorly beyond level of mid-length of chelipeds coxae base (Fig. 2B); median

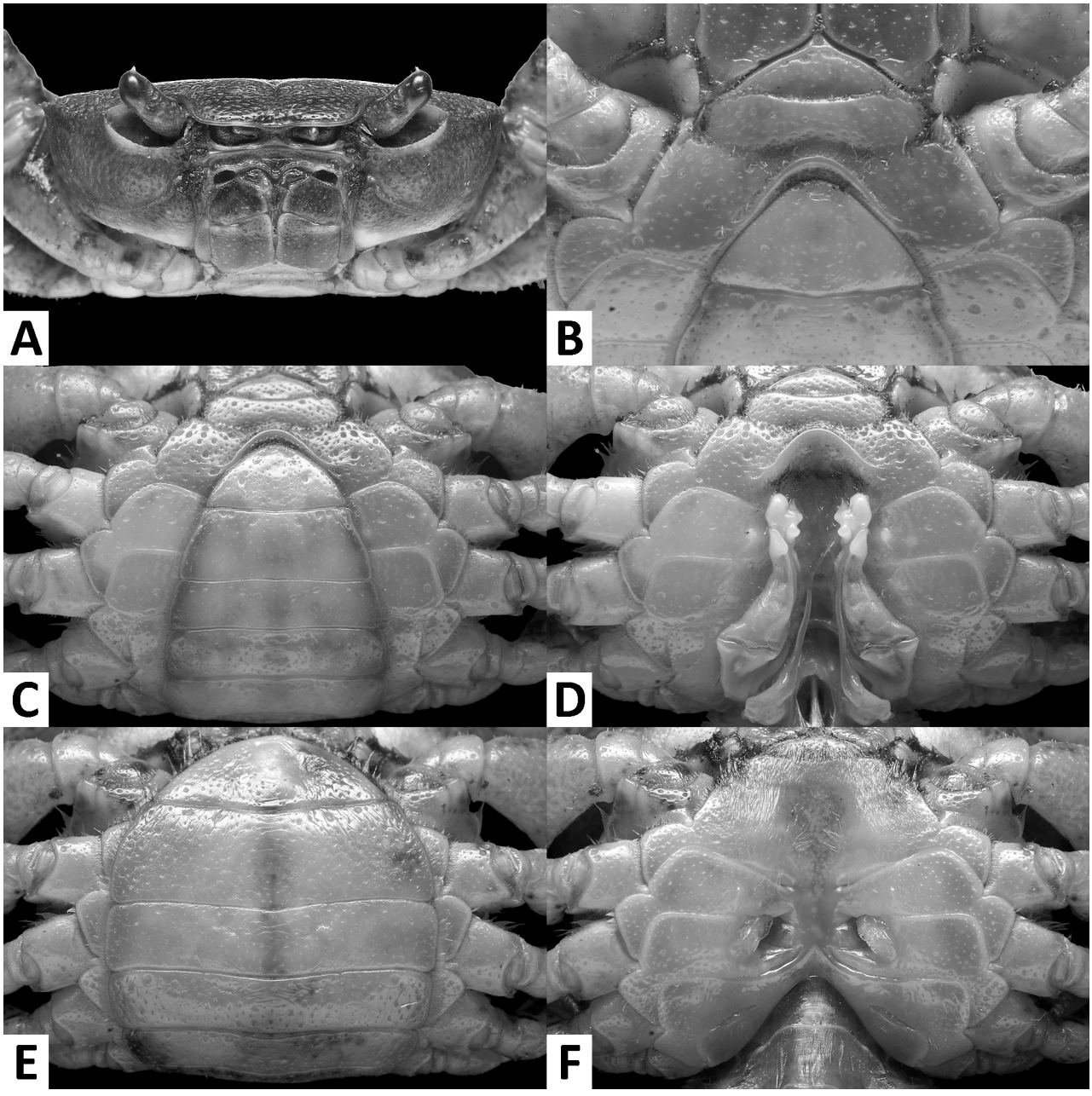

Fig. 2. (A–D) *Megapleonum shenzhen* n. sp., male holotype (18.6 × 14.4 mm), SYSBM 001983; (E–F) female paratype (22.4 × 16.7 mm), SYSBM 001985. (A) Cephalothorax, anterior view; (B) anterior thoracic sternum; (C) anterior thoracic sternum and pleon, ventral view; (D) sterno-pleonal cavity with G1 *in situ*, ventral view; (E) pleon, ventral view; (F) vulvae, ventral view.

longitudinal groove separating sternites 7, 8 deep (Fig. 2D). Male pleonal locking tubercle positioned at mid-length of sternites 5 (Fig. 2D). Female vulva ovate, medium-sized, reaching to the suture of sternites 5/6, relatively widely spaced between one another (Fig. 2F).

Male pleon large, broadly triangular; somite 3–6 progressively broader longitudinally, lateral margins convex; somite 6 width about 2.6 × length; telson 2 × as broad as long, apex rounded (Fig. 2C). Female pleon broadly ovate (Fig. 2E).

G1 sinuous, reaching beyond suture of sternites 4/5 *in situ* (Fig. 2D). Subterminal segment 2.2–2.5 × as long as terminal segment (n = 3), bent inwards, outer-distal part with distinct lobe. Terminal segment stout, goose-head-shaped; tip pointed, pointing inner-upwards; distal part forming lobe; ventral side with large bulging curved flap (Figs. 2D, 3C–E, 4G). G2 slender, subterminal segment relatively thick basally, tapering distally, subterminal segment 1.8 × as long as terminal segment (Fig. 3B).

Etymology: The species is named after the locality where the species was first collected, Shenzhen, Guangdong, China.

Colour in life: Dorsal surface generally mottled brown, blending in well with the rocks and plant debris in the hillstream where it is usually found (Fig. 4H).

Habitat: This species was collected from under rocks in hillstreams at around 100 m a.s.l. No other crabs could be found with the new species in Pingpu. In the Maluan Mountain collection site, the new species was extremely rare, whereas *Eriocheir hepuensis* and *Nanhaipotamon hongkongense* were common. We suspect that the main population of *M. shenzhen* n. sp. resides in the upper reaches of that hillstream where there would presumably be fewer *E. hepuensis*. At Luowutian Reservoir, *N. hongkongense* were also found

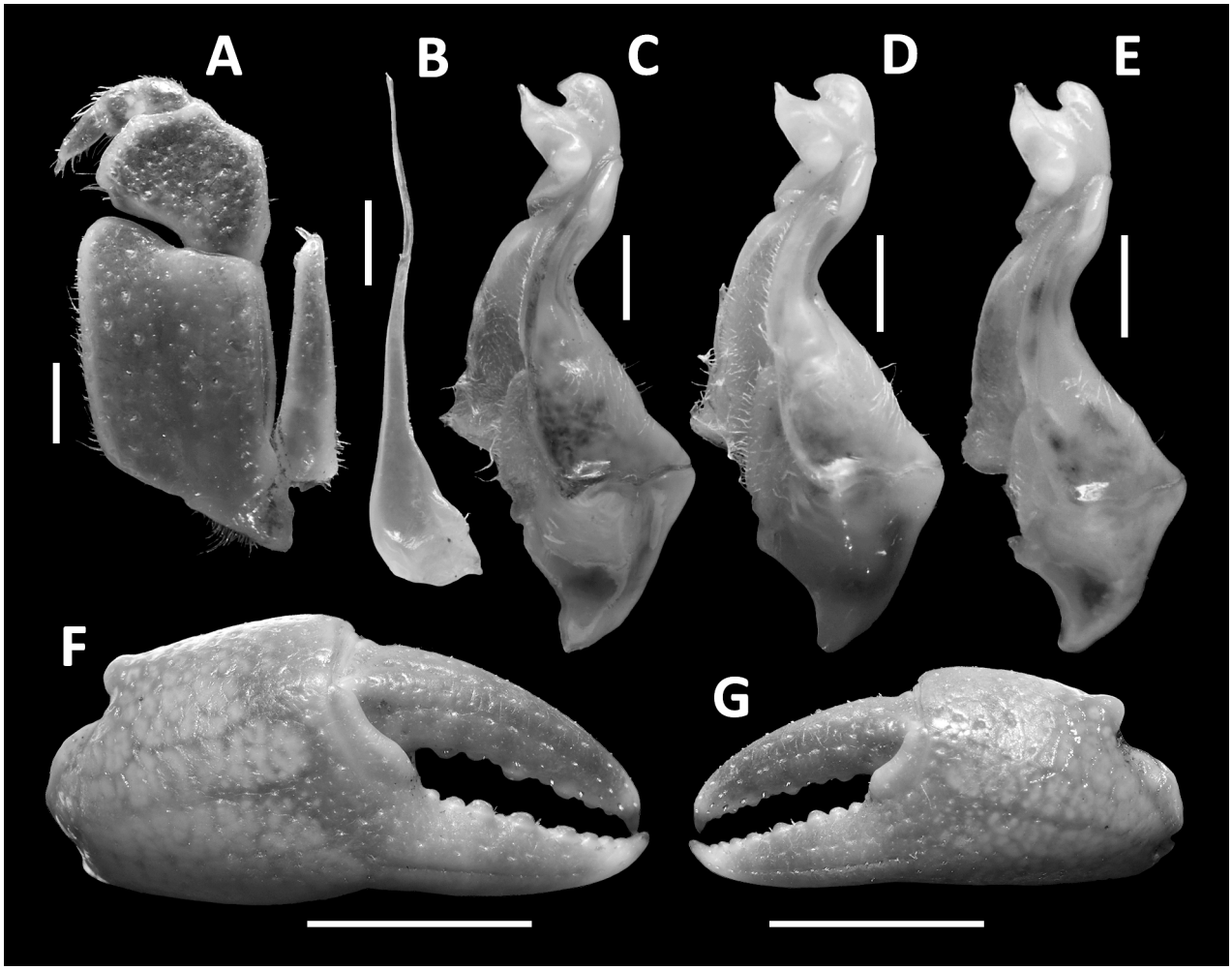

Fig. 3. (A–C, F–G) *Megapleonum shenzhen* n. sp., male holotype (18.6 × 14.4 mm), SYSBM 001983; (D) male paratype (17.2 × 13.1 mm), AM P.105613; (E) male paratype (16.2 × 12.4 mm), SYSBM 001988. Left maxilliped 3 (A); left G2, ventral view (B); left G1, ventral view (C–E); major cheliped (F); minor cheliped (G). Scale bars: A–E = 1.0 mm, F–G = 5.0 mm.

in the hillstream where we collected the new species. For reasons not yet known, the *N. hongkongense* found here seemed to be more aquatic in habit than most other populations, as all were found in the water and oddly no crab holes could be seen. The first author observed a population with similar aquatic habitats in Bowen Hill, Hong Kong.

Remarks: Externally, *Megapleonum shenzhen* n. sp. is very similar to *M. ehuangzhang*. Both species have a large and wide male pleon with convex lateral margins, which is the most noticeable external characteristic of the genus (Fig. 2C; Huang et al. 2018a: fig. 2C). Similarly, the anterior thoracic sternum is broad in both species, width 1.9 × as length (Fig. 2B; Huang et al. 2018a: fig. 4A). Another main feature of the genus is the unique G1 morphology, which is characterized by the overall sinuous shape and the curved flap on the terminal segment ventral side (Figs. 2D, 3C–E, 4G; Huang et al. 2018a: figs. 3B, C, E, F, H).

Despite the many similarities, the new species can easily be distinguished from *M. ehuangzhang*. The G1 of *M. shenzhen* n. sp. reaches well beyond the pleonal locking tubercle and even beyond the suture of sternites 4/5 *in situ* (Fig. 2D), while that of *M. ehuangzhang* barely exceeds the pleonal locking tubercle (Huang et al. 2018a: fig. 2D). The unique G1 terminal segment of the new species is also substantially different from *M. ehuangzhang*: the outer-distal part of the subterminal segment has a distinct raised lobe in the new species, whereas such a lobe is absent in *M. ehuangzhang*; the distal part of the terminal segment also forms a lobe in the new species, whereas such a lobe is also lacking in *M. ehuangzhang* (Figs. 2D, 3C–E, 4G; Huang et al. 2018a: figs. 3B, C, E, F, H). Additionally, the G2

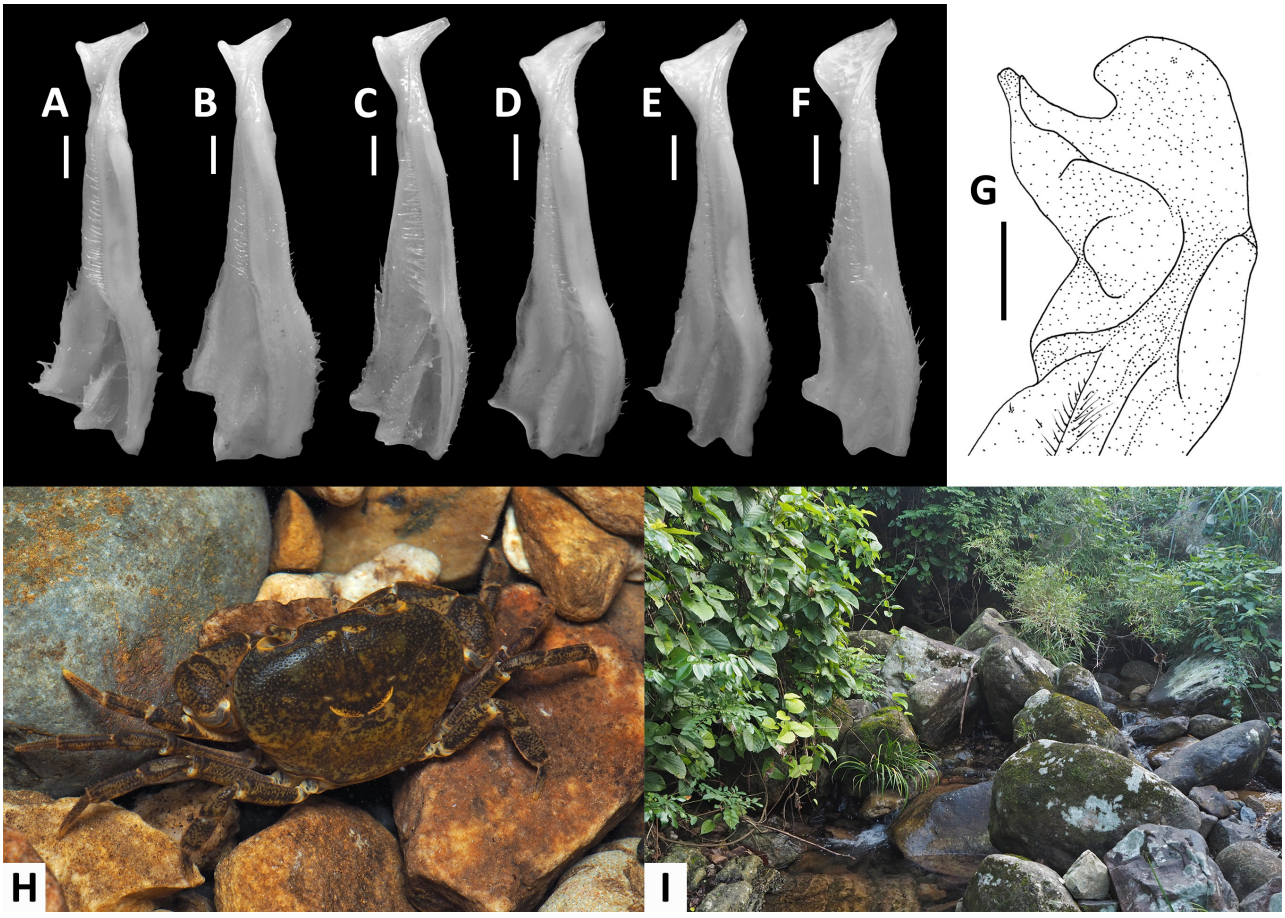

Fig. 4. (A–F) Left G1, ventral view. (A) *Nanhaipotamon aculatum* Dai, 1997, male (34.9 × 28.3 mm), SYSBM 001176, Bao'an, Shenzhen; (B) *Nanhaipotamon aculatum*, male (40.4 × 31.5 mm), SYSBM 001179, Bao'an, Shenzhen; (C) *Nanhaipotamon aculatum*, male (37.5 × 30.0 mm), SYSBM 001179, Shenzhen; (D) *Nanhaipotamon hongkongense* (Shen, 1940), male (32.0 × 25.4 mm), SYSBM 001780, Yantian, Shenzhen; (E) *Nanhaipotamon hongkongense*, male (31.0 × 25.4 mm), SYSBM 001781, Yantian, Shenzhen; (F) *Nanhaipotamon hongkongense*, male (28.0 × 22.5 mm), SYSBM 001782, Yantian, Shenzhen. (G) *Megapleonum shenzhen* n. sp., male holotype (18.6 × 14.4 mm), SYSBM 001983. Left G1 terminal segment, ventral view. (H) *Megapleonum shenzhen* n. sp., female paratype (22.4 × 16.7 mm), SYSBM 001985, colour in life. (I) Hillstream in Pingpu, Shenzhen, where *Megapleonum shenzhen* n. sp. is found. Scale bars: A–G = 1.0 mm.

terminal segment in *M. shenzhen* n. sp. is slenderer and has a pointed tip, whereas that of *M. ehuangzhang* is stouter and has a blunt tip (Fig. 3B; Huang et al. 2018a: fig. 3A, G). The new species also has vestigial flagellum on the third maxilliped exopod, while *M. ehuangzhang* completely lacks this character (Fig. 3A; Huang et al. 2018a: fig. 3D). However, this may not be a reliable character in separating species as some species can have individuals that totally lack the flagellum or have a very short flagellum (Huang et al. 2020).

With the discovery of this new species, the genus definition in Huang et al. 2018a, must also be adjusted to: Third maxilliped exopod with very short flagellum or no flagellum (instead of flagellum absent) and G2 with flagelliform terminal segment (instead of flagelliform terminal segment with blunt tip).

DISCUSSION

In total, 19 species from 10 genera belonging to the families Atyidae (3 species), Gecarcinucidae (1 species), Palaemonidae (7 species), Potamidae (4 species), Sesarmidae (2 species) and Varunidae (2 species) were recorded (Table 1). The most species-rich district of Shenzhen by far is Dapeng District, from which 15 species where recorded. Longgang and Yantian Districts are also species-rich, with seven recorded species each. As is to be expected, these districts all have large patches of hilly forested areas. Dapeng District in particular, has a long coastline and many hillstreams that flow directly into the ocean. This explains the presence of multiple species whose larval development is dependent on the marine environment (*e.g.*, *Eriocheir hepuensis*, *Macrobrachium lar*). As such, we suggest that Dapeng Peninsula is a priority for conservation efforts. We did not record any hillstream decapods from Pingshan or Guangming Districts, though this does not totally rule out the possibility that they exist there.

Of the four true freshwater crabs recorded, the two species of *Nanhaipotamon* show a distinct west-east distribution and with no detected overlap. Despite having drastically different body colours (Fig. 5A, B), the difference in their G1 morphology is not clear cut. Though the G1 terminal segment in *N. aculatum* (Fig. 4A–C) seems to be smaller and have a more curved inner-distal margin when compared to *N. hongkongense*

Table 1. Checklist and distributions of hillstream decapod crustaceans of Shenzhen

#	Species	Nanshan District	Bao'an District	Futian District	Luohu District	Longgang District	Yantian District	Pingshan District	Dapeng District
	Family Potamidae								
1	*Nanhaipotamon hongkongense* (Shen, 1940)					√	√	√	√
2	*Nanhaipotamon aculatum* Dai, 1997	√	√	√	√				
3	*Megapleonum shenzhen* sp. nov.						√		√
4	*Cryptopotamon anacoluthon* (Kemp, 1918)		√	√		√	√	√	√
	Family Gecarcinucidae								
5	*Somanniathelphusa zanklon* Ng & Dudgeon, 1992								√
	Family Varunidae								
6	*Eriocheir hepuensis* Dai, 1991						√		√
7	*Varuna yui* Hwang & Takeda, 1986								√
	Family Sesarmidae								
8	*Chiromantes haematocheir* (De Haan, 1833)								√
9	*Orisarma patshuni* (Soh, 1978)								√
	Family Palaemonidae								
10	*Macrobrachium formosense* Bate, 1868								√
11	*Macrobrachium fukienense* Liang & Yan, 1980					√			
12	*Macrobrachium* aff. *inflatu*m Liang & Yan, 1985								√
13	*Macrobrachium lar* (Fabricius, 1798)								√
14	*Macrobrachium laevis* Zheng, Chen & Guo, 2019					√			
15	*Macrobrachium nipponense* (De Haan, 1849 [in De Haan, 1833-1850])				√				
16	*Macrobrachium vietnamiense* Dang & Nguyen, 1972		√	√		√	√		√
	Family Atyidae								
17	*Caridina serrata* Stimpson, 1860		√			√	√	√	√
18	*Caridina cantonensis* Yu, 1938		√	√		√	√	√	√
19	*Caridina grandirostris* Stimpson, 1860								√

(Fig. 4D–F), the large intraspecific variation complicates morphological identification. This phenomenon of this genus has been recorded in other studies (Huang et al. 2018b 2021). In addition, there is genetic evidence to suggest that *N. hongkongense* is a species complex comprising multiple cryptic species (Huang et al. 2021). To avoid complication, we treat it as a single species according to the morphology in this study. *Cryptopotamon anacoluthon* (Fig. 5C) can be found throughout Shenzhen, and according to our observations does not coexist with *Megapleonum shenzhen* n. sp. (Fig. 4H) in the same hillstream. This is presumably due to competitive exclusion as both species utilize a similar habitat. *Somanniathelphusa zanklon* (Fig. 5D) was found in the lower reaches of hillstreams in Dapeng. This species typically favours lowland environments and is more commonly seen in ponds, rivers or reservoirs (Ng and Dudgeon 1992), but can also invade

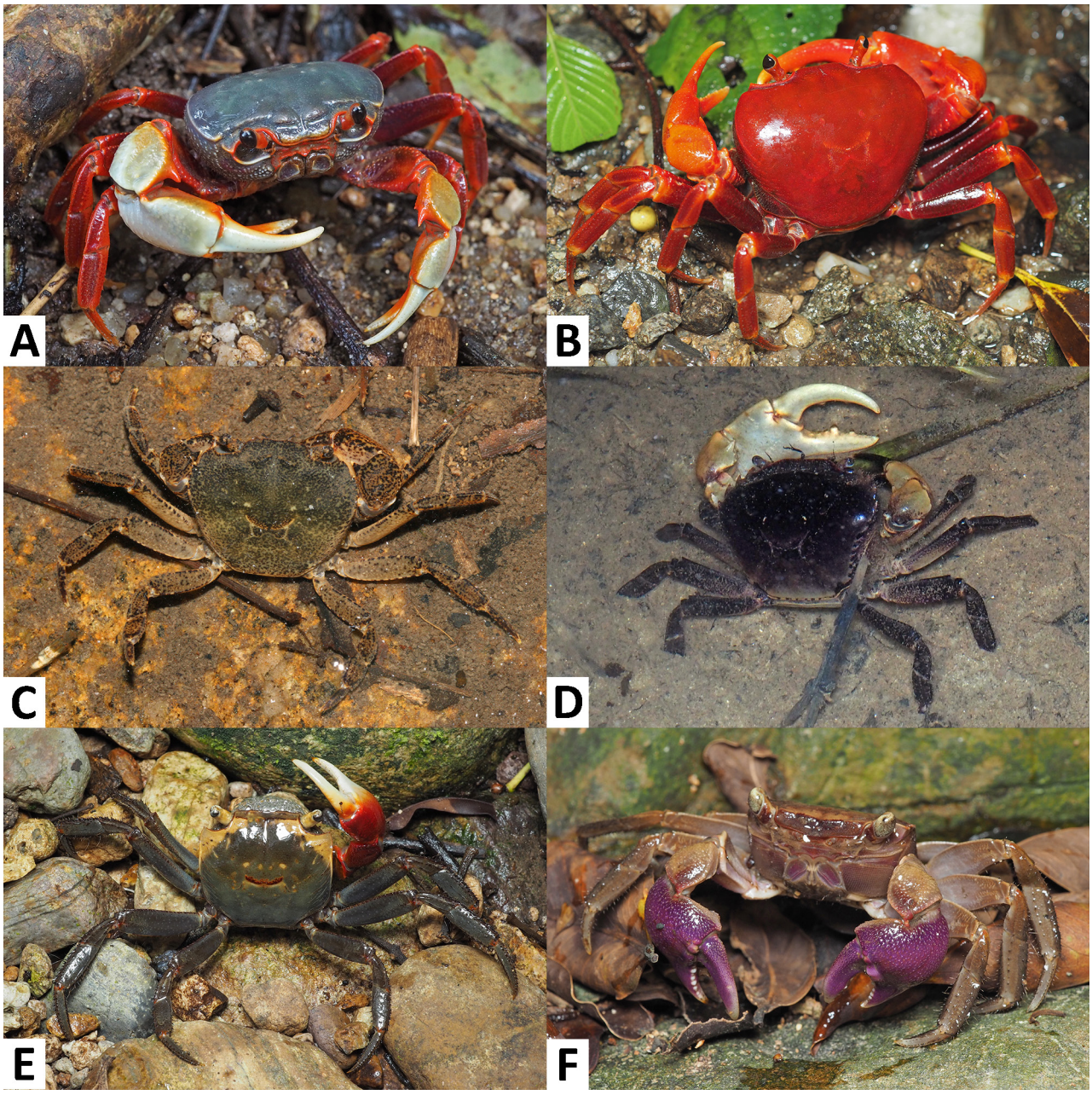

Fig. 5. Hillstream decapods of Shenzhen, colour in life 1. (A) *Nanhaipotamon aculatum* from Yangtaishan, Bao'an; (B) *Nanhaipotamon hongkongense* from Wutongshan, Yantian; (C) *Cryptopotamon anacoluthon* from Meishajian, Yantian; (D) *Somanniathelphusa zanklon* from Dongcun, Dapeng; (E) *Chiromantes haematocheir* from Yangmeikeng, Dapeng; (F) *Orisarma patshuni* from Luzuixi, Dapeng.

the lower reaches of hillstreams. Although *Chiromantes haematocheir*, *Orisarma patshuni*, *Eriocheir hepuensis* and *Varuna yui* (Figs. 5E, F, 6A, B) are able to venture into freshwater, they all require seawater to complete their lifecycle and therefore are restricted to coastal hillstreams. For the palaemonid shrimps, only the genus *Macrobrachium* was recorded in hillstreams. *Macrobrachium formosense* (Fig. 6F) and *M. lar* (Fig. 7C) have larvae that strictly require seawater to develop (Kusamura and Suzuki 1997; Lal et al. 2012), whereas only some populations of *M. nipponense* (Fig. 7D) are like this (Mashiko 1990). *Macrobrachium nipponense* is very common in Southern China but, being a lowland species that prefers lacustrine and riverine habitats, it is not usually found in hillstreams. In this survey, it was found in the lower reaches of a single hillstream in Luohu District which flowed into a reservoir that was being used for aquaculture. Both *M. fukienense*

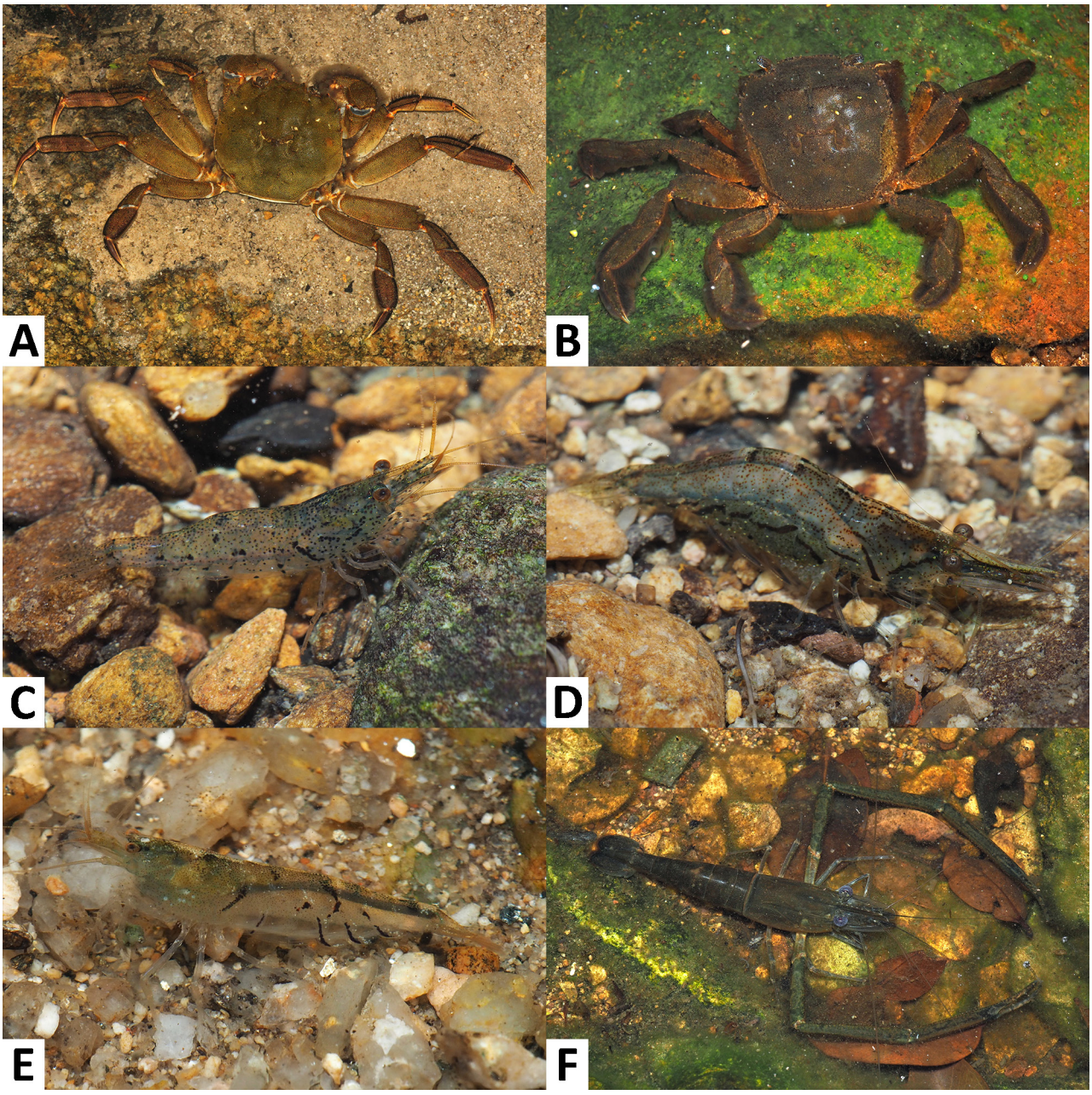

Fig. 6. Hillstream decapods of Shenzhen, colour in life 2. (A) *Eriocheir hepuensis* from Luogushan, Dapeng; (B) *Varuna yui* from Luzuixi, Dapeng; (C) *Caridina cantonensis* from Luowutian Reservoir, Longgang; (D) *Caridina grandirostris* from Xindacun, Dapeng; (E) *Caridina serrata* from Yangtaishan, Bao'an; (F) *Macrobrachium formosense* from Luzuixi, Dapeng.

(Fig. 7A) and *M.* aff. *inflatum* (Fig. 7E) were found from single localities and can be considered rare in Shenzhen. The latter is similar to *M. inflatum* in that both have inflated palms in the second pereiopods, but differs in multiple other external characters. We have passed specimens to Prof. Zhao-Liang Guo (Foshan University) for further investigation. On the other hand, *M. vietnamiense* (Fig. 7F) is widespread and can be found throughout Shenzhen. The recently described *M. laevis* (Fig. 7B) was heretofore only known from Foshan City and Jiangmen City of Guangdong (Zheng et al. 2019). The record presented herein represents a new known distribution for this species. The only atyid shrimps we found were three *Caridina* species; of these, the land-locked species *C. serrata* (Fig. 6E) and *C. cantonensis* (Fig. 6C) can be found in most areas of

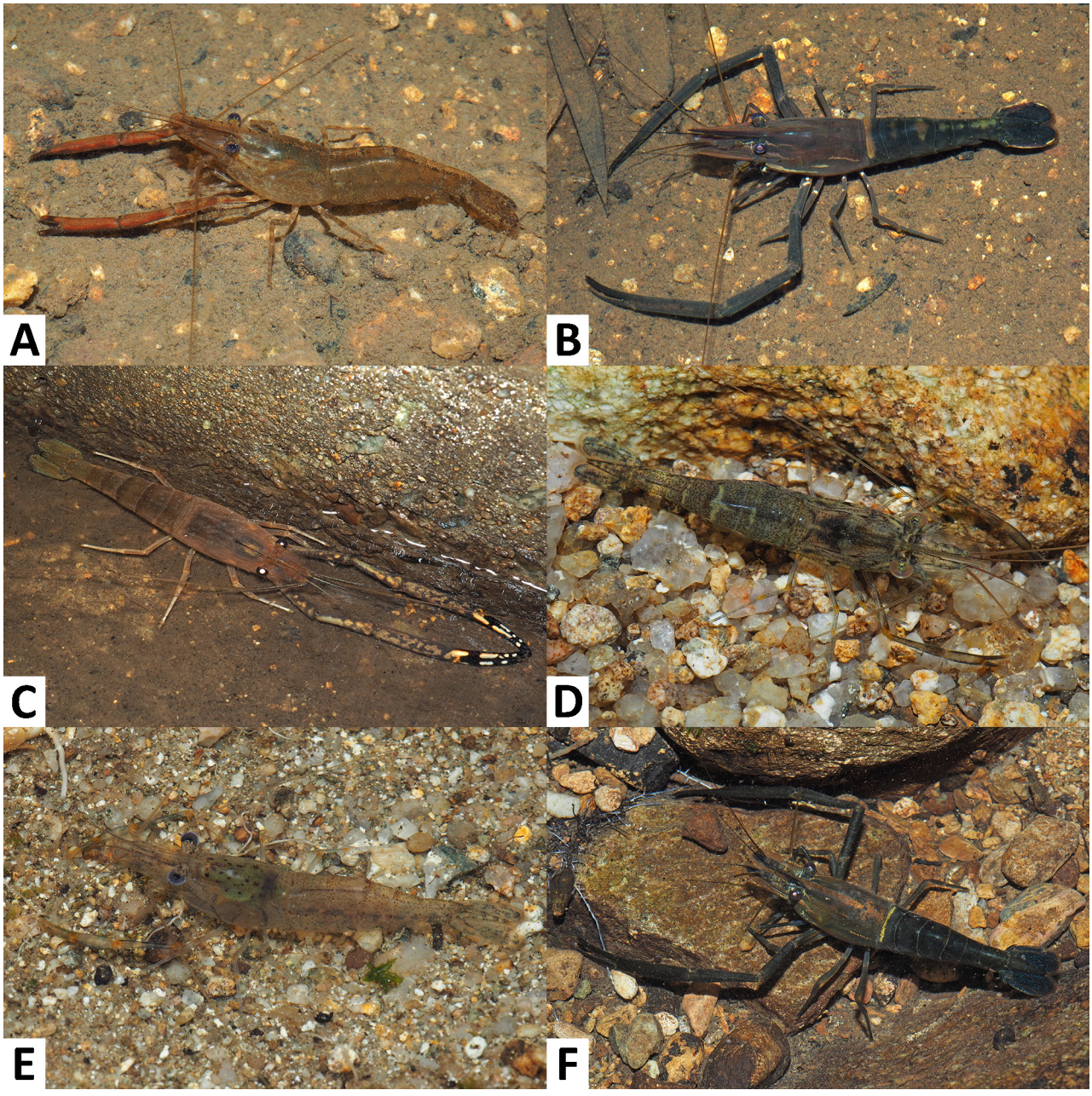

Fig. 7. Hillstream decapods of Shenzhen, colour in life 3. (A) *Macrobrachium fukienense* from Sanzhoutian Reservoir, Yantian; (B) *Macrobrachium laevis* from Sanzhoutian Reservoir, Yantian; (C) *Macrobrachium lar* from Mumianshu, Dapeng; (D) *Macrobrachium nipponense* from Yinhushan, Luohu, photographed in captivity; (E) *Macrobrachium* aff. *inflatum* from Luogushan, Dapeng; (F) *Macrobrachium vietnamense* from Luowutian Reservoir, Longgang.

Shenzhen, whereas *C. grandirostris* (Fig. 6D), a small-egg species, was only found from Dapeng Peninsula in coastal hillstreams. Though not exhaustive, our current surveys shed light on the biodiversity of hillstream decapods in Shenzhen and provide data for conservation plans.

As for the new species described above, not only is *Megapleonum shenzhen* n. sp. morphologically distinct from *M. ehuangzhang*, the nucleotide pairwise *p*-distance and K2P distance of the 16S gene between the two are 7.00% and 7.39%, respectively, which is much higher than the empirical species-level threshold of around 1% (Shih et al. 2004 2007), and higher than the average interspecific distances of *Yarepotamon* Dai & Türkay, 1997 (3.59% and 3.70%, respectively) and *Cantopotamon* Huang, Ahyong & Shih, 2017 (5.80% and 6.06%, respectively) (Mao and Huang 2020). Therefore, our proposal for this new species is supported by both morphological and genetic evidence. The discovery of a new species in a large and populous city like Shenzhen once again shows us just how much freshwater crab diversity remains to be documented in China.

CONCLUSIONS

The freshwater hillstream decapods of Shenzhen, China, were systematically surveyed for the first time. A total of 19 species from 10 genera belonging to the families Atyidae (3 species), Gecarcinucidae (1 species), Palaemonidae (7 species), Potamidae (4 species), Sesarmidae (2 species) and Varunidae (2 species) were recorded (Table 1). Dapeng District was found to be the most species-rich district for hillstream decapods in Shenzhen and should be considered a conservation priority. One *Macrobrachium* species could not be assigned to any known species and one potamid species was found to be new: *Megapleonum shenzhen* n. sp. Evidence from gonopodal morphology and genetic analyses support the new species.

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Ethics approval consent to participate: Not applicable.

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Supplementary materials

Fig. S1. Map of Shenzhen City and its divisions. (download)

Table. S1. List of specimens collected during the Shenzhen surveys. (download)