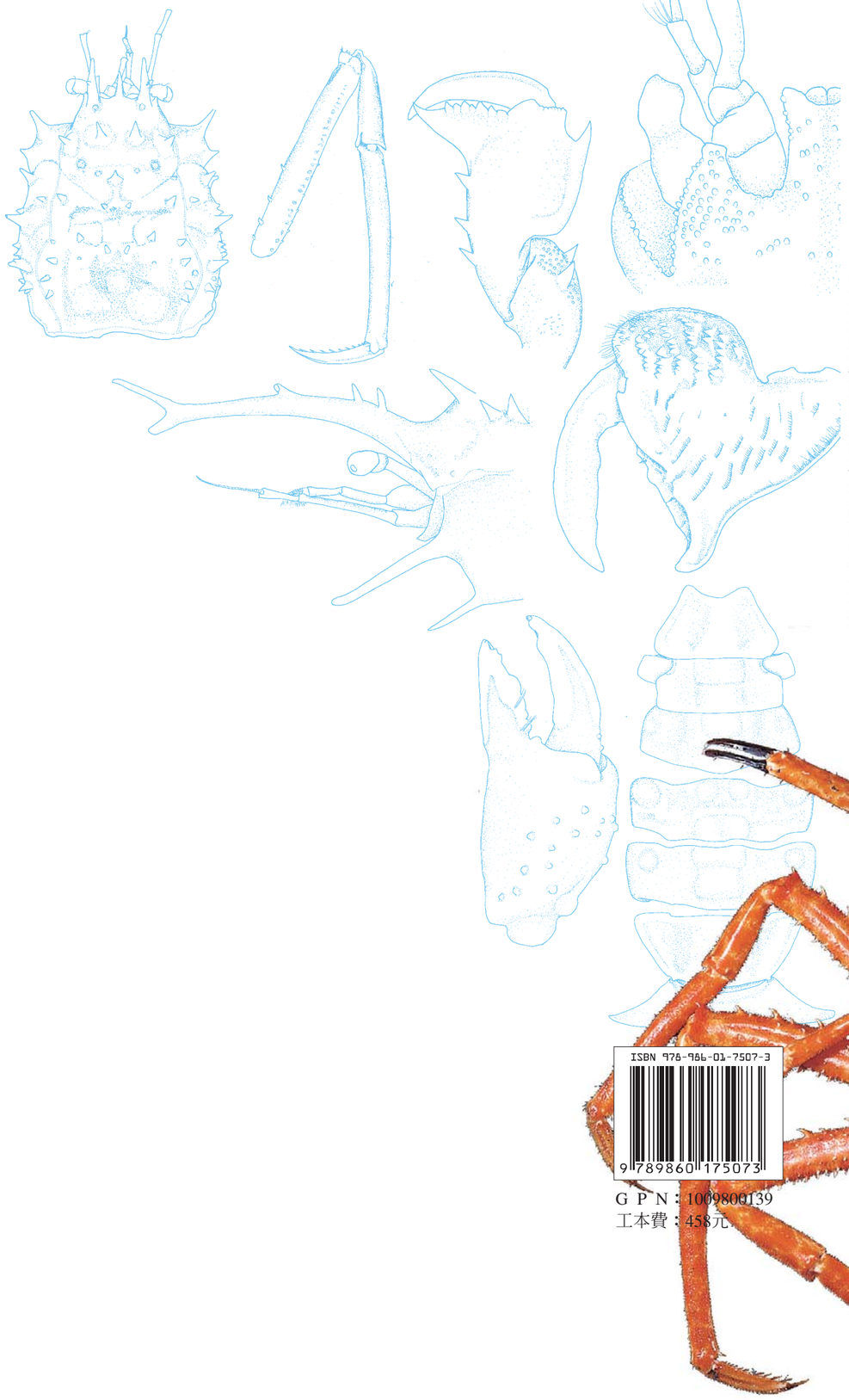

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（緒論及低等蟹類）

CRUSTACEAN FAUNA OF TAIWAN:
BRACHYURAN CRABS, VOLUME I –
CARCINOLOGY IN TAIWAN AND
DROMIACEA, RANINOIDA, CYCLODORIPPOIDA

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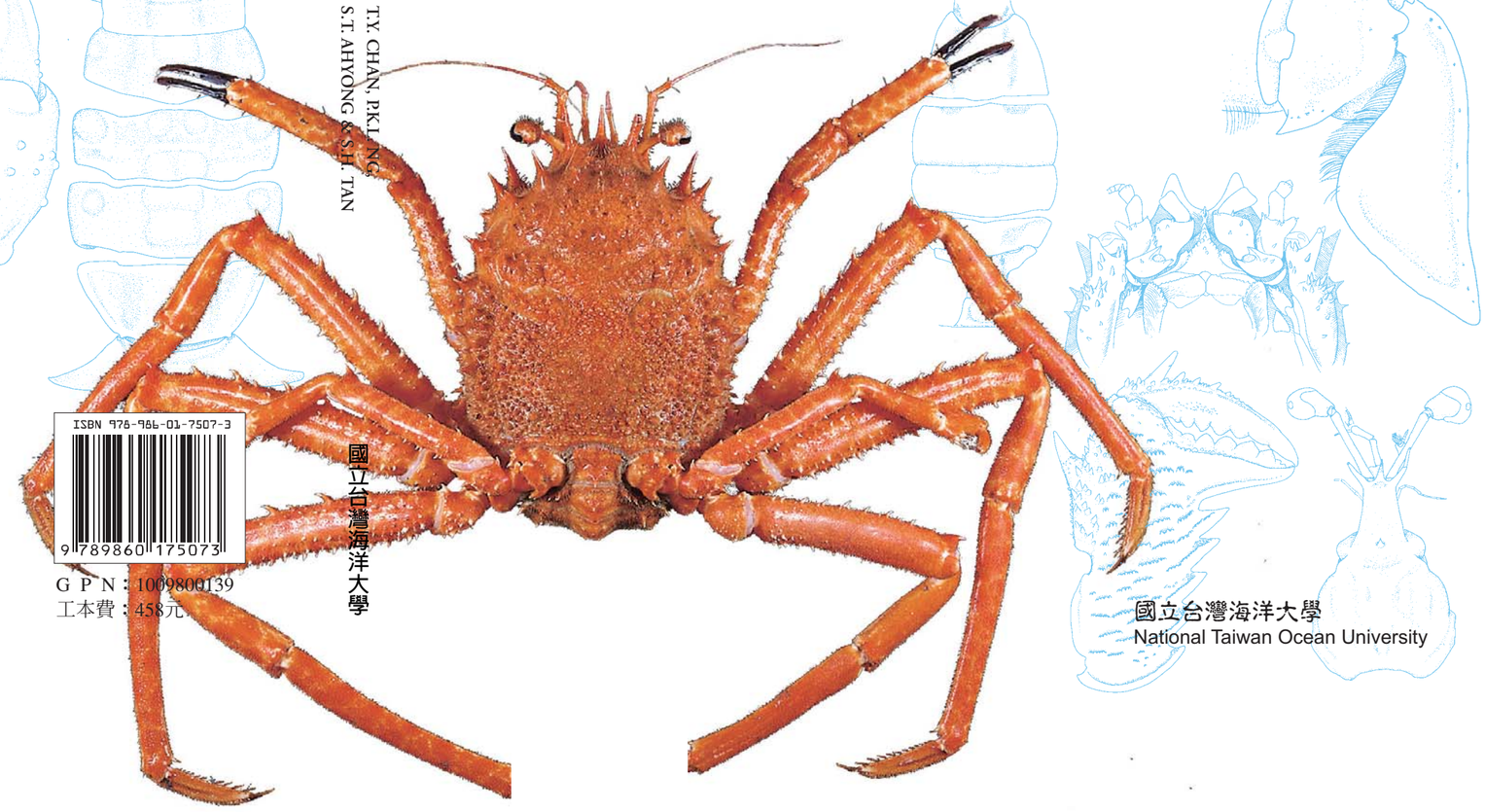

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序

真正的螃蟹屬於甲殼十足目中的短尾類，是大型甲殼類中多樣性最高的一群，全世界約有6,800多種，自高山、陸地至深海皆有分佈。台灣的蟹類自1902年起便有積極的調查研究，為大型甲殼類中較受關注的類群，到目前已記錄有600多種，佔全世界蟹類約十分之一，可見台灣有很豐富的海洋生物多樣性。本誌是由行政院國家科學委員會補助的研究計畫『編撰台灣無脊椎動物誌－台灣甲殼類』，邀請國際著名的蟹類分類專家共同編撰台灣蟹類誌（初版登錄於TaiBNET台灣生物多樣性資訊網http://www.taibif.org.tw/nbrpp/nbrpp.php），因台灣的蟹類有600多種，故將台灣蟹類誌分成至少6冊發行，本書為首冊，包括兩大部分，第一部份介紹台灣蟹類研究歷史、短尾類最新的分類系統和台灣各總科及科的檢索。第二部份介紹所謂低等蟹類（後1-2對步足退化或是特化）的綿蟹派、蛙蟹派和圓關公蟹派在台灣及東沙有分布的種類共8科36屬53種，其中一種為台灣特有，另外1屬7種為台灣新記錄。誌中對這53種螃蟹全部都有提供型態描述、重要特徵線繪圖和檢索等，其中48種亦附有彩色標本照以利參考鑑別。本誌之編輯及印刷是行政院國家科學委員會補助（NSC96-2621-B-019-008-MY2），由國立台灣海洋大學水產生物科技頂尖研究中心協助出版，謹致上由衷謝意，並感謝林芝君小姐在編輯上的協助。

GENERAL INTRODUCTION

Of all decapod crustaceans, no group is more diverse than the Brachyura or true crabs. With over 6,800 described species from all over the world (Ng *et al*., 2008), they far exceed the next most speciose group, the caridean shrimps with over 2,500 species! In the last review of the Taiwanese brachyuran crabs, Ng *et al*. (2001) recorded 560 species from 36 families. Today, the fauna stands at some 600 species, representing 64 families and 31 superfamilies. The increase in number of families is mainly due to the substantial family-level revisions which have taken place in the interim.

Brachyuran crabs are characterized mainly by their hard carapace and a highly reduced abdomen which is tucked underneath the carapace. This is the source of their name which means "short tail". This abdomen is often held tightly in place with different kinds of locking mechanisms; from simple spines to complex press-button devices. Almost all crabs have four pairs of walking legs (or pereopods 2 to 5) and a pair of pincers or chelipeds (pereopod 1). These are all thoracic appendages. In only one group of crabs is the last pair of legs completely lost, the Hexapodidae. In several families, e.g., Dynomenidae and Palicidae, the last pair of legs is strongly reduced and appears almost vestigial. How they function is not completely clear. In some other families like the Homolidae, Homolodromiidae, Cymonomidae, Cyclodorippidae or Dorippidae, the last pair or last two pairs of legs (pereopod 4 and/or 5) have been specially modified to help carry objects for defence and camouflage.

The compact carapace, dexterous chelipeds and adaptability has enabled true crabs to colonise almost every habitat on earth except the air, the highest mountains and the polar ice caps! The large number of species and myriad of shapes and forms seen in crabs is testament to their success. Today, there are crabs in the deep sea, near hydrothermal vents, in almost all intertidal habitats, rivers, swamps, rainforests and high mountains, caves and even the edge of deserts. Some are even able to move between freshwater and marine habitats! Many terrestrial species are well adapted to live outside water – with pseudolungs for respiration and a variety of different ways to get water and oxygen. While the majority of crabs have a marine planktonic phase in their life history, their larvae (zoeae) spending weeks or months floating in the ocean before changing into a small crab; over 1,000 species of Brachyura (mostly true freshwater crabs) have evolved direct development. That is, their large eggs hatch out into baby crabs – without a larval phase!

Certain groups dominate the natural landscape and this is also true in Taiwan. The mangrove habitats are dominated by the sesarmids and ocypodids, while the coral reef has a diversity of xanthids and their kin which is unparalleled. Many tropical inland coastal forests have huge colonies of gecarcinid land crabs! In inland tropical and subtropical freshwater systems, freshwater crabs of the families Potamidae and their allies are abundant.

Brachyuran crabs are amongst the best studied large crustaceans in Taiwan and have received considerable attention since 1902, with the number of species recorded from Taiwan now nearly one tenth of the known species of the world. The Taiwan catalog project is supported by the National Science Council, Taiwan, R.O.C., and a preliminary version of the Taiwan brachyuran catalog has already been made available online at TaiBNET (http://www.taibif.org.tw/nbrpp/nbrpp.php). In this printed version, the contents of the original catalog have been revised with supplementary data and illustrations. As there are more than 600 species of crabs known from Taiwan, it is not possible to publish this in one tome. As such, the printed version of the Taiwan brachyuran crab catalog is divided into at least six volumes. While the series will be edited by more or less the same team, the authors for each volume will have different authors. This is the first volume of the Taiwan brachyuran crab catalog series and contains two parts. Part I gives an overview of the crab studies in Taiwan and the updated classification scheme for brachyuran crabs, with key to all the superfamilies and families found in Taiwan. Part II is the species account for the so-called "primitive crabs" of the sections Dromiacea, Raninoida and Cyclodorippoida, and treats eight families, 36 genera and 53 species. All the species of these three sections known from Taiwan and its territory are covered. One genus and species, namely *Paomolopsis boasi*, is only

known from Dongsha and still not yet found off Taiwan. One genus (*Epigodromia*) and seven species (*Epigodromia acutidens, Lamoha longirostris, Lamoha superciliosa, Latreillopsis tetraspinosa, Homolodromia kai, Lyreidus brevifrons, Raninoides intermedius*) are new records for Taiwan (see also Richer de Forges & Ng, 2008). *Lamoha longirostris* and *Homolodromia kai* were reported from Dongsha before and are now known from Taiwan. *Raninoides intermedius* was previously incorrectly reported as *Notosceles serratifrons* in Taiwan and now the true *Raninoides intermedius* is also found from Taiwan. One species, *Tymolus hirtipes*, is known only from Taiwan thus far. The synonymies cited for each species are not exhaustive for the taxon – we find that impractical for the scope of work here. Therefore, for each species in the catalog, restricted synonymies are presented that cover the original citation, primary synonyms, major works, and references relevant to Taiwan. Each species, genus, family and superfamily is diagnosed. Line drawings illustrating distinguishing characters are given for all the species. Colour photographs of fresh specimens are provided for 48 of the 53 species. The line drawings and photographs are based on Taiwanese specimens (including those from localities within the territory of Taiwan), except for the line-drawings of *Hirsutodynomene spinosa*, *Homola mieensis*, *Dicranodromia doederleini* and *Notosceles serratifrons*. The Taiwan material of *Homola mieensis* is a dried mounted specimen not suitable for drawing, while the Dongsha specimen previously reported, could not be located although we still have the colour photograph. The only Taiwan specimen of *Dicranodromia doederleini* is very badly damaged and therefore a Japanese specimen has been used for the figures. The only known specimens of *Hirsutodynomene spinosa* and *Notosceles serratifrons* from Taiwan could not be located in their respective collections at the time of this study, and as such, figures have been provided from non-Taiwanese material.

The majority of specimens reported herein are housed in the collections of the National Taiwan Ocean University, Keelung (NTOU). Other specimens studied are deposited in the Biodiversity Research Center of the Academia Sinica, Taipei (ASIZ); Muséum national d'Histoire naturelle, Paris (MNHN); National Museum of Natural Science, Taichung (NMNS), National Institute of Water and Atmospheric Research, Wellington, New Zealand (NIWA); Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); and Taiwan Museum, Taipei (TMCD). Specimen size is indicated by carapace width (cw) and carapace length (cl), measured in millimeters (mm). General morphology is illustrated under **Morphological Terminology**. The abbreviations G1 and G2 are used for the male first and second gonopods, respectively. For specimens collected by the "TAIWAN" cruises, gear types are abbreviated as CP, PCP, OCP, CD and DW, and indicated before the station number. The abbreviations for gear types refer to the 4 m French beam trawl (CP), the 2.5 m French beam trawl (PCP), the 3 m ORE beam trawl (OCP), The Otter Trawl Le Drezen type Solo Hard Bottom 12.4 m (CD) and the Warén Dredge (DW).

We gratefully acknowledge our many colleagues for assistance and loan of specimens used in this study. In particular, we thank Régis Cleva (MNHN) and J.T. Lin (TMCD). We are grateful to C.H. Wang, J.F. Huang and M.S. Jeng for their help in various ways. We also thank Chih-Chun Lin for her efforts in editing the manuscript and preparing some of the line-drawings, N.K. Ng and J.C. Mendoza for drawing some figures, Pan-Wen Hsueh for allowing us to use the photograph of *Cryptodromia tuberculata*. H. Ota and Agriculture, Forestry and Fisheries Research Information Technology Center, Japan for help with M. Maki's photograph. STA gratefully acknowledges the financial support from the NIWA Capability Fund, and the New Zealand Foundation for Research, Science and Technology (BBBI091); while SHT, TN and PKLN acknowledge research support from the National University of Singapore. We sincerely thank the Center for Marine Bioscience and Biotechnology of the National Taiwan Ocean University for support in publishing this catalog. This catalog is a contribution from a project (NSC96-2621-B-019-008-MY2) granted by the National Science Council, Taiwan, R.O.C.

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Part II. Infraorder Brachyura: Sections Dromiacea, Raninoida, Cyclodorippoida.

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HISTORICAL REVIEW

Taiwan occupies a very strategic position in the Indo-West Pacific. It lies offshore from the long shorelines of mainland China and is latitudinally between the species-rich Philippine archipelago in the "Coral Triangle" and the islands of Japan. With a complex geological history, shallow continental shelves on the west, and very deep waters on the east, it is not surprising that Taiwan's brachyuran fauna is extremely rich with over 600 species recorded so far.

Taiwan, as defined in this series, includes the whole island of Taiwan as well as the islands under its jurisdiction, viz. Penghu, Lanyu, Lyudao, Kinmen, Matsu, Dongsha (= Pratas), Taiping Island and Diaoyutai (= Senkaku). Looking at Taiwan's geography, it is not unexpected that many zoologists would assume that all the crab fauna is shared with China, Philippines and Japan. However, several decades of intensive studies by many carcinologists have demonstrated that Taiwan has a unique composition of species, with many either endemic or only known from the island.

An exquisitely hand-crafted *Eriocheir japonica* made out of leather by a Taiwanese craftsman. The precision and accuracy of the crab attest to craftsman's attention to detail and also the popularity of crab motifs in traditional artistic interpretations.

The history of carcinology in Taiwan is interesting in that it has been relatively truncated compared to studies in other parts of Asia, which reach back to the 1700s or 1800s. For Taiwan, the brachyuran crabs have actually been studied by scientists for only about 100 years! In this review, we will have a quick look at the scope, pace and extent of the many discoveries made in Taiwan over the last century. New taxa and records will be highlighted, and major landmarks highlighted. We have not considered the revisionary studies or those

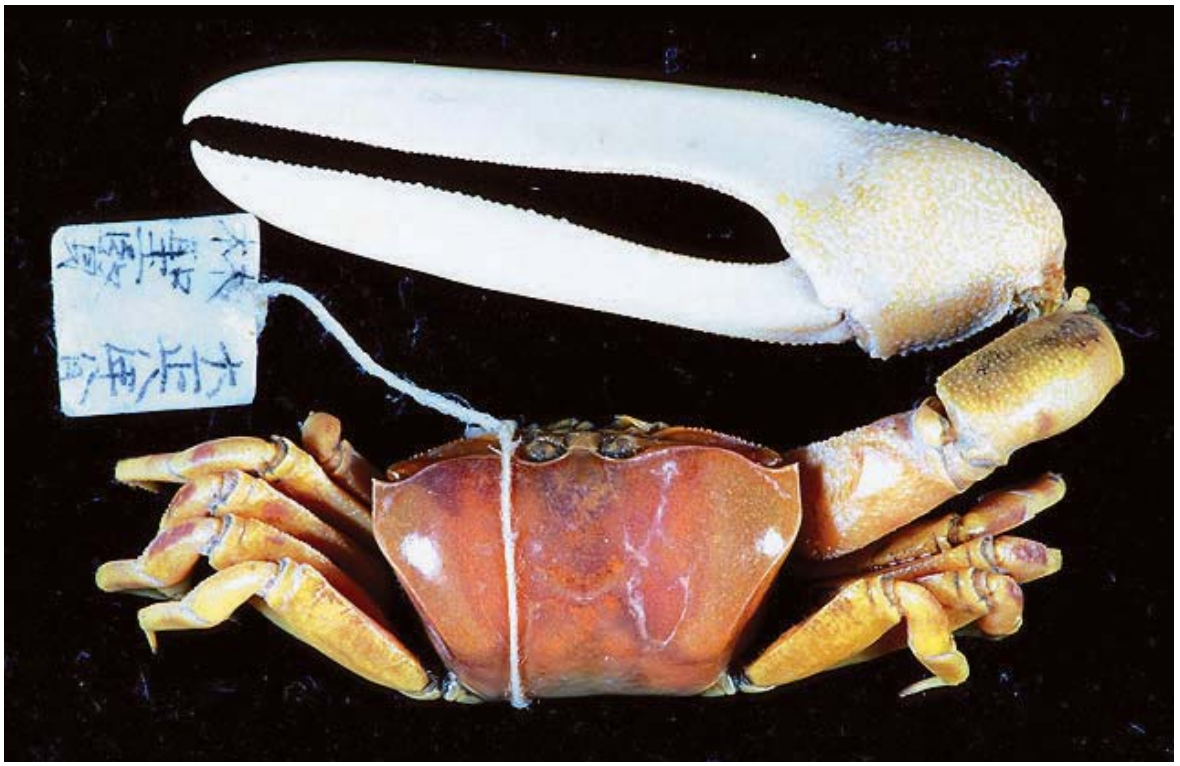
involving a larger geographic area (e.g., the Western Pacific) that also include, mention and/or list species or specimens from Taiwan. There are too many to be discussed here, although many have been listed by Ng *et al*. (2001). The recent fossil record has also not been considered much in this review of carcinology in Taiwan, even though there has been a good deal of activity. The problem with these studies of Recent fossils is that it is difficult or near-impossible to ascertain if they are conspecific with extant taxa. Many are poorly preserved and not all are available for study by other scientists. For example, the major compilation by Hu and Tao (1996) poses many problems (see Ng, 1999).

The first report which officially mentions crabs from Taiwan was in the "Records of Taiwan Government" (台灣府誌) (1760–1764) when Taiwan was governed by the Ching (= Qing) Dynasty of China. In this non-scientific document, only Chinese vernacular names are provided, but from the names and descriptions, the crabs mentioned are probably what are today called *Eriocheir japonica*, *Matuta lunaris*, *Ocypode stimpsoni*, *Uca lactea*, some sesarmids, *Helice formosensis*, *Portunus* spp., *Scylla* spp. and *Dorippe* spp. (see Lin, 1949).

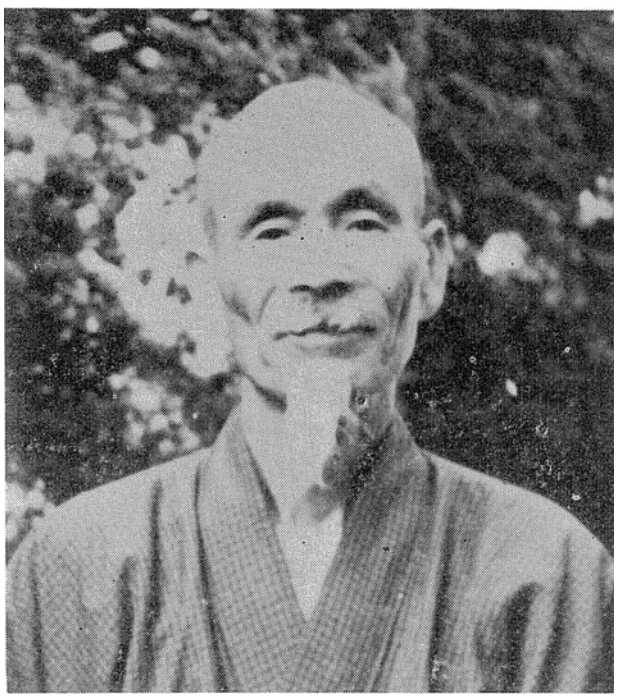
After 1895, Taiwan was controlled by the Japanese Government. During this time, scientific research on the crabs of Taiwan started in earnest. The taxonomy and natural history of Taiwanese crabs have been extensively studied by many Japanese scholars (see Shih, 1994). The report of T. Terasaki (寺崎留吉) (1902–1904) was the first detailed study of Taiwanese using Latin names for the crabs. Seven species were reported in this landmark publication: *Calappa philargius*, *C. hepatica*, *Scylla serrata*, *Portunus sanguinolentus*, *P. pelagicus* and *Podophthalmus vigil*. European and American scholars also contributed significantly to a better understanding of Taiwan's brachyuran crab fauna, mostly based on collections made by visitors to Taiwan. J. G. de Man (1914) described a new freshwater crab, "*Potamon (Potamon) Rathbuni*" (= *Candidiopotamon rathbunae*) from west-central Taiwan, and this was the first crab species whose type locality is Taiwan. This species is also a Taiwan endemic. A. Terao (寺尾新) (1915a-c) reported on the crabs in freshwater habitats which are hosts of lung flukes (*Potamon obtusipes*, *P. dehaani*, *P. sinensis*, *Sesarma dehaani* and *Eriocheir japonica*), although his identifications of the freshwater crabs (of *Potamon*) are incorrect as none of them are really Taiwanese. Later, Terao also studied the crabs occurring in rice paddies: *Helice formosensis*, *Chasmagnathus convexus* and *Chiromantes dehaani* (see Terao, 1916). Between 1914 and 1918, the Italian carcinologist B. Parisi reported 19 species of crabs from Taiwan, including a new freshwater crab, *Nanhaipotamon formosanum*. This is yet another endemic.

In the 1920s, crab studies continued to be conducted by Japanese scholars with help from European and American experts. Mary Rathbun (1921) described two new ocypodoid species from mudflats, *Uca formosensis* and *Ilyoplax formosensis*. The former species has since been shown to be a true Taiwanese endemic (see Shih *et al*., 1999). M. Oshima (大島正満) (1921a, b) subsequently listed 18 species of marine and freshwater crabs from Taiwan (including Penghu) after the report by Rathbun. H. Balss (1922a–c) also studied material from Taiwan, naming one new species, *Jonas formosae*, and adding 24 new records. M. Maki (牧茂市郎) and K. Tsuchiya (土屋寛) (1923) published the first monograph of Taiwanese decapods which contributed substantially to the foundation of crustacean research in Taiwan. With the help of Rathbun, 61 species of crabs were identified, mostly with excellent plates. Maki (1923) also treated the crabs in ricefields: *Helice formosensis*, *Chasmagnathus convexus* and *Chiromantes dehaani*.

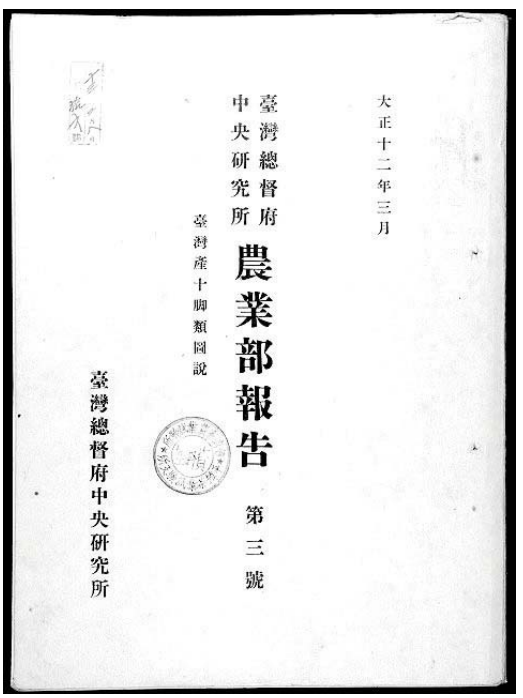
In the 1930s, many eminent Japanese scholars continued adding to our knowledge of Taiwanese crabs. Most of the work was done by the renowned carcinologist Tune Sakai (酒井恒), with most of the Taiwanese material sent to him for study by a famous naturalist, S. Takahasi (高橋定衛) (see Shih, 1994). M. Rathbun (1931) also published on a new species of pilumnid, *Heteropanope makiana* (= *Pilumnopeus makiana*) and a new varunid, *Helice formosensis*. S. Takahasi (1934a) surveyed the estuary of Danshuei, Taipei and recorded more than 16 species of crabs. Takahasi (1934b) also studied the littoral fauna in Keelung and recorded several



The holotype of *Uca formosensis* Rathbun, 1921, preserved in United States National Museum of Natural History in the Smithsonian Institution (USNM 54472) which was collected from Lugang, Jhanghua County, central-western Taiwan.



Professor Moichiro Maki who published the first monograph of Taiwanese shrimps and crabs with Mr. K. Tsuchiya.



The cover of Maki and Tsuchiya's 1923 classic, "*A monograph of the Decapoda Crustacea of Formosa*".

species of crabs there. Takahasi (1935) focused on the ecology of Taiwanese ocypodids and mictyrids, and had notes for 13 species, three of which were new records (*Scopimera bitympana*, *Ilyoplax delsmani* and *Tmethypocoelis ceratophora*). H. Sato (佐藤隼夫) (1936a–d) then published a series of collection reports on the littoral fauna of Taiwan, dealing with 29 species, nine of which were new records. From 1937 to 1939, T. Sakai (1937, 1938a, 1939) published a series of major monographs for the crabs from Japan and Taiwan, treating all as Japanese territory. From Taiwan, he recorded 118 species, with many new records. One new species, *Leucosia formosensis*, was established in 1937; with five new species, *Macrophthalmus boteltobagoe*, *Ilyoplax tansuiensis*, *Metaplax takahashii*, *Ptychognathus ishii* and *P. takahasii* published in 1939. S. Miyake (三宅貞祥) (1938) later recorded 11 new records of crabs from Taiwan (including Lanyu). Of interest is that T. Sakai (1938a) first commented that the hairy crab from eastern Taiwan should be identified with *Eriocheir rectus*, a species originally established by Stimpson (1858) from Macao near mainland China on the basis of a juvenile specimen. It was only many years later, in 1995, that a team led by Tin-Yam Chan (陳天任) showed otherwise, and named the Taiwanese "*E. rectus*" as a new species, *Eriocheir formosa* (see Chan *et al*., 1995). It was later placed in its own monotypic genus by N. K. Ng *et al*. (1999), *Platyeriocheir*, and both the genus and species are endemic to the island. Also interesting was a record of *Sesarma rotundata*, a tree-climbing crab from Tansui (= Danshuei) by Sakai (1939) which was later placed in a separate genus (*Labuanium*) but eventually found to be a new species, *Labuanium scandens*, known thus far only from Taiwan (Ng & Liu, 2003). F. Hiro (弘富士夫) (1939) surveyed the animals on coral reefs and along the coasts of southern Taiwan, adding more crab records.

In the 1940s, the terrible events of the Second World War seriously dampened carcinological research in Taiwan. Interestingly enough, two key reports were nevertheless published. Y. Horikawa (堀川安市) (1940) published a complete list of Taiwanese crabs, recording 143 species with 10 new records. H. Utinomi (內海富士夫) (= F. Hiro) (1944) also studied the gall crabs of the family Cryptochiridae, and added *Hapalocarcinus marsupialis* and *Pseudocryptochirus viridis* to the fauna of Taiwan.

After 1945 and the conclusion of hostilities, Taiwan no longer came under the Japanese. Between 1945 and the 1960s, there were only scattered studies on crabs. C.C. Lin (林朝棨) (1949) published a catalogue of the crabs from Taiwan (including Penghu and Lanyu). A total of 222 species were recorded, with 69 species being new records. This important paper was the first complete list of crabs since the end of the Second World War, and the first taxonomic paper written by a Taiwanese scholar. More studies by Taiwanese scholars followed in the 1960s. Y.C. Wu (吳榮聰) *et al*. (1962) studied the estuarine crabs in northwestern Taiwan. C.M. Chang (張正明) (1963) published a checklist of Taiwanese crabs with 78 species, 19 of which were new records. This is an important development and expanded our knowledge of the Taiwanese crab fauna 14 years after Lin (1949). S. Miyake and J.K. Chiu (邱瑞光) (1965) published on a new freshwater crab, *Geothelphusa miyazakii*, from northern Taiwan. The German carcinologist Richard Bott (1967) revised the freshwater crabs of East Asia, recognising a new subspecies (*Geothelphusa dehaani candidiensis*) and a new genus (*Candidiopotamon*) from Taiwan. He also established a new subspecies, *Somanniathelphusa sinensis taiwanensis*, from Taiwan (Bott, 1968a), as well as a new subgenus *Isolapotamon* (*Nanhaipotamon*) for *Potamon* (*Potamon*) *formosanum* Parisi, 1916 (Bott, 1968b). Bott (1970) later published a monograph of freshwater crabs from the Old World, of which four genera (*Candidiopotamon*, *Geothelphusa*, *Nanhaipotamon* and *Somanniathelphusa*) were recorded from Taiwan.

In the 1970s, studies of Taiwanese crabs again picked pace. Y. Nakasone (仲宗根幸男) and K. Nagahama (長濱克重) (1971) reported on the crab fauna in Diaoyutai (as Senkaku), offshore of northeastern Taiwan, with records of 19 species. H. Minei (嶺井久勝) (1974) revised the Taiwanese freshwater crabs and described a new species, *Geothelphusa chiui*. T. Sakai (1974) then published on a new species of goneplacoid, *Eucrate formosensis*, from Kaohsiung, although this was later regarded as a synonym of *E. alcocki Serène*, in Serène &

The holotype of *Geothelphusa candidiensis* Bott, 1967, preserved in the Senkenberg Museum (SMF 2855) was collected from Sun Moon Lake (Rihyuetan), Nantou County, west-central Taiwan.

Lohavanijaya, 1973 (see T. Sakai, 1976). J. Crane (1975) revised the fiddler crabs of the world and treated five species of *Uca* from Taiwan. More Taiwanese records were added by T. Sakai (1976) in his major monograph, *Crabs of Japan and the Adjacent Seas*. Taiwanese carcinologist Hsiang-Ping Yu (游祥平) (1979), a disciple of the highly respected Japanese carcinologist, Sadayoshi Miyake in Japan, reported on the swimming crabs (Portunidae) from Taiwan, adding many new records.

After 1980, crab studies in Taiwan started to build up momentum. J.J. Hwang (黃娟娟) & H.P. Yu (1980) studied the crustacean fauna in Lanyu. C.H. Wang & C.W. Chen (陳志文) (1981) published a list of the crabs preserved in Taiwan Museum with one new record (*Demania scaberrima*). B. Galil (1983) then described two new species of coral-inhabiting *Trapezia*: *T. cheni* and *T. garthi*. Wang (1984) studied the crab fauna in Kenting (= Kending) National Park in southern Taiwan, adding a new record, *Uca triangularis*. H.J. Su (蘇宏仁) & K.Y. Lue (呂光洋) (1984) surveyed the crab fauna in Danshuei mangrove swamp. H. Suzuki (鈴木廣志) (1985) studied the macrocrustaceans from Taiwan, adding some new records for the island. Hwang & K. Mitzue (水江一弘) (1985) revised the freshwater crabs from Taiwan known up to that time, while Hwang & M. Takeda (武田正倫) (1986) established a new species, *Varuna yui*, from Taiwan. A.Y. Dai (戴愛雲) *et al*. (1986) published a monograph for the marine crabs from China and included some material from Taiwan [a revised English version was published several years later by Dai and S.L. Yang (楊思諒) (1991)]. K.H. Chang (張崑雄) *et al*. (1987) studied the xanthid crabs in the corals from southern Taiwan, with *Trapezia formosa* and *T. tigrina* constituting new records. Y. Fukui (福井康雄) *et al*. (1989) surveyed the crab fauna on the coasts of Taiwan and found that *Uca perplexa* was a new record. Jung-Fu Huang (黃榮富) *et al*. (1989) revised the fiddler crab fauna from Taiwan, with *U. coarctata* and *U. dussumieri* being new records.

The 1990s saw an exponential rise in crab studies in Taiwan with the contributions of researchers from

Japan and Singapore, especially with the laboratory of H.P. Yu nurturing a group of very active decapod crustacean researchers. J.T. Shih (史金熹) *et al*. (1991) studied the crab fauna in Danshuei mangrove swamp, northwestern Taiwan. Huang *et al*. (1992) reviewed the crabs of Ocypodidae and Mictyridae in Taiwan. Ping-Ho Ho (何平合) *et al*. (1992) studied the terrestrial Gecarcinidae, adding a new record, *Discoplax rotundum*. J-S. Wu (吳忠信) (1992) reported on the crab fauna from Hsinchu, northwestern Taiwan. Ho *et al*. (1993) added one fiddler crab *Uca tetragonon* to the Taiwanese fauna. The early 1990s also saw Chia-Hsiang Wang (王嘉祥) of the Taiwan Museum bringing in brachyuran researchers from the National University of Singapore, and helping to catalyse a series of very productive research collaborations with different laboratories and teams in Taiwan. A measure of the impact Wang's actions can be reflected by the number of Singapore-based carcinologists on Taiwan crabs over the last 25 years — P.K.L. Ng (as Ng below), S.H. Tan (as Tan below), N.K. Ng, Cheryl G.S. Tan, W.L. Loh, Darren C.J. Yeo, Christoph Schubart (now in Regensburg, Germany) and Tohru Naruse (成瀨貫) (now in University of the Ryukyus, Japan) — and that their Taiwanese counterparts have included almost all the major players over this period (see Ng, 2008; Wang, 2008; for reviews). Most of the Taiwanese counterparts have also worked in the Raffles Museum of Biodiversity Research in Singapore. With over 60 papers already published from this synergy, the results speak for themselves! One noteworthy study was on the freshwater crab fauna of Taiwan which turned the systematics of this group on its head. Jhy-Yun Shy (施志昀) *et al*. (1994) revised the genus *Geothelphusa* from Taiwan and established 25 new species at one go! Ng *et al*. (1994) then published on a new deep sea crab *Chaceon manningi*, from Dongsha, South China Sea. M.S. Jeng (1994b) added eight new records of the symbiotic crabs (*Xenocarcinus tuberculatus*, *Pseudoliomera speciosa*, *Cymo andreossyi*, *Lybia tessellata*, *Trapezia guttata*, *T. lutea*, *T. rufopunctata* and *T. septata*) from southern Taiwan coral reefs. Ng & Wang (1994) added the pseudoziid *Pseudozius caystrus* to the Taiwanese fauna. Hsi-Te Shih (施習德) (1994) published a guidebook for the 10 fiddler crabs from Taiwan — the first color guide for this important group of crabs for the island. Z.G. Huang (1994) published a major checklist of the marine organisms around the seas of China, and Taiwanese crabs were mentioned. From 1994 to 1998, the marine biology laboratory of Ming-Shiou Jeng (鄭明修) published a series of surveys on the northeastern coast of Taiwan and some were new records (Jeng *et al*., 1994, 1996, 1997, 1998). During this period, P.H. Ho also published a series of short papers introducing some Taiwanese crabs (e.g., Ho, 1994–1997, 1998a–e) and some were new records. In 1995, T.Y. Chan *et al*. (1995) described a new varunid species *Eriocheir formosa*, which was later assigned to a new genus *Platyeriocheir* by N.K. Ng *et al*. (1999). C.G.S. Tan & Huang (1995) described a new camptandriid species, *Baruna sinensis*, from Taiwan; while Pan-Wen Hsueh (薛攀文) (1995) recorded *Clistocoeloma sinense* for the first time (see also Hsueh & Huang, 1996a). C.Y. Kuo (郭智勇) (1995) published a guide introducing the crabs from mangroves.

In 1996, there were more surveys on the crabs in seashore and freshwater habitats. Hsueh (1996) studied the coastal crabs from Gaomei, Taichung; while Wang & Hung-Chang Liu (劉烘昌) (1996c) surveyed the mangrove crabs from Kinmen. Shy *et al*. (1996) investigated the freshwater crab fauna in southwestern Taiwan. Wang and Liu published two colour guides (1996a, b) for the common seashore crabs and estuarine crabs from Taiwan. The former was updated in 1998 by the same two authors. H.T. Shih & H.K. Mok (莫顯喬) (1996) added the trapezoid genus *Quadrella* and the species *Q. maculosa* to the Taiwan fauna. An interesting colour guide to marine animals of Kinmen was also published by H.C. Yang (楊鴻嘉) & P.J. Chang (張寶仁) (1996); in it, they recorded the peculiar orithyiid species *Orithyia sinica*, a species which is not yet known from the main island of Taiwan. From 1996 to 1998, several reports of the survey on the crustaceans of Kending National Park, southern Taiwan, were published (Yu *et al*., 1996; Jeng, 1997, 1998). In 1997, Ng & Huang (1997) reported 16 new records from Taiwan (including Dongsha), including a new genus and a new species (*Pulchratis reticulatus*) from southern Taiwan. Ng *et al*. (1997) then reported on the semiterrestrial sesarmids *Neosarmatium* from

Taiwan and found five new records. Ng & Chan (1997) also added two new records, *Platypilumnus soelae* and *Trachycarcinus elegans*, to the Taiwan fauna. S.H. Lai (賴森煌) *et al*. (1997) reported on the crabs collected in Kaohsiung Harbor, adding more new records. Two color guides were published that year, one on the portunid crabs from Taiwan (Huang & Yu, 1997) and another on the seashore crabs of Hsinchu City (Ho & Hung, 1997).

Loh & S.H. Wu (吳書和) (1998) described a new species of majoid, *Paratymolus taiwanicus* (= *Dumeia taiwanicus*); and Tan & Liu (1998) recognised two more new freshwater crabs, *Geothelphusa hirsuta* and *G. pingtung*, from the island. W.J. Chen (陳溫柔) *et al*. (1998) established a new freshwater crab, *Geothelphusa neipu*, in a symposium abstract and was later redescribed in Shy *et al*. (2000); though its status has been challenged (Ng *et al*., 2001). Shy & Ng (1998) also reported on the freshwater crabs from Diaoyutai and southern Ryukyus, describing a new species, *Geothelphusa shokitai*, from Diaoyutai. Huang *et al*. (1998) demonstrated that the poorly known *Ocypode sinensis* is not only a new record but in fact one of the more common ghost crabs in Taiwan. Huang & Hsueh (1998) added two new deep water records for Taiwan: *Homolochunia gadaletae* and *Goniopugettia sagamiensis*. At the same time, Jeng & Ng (1998) documented the rare xanthid *Paratergatis longimanus* from Taiwan for the first time. Ng (1998), in a chapter of a FAO fishery guide, added four new records for Taiwan (*Dromia dormia*, *Ozius guttatus*, *Atergatopsis signatus* and *Episesarma lafondii*). Ng & Liu (1999) also recorded the rock-dwelling sesarmid, *Sesarma stormi*, from southern Taiwan for the first time, and placed it in a new genus, *Stelgistra*. In 1999, Wu *et al*. (1999) published on a new species *Acanthonyx formosa*. Tan *et al*. (1999) revised the family Parthenopidae from Taiwan and found six new records. Ng & Jeng (1999a) then found two new records of Hymenosomatidae (*Halicarcinus setirostris* and *Trigonoplax unguiformis*) for Taiwan. Ng & Jeng (1999b) also studied the symbiotic crabs (Eumedonidae and Portunidae) living with echinoderms in Taiwan and found four new records. W.R. Chou (周偉融) *et al*. (1999) studied the crustacean communities from southwestern Taiwan, including some new records. Shy & Yu (1999) then published a color guide for the freshwater crabs of Taiwan. Dai (1999) revised the freshwater crabs from China and Taiwan, but no new records were added.

In 1998, an International Symposium on Marine Biology in Taiwan was conducted, and in the subsequent proceedings in 2000, several shallow water and deep sea groups were revised. In this proceedings volume, two new species were described: *Tymolus hirtipes* (see Tan & Huang, 2000) and *Xenograpsus testudinatus* (see N. K. Ng *et al*., 2000). In addition, seven new records of Calappidae, Leucosiidae and Cancridae (Tan *et al*., 2000b), one new record of Goneplacidae (*Mathildella serrata*) (Ng & Chan, 2000), nine new records of Dromiidae, Raninidae and Palicidae (Ng *et al*., 2000a), and five new records of Homolidae and Latreilliidae (Tan *et al*., 2000a) were listed. The peculiar hydrothermal crab *Xenograpsus* was subsequently found to have some peculiar feeding behaviours (Jeng *et al*., 2004) and was later separated out into its own unique family, the Xenograpsidae (N.K. Ng *et al*., 2007). Ng (2000) also recognised a new species of pilumnid, *Pilumnus acanthosoma*, which has been confused with *P. dofleini*. K. Sakai (酒井勝司) (2000) then argued that what has been called "*Pinnotheres bidentatus*" from central-western Taiwan is actually a new species, *P. taichungae*. Ho *et al*. (2000) added 32 new records of Eriphiiidae, Pilumnidae and Xanthidae. Ng *et al*. (2000b) later also recorded the gecarcinid *Epigrapsus politus* from Diaoyutai. K.H. Hung (洪國雄) (2000) published a guide for the common marine organsims of Penghu, recording 54 species of crabs.

In 2001, a complete checklist of the Taiwanese crabs, including those from Kinmen and Dongsha, was published by Ng *et al*. (2001) — 38 years since Chang (1963). In this report, a total of 560 species from Taiwanese territory was recorded, including 20 new records. This was a project started in 1992 by Wang and Ng, but took a decade and the help of Ho and Shih to complete! In that year, Ho *et al*. (2001) also published on a new species of pilumnid, *Actumnus taiwanicus* and C.L. McLay *et al*. (2001) added four new records, viz. *Sphaerodromia ducoussoi*, *Cryptodromia tumida*, *Lambrachaeus ramifer* and *Sakaila japonica*. N.K. Ng *et al*.

(2001) then reported *Plagusia speciosa* from Taiwan for the first time. J.H. Lee (李榮祥) (2001) published a field guide to crabs in Taiwan, treating 140 species with color plates from Taiwan (including Kinmen). This book added *Ptychognathus affinis* and *Pseudograpsus setosus* as new records. C.P. Chen (陳章波) & J.Y. Wu (吳貞儀) (2001) later listed eight species of crabs from Matsu.

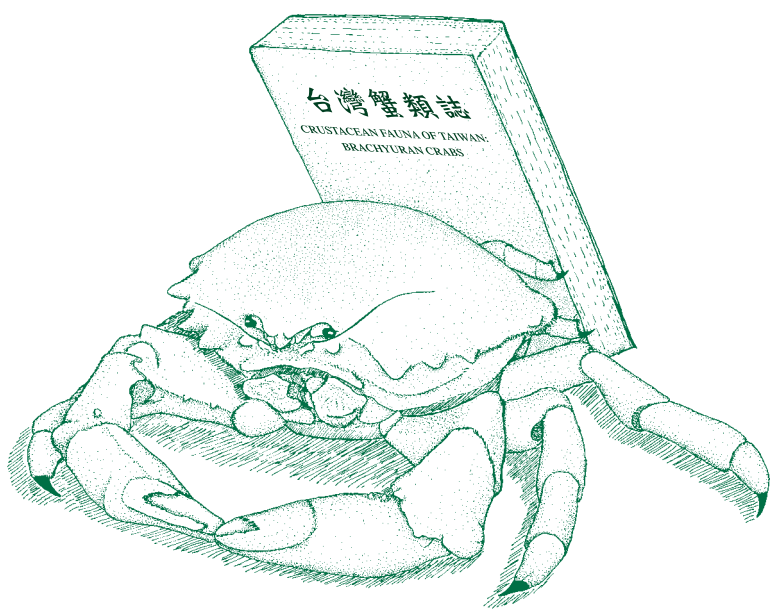
In 2002, a new genus and new species, *Latohexapus granosus*, was established by Huang *et al*. (2002) from Taiwan (the genus is not known elsewhere as yet). In addition, nine new records were found, viz. *Eucrate sulcatifrons*, *Carcinoplax spinosissima*, *C. purpurea*, *C. sinica*, *Psopheticus stridulans*, *P. hughi* (see Hsueh & Huang, 2002), *Paeduma orientalis* (see Huang *et al*., 2002), *Picrocerus armatus* (see Jeng & Ng, 2002), *Cryptolutea sagamiensis*, *Typhlocarcinops takedai* (see Ng & Huang, 2002) and *Epigrapsus politus* (see Cuesta *et al*., 2002).

In 2003, one new genus and 10 new species were published that year for Taiwan: *Scandarma* (see Schubart *et al*., 2003); *Scandarma lintou* (see Schubart *et al*., 2003); *Labuanium scandens* (see Ng & Liu, 2003); *Ethusina taiwanensis*, *E. alcocki*, *E. chenae*, *E. macrospina*, *E. insolita*, *E. saltator* (see Ng & Ho, 2003a); *Pilumnus chani* and *Typhlocarcinops yui* (see Ng & Ho, 2003b). There were also four new records from Taiwan, viz. *Latreillia metanesa* (see Castro, 2003), *Ethusina dilobotus* (see Ng & Ho, 2003a), *Pilumnus orbitospinis* and *P. spinulus* (see Ng & Ho, 2003b). In addition, W.J. Chen *et al*. (2003) published a guide introducing the freshwater crabs from southern Taiwan and Ho (2003) introduced the land crabs living in the coastal forests of Kending National Park in a colour booklet. Wang (2003) then treated 38 species of crabs from the coast of Kinmen in a chapter of a guide.

In a major paper resulting from the deep sea cruises and expeditions conducted jointly by the National Taiwan Ocean University, the French MUSORSTOM team and Taiwan Fisheries Research Institute, Ho *et al*. (2004) recorded 31 new records from deep-sea trawls. One new semiterrestrial species, *Geosesarma hednon*, was also described (Ng *et al*., 2004). In 2005, four new species of freshwater crabs were recognized: *Geothelphusa lili* and *G. shernshan* from southwestern Taiwan (Chen *et al*. 2005); *Geothelphusa leeae* from west-central Taiwan (Shy, 2005); and *Nanhaipotamon dongyinense* from *Dongyin* (Shih *et al*., 2005). In addition, two new records, *Ptychognathus altimanus* and *Utica gracilipes*, were also found from the estuary of southern Taiwan (Naruse *et al*., 2005). Y.L. Shen (冼宜樂) & Jeng (2005) published a complete guide for the crabs from Penghu, including 148 species of which 12 are new records for Taiwan. Naruse *et al*. (2006) added two new records, *Pseudactea corallina* from shallow reef waters and *Neosarmatium smithi* from mangroves. In a partial revision of the majoid genus *Pleistacantha*, S. Ahyong & T. Lee (2006) described the large spider crab, *P. maxima*, from northern Taiwan. Chen *et al*. (2007) published on a new freshwater crab, *Geothelphusa haiduan*, from eastern Taiwan; while Shih *et al*. (2008) reported on a new freshwater crab, *Geothelphusa siasiat*, from northwestern Taiwan.

Since 2004, the number of reports of new taxa and new records from Taiwan has decreased. There are several reasons. This has partly been because of the explosion of discoveries between 1990 and 2004 which covered a great diversity of families; and many groups are now well-known and well-collected. One key factor — the more complete surveying of the deep-sea through the activities of the National Taiwan Ocean University, the more complete survey of the reefs and mangroves by a large number of workers, and more thorough sampling of terrestrial habitats, has already uncovered many species. In fact, one reason for the surge in publications in the 1990s was because of the availability of key material from commercial deep-sea trawlers. A second major factor is that many members of that generation of Taiwanese and Singapore workers who worked through the 1990s have also retired, moved on, with some having graduated, left research, or are otherwise busy with other tasks. In any case, the fauna of Taiwan is by no means “very well understood”. The known species-diversity of several families and superfamilies, notably the Majoidea, Pilumnoidea and Leucosioidea is also

relatively poor, and we know of many new records and new species, some of which are now being described (e.g. Hsueh *et al*., in press; Richer de Forges & Ng, 2008; Richer de Forges *et al*., in press). There are also many new and cryptic species of freshwater crabs that await discovery or recognition (e.g., see Shih *et al*., 2006). In addition, there are many cryptic and tiny species, as well as those with specialized habitats, that await formal documentation, some of which are now in the process of being published (e.g. Hsueh & Ng, 2008; N.K. Ng *et al*., in press).



MUSEUM COLLECTIONS IN TAIWAN

The natural history collections in Taiwan have been gradually building even before the Second World War. Since 1980, more collections have been accumulating in universities, research institutes and museums. Of course, there are also large holdings of Taiwanese crabs in the United States, Germany, France, Japan and Singapore. In Taiwan, a few of the key repositories of brachyuran crabs merit mention.

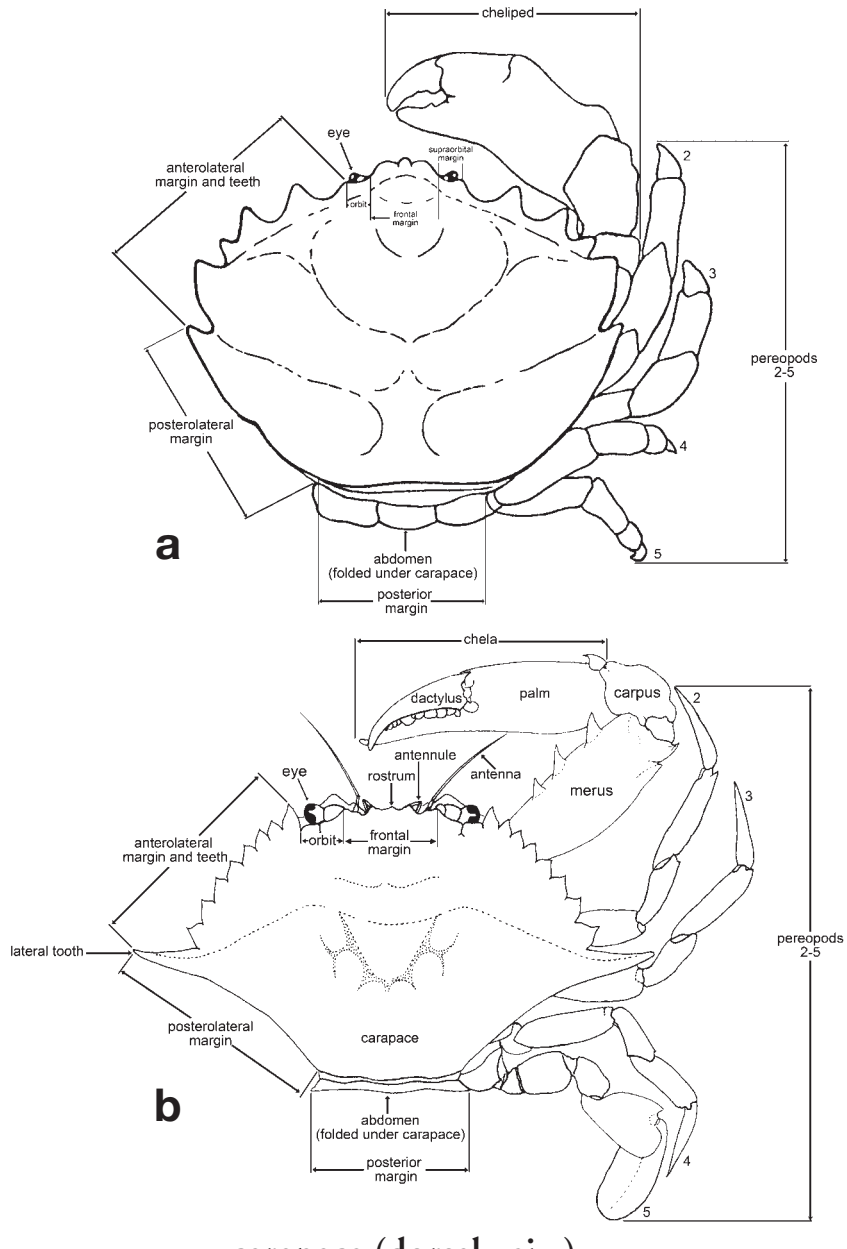
Historically, the National Taiwan Museum in Taipei has been the most important repository of brachyuran material in Taiwan. Its substantial collections include numerous dried and wet-preserved crab specimens, some pre-dating the Second World War (Wang, 2008). Wang & Chen (1981) and Ng *et al*. (2001) have also noted that the museum holds large dried collections from Mr. Chun-Yang Wei, mostly collected between 1950 and 1970 from Taiwan. The Taiwan museum collections are therefore valuable for a variety of historical as well as scientific reasons.

The National Taiwan Ocean University in Keelung (NTOU) has been gradually building up Crustacean collections since the 1980s, mainly through the efforts of Hsiang-Ping Yu and his many staff and students. Today, the NTOU boasts what is arguably the finest named collection of Taiwanese decapod crustaceans, including many type specimens. The Institute of Zoology of the Academia Sinica (present day Biodiversity Research Center) also holds a substantial collection of crabs from various parts of Taiwan, its reef collections being especially important. In the last decade or so, Taiwan's largest natural history museum, the National Museum of Natural Science in Taichung, has also been building up substantial holdings of decapod crustaceans. A good deal of this collection, however, remains unidentified and many new records will undoubtedly come from this material (e.g., see Naruse *et al*., 2005, 2006).

National Taiwan Museum.

MORPHOLOGICAL TERMINOLOGY

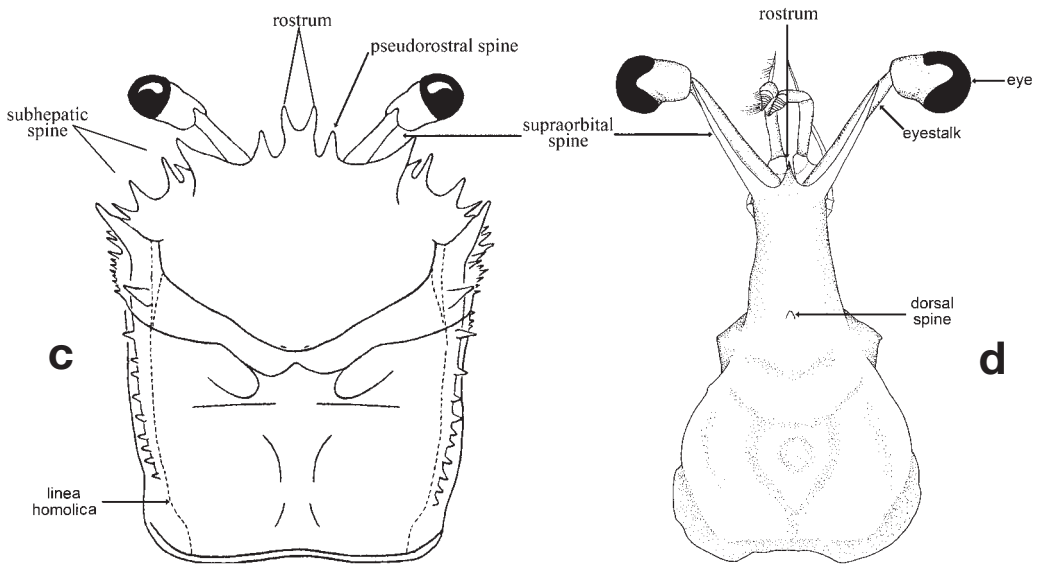
Ng *et al*. (2008) has provided a detailed review of the nomenclature, structure and terminology used for brachyuran crabs. Ng (1998) has also provided detailed figures and terms used for crab identification, some of which have been adapted and modified here for this catalogue. Thus, there is no need to repeat most of the information here and the reader is advised to consult the above papers for details. Nevertheless, we have provided figures to help the "novice" carcinologist get started.

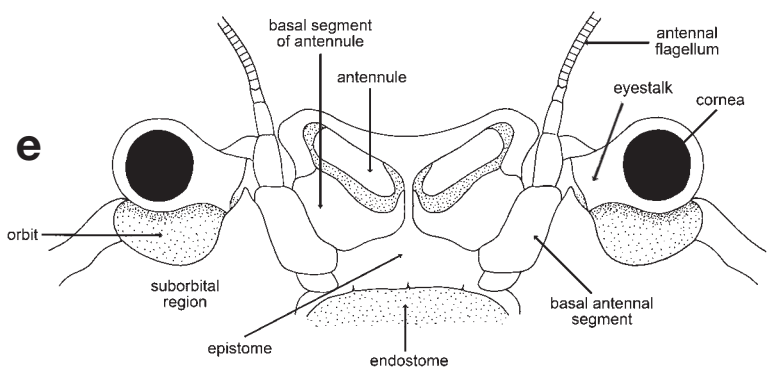


carapace (dorsal veiw)

Fig. 1. Descriptive terms of the dorsal view of the carapace: **a,** dromiid carapace. **b,** generalized crab carapace based on a portunid.

MORPHOLOGICAL TERMINOLOGY





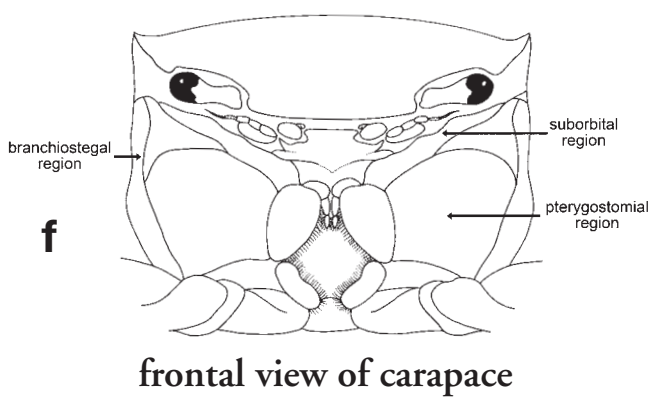


Fig. 2. c, d, descriptive terms of the dorsal view of the carapace: **c,** homolid carapace, **d,** latreilliid carapace. **e,** descriptive terms for eyes, antennae and antennules (ventral view). **f,** descriptive terms for the frontal view of the carapace.

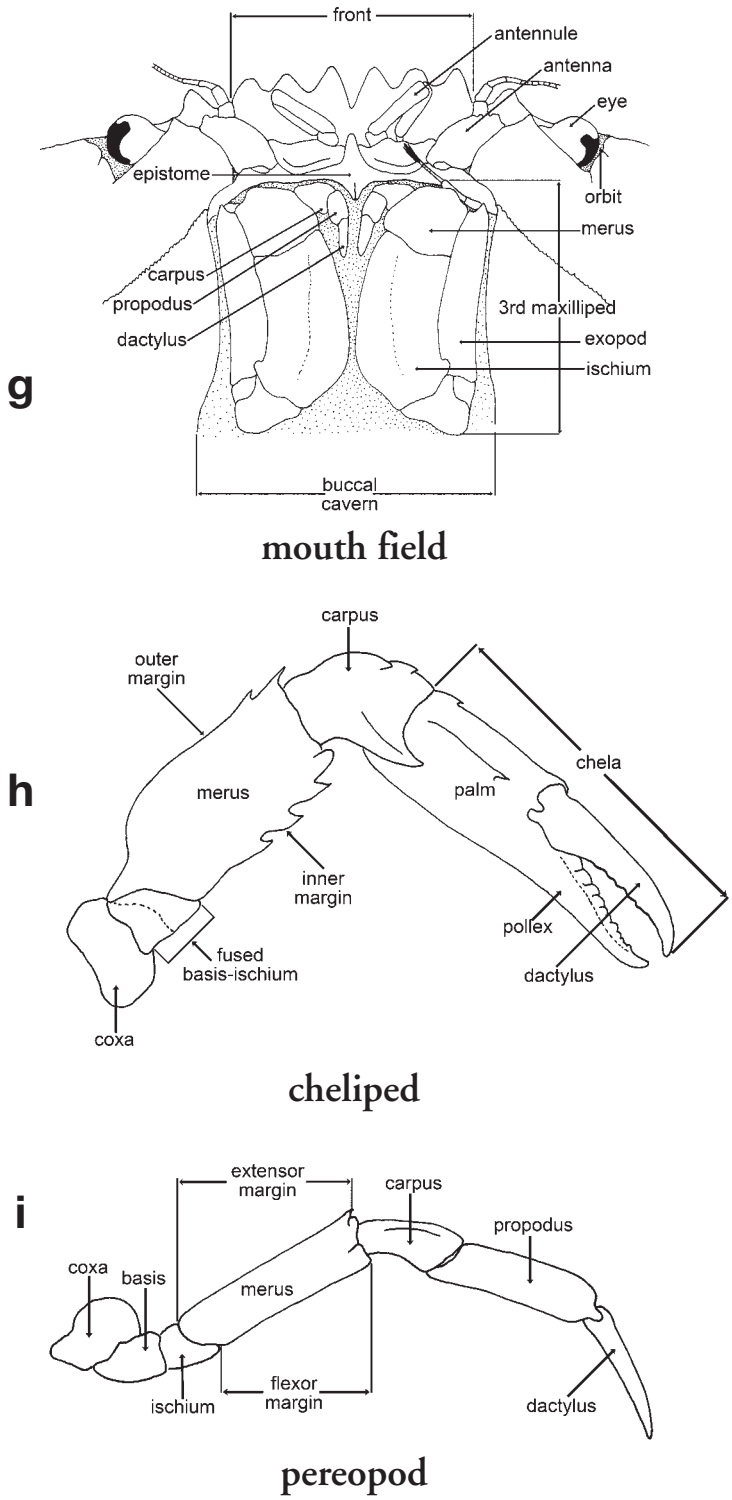
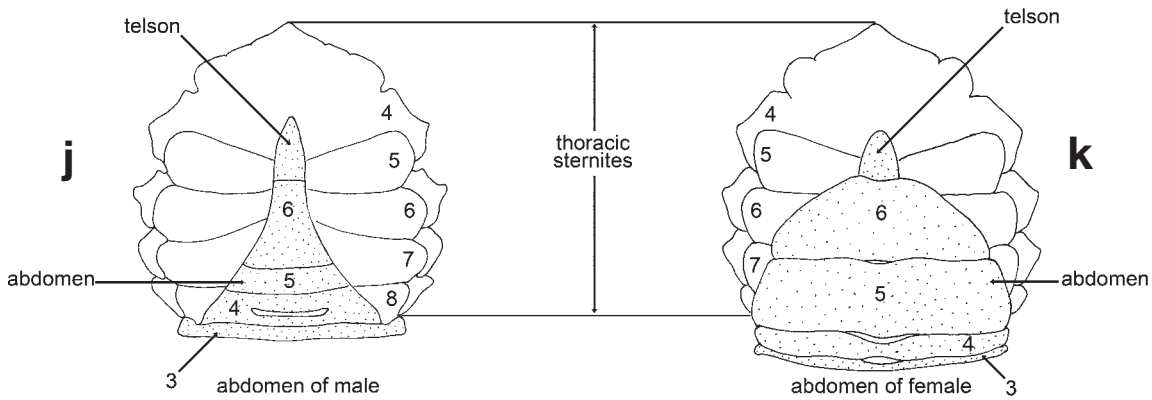
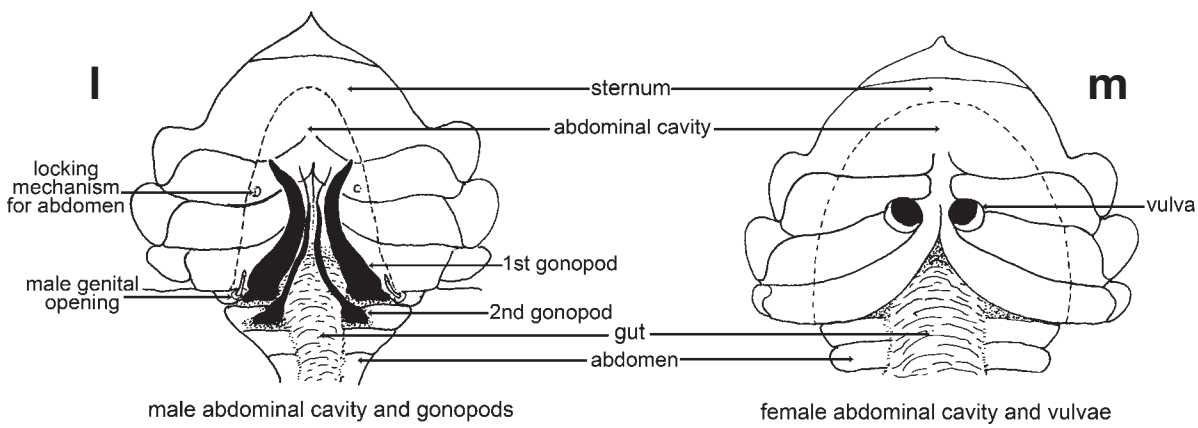


Fig. 3. **g,** descriptive terms for the mouth field. **h,** descriptive terms for the cheliped. **i,** descriptive terms for the pereopod.

MORPHOLOGICAL TERMINOLOGY



thoracic sternum and abdomen (ventral view)



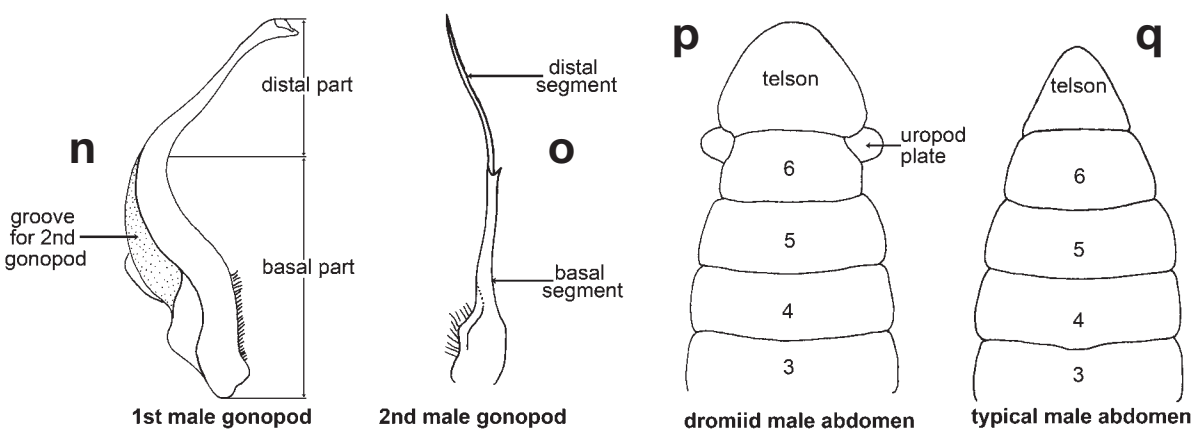


Fig. 4. j, k, descriptive terms for the thoracic sternum and abdomen: **j,** abdomen of male, **k,** abdomen of female. **l, m,** descriptive terms for the abdominal cavity, male gonopods and female vulvae: **l,** male abdominal cavity and gonopods, **m,** female abdominal cavity and vulvae. **n, o,** descriptive terms for the male gonopods: **n,** first male gonopod, **o,** second male gonopod. **p, q,** descriptive terms for the abdomen: **p,** dromiid male abdomen, **q,** typical brachyuran male abdomen.

SYSTEMATICS

The size and complexity of the Brachyura has led to considerable debate over their interrelationships and the resulting classification. Until the last three decades or so, the classification of brachyurans centred on features of the carapace and buccal frame, with major groups such as Oxyrhyncha, Oxystomata and Brachyrhyncha established on this basis (e.g. Balss, 1957). Guinot (1977, 1978, 1979) substantially reevaluated the phylogeny of the brachyurans by focusing instead on gonopore position as a more reliable phylogenetic indicator. She proposed three major divisions: Podotremata (with coxal gonopores), Heterotremata (with coxal and sternal gonopores) and Thoracotremata (with sternal gonopores). The podotrematous crabs, the subject of this work, have long been recognized as 'primitive' or basal brachyurans on the basis of various adult features and especially because of anomuran-like features of larvae. On the basis of larval and molecular data, some have even suggested that some podotremes, such as the dromiids, are not brachyurans, but anomurans (Spears *et al*., 1992). The available evidence, however, does not support this (McLay *et al*., 2001; Ahyong *et al*., 2007) — there is now little doubt that they are brachyurans. The status of Podotremata on the other hand, whether it is monophyletic, paraphyletic or polyphyletic, has been one of the more contentious issues in brachyuran systematics. The question of podotreme monophyly is not a trivial one (Tavares, 2003). If the Podotremata is polyphyletic, then some podotremes must lie outside the Brachyura (presumably among Anomura) which would significantly destabilize the high level decapod system and force reassessment of the evolution of crab-like form. If the Podotremata is monophyletic, then it is a valid taxon and is sister to Eubrachyura. If the Podotremata is paraphyletic, then the taxon is not valid and the sister group to Eubrachyura lies among the podotremes.

Morphological and molecular phylogenetic studies indicate that Brachyura and Anomura are reciprocally monophyletic sister clades, thus excluding podotreme polyphyly (Scholtz & Richter, 1995; Dixon *et al*., 2003; Ahyong & O'Meally, 2004). The larvae of anomurans and dromiids are certainly similar, but given that Anomura and Brachyura are sister groups, larval symplesiomorphies are hardly surprising (see review by McLay *et al*., 2001). In favour of podotreme monophyly several morphological features have been proposed. The most significant of these are the coxal gonopores in both sexes with unusual 'paired spermathecae' of females (paired seminal receptacles independent of the oviduct, associated with sternites 7/8). The 'paired spermathecae' are not present in anomurans, and the vulvae of female eubrachyurans (paired oviducal seminal receptacles on sternite 6) are of a different form (Guinot & Quenette, 2005). Similarly spermatozoal ultra-structure has been used to support podotreme monophyly (Jamieson, 1994; Jamieson *et al*., 2005).

Recent morphological and molecular analyses of Brachyura, however, indicate that the podotremes are strongly paraphyletic consisting of several successively nested clades of podotremes leading to the Eubrachyura (Brösing *et al*., 2002, 2007; Ahyong *et al*., 2007; Scholtz & McLay, in press). Internalization of the spermatheca is therefore an innovation in the stem brachyuran, but not a synapomorphy supporting Podotremata. Rather, it is a feature retained by successive podotreme clades and then lost with derivation of the eubrachyuran synapomorphies. Ng *et al*. (2008) discussed many of the above issues at length but finally adopted the more "conservative" approach of recognizing Podotremata as a taxon, favouring pragmatic groupings in lieu of a broader consensus among the research community. There is certainly considerable convenience in recognizing a Podotremata, but the accumulating evidence increasingly suggests that it should not be used.

In the present work, rather than recognizing Podotremata as a taxon, we treat independent podotreme clades as separate Sections alongside the largest brachyuran Section, Eubrachyura. The three podotreme Sections follow Ahyong *et al*. (2007): Dromiacea, Raninoida and Cyclodorippoida. Cyclodorippoida is the sister group to Eubrachyura. Raninoida is the sister group to Cyclodorippoida + Eubrachyura. Dromiacea is the sister group to all other brachyurans (i.e., Raninoida + [Cyclodorippoida + Eubrachyura]). The concept of Dromiacea

employed here, like that of Martin & Davis (2001), includes Dromioidea, Homolodromioidea and Homoloidea. Controversy, exists, however, over whether homoloids should be included in Dromiacea. For instance, Guinot (2008) and Scholtz & McLay (in press), argue that Dromiacea should be restricted to Dromioidea and Homolodromioidea on the basis of uropodal modifications, but recent molecular analyses suggest that homolodromioids are closer to homoloids than to dromioids (Ahyong *et al*., 2007) — which is not compatible with a restricted Dromiacea. Pending further phylogenetic studies of the dromiaceans, however, we employ Dromiacea in a broad sense to include homoloids.

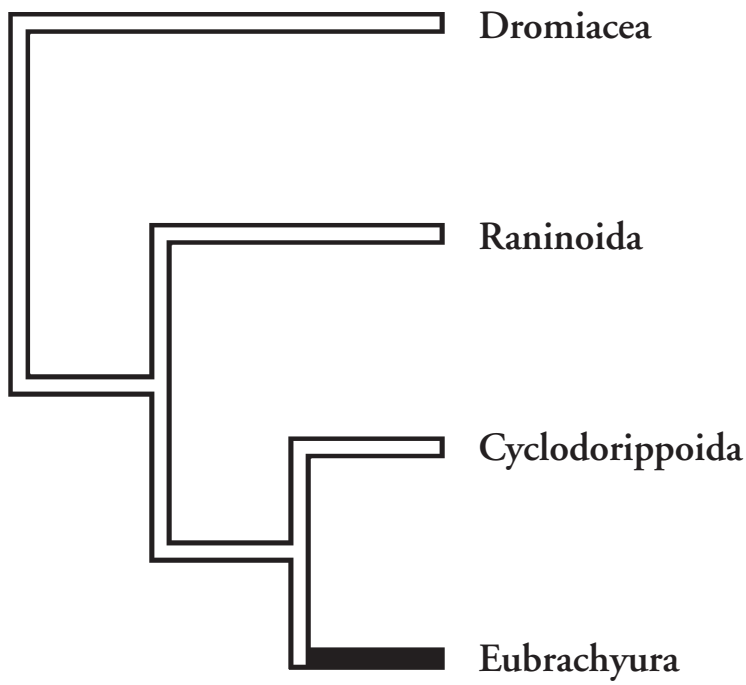


Fig. 5. Phylogenetic relationships of the Dromiacea, Raninoida, Cyclodorippoida and the Eubrachyura.

The earliest fossil crabs belong to one or other of the podotreme sections. The Dromiacea has a fossil record beginning in the early Jurassic, Raninoida in the early Cretaceous, and Cyclodorippoida in the late Cretaceous (or early Cretaceous if the extinct Torynommidae are regarded as cyclodorippoids) (Glaessner, 1969; Schweitzer & Feldmann, 2005; Brösing, 2008).

In contrast to Podotremata, Eubrachyura is monophyletic. The internal relationships of the Eubrachyura, however, are far from settled. Most recent classifications tentatively recognize the Heterotremata and Thoracotremata, but there are problems (Ng *et al*., 2008). The heterotreme-thoracotreme distinction is produced by two different patterns of the vas deferens and its ejaculatory duct, either via the coxa of the pereopod 5 coxa (Heterotremata) or through the sternum (Thoracotremata). The coxosternal disposition, which occurs in some heterotreme families, can be regarded as only a variant of the coxal condition since the male genital papilla still originates from the coxa. Among heterotremes, the coxosternal condition varies considerably, from having the male genital papilla being almost completely enclosed by sternites 7 and 8 (e.g. Dorippidae *pro parte*, Ethusidae, Palicidae), sometimes with accessory plates (e.g. Chasmocarcinidae), calcified along most of their

length (e.g. Scalopidiidae), or mostly exposed with episternal plates protecting it (e.g. Vultocinidae). Guinot *et al*. (in preparation) have accumulated strong evidence to show that the male sternal gonopore present unambiguously on sternite 8 is a synapomorphy of the Thoracotremata. If this grouping is restricted to the Grapsoidea and Ocypodoidea, then the available data suggests it is probably monophyletic. Numerous dissections in most brachyuran groups, notably by Guinot *et al*. (in preparation) have demonstrated that the sternal condition of the male gonopores in all the thoracotreme families, confirming the results previously obtained using *Ocypode cursor* (Linnaeus, 1758) (Guinot, 1979: fig. 56-B) and *Ucides occidentalis* (Ortmann, 1897) (von Sternberg & Cumberlidge, 2001: fig. 3B). Although some minor rearrangement of various groups currently regarded as thoracotreme or heterotreme will probably occur, the Thoracotremata appears to be monophyletic. The Heterotremata on the other hand, is probably paraphyletic, but it is perhaps also the most challenging 'group' because this condition is dominant in the Eubrachyura. The most speciose groups — xanthoids, pilumnoids and all the true freshwater crabs — are heterotremes. At present, there is no evidence that Heterotremata is monophyletic, and it seems likely that the grouping is para- or possibly polyphyletic, perhaps even with some apparent heterotremes nested within Thoracotremata. One family whose condition is still difficult to interpret is the Hymenosomatidae. They have been regarded as heterotremes or thoracotremes at different times, although their affinities appear to be with the wholly heterotreme majoids (see Ng *et al*., 2008). The Pinnotheroidea is another problem – they are supposedly thoracotremes, and most examined taxa appear to be so, but this grouping is almost certainly polyphyletic, and because of their small adult size, reproductive characters will need to be very carefully re-examined. Already, Ng *et al*. (2008) has questioned the placement of several of the traditionally pinnotherid groups; recognizing the Xenophthalmidae, as a distinct family allied to Dotillidae (not a subfamily), recognising the Asthenognathinae as a subfamily of the Varunidae; and transferring members of the genus *Tritodynamia* to the two separate families, the Macrophthalmidae and Varunidae! Within the Heterotremata, Ng *et al*. (2008) have noted that many of the superfamiles they recognised are provisional because too little is known. We expect substantial changes to take place, especially in large and problematic superfamilies like the Eriphiodea, Xanthoidea and Goneplacoidea. The classification within the Eubrachyura is likely to change substantially in the years ahead; eubrachyurans will be treated in forthcoming volumes of the catalog.

LIST OF BRACHYURAN SUPERFAMILIES AND FAMILIES KNOWN FROM TAIWAN

The classification used in this catalogue essentially follows that proposed by Ng *et al*. (2008). Departures from this system will be explained in the remarks for the relevant taxa. One major change is the decision here to not recognize the Podotremata as a taxon, being paraphyletic (see Systematics). Similarly, authorships and years for many nomenclaturally problematic taxa (notably for some homoloid genera) also follow those recommended in Ng *et al*. (2008).

Section DROMIACEA De Haan, 1833
- Dromioidea De Haan, 1833
  - Dromiidae De Haan, 1833
    - Dromiinae De Haan, 1833
      - Sphaerodromiinae Guinot & Tavares, 2003
    - Dynomenidae Ortmann, 1892
      - Dynomeninae Ortmann, 1892
      - Metadynomeninae Guinot, 2008
- Homolodromioidea Alcock, 1899
  - Homolodromiidae Alcock, 1899
- Homoloidea De Haan, 1839
  - Homolidae De Haan, 1839
  - Latreilliidae Stimpson, 1858

Section RANINOIDA De Haan, 1839
- Raninoidea De Haan, 1839
  - Raninidae De Haan, 1839
    - Lyreidinae Guinot, 1993
    - Notopodinae Serène & Umali, 1972
    - Ranininae De Haan, 1839
    - Raninoidinae Lörenthey & Beurlen, 1929

Section CYCLODORIPPOIDA Ortmann, 1892
- Cyclodorippoidea Ortmann, 1892
  - Cyclodorippidae Ortmann, 1892
    - Cyclodorippinae Ortmann, 1892
    - Xeinostomatinae Tavares, 1992
  - Cymonomidae Bouvier, 1898

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977
- Aethroidea Dana, 1851
  - Aethridae Dana, 1851
- Calappoidea De Haan, 1833
  - Calappidae De Haan, 1833
  - Matutidae De Haan, 1835
- Cancroidea Latreille, 1802
  - Atelecyclidae Ortmann, 1893
  - Cancridae Latreille, 1802
- Carpilioidea Ortmann, 1893
  - Carpiliidae Ortmann, 1893
- Corystoidea Samouelle, 1819
  - Corystidae Samouelle, 1819
- Dairoidea Serène, 1965
  - Dacryopilumnidae Serène, 1984
  - Dairidae Serène, 1965
- Dorippoidea MacLeay, 1838
  - Dorippidae MacLeay, 1838
  - Ethusidae Guinot, 1977
- Eriphioidea MacLeay, 1838
  - Dairoididae Števčić, 2005
  - Eriphiidae MacLeay, 1838
  - Hypothalassiidae Karasawa & Schweitzer, 2006
  - Oziidae Dana, 1851
  - Menippidae Ortmann, 1893
- Gecarcinucoidea Rathbun, 1904
  - Gecarcinucidae Rathbun, 1904
- Goneplacoidea MacLeay, 1838
  - Chasmocarcinidae Serène, 1964
    - Chasmocarcininae Serène, 1964
  - Goneplacidae MacLeay, 1838
  - Euryplacidae Stimpson, 1871
  - Mathildellidae Karasawa & Kato, 2003
  - Scalopidiidae Števčić, 2005
- Hexapodoidea Miers, 1886
  - Hexapodidae Miers, 1886
- Leucosioidea Samouelle, 1819
  - Iphiculidae Alcock, 1896
  - Leucosiidae Samouelle, 1819
    - Leucosiinae Samouelle, 1819
    - Ebaliinae Stimpson, 1871
- Majoidea Samouelle, 1819
  - Epialtidae MacLeay, 1838
    - Epialtinae MacLeay, 1838
    - Pisinae Dana, 1851
    - Tychinae Dana, 1851
  - Hymenosomatidae MacLeay, 1838
  - Inachidae MacLeay, 1838
  - Majidae Samouelle, 1819
    - Majinae Samouelle, 1819
- Orithyioidea Dana, 1852
  - Orithyiidae Dana, 1852
- Palicoidea Bouvier, 1898

- Crossotonotidae Moosa & Serène, 1981
- Palicidae Bouvier, 1898

Parthenopoidea MacLeay, 1838
- Parthenopidae MacLeay, 1838
  - Parthenopinae MacLeay, 1838
  - Daldorfiinae Ng & Rodríguez, 1986

Pilumnoidea Samouelle, 1819
- Galenidae Alcock, 1898
  - Denthoxanthinae Števčić, 2005
  - Galeninae Alcock, 1898
  - Halimedinae Alcock, 1898
- Pilumnidae Samouelle, 1819
  - Eumedoninae Dana, 1852
  - Pilumninae Samouelle, 1819
  - Rhizopinae Stimpson, 1858
- Tanaocheleidae Ng & Clark, 2000

Portunoidea Rafinesque, 1815
- Geryonidae Colosi, 1923
- Portunidae Rafinesque, 1815
  - Caphyrinae Paul'son, 1875
  - Carupinae Paul'son, 1875
  - Podophthalminae Dana, 1851
  - Portuninae Rafinesque, 1815
  - Thalamitinae Paul'son, 1875

Potamoidea Ortmann, 1896
- Potamidae Ortmann, 1896
  - Potamiscinae Bott, 1970

Pseudozioidea Alcock, 1898
- Pseudoziidae Alcock, 1898
  - Pseudoziinae Alcock, 1898

Trapezioidea Miers, 1886
- Domeciidae Ortmann, 1893
- Tetraliidae Castro, Ng & Ahyong, 2004
- Trapeziidae Miers, 1886
  - Calocarcininae Števčić, 2005
  - Quadrellinae Števčić, 2005
  - Trapeziinae Miers, 1886

Xanthoidea MacLeay, 1838
- Xanthidae MacLeay, 1838
  - Actaeinae Alcock, 1898
  - Chlorodiellinae Ng & Holthuis, 2007
  - Cymoinae Alcock, 1898
  - Etisinae Ortmann, 1893
  - Euxanthinae Alcock, 1898
  - Kraussiinae Ng, 1993
  - Liomerinae Sakai, 1976
  - Polydectinae Dana, 1851
  - Xanthinae MacLeay, 1838
  - Zalasiinae Serène, 1968
  - Zosiminae Alcock, 1898

Subsection THORACOTREMATA Guinot, 1977

Cryptochiroidea Paul'son, 1875
- Cryptochiridae Paul'son, 1875

Grapsoidea MacLeay, 1838
- Gecarcinidae MacLeay, 1838
- Grapsidae MacLeay, 1838
- Plagusiidae Dana, 1851
  - Percninae Števčić, 2005
  - Plagusiinae Dana, 1851
- Sesarmidae Dana, 1851
- Varunidae H. Milne Edwards, 1853
  - Asthenognathinae Stimpson, 1858
  - Cyclograpsinae H. Milne Edwards, 1853
  - Gaeticinae Davie & Ng, 2007
  - Varuninae H. Milne Edwards, 1853
- Xenograpsidae N. K. Ng, Davie, Schubart & Ng, 2007

Ocypodoidea Rafinesque, 1815
- Camptandriidae Stimpson, 1858
- Dotillidae Stimpson, 1858
- Macrophthalmidae Dana, 1851
  - Macrophthalminae Dana, 1851
  - Tritodynamiinae Števčić, 2005
- Mictyridae Dana, 1851
- Ocypodidae Rafinesque, 1815
  - Ocypodinae Rafinesque, 1815
  - Ucinae Dana, 1851
- Xenophthalmidae Stimpson, 1858
  - Xenophthalminae Stimpson, 1858

Pinnotheroidea De Haan, 1833
- Pinnotheridae De Haan, 1833
  - Pinnotherinae De Haan, 1833

KEY TO FAMILIES OF TAIWAN BRACHYURAN CRABS

With regards to the taxonomy, Ng *et al*. (2001) has already provided a detailed breakdown of the taxa known from Taiwan and this list was used as the primary starting point for this catalogue. It, however, has been and will be refined and updated in the series of volumes in this catalogue. The overall key to crab families presented here in Part I is for readers less familiar with brachyuran systematics to have a quick means of identifying their specimen. It tries to blend phylogeny and ease of use, and we hope we have found a good compromise. This key is substantially modified from that originally used in Ng (1998) for all brachyuran families (with emphasis on edible species) for the Food and Agriculture Organisation (FAO). Of course, the taxonomy and nomenclature in Ng (1998) will need to be updated against Ng *et al*. (2008). Two families have been included here even though they have not been formally reported from Taiwan as yet. Members of the deep sea family Retroplumidae Gill, 1894, should be found in Taiwan as they occur in Japan, Philippines and nearby seas. We expect it to be discovered in the near future. The majoid family Inachoididae Dana, 1851, is mainly American, but as some members (genus *Pyromaia*) have entered Japan as aliens, its presence in Taiwan may be expected. For convenience and ease of use by the reader, we have also placed keys for each of the major taxonomic sections treated. In this volume, for example, for the Sections Dromiacea, Raninoida, Cyclodorippoida, we have added keys to the superfamilies in each section, as well as families to the superfamilies. These keys are more detailed and provide more information on how to identify them. For some smaller groups, the family keys include taxa that are not yet found in Taiwan, but have been added for completeness and to aid researchers in the event these are found discovered in the island.

Keys to the families of brachyuran crabs found in Taiwan

1 Male and female genital openings coxal (on pereopod 5) 2
– Male genital openings coxal, coxo-sternal or sternal; female genital openings sterna 9
2 Basal segment of eyestalk much longer than terminal article, from dorsal view, eyestalk appears to be 2-segmented ..... **Latreilliidae**
– Basal segment of eyestalk much shorter than terminal article, from dorsal view, eyestalk appears to be unsegmented 3
3 Pereopod 5 distinctly subchelate to chelate or strongly reduced to just 3 articles, inserted obliquely on carapace and directed upwards 4
– Pereopod 5 normal in structure or reduced in size but not subchelate or chelate and never reduced to just 3 articles, inserted laterally on carapace and directed laterally 8
4 Merus of maxilliped 3 distinctly triangular in shape 5
– Merus of maxilliped 3 quadrate to subquadrate, never clearly triangular in shape 6
5 Carapace hexagonal to subovate; orbits distinct. Exopod of maxilliped 3 without flagellum ..... **Cyclodorippidae**
– Carapace rectangular to squarish; orbits absent. Exopod of maxilliped 3 with distinct flagellum ..... **Cymonomidae**
6 Carapace longitudinally rectangular, dorsal surface glabrous or with scattered stiff setae. Only pereopod 5 with dactylus and propodus subchelate to chelate ..... **Homolidae**
– Carapace longitudinally ovate, circular or hexagonal, dorsal surface usually with dense, soft setae. Both pereopod 4 and 5 with dactylus and propodus subchelate to chelate; carries sponges and other marine organisms when alive 7

7 Carapace circular to hexagonal. A small platelet-like structure usually intercalated between edges of abdominal somite 6 and telson. Crab carries sponges, tunicates, or bivalve shells ····· **Dromiidae**

– Carapace longitudinally ovate. No platelet-like structure intercalated between edges of abdominal somite 6 and telson. Crab believed to carry sponges or related objects ····· **Homolodromiidae**

8 Merus of maxilliped 3 distinctly triangular in shape. Carapace longitudinally ovate. Sternum very narrow, thoracic sternites 5–7 very narrow. Fingers of chela strongly bent. Abdominal somite 6 and telson normal without intercalated plate. Pereopod 5 reduced but still clearly discernible as leg. Usually burrows into soft substrates; does not carry objects ····· **Raninidae**

– Merus of maxilliped 3 quadrate, never distinctly triangular in shape. Carapace ovate to tranversely ovate. Sternum relatively broad. Fingers of chela not prominently bent. A small platelet-like structure always intercalated present between edges of abdominal somite 6 and telson. Pereopod 5 strongly reduced, present only as a short appendage. Not a burrower; no known carrying behaviour ····· **Dynomenidae**

9 Male genital openings clearly coxal, with genital papilla protruding directly from coxa of pereopod 5 ···· 10

– Male genital openings otherwise … ····· 54

10 Only 4 pairs of pereopods visible. Pereopod 5 lost, not visible in adults ····· **Hexapodidae**

– Five pairs of pereopods visible. Pereopods 1–5 visible in adults ····· 11

11 Merus of maxilliped 3 distinctly triangular in shape ····· 12

– Merus of maxilliped 3 quadrate to subquadrate, never clearly triangular in shape ····· 18

12 Pereopod 4 and 5 distinctly chelate, inserted obliquely on carapace and directed upwards ····· 13

– Pereopod 4 and 5 distinctly normal, not chelate, inserted laterally on carapace ····· 14

13 Afferent branchial openings narrow, elongated. Male abdomen triangular. Male gonopores coxal to coxal-sternal in condition. Dactyli of pereopods 4 and 5 relatively long, forming distinct subchela with propodus ····· **Dorippidae**

– Afferent branchial openings oval or circular. Male abdomen narrow, with nearly parallel sides. Male gonopores only exhibits coxal-sternal in condition. Dactyli of pereopods 4 and 5 hook-like ····· **Ethusidae**

14 Opening for afferent respiratory current at base of chela, no canal present along sides of buccal cavern even when maxilliped 3 pushed aside ····· 15

– Opening for afferent respiratory current below frontal margin or orbits, adjacent to endostome, with distinct canal present along sides of buccal cavern when maxilliped 3 pushed aside ····· 16

15 Female abdomen with all somites freely articulating, not forming brood-chamber with thoracic sternum, egg-mass protruding from sides of abdomen when ovigerous ····· **Iphiculidae**

– Female abdomen with most somites fused, forming brood-chamber with thoracic sternum, egg-mass not visible when ovigerous ····· **Leucosiidae**

16 Both afferent respiratory opening directly under the middle portion of the frontal margin, not separated by any of the mouthparts ····· 17

– Afferent respiratory opening separated by maxilliped 3 and not continuous with each other ····· **Aethridae**

17 Sides of carapace may be expanded to form a clypeiform process. Right chela (rarely left) with specialized cutting tooth, the fingers of other chela long, forceps-like; propodus and dactylus of pereopods 2–5 never paddle-like ····· **Calappidae**

– Sides of carapace never expanded to form a clypeiform process; chelae symmetrical, fingers never with specialized cutting tooth, propodus and dactylus of pereopods 2–5 paddle-like ····· **Matutidae**

18 Pereopod 5 strongly reduced compared to other legs, appears rudimentary or vestigial ····· 19

– Pereopod 5 subequal to other legs, or if smaller, is functional and not greatly reduced in size compared to pereopod 4 ····· 21

19 Carapace quadrate, smooth, may have dorsal transverse ridges, anterolateral margin entire. Pereopod 5 setose to strongly setose and appearing feather-like ..... **Retroplumidae** [not yet known from Taiwan]
– Carapace quadrate to ovate, dorsal surface rugose to strongly rugose and granulate, never with dorsal transverse ridges; anterolateral margin with teeth and spines. Pereopod 5 simple, filamentous, not setose · 20
20 Abdominal somites 1 and 2 of both sexes very short in comparison to the remaining four somites **Palicidae**
– Abdominal somites 1 and 2 of both sexes not significantly shorter than remaining somites **Crossotonotidae**
21 Carapace transversely ovate, wider than long; anterolateral margins convex. Wholly freshwater group; eggs large developing directly into juvenile crabs; females brooding young for short period 22
– Carapace transversely ovate to squarish or longer than broad. Completely marine; eggs almost always developing into planktonic zoeae, rarely as megalopa; females do not usually brood young 23
22 Mandibular palp with single lobe. Male abdomen triangular in shape ..... **Potamidae**
– Mandibular palp with two lobes. Male abdomen distinctly T-shaped ..... **Parathelphusidae**
23 Carapace usually pyriform, usually longer than broad, sometimes squarish. Carapace, chelipeds and walking legs usually with hooked setae (sometimes very dense) that cling on to debris and objects, used in camouflage 24
– Carapace usually broader than long. Carapace, chelipeds and legs without hooked setae (if present, setae simple or plumose) 27
24 Basal antennal segment broad, at most twice as long as broad. Orbits present, formed by supraorbital eave, adjacent spines and a postorbital spine or lobe ..... **Majidae**
– Basal antennal segment slender, at most twice as long as broad. Orbits absent or with narrow, weakly developed supraorbital eave and small postorbital lobe 25
25 Orbits with narrow, weakly developed supraorbital eave partially overhanging eyes; with or without small postorbital lobe ..... **Epialtidae**
– Orbits absent, eyes unprotected though orbital margin usually with several small spines and postorbital spine ... 26
26 Male telson fused with abdominal somite 6 ..... **Inachoididae** [not yet known from Taiwan]
– Male telson not fused with abdominal somite 6 ..... **Inachidae**
27 Fossae (sockets) for antennules squarish to longer than broad, antennules fold longitudinally, almost so or absent 28
– Fossae for antennules broader than long, antennules fold transversely or obliquely 31
28 Carapace poorly calcified; pyriform, subpyriform, triangular, circular, or subcircular; orbits absent ..... **Hymenosomatidae**
– Carapace strongly calcified, longitudinally and transversely ovate, hexagonal, circular, or subcircular; orbits complete 29
29 Antennal flagellum slightly setose to glabrous ..... **Cancrida**e
– Antennal flagellum distinctly setose 30
30 Antennae very long, longer than or as long as carapace length, strongly setose ..... **Corystidae**
– Antennae short, much shorter than carapace length, not strongly setose ..... **Atelecylidae**
31 Carapace triangular or hexagonal; front triangular, forked or spiniform. Chelipeds triangular in cross-section, usually very long 32
– Carapace shape not as above; front usually truncate or multidentate. Chelipeds usually oval to circular in cross-section, usually not prominently elongated 33
32 Press-button on sterno-abdominal cavity that retains male abdomen consisting of a rounded tubercle on posterior edge of sternite 5. Male abdomen relatively broad ..... **Dairoididae**
– Press-button on sterno-abdominal cavity consisting of a low peg-like tubercle on anterior edge of sternite 5.

Male abdomen relatively slender ..... **Parthenopidae**

33 Pereopod 5 dactylus flattened, paddle-like (with exception of a few mud-dwelling and obligate coral-symbionts) ..... **Portunidae**

– Pereopod 5 with normal dactylus, not paddle-like 34

34 Cross-section of dactylus of walking leg T-shaped ..... **Geryonidae**

– Cross-section of dactylus of walking leg not T-shaped, usually quadrate to ovate 35

35 Male abdominal somites (including telson) all freely articulating 36

– Male abdominal somites somites 3 and 4, or 3–5 fused, immovable, even if some or all the sutures are visible 47

36 Carapace trapezoidal in appearance, with antero- and posterolateral margins not well demarcated, converging sharply to very short posterior margin; frontal region very wide, eyes positioned at edge of carapace and demarcates broadest part of carapace 37

– Carapace quadrate to ovate; frontal margin normal, occupying part of frontal region; eyes not place at the edge of carapace, widest part of carapace usually at junction of well demarcated antero- and posterolateral margins 38

37 Carapace transversely ovate, appears subglobose, dorsally very convex; frontal margin not clearly discernible with entire surface very convex. G2 much longer than G1, with distal segment looping. Free living or in holes in dead corals ..... **Dacryopilumnidae**

– Carapace trapezoidal, dorsal surfaces almost flat; frontal margin sharply defined. G2 about half length of G1. Obligate symbionts mainly on zooxanthellate scleratinian acroporid corals ..... **Tetraliidae**

38 G1 very slender, usually S-shaped, distal part never with large spines or complex folds. G2 less than 0.25 times G1 length, very small, sigmoidal, comma-shaped 39

– G1 otherwise. G2 about between 0.3–0.7 times G1 length 41

39 At least one cheliped long and slender, at least twice length of carapace; tips of chelipeds spoon-tipped ..... **Tanaochelidae**

– Chelipeds about same length as carapace; tips of chelipeds not spoon-tipped, sharp 40

40 Carapace usually densely pubescent. Male abdomen triangular, with somites 5, 6 and telson trapezoidal to triangular. G1 S-shaped ..... **Pilumnidae**

– Carapace usually glabrous or sparely pubescent. Male abdomen distinctly T-shaped, with somites 5, 6 and telson slender, elongate. G1 long, straight to almost straight, tip may be fluted ..... **Galenidae**

41 Male abdomen distinctly T-shaped; male abdominal somites very narrow. G1 very slender medially and distally, almost straight. G2 about one-third length of G1 ..... **Euryplacidae**

– Male abdomen triangular; somites trapezoidal to triangular. G1 relatively stout and straight or gently curved. G2 0.25 times length to longer than G1 42

42 G2 about 0.3–0.5 times G1 length ..... **Pseudoziidae**

– G2 subequal in length or longer than G1 43

43 Male abdomen distinctly triangular, with lateral margins of somites 3–6 distinctly converging towards telson. Abdominal somite 3 about 2 times telson width ..... **Goneplacidae**

– Male abdomen subrectangular, with lateral margins of somites 3–6 gradually converging towards telson. Abdominal somite 3 about 2 times telson width 44

44 G1 reaching to edge of thoracic sternite 4 ..... **Menippidae**

– G1 reaching to edge of thoracic sternite 5 45

45 Carapace usually transversely ovate, with frontal regions relatively narrower; surfaces usually smooth or covered with flattened granules, sometimes appearing eroded; or carapace more quadrate and very setose,

with setae obscuring margins. Larger chela usually with distinct cutting tooth ..... **Oziidae**

– Carapace quadrate, with frontal regions relatively broad; surfaces usually granular to spinose, never strongly setose, margins never obscured by setae. Larger chela usually with indistinct cutting/crushing tooth or molariform crushing teeth 46

46 Carapace rugose to smooth, margins may be spinular but surfaces of carapace. Chelipeds and legs are never prominently spinose; larger chela with distinct molariform crushing teeth. G2 with terminal part of distal segment gradually tapering to sharp tip. Intertidal crabs ..... **Eriphiidae**

– Carapace, chelipeds and legs covered with numerous sharp spines all over dorsal and lateral surfaces. Larger chela with indistinct cutting/crushing tooth. G2 with terminal part of distal segment of G2 suddenly becoming very slender along terminal section. Subtidal to deep-water crabs ..... **Hypothalassiidae**

47 Male abdominal somites 3 and 4 fused 48

– Male abdominal somites 3–5 fused although sutures may be visible 49

48 Carapace ovate, dorsally prominently convex; anterolateral margin entire with only 1 rounded lateral tooth present. Male abdomen relatively broad. G2 very long, over 1.5 times G1 length, distal segment looping ... . **Carpiliidae**

– Carapace squarish to quadrate, dorsally gently convex to almost flat; anterolatelal margins usually dentate or lobate. Male abdomen triangular. G2 as long as G1, distal segment as long as subdistal segment or shorter .. .. **Mathildellidae**

49 Male genital papilla either exposed or sheathed under a calcified structure between thoracic sternites 7 and 8 50

– Male genital papilla never exposed or sheathed between thoracic sternites 7 and 8 51

50 Male genital papilla exposed between thoracic sternites 7 and 8, not sheathed under any structure. Carapace about twice as broad than long. Male abdominal somite 3 about 0.2 times carapace width ... **Scalopidiidae**

– Male genital papilla sheathed underneath a calcified structure between thoracic sternites 7 and 8. Carapace width about the same as length. Male abdominal somite 3 about 0.3 times carapace width Chasmocarcinidae

51 G2 slender, less than 0.3 times G1 length ..... **Xanthidae**

– G2 longer than 0.3 times G1 length. G1 moderately stout 52

52 Carapace surface with numerous mushroom-shaped tubercles, fusing with each other along edges; tufts of setae at edges of some of fused tubercles. G2 1.5 times length of G1. Free-living species ..... **Dairidae**

– Carapace surface smooth, gently rugose or with granules or small spines, never large tubercles, glabrous or almost so. G2 half length to subequal G1 length. Living amongst branches of scleractinian corals 53

53 Carapace rounded, dorsal surface covered with small granules and spines; anterolateral regions lined with numerous spines and granules. Propodus of chelipeds with prominent round or pointed tubercles along other surface; merus short, with a row of teeth along anterior margin ..... **Domeciidae**

– Carapace trapezoidal or transversely ovate, dorsal surface smooth or faintly rugose at best; anterolateral margin usually entire or with low teeth, never spines. Propodus of cheliped smooth, without tubercles along other surface; merus long to very long, always having a third or more of the length a row of conspicuous teeth along anterior margin ..... **Trapeziidae**

54 Carapace poorly calcified. Maxilliped 3 ischium and merus fused or free. Typically parasitic or commensal on molluscs, echinoderms or corals. 55

– Carapace well calcified; usually squarish or transversely ovate. Maxilliped 3 ischium and merus free. Free living 56

55 Carapace pyriform, subpyriform, triangular, circular, or subcircular; fossae (sockets) for antennulae squarish to longer than broad, antennulae fold longitudinally or almost so. Male and female adults parasitic in

scleractinian corals, forming galls ..... **Cryptochiridae**

– Carapace transversely ovate, squarish or rounded, never pyriform or subpyriform; fossae for antennulae broader than long, antennulae fold transversely or obliquely. Adults free living or as parasites or commensals in molluscs, various phyla of worms, echinoderms or other crustaceans, never with scleractinian corals ..... **Pinnotheridae**

56 Distinct rhomboidal gap between closed maxillipeds 3. Mandibles usually visible when mouthparts closed 57

– No distinct rhomboidal gap between closed maxillipeds 3, if present very small. Mandibles not visible when mouthparts closed 59

57 Carapace distinctly ovate; suborbital crest straight without any granules; pterygostomial region with very thick, soft setae. Pereopods 2–5 with strong fixed chitinous spines on dactyli ..... **Gercarcinidae**

– Carapace subquadrangular to quadrangular; suborbital crest with small granules; pterygostomial region glabrous to moderately setose. Pereopods 2–5 unarmed or with small chitinous spines on dactlyi. 58

58 Merus and ischium of maxilliped 3 without setose oblique ridge. Pterygostomial region sparingly setose, without pattern of reticulated setae ..... **Grapsidae**

– Merus and ischium of maxilliped 3 with distinct oblique setose ridge. Pterygostomial region densely setose, setae arranged in reticulate pattern ..... **Sesarmidae**

59 Front simple, triangular, narrow to very narrow compared to carapace width 60

– Front truncate, multilobate or multidentate, relatively broad compared to transverse carapace 63

60 Carapace rounded, globose; orbits absent; eyes relatively short 61

– Carapace quadrate; orbits long; eyes relatively long 62

61 Chelipeds relatively stout, almost covering entire face. Eyestalk absent ..... **Mictyridae**

– Chelipeds relatively small, not covering entire face. Eyestalk short but present ..... **Dotillidae**

62 Cheliped strongly heterochelus in males (as in *Uca*) or subequal in both sexes (*Ocypode*); dactylar finger with row of teeth along cutting edge, never distinct median or submedian truncate tooth ..... **Ocypodidae**

– Cheliped equal in size; dactylar finger usually with a distinct truncate tooth medially or submedially along cutting edge ..... **Macrophthalmidae**

63 Male abdominal somites 2 and 3 fused, or if suture visible, somites are immovable. G1 strongly bent, forming U-shape ..... **Camptandriidae**

– Male abdominal somites 2 and 3 always movable, never fused. G1 straight. Aquatic to semiterrestrial crabs 64

64 Carapace distinctly subcircular to quadrate in shape, usually longer than wide; frontal margin with deep cleft to receive antennules. Abdominal somites 3–5 or 3–6 fused ..... **Plagusiidae**

– Carapace ovate to quadrangular in shape, usually wider than long; frontal margin without cleft to receive antennules. Abdomen of 6 free somites and telson 65

65 Orbit of eyes totally closed. Maxillipeds 3 closed with almost no gape, with faint sulci on merus and ischium respectively. Subtidal crabs associated with hydrothermal vents ..... **Xenograpsidae**

– Orbit of eyes with lateral opening. Maxillipeds 3 closed with a small gape, with distinct sulci on merus and ischium respectively. Intertidal and subtidal crabs, many freshwater as adults ..... **Varunidae**

Part II. Infraorder Brachyura: Sections Dromiacea, Raninoida, Cyclodorippoida

By

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Section DROMIACEA De Haan, 1833
綿蟹派

Remarks.— Dromiacea includes three superfamilies: Dromioidea, Homoloidea and Homolodromioidea.

Key to superfamilies of Dromiacea

1. Pereopods 4 and 5 both reduced and subdorsal or dorsal, chelate or subchelate ····· 2
- Only pereopod 5 reduced and subchelate or not reduced but similar to pereopods 3 and 4 ···· **Homoloidea**
2. Carapace always longer than wide. Orbits undeveloped. Uropods not visible externally. Maxilliped 3 pediform ····· **Homolodromioidea**
- Carapace longer than wide to wider than long. Orbits well-developed. Uropods visible externally as small flattened plates (rarely absent). Maxilliped 3 operculiform ····· **Dromioidea**

Superfamily DROMIOIDEA De Haan, 1833
綿蟹總科

Diagnosis.— Carapace longer than wide to wider than long. Orbits developed. Pereopod 5 subchelate or simple. Pereopod 4 reduced and subchelate, or similar to pereopod 3. Uropods usually present as dorsal plates. Males with or without vestigial pleopods 3–5.

Remarks.— Dromioidea includes two families, Dromiidae and Dynomenidae, both of which are represented in Taiwan.

Key to families of Dromioidea

1. Pereopods 4 and 5 reduced, subchelate or chelate ····· **Dromiidae**
- Pereopod 5 reduced, subchelate or chelate. Pereopod 4 not reduced, similar to pereopod 3 ·· **Dynomenidae**

Family DROMIIDAE De Haan, 1833
綿蟹科

Dromiacea De Haan, 1833: ix, x.

Diagnosis.— Carapace typically convex and subglobular, ovoid, subcircular, or subpentagonal. Lateral linea present. Orbit, antennular and antennal fossae defined. Maxilliped 3 operculiform. Pereopods 4 and 5 smaller, similar in size, carried subdorsally; chelate, formed by a distal propodal spine and dactylus. Abdomen of both sexes usually of 6 free somites and telson or with somites 5 and 6 fused; males rarely with vestigial pleopods on somites 3–5; somite 1 of females with pair of uniramous pleopods. Abdomen usually with a retaining mechanism, often involving dorsal uropods. Uropods usually present in form of dorsal plates, sometimes intercalated laterally, rarely ventral. Male genital papilla forming a long penial tube. Spermathecal

apertures small and rounded. (After Davie, 2002).

Remarks.— The foundations for contemporary study of the Dromiidae were largely laid through the major revisionary studies by Colin McLay (e.g., McLay, 1993; McLay, 2001a, b; McLay *et al*., 2001) who has uncovered considerable and unexpected generic and specific diversity within the group. Dromiidae currently includes 39 genera and almost 130 species. The high level of diversity within Dromiidae led Guinot & Tavares (2003) to reexamine the dromiid classification in the light of previously used morphological features and new data derived from the thoracic sternum, abdomen and spermathecae. As a result, they divided the dromiids into three subfamilies: Dromiinae, Hypoconchinae and Sphaerodromiinae. The Sphaerodromiinae currently includes *Sphaerodromia*, *Eodromia*, and tentatively *Frodromia* (see Ng *et al*., 2008), and is believed to include the least 'derived' of the sponge crabs (McLay, 1993; Guinot & Tavares, 2003). Hypoconchinae includes only *Hypoconcha*, which has long been recognized to be unusual in Dromiidae, particularly on the basis of the structure of the carapace and pereopods 4 and 5 (McLay, 1993). Dromiinae includes the remaining (and majority of) dromiid genera. The subfamilial classification appears to accord well with previous models although McLay *et al*. (2001) suggested that *Conchoecetes* and *Hypoconcha* (now divided between Dromiinae and Hypoconchinae, respectively) are closely related based on similar adult and larval characters, perhaps warranting removal to a separate family. This will need further work to justify.

The Dromiidae currently includes 39 genera of which seven are represented in Taiwan. Most belong to the Dromiinae, but one genus of the Sphaerodromiinae is represented (*Sphaerodromia*). The subfamilies can be difficult to distinguish without careful examination of the thoracic sternum and reproductive structures. Therefore, for convenience, the following key distinguishes all dromiid genera from Taiwan based on carapace and pereopod characters without reference to subfamilial distinctions. The taxonomic arrangement of genera and species below, however, follows the subfamily classification of Guinot & Tavares (2003) and Ng *et al*. (2008).

Key to genera of Dromiidae from Taiwan

1. Carapace surface almost flattened, subpentagonal. Pereopod 4 dactylus large, talon-like, used for carrying bivalve shell ..... ***Conchoecetes***
- Carapace surface clearly convex, variously shaped. Pereopod 4 dactylus small, not talon-like, occluding with one or more propodal spines 2
2. Pereopod 4 dactylus opposed by 3–5 distal propodal spines ..... ***Sphaerodromia***
- Pereopod 4 dactylus opposed by 1 distal propodal spine 3
3. Carapace surface smooth or very sparely granular beneath tomentum 4
- Carapace surface densely granular or tuberculate beneath tomentum 6
4. Abdomen with somites 5 and 6 fused (suture visible, but somites immovable) ..... ***Lauridromia***
- Abdomen with all somites freely movable 5
5. Cheliped and pereopods 2 and 3 tuberculate, lobed or nodular. Cheliped usually without epipod ..... ***Cryptodromia***
- Cheliped and pereopods 2 and 3 smooth. Cheliped with epipod ..... ***Dromia***
6. Merus of cheliped and pereopods 2 and 3 petaloid ..... ***Petalomera***
- Merus of cheliped and pereopods 2 and 3 tuberculate and granulate, not petaloid 7
7. Carapace anterolateral teeth well-developed, with tubercles and small spines ..... ***Takedromia***
- Carapace anterolateral teeth present or absent, with rounded granules but no spines ..... ***Epigodromia***

Subfamily DROMIINAE De Haan, 1833
綿蟹亞科

Dromiacea De Haan, 1833: ix, x.
Conchoecetini Števčić, 2005: 21
Stebbingdromiini Števčić, 2005: 20.

Diagnosis.— Male pereopod 5 coxa unmodified, with long articulated, sclerotized tube containing genital papilla. Pereopods 2 and 3 propodi short or long, usually without distal spine; dactylus flexor margin armed or unarmed. Female sternal sutures 7/8 short or long; spermathecal aperture reaching beyond gonopore on pereopod 3. G2 exopod absent.

Remarks.— The Dromiinae includes 36 of the 39 dromiid genera of which seven are represented in Taiwanese waters.

Genus *Conchoecetes* Stimpson, 1858
居殼蟹屬

Conchoecetes Stimpson, 1858: 226 [type species: *Dromia artificiosa* Fabricius, 1798, by monotypy. Gender: masculine].

Diagnosis.— Carapace as wide as or slightly wider than long; flattened, subpentagonal, sometimes partly membranous; cervical and branchial grooves distinct; surface granular, with fine tomentum; front narrow, tridentate, median rostral tooth lower than lateral teeth; anterolateral margin long, unarmed or with small teeth; posterolateral margin with or without tooth. Maxilliped 3 coxae closely together. Chelipeds granular; with epipod. Pereopods 2 and 3 dactyli with 20–30 minute spines; propodi without distal spine. Pereopod 4 larger than pereopod 5; dactyl enlarged, talon-like, occluding with stout proximal propodal extension; used for carrying bivalve shell. Pereopod 5 small; segments flattened, dactyl small simple, upturned; propodus without distal spine occluding with dactylus. Abdomen of 6 free somites and telson. Uropod plates well-developed, visible externally; forming abdominal holding mechanism by locking against strong prominence on pereopod 2 coxae.

Remarks.— Species of *Conchoectes*, like *Hypoconcha*, are unusual in the Dromiidae for their choice of camouflage — bivalve shells rather than the more usual sponge or ascidian cap (see Guinot *et al*., 1995). Two of three species of *Conchocoetes* are known from Taiwan.

Key to species of *Conchoecetes*

1. Carapace with distinct lateral tooth at the junction of the antero- and posterolateral margins. Disto-extensor angle of merus and carpus of pereopod 4 gently produced, but not forming rounded, prominent bump ····· ····· ***C. artificiosus***
- Carapace margins without teeth. Disto-extensor angle of merus and carpus of pereopod 4 markedly produced, callous-like ····· ***C. intermedius***

Conchoecetes artificiosus (Fabricius, 1798)
幹練居殼蟹

Fig. 6. Male, Anping fishing port, Tainan County, Apr 1998.

Fig. 7. Male, Anping fishing port, Tainan County, Apr 1998, carrying a bivalve shell.

Dromia artificiosa Fabricius, 1798: 360 [type locality: Indian Ocean].

Conchoecetes artificiosus.— Chang, 1963: 1, 6, 7, pl. 1 fig. 1.— Ng, Chan & Wang, 2000: 156–157, fig. 1a.— Ng, Wang, Ho & Shih, 2001: 5.— Shen & Jeng, 2005: 17.

Material examined.— Dasi fishing port, Yilan Country, 21 Jul 2005: 1 ovigerous female (cw 27.1 mm, cl 25.7 mm) (NTOU). Anping fishing port, Tainan County, Apr 1998: 1 male (cw 22.9 mm, cl 21.9 mm) (NTOU). Taitung County, 15 Jul 1962: 1 dried specimen (TMCD 255).

Diagnosis.— Carapace with distinct lateral tooth at junction of antero- and posterolateral margins, clearly demarcated from anterolateral margin by distinct notch. Cheliped fingers pink in life. Disto-extensor angly of merus and carpus of pereopod 4 gently produced, but not forming rounded, prominent bump.

Size.— Males to cw 22.9 mm, cl 21.9 mm; females to cw 27.1 mm, cl 25.7 mm (present record).

Colouration.— Carapace surface white with fine brownish tomentum. Cheliped fingers pink on distal one-third to two-thirds.

Habitat.— Muddy or sandy substrates; 30–150 m.

Distribution.— Western Indian Ocean to Australia, Thailand, China, Taiwan and Japan.

Remarks.— *Conchoecetes artificiosus* is unique in the genus for its distinct anterolateral tooth at the junction of the antero- and posterolateral margins, although this is difficult to observe unless the tomentum is removed.

Fig. 8. Male (cw 22.9 mm, cl 21.9 mm), Anping fishing port, Tainan County, Apr 1998: **a,** carapace; **b,** merus and carpus of pereopod 4. Scales: a = 10 mm, b = 2 mm.

Conchoecetes intermedius Lewinsohn, 1984
中型居殼蟹

Fig. 9. Male, Donggang fishing port, Pingtung County, 11 Dec 1984.

Conchoecetes intermedius Lewinsohn, 1984: 119, fig 4 [type locality: Nosy Komba, Madagascar, 13°28'S, 48°21'E, 10 m].— Ng, Chan & Wang, 2000: 157–159, fig. 1c.— Ng, Wang, Ho & Shih, 2001: 5.— Chen & Sun, 2002: 37, 100–102, map 2, fig. 40, pl. V: fig. 1.— Shen & Jeng, 2005: 18.

Conchoecetes canaliculatus Yang & Dai, 1994: 127, 145, fig. 3 [type locality: South China Sea].

Material examined.— Donggang fishing port, Pingtung County, 11 Dec 1984: 1 male (cw 40.0 mm, cl 38.9 mm) (NTOU).

Diagnosis.— Carapace without anterolateral teeth; short supraorbital tooth present. Cheliped fingers light brown in life. Disto-extensor angle of merus and carpus of pereopod 4 markedly produced, callous-like.

Size.— Males to cw 40.4 mm, cl 40.0 mm; females to cw 33.0 mm, cl 33.0 mm (Chen & Sun, 2002).

Colouration.— Red-brown with brown tomentum. Cheliped finger tips light brown.

Habitat.— Not known; shallow water to at least 25 m.

Distribution.— Madagascar to Thailand, Singapore, the South China Sea and Taiwan.

Remarks.— The evenly rounded, rather than toothed carapace margins readily distinguish *C. intermedius* from its only known Taiwanese congener, *C. artificiosus*. *Conchoecetes intermedius* is rare in Taiwan, though it can reach almost twice the size of *C. artificiosus*. Shen & Jeng (2005) figured a specimen carrying a bivalve shell. Yang & Dai (1994) described *Conchoecetes canaliculatus* from the South China Sea, but Ng *et al*. (2000), via a detailed comparative discussion, demonstrated it to be a junior synonym of *C. intermedius*.

Fig. 10. Male (cw 40.0 mm, cl 38.9 mm), Donggang fishing port, Pingtung County, 11 Dec 1984: **a,** carapace; **b,** merus and carpus of pereopod 4. Scales: a = 10 mm, b = 2 mm.

Genus *Cryptodromia* Stimpson, 1858
隱綿蟹屬

Cryptodromia Stimpson, 1858: 64, 225 [type species: *Cryptodromia coronata* Stimpson, 1858, by original designation. Gender: feminine].

Dromioides Borradaile, 1903: 299 [type species: *Cryptodromia hilgendorfi* de Man, 1888, by monotypy. Gender: masculine].

Diagnosis.— Carapace as wide or wider than long; surface smooth or very sparsely granular, convex. Rostrum tridendate. Supraorbital tooth small, blunt; usually with small, blunt outer orbital tooth, and well-developed suborbital tooth. Maxilliped 3 coxae usually separated by gap. Female sternal grooves end apart on small tubercles between or behind pereopod 2 coxae. Cheliped rarely with epipod. Pereopods 2 and 3 with carpus and propodus lobed or nodular; dactyli with up to 6 spines on flexor margin. Pereopods 4 and 5 reduced; with 1 spine on propodus opposing dactylus and up to 2 spines on extensor margin. Pereopod 5 dactyl without spine on extensor margin. Abdomen of 6 free somites and telson. Uropods well-developed, visible externally. Abdominal locking mechanism formed by flange on pereopod 2 coxae fitting against uropod plates.

Remarks.— Four species of *Cryptodromia* sensu stricto have been reported from Taiwanese waters, but two of these, *C. fallax* Stimpson, 1858, and *C. tumida* Stimpson, 1858, are possibly misidentifications of *C. tuberculata*. Of the 22 known species of *Cryptodromia* (see Ng *et al*., 2008), only two are reliably known from Taiwan.

Key to species of *Cryptodromia* from Taiwan

1. Median rostral tooth more prominent than lateral teeth ····· ***C. tuberculata***
- Median rostral tooth less prominent than lateral teeth ····· ***C. fukuii***

Cryptodromia fukuii (Sakai, 1936)
福井隱綿蟹

Fig. 11. Male, Magang, Taipei Country, 13 Jul 1999, preserved specimen.

Petalomera fukuii Sakai, 1936: 31, fig. 8a–c, pl. 1: 2 [type locality: Shimoda, Sagami Bay, Japan].— Jeng, Chan, Fung, Tzeng & Yang, 1994: 97.— Jeng, Chan, Fung, Tzeng & Yang, 1996: 99 — Yu, Jeng, Chan, Ho & Shy, 1996: 12.— Jeng, 1997: 15.— Jeng, Shao, Fung, Tzeng & Wu, 1998: 121.

Cryptodromia fukuii.— McLay, 1993: 201–203, fig. 17c.— Ng, Wang, Ho & Shih, 2001: 5.

Material examined.— Magang, Taipei County, 13 Jul 1999: 2 males (cw 10.9 mm, cl 9.1 mm; cw 8.8 mm, cl 8.0 mm) (NMNS 003192-00073).

Diagnosis.— Carapace distinctly wider than long; surface smooth, covered with fine tomentum; lateral cardiac grooves deeply marked; with 4 unequal anterolateral teeth, last tooth smallest. Rostral teeth blunt; lateral teeth more prominent than median. Supraorbital tooth present. Cheliped with epipod; outer surface of palm minutely denticulate. Pereopods 2 and 3 with lobed carpi and propodi. Abdominal somites 4 and 5 with tubercle near posterior margin.

Size.— Males to cw 15 mm, females to cw 14.6 mm (McLay, 1993).

Colouration.— Overall drab brown. Cheliped fingers orange-brown.

Habitat.— Low intertidal to shallow subtidal rocky shores.

Distribution.— Japan, New Caledonia and Taiwan.

Remarks.— *Cryptodromia fukuii* is one of the few species of the genus with an epipod on the cheliped. The species is known to carry sponges and compound ascidians on the carapace (McLay, 1993).

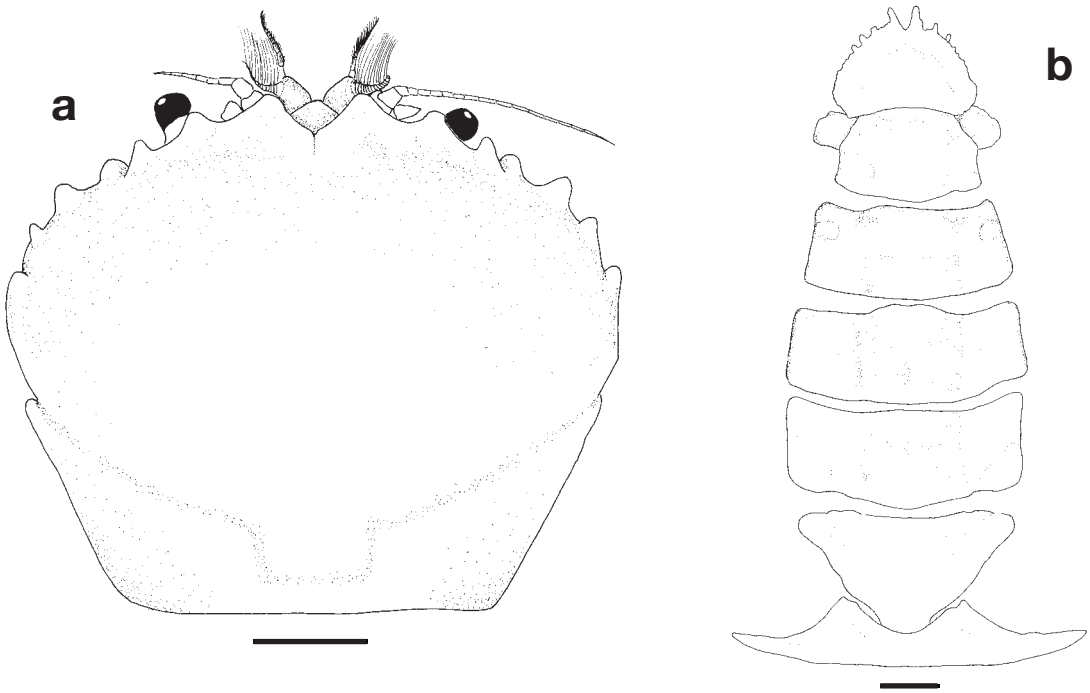


Fig. 12. Male (cw 10.9 mm, cl 9.1 mm), Magang, Taipei County, 13 Jul 1999: **a,** carapace; **b,** abdomen and telson. Scales: a = 2 mm, b = 1 mm.

Cryptodromia tuberculata Stimpson, 1858
瘤狀隱綿蟹

Fig. 13. Male, Lyudao, Taitung County, 27 Apr 2005, preserved specimen. (After Yeh, Hong & Hsueh, 2006)

Cryptodromia tuberculata Stimpson, 1858: [type locality: Kikai-shima, Amami Group, Japan].— McLay, 2001b: 838–840.— Yeh, Hong & Hsueh, 2006: 70, fig. 1A–B.

Cryptodromia fallax? — Ng, Chan & Wang, 2000: 159, fig. 1d. [Not *C. fallax* Stimpson, 1858].

Cryptodromia tumida? — Ng, Wang, Ho & Shih, 2001: 5.— McLay, Jeng & Chan, 2001: 965.— McLay, 2001b: 840 [Taiwanese specimen only]. [Not *C. tumida* Stimpson, 1858].

Material examined.— Yong-an, Kaohsiung County, no date: 1 male (cw 8.0 mm, cl 6.8 mm) (TMCD 2810). Jihuei (= Gi-huei), Taitung County, 25 Jan 2000: 1 male (cw 10.4 mm, cl 8.3 mm) (NMNS 4873-02). Lyudao, Taitung County, 27 Apr 2005: 1 male (cw 9.8 mm, cl 8.3 mm) (NMNS 4873-01).

Diagnosis.— Carapace wider than long; surface smooth, covered with fine tomentum; branchial grooves faint, branchiocardiac grooves distinct; with 4 anterolateral teeth, first 2 or 3 largest. Rostral teeth blunt, median tooth more prominent than lateral teeth. Supraorbital tooth present. Cheliped strongly tuberculate; outer and upper surface of palm with 20–25 blunt conical tubercles. Pereopods 2 and 3 carpi and propodi sharply verrucose; dactyli with 4 small flexor spines. Abdominal somites 3–5 with 4 tubercles along posterior margin; telson posterior margin subtruncate, concave.

Size.— Males to cw 13.0 mm, cl 11.0 mm; females to cw 9.2 mm, cl 9.0 mm (McLay, 2001b).

Colouration.— Overall dull tan-brown. Cheliped fingers reddish-pink with white tips and occlusal margins.

Habitat.— Under stones and boulders on intertidal rocky and coral reefs to 20 m depth (McLay, 2001b).

Distribution.— Western Australia to Indonesia, Philippines, Taiwan and Japan.

Remarks.— Yeh *et al*. (2006) were the first to recognize *C*. *tuberculata* from Taiwan on the basis of specimens from coral reef tide pools at Lyudao and Jihuei, Taitung County. The taxonomy of *C*. *tuberculata* and its supposed synonymy with *C*. *pileifera* Alcock, 1901, was elaborated on by McLay & Ng (2005). Previous records of *C*. *fallax* and *C*. *tumida*, based on the small male reported here (cw 8.0 mm, cl 6.8 mm, TMCD 2810) by Ng *et al*. (2000, 2001), McLay *et al*. (2001) and McLay (2001b), may be *C*. *tuberculata*. The prominent median rostral tooth and tuberculate pereopods as figured by Ng *et al*. (2000: fig. 1d) are consistent with *C*. *tuberculata* (C. McLay, pers. com.), but it appears to differ somewhat in the form of the anterolateral carapace teeth. The single male specimen reported by Ng *et al*. (2000, 2001) could not be re-examined at the time of this study. It was returned to the Taiwan Museum in 2003 (C.H. Wang, pers. comm.) but the specimen could not be located, possibly because the collection was being reorganized. Until the specimen can be located, we tentatively place it under *C*. *tuberculata*.

As with many other species of *Cryptodromia*, *C*. *tuberculata* is known to camouflage itself with sponge and compound ascidians.

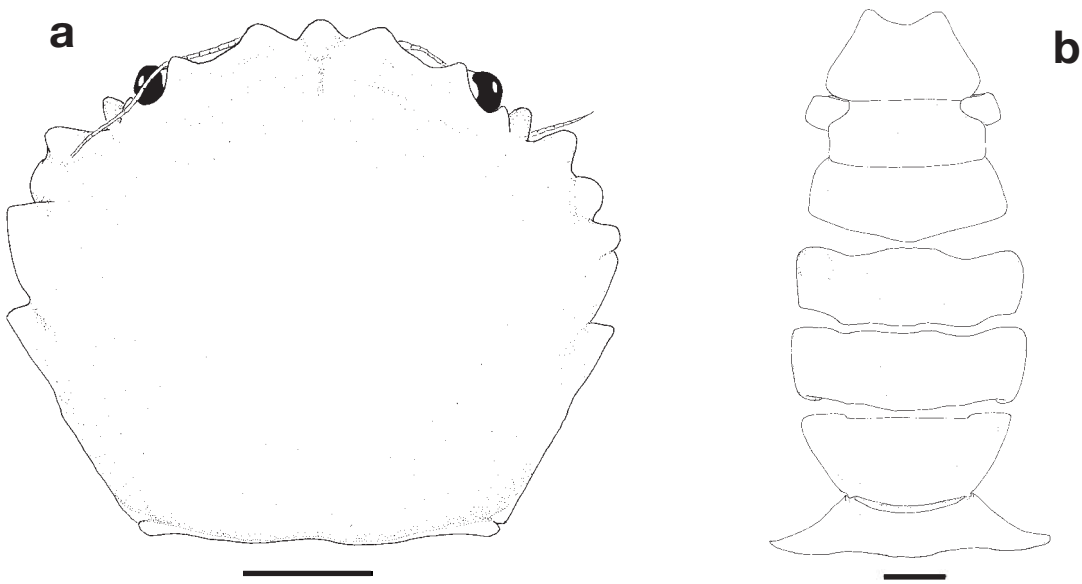


Fig. 14. Male (cw 9.8 mm, cl 8.3 mm), Jihuei, Taitung County, 25 Jan 2000: **a,** carapace; **b,** abdomen and telson. Scales: a = 2 mm, b = 1 mm.

Genus *Dromia* Weber, 1795
綿蟹屬

Dromia Weber, 1795: 92 [type species: *Cancer personata* Linnaeus, 1758, by designation of the International Commision of Zoological Nomenclature (1964, opinion 688). Gender: feminine].

Diagnosis.— Carapace wider than long, dorsally smooth or slightly sculptured. Rostrum tridentate, lateral teeth rounded. Maxilliped 3 coxae closely approximated or separated by wide gap. Cheliped with epipod. Pereopods 2–5 smooth. Pereopod 4 propodus with 1 spine opposing dactylus, extensor margin unarmed. Pereopod 5 shorter than pereopod 2; propodus with 1 or 2 spines opposing dactylus and with or without spine on outer margin; with or without spine on extensor margin of dactylus. Female sternal grooves ending apart or together between or behind cheliped coxae. Abdomen of 6 free somites and telson; uropods well-developed, visible externally. Abdominal locking mechanism formed by serrated flange on pereopod 2 coxae fitting against uropod plates.

Remarks.— Two of eight recognized species of *Dromia* are known from Taiwan.

Key to species of *Dromia* from Taiwan

1. Anterolateral margin with 5 teeth, third tooth very small and close to second tooth, none directed upward, last tooth directed anteriorly. Carapace tomentum even, uniform ····· ***D. dormia***
- Anterolateral margin with 4 teeth, 3 directed dorsally. Carapace tomentum wavy, undulating ··· ***D. wilsoni***

Dromia dormia (Linnaeus, 1763)
真綿蟹

Fig. 15. Male, Hepingdao fishing port, Keelung, May 1995.

Fig. 16. Male, Hepingdao fishing port, Keelung.

Cancer dormia Linnaeus, 1763: 413 [type locality: not known].

Cancer dormitator Herbst, 1790: 250, pl. 18: 103 [type locality: India].

Dromia rumphii Weber, 1795: 92 [type locality: not known].

Dromia hirsutissima Dana, 1852: 403 [type localities: Hawaii and Cape of Good Hope, South Africa].

Dromia dormia.— Ng, 1998: 1087.— Ng, Chan & Wang, 2000: 159–160, fig. 2a.— Ng, Wang, Ho & Shih, 2001: 5.

Dromidiopsis dormia.— Shen & Jeng, 2005: 19.

Material examined.— Longdong, Taipei County, May 1999: 1 male (cw 109.8 mm, cl 88.6 mm), 3 females (cw 102.1 mm, cl 86.3 mm – cw 148.3 mm, cl 120.7 mm) (NTOU). Hepingdao fishing port, Keelung City, Oct 1998: 1 male (cw 129.4 mm, cl 117.2 mm) (NTOU). Keelung City, 8 Mar 1986: 1 male (cw 117.9 mm, cl 94.0 mm) (NTOU). Dasi fishing port, Yilan County, 28 Jun 1995: 1 male (cw 53.7 mm, cl 46.8 mm) (NTOU).

Diagnosis.— Carapace tomentum short, uniform, velvety; median rostral tooth large, extending beyond lateral teeth; supraorbital tooth absent; anterolateral margin with 5 teeth, first tooth the largest, third tooth very small and close to second tooth; last tooth narrowed, directed anteriorly. Pereopods 2 and 3 dactyli with 4 or 5 flexor spines. Pereopod 4 dactylus opposed by 1 distal propodal spine. Pereopod 5 dactylus opposed by 2 distal propodal spines; propodal extensor margin with spine.

Size.— Males to cw 200 mm, cl 160 mm; females to cw 172 mm, cl 136.5 mm (McLay, 1993).

Colouration.— Dark drab brown. Tips of cheliped fingers white.

Habitat.— Coral and rocky substrates; 8–112 m (McLay, 2001a).

Distribution.— Western Indian Ocean to Indonesia, New Caledonia, Philippines, China, Japan, Taiwan, French Polynesia and Hawaii.

Remarks.— *Dromia dormia* is the largest dromiid in Taiwanese waters and, apart from maximum adult size (cw 200 mm versus 61 mm), is immediately distinguished from the smaller *D. wilsoni* by its even rather than wavy and undulating carapace tomentum. McLay (2001a) reported *D. dormia* from French Polynesia carrying the sponge *Hyattella* sp., though two specimens from Hawaii were observed to carry a piece of hollowed wood and a shoe sole, respectively (Edmondson, 1946). *Dromia dormia* is eaten in some areas (Ng, 1998) but is not normally considered edible and has been referred to as the "poison crab" by some fishermen (Dai & Yang, 1991). There is a report from the Philippines that it may be poisonous, but more biochemical tests are needed to confirm this.

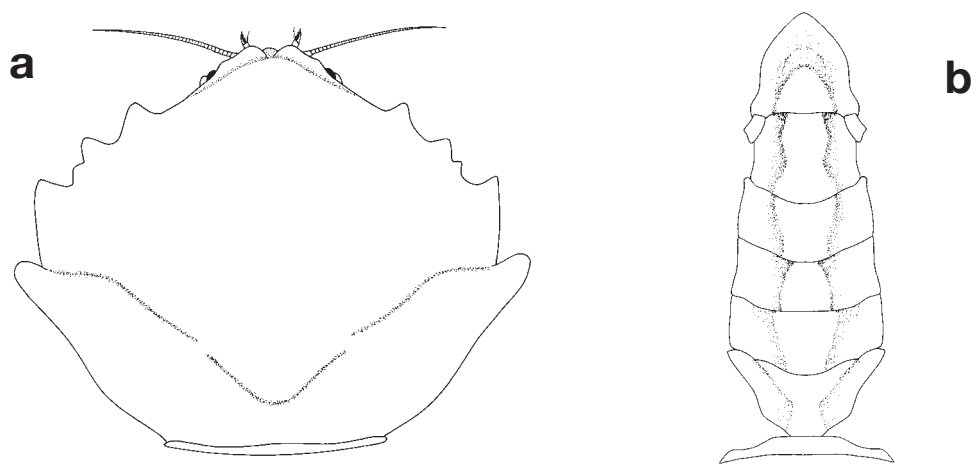


Fig. 17. Male (cw 109.8 mm, cl 88.6 mm), Longdong fishing port, Taipei County, May 1999: **a,** carapace; **b,** abdomen and telson. Scales = 10 mm.

Dromia wilsoni (Fulton & Grant, 1902)
威氏綿蟹

Fig. 18. Female, Dasi fishing port, Yilan County, 30 Feb 1998, preserved specimen.

Cryptodromia wilsoni Fulton & Grant, 1902: 61, pl. 9 [type locality: Port Phillip Heads, Victoria, Australia].
Dromia wilsoni.— Ng, Chan & Wang, 2000: 160, fig. 2b.— Ng, Wang, Ho & Shih, 2001: 5.

Material examined.— Dasi fishing port, Yilan County, 30 Feb 1998: 1 female (cw 40.2 mm, cl 29.0 mm) (NTOU).

Diagnosis.— Carapace tomentum wavy, undulating; median rostral tooth small, not extending beyond lateral teeth; supraorbital tooth blunt; anterolateral margin with 4 teeth, 3 directed dorsally. Pereopods 4 and 5 dactylus opposed by 1 distal propodal spine. Pereopod 5 propodal extensor margin without spine.

Size.— Males to cw 61.0 mm, females to cw 49.1 mm (McLay, 1993).

Colouration.— Dull red-brown. Tips of cheliped fingers white.

Habitat.— Low intertidal zone amongst boulders and encrusting organisms to 520 m (McLay, 1988; Davie, 2002).

Distribution.— St Helena Island (South Atlantic Ocean), South Africa, New Zealand, Australia, Philippines, French Polynesia, Hawaii, Japan, and Taiwan.

Remarks.— *Dromia wilsoni* is recognized as aberrant among species currently placed in *Dromia* (see McLay, 1993; McLay *et al*., 2001; McLay & Ng, 2005). Most significantly, the larvae of *D. wilsoni* differ markedly from those of other *Dromia*. As an adult, *Dromia wilsoni*, differs from other *Dromia* species in the presence of three small spines on the flexor margin of the pereopod 3 dactyl (absent in other species), the

presence in males of vestigial pleopods on the abdominal somites 3–5, and the wavy or undulating rather than even carapace tomentum. The vestigial pleopods and small flexor dactyl spines on pereopod 3 are probably plesiomorphic and the differences in carapace tomentum and pereopod dactyl spination are not particularly significant in comparison to other dromiid genera (McLay, 1993; McLay *et al*., 2001). Similarly, the larval differences might also reflect retention of plesiomorphies. As indicated by McLay *et al*. (2001), the generic position of *D. wilsoni* is not straightforward and it probably belongs to a separate genus. This matter is now the subject of ongoing studies by D. Guinot as well as C. Mclay (pers. comm.).

Dromia wilsoni has the distinction of being the most widespread dromiid crab, occurring in the south Atlantic Ocean and ranging throughout the Indo-West Pacific region.

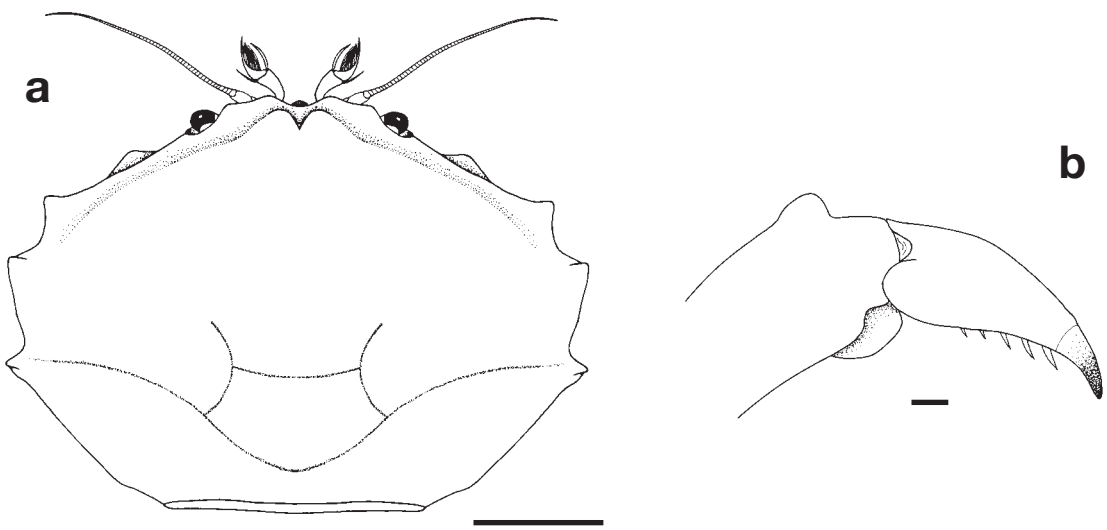


Fig. 19. Female (cw 40.2 mm, cl 29.0 mm), Dasi fishing port, Yilan County, 30 Feb 1998: **a,** carapace; **b,** dactylus and distal part of propodus of right pereopod 4. Scales: a = 10 mm, b = 1 mm.

Genus *Epigodromia* McLay, 1993
裔綿蟹屬

Epidromia Kossmann, 1878: 256 [type species: *Epidromia granulata* Kossmann, 1878. Gender: feminine]. [Preoccupied by *Epidromia* Gueneé, 1852 (Lepidoptera)].

Epigodromia McLay, 1993: 216 [type species: *Epidromia granulata* Kossmann, 1878, by original designation. Gender: feminine]. [Replacement name for *Epidromia* Kossmann, 1878, preoccupied].

Diagnosis.— Carapace wider than long or longer than wide; dorsal outline irregularly subcircular to polygonal; surface convex, granular, usually areolate. Rostrum tridentate, projecting. Postorbital tooth absent. Anterolateral teeth usually broad, granulated lobes or absent. Maxilliped 3 coxae separated by gap. Sternal grooves ending apart on small tubercles between pereopod 2 coxae. Cheliped with or without epipod. Pereopods 2 and 3 tuberculate, granular; dactyli with up to 7 flexor spines. Pereopods 4 and 5 much reduced, about as long as pereopod 3 ischiomerus; dactyli occluding with single propodal spine. Abdomen of 6 free somites and telson; uropod plates well-developed. Abdominal locking mechanism formed by serrated flange on pereopods 2 and 3 coxae fitting against uropod plates.

Remarks.— As with *Takedromia*, species of *Epigodromia* are not yet known to carry camouflage. The minute pereopods 4 and 5 appear to be too small to be effectively hold carry a camouflage cap. One of 10 species of *Epigodromia* is known from Taiwan.

Epigodromia acutidens (Sakai, 1983)
銳齒裔綿蟹

Fig. 20. Male, Dasi fishing port, Yilan County, 10 Mar 2001.

Petalomera acutidens Sakai, 1983: 3, pl.1: fig. 2 [type locality: mouth of Ise Bay, Wagu, Japan].

Material examined.— Dasi fishing port, Yilan County, 10 Mar 2001: 1 male (cw 18.3 mm, cl 16.0 mm) (NTOU).

Diagnosis.— Carapace wider than long, convex, areolate, covered with blunt granulated nodules; gastric region with pair of uright granulated tubercles; rostrum tridentate, lateral teeth broadly triangular with rounded apices, median tooth on lower plane than laterals, shorter; anterolateral margin with 5 or 6 pointed, granular teeth. Cheliped and pereopods 2–5 covered with rounded tubercles. Pereopods 2 and 3 dactyli with 5 or 6 small spines on flexor margin. Abdominal somite 4 with pair of prominent nodules.

Size.— To cw 24.5 mm, cl 21.5 mm (Sakai, 1983).

Colouration.— Overall mottled red-brown and cream. Cheliped fingers and pereopods 2 and 3 carpi cream on distal third.

Habitat.— Specific habitat not known, but recorded to a depth of 60 m (Marumura & Kosaka, 2003: 20).

Distribution.— Japan and Taiwan.

Remarks.— The present specimen represents the first record of *E. acutidens* from Taiwan, and only the third record of the species. *Epigodromia acutidens* has otherwise been recorded only from two Japanese localities: Ise Bay (type locality) and Wakayama Prefecture at 60 m depth (Marumura & Kosaka, 2003). As observed by Sakai (1983), *E. acutidens* is most similar to *E. nodosa* (Sakai, 1936), differing in having sharp

instead of obtuse anterolateral teeth.

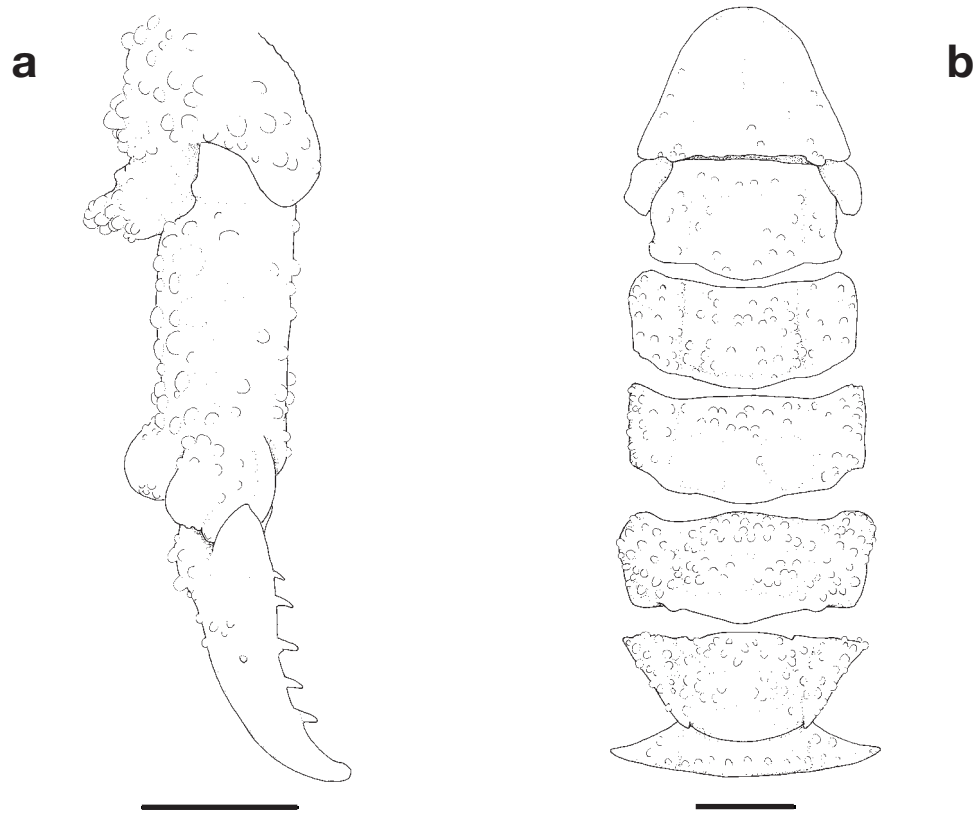


Fig. 21. Male (cw 18.3 mm, cl 16.0 mm), Dasi fishing port, Yilan County, 30 Jan 1998: **a,** left pereopod 2 distal segments; **b,** abdomen and telson. Scales = 2 mm.

Genus *Lauridromia* McLay, 1993
勞綿蟹屬

Lauridromia McLay, 1993: 145 [type species: *Dromia intermedia* Laurie, 1906, by original designation. Gender: feminine].

Diagnosis.— Carapace about as wide as long; covered by short, coarse tomentum and longer, shaggy setae on anterior branchial regions and along lateral margins. Rostral and anterolateral teeth well developed. Cheliped with epipod. Pereopods 2–5 smooth. Pereopod 4 propodus with 1 spine opposing dactylus, with spines on outer margin; dactylus inner and outer margins unarmed. Pereopod 5 shorter than pereopod 3; propodus with 1 or 2 spines opposing dactylus and 3 spines on extensor margin; dactylus extensor margin unarmed or with 1 spine. Female sternal grooves end apart on well-developed tubes behind chelipeds. Uropods visible externally. Abdominal locking mechanism formed by serrated flange on pereopods 2 and 3 (sometimes pereopod 1) coxae fitting against lateral margins of abdomen. Abdominal somites 5 and 6 fused but with suture visible.

Remarks.— *Lauridromia* McLay, 1993, was originally established for three species, *L. intermedia* (Laurie, 1906) (type species), *L. dehaani* (Rathbun, 1923) and *L. indica* (Gray, 1831) (see also McLay & Ng, 2005). *Lauridromia indica* differs from *L. intermedia* and *L. dehaani* mainly in having fully rather than partially fused abdominal somites 5 and 6, and well separated rather than closely placed sternal sutures 7/8. These characters correspond more closely to *Dromidiopsis* Borradaile, 1900, and in a brief comment, *L. indica* was transferred there by Ng *et al*. (2008). Both species of *Lauridromia* sensu stricto are known from Taiwan.

Key to species of *Lauridromia*

1. Carapace distinctly wider than long, last anterolateral tooth directed laterally; median rostral tooth visible dorsally. Pereopods 2 and 3 dactyli with 16–20 minute spines on flexor margins. Pereopod 5 propodus and dactylus without spines on extensor margins ····· ***L. dehaani***
- Carapace about as wide as long, last anterolateral tooth directed obliquely forward; median rostral tooth very small, not visible dorsally. Pereopods 2 and 3 dactyli with 5–8 minute spines on flexor margins. Pereopod 5 propodus with 2 or 3 spines on extensor margin; dactylus with 1 spine on extensor margin ·· ***L. intermedia***

Lauridromia dehaani (Rathbun, 1923)
漢氏勞綿蟹

Fig. 22. Female, Donggang fishing port, Pingtung County, 18 Jun 2004.

Fig. 23. Female, Hepingdao fishing port, Keelung.

Dromia dehaani Rathbun, 1923: 68 [type locality: Japan].— Chang, 1963: 1, 7, pl. 1: fig 2.— Dai, Yang, Song & Chen, 1986: 14, pl. 1:1, fig. 4.1.— Dai & Yang, 1991: 17, pl. 1:1, fig. 4.1.— Huang, 1994: 576.

Lauridromia dehaani.— Ng, 1998: 1088.— Ng, Chan & Wang, 2000: 160, fig. 2c.— Ng, Wang, Ho & Shih, 2001: 6, 53.— McLay & Ng, 2005: 15.— Shen & Jeng, 2005: 20.

Material examined.— Longdong, Taipei County, May 1999: 1 male (cw 76.1 mm, cl 62.8 mm), 1 female (cw 83.9 mm, cl 70.2 mm) (NTOU). Hepingdao fishing port, Keelung City, 6 Mar 1992: 1 female (cw 71.6 mm, cl 61.2 mm) (NTOU).— 5 Apr 2001: 1 male (cw 33.5 mm, cl 30.4 mm) (NTOU). Pengjiayu, Keelung City, 23 May 1990: 1 ovigerous female (cw 80.1 mm, cl 65.3 mm) (NTOU). Dasi fishing port, Yilan County, 4 Oct 1984: 1 male (cw 88.1 mm, cl 81.4 mm), 2 ovigerous females (cw 63.6 mm, cl 62.0 mm; cw 78.7 mm, cl 77.7 mm) (NTOU).— 13 Nov 1985: 1 ovigerous female (cw 84.9 mm, cw 75.1 mm) (NTOU). Gengfang fishing port, Yilan County, 8 Nov 1991: 1 female (cw 83.8 mm, cl 71.1 mm) (NTOU). Nanfang-ao fishing port, Yilan County, no date: 1 female (cw 72.7 mm, cl 63.3 mm) (ZRC). Gushan fishing port, Kaohsiung City, 2 Dec 1995: 1 male (cw 87.0 mm, cl 77.9 mm) (NTOU). Ezailiao, Kaohsiung County, 12 Jan 2001: 1 male (broken) (NTOU). Matsu, Lienchiang County, Aug 2000: 1 female (cw 27.3 mm, cl 25.1 mm) (NTOU). No specific locality: 2 males (cw 78.1 mm, cl 70.1 mm; cw 86.3 mm, cl 74.5 mm) (NTOU).— 1 male (cw 10.7 mm, cl 9.8 mm) (NTOU).— 13 May 1997: 1 female (cw 69.5 mm, cl 58.3 mm) (NTOU).

Diagnosis.— Carapace distinctly wider than long; median rostral tooth visible dorsally. Anterolateral margin with first 4 teeth acute, equally spaced, last tooth directed tooth directed laterally or slightly anterolaterally. Pereopods 2 and 3 dactyli with 16–20 minute spines on flexor margins. Pereopods 4 and 5 dactyli opposed by 1 strong distal propodal spine; extensor margins of propodi and dactyli unarmed.

Size.— Males to cw 100.3 mm, cl 91.2 mm (Chen & Sun, 2002); females to cw 84.9 mm, cl 75.1 mm.

Colouration.— Dark drab red-brown. Tips of cheliped fingers deep pink.

Habitat.— Muddy or sandy-mud substrates; 8–150 m (Dai & Yang, 1991).

Distribution.— Gulf of Aden, Sala-y-Gomez, India, Indonesia to China, Taiwan and Japan.

Remarks.— *Lauridromia dehaani* and *Dromia dormia* are the two largest dromiids in Taiwanese waters. They are superficially similar and can be mistaken for each other. *Lauridromia dehaani* is readily distinguished from *D. dormia*, however, by the shaggy rather than short, velvety tomentum, four instead of five anterolateral carapace teeth, 16 or more versus 4 or 5 spines on the flexor margins of the pereopods 2 and 3 dactyli, and the fused rather than free abdominal somites 5 and 6. In addition, the tips of the fingers are pink in *L. dehaani* but white in *Dromia dormia*.

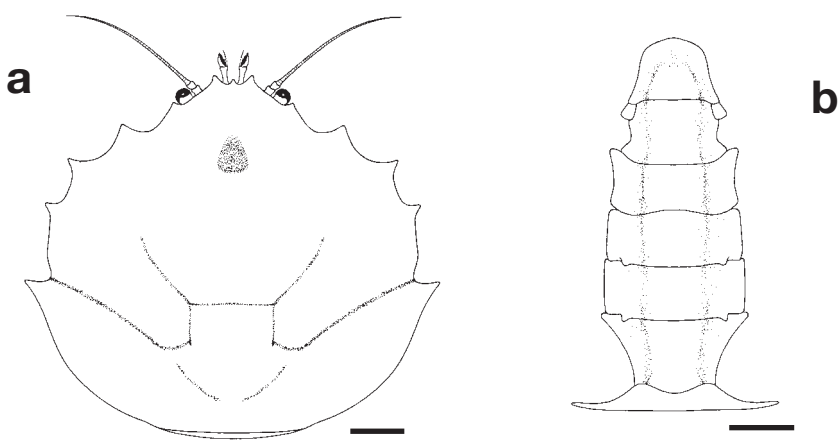


Fig. 24. Male (cw 76.1 mm, cl 62.8 mm), Longdong fishing port, Taipei County, May 1999: **a,** carapace; **b,** abdomen and telson. Scales = 10 mm.

Lauridromia intermedia (Laurie, 1906)
中型勞綿蟹

Fig. 25. Male, Longdong fishing port, Taipei County, 31 May 1999.

Fig. 26. Female, Hepingdao fishing port, Keelung, 4 Nov 1993.

Dromia intermedia Laurie, 1906: 351 [type locality: Galle, Sri Lanka].— Lin, 1949: 12.— Huang, 1994: 576.
Lauridromia intermedia.— Ng, Chan & Wang, 2000: 162, fig. 2d.— Ng, Wang, Ho & Shih, 2001: 6

Material examined.— Longdong, Taipei County, 31 May 1999: 1 male (cw 52.6 mm, cl 47.9 mm) (NTOU). Hepingdao fishing port, Keelung City, no date: 2 females (cw 49.8 mm, cl 47.7 mm; cw 50.3 mm, cl 42.3 mm) (NTOU). Jhongyun fishing port, Kaohsiung County, 25 Mar 1998: 1 female (cw 36.0 mm, cl 35.7 mm) (NMNS).

Diagnosis.— Carapace about as wide as long, subcircular; rostrum tridentate, but median tooth small, ventrally deflexed, not visible dorsally; anterolateral margin with first three acute, equally spaced, last tooth directed anterolaterally. Pereopods 2 and 3 dactyli with 5–8 minute spines on flexor margins. Pereopod 4 dactylus with unarmed extensor margin, flexor margin opposed by 1 distal propodal spine; propodus with 2 or 3 spines on extensor margin. Pereopod 5 dactylus with 1 spine on extensor margin, flexor margin opposed by 2 distal propodal spines; propodus with 3 smaller spines on extensor margin.

Size.— Males to cw 60.7 mm (McLay, 1993); females to cw 50.3 mm.

Colouration.— Orange-yellowish brown. Carapace with circular, dark-red patch on gastric region. Tips of cheliped fingers pink.

Habitat.— Sublittoral; 7–150 m, but usually less than 40 m (Davie, 2002).

Distribution.— Western Indian Ocean to Australia, New Caledonia, Philippines, Japan and Taiwan.

Remarks.— *Lauridromia intermedia* is known to carry a sponge cap on the carapace as camouflage (McLay, 1993).

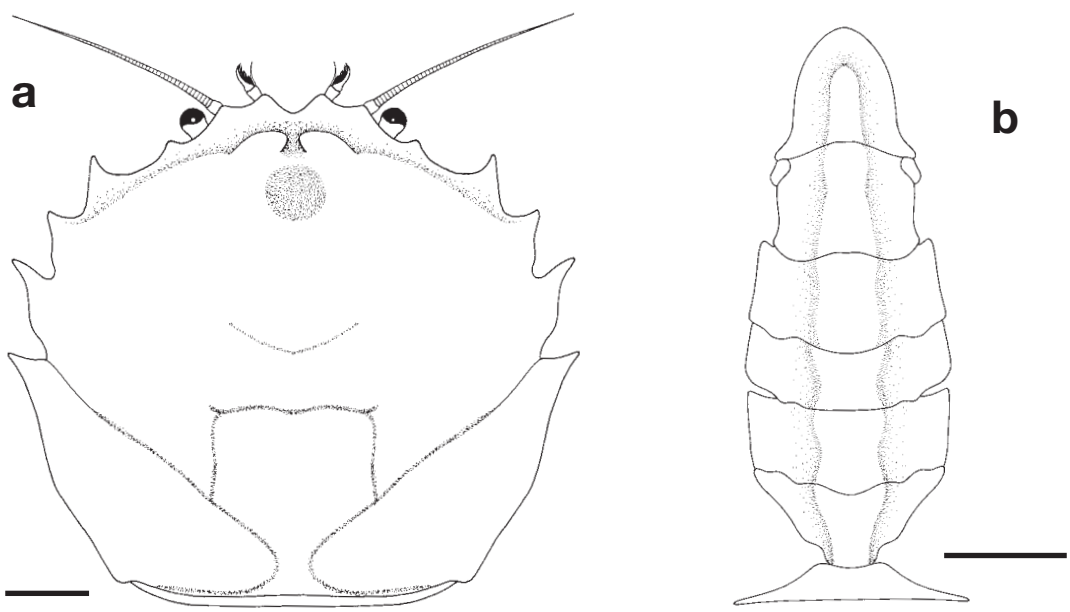


Fig. 27. Male (cw 52.6 mm, cl 47.9 mm), Longdong fishing port, Taipei County, 31 May 1999: **a,** carapace; **b,** abdomen and telson. Scales = 10 mm.

Genus *Petalomera* Stimpson, 1858
板蟹屬

Petalomera Stimpson, 1858: 226 [type species: *Petalomera granulata* Stimpson, 1858, by monotypy. Gender: feminine].

Diagnosis.— Carapace as long as or longer than wide; surface slightly to strongly convex, granular, sometimes areolated; lateral rostral teeth prominent; anterolateral teeth small. Maxilliped 3 coxae closely approximated, separated from tip of sternum by deep trough. Female sternal sutures 7/8 ending apart between or behind pereopod 2 coxae. Cheliped with epipod. Cheliped and pereopods 2 and 3 usually with petaloid meri. Pereopods 2 and 3 propodi without spines. Pereopods 4 and 5 dactyli opposed by 1 propodal spine. Abdomen of 6 free somites and telson; telson wider than long, rounded; male somites 3–5 without pleopods; uropod plates well-developed, visible externally. Abdominal locking mechanism formed by tuberculate knob on pereopod 2 coxae fitting against uropod plates.

Remarks.— McLay & Ng (2007) revised *Petalomera* and recognized four species, all from the Indo-West Pacific. One species of *Petalomera* is known from Taiwan.

Petalomera granulata Stimpson, 1858
顆粒板蟹

Fig. 28. Male, Keelung Islet, Keelung City, Aug 2000.

Fig. 29. Male, Penghu County, 28 Oct 2005.

Petalomera granulata Stimpson, 1858: 240 [type locality: Sagami Bay, Japan, by neotype designation (McLay & Ng, 2007)].— Ng, Chan & Wang, 2000: 162, fig. 3a.— Ng, Wang, Ho & Shih, 2001: 6.— McLay, Jeng & Chan, 2001: 965.— Chen & Sun, 2002: 91–93, fig. 36.— Shen & Jeng, 2005: 21.— McLay & Ng, 2007: 109–112, figs. 1–3.

Material examined.— Keelung Islet, Keelung City, Sep 2000: 1 male (cw 34.1 mm, cl 33.6 mm) (NTOU). Keelung City, Oct 1999: 1 male (cw 36.2 mm, cl 37.3 mm), 1 female (cw 26.4 mm, cl 26.0 mm) (ASIZ 72378). Toucheng, Yilan County, 8 Aug 1985: 1 female (TMCD 2084), 1 female (cw 20.8 mm, cl 20.8 mm) (ZRC 1993.7195).

Diagnosis.— Carapace highly domed, regions indistinct, separated by shallow grooves; outer margin of lateral rostral teeth coarsely granulate, margin not expanded or confluent with inner orbital tooth to form distinct eave; surface covered with large, blunt granules, sometimes areolate, especially on anterior half; with 3 small, indistinct anterolateral teeth. Pereopod 3 merus flattened but not petaloid. Pereopod 4 shorter than pereopod 5. Dactyli of pereopod 4 and 5 occluding with single spine on distal flexor propodal margin.

Size.— Males to cw 41.0 mm, cl 40.0 mm; females to cw 39.0 mm, cl 38.0 mm (Chen & Sun, 2002).

Colouration.— Dark red to red-brown overall. Cheliped fingers white.

Habitat.— The specific habitat is not known but the bathymetric range of 30–150 m (Sakai, 1965; Chen & Sun, 2002) has been reported. McLay & Ng (2007) reported a specimen collected apparently at 250 m from Tosa Bay, Japan.

Distribution.— Hong Kong northern China, Taiwan and Japan.

Remarks.— *Petalomera granulata* is the most common species of the genus in east Asian waters. At present, the type of camouflage carried by *P. granulata* is not known.

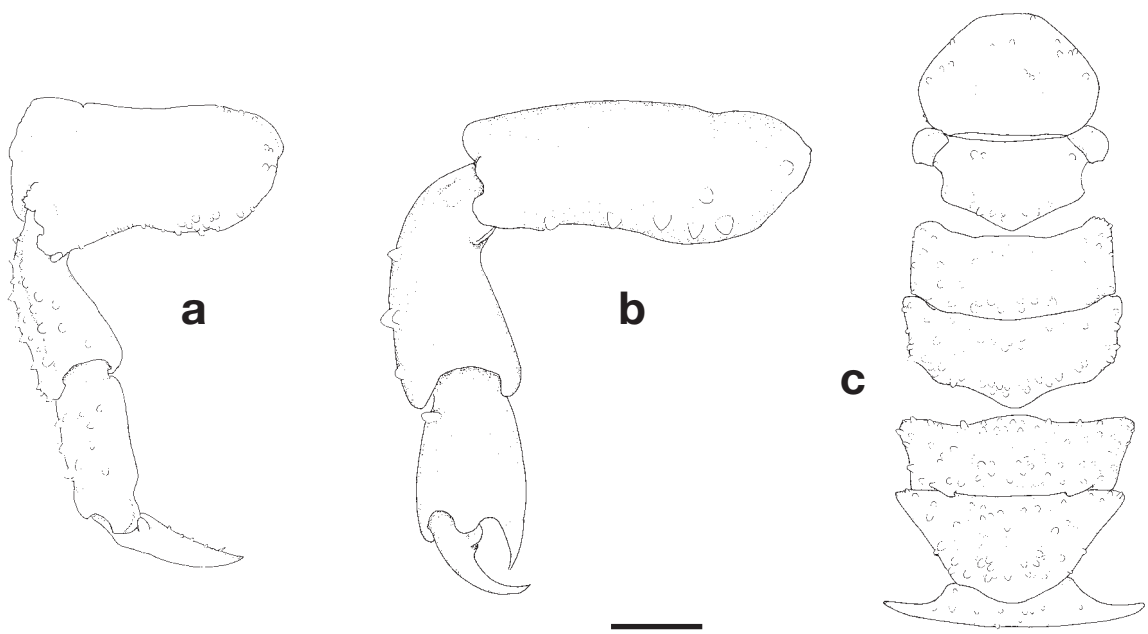


Fig. 30. Male (cw 34.1 mm, cl 33.6 mm), Keelung Islet, Keelung City, Sep 2000: **a,** left pereopod 2; **b,** left pereopod 4; c, abdomen and telson. Scale: a, c = 5 mm, b = 2 mm.

Genus *Takedromia* McLay, 1993
武田綿蟹屬

Takedromia McLay, 1993: 211 [type species: *Cryptodromia cristatipes* Sakai, 1969, by original designation. Gender: feminine].

Diagnosis.— Carapace distinctly wider than long, subcircular, surface granular, moderately to strongly convex; anterolateral teeth well-developed, laciniate and tuberculate. Maxilliped 3 coxae widely separated. Cheliped without podobranch or epipod. Pereopods 2 and 3 without podobranch; tuberculate and granulate; dactyli with up to 5 small spines. Pereopods 4 and 5 much reduced, about as long as pereopod 3 ischiomerus; dactyli occluding with 1 propodal spine; propodi without extensor spine. Female sternal grooves ending apart between pereopod 2 coxae. Abdomen of 6 free somites and telson; telson distally unarmed; uropods visible externally. Abdominal locking mechanism formed by serrated flange on pereopod 2 coxae fitting against uropod plates.

Remarks.— As with *Epigodromia*, species of *Takedromia* are not known to carry camouflage. McLay (1993) suggested that the minute pereopods 4 and 5 are perhaps too small to be functional, though this remains to be demonstrated. *Takedromia* includes five species, of which one is known from Taiwan.

Takedromia cristatipes (Sakai, 1969)
脊足武田綿蟹

Fig. 31. Male, CP216.

Cryptodromia cristatipes Sakai, 1969: 245, pl. 1: 1 [type locality: Tosa Bay, Japan].
Takedromia cristatipes.— Ng, Chan & Wang, 2000: 163.— Ng, Wang, Ho & Shih, 2001: 6.

Material examined.— Dasi fishing port, Yilan County, 11 Apr 1989: 1 female (TMCD 2494). CP216, 24°34.71'N, 122°4.02'E, 209–280 m, 27 Aug 2003: 1 male (cw 18.1 mm, cl 16.2 mm) (NTOU).

Diagnosis.— Rostrum subtruncate, scarcely trilobed, lobes blunt, broadly convex, separated by shallow emrgination; margins flared, straight, continuous with with supraorbital margin. Carapace dorsum finely granulate, with sparse tufts of long, plumose setae; anterolateral teeth short, stout, coarsely granulate.

Size.— Males to cw 24.5 mm, cl 19.7 mm, females to cw 20.2 mm, cl 17.8 mm (McLay & Ng, 2005).

Colouration.— Pale maroon. Cheliped fingers white distally. Distal end of pereopods 2 and 3 carpi white.

Habitat.— Sand, mud and shelly substrates; 48–430 m (McLay, 1993).

Distribution.— Japan, Taiwan, Philippines, Guam, and New Caledonia.

Remarks.— *Takedromia cristatipes* is distinctive in the genus for its truncate rostral lobes, which, in other congeners are prominently triangular or conical.

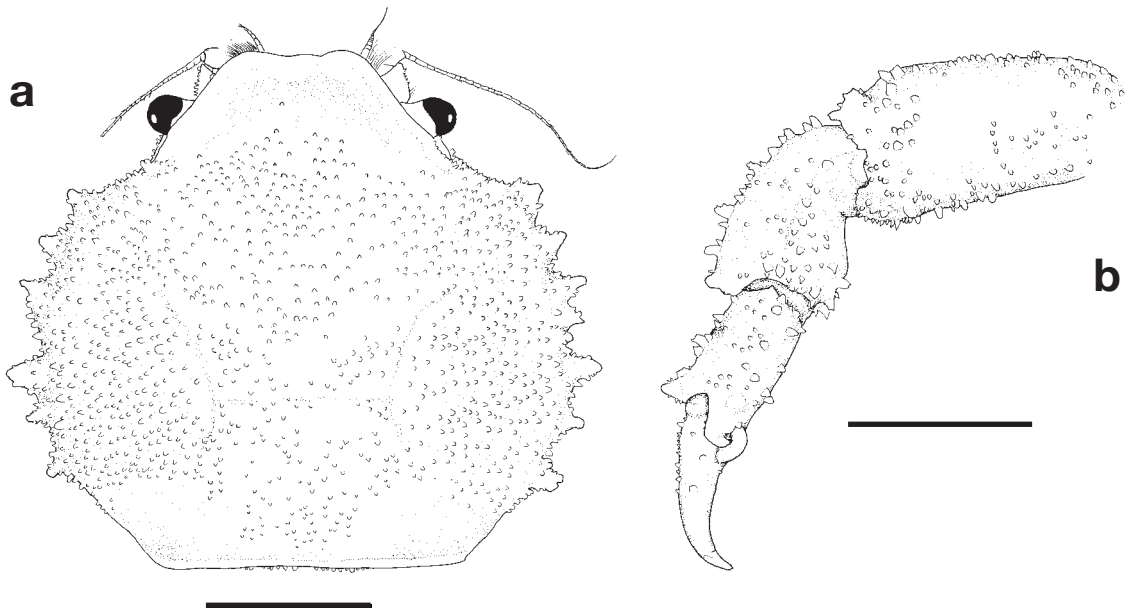


Fig. 32. Male (cw 18.1 mm, cl 16.2 mm), CP216: **a,** carapace; **b,** right pereopod 2. Scales = 5 mm.

Subfamily SPHAERODROMIINAE Guinot & Tavares, 2003
圓綿蟹亞科

Sphaerodromiinae Guinot & Tavares, 2003: 102–104.

Diagnosis.— Male pereopod 5 coxa modified into elongated, hard process enclosing gential papilla. Pereopods 2 and 3 propodus long, with distal spine; dactylus flexor margin multispinose. Female sternal sutures 7/8 short, ending wide apart behind gonopores; spermathecal aperture close to but not reaching level of gonopore on pereopod 3 coxa. G2 exopod present or absent.

Remarks.— The sphaerodromiines appear to be basal in Dromiidae (see Guinot & Tavares, 2003), of which some members share a suite of presumably plesiomorphic features with Dynomenidae such as vestigial male pleopods on abdominal somites 3–5, short female sternal sutures 7/8, spermathecal apertures that are close to the female gonopores on the pereopod 3 coxae, an exopod on the G2 basis, and the pereopod 5 coxa in males is prolonged to form a hardened process enclosing most of the genital papilla (Guinot, 2008). One of three sphaerodromiine genera is represented in Taiwan.

Genus *Sphaerodromia* Alcock, 1899
圓綿蟹屬

Sphaerodromia Alcock, 1899: 16 [type species: *Dromidia kendalli* Alcock & Anderson, 1894, by monotypy. Gender: feminine].

Diagnosis.— Carapace subglobose, surface minutely granular, tomentose; as wide as or wider than long; anterolateral margins without teeth. Front broadly triangular, bilobate. Antennal segment 2 distomedial corner not produced. Maxilliped 3 coxae close together. Cheliped with epipod and podobranch. Pereopods 2 and 3 with epipod and usually with distal propodal spine. Pereopods 4 and 5 with 3–5 propodal spines opposing dactyli. Abdomen of 6 free somites and telson; somites 3–5 with vestigial pleopods in males. G1 with apical plate. G2 basis with exopod. Uropod plates well-developed, visible externally. Abdominal locking mechanism not involving uropods; formed by serrated ridge on pereopods 2 and 3 coxae fitting against lateral margins of telson and somites 5 and 6.

Remarks.— *Sphaerodromia* includes five species of which two are known from Taiwan.

Key to species of *Sphaerodromia* from Taiwan

1. Carapace surface granular; anterolateral margin with deep notch near midlength ····· ***S. ducoussoi***
- Carapace surface smooth; anterolateral margin entire ····· ***S. kendalli***

Sphaerodromia ducoussoi McLay, 1991
杜氏圓綿蟹

Fig. 33. Female, Dasi fishing port, Yilan County, May 2000. (After McLay, Jeng & Chan, 2001)

Sphaerodromia ducoussoi McLay, 1991: 459, figs. 1a–d, 2a–h, 3a–d, pl. 1A [type locality: Tuanake, Tuamotu Archipelago, French Polynesia].— McLay, Jeng & Chan, 2001: 966, fig. 1A.— Ng, Wang, Ho & Shih, 2001: 6.

Material examined.— Dasi fishing port, Yilan County, May 2000: 1 female (cw 28.5 mm, cl 29.2 mm) (ZRC 2001.1010).

Diagnosis.— Carapace about as wide as long; surface granular; anterolateral margin with deep notch at midlength. Orbit with incipient vertical division, not divided horizontally.

Size.— Males to cw 43.0 mm, cl 43.2 mm; females to cw 40.9 mm, cl 41.4 mm (McLay, 1991).

Colouration.— Overall light tan with small, sparsely distributed reddish spots on the carapace.

Habitat.— Soft substrates; about 400–450 m.

Distribution.— French Polynesia and Taiwan.

Remarks.— The notched anterolateral carapace margins will distinguish *S. ducoussoi* from all other members of the genus.

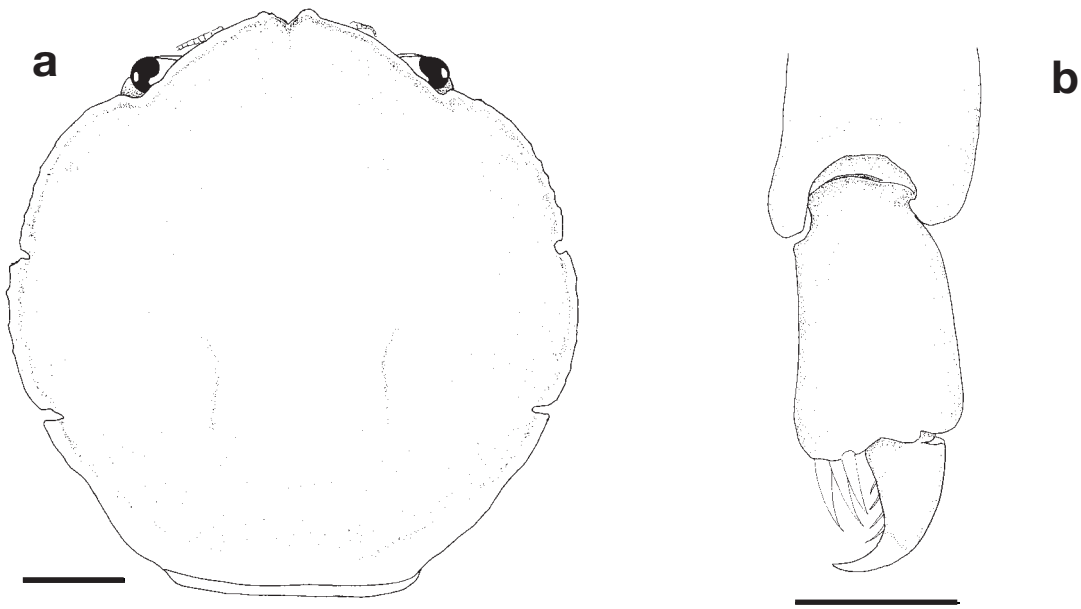


Fig. 34. Female (cw 28.5 mm, cl 29.2 mm), Dasi fishing port, Yilan County, May 2000: **a,** carapace; **b,** left pereopod 4 distal segments. Scales: a = 5 mm, b = 2 mm.

Sphaerodromia kendalli (Alcock & Anderson, 1894)
肯氏圓綿蟹

Fig. 35. Female, Dasi fishing port, Yilan County, 19 Jan 1999, preserved specimen.

Dromia kendalli Alcock & Anderson, 1894: 175 [type locality: Bay of Bengal].

Sphaerodromia kendalli.— Jeng, 1997: 15, 21.— Ng, Chan & Wang, 2000; 163, fig. 3b.— Ng, Wang, Ho & Shih, 2001: 6.

Material examined.— Dasi fishing port, Yilan County, 19 Jan 1999: 1 female (cw 48.3 mm, cl 50.0 mm) (NMNS).

Diagnosis.— Carapace about as wide as long; surface smooth; anterolateral margin entire, without notches. Orbit with incipient vertical division, not divided horizontally.

Size.— Males to cw 20.1 mm, cl 20.8 mm; females to cw 48.3 mm, cl 50.0 mm.

Colouration.— Dorsal tomentum light tan. Cheliped fingers light pink.

Habitat.— Soft substrates; 200–214 m.

Distribution.— Bay of Bengal, Indonesia, Philippines, Japan and Taiwan.

Remarks.— *Sphaerodromia kendalli* is most easily distinguished from *S. ducoussoi* in having entire rather than marginally notched lateral carapace margins.

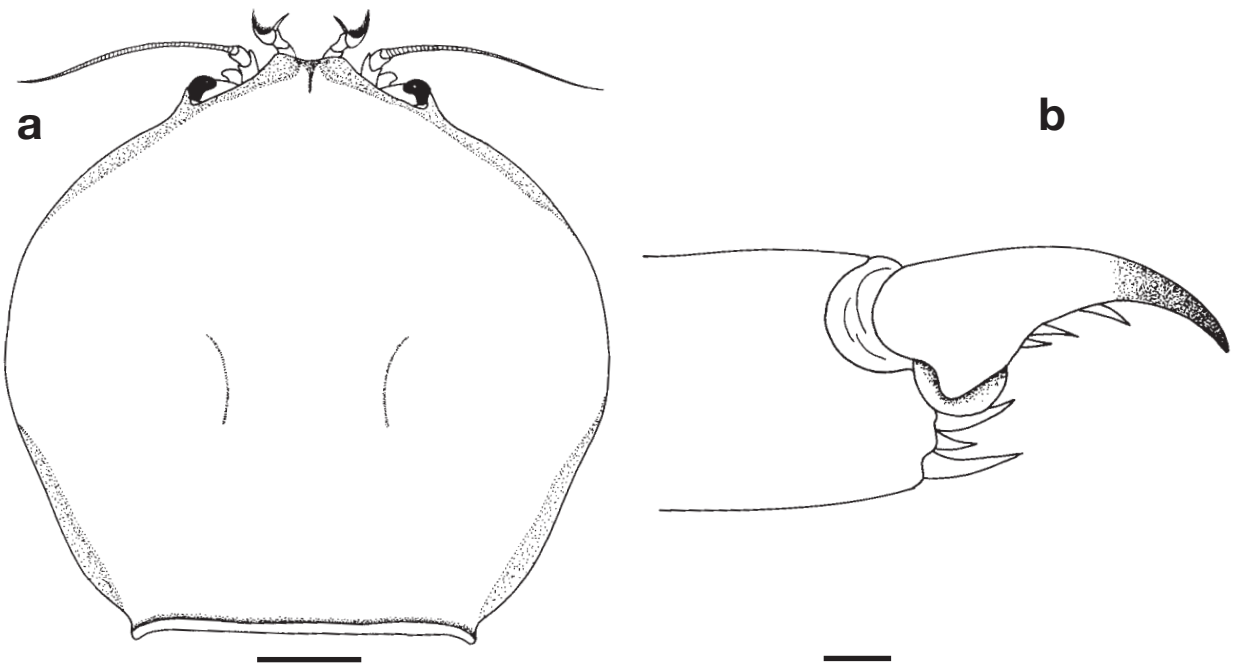


Fig. 36. Female (cw 48.3 mm, cl 50.0 mm), Dasi fishing port, Yilan County, 19 Jan 1999: **a,** carapace; **b,** dactylus and distal part of propodus of right pereopod 4. Scales: a = 10 mm, b= 1 mm.

Family DYNOMENIDAE Ortmann, 1892
貝綿蟹科

Dynomenidae Ortmann, 1892: 541.

Diagnosis.— Carapace usually wider than long, convex; surface smooth, spinous or areolate, usually densely setose; lateral borders distinct, armed with teeth; front unarmed, variously projecting; frontal groove well marked, posteriorly bifurcated; cervical, postcervical, and branchial grooves present. Orbital, antennular and antennal fossae defined. Maxilliped 3 operculiform; covering buccal cavity; separated at bases by plate at same level as sternum; basis and ischium fused, but suture distinct. Sternal sutures 7/8 of female ending well apart on low tubercles behind bases of pereopod 3. Chelipeds equal, stout; distally hollowed. Pereopod 5 reduced, carried in horizontal position alongside posterodorsal carapace margin above base of pereopod 4; dactyli rudimentary, subchelate. Abdomen of 6 somites and telson (usually movable), without pleura; both sexes with 5 pairs of pleopods, first pair vestigial in female, last 3 pairs rudimentary in male. Telson much wider than long; retaining mechanism for abdomen present, but not usually effective. Uropods present as well-developed dorsal plates. Spermathecal apertures small, rounded, at level of genital openings. Pereopod 5 coxa in males extending in long projection enclosing genital papilla. G1 with apical plate. (After McLay, 1999; Guinot, 2008).

Remarks.— The taxonomy and systematics of the Dynomenidae was reviewed in detail by McLay (1999), with recognition of five genera and 21 species worldwide. Since 1999, a further two species of *Dynomene* have been recognized (McLay, 2001b), four species of *Paradynomene* (see McLay & Ng, 2004), and one of *Hirsutodynomene* (see McLay & Ng, 2005). Guinot (2008) proposed a four-subfamily system in Dynomenidae to accommodate extant and fossil taxa. Two of the subfamilies are known from Taiwan although all four can be expected.

Dynomenids have their nearest relatives in the Dromiidae, and recent studies generally recognize both groups to be reciprocally monophyletic (McLay, 1993, 1999; Guinot, 2008), though some studies suggest that dynomenids could be nested within the dromiids (e.g., Guinot *et al*., 1994; Brösing *et al*., 2007; Ahyong *et al*., 2007). Either way, dynomenids share several features with the Sphaerodromiinae, presumed to be basal in Dromiidae: vestigial male pleopods on abdominal somites 3–5, short female sternal sutures 7/8, spermathecal apertures that are close to the female gonopores on the pereopod 3 coxae, an exopod on the G2, and the pereopod 5 coxa in males is prolonged to form a hardened process enclosing most of the genital papilla (Guinot, 2008).

Modern dynomenids do not carry camouflage. They are, however, reasonably inferred to be derived from a camouflage carrying ancestor since the closest and near closest relatives (i.e., dromiids, homolodromiids and homolids) are all camouflage carriers. Three dynomenid genera and species are represented in Taiwan.

Key to Dynomenidae from Taiwan

1. Carapace tomentum short and soft with uneven, undulating appearance; no long setae standing above tomentum. Cheliped fingers occluding for about half distal length. Pereopods 2–4 dactyli with fewer than 5 flexor spines ····· ***Metadynomene tanensis***
- Carapace setae coarse, short or long. Cheliped fingers occluding only at tips. Pereopods 2–4 dactyli with fewer than 5 or 6 flexor spines ····· 2
2. Carapace surface smooth to minutely granulate; dorsal setae short, coarse, sparse or dense, often arranged in tufts. Chelipeds granulate but not spinulate ····· ***Dynomene hispida***

- Carapace surface areolate, granulate and sparsely spinous (especially in anterobranchial region), covered with coarse short and long setae, arranged in tufts and giving shaggy appearance. Chelipeds granulate and spinulate ..... ***Hirsutodynomene hispida***

Subfamily DYNOMENINAE Ortmann, 1892
貝綿蟹亞科

Dynomenidae Ortmann, 1892: 541.

Genus *Dynomene* Desmarest, 1823
貝綿蟹屬

Dynomene Desmarest, 1823: 422, pl. 18: fig. 2 [type species: *Cancer hispida* Latreille, in Milbert, 1812, by subsequent designation and monotypy (H. Milne Edwards, 1837). Geneder: feminine].

Diagnosis.— Carapace wider than long, subcircular to slightly ovate; moderately convex; surface smooth or minutely granulate; dorsal setae short, coarse, sparse or dense, often arranged in tufts; frontal margin broadly rounded, continuous or with shallow median notch, unarmed; lateral margins well-defined, with distinct teeth or acute granules. Cheliped dactylus strongly curved, fingers occluding distally only. Pereopods 2–4 dactyli with 5 or 6 spines on flexor margin.

Remarks.— Of the seven known species of *Dynomene*, only the type species is known from Taiwan.

Dynomene hispida (Latreille, in Milbert, 1812)
硬毛貝綿蟹

Fig. 37. Male, Wanlitong, Pingtung County, Dec 1991.

Fig. 38. Male, Wanlitong, Pingtung County, 2 Jun 1992, between branching coral.

Cancer hispida Latreille, *in* Milbert, 1812: 274 [type locality: Mauritius].

Dynomene hispida.— Horikawa, 1940: 22, 23.— Lin, 1949: 12.— Dai, Yang, Song & Chen, 1986: 28, fig. 11, pl. 3: 2.— Dai & Yang, 1991: 32, fig. 11, pl. 3: 2.— Huang, 1994: 577.— McLay, 1999: 473, figs. 3a, 5a–b, 11, 12a–c, 17a, 18a–g.— Ng, Wang, Ho & Shih, 2001: 6.

Dynomene latreillii Eydoux & Souleyet, 1842: 239, pl. 3: 3–5 [type locality: Hawaii].

Dynomene granulobata Dai, Yang & Lan, 1981: 119, figs. 10–14 [type locality: Dongdao, Xisha Islands, South China Sea].

Material examined.— South Bay, Pingtung County, 5 Dec 1985: 1 female (cw 7.7 mm, cl 6.4 mm) (NTOU). Wanlitong, Pingtung County, 2 Jun 1992: 1 male (cw 6.6 mm, cl 5.2 mm), 1 ovigerous female (cw 10.4 mm, cl 8.2 mm) (NTOU).

Diagnosis.— Carapace about 1.3 times wider than long; surface minutely granular and setose, not forming clumps; supraorbital margin entire, without notch, with about 5 small acute spines; anterolateral teeth well-developed, sharply pointed. Carapace and pereopods covered with short, coarse, plumose setae interspersed with longer setae. Cheliped carpus and propodus granulate; finger tips with well-developed teeth. Pereopods 2–4 carpi with 3 rows of granules; dactyli with 5 or 6 flexor spines. Pereopod 3 merus length about 1.5 times height and about ome-third carapace length.

Size.— Males to cw 19.0 mm, cl 14.0 mm; females to cw 15.6 mm, cl 12.3 mm (McLay, 1999).

Colouration.— Overall dark brown or black, fringed with golden brown setae. Carapace with pale patches. Pereopods with some patches of light blue at limb joints.

Habitat.— Coral and rocky reefs, often amongst live scleractinian corals; intertidal to 30 m depth (McLay, 1999).

Distribution.— Western Indian Ocean to Australia, New Caledonia, Indonesia, Japan, Taiwan Hawaii and French Polynesia.

Remarks.— This small species is typically found associated with hard corals. The last pair of vestigial pereopods are mobile but they do not appear to be able to grasp the substratum or carry any object.

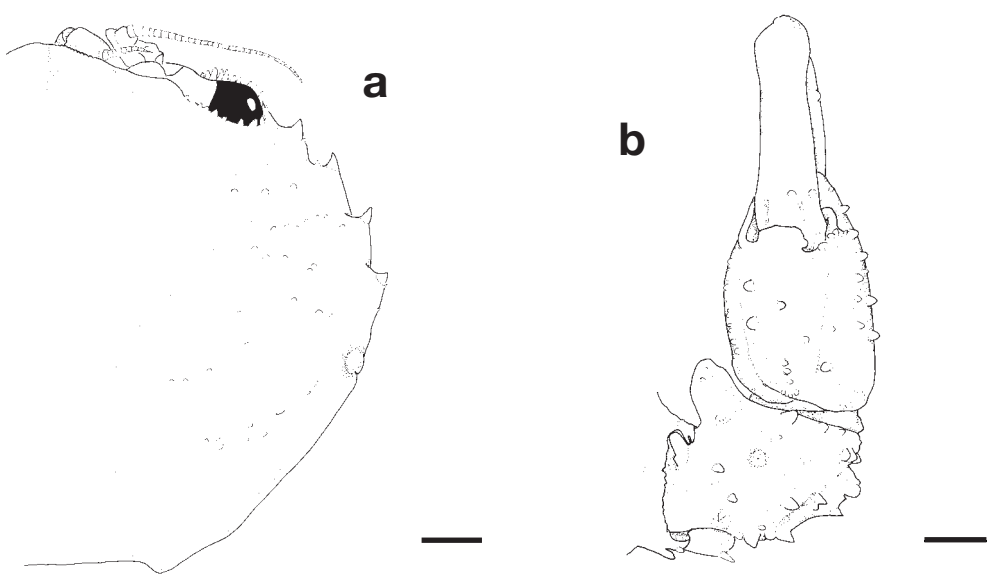


Fig. 39. Ovigerous female (cw 10.4 mm, cl 8.2 mm), Wanlitong, Pingtung County, 2 Jun 1992: **a,** right carapace; **b,** right chela, dorsal view. Scales = 1 mm.

Genus *Hirsutodynomene* McLay, 1999
毛貝綿蟹屬

Hirsutodynomene McLay, 1999: 504–505 [type species: *Dynomene spinosa* Rathbun, 1911, by original designation. Gender: feminine].

Diagnosis.— Carapace 1.15–1.30 times wider than long, usually subcircular; dorsal surface moderately convex, smooth or areolate and sparsely spinous (especially in anterobranchial region), covered with coarse short and long setae, arranged in tufts; lateral margins well-defined, with distinct teeth; cervical, postcervical and branchial grooves usually indicated; frontal margin broadly triangular, continuous, unarmed. Cheliped dactylus strongly curved, fingers occluding distally only. Pereopods 2–4 dactyli with 5 or 6 spines on flexor margin.

Remarks.— Only the type species of three known taxa of *Hirsutodynomene* is known from Taiwan.

Hirsutodynomene spinosa (Rathbun, 1911)
多刺毛貝綿蟹

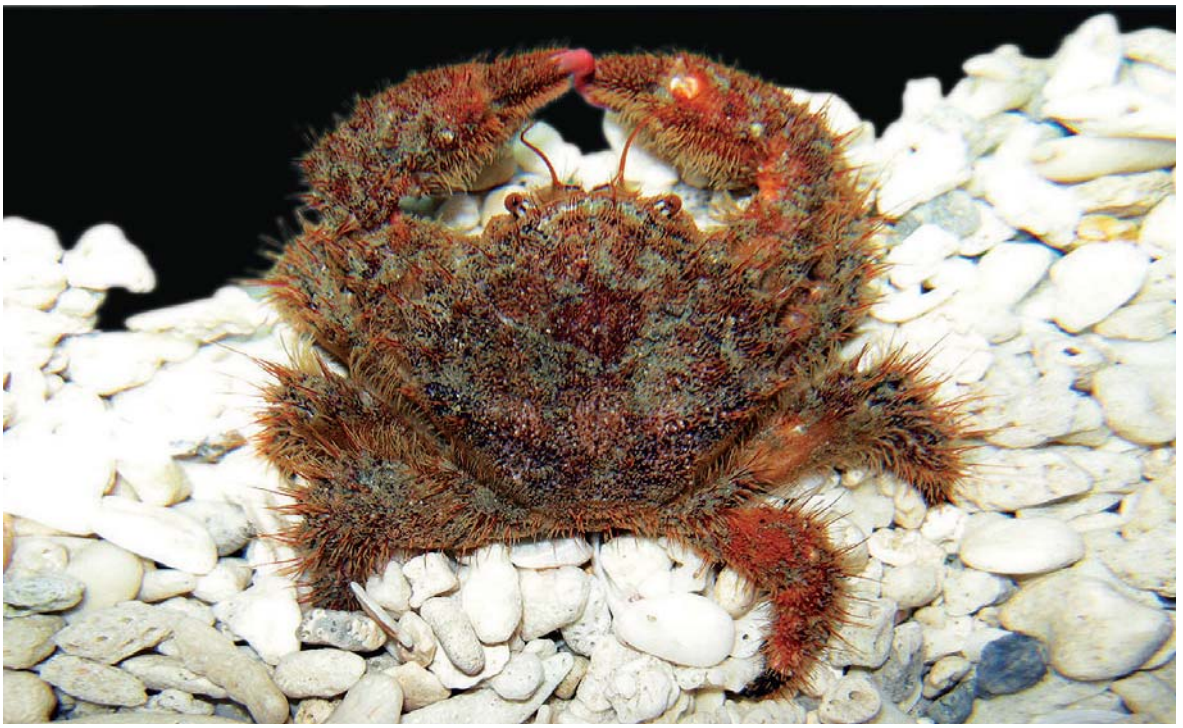


Fig. 40. Female, Gueishandao, Yilan County, Apr 2002.

Fig. 41. Female, Gueishandao, Yilan County, Apr 2002, anterior view of carapace.

Dynomene spinosa Rathbun, 1911: 196, pl. 17: 1 [type locality: Coetivy Island, Seychelles].
Hirsutodynomene spinosa.— Ng, McLay & Wang, 2003: 29.— McLay & Ng, 2005: 21.

Material examined.— Gueishandao, Yilan County, Apr 2002: 1 female (cw 36.1 mm, cl 26.9 mm) (ZRC).

Diagnosis.— Carapace 1.25–1.30 times wider than long; surface with granules or small spines; branchial regions with about 12 small spines; tomentum consisting of dense cover of long, filiform setae, arranged in clumps associated with areolae or spines, interspersed with short, serrated setae, apically bent at right angles; suborbital margin with short spines. Inner carpal margin of cheliped with a sharp spine. Pereopods 2–4 with spinose margins.

Size.— Males to cw 28.7 mm, cl 21.3 mm; females to cw 36.1 mm, cl 26.9 mm (McLay, 2001b; McLay & Ng, 2005).

Colouration.— Reddish brown setae covering body and pereopods.

Habitat.— Coral and rocky reefs; intertidal to about 25 m depth (McLay, 2001b).

Distribution.— Western Indian Ocean from Madagascar and the Seychelles to Western Australia and eastern Australia (south to Port Jackson), Indonesia and Vietnam to Taiwan, Japan and the central Pacific.

Remarks.— *Hirsutodynomene spinosa* is the only species of the genus known from Taiwan, and is easily recognized among other Taiwanese dynomenids by its long, shaggy dorsal setae. Its taxonomy has been discussed at length in McLay (2001b) and Ng *et al.* (2003) and there is no need to elaborate here. The Taiwan specimen reported by Ng *et al.* (2003) could not be located at the time of writing, and a specimen from the Glorieuses Islands was used to illustrate the distinguishing characters of this species.

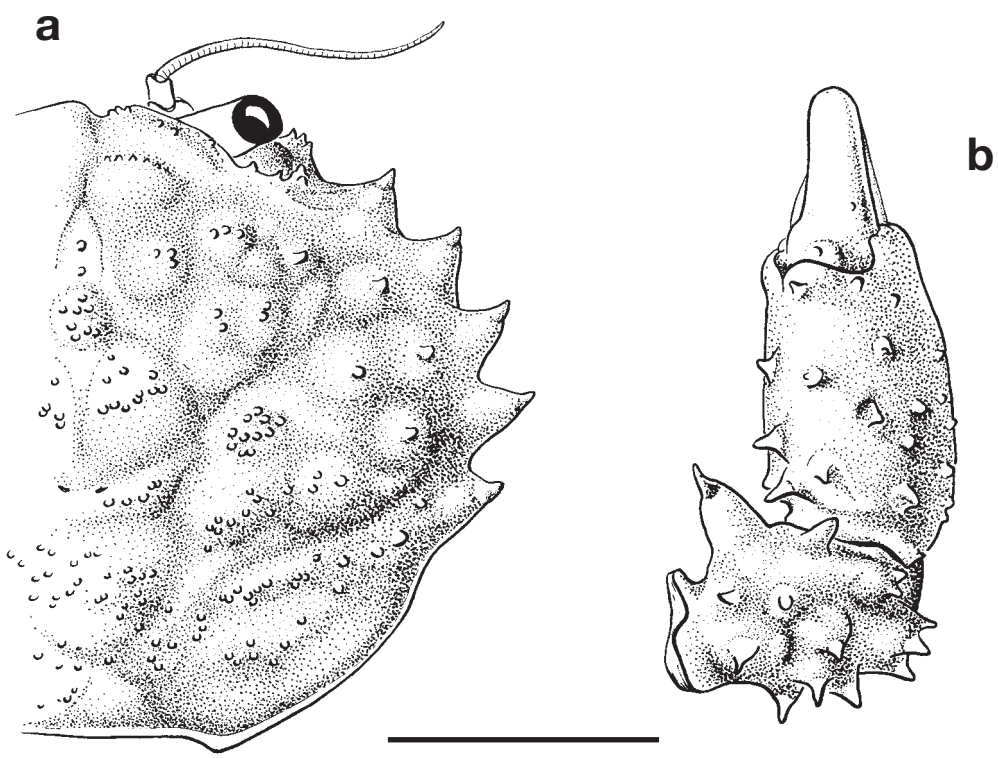


Fig. 42. Male (cw 16.4 mm, 14.3 mm), Glorieusus Islands (MNHN-B 6899): a, right carapace; b, right chelipeds, dorsal view. Scale = 10 mm. (After McLay, 1999).

Subfamily METADYNOMENINAE Guinot, 2008
後貝綿蟹亞科

Metadynomeninae Guinot, 2008: 10.

Genus *Metadynomene* McLay, 1999
後貝綿蟹屬

Metadynomene McLay, 1999: 516 [type species: *Metadynomene devaneyi* Takeda, 1977, by original designation. Gender: feminine].

Diagnosis.— Carapace subcircular, slightly wider than long, moderately convex, surface smooth but densely covered with short, soft setae only, giving uneven, undulating appearance; frontal margin broadly rounded, continuous, unarmed; lateral margins well-defined, marked by shallow indentations or distinct teeth. Cheliped dactylus not strongly curved; margins of fingers occluding for about half their length. Pereopods 2–4 dactyli with 2–4 spines on flexor margin.

Remarks.— Of the three species of *Metadynomene*, only one is known from Taiwan thus far.

Metadynomene tanensis (Yokoya, 1933)
種島後貝綿蟹

Fig. 43. Ovigerous female, Dasi, Yilan County, 12 Jul 2005.

Fig. 44. Ovigerous female, Dasi, Yilan County, 12 Jul 2005, ventral view showing eggs in abdominal cavity.

Dynomene tanensis Yokoya, 1933: 96, fig. 38 [E of Tanegashima Island, Japan, 219 m].

Dynomene praedator.— Miyake, 1938: 194, fig. 4: 2.— Lin, 1949: 12.

Metadynomene tanensis.— McLay, 1999: 521, figs. 4d, 6c, 7f, 9d–e, 11, 13c, e–f, 14e, 25b, 27, 28.— McLay, Jeng & Chan, 2001: 964.— Ng, Wang, Ho & Shih, 2001: 5.— McLay & Ng, 2005: 24–25.

Material examined.— Dasi fishing port, Yilan County, 23 Mar 1999: 1 female (cw 18.1 mm, cl 16.4 mm) (ZRC 2001.1008). Nanfang-ao fishing port, Yilan County, no date: 1 male (cw 9.0 mm, cl 8.0 mm) (NTOU). DW5, 22°40.5'N, 119°56.5'E, 213–236 m, 27 Jul 2000: 1 female (cw 22.6 mm, cl 20.5 mm) (MNHN). DW149, 22°18.5'N, 121°29.37'E, 258–258 m, 20 May 2002: 1 male (cw 7.5 mm, cl 6.8 mm) (NTOU). DW151, 22°18.34'N, 121°30.04'E, 301–356 m, 20 May 2002: 1 male (cw 9.5 mm, cl 8.9 mm) (NTOU). CD 386, 24°38.472'N, 122°09.911'E, 301–304 m, 25 Jul 2006: 1 male (cw 22.7 mm, cl 19.0 mm) (NTOU).

Diagnosis.— Carapace with four prominent, unequal, blunt teeth along lateral margins (but obscured by tomentum); suborbital margin shelf-like, projecting anteriorly, visible dorsally. Pereopod 5 with podobranch.

Size.— Males to cw 23.7 mm, cl 21.4 mm, females to cw 24.8 mm, cl 22.4 mm (McLay & Ng, 2005).

Colouration.— Body covered in pale tan velvet tomentum, orange on the carpi and distal end of meri of each pereopod. Cheliped fingers may have a pale pinkish-orange proximally becoming white distally. Eggs pale tan.

Habitat.— Known from depths 205–520 m but usually from 300–400 m (McLay, 1999).

Distribution.— Southern Japan, Taiwan, Philippines, Indonesia, New Caledonia, and Tuamotu Islands, French Polynesia (McLay *et al*., 2001; McLay & Ng, 2005).

Remarks.— Among Taiwanese dynomenids, *M. tanensis* is distinctive owing to its dense carapace tomentum which is short and soft with an uneven, undulating appearance; setation in other species is coarse and uneven.

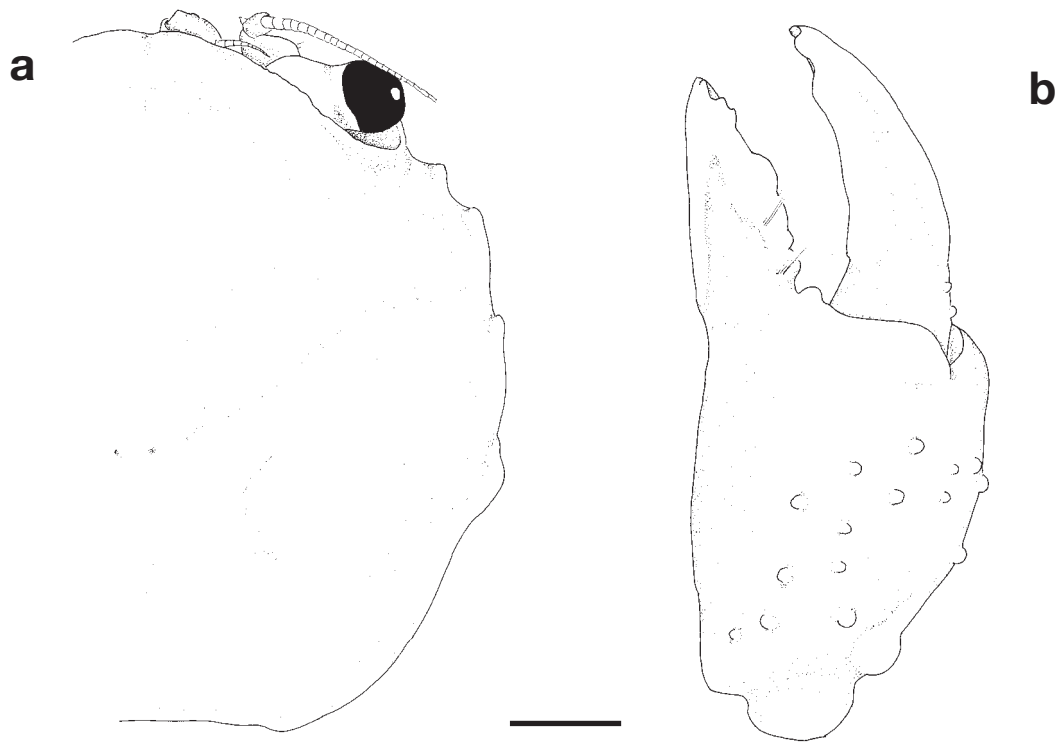


Fig. 45. Male (cw 9.5 mm, cl 8.9 mm), DW151: **a,** right carapace; **b,** left chela. Scale = 1 mm.

Superfamily HOMOLOIDEA De Haan, 1839
人面蟹總科

Diagnosis.— Orbits undeveloped. Carapace longer than wide. Pereopod 5 subchelate or simple. Pereopod 4 similar to pereopod 3. Male abdominal somite 6 with small socket on either side, engaging with 'homolid button' on thoracic sternite 4. Males without pleopod 3–5.

Remarks.— Homoloidea includes three families, Homolidae, Latreilliidae and Poupiniidae, of which the first two are represented in Taiwan. The Poupiniidae has been reported from French Polynesia and Guam thus far (see Ng, 1998).

Key to families of Homoloidea

1. Carapace with linea homolica ····· **Homolidae**
- Carapace without linea homolica ····· 2
2. Pereopod 5 reduced, chelate of simple, carried dorsally. Carapace pyriform ····· **Latreilliidae**
- Pereopod 5 similar to pereopod 4, neither chelate, reduced, nor carried dorsally. Carapace barrel-shaped ····· **Poupiniidae** [not known from Taiwan]

Family HOMOLIDAE De Haan, 1839
人面蟹科

Homolidea De Haan, 1839: 102.
Thelxiopeidae Rathbun, 1937: 2.
Homolidae.— White, 1847: 55.

Diagnosis.— Carapace longer than wide, rectangular; dorsal surface granular to spiny; longitudinal suture line running from posterior border to antennal spine (linea homolica) present. Front narrow; prominent slender triangular rostrum, sometimes bifid, often appearing tridentate. Orbit undefined. Eyestalks of 2 movable articles: first slightly longer than second, slender, conspicuous; and second stout, with terminal cornea. Antennule without socket, basal article subglobular. Antennal flagellum much longer than carapace. Interantennular septum a distinct vertical process. Maxilliped 3 pediform to suboperculiform. Chelipeds (pereopod 1) and pereopods 2 and 3, long, each with epipod. Pereopod 5 reduced, lying obliquely on carapace and directed upwards, subchelate–chelate. Abdomen of male and usually of female, of 6 free somites and telson. Gills phyllobranchiate; 13 or 14 pairs. (After Davie, 2002).

Remarks.— Homolids, sometimens referred to as 'deep-water carrier crabs' (Guinot *et al*., 1995; Davie, 2002), carry camouflage in the form of sponges or cnidarians with their last pair of pereopods. They generally occur at outer shelf to slope depths on all types of substrate. Unlike dromiids and homolodromiids, which carry camouflage using the last two pairs of pereopods, homolids have only the last pair of pereopods modified for carrying.

The morphology and systematics of the Homolidae were reviewed in detail by Guinot & Richer de Forges (1995). Of the known dromiaceans, homolids most closely resemble homolodromiids in general habitus, especially in the elongate carapace. Homolids, however, are easily separated from homolodromiids by having

only pereopod 5, rather than both pereopods 4 and 5, reduced, forming a chela or subchela. Ten of 14 homolid genera are represented in Taiwan. The key below, however, includes all known homolid genera for completeness. Although *Dagnaudus* Guinot & Richer de Forges, 1995, a temperate southern hemisphere genus, is unlikely to be found in Taiwan, members of *Ihlopsis* Guinot & Richer de Forges, 1995, *Gordonopsis* Guinot & Richer de Forges, 1995, and *Homolax* Alcock, 1899, are all subtropical to tropical and could well be expected to be discovered in Taiwanese waters in the future.

Key to genera of Homolidae

1. Pereopod 5 merus clearly longer than carapace length (including rostrum) 2
- Pereopod 5 merus shorter than carapace length (including rostrum) 4
2. Pseudorostral spines distally bifid; as long as or longer than maximum carapace width. Pereopod 5 dactylus and propodus forming large pincer; fingers long, slender, with wide gape ..... ***Homolochunia***
- Pseudorostral spines distally unidivided (with or without dorsal spines along margin); shorter than maximum carapace width. Pereopod 5 dactylus and propodus forming small subchela, occluding, without wide gape 3
3. Carapace hepatic region not swollen; width across hepatic region (excluding spines) narrower than width across branchial regions (excluding spines); without constriction behind hepatic region. Pseudorostral spines with row of dorsal spines ..... ***Dagnaudus*** [not yet known from Taiwan]
- Carapace hepatic region swollen, width across hepatic region equal to or greater than width across branchial regions; with distinct constriction behind hepatic region. Pseudorostral spines simple or with row of dorsal spines ..... ***Latreillopsis***
4. Rostrum with pair of dorsal spines, directed anterolaterally, forming trident. Carapace with long lateral spine at base of cervical groove and long upright median gastric spine ..... ***Homologenus***
- Rostrum simple. Carapace margin at base of cervical groove unarmed or with spines of similar length to other carapace spines; without long median gastric spine 5
5. Maxilliped 3 operculiform, almost fully covering buccal cavity. Carapace hepatic region swollen. Carapace without dorsal or lateral spines, apart from subhepatic spine ..... ***Homolomannia***
- Maxilliped 3 pediform or subpediform, not covering buccal cavity. Carapace hepatic region not swollen .. 6
6. Pseudorostral spines antler-like, with additional dorsal spines; very long, equal to or exceeding distance between bases of hepatic spines; with additional dorsal spines ..... ***Ihlopsis*** [not yet known from Taiwan]
- Pseudorostral spines not antler-like, simple or with short dorsal spine at midlength; length distinctly less than distance between bases of hepatic spines 7
7. Carapace dorsal and lateral surfaces with spinules or spines 8
- Carapace dorsal and lateral surfaces without covering of spinules or spines 13
8. Pereopod 5 merus long, reaching anteriorly to level or orbit 10
- Pereopod 5 merus relatively short, not reaching anteriorly to the level of the orbit 11
10. Carapace surface and margins covered with prominent conical spines. Pseudorostral spines as long as or longer than rostrum ..... ***Moloha***
- Carapace surface and margins without conical spines. Pseudorostral spines low, much shorter than half rostral length ..... ***Homolax*** [not yet known from Taiwan]
11. Pseudorostral spines small, conical, much shorter than rostrum 14
- Pseudorostral spines well developed, as long as or longer than rostrum 12
12. Pereopod 5 merus very slender, more than 10 times as long as wide ..... ***Yaldwynopsis***
- Pereopod 5 merus relatively stout, about 7 times as long as wide ..... ***Paromola***

13. Carapace widest near midlength. Pseudorostral spines very small, much shorter than rostrum ***Paramolopsis***
- Carapace widest posteriorly. Pseudorostral spines well developed, conical, about as long as rostrum ····· ***Gordonopsis*** [not yet known from Taiwan]

14. Anterior wall of carapace either side of rostrum with elongated, transverse cavity forming orbit-like structure. Outer surface of cheliped palm with dark coloured sunken depression at base of pollex in males and some females ····· ***Lamoha***
- Anterior wall of carapace lateral to rostrum rounded, without orbit-like structure. Outer surface of cheliped palm without sunken depression at base of pollex ····· ***Homola***

Genus *Homola* Leach, 1815
人面蟹屬

Homola Leach, 1815: 324 [type species: *Homola spinifrons* Leach, 1815, by monotypy (subjective synonym of *Cancer barbatus* Fabricius, 1793). Gender: feminine].

Thelxiope Rafinesque, 1814: 215 [type species: *Thelxiope palpigera* Rafinesque, 1814, by monotypy. Gender: feminine]. [Name suppressed by International Commission of Zoological Nomenclature, opinion 522].

Diagnosis.— Carapace thick, deep, broadest anteriorly or lateral margins subparallel; dorsal and lateral surfaces with spinules or spines; hepatic region not swollen. Maxilliped 3 pediform. Pereopod 5 merus not reaching anteriorly to the level of protogastric spines; dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Two of 11 described species of *Homola* are known from Taiwan.

Key to species of *Homola* from Taiwan

1. Rostrum spiniform, apex minutely bifurcate. Anterolateral angle of carapace with prominent, conical spine reaching anteriorly slightly beyond base of eyes ····· ***H. mieensis***
- Rostrum distinctly bifid. Anterolateral angle of carapace with small, short spines, none reaching as far forward as base of eyes ····· ***H. orientalis***

Homola mieensis Sakai, 1979
三重人面蟹

Fig. 46. Female, Dongsha, 22 Apr 1995.

Fig. 47. Female, Dasi fishing port, Yilan County, 20 Apr 1995, dried specimen.

Homola mieensis Sakai, 1979: 3, frontispiece fig. 2, figs. 1c, 3b [type locality: Hamajima, Mie Prefecture, Japan].— Ng, Wang, Ho & Shih, 2001: 6, 74, fig. 1a.

Material examined.— Dasi fishing port, Yilan County, 20 Apr 1995: 1 female (cw 36.0 mm, cl 42.6 mm) (TMCD). Dongsha, Apr 1995: 1 female (cw 37.2 mm, cl 41.4 mm) (Taiwan Fisheries Research Institute, Keelung).

Diagnosis.— Rostrum spiniform, apex minutely bifurcate. Hepatic region with several spinules and large, robust, anteriorly or anterolaterally directed spines, extending anteriorly slightly beyond level of base of eyestalk. Carapace (excluding spines) widest in posterior half. Pereopods 2 and 3 meri with spinose flexor margin.

Size.— To cw 55.0 mm, cl 65.0 mm (Ikeda, 1998).

Colouration.— Overall background colour dirty white covered with dense reddish mottling. Cheliped fingers black.

Habitat.— Soft substrates; 200–240 m (Ikeda, 1998; Richer de Forges & Ng, 2008).

Distribution.— Japan, Taiwan, South China Sea (Dongsha), Solomon Islands (Richer de Forges & Ng, 2008).

Remarks.— *Homola mieensis* was reported from Dongsha and Taiwan (Ng *et al*., 2001). This species is easily distinguished from its only other Taiwanese congener by its minutely bifurcate, rather than distinctly bifurcate rostral apex, strong and robust rather than small anterolateral (hepatic) spines, and different carapace shape. In *H. orientalis*, the carapace (excluding spines) is widest anteriorly, rather than in the posterior half as in *H. mieensis*. The colour in life of *Homola mieensis* is very distinctive and easily distinguishes it from all congeners. As the TMCD specimen is dry mounted and the Dongsha specimen had transferred to the Taiwan Fisheries Research Instutue, Keelung and could not be located during this study, a specimen from New Caledonia is used to illustrate the distinguishing characters of the species.

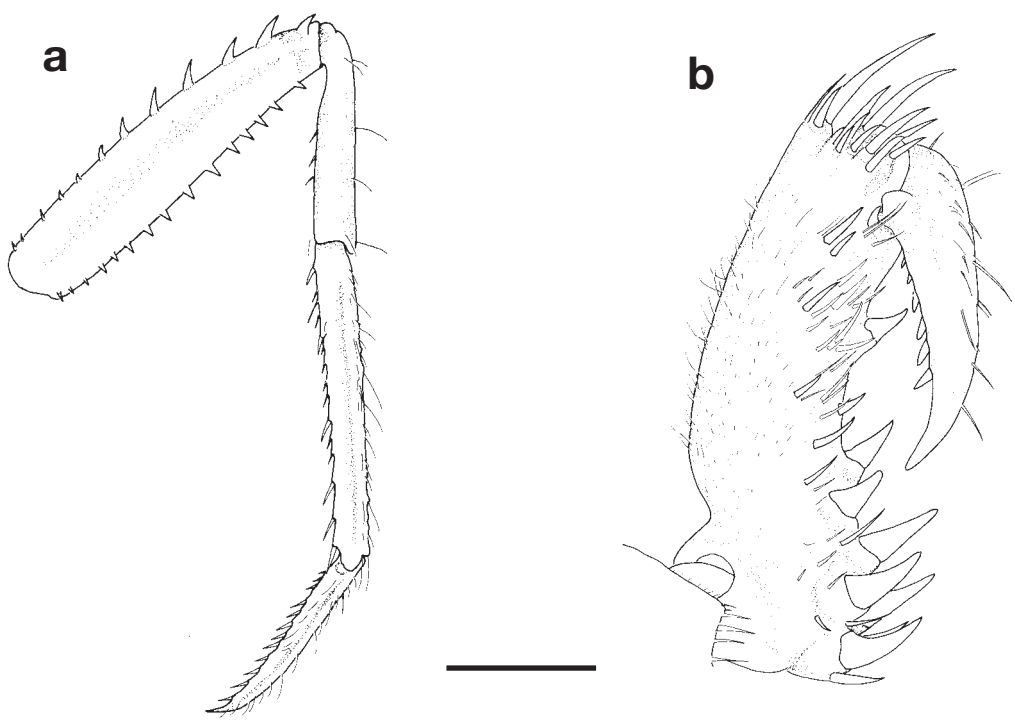


Fig. 48. Male (cw 21.7 mm, cl 27.9 mm), New Caledonia (ZRC 2008.0978): **a,** right pereopod 3; **b,** propodus and dactylus of right pereopod 5. Scale: a = 10 mm, b = 2 mm.

Homola orientalis Henderson, 1888
東方人面蟹

Fig. 49. Female, Donggang fishing port, Pingtung County, 16 Jun 2004.

Homola orientalis Henderson, 1888: 19, pl. 2: 1, 1a [off Cebu, Philippines, 10°14'N, 123°54'E, 174 m].— Hu & Tao, 1996: pl. 9: figs 3, 8.— Jeng, Shao, Fung, Tzeng & Wu, 1998: 122.— Tan, Huang & Ng, 2000: 182, 183.— Ng, Wang, Ho & Shih, 2001: 6.

Homola andamanica Alcock, 1899: 7 [type locality: Andaman Sea].

Material examined.— Dasi fishing port, Yilan County, 8 May 1982: 1 female (cw 22.5 mm, cl 26.3 mm) (NTOU).— 1 Apr 1989: 1 male (cw 26.9 mm, cl 32.1 mm) (NTOU).— 13 Nov 1989: 1 female (cw 13.8 mm, cl 17.1 mm) (NTOU).— 19 Jun 1990: 2 females (cw 25.8 mm, cl 31.7 mm; cw 24.6 mm, cl 31.2 mm) (NTOU).— 5 Jul 1990: 1 female (cw 22.2 mm, cl 26.3 mm) (NTOU).— 20 Oct 1990: 1 ovigerous female (cw 26.9 mm, cl 32.4 mm), 1 female (cw 20.2 mm, cl 23.9 mm) (NTOU).— 7 Nov 1990: 1 ovigerous female (cw 26.6 mm, cl 32.3 mm), 1 female (cw 29.5 mm, cl 37.7 mm) (NTOU).— 17 Nov 1990: 1 female (cw 21.5 mm, cl 27.4 mm) (NTOU).— 20 Nov 1990: 2 ovigerous females (cw 21.3 mm, cl 26.6 mm; cw 24.7 mm, cl 28.9 mm) (NTOU).— 19 Mar 1991: 4 females (cw 24.2 mm, cl 33.2 mm – cw 36.2 mm, cl 44.3 mm) (NTOU).— 5 Jun 1991: 1 female (cw 14.1 mm, cl 16.1 mm) (NTOU).— 8 Nov 1991: 1 ovigerous female (cw 21.2 mm, cl 25.1 mm) (NTOU).— 15 Dec 1991: 1 ovigerous female (cw 22.0 mm, cl 27.4 mm) (NTOU).— 20 Jan 1992: 1 male (cw 24.1 mm, cl 29.1 mm) (NTOU).— 20 Mar 1992: 1 male (cw 17.9 mm, cl 21.6 mm), 1 female (cw 20.7 mm, cl 27.0 mm) (NTOU).— 27 May 1997: 1 ovigerous female (cw 27.0 mm, cl 21.7 mm) (ZRC).— 17 Nov 1997: 3 males (largest cw 30.5 mm, cl 39.5 mm), 2 females (ZRC).— Dec 1997: 1 male (cw 19.1 mm, cl 23.3 mm)

(NTOU).— 19 Feb 1998: 2 males (cw 28.7 mm, cl 37.0 mm; cw 30.8 mm, cl 38.5 mm) (NTOU).— 10 Dec 1999: 1 male (cw 34.0 mm, cl 40.5 mm) (NTOU).— 2000: 4 males (largest cw 40 mm, cl 47.9 mm) (ZRC 2001.0036). Nanfang-ao fishing port, Yilan County, 20 Apr 1985: 1 male (cw 20.1 mm, cl 25.1 mm) (NTOU).— 21 Dec 1990: 1 ovigerous female (cw 23.6 mm, cl 29.4 mm) (NTOU).— 10 Apr 1991: 1 male (cw 16.1 mm, cl 19.9 mm), 1 ovigerous female (cw 23.6 mm, cl 28.2 mm) (NTOU).— 16 May 1991: 1 male (cw 21.5 mm, cl 27.9 mm) (ZRC 1995.601).— 19 Jun 1991: 1 ovigerous female (cw 24.2 mm, cl 26.9 mm) (NTOU).— 17 Jul 1991: 1 female (cw 10.2 mm, cl 12.7 mm) (NTOU).— 7 Nov 1991: 1 ovigerous female (cw 27.4 mm, cl 33.1 mm) (NTOU).— 17 Dec 1991: 1 ovigerous female (cw 19.4 mm, cl 23.2 mm) (NTOU).— 21 May 1992: 1 male (cw 17.3 mm, cl 20.9 mm) (NTOU).— 3 Jul 1992: 1 male (cw 19.5 mm, cl 23.4 mm), 1 ovigerous female (cw 27.5 mm, cl 33.6 mm) (NTOU). Donggang fishing port, Pingtung County, 2 Dec 1984: 3 females (cw 15.8 mm, cl 19.1 mm – cw 21.7 mm, cl 28.2 mm) (NTOU).— 16 Mar 1995: 1 male (cw 16.5 mm, cl 19.9 mm) (NTOU). CP58, 24°35.1'N, 122°05.8'E, 221–254 m, 4 Aug 2000: 1 female (cw 7.8 mm, cl 10.9 mm) (NTOU). DW208, 22°17.88'N, 121°29.35'E, 209 m, 30 May 2003: 1 male (12.5 mm, cl 16.6 mm) (NTOU). No specific locality: 2 males (cw 25.6 mm, cl 34.1 mm; cw 30.3 mm, cl 38.5 mm), 1 female (cw 25.3 mm, cl 28.1 mm) (NTOU).— 1 female (cw 21.2 mm, cl 26.4 mm) (NTOU).

Diagnosis.— Carapace with distinctly bifid rostrum; subhepatic region with small spines, largest not extending laterally beyond widest part of carapace; carapace width (excluding spines) greatest anteriorly; with 1 prominent anterolateral spine. Pereopods 2–4 meri with spinules on flexor margin.

Size.— Males to cw 40.0 mm, cl 47.9 mm; females to cw 36.2 mm, cl 44.3 mm (present record).

Colouration.— Overall diffuse red-orange with irregular mottling. Cheliped palms whitish; fingers red-orange, tips whitish.

Habitat.— Soft substrates; 20–650 m (Guinot & Richer de Forges, 1995; Minemizu, 2000; Richer de Forges, 2007).

Distribution.— Western Indian Ocean to Australia, Philippines, China, Taiwan, New Zealand, Hawaii and French Polynesia.

Remarks.— The taxonomy of *H. orientalis* is still problematical. It ranges widely, from the Indian Ocean to Hawaii, and while morphological differences have been observed, they do not presently appear to be sufficiently consistent or substantial to warrant recognition of two or more species (see Guinot & Richer de Forges, 1995; Richer de Forges & Ng, 2007). As observed by Tan *et al*. (2000), adult males from Taiwan generally have more pronounced gastric and epigastric spines than females. Similarly the spine on abdominal somite 2 is sharp in females and juvenile males, becoming blunt in adult males. *Homola orientalis* is known to carry sponge, alcyonarian coral, and even plant debris (Guinot *et al*., 1995; Minemizu, 2000).

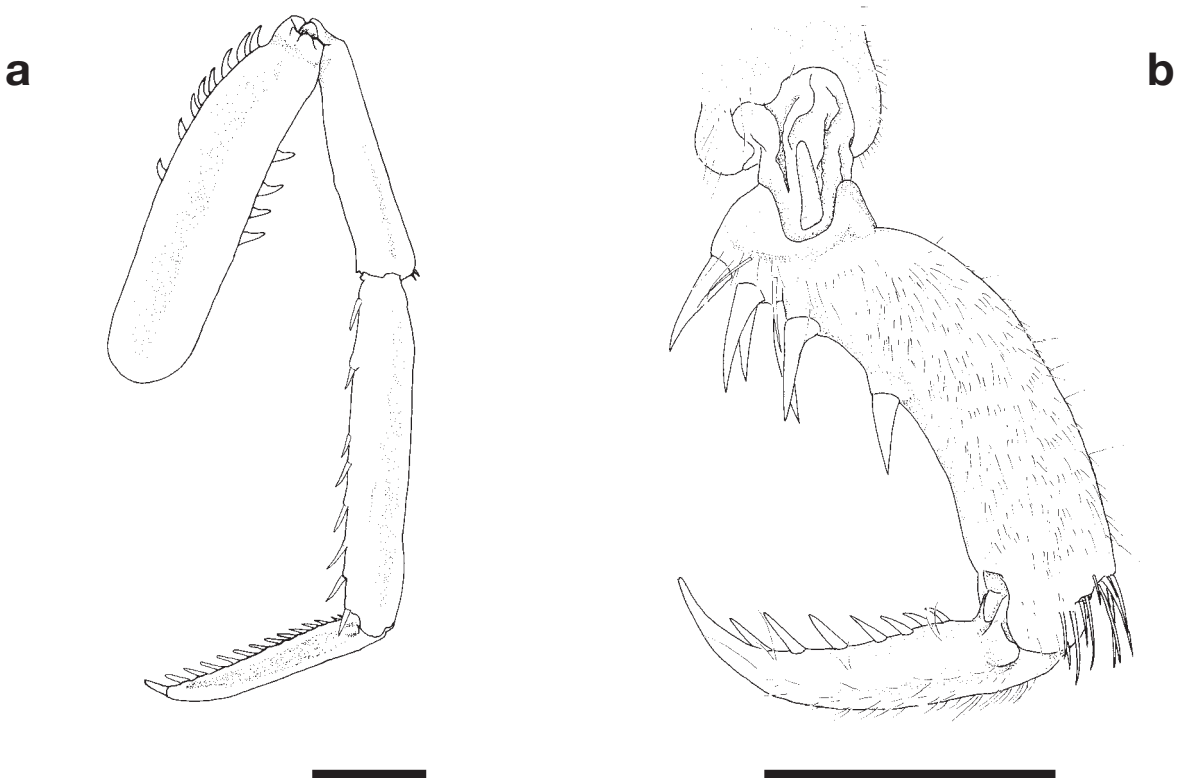


Fig. 50. Male (cw 40.0 mm, cl 47.9 mm), Dasi fishing port, Yilan County, 2000: **a,** right pereopod 3; **b,** propodus and dactylus of right pereopod 5. Scales: a = 10 mm; b = 5 mm.

Genus *Homolochunia* Doflein, 1904
昆人面蟹屬

Homolochunia Doflein, 1904: 21 [type species: *Homolochunia valdiviae* Doflein, 1904, by monotypy. Gender: feminine].

Diagnosis.— Pseudorostral spines distally bifid and dorsally spined, antler-like; as long as or longer than maximum carapace width. Carapace hepatic region swollen, with strong anteriorly directed spine. Pereopod 5 merus distinctly longer than carapace (including rostrum); dactylus and propodus forming large pincer; fingers long, slender, with wide gape.

Remarks.— *Homolochunia* is distinctive in the Homolidae by the unusual structure of the pereopod 5 chela. In other homolids, the pereopod 5 dactylus forms a subchela by occluding against the spinous distal margin of the propodus. In *Homolochunia*, however, the slender pereopod 5 dactylus and a long, curved, basal extension of the propodus form a pincer which has a distinct gape, with only the tips meeting. One of three described species of *Homolochunia* is known from Taiwan. A fourth species of *Homolochunia* was recently described from the Solomon Islands (Richer de Forges & Ng, 2008)

Homolochunia gadaletae Guinot & Richer de Forges, 1995
加氏昆人面蟹

Fig. 51. Male, Dongsha, April 1995.

Fig. 52. Female, Dongsha, April 1995.

Homolochunia gadaletae Guinot & Richer de Forges, 1995: 434, figs. 50e–f, 51d–f [type locality: Tosa Bay, Japan, 250 m].— Huang & Hsueh, 1998: 222, fig. 1a–d.— Tan, Huang & Ng, 2000: 183.— Ng, Wang, Ho & Shih, 2001: 6.

Material examined.— Nanfang-ao fishing port, Yilan County, 4 Jul 1997: 1 female (cw 31.4 mm, cl 39.4 mm) (NMNS 2677-1), 1 male (cw 26.6 mm, cl 35.7 mm), 1 female (cw 30.4 mm, cl 37.8 mm) (ZRC 1999.2401). Gushan fishing port, Kaoshiung City, 2 Nov 1957: 1 male (dried) (TMCD 388). Kaoshiung, 2 Nov 1963: 1 female (dried) (TMCD 256). Donggang fishing port, Pingtung County, 2 Nov 1978: 1 dried specimen (TMCD 389), 1 dried specimen (TMCD 390). Dongsha, 420 m, 21 Apr 1995: 1 male (cw 24.4 mm, cl 35.3 mm) (NTOU). No specific locality: 1 female (cw 24.8 mm, cl 37.4 mm) (ZRC 1998.0475).

Diagnosis.— Pseudorostral spines subparallel or slightly divergent; bifid distally, proximal margin with several small spinule. Carapace midlateral margins with 2 pronounced spines (1 anterolateral spine, 1 posterolateral spine). Pereopod 5 merus about two-thirds length of pereopod 4 merus; chela prominent, pollex at least one-third carpus length, with wide gape between fingers.

Size.— Males to cw 26.6 mm, cl 35.7 mm; females to cw 31.4 mm, cl 39.4 mm (present record).

Colouration.— Light brown to pinkish.

Habitat.— Sandy or muddy substrates; 150–420 m.

Distribution.— Japan, Taiwan and South China Sea (Dongsha).

Remarks.— The distinctive pincer-like pereopod 5 will distinguish *H. gadaletae* from all other Taiwanese homolids. The four described species of *Homoluchunia* have discrete known ranges: *H. kullar* Griffin & Brown, 1976 is known only from the southwestern Pacific between Lifou, New Caledonia and eastern Australia; *H. valdiviae* Doflein, 1904, ranges from the western Indian Ocean to southern Indonesia; *H. gadaletae* is known only from Japan, Taiwan and the South China Sea; and *H. menezi* Richer de Forges & Ng, 2008, is known only from the Solomon Islands. The present photographs are of specimens collected from Dongsha.

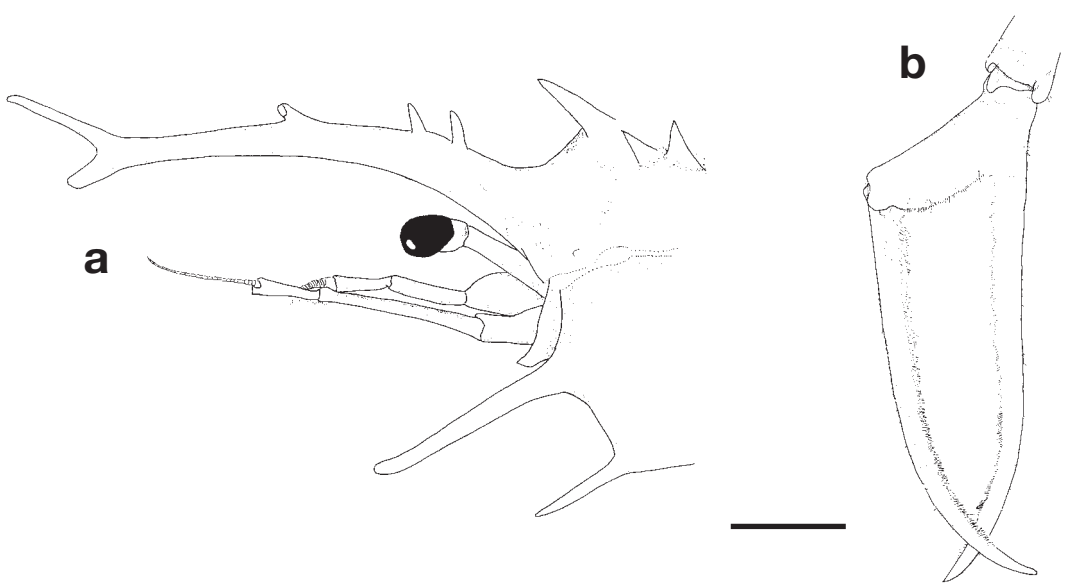


Fig. 53. Female (cw 30.4 mm, cl 37.8 mm), Nanfang-ao fishing port, Yilan County, 4 Jul 1997: **a,** anterior part of cephalothorax, lateral view; **b,** propodus and dactylus of left pereopod 5. Scale = 5 mm.

Genus *Homologenus* A. Milne-Edwards *in* Henderson, 1888
似人面蟹屬

Homolopsis A. Milne-Edwards, 1880: 34 [type species: *Homolopsis rostratus* A. Milne-Edwards, by monotypy. Gender: feminine. Preoccupied by *Homolopsis* Gray, 1842 (Reptilia)].

Homologenus A. Milne-Edwards *in* Henderson, 1888: 20. [Replacement name for *Homolopsis* A. Milne-Edwards, 1880: 34].

Diagnosis.— Rostrum with pair of dorsal spines, directed anterolaterally, forming trident. Carapace longitudinally ovate, broadest posteriorly; with with long lateral spine at base of cervical groove and long upright gastric spine. Pereopod 5 merus shorter than carapace; dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Ten species of *Homologenus* are currently known, of which only one occurs in Taiwan.

Homologenus malayensis Ihle, 1912
馬來似人面蟹

Fig. 54. Ovigerous female, PCP344.

Homologenus malayensis Ihle, 1912: 209 [type locality: Sulawesi, Indonesia, 1°58.5'N, 125°00.5'E, 1165 m]. — Ho, Ng, Chan & Lee, 2004: 642, fig. 1A.

Material examined.— CP32, 22°01.7'N, 120°11.1'E, 910–1129 m, 30 Jul 2000: 1 female (cw 11.7 mm, cl 14.3 mm) (NTOU). CD192, 22°17.19'N, 120°1.01'E, 960–1302 m, 28 Aug 2002: 1 ovigerous female (cw 13.5 mm, cl 15.4 mm) (NTOU). PCP344, 22°15.952'N, 120°0.110'E, 995–1073 m, 8 Mar 2006: 1 ovigerous female (cw 12.9 mm, cl 14.5 mm excluding broken rostrum) (NTOU). PCP445, 22°17.102'N, 120°0.167'E, 982–999 m, 14 Jul 2008: 1 ovigerous female (cw 13.0 mm, cl 13.7 mm) (NTOU).

Diagnosis.— Carapace with long, laterally directed anterolateral spine, posterolateral margin unarmed; gastric region with strong upright spine; antennal spine styliform; rostrum longer than twice length of pseudorostral spines. Distal end of pereopods 2–4 meri with extensor spine but not flexor spine. Pereopod 4 merus with smooth, unarmed, flexor margin.

Size.— Males to cw 6.5 mm, cl 10.8 mm(Guinot & Richer de Forges, 1995); females to cw 13.5 mm, cl 15.4mm.

Colouration.— Overall translucent off-white.

Habitat.— Soft substrates; 769–1302 m (Guinot & Richer de Forges, 1995; present record).

Distribution.— Indonesia, Philippines, Taiwan and Japan.

Remarks.— *Homologenus malayensis* is easily distinguished from all other Taiwanese homolids by the

long tridentate rostrum in combination with the long, outwardly directed lateral carapace spines. It is rarely seen because it prefers very deep water.

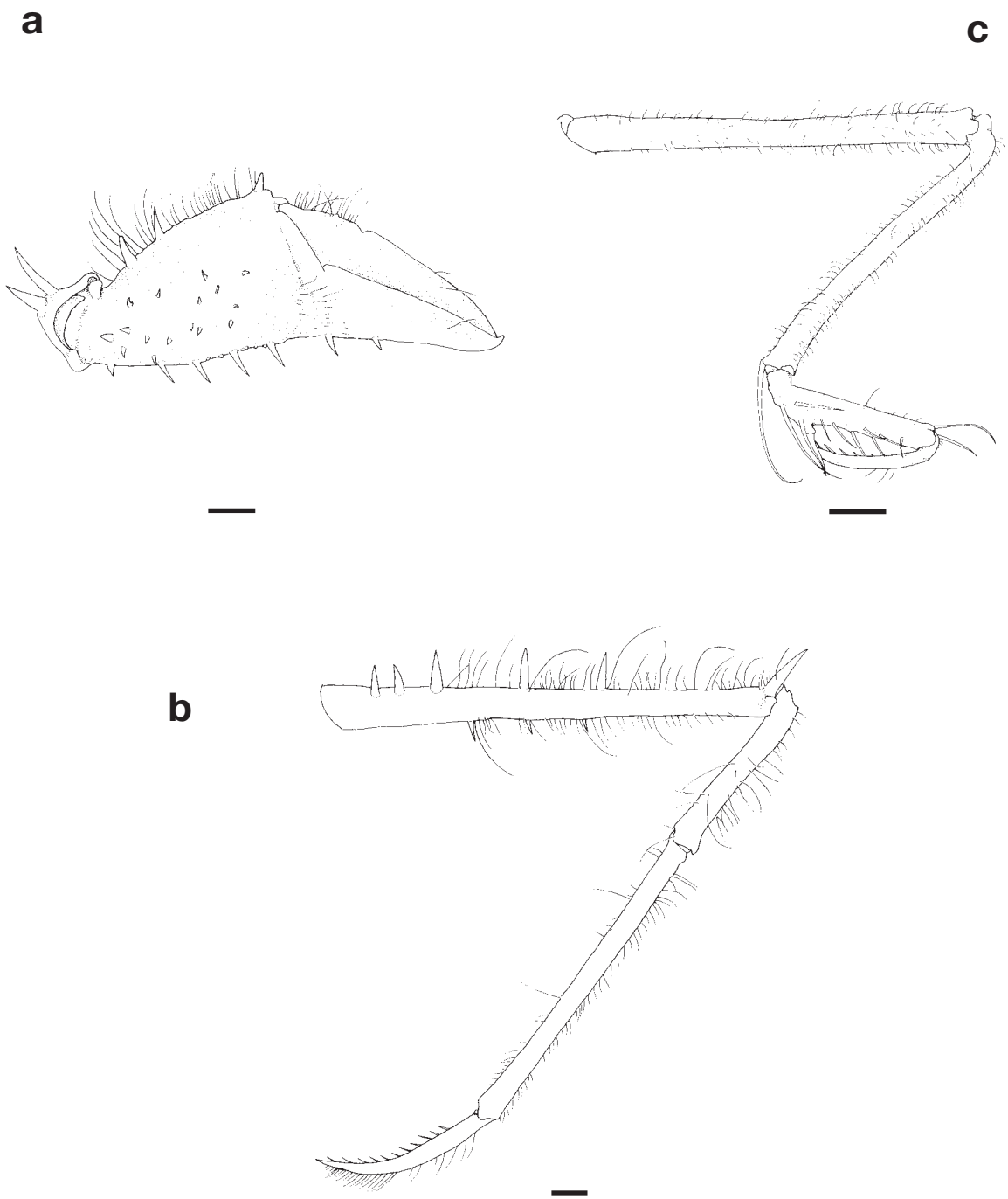


Fig. 55. Ovigerous female (cw 12.9 mm, cl 14.5 mm), PCP344: **a,** right chela; **b,** right pereopod 3; **c,** right pereopod 5. Scales = 1 mm.

Genus *Homolomannia* Ihle, 1912
曼人面蟹屬

Homolomannia Ihle, 1912: 206 [type species: *Homolomannia sibogae* Ihle, 1912, by monotype. Gender: feminine].

Diagnosis.— Carapace dorsum tomentose; rostral and pseudorostral teeth short, triangular; hepatic region swollen, anterolaterally produced into stout conical spine. Maxilliped 3 operculiform, almost fully covering buccal cavity. Pereopod 5 propodus L-shaped, held at right angle to carpus; dactylus occluding with flexor margin of propodus, forming subchela; merus shorter than carapace length (including rostrum).

Remarks.— Both species of *Homolomannia* occur in Taiwan.

Key to species of *Homolomannia*

1. Carapace gastric region flat; intestinal region without ridge. Pereopod 5 propodus occlusal margin with short spine opposing apex of dactylus ····· ***H. occlusa***
- Carapace gastric region inflated; intestinal region with low transverse ridge. Pereopod 5 propodus occlusal margin without spine opposing dactylus ····· ***H. sibogae***

Homolomannia occlusa Guinot & Richer de Forges, 1981
封口曼人面蟹

Fig. 56. Male, Donggang fishing port, Pingtung County, 23 Mar 1985.

Homolomannia occlusa Guinot & Richer de Forges, 1981: 537, figs. 3f, 4i, pl. 6: 2a–c [type locality: Majunga, Madagascar, 180–200 m].— Tan, Huang & Ng, 2000: 183.— Ng, Wang, Ho & Shih, 2001: 6.— Chen & Sun, 2002: 155–156, fig. 66.— Richer de Forges & Ng, 2007: 41–42, fig. 8E–F.— Richer de Forges & Ng, 2008: 14, figs. 11, 12.

Material examined.— Donggang fishing port, Pingtung County, 23 Feb 1985: 1 male (cw 13.4 mm, cl 17.8 mm) (NKMT).

Diagnosis.— Pseudorostral spines broadly triangular. Carapace gastric region flat; intestinal region without ridge. Buccal cavity rounded anterolaterally. Pereopod 5 propodus with short spine opposing apex of dactylus.

Size.— Males to cw 18.4 mm, cl 22.7 mm; females to cw 14.3 mm, cl 18.8 mm (Richer de Forges & Ng, 2007, 2008; Chen & Sun, 2002).

Colouration.— Bright red (Richer de Forges & Ng, 2007).

Habitat.— Soft substrates and steep slopes; 180–210 m.

Distribution.— Madagascar, Philippines and Taiwan.

Remarks.— *Homolomannia occlusa* was described from Madagascar, was then reported from Taiwan by Tan *et al*. (2000) and has since been reported from the Philippines. In the Philippines, *H. occlusa* and *H. sibogae* occur on both level and steep, sloping habitats, though there appears to be a degree of habitat differentiation (Richer de Forges & Ng, 2007). *Homolomannia occlusa* appears to favour steep slopes, and *H. sibogae*, more

level substrates. As has been discussed by Richer de Forges & Ng (2007), the crimson red colour of *H. occlusa* in life is diagnostic and easily distinguishes it from the dull brown *H. sibogae*. Chen & Sun (2002) incorrectly reported this specimen as a female.

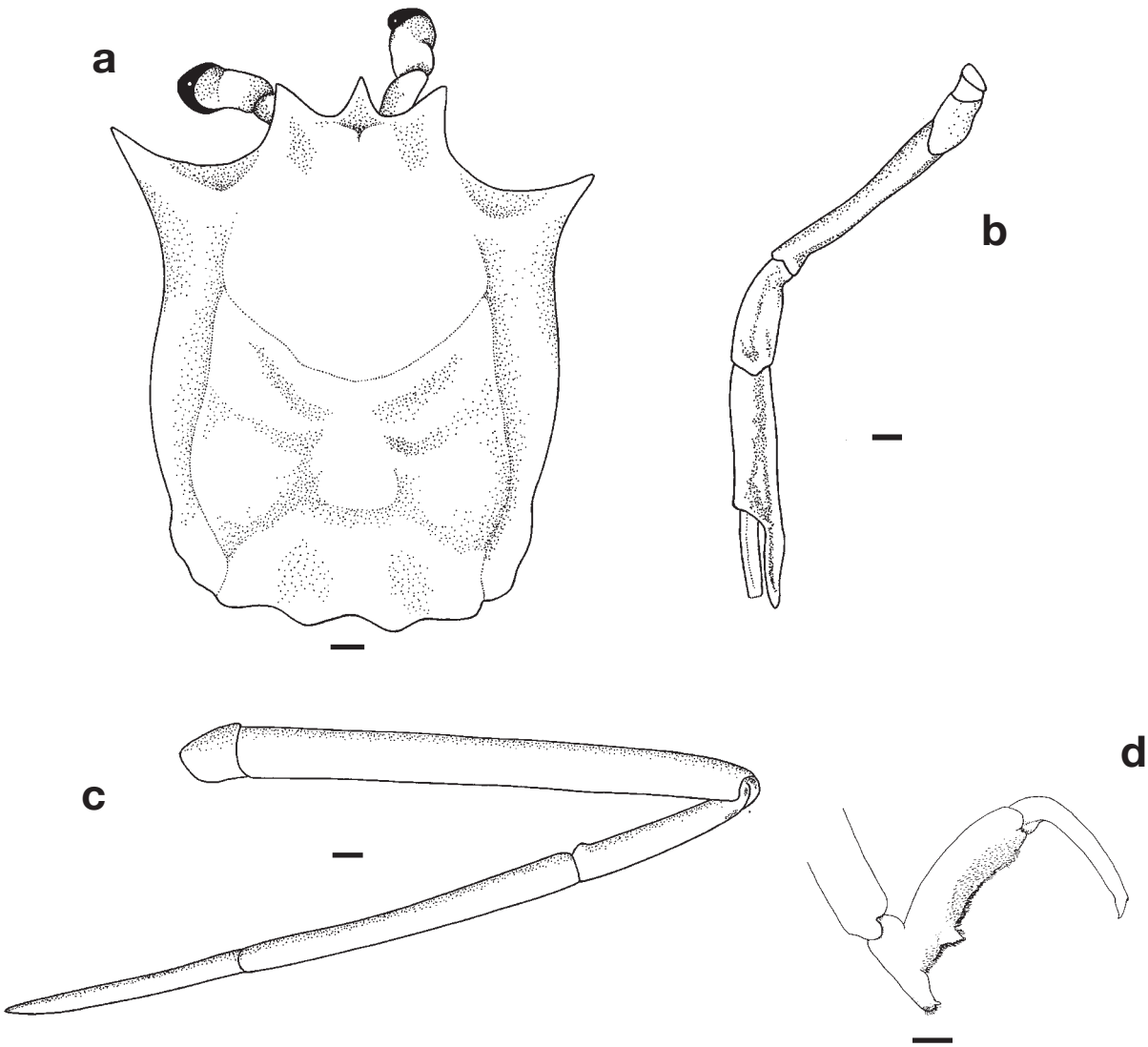


Fig. 57. Male (cw 13.4 mm, cl 17.8 mm), Donggang fishing port, Pingtung County, 23 Feb 1985: **a,** carapace; **b,** right chela; **c,** right pereopod 3; **d,** dactylus of right P5. Scales: a-c = 1 mm, d = 10 mm. (a-c after Chen & Sun, 2002, d after Tan et al., 2000).

Homolomannia sibogae Ihle, 1912
西氏曼人面蟹

Fig. 58. Male, Donggang fishing port, Pingtung County, 21 Mar 2005.

Fig. 59. Female, Dasi fishing port, Yilan County.

Homolomannia sibogae Ihle, 1912: 208 [type locality: Kai Islands, Indonesia, 310 m].— Tan, Huang & Ng, 2000: 183, 184, figs. 1b, 3.— Ng, Wang, Ho & Shih, 2001: 6.— Chen & Sun, 2002: 154–155, fig. 65 — Richer de Forges & Ng, 2007: 41, fig. 8C–D.— Richer de Forges & Ng, 2008: 11, figs. 9, 10.

Material examined.— Dasi fishing port, Yilan Country, 2 Jul 2003: 1 male (cw 27.1 mm, cl 33.9 mm) (NTOU). Donggang fishing port, Pingtung County, 2 Dec 1984: 1 female (cw 28.0 mm, cl 33.8 mm) (NKMT).— 31 oct 1989: 1 male (cw 24.1 mm, cl 29.2 mm) (NTOU).— 2 Apr 1992: 1 female (cw 19.8 mm, cl 24.0 mm) (NKMT).— 2 Dec 1995: 1 female (cw 26.5 mm, cl 32.0 mm) (NKMT).— 22 Jan 1996: 1 female (cw 23.2 mm, cl 29.2 mm) (NKMT).— 6 Nov 2000: 1 male (cw 23.6 mm, cl 30.6 mm), 1 ovigerous female (cw 24.9 mm, cl 32.7 mm) (ZRC 2001.0038).— 21 Mar 2005: 1 male (cw 23.6 mm, cl 29.2 mm) (NTOU).

Diagnosis.— Pseudorostral spines stout, conical. Gastric region inflated; intestinal region with low transverse ridge. Buccal cavity with anterolateral tooth. Pereopod 5 propodus without spine opposing dactylus.

Size.— Males to cw 23.6 mm, cl 30.6 mm; females to cw 28.0 mm, cl 34.2 mm (present study; Chen & Sun, 2002).

Colouration.— Usually dull orangish-brown, occasionally pale orange. Distal ends of pereopods 2–4 merus, carpus, propodus and dactylus reddish.

Habitat.— Soft level substrates and steep slopes; 204–1258 m (Richer de Forges & Ng, 2007).

Distribution.— New Caledonia, Lifou, Indonesia, Philippines, Taiwan and Japan.

Remarks.— *Homolomannia sibogae* appears to be more common in Taiwan than *H. occlusa*, both of which were first reported from the island by Tan *et al.* (2000). The identity of the material from New Caledonia and adjacent areas needs to be verified; there appear to be consistent differences that suggest that it may be a different species (Guinot & Richer de Forges, 1995; Richer de Forges & Ng, 2008).

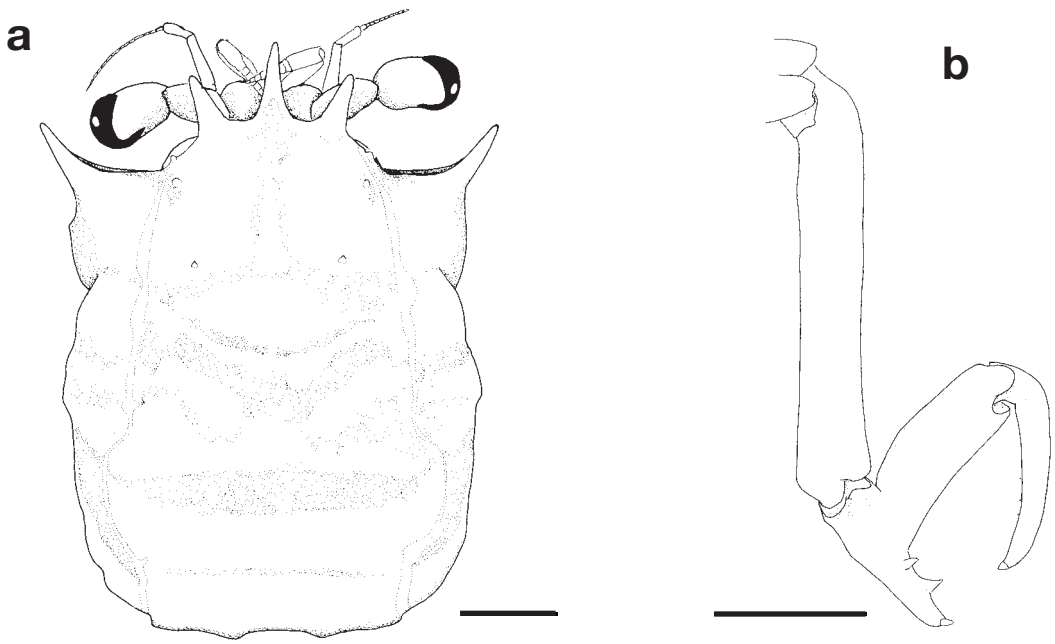


Fig. 60. Male (cw 23.6 mm, cl 30.6 mm), Donggang fishing port, Pingtung County, 3 Nov 2000: **a,** carapace; **b,** right pereopod 5 distal segments. Scales = 5 mm.

Genus *Lamoha* Ng, 1998
拉摩蟹屬

Hypsophrys Wood-Mason & Alcock, 1891: 269 [type species: *Hypsophrys supercliosa* Wood-Mason & Alcock, 1891. Gender: feminine].

Lamoha Ng, 1998a: 121–125. [Replacement name for *Hypsophrys* Wood-Mason & Alcock, 1891, preoccupied by *Hypsophrys* Agassiz, 1858 (Pisces)].

Diagnosis.— Carapace thick, longitudinally subquadrate; anterior wall either side of rostrum with elongated, transverse cavity forming orbit-like structure; pseudorostral and supraorbital spines distinctly shorter than rostrum. Maxilliped 3 pediform, not covering buccal cavity. Outer surface of cheliped palm with dark coloured sunken depression at base of pollex in males and some females. Pereopod 5 very slender, distinctly shorter than carapace; merus much narrower than pereopod 4 merus; dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Species of *Lamoha* were originally placed in *Hypsophrys* Wood-Mason & Alcock, 1891. Ng (1998a), however, showed that the name *Hypsophrys* Wood-Mason & Alcock, 1891, was preoccupied by *Hypsophrys* Agassiz, 1858 [Pisces], warranting the replacement name *Lamoha*. Species of *Lamoha* are known to carry sea anemones (Guinot *et al*., 1995). Nine species of *Lamoha* are currently known, of which three occur in Taiwan.

Key to species of *Lamoha* from Taiwan

1. Rostrum apically bifid. Pereopod 5 merus with spinose flexor margin ····· ***L. murotoensis***
- Rostrum simple, apex undivided. Pereopod 5 merus with smooth flexor margin ····· 2
2. Carapace with 1 hepatic spine (both sexes); supraorbital margin entire; gastro-cervical groove deep; sunken depression at base of cheliped pollex very prominent, deep, always darkly pigmented ····· ***L. longirostris***
- Carapace with 2 hepatic spines (female); supraorbital margin with low lobe; gastro-cervical groove relatively shallower; sunken depression at base of cheliped pollex shallow, not prominent, weakly to not pigmented ·· ····· ***L. superciliosa***

Lamoha longirostris (Chen, 1986) 長額拉摩蟹

Fig. 61. Male, CP372.

Fig. 62. Ovigerous female, Dongsha.

Hypsophrus longirostris Chen, 1986: 227 [misspelling of *Hypsophrys*] [type locality: East China Sea, 28°45'N, 127°30'E, 900 m].

Hypsophrys futuna Guinot & Richer de Forges, 1995: 456, figs. 61l, 66a, g [type locality: near Combe Bank and Bayonnaise Bank, 12°35'S, 178°11.5'W, 1300].

Lamoha longirostris.— Ng & Chen, 1999: 760, figs. 1, 2.— Ng, Wang, Ho & Shih, 2001: 54.— Takeda, Watabe & Ohta, 2005: 106, fig. 1B.— Richer de Forges & Ng, 2008: 20, figs. 17, 18, 22B–D.

Material examined.— Dongsha, 1265 m, 25 Apr 1996: 1 male (cw 19.0 mm, cl 24.7 mm) (TMCD), 1 male (cw 20.5 mm, cl 26.3 mm) (ZRC 1999.410).— no date, 1400 m: 2 ovigerous females (cw 21.6 mm, cl 26.4 mm; cw 19.0 mm, cl 21.6 mm) (ZRC 2008.0991). CP372, 24º23.619'N, 122º14.138'E, 1220–1280 m, 26 Aug 2006: 1 male (cw 19.2 mm, cl 23.4 mm) (NTOU).

Diagnosis.— Carapace with simple rostrum; supraorbital margin unarmed; subhepatic region with 1 large, anteriorly directed, inner spine, and 1 small outer spinule or granule; protogastric region smooth, unarmed. Dark coloured sunken depression at base of cheliped pollex in both sexes. Pereopod 5 merus with smooth, unarmed flexor margin.

Size.— Males to cw 20.5 mm, cl 26.3 mm, females to cw 21.6 mm, cl 26.4 mm (present study).

Colouration.— Pinkish to orangish–red (Richer de Forges & Ng, 2008).

Habitat.— Soft mud; 630–1440 m (Takeda *et al*., 2005; present record).

Distribution.— China, Taiwan, Japan and the Wallis and Futuna Islands.

Remarks.— Ng & Chen (1999) showed that *Lamoha longirostris* is a senior synonym of *Hypsophrys futuna* Guinot & Richer de Forges, 1995. The species was first reported from the Dongsha by Ng *et al*. (2001) and we have two specimens from near that area in the South China Sea (see Richer de Forges & Ng, 2008). It is here reported from Taiwan for the first time.

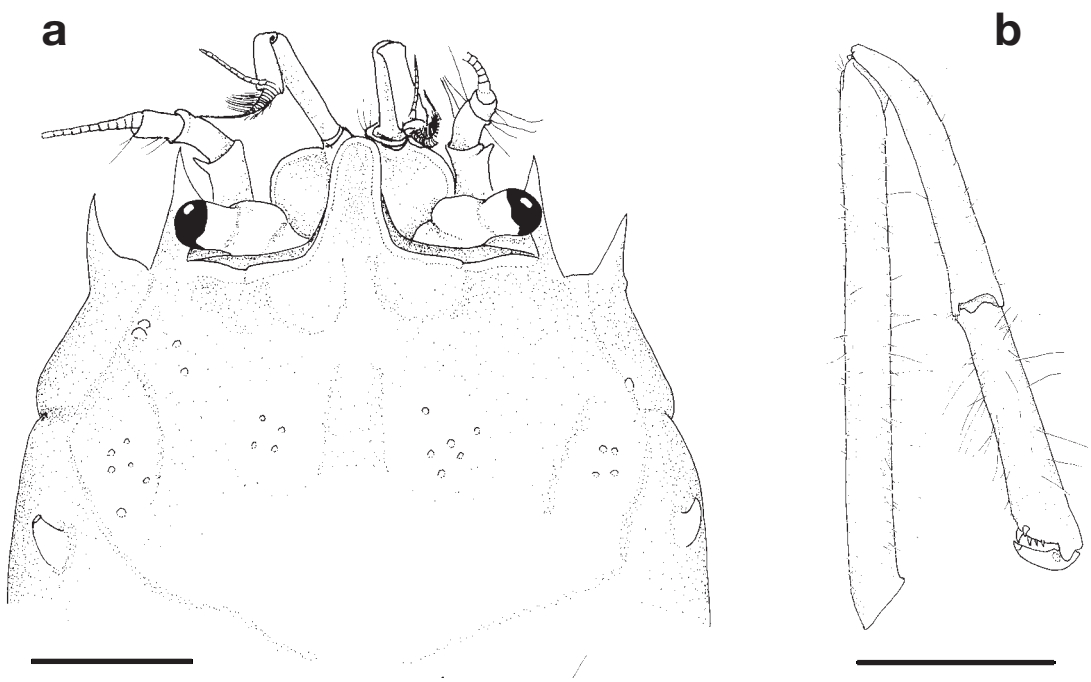


Fig. 63. Male (cw 20.5 mm, cl 26.3 mm), Dongsha, 25 Apr 1996: **a,** anterior part of carapace; **b,** right pereopod 5. Scales = 5 mm.

Lamoha murotoensis (Sakai, 1979)
室戶拉摩蟹

Fig. 64. Male, CD386.

Hypsophrys murotoensis Sakai, 1979: 6, figs. 2a–c, 3d [type locality: Muroti-zaki, Kochi Prefecture, Japan, 200 m].— Guinot & Richer de Forges, 1995: 449, fig. 57c.

Lamoha murotoensis.— Tan, Huang & Ng, 2000: 185.— Ng, Wang, Ho & Shih, 2001: 6.— Ng & Wang, 2002: 14, fig. 1.— Richer de Forges & Ng, 2008: 21, fig. 16B, D.

Material examined.— Dasi fishing port, Yilan Country, Aug 2005: 1 female (cw 23.5 mm, cl 28.7 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 3 Jul 1992: 1 male (cw 18.6 mm, cl 20.5 mm) (NKMT), 1 male (cw 18.5 mm, cl 22.2 mm) (ZRC).— Oct 1999: 1 ovigerous female (cw 22.0 mm, cl 25.0 mm) (ZRC).— 5 Sep 2000: 1 male (cw 28.4 mm, cl 35.2 mm) (ZRC 2001.130).— no date: 1 male (cw 18.5, cl 22.0 mm) (ZRC). CD380, 24°38.598'N, 122°10.436'E, 456–330 m, 24 Jul 2006: 1 female (cw 18.7 mm, cl 23.6 mm) (NTOU). CD386, 24°38.472'N, 122°09.911'E, 301–304 m, 25 Jul 2006: 3 males (cw 21.1 mm, cl 24.1 mm – cw 29.5mm, cl 34.1 mm) (NTOU).

Diagnosis.— Carapace with bifid rostrum; with pseudorostral and supraorbital spine; subhepatic region with 1 large, anteriorly directed inner spine, and 1 small outer spinule or granule; upper posterolateral margin with strongly granulate carina. Pereopod 5 merus with unarmed extensor margin; flexor margin spinose.

Size.— Males to cw 32.7 mm, cl 39.0 mm; females to cw 31.2 mm, cl 36.0 mm (Guinot & Richer de Forges, 1995).

Colouration.— Overall reddish-pink, darkest on carapace. Carapace spines, tubercles and margins of front

and rostrum, lateral and posterior margins white. Cheliped fingers black-brown distally, white proximally; spines and carpo-meral articulation white. Pereopods 2–4 with white spines, carpo-meral articulation and dactylus margins.

Habitat.— Sandy-mud substrates; 35–456 m (Guinot & Richer de Forges, 1995; present study). The 35 m depth recorded for the NKMT specimen is somewhat suspicious as the species is generally known from waters deeper than 100 m (see also Ng & Wang, 2002; Richer de Forges & Ng, 2007).

Distribution.— Madagascar and the Seychelles, Marquesas Islands, Indonesia, Philippines, Japan and Taiwan (Ng & Wang, 2002).

Remarks.— The distally bifurcate, rather than undivided, rostrum, as well as the ornamented dorsal surface of the carapace will distinguish *L. murotoensis* from the two other species of the genus from Taiwan and Dongsha.

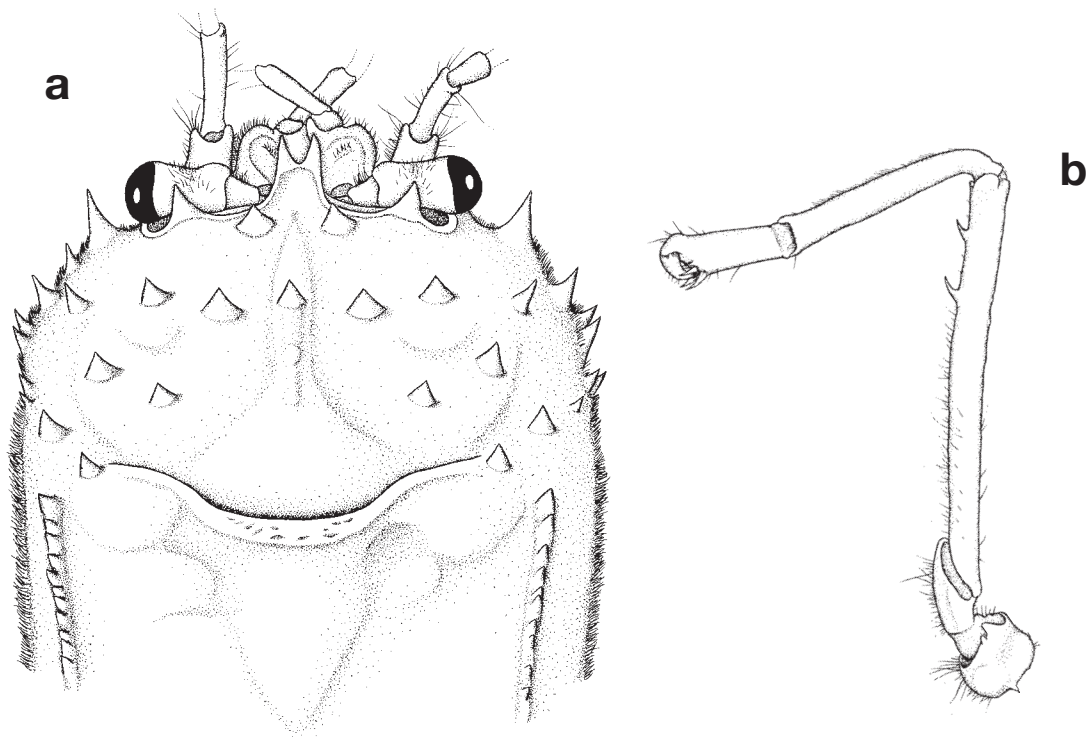


Fig. 65. Male (cw 18.5 mm, cl 22.2 mm), Nanfang-ao fishing port, Yilan County, 3 Jul 1992: **a,** anterior part of carapace; **b,** left pereopod 5. Scales: a = 10 mm, b = 5 mm.

Lamoha superciliosa (Wood-Mason & Alcock, 1891)
眼眉拉摩蟹

Fig. 66. Male, CP277.

Fig. 67. Ovigerous female, OCP280.

Hypsophrus superciliosa Wood-Mason & Alcock, 1891: 269 [type locality: Arabian Sea, 15°02'N, 73°34'E, 1353 m].

Lamoha superciliosa.— Richer de Forges & Ng, 2008: 23, figs. 19, 20, 21, 22E– F

Material examined.— CP277, 24°23.57'N, 122°14.12'E, 1222–1261 m, 14 Jun 2005: 1 male (cw 14.8 mm, cl 18.1 mm), 2 females (cw 9.9 mm, cl 12.2 mm; cw 8.3 mm, cl 10.5 mm) (NTOU). OCP280, 24°23.71'N, 122°14.22'E, 1212–1261m, 14 Jun 2005: 1 ovigerous female (cw 14.8 mm, cl 18.1 mm) (ZRC).

Diagnosis.— Carapace with simple rostrum; supraorbital spine low; subhepatic region with 2 large, anteriorly directed spines in females; protogastric region with scattered spinules. Dark coloured sunken depression at base of cheliped pollex in both sexes. Pereopod 5 merus flexor margin smooth, unarmed.

Size.— Males to cw 14.8 mm, cl 18.1 mm; females to cw 22.0 mm, cl 25.0 mm (present study; Serène & Lohavanijaya, 1973).

Colouration.— Overall uniform orangish–red to pinkish–red. Cheliped fingers black-brown on distal two-thirds.

Habitat.— Sand and mud substrates; 183–2000 m.

Distribution.— Indian Ocean from the Maldives, Bay of Bengal to the South China Sea and Taiwan (see Richer de Forges & Ng, 2008).

Remarks.— This relatively small and poorly known species was described from the Persian Gulf area and has also been reported from off Vietnam by Serène & Lohavanijaya (1973). *Lamoha superciliosa* is recorded for the first time from Taiwan and is treated at some length by Richer de Forges & Ng (2008). These authors commented that there were some differences between the Indian Ocean and Pacific material but could not be certain if they were significant at the species level.

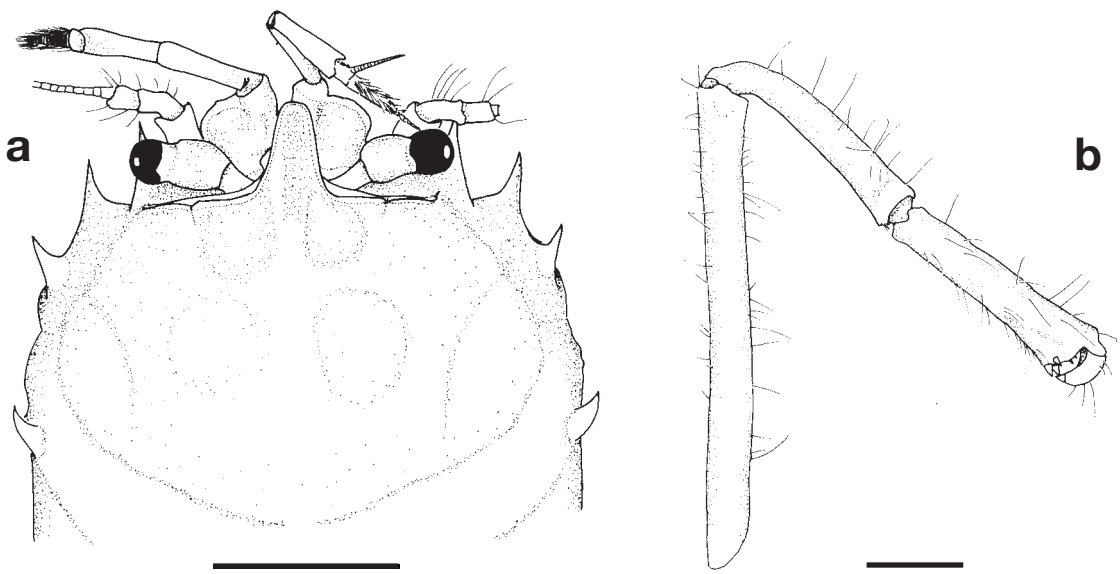


Fig. 68. Ovigerous female (cw 14.8 mm, cl 18.1 mm), OCP280: **a,** anterior part of carapace; **b,** right pereopod 5. Scales: a = 5 mm, b = 2 mm.

Genus *Latreillopsis* Henderson, 1888
仿蛛形蟹屬

Latreillopsis Henderson, 1888: 21 [type species: *Latreillopsis bispinosa* Henderson, 1888, by monotypy. Gender: feminine].

Diagnosis.— Carapace dorsum glabrous; rostral and pseudorostral spines slender, elongate; hepatic region swollen, anterolaterally produced into slender conical spine. Pereopod 5 dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Ten described species of *Latreillopsis* are known (Richer de Forges & Ng, 2008), with two from Taiwan.

Key to species of *Latreillopsis* from Taiwan

1. Carapace with 2 hepatic spines. Maxilliped 3 merus with bluntly rounded outer distal angle ‥ ***L. bispinosa***
- Carapace with 4 hepatic spines. Maxilliped 3 merus with pointed outer distal angle ……. ***L. tetraspinosa***

Latreillopsis bispinosa Henderson, 1888
雙刺仿蛛形蟹

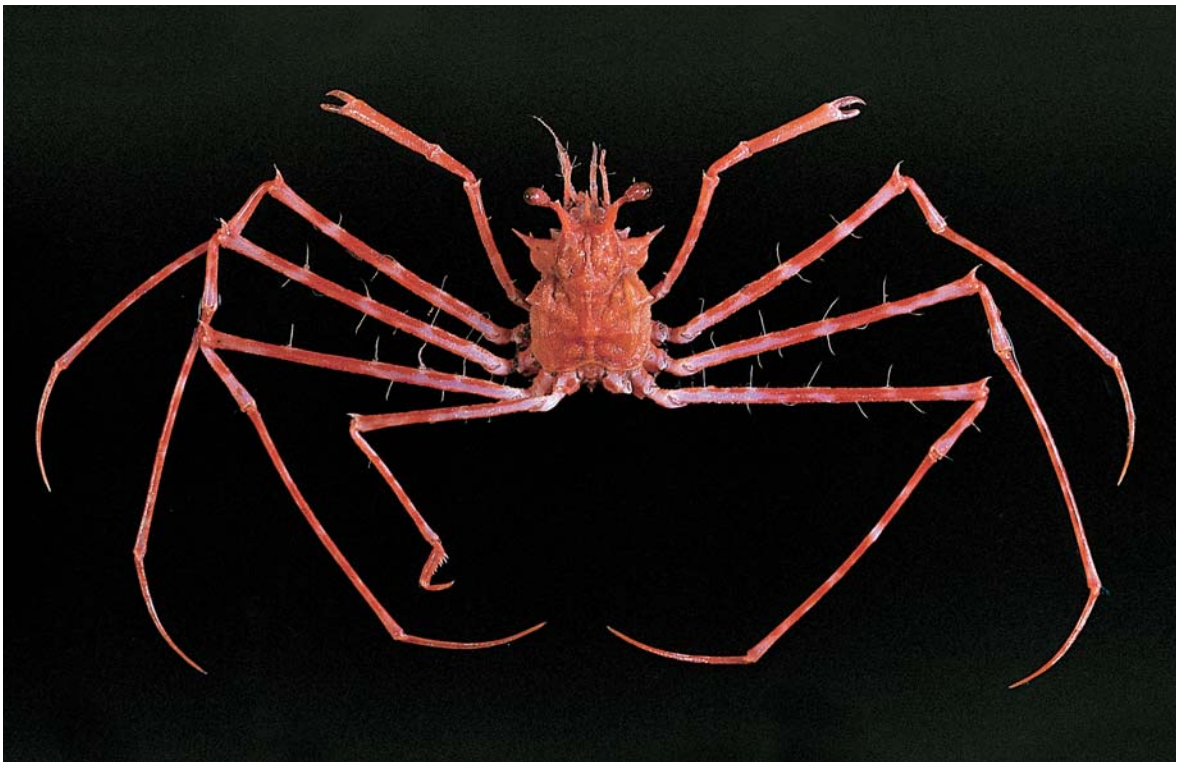


Fig. 69. Male, Nanfang-ao fishing port, Yilan County, 15 May 2003.

Latreillopsis bispinosa Henderson, 1888: 22, pl. 2, figs. 3, 3a–c [type locality: Cebu, Philippines, 10°14'N, 123°54'E, 176 m].— Ng & Huang, 1997: 262, fig. 1D.— Tan, Huang & Ng, 2000: 185.— Ng, Wang, Ho & Shih, 2001: 6.

Material examined.— Nanfang-ao fishing port, Yilan County, 15 May 2003: 1 male (cw 12.2 mm, cl 17.5 mm) (NTOU). Singda Harbor fishing port, Kaohsiung County, 1 Dec 1984: 1 male (cw 12.8 mm, cl 17.0 mm) (NTOU). Donggang fishing port, Pingtung County, 31 Oct 1989: 1 female (cw 18.7 mm, cl 20.9 mm) (NTOU).— 5 Aug 1996: 1 female (cw 13.6 mm, cl 15.4 mm) (ZRC 1997.381).

Diagnosis.— Pseudorostral spines simple, without accessory spines, longer than rostral spine; subhepatic region with 2 long spines. Maxilliped 3 merus with rounded anterolateral angle.

Size.— Males to cw 15.0 mm, cl 20.0 mm (Guinot & Richer de Forges, 1995); females to cw 18.7 mm, cl 20.9 mm.

Colouration.— Uniform reddish-orange overall; legs with scattered white patches giving a somewhat banded appearance.

Habitat.— Soft substrates; 20–350 m (Guinot & Richer de Forges, 1995; Minemizu, 2000).

Distribution.— Philippines, Japan and Taiwan (Tan *et al*., 2000a).

Remarks.— *Latreillopsis bispinosa* can be separated from *L. tetraspinosa*, the only other known congener from Taiwan, by its two instead of four hepatic spines and rounded anterolateral margin of the merus of

maxilliped 3. The fresh colours of the various species of *Latreillopsis* appear to be useful in distinguishing several species (Richer de Forges, 2007, in press).

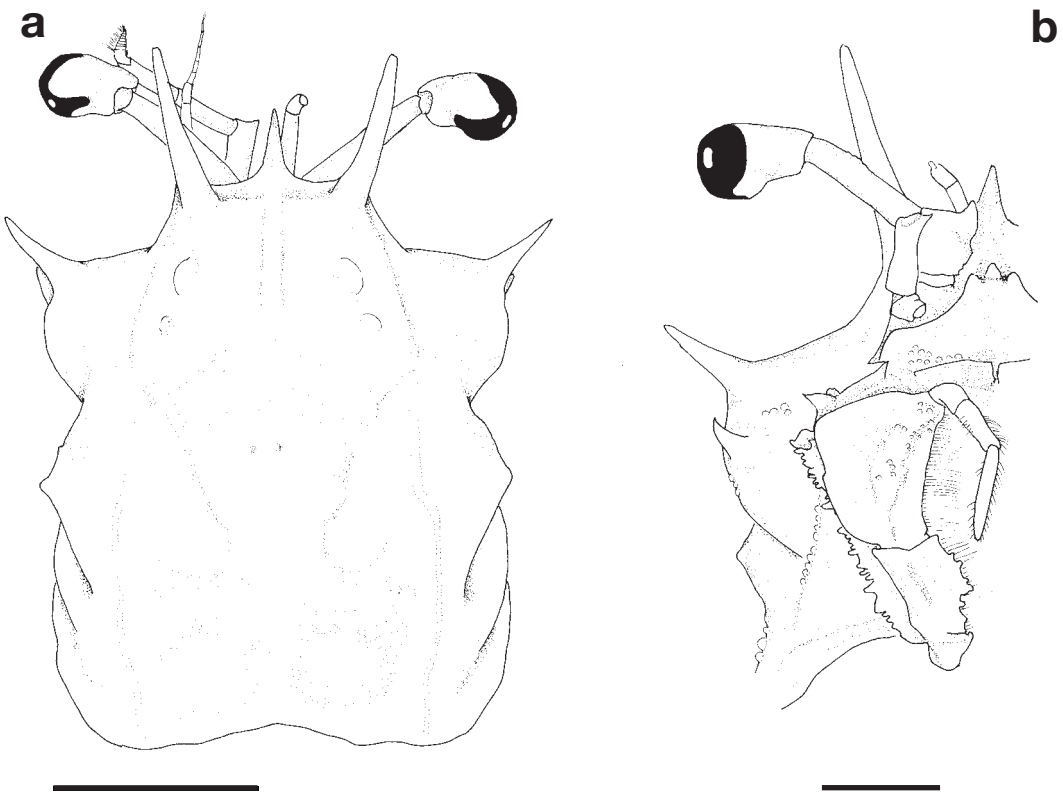


Fig. 70. Female (cw 13.6 mm, cl 15.4 mm), Donggang fishing port, Pingtung County, 5 Aug 1996: **a,** carapace, dorsal view; **b,** right cephalothorax, ventral view. Scales: a = 5 mm, b = 2 mm.

Latreillopsis tetraspinosa Dai & Chen, 1980
四刺仿蛛形蟹

Fig. 71. Female, CP174.

Latreillopsis tetraspinosa Dai & Chen, 1980: 39, figs 1–5 [type locality: Xincun, Hainan, China].

Material examined.— CP174, 22°20.35'N, 120°28.86'E, 35 m, 27 May 2002: 1 female (cw 7.4 mm, cl 9.8 mm) (NTOU).

Diagnosis.— Pseudorostral spines simple, without accessory spines, longer than rostral spine; hepatic region with 4 spines, 2 not visible dorsally. Maxilliped 3 merus with pointed anterolateral angle.

Size.— Males to cw 5.8 mm, cl 9.8 mm; females to cw 8.0 mm, cl 10.5 mm (Chen & Sun, 2002).

Colouration.— Pale pink-orange overall to a dull orange-brown body with whitish pereopods, hepatic and gastric regions.

Habitat.— Sandy substrates; 35–150 m (present record; Dai & Yang, 1991).

Distribution.— Indonesia, Philippines, Taiwan and Japan.

Remarks.— *Latreillopsis tetraspinosa* is distinguished from all other species of the genus by the combination of simple, unarmed pseudorostral spines, four hepatic spines (of which two are on the lower hepatic surface and not visible dorsally), and the sharp and pointed outer distal angle of the maxilliped 3 merus. The species is recorded for the first time from Taiwan.

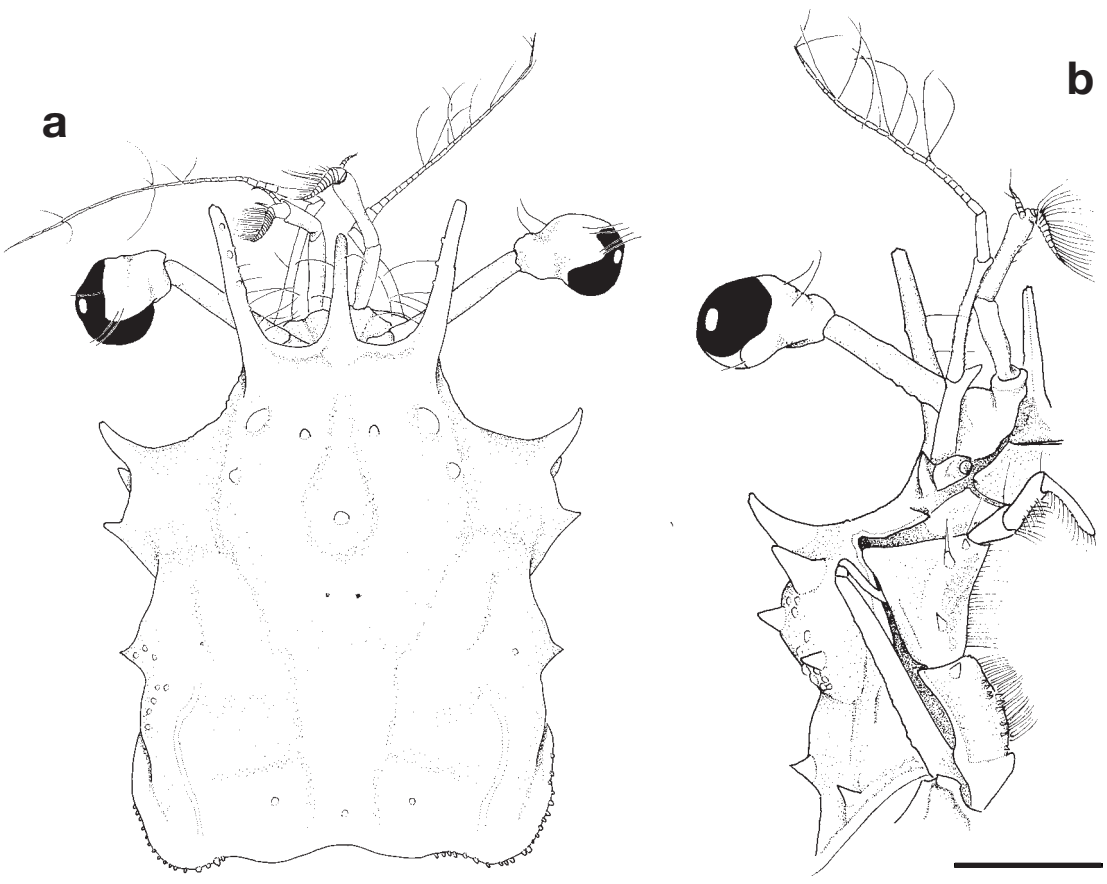


Fig. 72. Female (cw 7.4 mm, cl 9.8 mm), CP174 : **a,** carapace, dorsal view; **b,** right cephalothorax, ventral view. Scales = 2 mm.

Genus *Moloha* Barnard, 1947
摩羅蟹屬

Thelxiope (Moloha) Barnard, 1947: 371 [type species: *Latreillopsis alcocki* Stebbing, 1920, by monotypy. Gender: feminine].

Diagnosis.— Carapace thick, deep, broadest near half; hepatic region not swollen; frontal region with 3 spines (rostrum and 2 supraorbital spines); proximal segment of eyestalk shorter than distal segment. Pereopod 5 dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Six species of *Moloha* are known, one from Taiwan.

Moloha majora (Kubo, 1936)
大摩羅蟹

Fig. 73. Male, Dasi fishing port, Yilan County, 22 Dec 1997.

Latreillopsis major Kubo, 1936: 63, pl. 17 [type locality: Komibato, Bosyu Province, Japan, 311 m].

Moloha majora.— Tan, Huang & Ng, 2000: 185, fig. 4, 186.— Ng, Wang, Ho & Shih, 2001: 6.— Richer de Forges & Ng, 2007: 32.

Material examined.— Dasi fishing port, Yilan County, 22 Dec 1997: 1 male (cw 46.8 mm, cl 56.1 mm) (NTOU).— Jun 2000: 1 male (cw 65.5 mm, cl 76.1 mm) (ZRC 2001.0039).

Diagnosis.— Carapace sides with numerus pointed tubercles. Pereopods 2–4 subcylindrical; merus with strong dorsal distal spine, but only small widely spaced spinules on extensor and flexor margins. Pereopod 5 merus with strong distal spine on extensor margin, margins otherwise unarmed.

Size.— Males to cw 65.5 mm, cl 76.1 mm; females to cw 43.0 mm, cl 51.5 mm (Guinot & Richer de Forges, 1995; present record).

Colouration.— Reddish–orange with reddish mottling or diffuse banding on the pereopods. Carapace spines red.

Habitat.— Soft substrates; 100–310 m (Guinot & Richer de Forges, 1995).

Distribution.— Japan, Taiwan and Philippines.

Remarks.— Of the known Taiwanese homolids, *Moloha majora* superficially resembles *Homolochunia gadaletae*, in sharing a similar carapace shape and long dorsal carapace spines (Tan *et al*., 2000a). *Moloha majora* is readily distinguished from *H. gadaletae*, however, by the simple rather than bifurcate pseudorostral

spines and short rather than long and slender pereopod 5 dactylus and propodus. *Yaldwynopsis saguili* also bears a superficial similarity to *Moloha majora* but can easily be distinguished by the longer spines on the chelipeds.

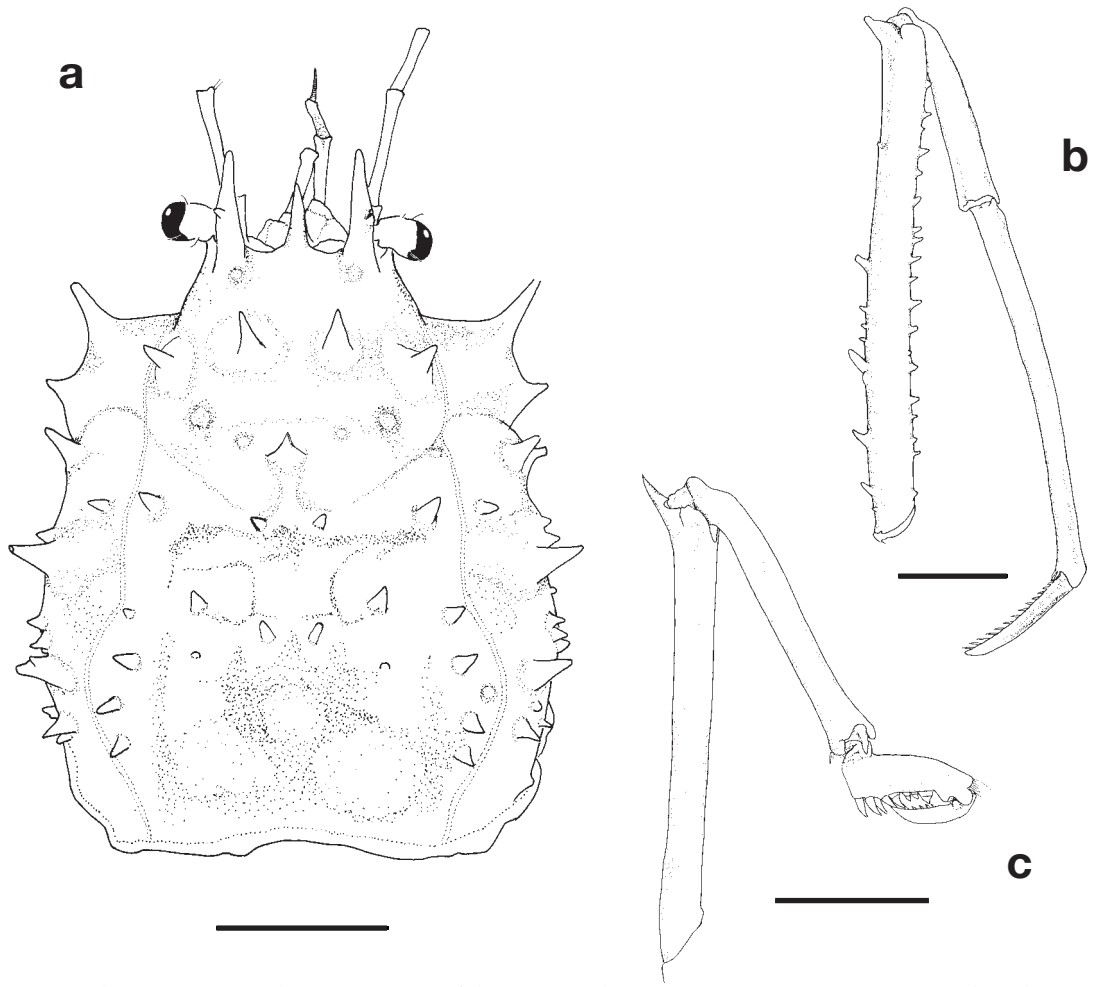


Fig. 74. Male (cw 65.5 mm, cl 76.1 mm), Dasi fishing port, Yilan County, June 2000: **a,** carapace; **b,** right pereopod 3; **c,** right pereopod 5. Scales = 20 mm.

Genus *Paromola* Wood-Mason & Alcock, 1891
擬人面蟹屬

Paromola Wood-Mason & Alcock, 1891: 267 [type species: *Dorippe cuvieri* Risso, 1816, by original designation. Gender: feminine].

Diagnosis.— Carapace longitudinally ovate, broadest posteriorly; hepatic region not prominently swollen; margins without long lateral spine; epigastric region without long upright spine. Pereopod 5 dactylus occluding with flexor margin of propodus, forming subchela.

Remarks.— Of the six recognized species of *Paromola*, two are known from Taiwan.

Key to species of *Paromola* from Taiwan

1. Pseudorostral spines shorter than rostrum. Carapace dorsal surface and lateral margins with acute tubercles and spines ..... ***P. japonica***
- Pseudorostral spines longer than rostrum. Carapace dorsal surface and lateral margins strongly granulate ..... ***P. macrochira***

Paromola japonica Parisi, 1915
日本擬人面蟹

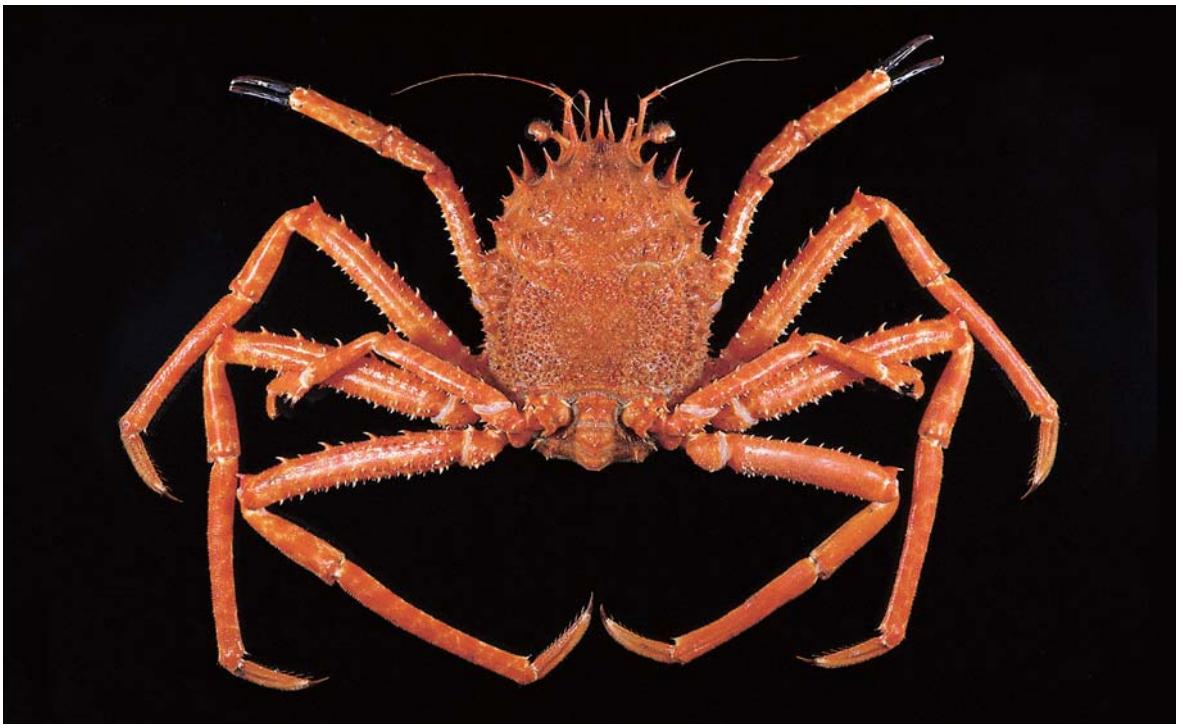


Fig. 75. Female, Dasi fishing port, Yilan County, 15 Apr 1997.

Fig. 76. Female, Dasi fishing port, Yilan County, 29 Jul 2003.

Homola japonica Parisi, 1915: 109, pl. 3 [type locality: Diso, Sagami Bay, Japan].

Latreillopsis hawaiiensis Edmondson, 1932: 5, fig. 1, pl. 1 [type locality: O'ahu, Hawaii].

Paromola japonica.— Jeng, Chan, Fung, Tzeng & Yang, 1994: 98.— Jeng, Chan, Fung, Tzeng & Yang, 1996: 99.— Ng & Huang, 1997: 261, fig. 1A.— Jeng, Shao, Fung, Tzeng & Wu, 1998: 122.— Ng, 1998b: 1084. — Tan, Huang & Ng, 2000: 186.— Ng, Wang, Ho & Shih, 2001: 6.— Ahyong & O'Meally, 2004: 688.

Material examined.— Dasi fishing port, Yilan County, Jun 1993: 1 male (cw 90.2 mm, cl 113.3 mm), 1 female (cw 84.5 mm, cl 107.9 mm) (ZRC 1995.640). Nanfang-ao fishing port, Yilan County, 21 Dec 1991: 1 male (cw 84.3 mm, cl 102.1 mm) (NTOU).— 6 Aug 1996: 1 female (cw 62.5 mm, cl 74.4 mm) (ZRC). Dongsha, about 600 m, 22 Feb 1990: 1 male (cw 52.7 mm, cl 77.0 mm) (NTOU), 1 female (cw 47.1 mm cl 61.5 mm) (ZRC 1995.596). No specific locality: 1 male (cw 54.9 mm, cl 69.1 mm) (NTOU).— 1 female (cw 47.6 mm, cl 55.9 mm) (NTOU).

Diagnosis.— Pseudorostral spines elongate, shorter than rostrum, extending beyond eyes; outer margin usually with accessory spinule or granule at distal third. Carapace dorsal surface and lateral margins with acute tubercles and spines. Basal antennal article with a proximal carina and distal spine on inner margin and a median and distal spine on outer margin. Merus of pereopods 2–5 with strong distal spine; pereopod 5 merus not reaching anteriorly to the cercival groove of the carapace.

Size.— Males to cw 118 mm, cl 145 mm; females to cw 84.5 mm, cl 112 mm (Guinot & Richer de Forges, 1995; present record).

Colouration.— Orangish-reddish-brown to dull red overall with spines slightly darker in colour.

Habitat.— Soft substrates; 80–600 m.

Distribution.— Taiwan, South China Sea (Dongsha), Japan and Hawaii (Ng, 1998).

Remarks.— *Paromola japonica* is readily distinguished from *P. macrochira*, the only other congener known from Taiwan, by the proportionally longer pseudorostral spines and spinose instead of granulate dorsal surface and lateral margins of the carapace. This species is taken as by-catch in commercial deep water demersal trawls, and occasionally in traps, but is not normally eaten (Ng, 1998).

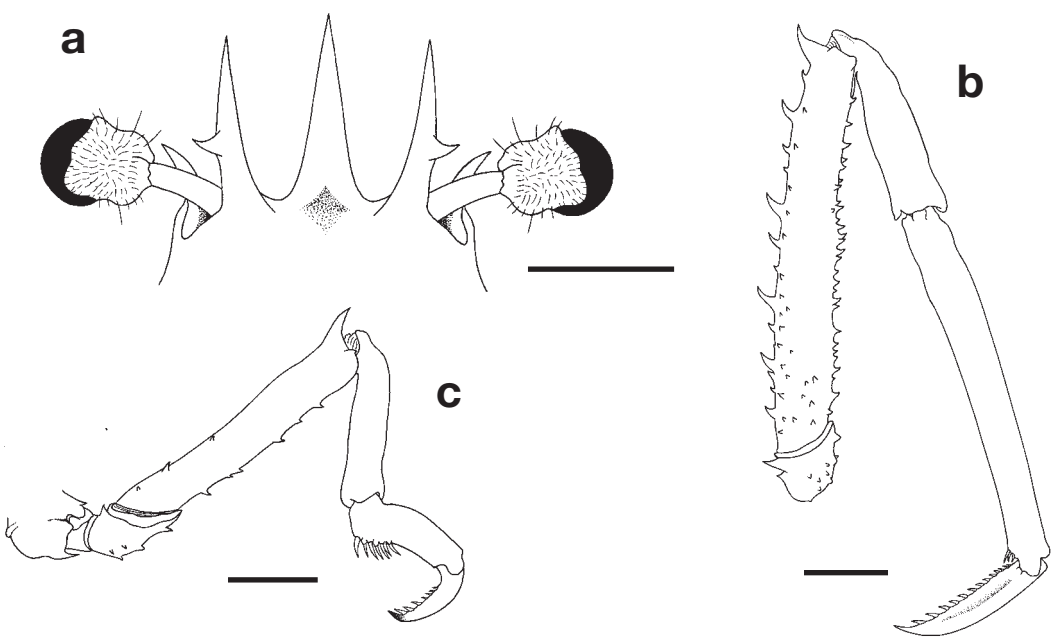


Fig. 77. Female (cw 47.6 mm, cl 55.9 mm), no specific locality: **a,** anterior part of carapace; **b,** right pereiopod 4; **c,** right pereopod 5. Scales = 10 mm.

Paromola macrochira Sakai, 1961
巨螯擬人面蟹

Fig. 78. Male, Dasi fishing port, Yilan County.

Fig. 79. Female, Dasi fishing port, Yilan County, 24 Sep 1996.

Fig. 80. Male, Pei Kuan Resort Crab Museum, Beiguan, Yilan County.

Paromola macrochira Sakai, 1961: 146, pl. 4, fig. 5 [type locality: Tosa Bay, Japan].— Ng & Huang, 1997: 262, fig. 1B, C.— Tan, Huang & Ng, 2000: 186.— Ng, Wang, Ho & Shih, 2001: 6, 54.

Material examined.— Hepingdao fishing port, Keelung City, Feb 1996: 2 females (NTOU). Dasi fishing port, Yilan County, Jun 1993: 1 male (cw 123.1 mm, cl 153.4 mm) (ZRC 1997.380).— Apr 1999: 1 ovigerous female (cw 118.2 mm, cl 146.1 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 21 Dec 1990: 1 male (cw 112.8 mm, cl 126.5 mm) (NTOU).— 21 Dec 1990: 1 male (cw 121.2 mm, cl 142.2 mm) (NTOU).— 5 Mar 1991: 1 ovigerous female (cw 112.3 mm, cl 136.2 mm) (NTOU).— no date: 1 ovigerous female (NTOU). Donggang fishing port, Pingtung County, 20 Jun 1967: 1 male (dried) (TMCD 385). Dongsha, 28 Oct 1989: 1 female (cw 112.8 mm, cl 128.4) (NTOU), 2 females (cw 101.3 mm, cl 129.2 mm; cw 92.7 mm, cl 106.8 mm) (ZRC 1995.647), 1 male (cw 63.6 mm, cl 83.9 mm) (ZRC 1998.0534).— 29 Oct 1989, 642– 648 m: 1 male, 1 female (NTOU).— no date: 1 male (cw 103.2 mm, cl 32.7 mm) (NTOU). No specific locality: 2 males (cw 125.1 mm, cl 142.3 mm; cw 122.3 mm, cl 146.1 mm), 1 ovigerous female (cw 112.6 mm, cl 42.7 mm) (NTOU).— 1 male (cw 135.1 mm, cl 149.2 mm), 1 ovigerous female (cw 109.3 mm, cl 139.1 mm), 1 female (cw 96.3 mm, cl 114.2 mm) (NTOU).— 1 male (cw 109.4 mm, cl 132.3 mm), 1 female (cw 114.3 mm, cl 42.7 mm) (NTOU).— 1 male (cw 104.2 mm, cl 135.4 mm) (NTOU).— 1 male (cw 118.1 mm, cl 136.3 mm) (NTOU).— 1 female (cw 84.2 mm, cl 93.9 mm) (NTOU).— 1 female (cw 113.1 mm, cl 144.5 mm) (NTOU).

Diagnosis.— Pseudorostral spines elongate, longer than rostrum, extending beyond eyes; outer margin without accessory spinule. Carapace dorsal surface and lateral margins strongly granulate. Basal antennal article unarmed.

Size.— Males to cw 118.2 mm, cl 153.4 mm; females to cw 118.2 mm, cl 146.1 mm (present record).

Colouration.— Uniform yellowish-brown to reddish-brown; legs dirty-white.

Habitat.— Soft substrates; 100–648 m.

Distribution.— Japan, Taiwan, South China Sea (Dongsha) and Philippines (Richer de Forges & Ng, 2007).

Remarks.— In Taiwan, *P. macrochira*, though uncommon, is sold in the fishing ports, both as a souvenir and as seafood. This large species has also been reported from the southern Philippines (Richer de Forges & Ng, 2007).

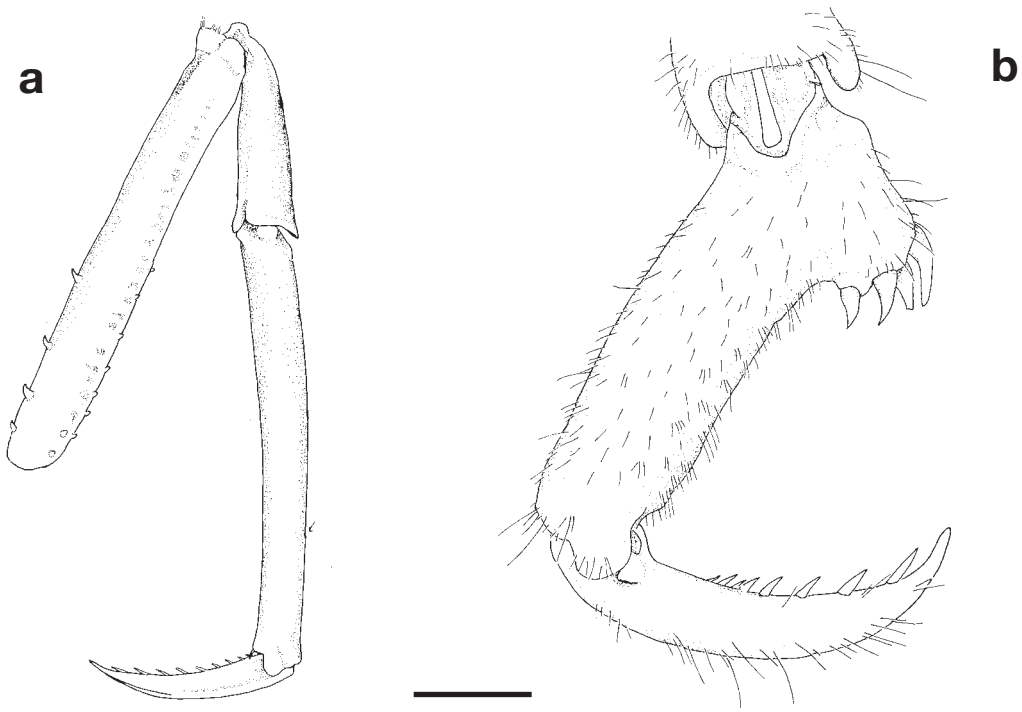


Fig. 81. Male (cw 63.6 mm, cl 83.9 mm), Dongsha, 28 Oct 1989: **a,** right pereopod 3; **b,** propodus and dactylus of left pereopod 5. Scale: a = 20 mm; b = 5 mm.

Genus *Paromolopsis* Wood-Mason & Alcock, 1891
仿人面蟹屬

Paromolopsis Wood-Mason & Alcock, 1891: 268 [type species: *Paromolopsis boasi* Wood Mason & Alcock, 1891, by monotypy. Gender: feminine].

Diagnosis.— Rostrum a slender spine, without lateral spine. Carapace depressed, urn shaped, longer than broad, widest behind midlength; dorsum finely granulate, unarmed. Pereopod 5 merus shorter than carapace; dactylus about two-thirds as long as propodus; propodus with distinct, blunt proximal projection. Antennal flagellum much longer than carapace

Remarks.— The single known species of the genus is known from Dongsha, a territory of Taiwan.

Paromolopsis boasi Wood Mason & Alcock, 1891
玻氏仿人面蟹

Fig. 82. Female, Dongsha, 21 Apr 1995.

Paromolopsis boasi Wood Mason & Alcock, 1891: 268, fig 5 [type locality: North Sentinel Island, Andaman Islands, 846 m].— Ng, Wang, Ho & Shih, 2001: 54, 74, fig. 1b.

Material examined.—Dongsha, 21 Apr 1995, 420 m: 1 male (cw 24.6mm, cl 28.7mm), 1 female (cw 32.5 mm, cl 33.1 mm) (NTOU).— 22 Apr 1995: 1 female (cw 32.7 mm, cl 39.0 mm) (ZRC 1999. 1125).

Diagnosis.— As for genus.

Size.— Males to cw 41.0 mm, cl 48.0 mm; females to cw 38.0 mm, cl 41.0 mm (Guinot & Richer de Forges, 1995).

Colouration.— Chelae and ventral surfaces whitish. Dorsally reddish–purple.

Habitat.— Outer continental shelf and slope; 284–1124 m (Davie, purple 2002).

Distribution.— Western Indian Ocean to the Andaman Sea, Australia, Indonesia, Malaysia, South China Sea, Dongsha (territory of Taiwan), Japan and New Caledonia.

Remarks.— Guinot & Richer de Forges (1995) and Richer de Forges & Ng (2008) discuss in depth the taxonomy of this very widespread species which has an extremely broad bathymetric range. *Paromolopsis boasi*, as currently understood, is probably a species complex.

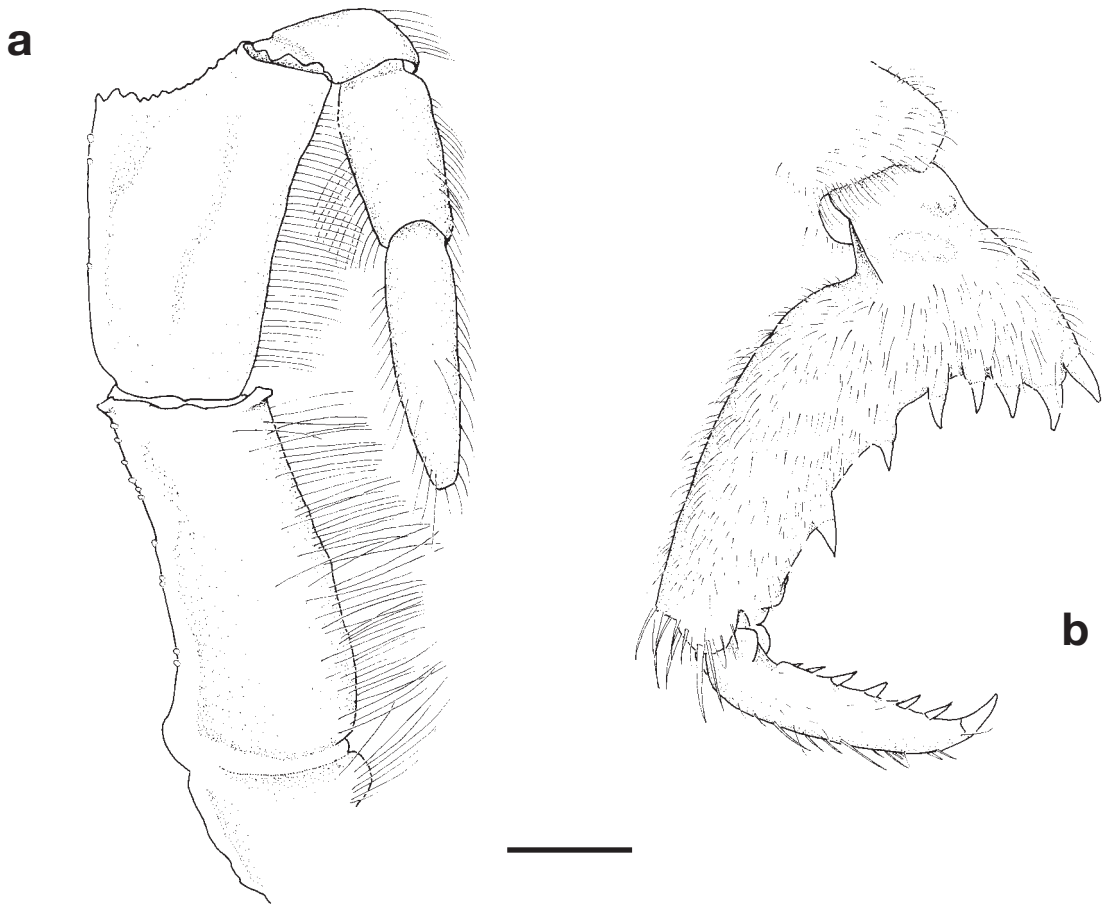


Fig. 83. Female (cw 32.7 mm, cl 39.0 mm), Dongsha, 22 Apr 1995: **a,** right maxilliped 3; **b,** propodus and dactylus of left pereopod 5. Scale = 2 mm.

Genus *Yaldwynopsis* Guinot & Richer de Forges, 1995
亞氏蟹屬

Yaldwynopsis Guinot & Richer de Forges, 1995: 435–437 [type species: *Paromola spinimana* Griffin, 1965. Gender: masculine].

Diagnosis.— Carapace dorsal and lateral surfaces strongly multispinose; rostrum simple; without median gastric spine; anterior wall of carapace lateral to rostrum rounded, without orbit-like structure. Chelipeds of male distinctly longer than other pereopods; outer surface of palm without sunken depression or dark patch at base of pollex. Pereopod 5 merus shorter than carapace length (including rostrum); slender, distinctly narrower than pereopod 4 merus.

Remarks.— Three species of *Yaldwynopsis* are known, two of which were recently described (Richer de Forges & Ng, 2007). One species, *Yaldwynopsis saguili*, is known from Taiwan.

Key to species of *Yaldwynopsis*

1. Pereopod 5 merus extensor margin with 2 spines in addition to distal spine ..... ***Y. guinotae***
- Pereopod 5 merus extensor margin smooth, unarmed (except for distal spine) 2
2. Pereopod 3 merus with row of 6 spines along extensor margin. Cheliped dactylus with 2 spines on proximal extensor margin ..... ***Y. saguili***
- Pereopod 3 merus with 8 or more dorsal spines. Cheliped dactylus unarmed on extensor margin ..... ***Y. spinimanus***

Yaldwynopsis saguili Richer de Forges & Ng, 2007
薩氏亞氏蟹

Fig. 84. Male, Nanfang-ao fishing port, Yilan County, May 1998.

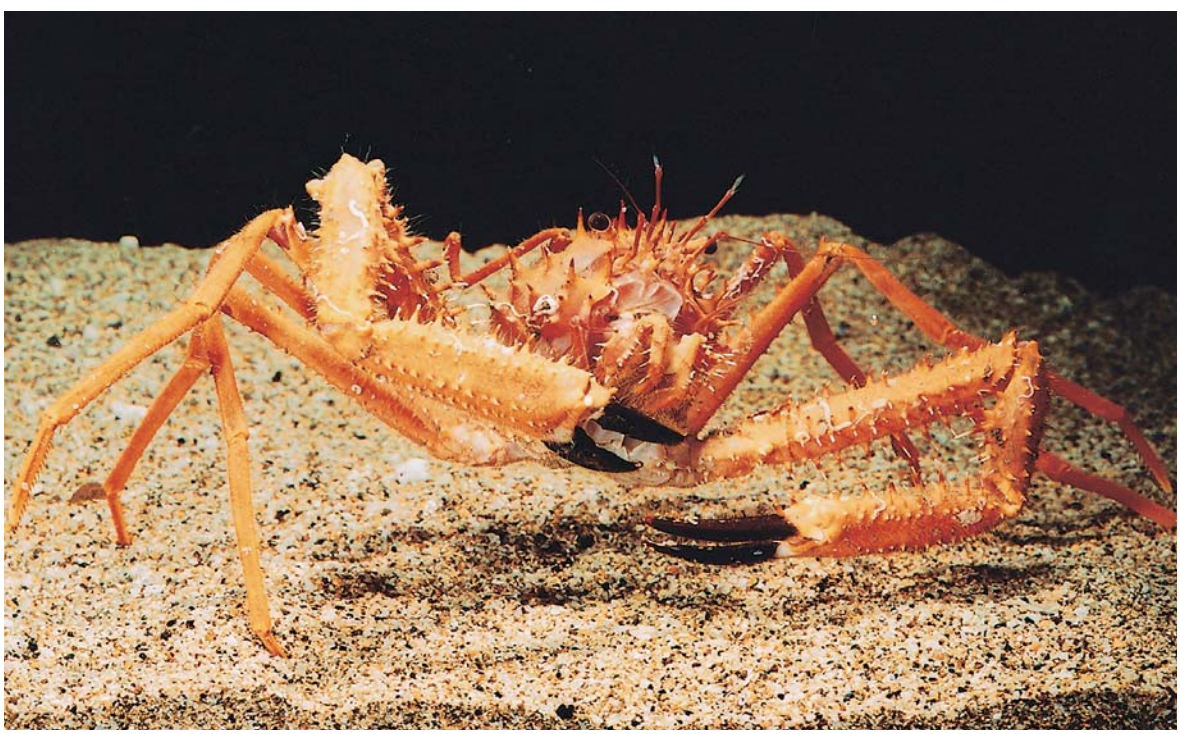


Fig. 85. Male, Hepingdao fishing port, Keelung, Jun 2000.

Yaldwynopsis spinimanus.— Guinot & Richer de Forges, 1995: 437, fig. 52A–B, 53A–C. [Not *Yaldwynopsis spinimanus* (Griffin, 1965)].

Yaldwynopsis saguili Richer de Forges & Ng, 2007: 38, figs 6, 8A, 9A–C [type locality: Balicasag Island, Philippines].

Material examined.— Hepingdao fishing port, Keelung City, Jun 2000: 1 male (cw 39.5 mm, cl 47.0 mm) (ZRC 2008.0482). Nanfang-ao fishing port, Yilan County, May 1998: 1 male (cw 17.4 mm, cl 20.8 mm) (ZRC 2007.0175).

Diagnosis.— Cheliped dactylus with 2 spines on proximal extensor margin. Pereopod 3 merus with row of 6 spines along extensor margin. Pereopod 4 merus with 6 or 7 extensor spines and 4 or 5 flexor spines. Pereopod 5 merus extensor margin smooth, unarmed (except for distal spine); flexor margin with 4 spines.

Size.— Males to cw 39.5 mm, cl 47.0 mm; females to cw 32.6 mm, cl 40.8 mm (Richer de Forges & Ng, 2007; present record).

Colouration.— Overall pale orange, spines reddish—orange. Cheliped fingers dark brown.

Habitat.— Level substrates and reef slopes; 60–140 m.

Distribution.— Philippines, Japan and Taiwan.

Remarks.— *Yaldwynopsis saguili* was recently described from the Philippines. Japanese material previously identified as *Y. spinimanus* (see Guinot & Richer de Forges, 1995) was shown by Richer de Forges & Ng (2007) to be conspecific instead with material from Taiwan and Philippines, and referred to a new species. A third species was also described from French Polynesia.

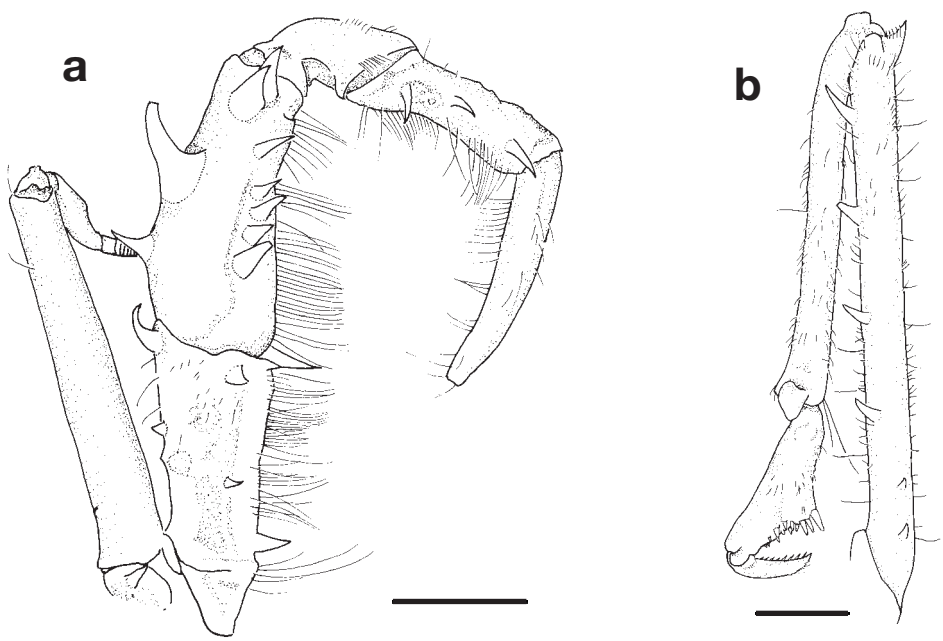


Fig. 86. Male (cw 39.5 mm, cl 47.0 mm), Hepingdao fishing port, Keelung City, Jun 2000: **a,** right maxilliped 3; **b,** left pereopod 5. Scales = 5 mm.

Family LATREILLIIDAE Stimpson, 1858
蛛形蟹科

Latreillidea Stimpson, 1858: 226 [corrected to Latreilliidae by Stebbing (1902), see Holthuis (1962:248)].

Diagnosis.— Carapace pyriform, strongly narrowed anteriorly; gastric region elongated to form "neck." Basal article of ocular peduncle much longer than cornea. Rostrum spiniform, short, ventrally deflexed, flanked on each side by long, divergent supraocular spine. Linea homolica absent. Pereopods strongly elongated and slender, coxae not covered by carapace. Pereopod 5 dorsal, shorter than preceding pereopod; dactylus forming subchela against subdistal spinules on propodus or trailing without forming subchela. Maxilliped 3 ischium and merus narrow, elongated. Adult female abdomen with somites 4–6 fused, forming plate. Male abdomen with all somites free or somites 4 and 5 fused. Abdominal holding system of males and immature females formed by distal portion of abdomen fitting into sterno-abdominal depression; tip of telson fitting into horseshoe-shaped sternites 1 and 2, and homoloid press-button (serrated sternal crest, deep abdominal socket). Pereopod 5 coxa rounded, not elongated; male genital papilla relatively long, soft.

Remarks.— The latreillids are a small group of small podotrematous crabs distributed worldwide. Latreillids typically live in deep-water and do not exceed 20 mm carapace length. Seven species in two genera are presently recognised (Castro *et al*., 2003). Three species are known from Taiwan.

Key to genera of Latreilliidae

1. Pereopod 5, without conspicuous setae on propodus; propodus as long as or shorter than half length of carpus ····· ***Eplumula***
- Pereopod 5 with conspicuous setae along length of propodus, giving feather-like appearance; propodus distinctly longer than half length of carpus ····· ***Latreillia***

Genus *Eplumula* Williams, 1982
無毛蟹屬

Eplumula Williams, 1982: 229 [type species: *Latreillia phalangium* De Haan, 1839, by original designation. Gender: feminine].

Diagnosis.— Pereopod 5 conspicuously short, shorter than merus of pereopod 4. Pereopod 5 propodus half or less than half length of pereopod 5 carpus; without conspicuous, feather-like setae on sides; distally flattened, broadened, often distally spinose; dactyli forming subchelae.

Remarks.— One of the two known species of *Eplumula* is known from Taiwan.

Eplumula phalangium (De Haan, 1839)
長踦無毛蟹

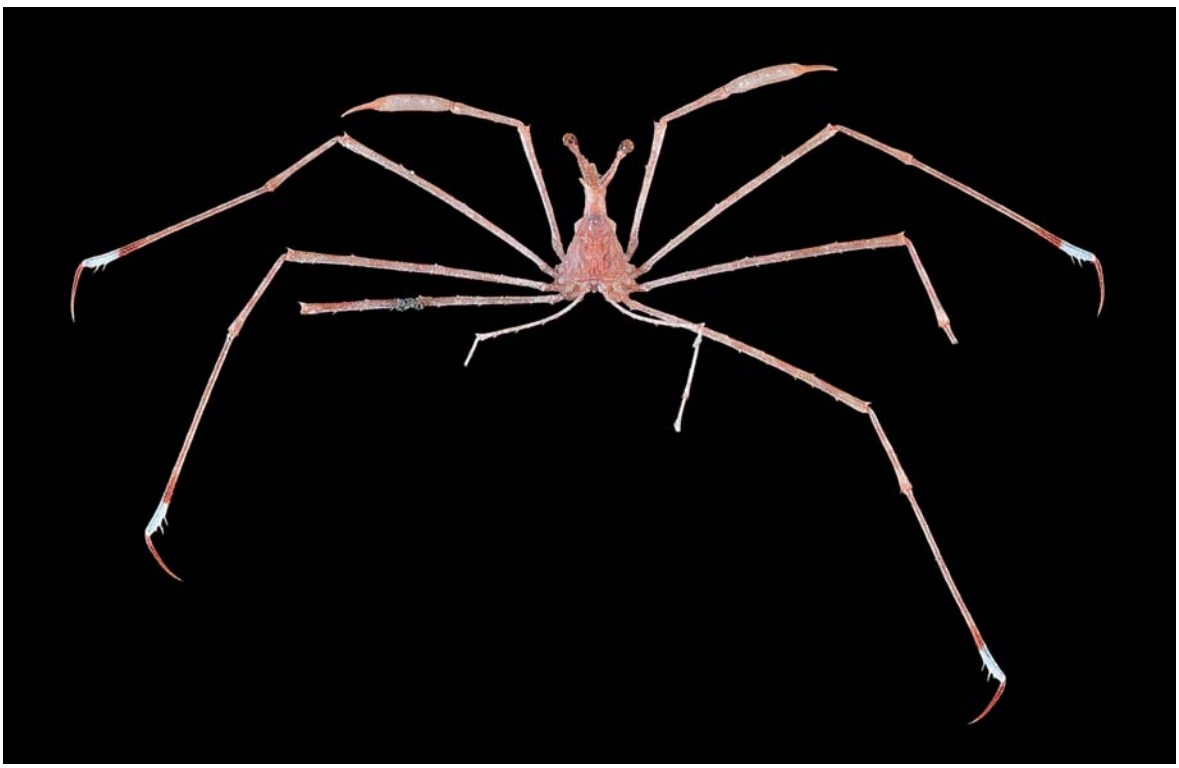


Fig. 87. Male, Dasi fishing port, Yilan County, May 1997.

Latreillia phalangium De Haan, 1839: 108, pl. 30: 2 [type locality: Japan].

Eplumula phalangium.— Tan, Huang & Ng, 2000: 186, 187.— Ng, Wang, Ho & Shih, 2001: 6.— Castro, Williams & Cooper, 2003: 609, fig. 4.

Material examined.— Dasi fishing port, Yilan County, 7 Aug 1991: 1 male (cw 4.9 mm, cl 8.0 mm) (NKMT).— Nov 1996: 1 female (cw 5.6 mm, cl 9.5 mm) (NTOU).— 20 May 1997: 1 male (cw 5.4 mm, cl 8.3 mm) (NTOU).— May 1997: 1 male (cw 5.4 mm, cl 9.0 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 18 Jul 1991: 1 female (cw 6.7 mm, cl 10.0 mm) (NTOU).— 3 Jul 1992: 2 males (cw 5.8 mm, cl 9.3 mm; cw 5.0 mm, cl 9.3 mm), 1 female (cw 4.2 mm, cl 7.8 mm) (NTOU). Donggang fishing port, Pingtung County, 20 Nov 1970: 1 female (TMCD 269).

Diagnosis.— Carapace gastric region with dorsal spine, more prominent and acute in females. Gastric region relatively short, not slender in appearance (half or less carapace length), especially in females. Supraocular spines usually longer than ocular peduncles. Hepatic swellings each with spine, more prominent and acute in females. Branchial regions of adult females usually with lateral spine. Maxilliped 3 merus with obtuse tubercle or acute tooth on ventral surface, most prominent in females. Pereopod 5 without conspicuous setae on propodus.

Size.— Males to cl 7.9 mm, cw 12.4 mm; females to cw 9.5 mm, cl 14.0 mm (Williams, 1982).

Colouration.— Carapace transparent pink with irregular reddish lines. Chelipeds and walking legs with

dull, diffuse red and white bands for most of length; walking leg dactyli bright red; distal end of merus with bright red and stark white band.

Habitat.— Often found on the branches of gorgonians; 30–307 m.

Distribution.— Japan, southern Korea, Taiwan and Philippines.

Remarks.— *Eplumula phalangium* is known to carry seaweeds and hydroids as camouflage.

As remarked by Castro *et al*. (2003), specimens of *E. phalangium* lacking the last pair of pereopods are easily confused with *L. valida* because both have a relatively short gastric region bearing a dorsal spine. *Eplumula phalangium*, however, can also be distinguished from *L. valida* by the length of the supraocular spines (longer or as long as the ocular peduncles, rather than shorter), the presence of a hepatic spine, and the presence of a tubercle or spine on the merus of maxilliped 3 of females and small males.

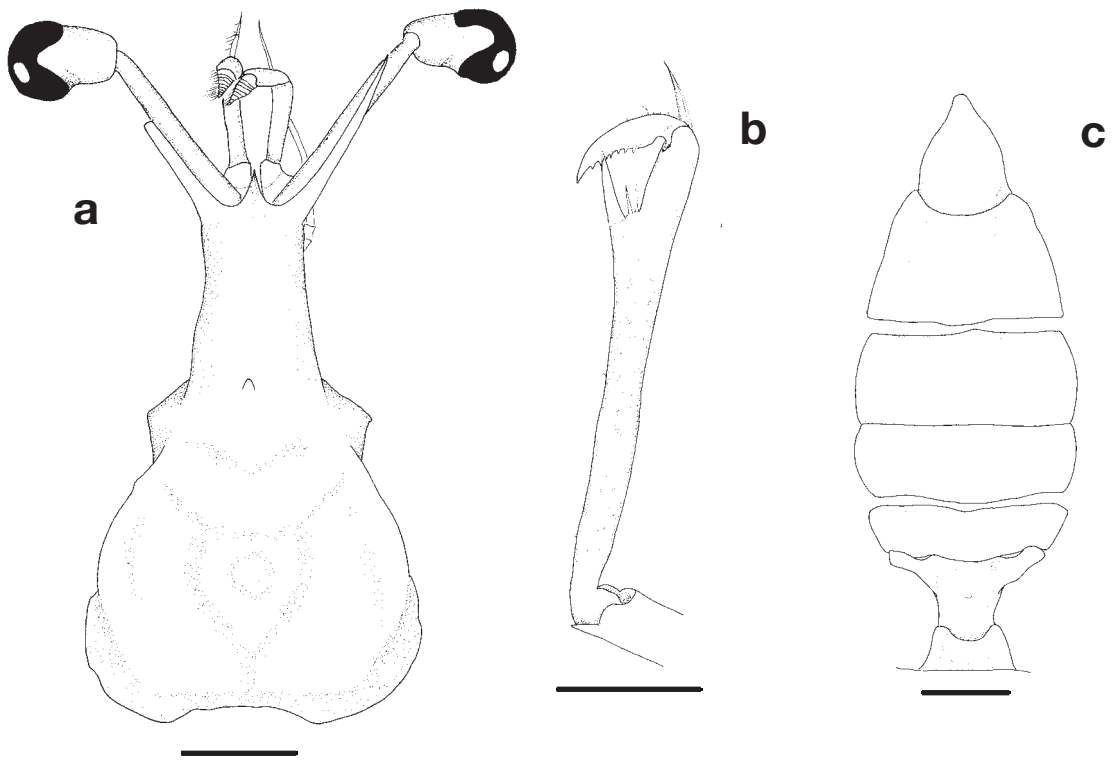


Fig. 88. Male (cw 5.8 mm, cl 9.3 mm), Nanfang-ao fishing port, Yilan County, 3 Jul 1992: **a,** carapace; **b,** propodus and carpus of left pereopod 5; **c,** abdomen and telson. Scales = 1 mm.

Genus *Latreillia* Roux, 1830
蛛形蟹屬

Latreillia Roux, 1830: unnumbered page, pl. 22 [type species: *Latreillia elegans* Roux, 1830 by monotypy. Gender: feminine].

Diagnosis.— Total length of pereopod 5 longer than pereopod 4 merus. Pereopod 5 propodus with conspicuous, feather-like setae on lateral margins, distal end not conspicuously broadened; dactylus occluding with propodus to form subchela or trailing without forming subchela.

Remarks.— Castro *et al*. (2003) recognized five species of *Latreillia*; two are known from Taiwan.

Key to species of *Latreillia* from Taiwan

1. Pereopod 5 dactylus trailing, not forming subchela ····· ***L. valida***
- Pereopod 5 dactylus forming subchela ····· ***L. metanesa***

Latreillia metanesa Williams, 1982
近島蛛形蟹

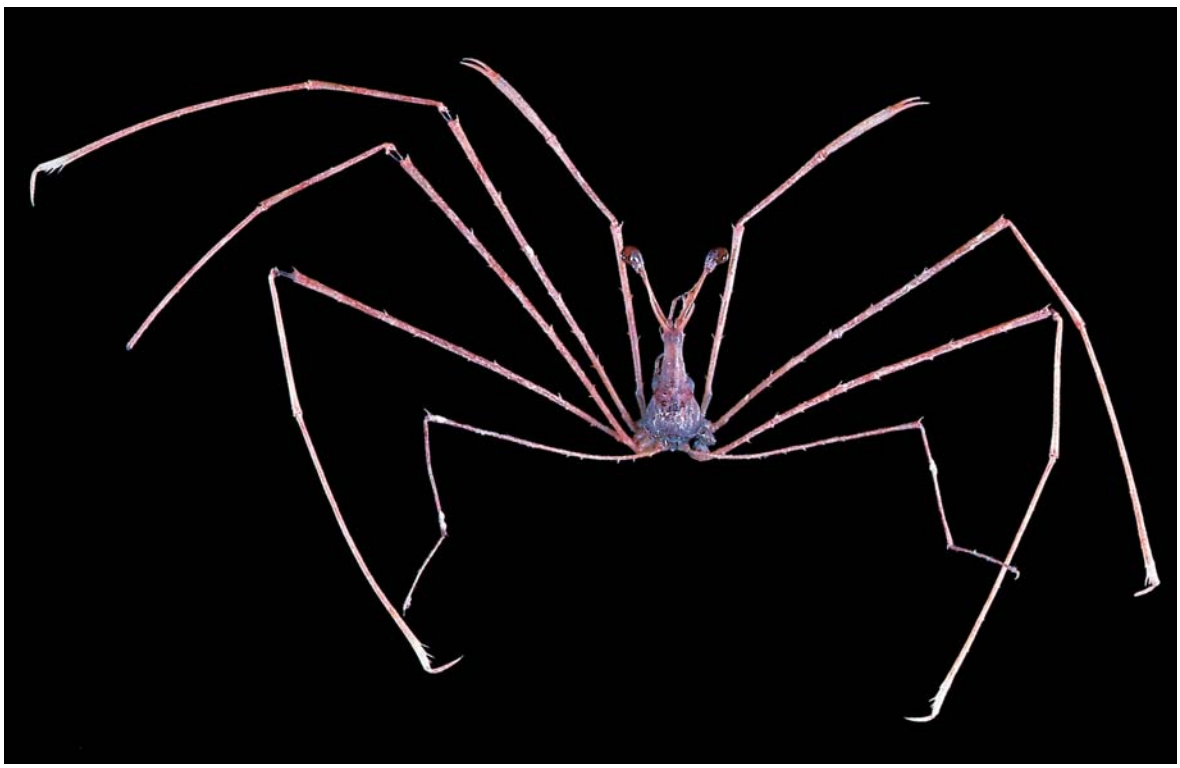


Fig. 89. Female, CP58.

Latreillia metanesa Williams, 1982: 240, figs. 3d, 4, 5a–d, 8 [type locality: off Puniawa Point, Maui, Hawaiian Islands, 174–278 m].— Castro, Williams & Cooper, 2003: 613, figs. 3C, 6–9, 14A–C.— Ng, Guinot & Davie, 2008: 41, fig. 14.

Material examined.— CP 58, 24°35.1'N, 122°05.8'E, 221–254 m, 4 Aug 2000: 2 males, 2 females (MNHN-B 28476). CP212, 24°34.60'N, 122°5.84'E, 223–260 m, 26 Aug 2003: 1 male (cw 4.6 mm, cl 8.2 mm) (NTOU).

Diagnosis.— Carapace gastric region with prominent spine in juveniles and small adults (obsolete in adults); gastric region slender, length 0.4 carapace length or greater; supraocular spines equal or slightly longer than ocular peduncles; hepatic region with tubercle or spine, most prominent in females. Pereopod 5 dactylus occluding with propodus forming subchela; propodus shorter than carpus, with 5 or 6 movable spinules. Male abdomen with all somites distinct, not fused. Maxilliped 3 merus with obtuse tubercle or acute tooth on ventral surface, most prominent in females.

Size.— Males to cw 6.4 mm, cl 12.1 mm; females to cw 7.7 mm, cl 14.4 mm (Castro *et al*., 2003).

Colouration.— Carapace transparent yellowish with thin, red and white vertical lines. Posterior margin of carapace red with white outline. Abdominal somites with red margins. Chelipeds and walking legs transparent with dull, diffuse red and white bands.

Habitat.— Muddy sand; 22–806 m.

Distribution.— East Africa to Taiwan, French Polynesia, the Hawaiian Islands and the Sala y Gómez and Nazca submarine ridges.

Remarks.— *Latreillia metanesa* was first recorded from Taiwanese waters by Castro *et al*. (2003), and is most easily distinguished from *L. valida* by the subchelate rather than simple pereopod 5.

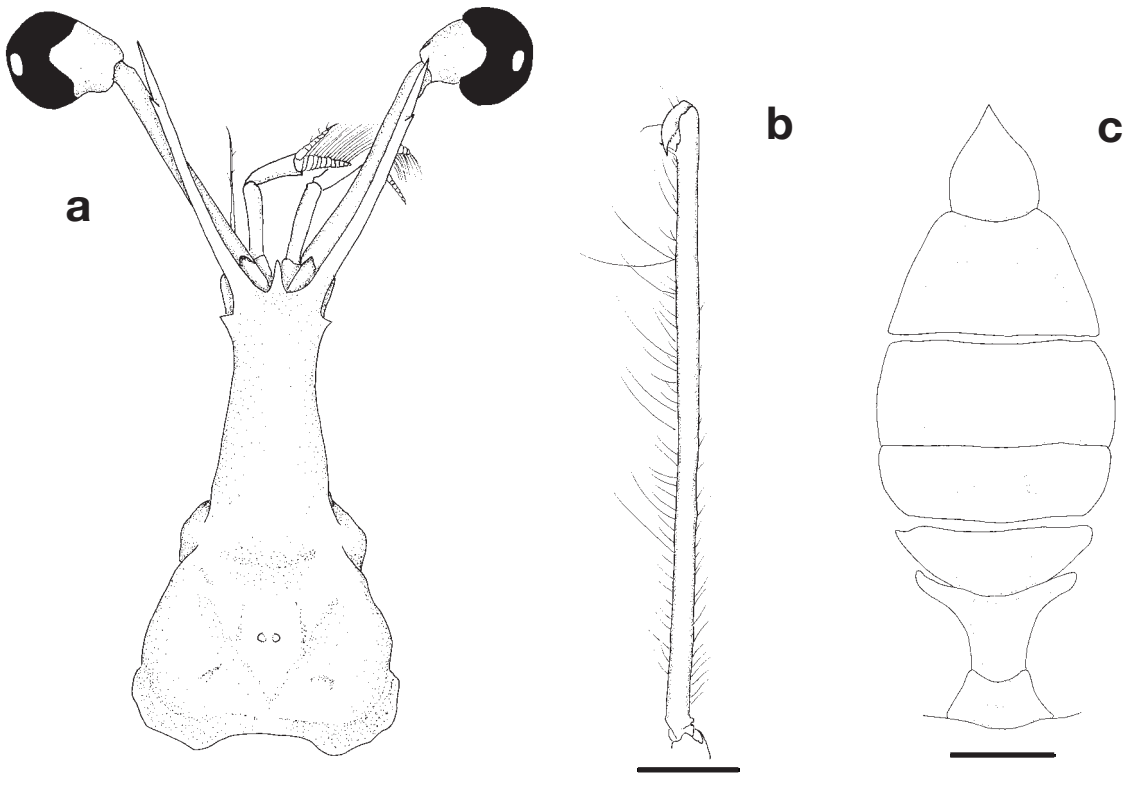


Fig. 90. Male (cw 4.6 mm, cl 8.2 mm), CP212: **a,** carapace; **b,** propodus and carpus of left pereopod 5; **c,** abdomen and telson. Scales: a = 2 mm, b, c = 1 mm.

Latreillia valida De Haan, 1839
強壯蛛形蟹

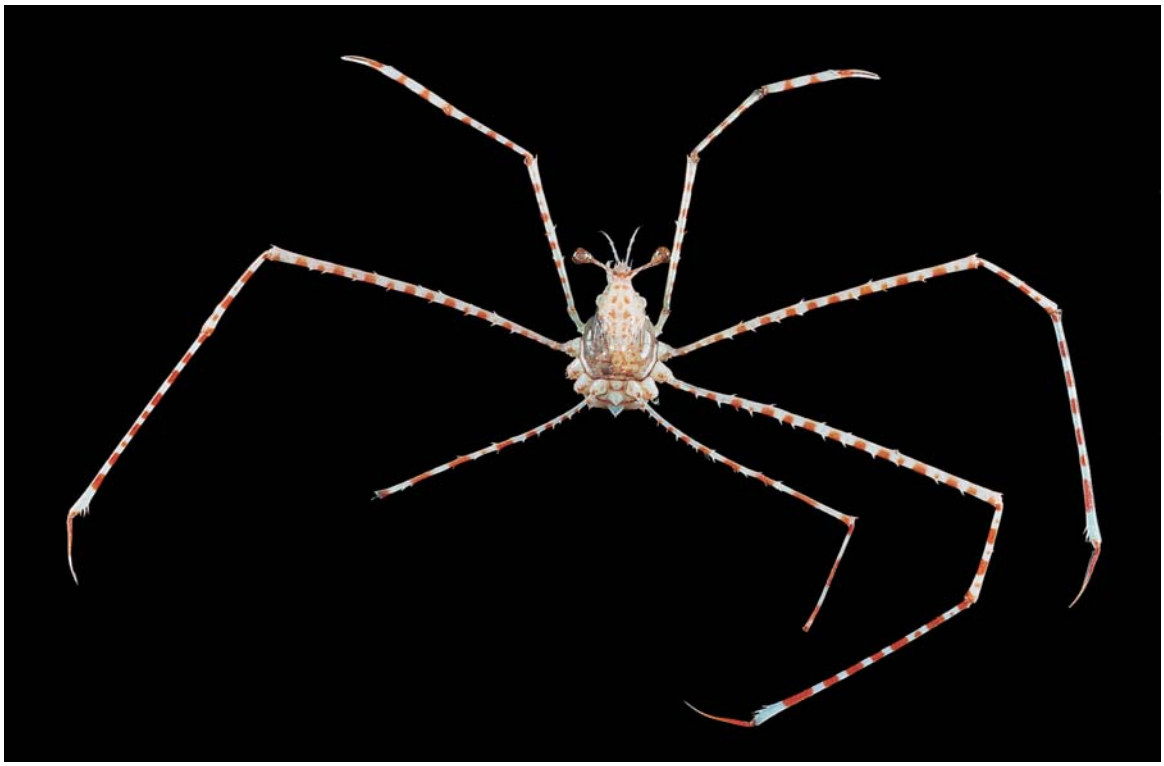


Fig. 91. Ovigerous female, Donggang fishing port, Pingtung County, 5 Aug 1996.

Latreillia valida De Haan, 1839: 107, pl. 30: 1 [type locality: Japan].— Tan, Huang & Ng, 2000: 187.— Ng, Wang, Ho & Shih, 2001: 6.— Castro, Williams & Cooper, 2003: 623, figs. 3D, 12, 13, 14D–F.

Material examined.— Dasi fishing port, Yilan County, 7 Jul 1985: 1 female (cw 8.3 mm, cl 12.7 mm) (NTOU).— 7 Aug 1991: 1 male (cw 7.2 mm, cl 10.2 mm) (NTOU).— Nov 2003: 1 ovigerous female (cw 10.1 mm, cl 14.4 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 5 Mar 1991: 1 male (cw 12.0 mm, cl 16.9 mm) (NKMT).— 20 Aug 1991: 1 male (cw 9.4 mm, cl 15.3 mm) (NTOU). Tainan, 22 Mar 1971: 1 female (dried) (TMCD 391). Kaohsiung Harbor, Kaohsiung City, 5 Aug 1996: 2 females (largest ovigerous cw 10.0 mm, cl 15.7 mm) (ZRC). Kaohsiung, 1 Nov 1968: 1 female (dried) (TMCD 271). Donggang fishing port, Pingtung County, 23 Mar 1985: 1 male (cw 7.9 mm, cl 11.6 mm) (ZRC 2000.2620), 4 males (largest cw 7.8 mm, cl 11.8 mm), 1 female (ZRC).— 4 Apr 1992: 1 spec (heavily demage).— 18 Jan 2001: 1 female (cw 7.8 mm, cl 11.2 mm) (NTOU).

Diagnosis.— Carapace gastric region with prominent spine in juveniles and adults; gastric region short, less than 0.35 carapace length; supraocular spines shorter than ocular peduncles; hepatic region without tubercle or spine. Maxilliped 3 merus without ventral tubercle or spine. Pereopod 5 dactylus trailing, not occluding with propodus; propodus shorter than carpus, without movable spinules. Male abdomen with all somites distinct, not fused.

Size.— Males to cw 12.0 mm, cl 16.9 mm (present record); females to cl 17.9 mm (Williams, 1982).

Colouration.— Carapace transparent yellowish with irregular red spots and lines. Posterior margin of carapace and abdominal margins red. Chelipeds and walking legs with stark red and white banding.

Habitat.— Muddy sand; 30–731 m.

Distribution.— South Africa and Madagascar to Australia, Japan, Taiwan, Philippines, New Caledonia and Vanuatu to Tonga.

Remarks.— Unlike *Eplumula phalangium*, *L. valida* is not presently known to carry camouflage with its pereopod 5.

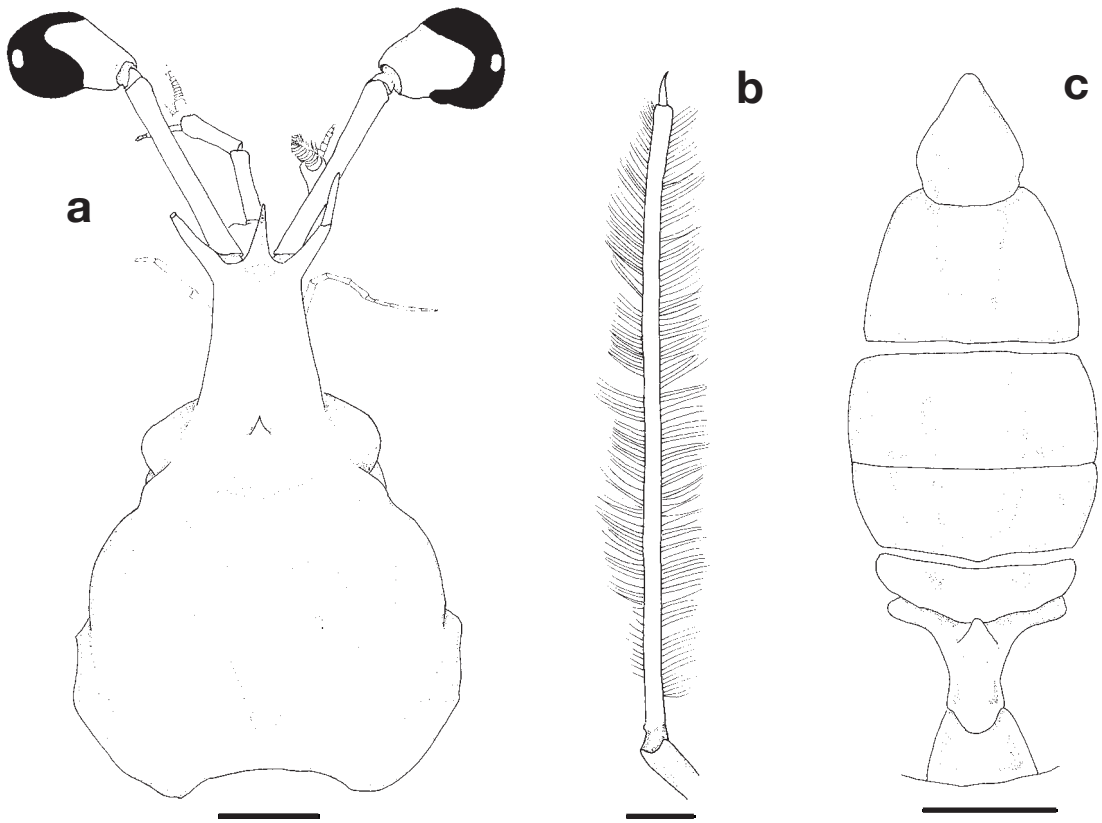


Fig. 92. Male (cw 7.9 mm, cl 11.6 mm), Donggang fishing port, Pingtung County, 23 Mar 1985: **a,** Carapace; **c,** abdomen and telson. Male (cw 9.4 mm, cl 15.3 mm), Nanfang-ao fishing port, Yilan County, 20 Aug 1991: **b,** propodus and carpus of right pereopod 5. Scales = 2 mm.

Superfamily HOMOLODROMIOIDEA Alcock, 1900
人面綿蟹總科

Diagnosis.— see Diagnosis of family.

Remarks.— One family, Homolodromiidae, is recognised.

Family HOMOLODROMIIDAE Alcock, 1900
人面綿蟹科

Homolodromidae (sic) Alcock, 1900: 123, 127, 130.

Diagnosis.— Carapace longer than wide; dorsal surface variously setose; branchiostegite decalcified, soft, not defined by lateral line. Orbit ill-defined. Maxilliped 3 pediform. Cheliped dactylus closing into cleft tip of fixed finger. Pereopods 4 and 5 reduced, lying obliquely on carapace and directed upwards, subchelate or 'chelate'. Abdomen of both sexes of 7 somites, each with distinct pleuron; pleopods 3–5 vestigial in males; uropods present and ventral (not visible dorsally).

Remarks.— Homolodromiidae includes two genera, *Homolodromia* A. Milne-Edwards, 1880 and *Dicranodromia* A. Milne-Edwards, 1880, both of which are represented in Taiwan.

Key to genera of Homolodromiidae

1. Distal flexor margin of propodus of pereopods 4 and 5 not produced to form pollex, but with long distal movable spines that occlude with dactylus forming functional 'chela' ····· ***Dicranodromia***
- Distal flexor margin of propodus of pereopods 4 and 5 produced to form pollex that occludes with dactylus; pollex armed distally with movable spines ····· ***Homolodromia***

Genus *Dicranodromia* A. Milne-Edwards, 1880
雙齒綿蟹屬

Dicranodromia A. Milne-Edwards, 1880: 31 [type species: *Dicranodromia ovata* A. Milne Edwards, 1880, by monotypy. Gender: feminine].

Diagnosis.— Distal flexor margin of propodus of pereopods 4 and 5 not produced to form pollex, but with long distal movable spines that occlude with dactylus forming functional 'chela'. Basal segment of ocular peduncle articulated.

Remarks.— Nineteen species of *Dicranodromia* are known worldwide (Ng *et al*., 2008; Ahyong, 2008), of which one is known from Taiwan.

Dicranodromia doederleini Ortmann, 1892
杜氏雙齒綿蟹

Fig. 93. Female, CP55, carapace heavily damaged.

Dicranodromia döderleini Ortmann, 1892: 549, pl. 26: 4, 4st, 4z [type locality: Sagami Bay, Japan, 273 m].
Dicranodromia doederleini.— Ho, Ng, Chan & Lee, 2004: 643, fig. 1B.

Material examined.— CP55, 24°26.9'N, 122°18.1'E, 638–824m, 4 Aug 2000: 1 female (cw 7.5 mm, cl 11.1 mm, carapace badly damaged) (NTOU).

Diagnosis.— Carapace dorsum sparsely and unevenly setose, not obscuring surface contours; dorsal integument smooth medially; with granules or spinules on dorsolateral surfaces; lateral margin of frontal teeth concave; outer orbital tooth prominent, pointed. Basal antennal segment with spinules. Outer surface of cheliped with smooth central surface, slightly granulate on upper and lower surfaces. Pereopods 2 and 3 with dactylus, carpus and propodus unarmed; merus extensor and flexor margins without distinct spines, granulate or only minutely spinulate.

Size.— To cw 23.8 mm, cl 26.2 mm (Ikeda, 1998).

Colouration.— Pale dirty brown.

Habitat.— Soft substrates; may carry sponge; 65–824 m.

Distribution.— Japan and Taiwan.

Remarks.— Ho *et al*. (2004) first recorded *D. doederleini* from Taiwan. It is thus far known only from the broken specimen and has not been collected since. Therefore, a Japanese specimen is used for the illustrations of this species. Guinot (1995) commented that the taxonomy of this species was difficult (see also Ng & Naruse,

2007).

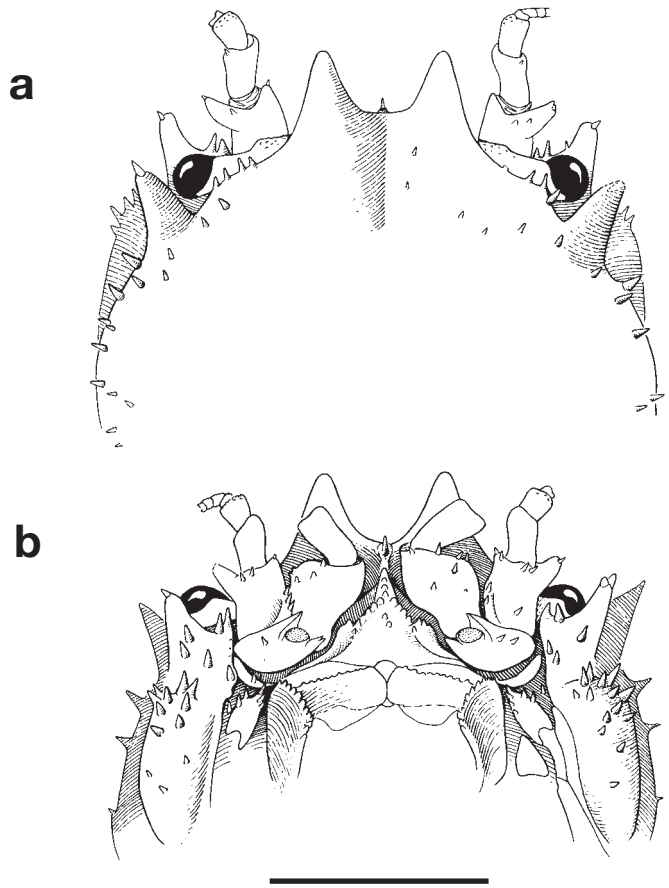


Fig. 94. Female (cw 14 mm, cl 21.2 mm), Tokyo (MNHN-B 21683): **a,** carapace, front portion; **b,** oral field. Scale: 5 mm. (After Guinot, 1995).

Genus *Homolodromia* A. Milne-Edwards, 1880
人面綿蟹屬

Homolodromia A. Milne-Edwards, 1880: 32 [type species: *Homolodromia paradoxa* A. Milne-Edwards, 1880, by monotypy. Gender: feminine].

Diagnosis.— Distal flexor margin of pereopods 4 and 5 propodus produced to form pollex that occludes with dactylus; pollex armed distally with movable spines. Basal segment of ocular peduncle fixed, immobile.

Remarks.— *Homolodromia* was comprehensively revised by Guinot (1995), who recognized five species in the genus. A single species is known from the Indo-West Pacific, and from Taiwanese waters.

Homolodromia kai Guinot, 1993
凱島人面綿蟹

Fig. 95. Male, CD130.

Fig. 96. Ovigerous female, Dongsha, 22 Apr 1995.

Fig. 97. Ovigerous female, Dongsha, 22 Apr 1995, carrying sponge, ventral view.

Homolodromia kai Guinot, 1993: 1228, fig. 5 [type locality: Kai Islands, Indonesia, 688–694 m].— Ho & Ng, 1999: 1123.— Ng, Wang, Ho & Shih, 2001: 54.— Chen & Sun, 2002: 130, pl. VI-5.— Takeda, Watabe & Ohta, 2005: 106, fig. 1A.

Material examined.— CD130, 22°18.77'N, 120°6.99'E, 728–709 m, 22 Aug 2001: 1 male (cw 9.9 mm, cl 13.7 mm) (ZRC 2007.0104). CD141, 22°12.04'N, 119°59.96'E, 1110–985 m, 24 Nov 2001: 1 male (cw 20.2 mm, cl 26.5 mm) (ZRC 2007.0103). Dongsha, 650 m, 22 Apr 1995: 1 ovigerous female (cw 26.7 mm, cl 33.8 mm) (ZRC).

Diagnosis.— Carapace and pereopods covered with long, fine setae, appearing 'hairy'; integument smooth, not spinulate. Male pleopods 3–5 vestigial; pleopod 3 a minute bud, about as long as wide; pleopods 4 and 5 elongate, more than 3 times as long as wide. Female spermathecal orifices positioned submedially on sternum, bordered by thickened rim.

Size.— Males to cw 19.0 mm, cl 27.0 mm (Guinot, 1993); females to cl 36.1 mm (Ahyong, 2008).

Colouration.— Carapace and appendages uniform off-white. Occlusal margins of cheliped fingers pale pink. Pereopods 4 and 5 dactyli pink. Inner mouthparts and mandibles pale orange-red. Setae light brown.

Habitat.— 350–1110 m (Ahyong, 2008; present record).

Distribution.— Indonesia, New Caledonia, eastern Australia, New Zealand, Wallis and Futuna Islands, South China Sea (Dongsha), Taiwan and Japan.

Remarks.— *Homolodromia kai* was first reported from "Taiwanese" waters on the basis of the present specimen from the Dongsha (Ho & Ng, 1999). This species was also recently collected off the southwestern coast of Taiwan (present material). As remarked by Ng *et al*. (2001), the Dongsha specimen agrees well with Guinot (1995) differing only in minor details: the inner margins of the rostral lobes are subparallel and less obviously convergent, and the subhepatic region only has one instead of two small, low granules. Most significantly, the Dongsha specimen was carrying a sponge cap on the carapace, which was first confirmation of camouflage carrying in *Homolodromia* (Ho & Ng, 1999).

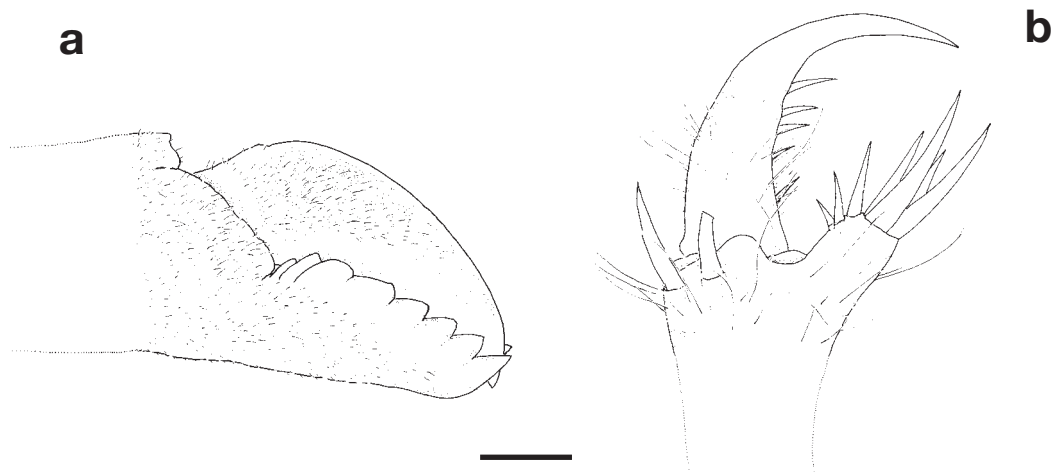


Fig. 98. Male (cw 20.2 mm, cl 26.5 mm), CD141: **a,** distal part of right chela; **b,** distal part of propodus and dactylus of left pereopod 5. Scale: a = 2 mm, b = 1 mm.

Section RANINOIDA De Haan, 1839
蛙蟹派

Remarks.— A single superfamily and family is recognized.

Superfamily RANINOIDEA De Haan, 1839
蛙蟹總科

Diagnosis.— see Diagnosis of family.

Remarks.— Some authors recognized Goeke's (1981) raninoid subfamily, Symethinae, as a separate family Symethidae (see Guinot, 1993; Tucker, 1998; Martin & Davis, 2001). Phylogenetic relationships within Raninoidea have not yet been studied comprehensively. Unfortunately, Tucker's (1998) cladistic analysis did not incude *Symethis* and other studies that have included *Symethis* (e.g., Ahyong *et al*., 2007) were focused on high level phylogeny. Although *Symethis* bears some unusual autapomorphies, it otherwise differs little from other raninids, and is plausibly nested among the other five raninoid subfamilies. Therefore, until comprehensive phylogenetic analyses of Raninidae *sensu lato* become available, we regard Symethinae as a raninid subfamily following Davie (2002), Ahyong *et al*. (2007) and Ng *et al*. (2008). Therefore, we recognize a single family, Raninidae, in the Raninoidea.

Family RANINIDAE De Haan, 1839
蛙蟹科

Raninoidea De Haan, 1839: 56.

Diagnosis.— Carapace longer than wide, widest in anterior third. Proximal articles of the exopodite and endopodite of maxilliped 1 forming respiratory canal; inhalant branchial canals between abdominal somite 1 and pereopod 5 coxae. Maxilliped 3 narrow, completely covering buccal cavity. Buccal cavity elongate, triangular. Chelipeds robust subequal, flattened, with fingers nearly at right angles to palm. Pereopods 2–5 with flattened propodi and dactyli. Pereopod 5 raised above plane of other legs. Thoracic sternum narrow, especially sternites 5–7. Abdomen of 6 somites and telson, incompletely reflexed, most somites visible dorsally; uropods absent. Male and female gonopores coxal. Spermathecae present.

Remarks.— Six subfamilies are presently recognized in Raninidae of which four are represented in Taiwan.

Key to subfamilies of Raninidae known from Taiwan

1. Carapace widest across anterior margin; surface uniformly scabrous ..... **Raninidae**
- Carapace widest behind anterior margin; surface generally smooth, granulate or minutely spinulate 2
2. Maxilliped 3 ischium with oblique proximal ridge ..... **Notopodinae**
- Maxilliped 3 ischium without oblique proximal ridge 3

3. Distance between outer orbital spines distinctly narrower than half maximum carapace width ·· **Lyreidinae**
- Distance between outer orbital spines about half or more maximum carapace width ····· **Raninoidinae**

Subfamily Ranininae De Haan, 1839
蛙蟹亞科

Raninoidea De Haan, 1839: 56.

Diagnosis.— Carapace widest across anterior margin; surface scabrous. Orbits directed anteriorly. Thoracic sternum strongly deflexed at level of sternite 7; sternite 8 perpendicular to sternite 7; sternite 4 wide; sternite 5 obvious only laterally; sternite 6 linear, especially between pereopod 3 coxae. Eyestalk 3-segmented. Maxilliped 3 ischium without oblique ridge.

Remarks.— Ranininae includes only the type genus and species, *Ranina ranina*.

Genus *Ranina* Lamarck, 1801
蛙蟹屬

Ranina Lamarck, 1801: 156 [type species: *Cancer raninus* Linnaeus, 1758, by subsequent designation (Latreille, 1810: 422). Gender: feminine].

Diagnosis.— Carapace broad, wider than long, widest across anterior margin in adults; frontal margin trilobate; dorsum covered with flattened, anteriorly directed scales. Eye stalk folding transversely; 3-segmented. Pereopods 2–5 dactyli broad, spatulate. Pereopod 5 well developed, not markedly smaller than pereopod 4.

Remarks.— One species of *Ranina* is presently known, *R. ranina*.

Ranina ranina (Linnaeus, 1758)
真蛙蟹

Fig. 99. Male, Gengfang fishing port, Yilan County, May 1999.

Fig. 100. Female, Gengfang fishing port, Yilan County, 30 May 1997.

Cancer raninus Linnaeus, 1758: 625 [type locality: Indian Ocean].

Ranina serrata Lamarck, 1801: 225 [type locality: not known].

Ranina dentata H. Milne Edwards, 1837: 194, pl. 21: figs 1–4 [type locality: Indian Ocean].

Ranina ranina.— Oshima, 1921b: 227. – Balss, 1922b: 122.— Maki & Tsuchiya, 1923: 122.— Sakai, 1937: 178, pl. 16: fig. 4.— Horikawa, 1940: 24.— Lin, 1949: 15.— Chang, 1965: 51.— Wang & Chen, 1981: 150.— Dai, Yang, Song & Chen, 1986: 38, fig.17, pl. 4: 2.— Dai & Yang, 1991: 42, fig.17, pl. 4: 2.— Huang, 1994: 578.— Jeng, Chan, Fung, Tzeng & Yang, 1994: 98.— Ho, 1996: 72.— Jeng, Chan, Fung, Tzeng & Yang, 1996: 100.— Jeng, 1997: 15, 22, 42, figs. 50–53.— Jeng, Shao, Fung, Tzeng & Wu, 1998: 123.— Jeng, 1998: 56.— Ng, 1998b: 1090.— Ng, Chan & Wang, 2000: 165, 166, fig. 5a, b.— Ng, Wang, Ho & Shih, 2001: 6.— Shen & Jeng, 2005: 23.

Material examined.— Keelung, 15 Jul 1985: 1 dried male (TMCD 393). Gengfang fishing port, Yilan County, 22 Feb 1991: 1 male (cw 48.1 mm, cl 60.0 mm) (NTOU).— Jun 1993: 5 males, 3 females (ZRC 1995.591), 2 males, 2 females (TMCD).— May 1999: 3 males (cw 46.4 mm, cl 58.4 mm – cw 71.7 mm, cl 80.7 mm), 1 ovigerous female (cw 61.2 mm, cl 74.1 mm), 1 females (cw 61.0, cl 72.3 mm) (NTOU).— 23 Jun 1999: 1 male (cw 56.0 mm, cl 67.7 mm), 3 ovigerous females (cw 54.1 mm, cl 66.5 mm – cw 62.3 mm, cl 76.4 mm), 2 females (cw 54.1 mm, 65.6 mm; cw 54.9 mm, cl 67.8 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 21 Jul 1985: 1 female (cw 47.9 mm, cl 59.1 mm) (NTOU). Northeastern coast, Jun 1993: 4 males (largest cw 80.2

mm, cl 87.8 mm), 2 females (largest cw 72.9 mm, cl 82.4 mm) (ZRC 1995.0591). No specific locality: 1 male (cw 65.3 mm, cl 73.5 mm), 1 female (cw 73.4 mm, cl 92.8 mm) (NTOU).

Diagnosis.— As for genus.

Size.— Males to cl 150 mm; females to cl 120 mm (Ng, 1998b).

Colouration.— Bright red-orange.

Habitat.— Sandy substrates; intertidal to 121 m.

Distribution.— Western Indian Ocean to Australia, Hawaii and French Polynesia including China, Taiwan and Japan.

Remarks.— *Ranina ranina* is the largest of the raninid crabs, and is a popular commercial species throughout Southeast Asia, Japan, China, Taiwan and Australia. In Taiwan, *Ranina ranina* is not naturally abundant but commands relatively high market prices (Ho, 1996; Ng, 1998). The Taiwanese specimens available for study are all smaller than specimens from other areas (reaching a maximum carapace length 15 cm and 0.9 kg for males), with males having the anterolateral angle of the carapace less strongly expanded (Ng *et al*., 2000). Owing to the high market value of *R. ranina*, large numbers are regularly imported into Taiwan from Australia and the Philippines. Most of the large specimens, including live specimens, seen in Taiwanese markets are imported live from Australia (Ng *et al*., 2000).

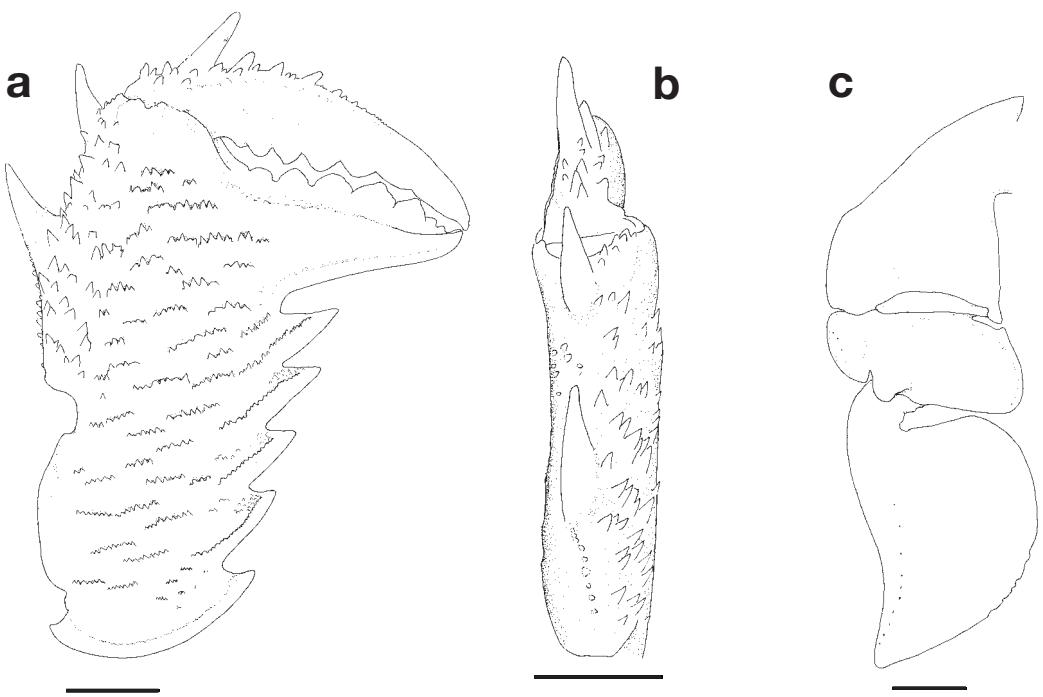


Fig. 101. Male (cw 62.3 mm, cl 71.8 mm), northeastern coast, Jun 1993: **a,** right chela, outer view; **b,** right chela, upper view; **c,** carpus to dactylus of left pereopod 4. Scales = 5 mm.

Subfamily Lyreidinae Guinot, 1993
琵琶蟹亞科

Lyreidinae Guinot, 1993: 1325–1326.

Diagnosis.— Carapace elongate, fusiform, widest near midlength; dorsal surface smooth. Orbits directed anteriorly. Thoracic sternum strongly deflexed at level of sternite 7; sternite 8 perpendicular to sternite 7; sternite 4 wide; sternite 5 with pair of long projections; sternite 6 obvious only laterally. Eyestalk 1-segmented. Maxilliped 3 ischium without oblique proximal ridge.

Remarks.— Lyreidinae includes two genera of which one is represented in Taiwan.

Genus *Lyreidus* De Haan, 1841
琵琶蟹屬

Lyreidus De Haan, 1841: 138 [type species: *Lyreidus tridentatus* De Haan, 1841. Gender: masculine].

Diagnosis.— Carapace longer than wide; widest near midlength; dorsum smooth; rostrum simple, triangular, without accessory dentition. Eyestalk folding transversely; 1-segmented. Orbital sinus with 1 fissure. Pereopods 2 and 3 dactyli lanceolate, slender. Pereopod 4 dactylus broad, spatulate. Inner proximal margin of pereopod 4 propodus with spine. Pereopod 5 markedly smaller than pereopod 4.

Remarks.— The three known species of *Lyreidus* occur in Taiwan. Juveniles of *L. brevifrons* and *L. tridentatus* are difficult to distinguish because diagnostic characters are not fully developed, so the key below should be used with caution when identifying juveniles.

Key to species of *Lyreidus*

1. Carapace without lateral spine near midlength. Cheliped carpus with 1 dorsal spine ····· ***L. stenops***
- Carapace with lateral spine near midlength. Cheliped carpus with 2 dorsal spines ····· 2
2. Carapace without postorbital constriction, margin appearing straight in dorsal view. Outer orbital teeth not projecting anteriorly beyond apex of rostrum. Dorsal spines of cheliped carpus both directed mesially ····· ***L. tridentatus***
- Carapace with slight postorbital constriction, margin shallowly concave in dorsal view. Outer orbital teeth projecting slightly beyond apex of rostrum. Disto-dorsal spines of cheliped carpus directed anteriorly, posterior spine directed mesially ····· ***L. brevifrons***

Lyreidus brevifrons Sakai, 1937
短額琵琶蟹

Fig. 102. Male, Dasi fishing port, Yilan County, Sep 2000.

Lyreidus brevifrons Sakai, 1937: 171 [type locality: Indian Ocean].

Material examined.— Dasi fishing port, Yilan County, Sep 2000: 1 male (cw 20.2 mm, cl 35.8 mm) (NTOU). Dongsha, 18 Apr, 1999: 1 male (cw 10.5 mm, cl 24.5 mm) (NTOU). CP160, 22°12.98'N, 120°28.78'E, 300 m, 24 May 2002: 1 male (cw 11.2 mm, cl 17.3 mm) (NTOU). CP161, 22°09.63'N, 120°35.48'E, 302 m, 25 May 2002: 1 male (cw 16.2 mm, cl 27.0 mm) (NTOU).

Diagnosis.— Carapace with slight postorbital constriction, margin shallowly concave in dorsal view; lateral border with spine near midlengthl outer orbital teeth projecting slightly beyond apex of rostrum. Cheliped carpus with 2 dorsal spines, distal spine directed anteriorly, posterior spine directed mesially.

Size.— Males to cw 20.2 mm, cl 35.8 mm; females to cw 11.8 mm, cl 22.2 mm (present study; Chen & Sun, 2002).

Colouration.— Overall dull pink-tan. Cheliped fingers white. Pereopods 2–4 dactyli dark pink.

Habitat.— Sandy substrates; 31–302 m.

Distribution.— Western Indian Ocean to the South China Sea, Taiwan and Japan.

Remarks.— *Lyreidus brevifrons* closely resembles *L. tridentatus* and is best distinguished by the more slender outerorbital spines, which can be slightly longer than the rostrum. The material reported here represents the first record of the species from Taiwan.

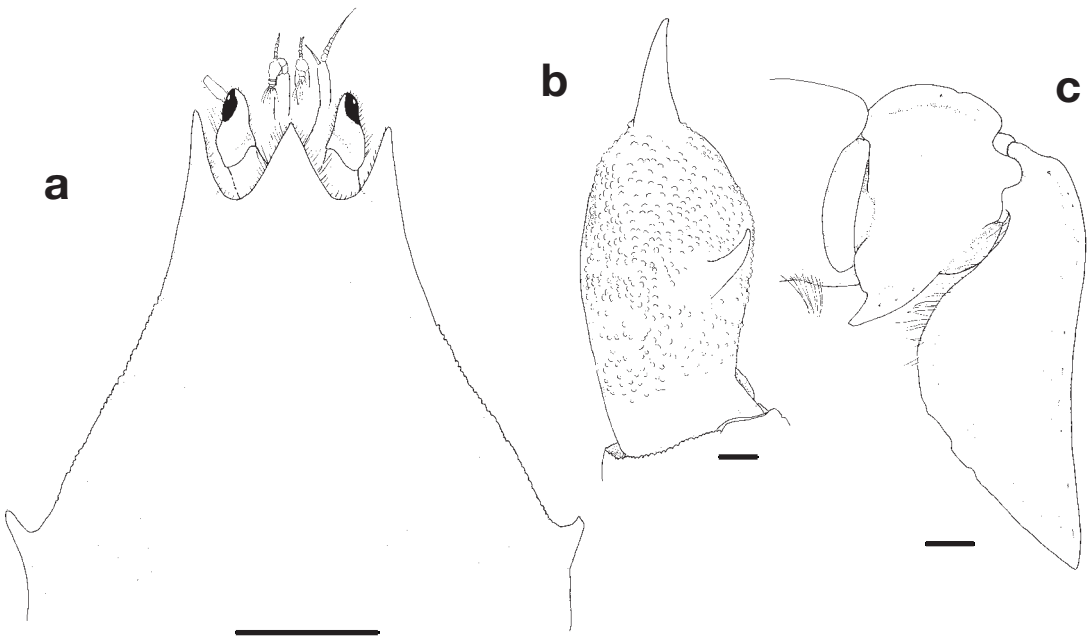


Fig. 103. Male (cw 20.2 mm, cl 35.8 mm), Dasi fishing port, Yilan County, Sep 2000: **a,** anterior part of carapace; **b,** carpus of left cheliped; **c,** propodus and dactylus of right pereopod 4. Scales: a = 5 mm, b= 1 mm, c = 2 mm.

Lyreidus stenops Wood-Mason, 1887
窄額琵琶蟹

Fig. 104. Nanfang-ao fishing port, Yilan County, 9 Jul 1984.

Lyreidus stenops Wood-Mason, 1887: 209, pl. 1: 7, 8 [type locality: Indian Ocean].— Ng, Chan & Wang, 2000: 163, 164, fig. 4a.— Ng, Wang, Ho & Shih, 2001: 7.— Shen & Jeng, 2005: 24.

Lyreidus integra Terasaki, 1902: 217 [type locality: Japan].

Lyreidus politus Parisi, 1914: 311, pl. 13: 5 [type locality: Taiwan].— Chang, 1963: 2, 10, 11, fig. 3.

Material examined.— Dasi fishing port, Yilan County, 10 Dec 1987: 2 males (TMCD 2329), 1 male (ZRC 1995.579). Nangfang-ao fishing port, Yilan County, 3 Sep 1996: 1 male (cw 22.4 mm, cl 42.8 mm) (NMNS 2766-51). Jhongyun fishing port, Kaohsiung County, 17 Mar 1998: 1 female (cw 26.2 mm, cl 47.2 mm) (NMNS 2804-36).

Diagnosis.— Lateral border of carapace without spine near midlength. Cheliped carpus with 1 dorsal spine.

Size.— Males to cw 25.5 mm, cl 47.0 mm; females to cw 26.2 mm, cl 47.2 mm (Chen & Sun, 2002; present record).

Colouration.— Overall pink-tan with some red marks on anterior half of carapace.

Habitat.— Sandy substrates; 31–118 m.

Distribution.— Australia, Philippines, China, Japan and Taiwan.

Remarks.— *Lyreidus stenops* is easily distinguished from *L. tridentatus* by the absence of a spine on the lateral margins of the carapace.

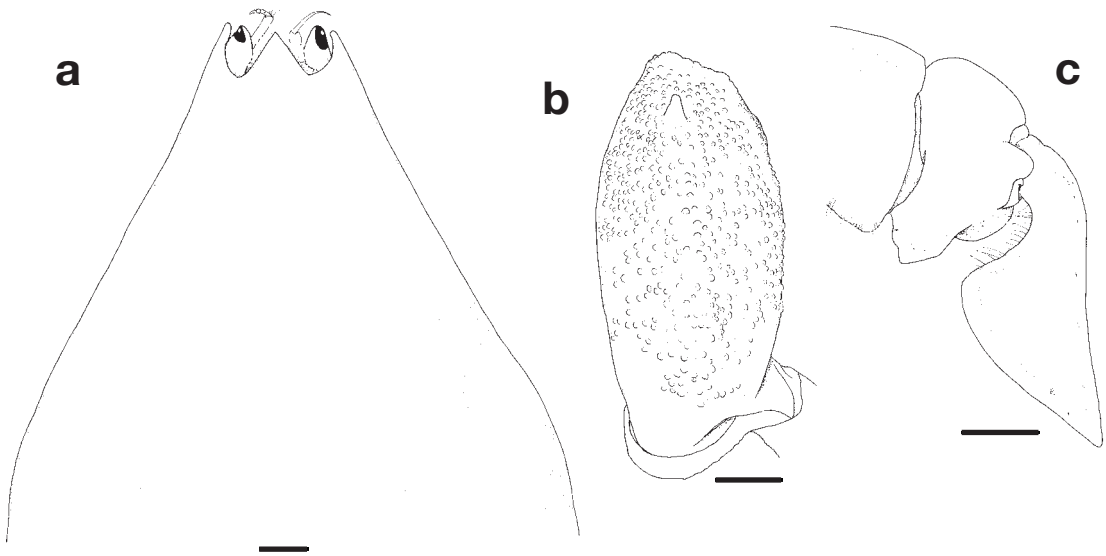


Fig. 105. Male (cw 22.4 mm, cl 42.8 mm), Nanfang-ao fishing port, Yilan County, 3 Sep 1996: **a,** anterior part of carapace; **b,** carpus of left cheliped; **c,** propodus and dactylus of right pereopod 4. Scales = 2 mm.

Lyreidus tridentatus De Haan, 1841
三齒琵琶蟹

Fig. 106. CP159.

Lyreidus tridentatus De Haan, 1841: 140, pl. 35: 6 [type locality: Japan].— Ng, Chan & Wang, 2000: 164, fig. 4b.— Ng, Wang, Ho & Shih, 2001: 7.

Lyreidus elongatus Miers, 1879: 46 [type locality: Kada Bay, Japan].

Lyreidus australiensis Ward, 1933: 377, pl. 23: fig 10 [off Newcastle, New South Wales, Australia].

Lyreidus fossor Bennett, 1964: 9, 24–26, figs 5–9, 106 [type locality: N of Whale Island, Bay of Plenty, New Zealand].

Material examined.— Keelung City, 28 Oct 1966: 1 dried male (TMCD 278). Dasi fishing port, Yilan County, 25 Mar 1986: 1 female (TMCD 2157).— 5 Jul 1991: 1 male (cw 23.0 mm, cl 40.2 mm) (NTOU). Nanfang-ao fishing port, Yilan County, 16 Mar 1986: 1 male (cw 27.8 mm, cl 50.0 mm) (NTOU). Anping fishing port, Tainan County, 2 Nov 1966: 2 dried specimens (TMCD 395, 396). Donggang fishing port, Pingtung County, 3 Sep 1997: 1 male (cw 25.0 mm, cl 45.0 mm) (NTOU). CP166, 22°23.85'N, 120°15.29'E, 200 m, 26 May 2002: 1 male (cw 14.0 mm, cl 24.5 mm) (NTOU). No specific locality, Mar 2002: 1 male (cw 24.2 mm, cl 44.0 mm) (NTOU).

Diagnosis.— Carapace without postorbital constriction, margin appearing straight in dorsal view; lateral border with spine near midlength; outer orbital teeth not projecting anteriorly beyond apex of rostrum. Cheliped carpus with 2 dorsal spines, both directed mesially.

Size.— Males to cw 31.3 mm, cl 52.2 mm; females to 29.1 mm, cl 48.8 mm (Ahyong, unpublished,

specimens from northern New Zealand, NIWA 16850, 16900).

Colouration.— Carapace reddish to reddish-brown with uniform to densely mottled, reticulated patterning. Pereopods pale-pinkish tan with diffuse-red carpo-meral articulation. Cheliped fingers white. Pereopod 4 dactylus dark pink.

Habitat.— Sandy-mud shelf and slope substrates; 27–382 m (McLay, 1988).

Distribution.— Australia, New Zealand, New Caledonia, China, Taiwan, Japan, Fiji and Hawaii.

Remarks.— *Lyreidus tridentatus* is the most widespread species of the genus, and more common than *L. stenops* or *L. brevifrons* in Taiwan. The taxonomy of this widespread species is problematical; the degree of variation suggests that we are dealing with a species complex.

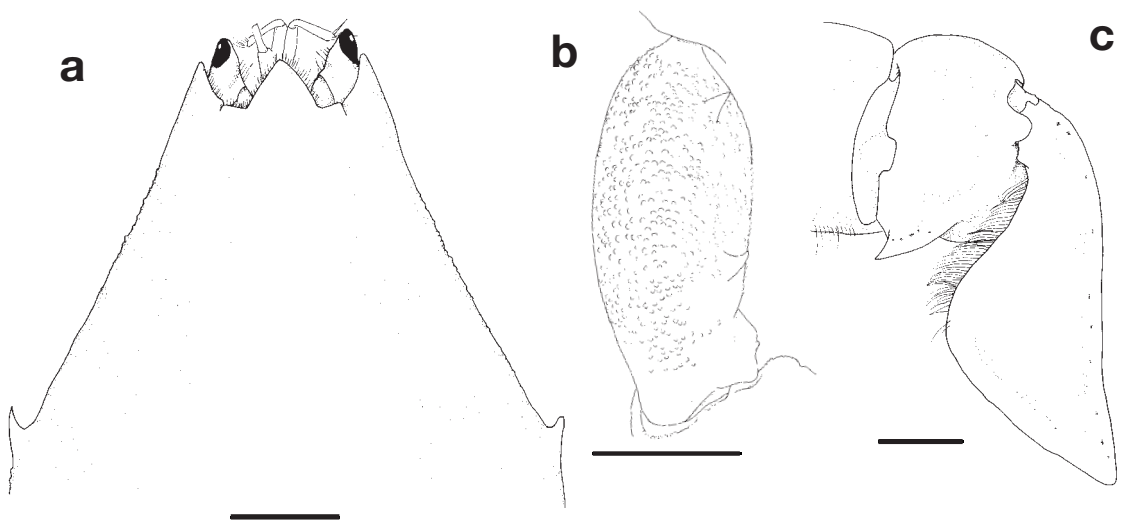


Fig. 107. Male (cw 24.2 mm, cl 44.0 mm) (NTOU), no specific locality, Mar 2002: **a,** anterior part of carapace; **b,** carpus of left cheliped; **c,** propodus and dactylus of right pereopod 4. Scales: a, b = 5 mm, c = 2 mm.

Subfamily Notopodinae Serène & Umali, 1972
背足蟹亞科

Notopodinae Serène & Umali, 1972: 29.
Cosmonotini Števčić, 2005: 27.

Diagnosis.— Carapace widest behind anterior margin; surface smooth, granulate or spinulate. Eyes folding obliquely backward and downward. Thoracic sternum enlarged anteriorly, markedly narrowed posteriorly; with very narrow gap between pereopods 2–4 coxae. Maxilliped 3 ischium with oblique proximal ridge.

Remarks.— Notopodinae includes four genera, of which three are represented in Taiwan. For convenience, all four genera are distinguished in the key below.

Key to genera of Notopodinae

1. Carapace with dorsal median ridge; front with V-shaped emargination, rostrum absent ····· ***Cosmonotus***
- Carapace without dorsal median ridge; rostrum present ····· 2
2. Carapace with transverse spinulate ridge between anterolateral spines ····· ***Notopus***
- Carapace without transverse spinulate ridge between anterolateral spines ····· 3
3. Pereopod 4 dactylus distally truncate, blunt ····· ***Umalia***
- Pereopod 4 dactylus distally tapering, acute ····· ***Ranilia***

Genus *Cosmonotus* Adams &White, 1848
六角蟹屬

Cosmonotus Adams &White, 1848: 60 [type species: *Cosmonotus grayi* Adams & White, 1848, by monotypy. Gender: masculine].

Engonionotus Rathbun, 1897: 166. [Unnecessary replacement name for *Cosmonotus* Adams &White, 1848].

Diagnosis.— Carapace with median ridge; frontal margin with distinct V-shaped median emargination, lacking rostrum. Ocular peduncle length about one-third distance between lateral spines, folding obliquely backward and downward.

Remarks.— Three species of *Cosmonotus* are presently recognized, of which one is known from Taiwan.

Cosmonotus grayi Adams &White, 1848
葛氏六角蟹

Fig. 108. Male, CP167.

Cosmonotus grayi Adams &White, 1848: 60, pl. 13: 3 [type locality: Borneo].— Sakai, 1937: 173, pl. 16: 2; 1976: 57, pl. 20: 3.— Dai, Yang, Song & Chen, 1986: 43, pl. 4: 6.— Dai & Yang, 1991: 49, pl. 4: 6.— Ng, Chan & Wang, 2000: 163.— Ng, Wang, Ho & Shih, 2001: 7.

Cosmonotus grayii.— Horikawa, 1940: 24.

Material examined.— CP167, 22°26.19'N, 120°16.29'E, 100 m, 26 May 2002: 1 male (cw 6.4 mm, cl 7.9 mm) (NTOU).

Diagnosis.— Carapace dorsum with granulated and setose ridges; V-shaped depression without tubercles. Sternum quadrate.

Size.— Males to cw 9.3 mm, cl 11.0 mm; females to cw 11.0 mm, cl 13.5 mm (Chen & Sun, 2002).

Colouration.— Carapace and abdomen with tan and red-brown mottling. Pereopods and abdomen white; setae light brown.

Habitat.— Sandy or shelly substrates; 30–212 m (Takeda, 1973).

Distribution.— Widely distributed in the Indo-West Pacific ranging from the Persian Gulf to Australia, Taiwan and Japan.

Remarks.— *Cosmonotus grayi* was first recorded from Taiwan by Sakai (1937) but it was only recently that a contemporary specimen from Taiwan has been found. The taxonomy of this genus is currently under review.

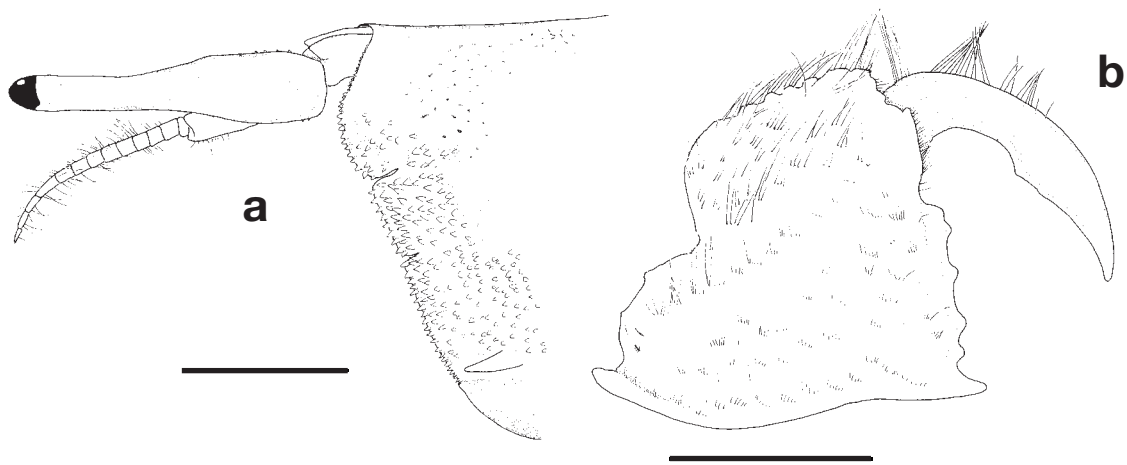


Fig. 109. Male (cw 6.4 mm, cl 7.9 mm), CP167: **a,** anterior part of carapace, lateral view; **b,** right chela. Scales = 2 mm.

Genus *Notopus* De Haan, 1841
背足蟹屬

Notopus De Haan, 1841: 137 [type species: *Cancer dorsipes* Linnaeus, 1758, by monotypy. Gender: masculine].

Diagnosis.— Carapace without median carina; with transverse spinulate ridge between anterolateral spines; fronto-orbital border with 1 fissure either side of rostrum.

Remarks.— The only known species of *Notopus*, *N. dorsipes*, occurs in Taiwan.

Notopus dorsipes (Linnaeus, 1758)
上腳背足蟹

Fig. 110. Male, Nanliao fishing port, Mituo, Kaohsiung County, 6 Jan 1993.

Cancer dorsipes Linnaeus, 1758: 630 [type locality: Ambon, Indonesia].

Notopus dorsipes.— Ng, Chan & Wang, 2000: 165.— Ng, Wang, Ho & Shih, 2001: 7.— Shen & Jeng, 2005: 25.

Material examined.— Nanliao fishing port, Mituo, Kaohsiung County, 6 Jan 1993: 1 male (cw 20.5 mm, cl 27.3 mm) (ZRC).— 7 Jan 1993: 1 male (cw 18.7 mm, cl 25.1 mm) (NTOU). Kaohsiung County, 15 Jul 1968: 1 male (dried) (TMCD 397).

Diagnosis.— As for genus.

Size.— Males to cw 20.5 mm, cl 27.3 mm; females to cw 15.8 mm, cl 22.0 mm (Chen & Sun, 2002; present record).

Colouration.— Carapace with dense red-brown and off white mottling; with dark red brown spot, outlined in white, on either side. Pereopods white with diffuse red-brown mottling.

Habitat.— Sandy substrates.

Distribution.— Western Indian Ocean to Australia, Indonesia, China, Taiwan and Japan.

Remarks.— Although *Notopus dorsipes* ranges widely in the Indo-West Pacific, it is apparently rare in Taiwan. The pair of large red-spots on the carapace, one on each side near the midlength, is a good recognition character.

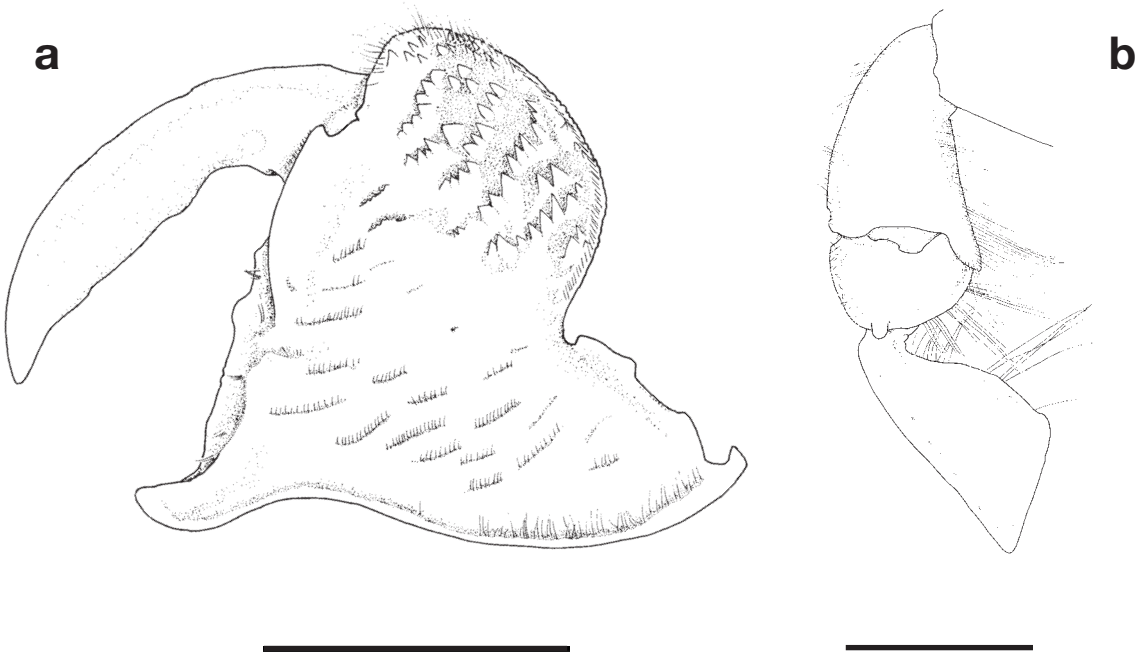


Fig. 111. Male (cw 18.7 mm, cl 25.1 mm), Nanliao fishing port, Mituo, Kaohsiung County, 7 Jan 1993: **a,** left chela; **b,** left pereopod 4. Scales = 5 mm.

Genus *Umalia* Guinot, 1993
烏氏蟹屬

Umalia Guinot, 1993: 1330 [type species: *Notopus misakiensis* Sakai, 1937, by original designation. Gender: feminine].

Diagnosis.— Carapace without median carina; without transverse spinulate ridge between anterolateral spines; fronto-orbital border with 2 fissures either side of rostrum. Pereopod 4 dactylus distally truncate, blunt.

Remarks.— Guinot (1993) recognized that Atlanto- East-Pacific species of *Ranilia* differed from Indo-West Pacific species of *Ranilia* in the form of the P4 dactylus — distally acute and distally truncate, respectively. The Indo-West Pacific species were transferred to a new genus *Umalia*. Seven Indo-West Pacific species of *Umalia* are known (Ng *et al*., 2008), of which one has been recorded from Taiwan.

Umalia orientalis (Sakai, 1963)
東方烏氏蟹

Fig. 112. Female, Dasi fishing port, Yilan County, 20 Feb 1998.

Ranilia orientalis Sakai, 1963: 226, fig. 6 [type locality: Japan].— Ng, Chan & Wang, 2000: 165.— Ng, Wang, Ho & Shih, 2001: 7.

Umalia orientalis.— Ng, Guinot & Davie, 2008: 42.

Material examined.— Dasi fishing port, Yilan County, 20 Feb 1998: 1 female (cw 34.3 mm, cl 45.0 mm) (NTOU). Gushan fishing port, Kaohsiung City, 14 Jan 1988: 1 female (carapace damaged) (NTOU).

Diagnosis.— Carapace breadth less than three-quarters carapace length; fronto-orbital distance more than half carapace width; dorsum covered with transverse of oblique rows of granules. Cornea of eye normal, not markedly reduced. Dactylus of pereopod 4 elongate, quadrangular.

Size.— Males to cw 21.0 mm, cl 42.0 mm; females to cw 34.3 mm, cl 45.0 mm (Sakai, 1976; present study).

Colouration.— Creamy white with dense red-orange marbling on carapace, pereopods 4 and 5 and abdomen. Chelipeds and pereopods 2 and 3 white with some slight diffuse red brown mottling.

Habitat.— Sand and shelly substrates; 50–120 m.

Distribution.— China, Taiwan and Japan.

Remarks.— *Umalia orientalis* has been recorded from Taiwan as a species of *Ranilia* (see Ng, Chan & Wang, 2000). The distinctive colour pattern of this species is diagnostic.

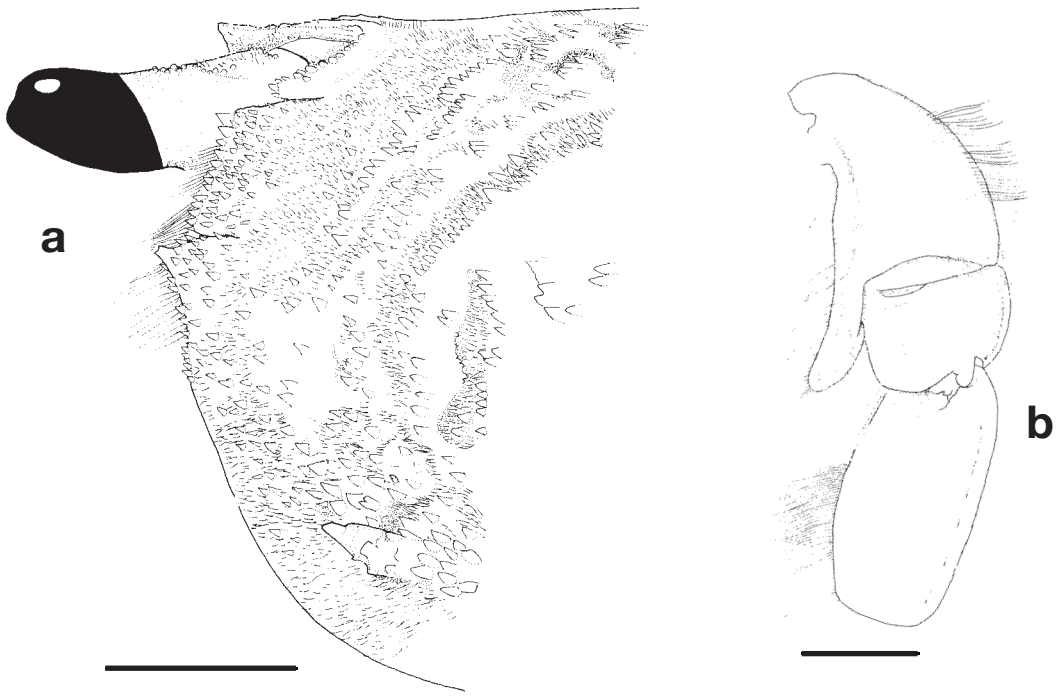


Fig. 113. Female (cw 34.3 mm, cl 45.0 mm), Dasi fishing port, Yilan County, 20 Feb 1998: **a,** anterior part of carapace, lateral view; **b,** right pereopod 4 distal segments. Scales = 5 mm.

Subfamily Raninoidinae Lörenthey & Beurlen, 1929
仿蛙蟹亞科

Raninoidinae Lörenthey & Beurlen, 1929: 299.
Raninellidae Beurlen, 1930: 363.

Diagnosis.— Carapace elongate, widest behind anterior margin; surface smooth or granulate; frontal margin wide, distance between outer orbital spines about half or more maximum carapace width. Thoracic sternites 1–6 in same plane; sternite 4 much enlarged; sternites 5 and 6 demarcated by transverse line. Basal antennal article well developed, with prominent scale. Eyestalk 1-segmented. Maxilliped 3 ischium without oblique proximal ridge.

Remarks.— Three genera are included in Raninoidinae; two are represented in Taiwan.

Key to genera of Raninoidinae from Taiwan

1. Cheliped palm dorsal margin without spine, with double carina. Abdominal somite 1 more than twice as wide as long ····· ***Notosceles***
- Cheliped palm dorsal margin with distal spine, without double carina. Abdominal somite 1 less than twice as wide as long at midlength ····· ***Raninoides***

Genus *Notosceles* Bourne, 1922
背腳蟹屬

Notosceles Bourne, 1922: 73 [type species: *Notosceles chimmonis* Bourne, 1922, by original designation. Gender: masculine].

Diagnosis.— Carapace elongate-oval, widest at anterior third, anterolateral margins short, concave, laterally and dorsally convex, surface finely granulate; frontal margin half maximum carapace width. Rostrum triangular. Supraorbital margin with 2 fissures. Eyestalks folding transversely. Sternum without anterolateral process between between cheliped and pereopod 2 coxae. Pereopods 2 and 4 dactyli ovate, pereopod 3 dactylus pointed; pereopod 5 markedly smaller than pereopod 4. Cheliped palm dorsal margin without spine, with double carina. Abdominal somite 1 more than twice as wide as long.

Remarks.— Guinot (1993) clarified the taxonomy of *Notosceles* Bourne, 1922, and *Raninoides* H. Milne Edwards, 1837, and moved several species between them. As she defines *Notosceles*, five species are known, of which one is known from Taiwan.

Notosceles serratifrons (Henderson, 1893)
鋸額背腳蟹

Fig. 114. Female, DW34.

Raninoides serratifrons Henderson, 1893: 403, figs. 10–12 [type locality: Ceylon].

Material examined.— DW34, 22°01.9'N, 120°36.4'E, 246–240 m, 31 Jul 2000: 1 female (NTOU).

Diagnosis.— Rostrum triangular, coarsely serrated. Inner orbital angle a serrated spine; supraorbital spine acute and almost as long as outer orbital spine; margin between outer orbital and anterolateral spines serrate or spinose. Cheliped propodus with 2 dorsal carinae, not meeting proximally; ventrally with 3 spines; carpus dorsally serrate. Pereopod 3 dactylus falcate.

Size.— Males to cw 11.8 mm, cl 22.5 mm; females to cw 13.5 mm, cl 23.0 mm (Chen & Sun, 2002).

Colouration.— Overall off white; abdomen and anterior third of carapace diffusely red-brown.

Habitat.— Soft substrates; 50–246 m.

Distribution.— Sri Lanka to Australia, China, Taiwan and Japan.

Remarks.— *Notosceles serratifrons* is formally reported from Taiwan for the first time. The previous record of *N. serratifrons* from Taiwan by Ng *et al*. (2001) was actually based on a specimen of the superficially similar *Raninoides intermedius*. Although the specimen cannot be presently located, the photograph from DW34 clearly depicts this species. A specimen from the Philippines is used to illustrate its distinguishing characters.

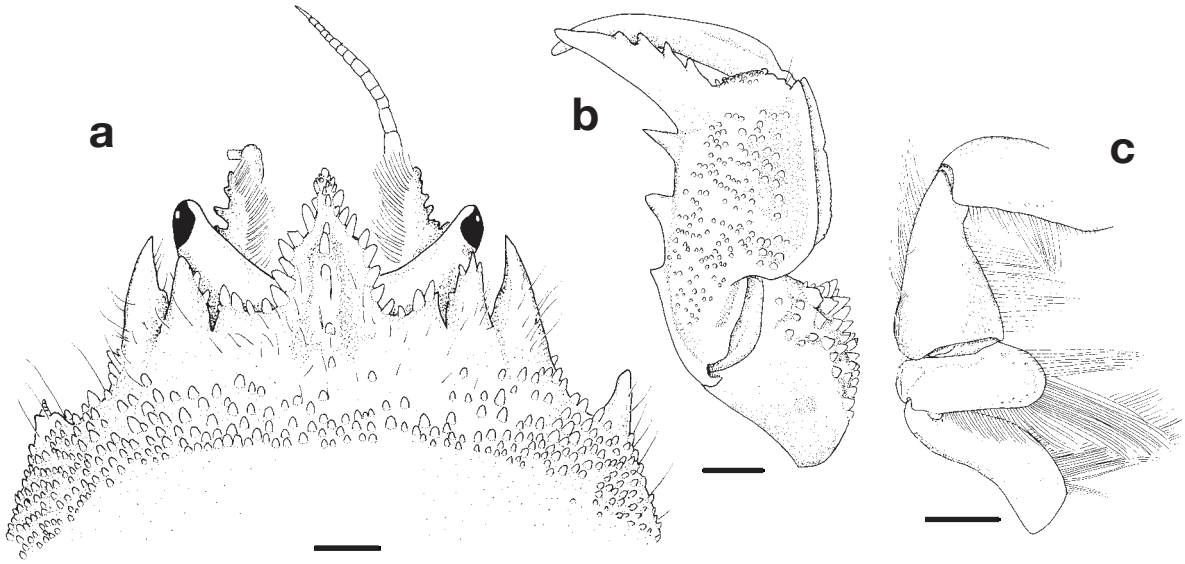


Fig. 115. Male (cw 10.9 mm, cl 20.1 mm), Balicasag, Philippines, 2 Mar 2004 (ZRC): **a,** anterior part of carapace; **b,** carpus and chela of right cheliped; **c,** left pereopod 4. Scales: a, c = 2 mm, b = 1 mm.

Genus *Raninoides* H. Milne Edwards, 1837
仿蛙蟹屬

Raninoides H. Milne Edwards, 1837: 196 [type species: *Ranina loevis* Latreille, 1825, by monotypy. Gender: masculine].

Diagnosis.— Carapace elongate-oval, widest at anterior third, anterolateral margins short, concave, laterally and dorsally convex, surface finely granulate; frontal margin half maximum carapace width. Rostrum triangular. Supraorbital margin with 2 fissures. Eyestalks folding transversely. Sternum with anterolateral process between cheliped and pereopod 2 coxae. Cheliped palm dorsal margin with distal spine, without double carina. Pereopods 2 and 4 dactyli ovate, pereopod 3 dactylus pointed; pereopod 5 markedly smaller than pereopod 4. Abdominal somite 1 less than twice as wide as long at midlength.

Remarks.— *Raninoides* includes 11 species of which one is known from Taiwan.

Raninoides intermedius Dai & Xu, 1991
中型仿蛙蟹

Fig. 116. Female, Fangliao, Pingtung County, 7 Dec 1969, dried specimen.

Notosceles serratifrons.— Ng, Wang, Ho & Shih, 2001: 7, 74, fig. 1c. [Not *Notosceles serratifrons* (Henderson, 1893)].

Raninoides intermedius Dai & Xu, 1991: 1, 43, fig. 1 [type locality: Nansha Islands, South China Sea].

Material examined.— Fangliao, Pingtung County, 7 Dec 1969: 1 dried female (cw 15.4 mm, cl 29.8 mm) (TMCD 394).

Diagnosis.— Carapace elliptical, with 1 tooth on anterolateral margin. Rostrum with granular margins, not serrated. Supraorbital margin divided by 2 deep, narrow fissures resulting in 3 sharp teeth. Fronto-orbital width about two-thirds carapace width. Sternal process between cheliped and pereopod 2 coxae with sharp apex. Cheliped palm with 1 dorsal and 3 sharply triangular teeth ventral. Abdominal somites without median spines of tubercles.

Size.— Males to cw 15.7 mm, cl 30.0 mm; females to cw 21.3 mm, cl 39.0 mm (Chen & Sun, 2002).

Colouration.— Not known.

Habitat.— Muddy to sandy substrates; 67–127 m (Chen & Sun, 2002).

Distribution.— Nansha Islands and Fangliao, Taiwan.

Remarks.— *Raninoides intermedius* is recognized from Taiwan for the first time. The present specimen was previously reported from Taiwan as *Notosceles serratifrons* (see Ng *et al*. 2001). A re-examination of the specimen in question indicates it is referable to Dai & Xu's (1991) taxon.

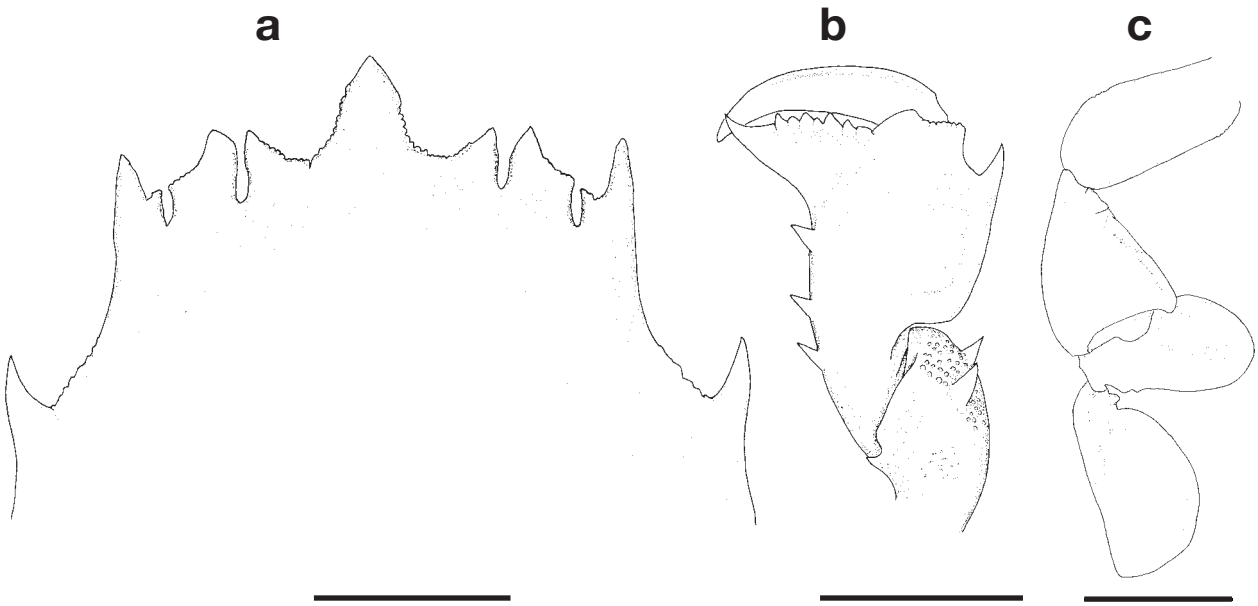


Fig. 117. Female (cw 15.4 mm, cl 29.8 mm), Fangliao, Pingtung County, 7 Dec 1969: **a,** anterior part of carapace; **b,** carpus and chela of right cheliped; **c,** left pereopod 4. Scales = 5 mm.

Section CYCLODORIPPOIDA Ortmann, 1892
圓關公蟹派

Diagnosis.— Maxilliped 3 operculiform. Pereopods 4 and 5 reduced, subchelate, subdorsal. Sternal plate wide, with true sterno-abdominal cavity. Male and female gonopores coxal. Males without pleopods 3–5. Abdominal somite 6 without trace of uropods.

Remarks.— The Cyclodorippoida is the sister group to Eubrachyura sharing features such as the broad thoracic sternite 3 which widely separates the left and right maxilliped 3 ischiobasis, and true sterno-abdominal cavity (Scholtz & McLay, in press). All are small species (less the 15 mm carapace width) from outer shelf and slope depths. Cyclodorippoida includes one superfamily and three families.

Superfamily CYCLODORIPPOIDEA Ortmann, 1892
圓關公蟹總科

Diagnosis.— As for section.

Remarks.— Cyclodorippoidea includes three families, Phyllotymolinidae Tavares, 1998, Cyclodorippidae Ortmann, 1892, and Cymonomidae Bouvier, 1897, of which the latter two are represented in Taiwan. The Phyllotymolinidae is represented in the western Pacific, including Japan, so it can be expected to also found in Taiwan in the future. Therefore, the key below includes all three cyclodorippoid families.

Key to families of CYCLODORIPPOIDEA

1. Orbits developed; eyes retractile 2
- Orbits undeveloped; eyes immovable or movable ..... **Cymonomidae**
2. Endostome deep, projecting anteriorly with rounded anterior margin, giving buccal cavity a semi-elliptical appearance. Maxilliped 3 palp inserted on inner surface of merus, insertion not visible externally; exopod without flagellum ..... **Cyclodorippidae**
- Endostome shallow, only slightly projecting anteriorly, giving buccal cavity a rectangular appearance. Maxilliped 3 palp inserted near inner angle of merus, insertion visible externally; exopod with flagellum ..... **Phyllotymolinidae** (not yet known from Taiwan)

Family CYCLODORIPPIDAE Ortmann, 1892
圓關公蟹科

Cyclodorippidae Ortmann, 1892: 522.

Tymolinae Alcock, 1896: 274.

Diagnosis.— Carapace subcircular or subpentagonal. Orbits developed; eyes movable and retractile. Maxilliped 3 elongate; covering buccal cavity; palp inserted on inner surface of merus, insertion not visible

externally; exopod without flagellum. Endostome deep, projecting anteriorly with rounded anterior margin, giving buccal cavity semi-elliptical appearance. Pereopods 2–5 basis and ischium articulating. Pereopods 2 and 3 long, thin, subequal. Pereopods 4 and 5 reduced, positioned dorsally. Female with sternal grooves. Abdominal somite 1 visible dorsally; uropods absent. Male and female genital openings coxal; spermathecal apertures usually at level of genital openings, sometimes located more anteriorly.

Remarks.— The Cyclodorippidae presently includes 10 genera and 36 species worldwide (Ng *et al*. 2008). Three genera are represented in Taiwan: *Tymolus*, *Ketamia* and *Xeinostoma*.

Key to subfamilies of Cyclodorippidae

1. Distance between outer orbital teeth less than or greater than half maximum carapace width. Male abdomen of 5 or 6 somites. Pleopods 2–5 in females articulating on inner surface of abdominal somites, not at margins ..... **Cyclodorippinae**
- Distance between outer orbital teeth always much greater than half maximum carapace width. Male abdomen of 5 or 7 somites. Pleopods 2–5 in females articulating on at extremity of respective abdominal somites ..... **Xeinostomatinae**

Subfamily Cyclodorippinae Ortmann, 1892
圓關公蟹亞科

Cyclodorippinae Ortmann, 1892: 552.

Diagnosis.— Distance between outer orbital teeth much less than or graeter than half maximum carapace width. Male abdomen of 5 or 6 somites. Pleopods 2–5 in females articulating on inner surface of abdominal somites, not at margins.

Remarks.— Cyclodorippinae include seven genera of which one is represented in Taiwan.

Genus *Tymolus* Stimpson, 1858
鬼蟹屬

Tymolus Stimpson, 1858: 163 [type species: *Tymolus japonicus* Stimpson, 1858, by monotypy. Gender: masculine].

Diagnosis.— Carapace subcircular, weakly granular, anterolateral margin ill-defined; front multilobate or truncated, less than half as wide as carapace. Antennae longer than half carapace length. Eyestalks retractile, oriented longitudinally. Abdomen of female broader than carapace; segments articulating ventrally.

Remarks.— Nine species of *Tymolus* are presently recognized of which four are known from Taiwan.

Key to species of *Tymolus* from Taiwan

1. Carapace median frontal teeth as long as or longer than laterals, with deep sinus separating medians, almost as deep as sinus separating medians from laterals. Lateral carapace margins with several pronounced projections ..... ***T. japonicus***
- Carapace median frontal teeth separated by shallow sinus and projecting well in advance of laterals. Lateral

carapace margins without pronounced projections 2

2. Pereopod 2 merus greatly elongate, longer than combined length of dactylus, carpus and propodus ***T. brucei***
- Pereopod 2 merus subequal to combined length of dactylus, carpus and propodus 3
3. Carapace wider than long. Margins of pereopods 2 and 3 lined with long setae ..... ***T. hirtipes***
- Carapace as wide as long. Margins of pereopods 2 and 3 glabrous or with sparse, very short setae ***T. uncifer***

Tymolus brucei Tavares, 1991
布氏鬼蟹

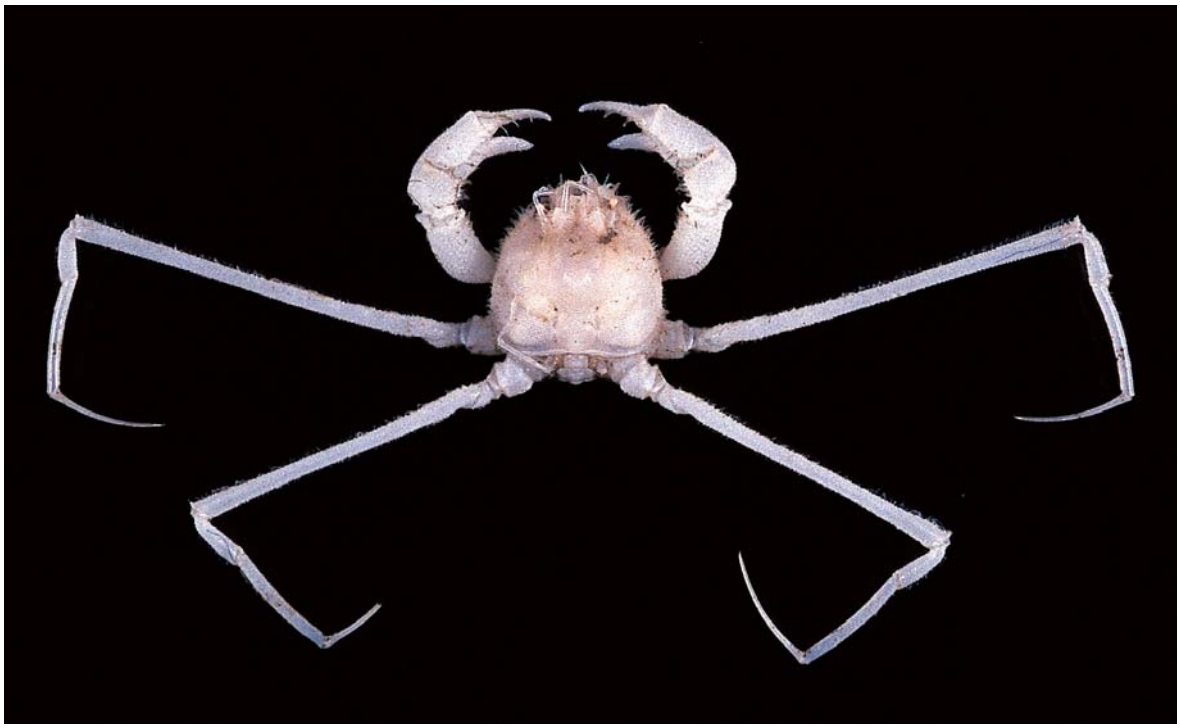


Fig. 118. Male, CP27.

Fig. 119. Juvenile male, DW254.

Tymolus brucei Tavares, 1991: 451 [type locality: off northwestern Australia, 18°52.2'S, 116°11.1'E, 456–458 m].— Ho, Ng, Chan & Lee, 2004: 645, fig. 1D.

Material examined.— CP27, 22°13.3'N 120°23.4'E, 329–377 m, 30 Jul 2000: 3 males (cw 4.9 mm, cl 4.6 – cw 5.7 mm, cl 5.4 mm), 3 ovigerous females (cw 4.2 mm, cl 4.0 mm – cw 5.7 mm, cl 5.2 mm) (ZRC 2001.2209). DW254, 24°55.97'N, 122°4.31'E, 220 m, 28 Aug 2004: 1 male (cw 3.0 mm, cl 3.0 mm) (NTOU).

Diagnosis.— Carapace front with 4 teeth, median pair projecting beyond laterals, separated by shallow sinus; with even, finely granular lateral margins, without pronounced projections; outer orbital tooth and outer frontal tooth separated by wide V-shaped notch. Pereopod 2 merus greatly elongate, longer than combined length of dactylus, carpus and propodus.

Size.— Males to cw 5.7 mm, cl 5.4 mm; females to cw 5.7 mm, cl 5.2 mm.

Colouration.— Off-white.

Habitat.— Sand-mud substrates; 220–516 m (persent record; Chen & Sun, 2002).

Distribution.— Australia, China and Taiwan.

Remarks.— The very elongate merus of pereopod 2, being longer than the combined length of the dactylus, carpus and propodus, is a distinctive character of *T. brucei*.

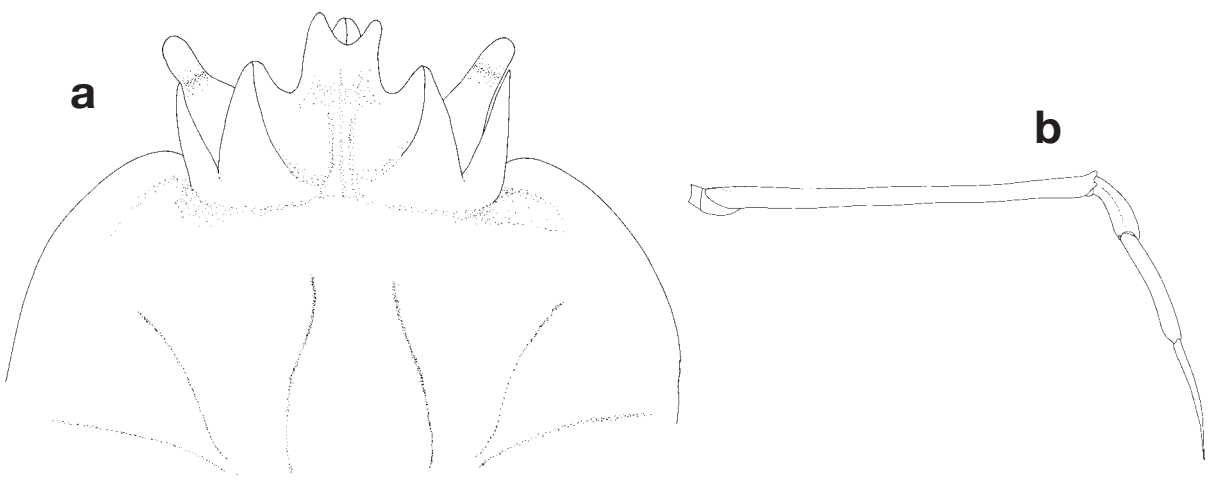


Fig. 120. Ovigerous female (cw 5.7 mm, cl 5.2 mm), CP27: **a,** anterior part of carapace; **b,** right pereopod 2. Scales: a = 1 mm, b = 2 mm.

Tymolus hirtipes Tan & Huang, 2000
毛足鬼蟹

Fig. 121. Male, CP264.

Tymolus hirtipes Tan & Huang, 2000: 136–139, figs. 1–4 [type locality: Nangfangau, I-Lan County, Taiwan].— Ng, Wang, Ho & Shih, 2001: 8.

Material examined.— Nanfang-ao fishing port, Yilan County, 2 Apr 1992: holotype male (cw 10.2 mm, cl 8.5 mm) (ZRC). CP264, 24°28.07'N, 121°53.55'E, 330–297 m, 1 Sep 2004: 1 male (cw 10.4 mm, cl 8.8 mm) (NTOU).

Diagnosis.— Carapace broader than long; front with 4 teeth, median pair projecting beyond laterals, separated by shallow sinus; with even, finely granular lateral margins, without pronounced projections; surface finely granular, almost glabrous; outer orbital tooth and outer frontal tooth separated by wide V-shaped notch. Margins of pereopods 2 and 3 lined with long setae; meri unarmed distally. Pereopod 2 merus shorter than combined length of dactylus, carpus and propodus.

Size.— Only males known to cw 10.4 mm, cl 8.8 mm.

Colouration.— White overall.

Habitat.— Sand-mud substrates; 297-330 m.

Distribution.— Known only from northeastern Taiwan.

Remarks.— Of the Taiwanese species of *Tymolus*, *T. hirtipes* is most similar to *T. uncifer*, differing notably in its carapace proportions — wider than long rather than as long as wide. This species is presently known only from the present two specimens.

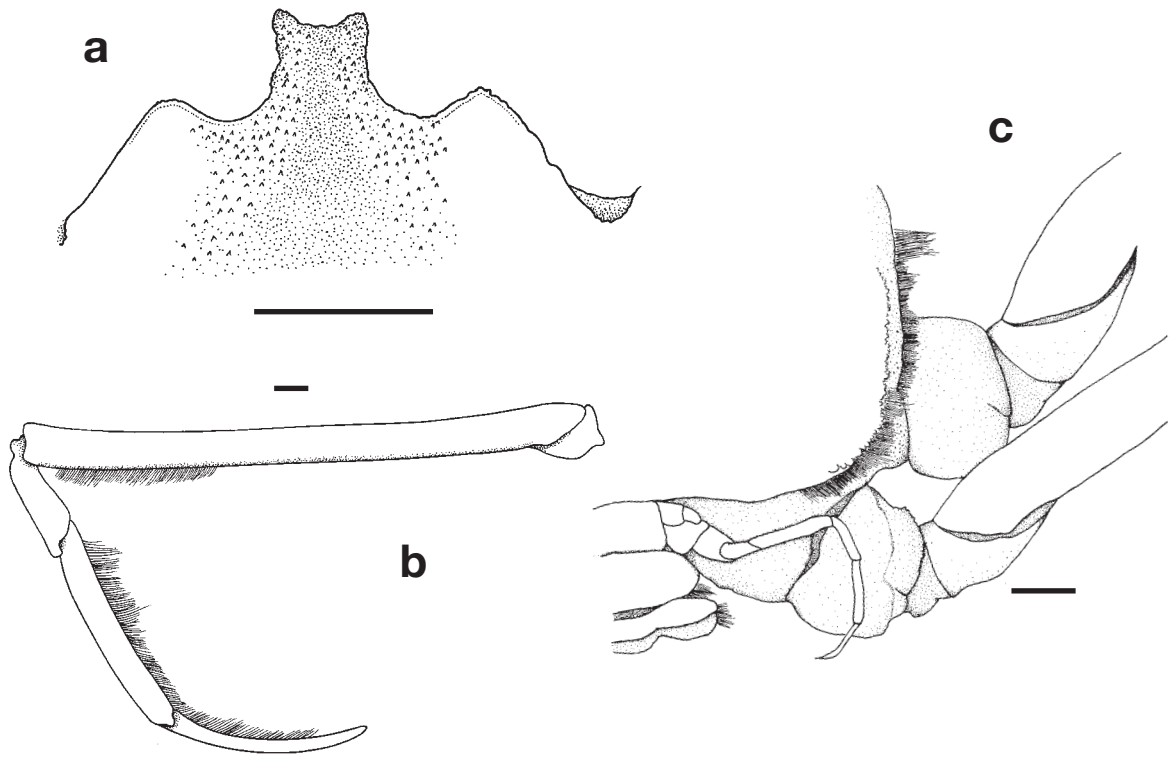


Fig. 122. Holotype male (cw 10.2 mm, cl 8.5 mm), Nanfang-ao fishing port, Yilan County, 2 Apr 1992: **a,** anterior part of carapace; **b,** left P2; **c,** right P5 and right posterolateral parts of body. Scales = 10 mm. (After Tan & Huang, 2000).

Tymolus japonicus Stimpson, 1858
日本鬼蟹

Fig. 123. Male, CP216.

Fig. 124. Female, CP71, carapace damaged.

Tymolus japonicus Stimpson, 1858: 163 [type locality: Japan].— Ho, Ng, Chan & Lee, 2004: 645, fig. 1E.

Material examined.— CP58, 24°35.1'N, 122°05.8'E, 221–254 m, 4 Aug 2000: 3 females (cw 4.8 mm, cl 4.1 mm – cw 5.5 mm, cl 4.4 mm) (NTOU), 1 ovigerous female (cw 5.7 mm, cl 5.0 mm) (ZRC 2001.2210). CP216, 24°34.71'N, 122°4.02'E, 209–280 m, 27 Aug 2003: 1 male (cw 4.0 mm, cl 4.0 mm), 1 female (cw 6.5 mm, cl 6.4 mm) (NTOU).

Diagnosis.— Carapace front with 4 teeth, median pair as long as or longer than laterals, with deep sinus separating medians, almost as deep as sinus separating medians from laterals; with pronounced pterygostomian, hepatic, anterolateral and lateral branchial projections; outer orbital tooth and outer frontal tooth almost in contact, separated by narrow fissure.

Size.— Males to cw 12.0 mm, cl 10.4 mm; females to cw 10.0 mm, cl 9.0 mm (Tavares, 1991).

Colouration.— Off-white.

Habitat.— Sandy-mud substrates; 44–600 m (Takeda, 2001; present record for CP71).

Distribution.— China, Taiwan and Japan.

Remarks.— *Tymolus japonicus* was first recorded from Taiwan by Ho *et al*. (2004).

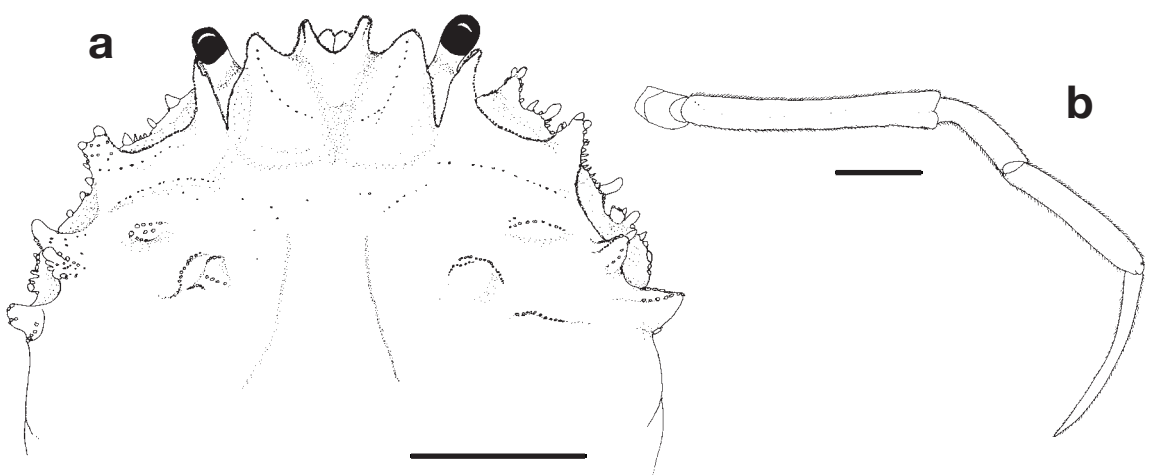


Fig. 125. Female (cw 5.5 mm, cl 4.4 mm), CP58: **a,** anterior part of carapace; **b,** right pereopod 2. Scales = 1 mm.

Tymolus uncifer (Ortmann, 1892)
鉤突鬼蟹

Fig. 126. Male, CP71.

Fig. 127. Female, CP247.

Cyclodorippe uncifera Ortmann, 1892: 560 [type locality: Japan].

Cyclodorippe uncifera melanoma Doflein, 1904: 35 [type locality: East Africa].

Tymolus uncifer.— Ho, Ng, Chan & Lee, 2004: 643, fig. 1C.

Material examined.— CP49, 22°55.7'N, 121°21.6'E, 266–262 m, 2 Aug 2000: 1 female (cw 3.4 mm, cl 3.4 mm) (NTOU). CP71, 24°52.33'N, 122°03.10'E, 600 m, 6 May 2001: 4 males (cw 5.0 mm, cl 4.3 mm – cw 7.0 mm, cl 6.9 mm), 6 females (cw 5.7 mm, cl 5.5 mm – cw 6.9 mm, cl 6.6 mm). CP88, 24°51.28'N, 122°02.80'E, 650 m, 9 May 2001: 9 males (cw 5.4 mm, cl 5.3 mm – cw 6.1 mm, cl 5.9 mm) (NTOU). CP194, 22°11.6'N, 120°23.82'E, 402–505 m, 29 Aug 2002: 1 male (cw 6.1 mm, cl 6.5 mm) (NTOU). CP247, 24°52.13'N, 122°2.42'E, 487–540 m, 28 Aug 2004: 1 female (cw 6.5 mm, cl 6.1 mm), 1 ovigerous female (cw 6.9 mm, cl 6.6 mm) (NTOU).

Diagnosis.— Carapace about as long as wide; front with 4 teeth, median pair projecting beyond laterals, separated by shallow sinus; with even, finely granular lateral margins, without pronounced projections; surface finely granular, almost glabrous; outer orbital tooth and outer frontal tooth separated by wide V-shaped notch. Margins of pereopods 2 and 3 glabrous or with very short, sparse setae. Merus of pereopod 2 subequal to combined length of dactylus, carpus and propodus. Maxilliped 3 weakly granulate.

Size.— Males to cw 7.0 mm, cl 6.9 mm; females to cw 6.9 mm, cl 6.6 mm.

Colouration.— Off-white.

Habitat.— Sandy-mud substrates; 50–729 m (Tavares, 1991).

Distribution.— East Africa, China, Taiwan and Japan.

Remarks.— Tavares (1991) regarded *T. glaucommus* (Alcock, 1894) (type locality: Andaman Sea) as a junior synonym of *T. uncifer*, but as indicated by Tan & Huang (2000), the two nominal species appear to differ in carapace and pereopod proportions. Until specimens of *T. glaucommus* can be studied, we follow Tan & Huang (2000) in excluding Alcock's species from the synonymy of *T. uncifer*.

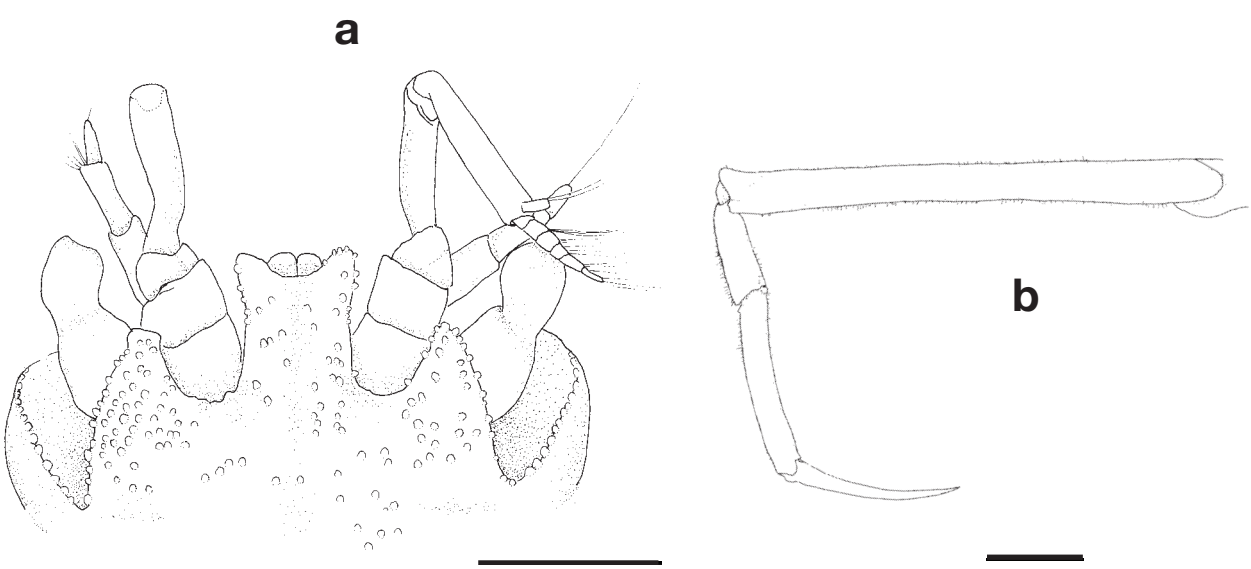


Fig. 128. Ovigerous female (cw 6.9 mm, cl 6.6 mm), CP247: **a,** anterior part of carapace; **b,** left pereopod 2. Scales: a = 1 mm, b = 2 mm.

Subfamily Xeinostomatinae Tavares, 1992
異口蟹亞科

Xeinostominae Tavares, 1992: 514.

Diagnosis.— Distance between outer orbital teeth always much greater than half maximum carapace width. Male abdomen of 5 or 7 segments. Pleopods 2–5 in females articulating at extremity of respective abdominal somites.

Remarks.— Xeinostomatinae includes three genera, two of which are represented in Taiwan.

Key to genera of Xeinostomatinae

1. Front with broad basal portion and narrower median spine or projection ..... ***Krangalangia*** [not known in Taiwan]
- Median frontal margin subtruncate to medially notched, without median projection 2
2. Front triangular with short V-shaped median notch. Supraorbital margin with notch ..... ***Ketamia***
- Front broadly rounded or trapezoid, anterior margin subtruncate or broadly concave. Supraorbital margin without notch ..... ***Xeinostoma***

Genus *Ketamia* Tavares, 1992
可丹蟹屬

Ketamia Tavares, 1992: 514 [type species: *Cyclodorippe (Cyclodorippe) depressa* Ihle, 1916. Gender: feminine].

Diagnosis.— Carapace outline squarish to subpentagonal; front broadly triangular, with median notch, projecting anteriorly slightly in advance on outerorbital spines; orbital margins well defined, with dorsal notch; fronto-orbital width distinctly greater than half maximum carapace width; endostome produced anteriorly, visible dorsally. Abdomen of 5 free somites in males (telson and abdominal somites 5 and 6 fused, though somite 5/6 suture may be visible); of 7 free segments in females. Pereopods 2 and 3 dactyli laterally compressed.

Remarks.— *Ketamia* includes four species; one is known from Taiwan.

Ketamia handokoi Tavares, 1993
韓氏可丹蟹

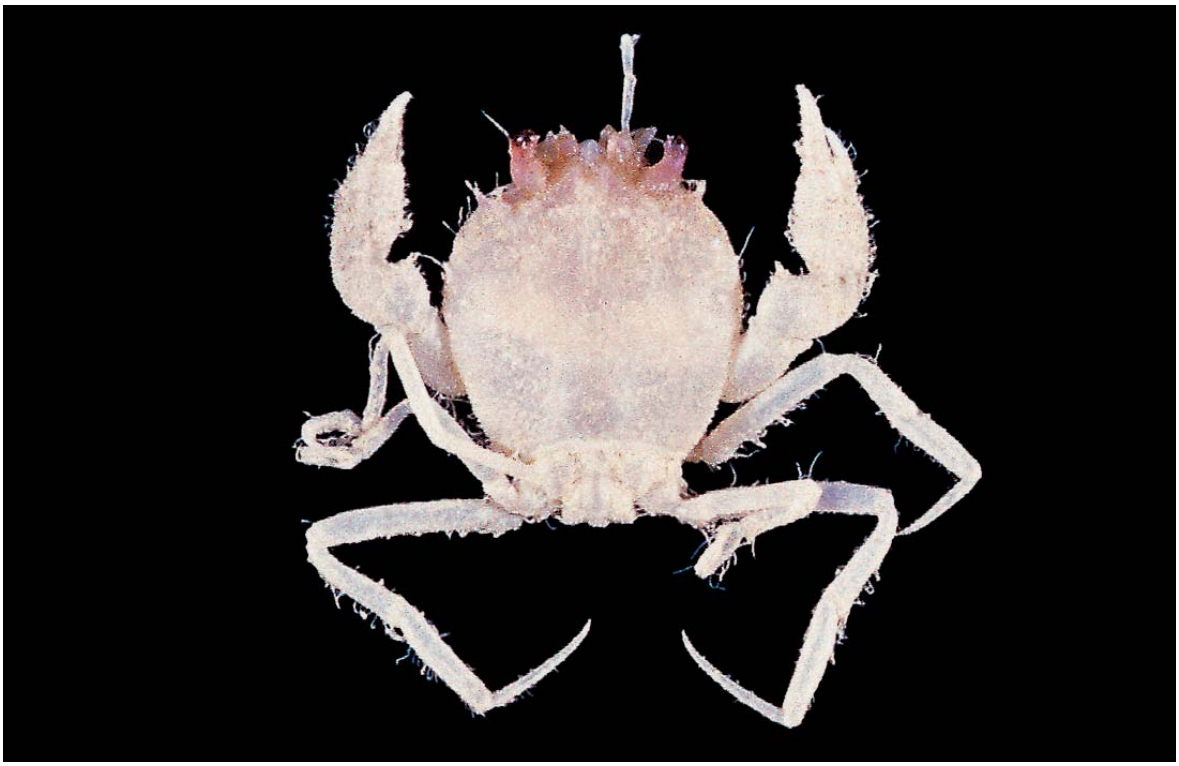


Fig. 129. Male, DW5.

Ketamia handokoi Tavares, 1993b: 301, 303, fig. 17 a–c [type locality: Kai Islands, Indonesia, 5°17.38'S, 132°41.07'E, 214–221 m].— Ho, Ng, Chan & Lee, 2004: 645, figs. 1F, 2.

Material examined.— DW5, 22°40.5'N, 119°56.5'E, 213– 236 m, 27 Jul 2000: 1 male (cw 3.6 mm, cl 3.4 mm) (NTOU).

Diagnosis.— Carapace lateral margins distinctly convex, giving subpentagonal appearance; endostome not protruding beyond frontal margin of carapace. Male with abdominal somite 6 and telson fused; other somites free.

Size.— Males to cw 11 mm, cl 10 mm; females not known (Tavares, 1993b).

Colouration.— Overall off-white. Eyestalks pink.

Habitat.— 213–310 m.

Distribution.— Kai Islands (Indonesia), Taiwan and Japan.

Remarks.— *Ketamia handokoi* is distinctive in the genus for its subpentagonal to subcircular carapace outline. In other species of *Ketamia*, the lateral margins of the carapace are only slightly convex, presenting a squarish dorsal outline. As already observed by Ho *et al*. (2004), the present specimen differs from the type description of *K. handokoi* (type locality: Kai Islands, Indonesia) in the less strongly produced rostrum, minutely versus distinctly serrate rostral margins, and a distinctly smaller anterolateral tooth. In addition, the supraorbital fissure in the Taiwanese specimen is shallow rather than deep (cf. Tavares, 1993b: fig. 17). The Taiwanese

specimen of *K. handokoi*, however, is about one-third the size of the holotype (cw 11.0 mm, cl 10.0 mm), so the aforementioned differences may be size related. In other respects, particularly in the rounded rather than squarish dorsal outline, the Taiwanese specimen matches *K. handokoi*.

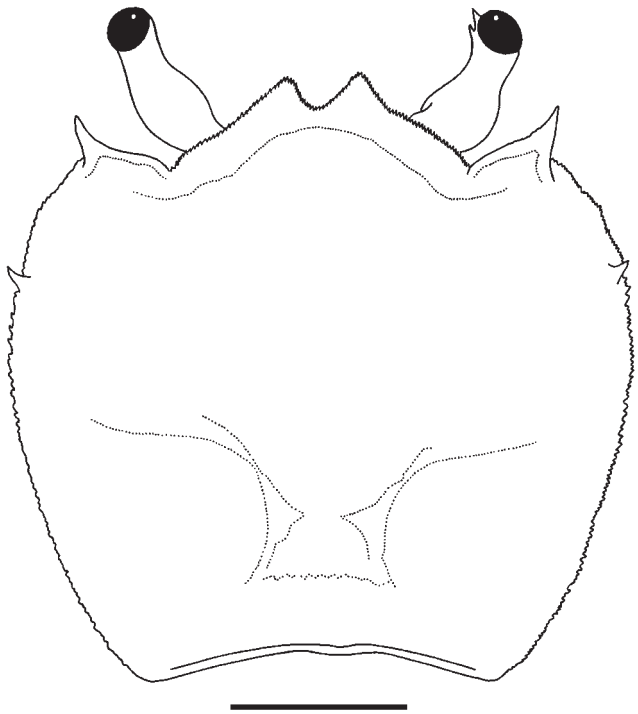


Fig. 130. Male (cw 3.6 mm, cl 3.4 mm), DW5, carapace. Scale =1mm (After Ho *et al.*, 2004).

Genus *Xeinostoma* Stebbing, 1920
異口蟹屬

Xeinostoma Stebbing, 1920: 243 [type species: *Xeinostoma eucheir* Stebbing, 1920, by monotypy. Gender: neuter].

Diagnosis.— Carapace outline subcircular; front semicircular, granulate or dentate, with or without shallow median notch, projecting anteriorly well in advance of outer orbital spines; orbital margins well defined, granular, without dorsal notch; fronto-orbital width distinctly greater than half maximum carapace width; endostome produced anteriorly but not visible dorsally. Abdomen of 5 free somites in males (telson and abdominal somites 5 and 6 fused); of 6 free somites in females (telson and abdominal somite 6 fused). Pereopods 2 and 3 dactyli laterally compressed.

Remarks.— One of four species of *Xeinostoma* is known from Taiwan.

Xeinostoma sakaii Tavares, 1993
酒井異口蟹

Fig. 131. Male, DW34.

Fig. 132. Female, CP172.

Xeinostoma sakaii Tavares, 1993b: 289, 292, figs. 13c, 14b–c [type locality: Minabe, Kii Peninsula, Hosnshu, Japan].— Ho, Ng, Chan & Lee, 2004: 646, fig. 1G.

Material examined.— DW34, 22°01.9'N, 120°36.4'E, 246–240 m, 31 Jul 2000: 2 males (cw 4.6 mm, cl 4.2 mm; cw 8.5 mm, cl 7.5 mm), 1 female (carapace broken) (NTOU), 1 female (cw 4.7 mm, cl 4.5 mm) (ZRC 2001.2212).

Diagnosis.— Carapace dorsum including frontal region covered with fine granules; frontal margin lined with elongate granules, distinctly larger than dorsal granules.

Size.— Males to cw 11.0 mm, cl 10.0 mm; females to cw 9.0 mm, cl 8.0 mm (Tavares, 1993b).

Colour.— Overall dirty white with diffuse red brown on carapace, cheliped palm and ambulatory legs.

Habitat.— Soft substrates; 170–310 m (Tavares, 2000; present record for CP172).

Distribution.— Philippines, Taiwan and Japan.

Remarks.— *Xeinostoma sakaii* was first reported from Taiwan by Ho *et al*. (2004). The present specimens agree well with the type description.

Fig. 133. Female (cw 4.7 mm, cl 4.5 mm), DW34: **a,** anterior part of carapace; **b,** left chela. Scales = 1 mm.

Family CYMONOMIDAE Bouvier, 1897
絲足蟹科

Cymonomae Bouvier, 1897: 7.

Diagnosis.— Carapace subquadrate to ovate, about as long as wide. Eyes movable or immovable, orbits absent. Maxilliped 3 elongate, completely covering buccal cavity; exopod with flagellum. Endostome shallow, only slightly projecting anteriorly, giving buccal cavity a rectangular appearance. Pereopods 2–5 basis and ischium fused. Pereopods 2 and 3 long and thin, subequal. Pereopods 4 and 5 reduced and positioned dorsally. Female with sternal grooves. Abdominal somites 1 and 2 visible dorsally; uropods absent. Genital openings coxal, female on pereopod 3, male on pereopod 5.

Remarks.— Cymonomidae includes five genera, of which only one is represented in Taiwan. All cymonomids occur on outer shelf habitats. Another genus, *Cymonomoides* Tavares, 1993, may also be present in the seas around Taiwan so it is included in this key for convenience.

Key to genera of Cymonomidae known from Taiwan and adjacent waters

1. Abdomen 7-segmented ..... ***Cymonomoides***
- Abdomen 6-segmented ..... ***Cymonomus***

Genus *Cymonomus* A. Milne Edwards, 1880
絲足蟹屬

Cymonomus A. Milne Edwards, 1880: 26 [type species: *Cymonomus quadratus* A. Milne Edwards, 1880, by monotypy. Gender: masculine].

Diagnosis.— Carapace subquadrate. Eyestalks fused to carapace, immovable. Pereopods 4–5 well-developed, though markedly smaller than pereopods 2 and 3. Abdomen 6-segmented.

Remarks.— *Cymonomus* presently includes 26 species of which 14 occur in the Indo-West Pacific (Ahyong & Brown, 2003; Ahyong, 2008). One species of *Cymonomus* is known from Taiwan.

Cymonomus andamanicus Alcock, 1905
安達曼絲足蟹

Fig. 134. Male, CP214.

Fig. 135. Female, CP362.

Cymonomus andamanicus Alcock, 1905: 568, pl. 18 [type locality: Andaman Sea].— Ho, Ng, Chan & Lee, 2004: 647, fig. 1H.

Material examined.— CP61, 24°47.5'N, 122°17.4'E, 1134 m, 4 Aug 2000: 1 female (cw 9.2 mm, cl 9.2 mm) (ZRC 2004.0761). CP214, 24°28.59'N, 122°12.66'E, 490–1027m, 27 Aug 2003: 1 male (cw 6.7 mm, cl 7.2 mm) (NTOU).

Diagnosis.— Rostrum not extending anteriorly beyond eyestalks. Eyestalks strongly divergent, diverging from midline by 30–45º; demarcation between carapace and eyestalks distinct. Anterolateral margin of carapace rounded, unarmed; lateral frontal projections small, distinctly shorter than rostrum. Carapace, abdomen and pereopods granular.

Size.— Males to cw 6.7 mm, cl 7.2 mm; females to cw 11.0 mm, cl 10.5 mm.

Colour.— Overall dirty white.

Habitat.— Muddy substrates; 250–1134 m.

Distribution.— Andaman Sea, Taiwan and Japan (Sakai, 1976; Ho *et al*., 2004).

Remarks.— *Cymonomus andamanicus* is a poorly known species and we identify the present specimens based on their similarity to Alcock's (1905) description and figures.

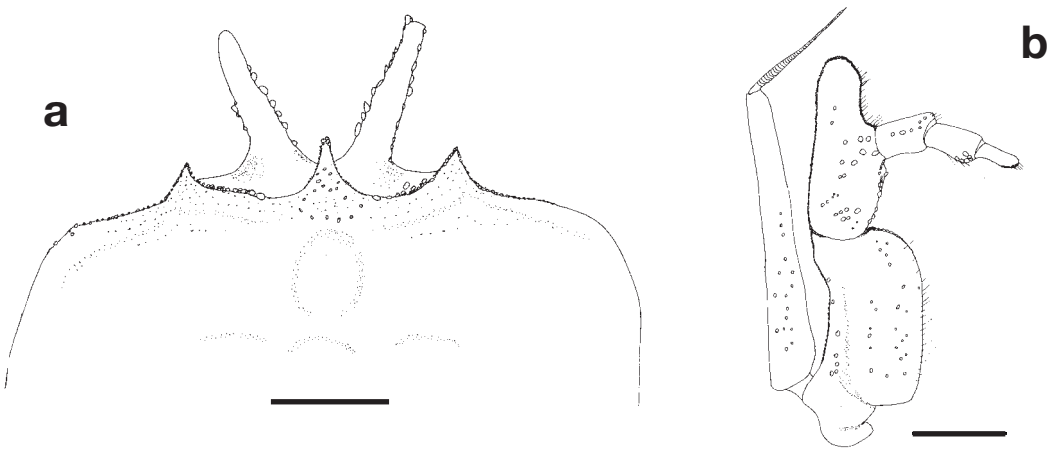


Fig. 136. Female (cw 9.2 mm, cl 9.2 mm), CP61: **a,** anterior part of carapace; **b,** right maxilliped 3. Scales = 1 mm.

Literature Cited

Adams, A. & White, A. 1848. Crustacea. *In*: Adams, A. (ed.), The Zoology of H. M. S. "Samarang"; under the command of Captain Sir Edward Belcher, C. B., F. R. A. S., F. G. S. during the years 1843–1846. London: Reeve, Bendam & Reeve, viii + 66 pp., pls 1–13.

Agassiz, L. 1858. Remarks on the fishes from Lake Nicaragua. *Proceedings of the Boston Society of Natural History*, 6 (1856–1859): 407–408.

Ahyong, S. T. 2008. Deepwater crabs from seamounts and chemosynthetic habitats off eastern New Zealand (Crustacea: Decapoda: Brachyura). *Zootaxa*, 1708: 1–72.

Ahyong, S. T., Lai, J. C. Y., Sharkey, D., Colgan, D. J. & Ng, P. K. L. 2007. Phylogenetics of the brachyuran crabs (Crustacea: Decapoda) part 1: the status of Podotremata based on small subunit nuclear ribosomal RNA. *Molecular Phylogenetics and Evolution*, 45: 576–586.

Ahyong, S. T. & Lee, T. 2006. Two new species of *Pleistacantha* from the Indo-West Pacific (Crustacea, Decapoda, Majidae). *Zootaxa*, 1378: 1–17.

Ahyong, S. T. & O'Meally, D. 2004. Phylogeny of the Decapoda Reptantia: resolution using three molecular loci and morphology. *Raffles Bulletin of Zoology*, 52: 673–693.

Alcock A. 1894. Natural History Notes from H. M. Indian Marine Survey Steamer "Investigator". *Annals and Magazine of Natural History*, (6) 13: 225–245, 321–334, 400–411.

Alcock, A. 1899. *An account of the deep-sea Brachyura collected by the Royal Indian Marine Survey Ship "Investigator"*. Calcutta, 85 pp, 4 pls.

Alcock, A. 1900. Materials for a carcinological fauna of India. No. 6. The Brachyura Catometopa or Grapsoidea. *Journal of the Asiatic Society of Bengal, Calcutta*, 69: 279–486.

Alcock A. 1905. Natural History Notes from the Royal Indian Marine Surveying Ship "Investigator", Captain T. H. Heming, R. N., Commanding. Series III, No. 9. On a new species of the dorippoid genus *Cymonomus* from the Andaman Sea, considered with reference to the distribution of the Dorippidae; with some remarks on the allied genus *Cymonomops*. *Annals and Magazine of Natural History*, (7) 15: 565–577, fig. 1, 1a, pl. 1.

Alcock, A. & Anderson, A. R. 1894. Natural history notes from H. M. Indian Marine Survey Steamer "Investigator", Commander C. F. Oldham, R. N., commanding. Ser. II (14). An account of a recent collection of deep-sea Crustacea from the Bay of Bengal and Laccadive Sea. *Journal of the Asiatic Society of Bengal*, 63: 141–185, pl. 9.

Balss, H. 1922a. Diagnosen neuer japanischer Decapoden. *Zoologischer Anzeiger*, 54 (1/2): 1–7.

Balss, H. 1922b. Ostasiatische Decapoden, III. Die Dromiaceen, Oxystomen und Parthenopiden. *Archiv für Naturgeschichte*, 88A (3): 104–140.

Balss, H., 1922c. Ostasiatische Decapoden, IV. Die Brachyrhyncha (Cancridea). *Archiv für Naturgeschichte*, 88A (11): 94–166.

Balss, H. 1957. Decapoda, VIII. Systematik. *In: Dr. H.G. Bronns Klassen und Ordnungen des Tierreichs*, Band 5, Abteilung 1, Buch 7: 1505–1672.

Barnard, K. H. 1947. Descriptions of new species of South African Decapod Crustacea, with notes on synonymy and new records. *Annals and Magazine of Natural History*, (11), 13 (102), 1946 (1947): 361–392.

Bennett, E. W. 1964. The Marine Fauna of New Zealand: Crustacea Brachyura. *New Zealand Oceanographic Institute Memoir*, 22: 1–120.

Borradaile, L. A. 1900. On some Crustaceans from the South Pacific. Part IV. The crabs. *Proceedings of the Zoological Society of London*, 1900: 568–596, pls. 40–42.

Borradaile, L. A. 1903. On the genera of the Dromiidae. *Annals and Magazine of Natural History*, (7) 11: 297–303.

Bourne, G. C. 1922. On the Raninidae: a study in carcinology. *Journal of the Linnean Society of London, Zoology*, 35: 25–78, pls 4–7.

Bouvier, E.-L. 1897. Sur la classification, les origines et la distribution des crabes de la famille des Dorippidés. *Bulletin de la Societé philomathique de Paris*, (8) 9: 54–70.

Bott, R., 1967. Potamiden aus Ost-Asien (*Parapotamon* de Man, *Sinopotamon* n. gen., *Candidiopotamon* n. gen., *Geothelphusa* Stimpson) (Crustacea, Decapoda). *Senckenbergiana biologica*, 48: 203–220.

Bott, R., 1968a. Potamiden aus Süd-Asien (Crustacea, Decapoda). *Senckenbergiana biologica*, 49: 119–130.

Bott, R., 1968b. Parathelphusiden aus Hinterindien (Crustacea, Decapoda, Parathelphsidae). *Senckenbergiana biologica*, 49: 403–422.

Bott, R., 1970. Die Süsswasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. Eine Revision der Potamoidea und Parathelphusoidea (Crustacea, Decapoda). *Abhandlungen Senckenbergischen Naturforschenden Gesellschaft*, 526: 1–338.

Brösing, A. 2008. A reconstruction of an evolutionary scenario for the Brachyura (Decapoda) in the context of the Cretaceous-Tertiary Boundary. *Crustaceana*, 81 (3): 271–287.

Brösing, A., Richter, S. & Scholtz, G. 2002. The foregut ossicle system of *Dromia wilsoni*, *Dromia personata* and *Lauridromia intermedia* (Decapoda, Brachyura, Dromiidae), studied with a new staining method. *Arthropod Structure & Development*, 30: 329–338.

Brösing, A., Richter, S. & Scholtz, G. 2007. Phylogenetic analysis of the Brachyura (Crustacea, Decapoda) based on characters of the foregut with establishment of a new taxon. *Journal of Zoological Systematics and Evolutionary Research*, 45: 20–32.

Castro, P., Williams, A. B. & Cooper, L. L. 2003. Revision of Latreillidae Stimpson, 1858 (Crustacea, Decappoda, Brachyura). *Zoosystema*, 25: 601–634.

Chan, T.Y., M.S. Hung & H.P. Yu, 1995. Identity of *Eriocheir recta* (Stimpson, 1858) (Decapoda: Brachyura), with description of a new crab from Taiwan. *Journal of Crustacean Biololgy*, 15: 301–308

Chang, C.M. 1963. A check-list of Taiwan crabs with descriptions of 19 new records. *Biological Bulletin of the Tunghai University*, 14: 1–23.

Chang, C.M. 1965. *Edible Crustacea of Taiwan*. Chinese-America Joint Commission on Rural Reconstruction, Taipei. 60 pp. (In Chinese)

Chang, K.H., Chen, Y.S. & Chen, C.P., 1987. Xanthid crabs in the corals, *Pocillopora damicornis* and *P. verrucosa* of southern Taiwan. *Bulletin of Marine Science*, 41: 214–220.

Chen, C.P. & Wu, J.Y. 2001. *Seashore Animals*. Matsu National Scenic Area Administration, Matsu, Taiwan. (In Chinese)

Chen, H. 1986. Preliminary studies on the Homolidae (Brachyura, Crustacea) of Chinese waters. *Transactions of the Chinese Crustacean Society*, 1: 227–228.

Chen, H. & Sun, H., 2002. Marine primitive crabs, Brachyura, Arthropoda Crustacea. *Fauna Sinica, Invertebrata*, 30: xiii + 597 pp., pls 1-16. (In Chinese with English summary)

Chen, W.J., Hsu, M.J. & Cheng, J.H. 2007. A new species of alpine freshwater crab (Brachyura: Potamidae) from Siangyang National Forest Recreation area, Taiwan. *Crustaceana*, 80: 897–907.

Chen, W.J., Cheng, J.H. & Shy, J.Y. 2005. On two new species of freshwater crabs (Crustacea: Decapoda: Brachyura: Potamidae) from southern Taiwan. *Raffles Bulletin of Zoology*, 53: 103–110.

Chen, W.J., Jeng, J.H. & Shy, J.Y. 1998. A new species of freshwater crab, *Geothelphusa neipu* (Decapoda: Brachyura: Potamidae) from southern Taiwan. *In*: Abstracts of the Meeting of the Taiwan Fisheries Society. Taiwan Fisheries Society, Taipei, p. 154.

Chen, W.J., Tsai, S.H., Hsu, M.J. & Cheng, J.H. 2003. Freshwater Crab Fauna in Southern Taiwan. Kaohsiung County Government, Kaohsiung.

Chou, W.J., Lai, S.H. & Fang, L.S. 1999. Benthic crustacean communities in waters of southwestern Taiwan and their relationships to environmental characteristics. *Acta Zoologica Taiwanica*, 10: 25–35.

Crane, J., 1975. *Fiddler Crabs of the World (Ocypodidae: Genus Uca)*. Princeton University Press, New Jersey. 736 pp.

Cuesta, J.A., Liu, H.C. & Schubart, C.D. 2002. First zoeal stages of *Epigrapsus politus* Heller, *E. notatus* (Heller) and *Gecarcoidea lalandii* H. Milne-Edwards, with remarks on zoeal morphology of the Gecarcinidae (Crustacea: Brachyura). *Journal of Natural History*, 36: 1671-1685.

Dai, A.Y., 1999. *Fauna Sinica. Crustacea: Decapoda: Parathelphusidae, Potamidae*. Science Press, Beijing, China. 501 pp., 30 pls. (In Chinese).

Dai, A.Y. & Chen, H. L. 1980. One new species of *Latreillopsis* from South China Sea. Acta Zootaxonomica Sinica, 5: 39–41, fig. 1. (In Chinese)

Dai, A.Y. & Xu, Z.X. 1991. A preliminary study of the crabs of the Nansha Islands, China. *Studies on the Marine Organisms of the Nansha Islands and Surrounding Seas*, 3: 1-47.

Dai, A.Y., Yang, S.L. Song, Y.Z. & Chen, G.X. 1986. *Crabs of the China Seas*. China Ocean Press, Beijing, xi + 642 pp, 74 pls. (In Chinese)

Dai, A.Y. & Yang, S.L. 1991. *Crabs of the China Seas*. China Ocean Press, Beijing and Springer-Verlag, Berlin, 608 pp, 74 pls.

Dai, A.Y., Yang, S.L. & Lan, J. 1981. On the crabs of the Xisha Isands – *Dynomene. Nanhai Studia Marina Sinica*, 2: 117–124, figs 1–14.

Dai, A.Y. & Xu, Z. 1991. A preliminary study on the crabs of the Nansha Islands. *Symposium on Marine Biological Research from the Nansha Islands and adjacent seas, Collected Papers*, 3: 1–47.

Dana, J. D. 1852–1855. Crustacea, Part 1. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N., 13: 1–685 [1852]. Atlas: 1–27, pls. 1-96 [1855]. C. Sherman, Philadelphia.

Davie, P. J. F. 2002. *Crustacea: Malacostraca: Eucarida (Part 2): Decapoda – Anomura, Brachyura*. *In*: Wells, A., & Houston, W. W. K. (eds), *Zoological Catalogue of Australia*. Vol. 19.3B CSIRO Publishing: Melbourne, xiv + 641 pp.

Davie, P. J. F., & Short, J. W. 1989. Deepwater Brachyura (Crustacea: Decapoda) from southern Queensland, Australia with descriptions of four new species. *Memoirs of the Queensland Museum*, 27: 157–187.

Doflein, F. 1904. Brachyura. *Wissenschaftleche Ergebmisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898–1899*, 6: 1–314.

Desmarest, A.-G. 1823. Malacostracés. *Dictionnaire des Sciences Naturelles*, 28: 138–425. F.G. Levrault, Paris, Strasbourg.

Dixon, C. J., Ahyong, S. T. & Schram, F. R. 2003. A new hypothesis of decapod phylogeny. *Crustaceana*, 76: 935-975.

Edmondson, C. H. 1932. A giant *Latreillopsis* from Hawaii. *Bernice P. Bishop Museum Occasional Papers*, 9 (24): 1-9.

Edmondson, C. H. 1946. Reef and shore fauna of Hawaii, 2nd Edition. *Special publications of the Bishop Museum*, 22: i–iii, 1–381, Figs. 1–233.

Eydoux, F. & Souleyet, L. F. A. 1842. Zoologie. *In*: Vaillant, A. N. (ed.), *Voyage autour du monde exécuté pendant les années 1836 et 1837 sur la corvette la Bonite, commandée par M. Vaillant*, 1 (2): 107–328; 1846–49, Atlas, 150 pls.

Fabricius, J. C. 1793. Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species adjectis synonymis, locis; observatiosnibus, descriptionibus, Hafniae.

Fabricius, J. C. 1798. *Entomologia Systematica Emendata et aucta Secundum Classes, Ordines, Genera, Species, adjectis Synonymis, Locis, Observationbus, Descriptionibus. Supplementum Entomologiae Systematicae*. Hafniae, Proft et Storch, 572 pp.

Fukui, Y., Wada, K. & Wang, C. H. 1989. Ocypodidae, Mictyridae and Grapsidae (Crustacea: Brachyura) from some coasts of Taiwan. *Journal of Taiwan Museum*, 42: 225–238.

Fulton, S. W. & Grant, F. E. 1902. Some little known Victorian decapod Crustacea with descriptions of new species, no. 2.

Proceedings of the Royal Society of Victoria, 15: 59–68, pls. 8–10.

Galil, B., 1983. Two new species of *Trapezia* (Decapoda: Brachyura), coral-inhabiting crabs from Taiwan. *Micronesica*, 19: 123–129.

Glaessner, M. F. 1969. Decapoda. *In*: Moore, R. C. (ed.) *Arthropoda 4. Part R, vol. 2. Treatise on Invertebrate Paleontology*. Geological Society of America and University of Kansas Press, Lawrence. Pp. 399–533.

Goeke, G. D. 1981. Symethinae, new subfamily, and *Symethis garthi*, new species, and the transfer of *Raninoides ecuadorensis* to *Notosceles* (Raninidae: Brachyura: Gymnopleura). *Proceedings of the Biological Society of Washington*, 93: 971–981.

Gray, J. E. 1831. Description of a new genus and some undescribed species of Crustacea. *Zoological Miscellany, London*, pp. 39–41.

Gray, J. E. 1842. Description of some hitherto unrecorded species of Australian reptiles and batrachians. *In*: Gray, J. E. (ed.) *Zoological Miscellany*. Treuttel Würz & Co, pp. 51–57

Griffin, D. J. G., 1965. A new species of *Paromola* (Crustacea, Decapoda, Thelxiopidae) from New Zealand. *Transactions of the Royal Society of New Zealand*, 7: 85–91.

Griffin, D. J. G. & Brown, D. E. 1976. Deepwater decapod Crustacea from eastern Australia: brachyuran crabs. *Records of the Australian Museum*, 30: 248–271.

Guinot, D. 1977. Propositions pour une nouvelle classification des Crustacés Décapodes Brachyoures. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences*, series 3, 285: 1049–1052.

Guinot, D. 1978. Principes d'une classification evolutive des Crustacés Décapodes Brachyoures. *Bulletin du biologique France et Belgique*, new series, 112: 211–292. (In French)

Guinot, D. 1979. Donnees nouvelles sur la morphologie, la phylogenèse et la Crustacés Décapodes Brachyoures. *Mèmoires du Muséum national d'Histoire Naturelle, Paris, (A) Zoologie*, 112: 1–354, pls 1–27. (In French)

Guinot, D. 1993. Données nouvelles sur les Raninoidea De Haan, 1841 (Crustacea Decapoda Brachyura Podotremata). *Comptus Rendus du Academie Sciences Paris, Science de la vie/Life Sciences*, 316: 1324–1331.

Guinot, D. 1995. Crustacea Decapoda Brachyura: révision de la famille des Homolodromiidae Alcock, 1900. *In*: Crosnier, A. (ed.), *Résultats des Campagnes MUSORSTOM, vol. 13. Mèmoires du Muséum National d'Histoire Naturelle, Paris*, 163: 155–282.

Guinot, D. 2008. A re-evaluation of the Dynomenidae Ortmann, 1892 (Crustacea, Decapoda, Brachyura, Podotremata), with the recognition of four subfamilies. *Zootaxa*, 1850: 1–26.

Guinot D., Doumenc, D., Chintiroglou, C. 1995. A review of the carrying behaviour in brachyuran crabs, with additional information on the symbioses with sea anemones. *Raffles Bulletin of Zoology*, 43: 377–416.

Guinot, D. & Richer de Forges, B. 1981. Homolidae, rares ou nouveaux, de l'Indo-Pacifique (Crustacea, Decapoda, Brachyura). *Bulletin du Muséum national d'Histoire naturelle, Paris*, (4), 3A (2): 523–581, figs. 1–7, pls. 1–8.

Guinot, D. & Richer de Forges, B. 1995. Crustacea Decapoda Brachyura: Rèvision de la famille des Homolidae De Haan, 1839. *In*: Crosnier, A. (ed.), *Rèsultats des campagnes MUSORSTOM, 13. Mèmoires du Musèum national d'Histoire Naturelle, Paris*, 163: 283–517. (In French)

Guinot, D., Jamieson, B. G. & Richer de Forges, B. 1994. Relationship of Homolidae and Dromiidae - evidence from spermatozoal ultrastructure (Crustacea, Decapoda). *Acta Zoologica*, 75: 255–267.

Guinot, D. & Quenette, G. 2005. The spermatheca in podotreme crabs (Crustacea, Decapoda, Brachyura, Podotremata) and its phylogenetic implications. *Zoosytema*, 27: 267–342.

Guinot, D. & Tavares, M. S. 2003. A new subfamilial arrangement for the Dromiidae De Haan, 1833, with diagnoses and descriptions of new genera and species (Crustacea, Decapoda, Brachyura). *Zoosystema*, 25: 43–129.

Haan, W. de 1833–1850. Crustacea, *In*: P. F. Siebold (ed.), Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis superiorum, qui summum in India Batava Imperium tenent, suscepto, annis 1823-1830

collegit, notis, observationibus et adumbrationibus illustravit. *Lugduni Batavorum (Leiden)*, fasc. 1–8: i–xxi + vii–xvii + ix–xvi + 1–243, pl. 1–55, A–J, L–Q, circ., pl. 2.

Henderson, J. R. 1888. Report of the Anomura collected by H.M.S. Challenger during the years 1873–76. *Report on the Scientific Results of the voyage of H.M.S. Challenger during the years 1873–76 under the command of Captain George S. Nares, R.N., F.R.S. and the late Captain Frank Tourle Thompson, R.N., Zoology*, 27 (69): i–xi, 1–221, pls 1–21.

Henderson, J. R. 1893. A contribution to Indian carcinology. *Transactions of the Linnaean Society of London, Zoology*, (2) 5: 325–458.

Herbst, J. F. W. 1782–1804. *Versuch einer Naturgeschichte der Krabben und Krebse, nebst einer systematischen Beschreibung ihrer verschiedenen Arten*. Vols. 1–3, 515 pp., pls 1–62.

Hiro, F., 1939. A glimpse on the coral reef and coastal fauna of southern Formosa [1]. *Botany and Zoology*, 7: 889-898. (In Japanese)

Ho, P.H., 1994. How much do we know about poisonous crabs? (3). *Fisheries Extension, Taipei*, 92: 21–24. (In Chinese)

Ho, P.H., 1995. Sentinels of the muddy shore — big-eyed crabs (*Macrophthalmus*) (1). *Fisheries Extension, Taipei*, 104: 21–24. (In Chinese)

Ho, P.H. 1996. Crabs. *In*: Shao, K. C. (ed.), *Common Seafood of Taiwan*. Part 1: 71–90. Taiwan Fisheries Department, Taipei. (In Chinese)

Ho, P.H. 1997. Land crabs which breed in the sea (7). *Fisheries Extension, Taipei*, 134: 9–12. (In Chinese)

Ho, P.H. 1998a. True freshwater crabs (1). *Fisheries Extension, Taipei*, 141: 9–12. (In Chinese)

Ho, P.H. 1998b. True freshwater crabs (2). *Fisheries Extension, Taipei*, 142: 9–12. (In Chinese)

Ho, P.H. 1998c. True freshwater crabs (3). *Fisheries Extension, Taipei*, 143: 9–12. (In Chinese)

Ho, P.H. 1998d. True freshwater crabs (4). *Fisheries Extension, Taipei*, 144: 9–12. (In Chinese)

Ho, P.H. 1998e. True freshwater crabs (5). *Fisheries Extension, Taipei*, 145: 9–12. (In Chinese)

Ho, P.H. 2003. Land Crabs in the Coastal Forest of Kenting National Park. 47 pp. Kenting National Park, Pingtung, Taiwan. (In Chinese)

Ho, P.H. & Hung, M.S. 1997. Seashore Crabs of Hsin-Chu City. 122 pp. Hsinchu City Government, Hsinchu, Taiwan. (In Chinese)

Ho, P.H. & Ng, P. K. L. 1999. On *Homolodromia kai Guinot*, 1993 (Decapoda, Brachyura, Homolodromiidae) from the South China Sea. *Crustaceana*, 72: 1123–1126.

Ho, P.H., Ng, P. K. L. Chan, T.Y. & Lee, D.A. 2004. New records of 31 species of brachyuran crabs from the joint Taiwan-France expeditions, "TAIWAN 2000" and "TAIWAN 2001", off deep waters in Taiwan. *Crustaceana*, 77: 641–668.

Ho, P.H., Shy, J.Y. & Yu, H.P. 1992. The land crabs of the family Gecarcinidae (Crustacea, Decapoda, Brachyura) of Taiwan. *Annuals of Taiwan Museum*, 35: 51–66. (In Chinese with English abstract)

Ho, P.H., Wang, C.H., Lin, J.T. & Yu, H.P. 1993. First record of the fiddler crab *Uca tetragonon* (Herbst, 1790) (Crustacea: Decapoda: Ocypodidae) from Taiwan, with notes on its handeness. *Journal of Taiwan Museum*, 46: 17-25.

Ho, P.H., Yu, H.P. & Ng, P. K. L. 2000. New records of Eriphiiidae, Pilumnidae and Xanthidae (Crustacea: Decapoda: Brachyura) from Taiwan. *Raffles Bulletin of Zoology*, 48: 111–122.

Ho, P.H., Yu, H.P. & Ng, P. K. L. 2001. The Indo-Pacific Pilumnidae XIV. On a new species of *Actumnus* (Crustacea: Decapoda: Brachyura) from Taiwan. *Proceedings of the Biological Society of Washington*, 114: 145–151.

Holthuis, L. B. 1962. Forty-seven genera of Decapoda (Crustacea); proposed addition to the official list. *Bulletin of Zoological Nomenclature*, 19: 232–253.

Horikawa, Y. 1940. A list of Formosan crabs. *Scientific Taiwan*, 8: 21–31.

Hsueh, P.W. 1995. Notes on the biology of a poorly known grapsid crab *Clistocoeloma sinense* Shen, 1933 (Decapoda, Brachyura) from Taiwan. *Bulletin of the National Museum of Natural Science*, 5: 143–146.

Hsueh, P.W. 1996. Brachyuran composition and its associated microhabitats at the Kaomei coastal wetland, west-central

Taiwan. *Bulletin of the National Museum of Natural Science*, 8: 35–42.

Hsueh, P.W. & Huang, J.F. 1996. A new record of *Clistocoeloma sinense* Shen, 1933, from Taiwan (Decapoda, Brachyura, Grapsidae, Sesarminae) with notes on its distribution and ecology. *Crustaceana*, 69: 63–70.

Hsueh, P.W. & Huang, J.F. 2002. Crabs of the family Goneplacidae (Decapoda, Brachyura) from Taiwan. *Crustaceana*, 75: 111–136.

Hsueh, P.W. & Ng, P. K. L. 2008. Two unrecorded genera and species of brachyuran crabs (Decapoda: Camptandriidae, Pilumnidae) from Taiwan, with a note on *Cancer semicylindrus* Fabricius, 1798. *Raffles Bulletin of Zoology*, Supplement, 19: 99–103.

Hsueh, P.W., Huang, J.F. & Ng, P. K. L. in press. On a new genus and new species of pilumnid crab from Taiwan, and the generic placements of *Heteropanope changensis* (Rathbun, 1909) and *Pilumnopeus pereiodontus* Davie & Ghani, 1993 (Crustacea: Decapoda: Brachyura). *Journal of Natural History*.

Hu, C.H. & Tao, H.J. 1996. *Crustacean Fossils of Taiwan*. Ta-Jen Printers, Taipei, 228 pp., 68 pls. (In Chinese)

Huang, J.F. & Hsueh, P.W. 1998. New records of two interesting deep water crabs *Homolochunia gadaletae* Guinot and Richer de Forges, 1995 (Homolidae) and *Rochinia sagamiensis* (Gordon, 1931) (Majidae) (Crustacea: Decapoda: Brachyura), from Taiwan. *Zoological Studies*, 37: 222–225.

Huang, J.F., Hsueh, P.W. & Ng, P. K. L. 2002. Crabs of the family Hexapodidae (Decapoda: Brachyura) from Taiwan, with description of a new genus and new species. *Journal of Crustacean Biology*, 22: 651–660.

Huang, J.F., Yu, H.P. & Takeda, M. 1989. Fiddler crabs (Crustacea: Decapoda: Ocypodidae) of Taiwan. *Bulletin of the Institute of Zoology, Academia Sinica*, 28: 191–209.

Huang, J.F., Yang, S.L. & Ng, P. K. L. 1998. Notes on the taxonomy and distribution of two closely related species of ghost crabs, *Ocypode sinensis* and *O. cordimanus* (Decapoda, Brachyura, Ocypodidae). *Crustaceana*, 71: 942–954.

Huang, J.F., Yu, H.P. & Takeda, M.1992. A review of the ocypodid and mictyrid crabs (Crustacea: Decapoda: Brachyura) in Taiwan. *Bulletin of the Institute of Zoology, Academia Sinica*, 31: 141–161.

Huang, Z.G. 1994. Brachyura. *In*: Huang, Z.G. (chief ed.) Marine species and their distributions in China's Seas. Department of Ocean Management and Monitoring State Oceanic Administration. China Ocean Press, Beijing. Pp. 576–600.

Hwang, J.J. & Mizue, K.1985. Fresh-water crabs of Taiwan. *Bulletin of the Faculty of Fisheries*, Nagasaki University, 57: 1–21.

Hung, K.H., 2000. *Common Marine Biology in Penghu*. Penghu County Government, Penghu, Taiwan. (In Chinese)

Hwang, J.J. & Takeda, M.1986. A new freshwater crab of the family Grapsidae from Taiwan. *Proceedings of the Japanese Society of Systematic Zoology*, 33: 11–18.

Hwang, J.J. & Yu, H.P. 1980. A fauna-list of the Crustacea from Lan-Yu Island. *Annual of Taiwan Museum*, 23: 151–180. (In Chinese)

Ihle, J. E. W. 1912. Über einige neue, von der Siboga-Expedition gesammelte Homolidae. *Tijdschrift nederlandsch dierkunde Vereen*, (2)12: 206–214.

Jamieson, B. G. M., 1994. Phylogeny of the Brachyura with particular reference to the Podotremata: evidence from a review of sperm ultrastructure. *Philosophical Transactions of the Royal Society*, (B) 345: 373–393.

Jamieson, B. G. M., Guinot, D. & Richer de Forges, B. 1995. Phylogeny of the Brachyura (Crustacea, Decapoda): evidence from spermatozoal ultrastructure. *In*: Jamieson, B. G. M. & Ausio, J. J. (eds.), *Advances in Spermatozoal Phylogeny and Taxonomy. Mémoires du Muséum national d'Histoire naturelle, Paris*, 166: 265–283.

Ikeda H. 1998. *The deep-sea crabs of Sagami Bay*. Hayama Shiosai Museum, Japan, 180 pp.

Jeng, M.S. 1994b. Newly recorded symbiotic crabs (Crustacea: Decapoda: Brachyura) from southern Taiwan coral reefs. *Zoological Studies*, 33: 314–318.

Jeng, M.S. 1997. *Studies on the land and aquatic decapod crustacean fauna of the Kenting National Park (II) – Communities of decapod crustaceans around the sea*. Ministry of the Interior, Taipei, ii + 66 pp. (In Chinese)

Jeng, M.S. 1998. *The Prawns and Crabs of Kenting National Park*. Kenting National Park Hand Guides No. 14: 1–133. (In Chinese)

Jeng, M.S., Chan, R.G., Fung, H.R., Tzeng, C.S. & Yang, C.T. 1994. *Northeast Coast Area. Investigations into ecological resources and monitoring (I)*. Ministry of Transport and Tourism, Taipei, 205 pp. (In Chinese)

Jeng, M.S., Chan, R.G., Fung, H.R., Tzeng, C.S. & Yang, C.T. 1996. *Northeast Coast Area. Investigations into ecological resources and monitoring (II)*. Ministry of Transport and Tourism, Taipei, 184 pp. (In Chinese)

Jeng, M.S., Chan, R.G., Fung, H.R. & Tzeng, C.S. 1997. *Northeast Coast Scenic Area. Investigations into ecological resources and monitoring (III)*. Ministry of Transport and Tourism. Taipei, 194 pp. (In Chinese)

Jeng, M.S., Ng, N. K. & Ng, P. K. L. 2004. Hydrothermal vent crabs feast on sea 'snow'. Nature, 432: 969.

Jeng, M.S. & Ng, P. K. L. 1998. Notes on *Paratergatis longimanus* Sakai, 1965 (Decapoda, Brachyura, Xanthidae), a new record for Taiwan. *Crustaceana*, 71: 827–832.

Jeng, M.S. & Ng, P. K. L. 2002. *Picrocerus armatus* A. Milne-Edwards, 1865 (Brachyura, Majidae, Tychinae), an interesting new record from Taiwan. *Crustaceana*, 75: 1153–1155.

Jeng, M.S., Shao, K.T., Fung, H.R. Tzeng, C.S. & Wu, S.H. 1998. *Northeast Coast Area. Investigations into ecological resources and monitoring (IV)*. Ministry of Transport and Tourism, Taipei, 182 pp. (In Chinese)

Kossmann, R. 1878. Kurze notizen über einige neue Crustaceen sowie über neue Fundorte einiger bereitis beschriebenen. *Archiv für Naturgeschichte*, 44: 251–258.

Kubo, I. 1936. A new homoloid from Japan. *Journal of the Imperial Fisheries Institute, Tokyo*, 31: 63–68, pl. 17, table 1.

Kuo, C.Y. 1995. *Natural Trip of Taiwanese Mangroves*. Tashu Culture Ltd., Taipei. 198 pp. (In Chinese)

Lai, S.H., Huang, J.F. & Fang, L.S. 1997. Crab fauna of Kaohsiung Harbor, southwestern Taiwan. *Annual of Taiwan Museum*, 40: 225–240. (In Chinese with English abstract)

Lamarck, J. B. P. A. 1801. Systême des Animaux sans Vertèbres. Deterville, Paris.

Laurie R. D. 1906. Report on the Brachyura collected by Professor Herdman, at Ceylon, in 1902. *In*: W. A. Herdman (ed.), *Report to the Government of Ceylon on the pearl oyster fisheries of the Gulf of Manaar. With supplementary reports upon the marine biology of Ceylon by other naturalists*. Part 5, suppl. Rep. 40: 349–432, 12 text figs., 2 pls.

Latreille, P. A., 1812. Crustacés et Insectes. *In*: Milbert, J. (ed.), *Voyage pittoresque à l'Ile-de-France, au cap de Bonne-Espérance et à l'Ile de Ténériffe, par M. J. Milbert. Peintre embarqué sur la corvette le Géographe, et Directeur des gravures de la partie historique du Voyage aux Terres-Australes. Avec un Atlas, composé de trois cartes géographiques, et de quarante-cinq vues pittoresques déssinéessur les lieux, et gravées en partie par l'auteur*. Vol. 2. Crustacés: 270–280. A. Nepveu, Paris.

Latreille, P. A. 1825. *Familles naturelles du règne animal, exposées succinctement et dans un ordre analytique, avec l'indication de leurs genres*. J.B. Baillière, Paris. 570pp.

Leach, E. W. 1815. A tabular view of the external characters of four classes of animals, which Linné arranged under Insecta; with distribution of genera composing three of these Classes into Orders, and descriptions of several new genera and species. *Transactions of the Linnean Society of London*, 11: 306–400.

Lee, J.H., 2001. *A Field Guide to Crabs in Taiwan*. Bigtrees Co., Taipei.

Lewinsohn, C. 1984. Dromiidae from Madagascar and the Seychelles (Crustacea Decapoda Brachyura). *Bulletin du Muséum national d'Histoire naturelle, Paris*, (4) 6A (1): 89–129, fig. 1–4, pls. 1–4.

Lin, C.C. 1949. A catalogue of Brachyurous Crustacea of Taiwan. *Quarterly Journal of the Taiwan Museum*, 2: 10–33.

Linnaeus C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymies locis*. Ed. 10, 1: 1–854, Holmiae.

Linnaeus, C. 1763. Centuria Insectorum, Quam, Praesidae D. D. Car. Von Linne, Proposuit Boas Johansson, Calmariensis. *In*: Linnaeus, C. (ed.), *Amoenitates Academicae; seu Dissertations variae, physicae, medicae, botanicae, Antehac seorsim editae, nunc collectae and auctae*, 6: 384–415.

Loh, L. W. & Wu, S.H. 1998. On a new species of *Paratymolus* from Taiwan (Crustacea: Decapoda: Brachyura: Majidae). *Raffles Bulletin of Zoology*, 46: 609–614.

Lörenthey, I. & Beurlen, K. 1929. Die fossilien Decapoden des Länder der ungarischen Krone. *Geologica Hungarica (Series Palaeontologia)*, 3: 1–420.

Maki, M. 1923. Crabs and rice paddy. *Zoological Magazine*, Tokyo, 35: 49–51.

Maki, M. & Tsuchiya, K. 1923. *A monograph of the Decapoda Crustacea of Formosa*. Report of the Department of Agriculture, Government of Research Institute of Taihoku, No. 3: xi + 215 + 4. (In Japanese)

Man, J. G. de. 1887–1888. Bericht ueber die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Naturgeschichte*, 53: 215–288, pls. 7–10 (issued 1887); 53: 289–600, pls. 11–22a (issued 1888).

Man, J. G. de. 1914. Note sur quelques Crustacès Brachyures terrestres et d'eaux douce apparteenant au Musee Civique de Gene. *Annals de Museum Storia naturalis Genova*, 46: 122–138.

Marumura, M. & Kosaka, A. (2003) *Catalogue of the Brachyuran and Anomuran crabs donated by the late Mr. Seiji Nagai to the Wakayama Prefectural Museum of Natural History*. Wakayama Prefectural Museum, Wakayama, Japan, 73 pp. [In Japanese]

Martin, J. W. & Davis, G. E. 2001. An updated classification of the Recent Crustacea. *Natural History Museum of Los Angeles County Science Series*, 39: 1–124.

McLay, C. L. 1988. Crabs of New Zealand. *Leigh Laboratory Bulletin*, 22: i–iv, 1–463.

McLay C. L. 1991. A small collection of deep water sponge crabs (Brachyura: Dromiidae) from French Polynesia, including a new species of *Sphaerodromia* Alcock, 1899. *Bulletin Muséum National Histoire Naturelle, Paris*, (4) 13A (3–4): 457–481, figs. 1-8, pl. 1.

McLay, C. L. 1993. Crustacea Decapoda: the sponge crabs (Dromiidae) of New Caledonia and the Philippines with a review of the genera. *In*: Crosnier, A. (ed.), *Résultats des Campagnes MUSORSTOM, Volume 10. Mémoires du Muséum national d'Histoire naturelle, Paris*, 156: 111–251.

McLay, C. L. 1999. Crustacea: Decapoda: Revision of the family Dynomenidae. *In*: A. Crosnier (ed.), *Rèsultats des Campagnes MUSORSTOM, 20. Mèmoires du Musèum national d'Histoire Naturelle, Paris*, 180: 427–569.

McLay, C. L. 2001a. The Dromiidae of French Polynesia and a new collection of crabs (Crustacea, Decapoda, Brachyura) from the Marquesas Islands. *Zoosystema*, 23: 77–100.

McLay, C. L. 2001b. Dynomenidae and Dromiiidae (Decapoda, Brachyura) from Guam, Philippine Islands, Tonga and Samoa. *Zoosystema*, 23: 807–856.

McLay, C. L., Jeng, M.S. & Chan, T.Y. 2001. New records of Dromiidae, Aethridae, and Parthenopidae from Taiwan (Decapoda, Brachyura). *Crustaceana*, 74: 963–976.

McLay, C.L., Lim, S.S.L. & Ng, P.K.L. 2001. On the first zoea of *Lauridromia indica* (Gray, 1831), with an appraisal of the generic classification of the Dromiidae (Decapoda: Brachyura) using larval characters. *Journal of Crustacean Biology*, 21: 733–747.

McLay, C. L. & Ng, P. K. L. 2004. A taxonomic revision of the genus *Paradynomene* Sakai, 1963 (Crustacea: Decapoda: Brachyura: Dynomenidae) *Zootaxa*, 657: 1–24

McLay, C. L. & Ng, P. K. L. 2005. On a collection of Dromiidae and Dynomenidae from the Philippines, with description of a new species of *Hirsutodynomene* McLay, 1999 (Crustacea: Decapoda: Brachyura). *Zootaxa*, 1029: 1–30.

McLay, C. L. & Ng, P. K. L. 2007. Revision of the Indo-West Pacific sponge crabs of the genus *Petalomera* Stimpson, 1858 (Decapoda: Brachyura: Dromiidae). *Raffles Bulletin of Zoology*, 55: 107–120.

Miers, E. J. 1879. Descriptions of new or little-known species of maioid Crustacea (Oxyrhyncha) in the collection of the British Museum. *Annals and Magazine of Natural History*, (5) 4: 1–28, pls. 4, 5.

Milne-Edwards, A. 1880. No. 1. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf

of Mexico, and in the Caribbean Sea, 1877, '78, '79, by the US coast survey steamer *Blake*, Lieut.-Commander C.D. Sigsbee, U.S.N., and Commander J.R. Bartlett, U.S.N., Commanding. VIII. Études préliminaires sur les Crustacés. *Bulletin of the Museum of Comparative Zoology of Harvard College*, 8 (1): 1–68, pls 1–2.

Minei, H. 1974. Potamoid crabs of Taiwan, with description of one new species (Crustacea, Decapoda). *Journal of the Faculty of Agriculture, Kyushu University*, 18: 239–251.

Minemizu, R. 2000. *Marine decapod and stomatopod crustaceans mainly from Japan*. Bun-ichi-sogo-shuppan, Tokyo, 344 pp.

Milne Edwards, H. 1837. *Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux*, vol. 2. Librairie Encylopédique de Roret, Paris, 532 p. *Atlas* [1834, 1837, 1840], 32 p., pls. 1–14, 14 bis, 15–25, 25 bis, 26–42.

Miyake, S. 1938. Unrecorded crabs from Formosa collected by Prof. H. Ohshima in 1932. *Transactions of the Natural History Society of Formosa*, 28 (177): 187–196.

Miyake, S. & Chiu, J.K. 1965. A new potamonid crab, *Potamon (Geothelphusa) miyazakii* sp. nov., as an intermediate host of the lung-fluke from Formosa. *Journal of the Faculty of Agriculture, Kyushu University*, 13: 595–600.

Nakasone, Y. & Nagahama, K. 1971. Intertidal invertebrate fauna of the Senkaku Islands. *Reports of Investigations of the Senkaku Islands*. University of the Ryukyus, Okinawa, pp. 115-128, pls. M1-5.

Naruse, T., Lee, J.H. & Shih, H.T. 2006. Two new records of shallow-water and mangrove crabs (Crustacea: Decapoda: Brachyura) from Taiwan. *Collections and Research, Taichung Museum*, 19: 17–21.

Naruse, T., Shih, H.T., Ng, N. K. & Hsu, H. L. 2005. On two new records of varunid crabs (Crustacea: Brachyura: Varunidae) from southern Taiwan. *Collections and Research, Taichung Museum*, 18: 69–79.

Ng, N. K., Davie, P. J. F., Schubart, C. D. & Ng, P. K. L. 2007. Xenograpsidae, a new family of grapsoid crabs (Crustacea: Brachyura) associated with shallow water hydrothermal vents. *Raffles Bulletin of Zoology*, Supplement 16: 233–256.

Ng, N. K., Guo, J. & Ng, P. K. L. 1999. Generic affinities of *Eriocheir leptognathus* and *E. formosa* with description of a new genus (Brachyura: Grapsidae: Varuninae). *Journal of Crustacean Biology*, 19: 154–170.

Ng, N. K., Huang, J.F. & Ho, P.H. 2000. Description of a new species of hydrothermal crab, *Xenograpsus testudinatus* (Crustacea: Decapoda: Brachyura: Grapsidae) from Taiwan. *In*: Hwang, J.S. Wang, C.H. & Chan, T.Y. (eds.), *Proceedings of the International Symposium on Marine Biology in Taiwan — Crustacean and Zooplankton Taxonomy, Ecology and Living Resources. National Taiwan Museum Special Publication Series*, No. 10: 191–199.

Ng, N. K., Hsueh, P.W. & Ng, P. K. L. in press. *Oreotlos latus* (Borradaile, 1903), a new record for Taiwan, with the first description of a male and a revised key to the genus (Brachyura, Leucosiidae). *Crustaceana*.

Ng, N. K., Liu, H.C. & Ho, P.H. 2001. *Plagusia speciosa* Dana, 1851, a new record for Taiwan (Crustacea: Decapoda: Brachyura: Plagusiinae) with a key to the genus for Taiwan. *Journal of the National Taiwan Museum*, 53(2): 13–22.

Ng. P. K. L. 1998a. *Lamoha*, a replacement name for *Hypsophrys* Wood-Mason & Alcock, 1891 (Brachyura, Homolidae), a junior synonym of *Hypsophrys* Agassiz, 1859 (Pisces, Teleostei, Cichlidae). *Crustaceana*, 71: 121–125.

Ng, P. K. L. 1998b. Crabs. *In*: Carpenter, K. E. & Niem, V. H. (eds.), FAO Species identification guide for fishery purposes. *The living marine resources of the Western Central Pacific. Volume 2. Cephalopods, crustaceans, holothurians and sharks*. Food and Agriculture Organisation, Rome. Pp. 1045–1155.

Ng, P. K. L. 1999. Book review: Crustacean Fossils of Taiwan. *Crustaceana*, 72: 237–239.

Ng, P. K. L. 2000. The Indo-Pacific Pilumnidae XIII. On the identity of *Pilumnus dofleini* Balss, 1933, with description of a new species (Crustacea: Decapoda: Brachyura) from Taiwan and the South China Sea. *Zoological Studies*, 39: 301–306.

Ng, P. K. L. 2008. The National Taiwan Museum and Taiwanese carcinology – 20 years on. *Taiwan Natural Science, Taipei*, 98: 54–57.

Ng, P. K. L. & Chan, T.Y. 1997. Two newly recorded crab genera (Crustacea: Decapoda: Brachyura) from Taiwan: *Platypilumnus* (Goneplacidae) and *Trachycarcinus* (Atelecylidae). *Journal of Taiwan Museum*, 50: 107–112.

Ng, P. K. L. & Chan, T.Y. 2000. Note on *Mathildella serrata* (Sakai, 1974) (Crustacea: Decapoda: Brachyura: Goneplacidae) from deep waters in Taiwan. *In*: Hwang, J.S. Wang, C.H. & Chan, T.Y. (eds.), *Proceedings of the International Symposium on Marine Biology in Taiwan — Crustacean and Zooplankton Taxonomy, Ecology and Living Resources. National Taiwan Museum Special Publication Series*, No. 10: 149–153.

Ng, P. K. L., Chan, T.Y. & Wang, C.H. 2000. The crabs of the families Dromiidae, Raninidae, Corystidae and Palicidae (Crustacea: Decapoda: Brachyura) of Taiwan. *In*: Hwang, J.S., Wang, C.H. & Chan, T.Y. (eds), *Proceedings of the International Symposium on Marine Biology in Taiwan — Crustacean and Zooplankton Taxonomy, Ecology and Living Resources. National Taiwan Museum Special Publication Series*, No. 10: 155–180.

Ng, P. K. L. & Chen, H.L. 1999. On the identities of two Pacific species of deep-water porter crabs, *Hypsophrys longirostris* Chen, 1986, and *Homologenus donghaiensis* Chen, 1986 (Crustacea: Decapoda: Brachyura: Homolidae). *Proceedings of the Biological Society of Washington*, 112: 759–767.

Ng, P. K. L., Guinot, D. & Davie, P. J. F. 2008. Systema Brachyurorum: part I. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bulletin of Zoology*, Supplement 17: 1–286.

Ng, P. K. L. & Ho, P.H. 2003a. On the deep-water dorippid crabs of the genus *Ethusina* Smith, 1884 (Crustacea: Decapoda: Brachyura) from Taiwan. *Raffles Bulletin of Zoology*, 51: 71–85.

Ng, P. K. L. & Ho, P.H. 2003b. The Indo-Pacific Pilumnidae XVIII. New species and new records from Taiwan (Decapoda, Brachyura). *Crustaceana*, 76: 167–176.

Ng, P. K. L. & Huang, J.F. 1997. Unrecorded crabs (Crustacea: Decapoda: Brachyura) from Taiwan and Tungsha Islands, with description of a new genus and species of Xanthidae. *Zoological Studies*, 36: 261–276.

Ng, P. K. L. & Jeng, M.S. 1999a. The Hymenosomatidae (Decapoda, Brachyura) of Taiwan. *Crustaceana*, 72: 531–534.

Ng, P. K. L. & Jeng, M.S. 1999b. The brachyuran crabs (Crustacea: Decapoda: Eumedonidae and Portunidae) symbiotic with echinoderms in Taiwan. *Zoological Studies*, 38: 268–274.

Ng, P. K. L., Lee, D.A. & Yu, H.P. 1994. A new deep sea crab of the genus *Chaceon* (Decapoda, Geryonidae) from the South China Sea. *Crustaceana*, 67: 371–380.

Ng, P. K. L. & Liu, H.C. 1999. The taxonomy of *Sesarma tangi* Rathbun, 1931 and S. *stormi* De Man, 1895 (Crustacea: Decapoda: Brachyura: Grapsidae: Sesarminae), with establishment of a new genus for *S. stormi*. *Zoological Studies*, 38: 228–237.

Ng, P. K. L. & Liu, H.C. 2003. On a new species of tree-climbing crab of the genus *Labuanium* (Crustacea: Decapoda: Brachyura: Sesarmidae) from Taiwan. *Proceedings of the Biological Society of Washington*, 116: 601–616.

Ng, P. K. L., Liu, H.C. & Schubart, C. D. 2004. *Geosesarma hednon*, a new species of terrestrial crab (Crustacea: Decapoda: Brachyura: Sesarmidae) from Taiwan and Philippines. *Raffles Bulletin of Zoology*, 52: 239–249.

Ng, P. K. L., Liu, H.C. & Wang, C.H. 1997. On the terrestrial sesarmine crabs of the genus *Neosarmatium* (Crustacea: Decapoda: Brachyura: Grapsidae) from Taiwan. *Journal of Taiwan Museum*, 1996, 49: 145–159.

Ng, P. K. L., McLay, C. L. & Wang, C.H. 2003. *Hirsutodynomene spinosa* (Rathbun, 1911): a new record for Taiwan (Crustacea, Decapoda, Brachyura, Dynomenidae). *Journal of the National Taiwan Museum*, 56: 29–32.

Ng, P. K. L., Nakasone, Y. & Kosuge, T. 2000. Presence of the land crab, *Epigrapsus politus* Heller (Decapoda: Brachyura: Gecarcinidae) in Japan and Christmas Island, with a key to the Japanese Gecarcinidae. *Crustaceana*, 73: 379–381.

Ng, P. K. L. & Naruse, T. 2007. On two species of deep sea homoloid crabs of the genus *Dicranodromia* (Crustacea: Decapoda: Brachyura: Homolodromiidae) from the Philippines, with description of a new species. *Raffles Bulletin of Zoology*, Supplement 16: 47-53.

Ng, P. K. L. & Wang, C.H. 1994. Notes on the enigmatic genus *Pseudozius* Dana, 1851 (Crustacea, Decapoda, Brachyura). *Journal of Taiwan Museum*, 47: 83–99.

Ng, P. K. L. & Wang, C.H. 2002. Notes on two species of deep-water porter crabs of the genus *Lamoha* (Crustacea: Decapoda: Brachyura: Homolidae) from the Pacific. *Journal of the National Taiwan Museum*, 2001, 54(2): 13-24.

Ng. P. K. L., Wang, C.H., Ho, P.H. & Shih, H.T. 2001. An annotated list of brachyuran crabs from Taiwan (Crustacea, Decapoda). *National Taiwan Museum Special Publication Series*, 11: 1–86.

Ortmann A. 1892. Die Decapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und z. Z. im Strassburger Musesum aufbewahrten Formen. V. Theil. Die Abtheilungen Hippidea, Dromiidea und Oxystomata. *Zoologische Jahrbücher, Abtheilung für Systematik, Geographie und Biologie der Thiere*, 6: 532–588, pl. 26.

Oshima, M., 1921a. Supplement to the species list of the crabs and shrimps from Formosa. *Zoological Magazine*, 33: 122–124.

Oshima, M. 1921b. Supplement to the species list of the decapod crustaceans from Formosa. *Zoological Magazine*, 33: 226–227.

Parisi, B. 1914. I. Decapodi giapponesi del Museo di Milano, I. Oxystomata. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano*, 53: 282– 311, pls. 11–13.

Parisi, B. 1915. I Decapodi giapponesi del Museo di Milano. II. Dromiacea. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano*, 54: 102–116, fig. 1–2, pl. 2–3.

Parisi, B. 1916. I Decapodi Giapponesi del Museuo di MI-Lano. IV. Cyclometopa. *Atti della Societa Italiana di Scienze Naturali*, 55: 153–190.

Parisi, B. 1918. I Decapodi Giapponesi del Museuo di MI-Lano. VI. Catometopa e Paguridea. *Atti della Societa Italiana di Scienze Naturali*, 57: 90–115.

Rafinesque, C. S. 1814. Précis des Découvertes et Travaux somiologiquesde Mr. C. S. Rafinesque-Schmaltz entre 1800 et 1814. Ou choix raisonné de ses principales Découvertes en Zoologie et en Botanique, pour server d'introduction à ses ouvrages futures. Palerme, Royale typogr. Milit., 55 pp. [Crustacés: 20 sq.].

Rathbun, M. J. 1897. A revision of the nomenclature of the Brachyura. *Proceedings of the Biological Society of Washington*, 11: 153–167.

Rathbun, M. J. 1911. Marine Brachyura. The Percy Sladen Trust Expedition to the Indian Ocean in 1905 under the leadership of Mr. J. Stanley Gardiner, vol. 3 no. 11. *Transactions of the Linnean Society, London*, ser. 2, 14: 191–261, pls. 15-20.

Rathbun, M. J. 1921. New species of crabs from Formosa. *Proceedings of the Biological Society of Washington*, 34: 155–156.

Rathbun, M. J. 1923. An analysis of "*Dromia dormia (Linnaeus)*". *Proceedings of the Biological Society, Washington*, 36: 65–70.

Rathbun, M. J., 1931. New and Rare Chinese Crabs. *Lingnan Science Journal*, 8: 75–125. (Dated 1929; published 1931)

Rathbun, M. J. 1937. The oxystomatous and allied crabs of America. *Bulletin, United States National Museum* 106: 1–278, pls. 1–86.

Richer de Forges, B. & Ng, P. K. L. 2007. New records and new species of Homolidae De Haan, 1839, from the Philippines and French Polynesia (Crustacea: Decapoda: Brachyura). *Raffles Bulletin of Zoology*, Supplement 16: 29–45.

Richer de Forges, B. & Ng, P. K. L. 2008. New Western Pacific records of Homolidae De Haan, 1839, with descriptions of new species of *Homolochunia* Doflein, 1904, and *Latreillopsis* Henderson, 1888 (Crustacea: Decapoda: Brachyura). *Zootaxa,* 1967: 1–35.

Richer de Forges, B., Li, K. & Ng, P. K. L. in press. *Cyrtomaia largoi* Richer de Forges & Ng, 2007 (Crustacea, Decapoda, Inachidae): a new record for Taiwan. *Crustaceana*.

Risso, A. 1816. *Histoire naturelle des crustacés des environs de Nice*. 175 pp.

Roux, P. 1828–1830. *Crustacés de la Méditerranée et de son littoral*. Levrault, Paris, 176 unnumbered pages, pls 1–45 (pls. 1–10 [1828], 11–15 [1829], pls. 16–45[1830]).

Sakai, K., 2000. On the occurrence of three species of crabs on Shikoku Island, Japan, and a new species, *Pinnotheres taichungae* nov. spec., from Taiwan (Decapoda, Brachyura). *Crustaceana*, 73: 1155–116.

Sakai, T. 1936. Studies on the crabs of Japan, I. Dromiacea. *Science Reports of the Tokyo Bunrika Daigaku*, B, 3, Supplement 1: 1–66, figs. 1–13, pls. 1–9.

Sakai, T. 1937. Studies on the crabs of Japan, II. Oxystomata. *Science Reports of the Tokyo Bunrika Daigaku*, B, 3, Supplement 2: 67–192, pls. 10–19.

Sakai, T., 1938a. Brachygnatha, Oxyrhyncha. Studies on the crabs of Japan, III: 194–364, pls. 20–41. Yokendo, Tokyo.

Sakai, T., 1938b. On three systematically interesting crabs from Japan, one of which is new to science. *Annotationes Zoologicum Japonese*, 17: 301–309.

Sakai, T., 1939. Brachygnatha. Brachyrhyncha. Studies on the crabs of Japan. IV: 365–741, pls. 42–104. Yokendo Ltd., Tokyo.

Sakai, T. 1961. New species of Japanese crabs from the collection of His Majesty The Emperor of Japan. *Crustaceana*, 3: 131–150, pls. 3–4, figs. 1–4.

Sakai, T. 1963. Description of two new genera and fourteen new species of Japanese crabs from the collection of His Majesty The Emperor of Japan. *Crustaceana*, 5: 213–233, figs. 1–8.

Sakai T. 1965. *The Crabs of Sagami Bay, collected by His Majesty the Emperor of Japan*. Tokyo, Maruzen Co., i–xvi, 1–206, figs. 1–27, pls. 1–100: 1–92, 1–26, 27–32, 1 map.

Sakai T. 1969. Two new genera and twenty-two new species from Japan. *Proceedings of the Biological Society of Washington*, 82: 243–280, pls. 1, 2.

Sakai, T., 1974. Notes from the carcinological fauna of Japan. (V). *Researches on Crustacea*, 6: 86–102.

Sakai, T. 1976. Crabs of Japan and the Adjacent Seas. Kodansha Ltd., Tokyo. 3 volumes: i–xxix + 1–773 (English text); 1–461 (Japanese text); 1–16, pls. 1–251 (plates).

Sakai, T. 1979. Descriptions of three new species of crabs of the family Homolidae from Japan. *Researches on Crustacea*, 9: 1–11.

Sakai, T. 1983. Description of new genera and species of Japanese crabs, together with systematically and biogeographically interesting species. (I). *Researches on Crustacea*, 12: 1–44, pl. 1–8.

Sato, H., 1936a. The collections of the littoral animals of Formosa (1). *Botany and Zoology*, 4: 1435–1442. (In Japanese)

Sato, H., 1936b. The collections of the littoral animals of Formosa (2). *Botany and Zoology*, 4: 1619–1624. (In Japanese)

Sato, H., 1936c. The collections of the littoral animals of Formosa (4). *Botany and Zoology*, 4: 1951–1957. (In Japanese)

Sato, H., 1936d. On the littoral fauna of Formosa. *Scientific Taiwan*, 4: 137–144. (In Japanese)

Scholtz, G. & McLay, C. in press. Is the Brachyura Podotremata a monophyletic group? *In*: Martin, J. W., Crandall, K.A. & Felder, D.F. (eds), *Decapod Crustacean Phylogenetics*. *Crustacean Issues* 18.

Scholtz, G. & Richter, S. 1995. Phylogenetic systematics of the reptantian Decapoda (Crustacea, Malacostraca). *Journal of the Linnean Society*, 113: 289–328.

Schweitzer, C.E. & Feldmann, R. M. 2005. Decapod crustaceans, the K/P event, and Palaeocene recovery. *In*: Koenemann, S. & Jenner, R. A. (eds) *Crustacea and Arthropod Relationships*. *Crustacean Issues*, 16: 17–53.

Schubart, C.D., Liu, H.C. & Cuesta, J. A. 2003. A new genus and species of tree-climbing crab (Crustacea: Brachyura: Sesarmidae) from Taiwan with notes on its ecology and larval morphology. *Raffles Bulletin of Zoology*, 51: 49–59.

Serène, R. & Lohavanijaya, P. 1973. The Brachyura (Crustacea: Decapoda) collected by the NAGA Expedition, including a review of the Homolidae. *Naga Report, Scientific Results of Marine Investigation of the South China Sea and the Gulf of Thailand 1959–1961*, 4 (4): 1–186, pls. 1–21.

Serène, R. & Umali, A.F. 1972. The family Raninidae and other new and rare species of Brachyuran Decapods from the Philippines and adjacent regions. *Philippine Journal of Science*, 99 (1–2): 21–105, pls. 1–9.

Shen, Y.L. & M.S. Jeng, 2005. *Crabs of Penghu*. Fisheries Research Institute, COA, Keelung. (In Chinese)

Shih, H.T., 1994. *Fiddler Crabs*. National Museum of Marine Biology and Aquarium, Kaohsiung. 190 pp. (In Chinese)

Shih, H.T., Chen, G.X. & Wang, L.M. 2005. A new species of freshwater crab (Decapoda: Brachyura: Potamidae) from

Dongyin Island, Matsu, Taiwan, defined by morphological and molecular characters, with notes on its biogeography. *Journal of Natural History*, 39: 2901–2911.

Shih H.T., Hung, H.C., Schubart, C.D., Chen, C.A. & Chang, H.W. 2006. Intraspecific genetic diversity of the endemic freshwater crab *Candidiopotamon rathbunae* (Decapoda, Brachyura, Potamidae) reflects five million years of geological history of Taiwan. *Journal of Biogeography*, 33: 980–989.

Shih, H.T. & Mok, H.K.1996. *Quadrella maculosa* Alcock, 1898, a genus and species of shallow water xanthid crab (Brachyura: Xanthoidea: Trapeziidae) new to Taiwan. *Zoological Studies*, 35: 146–148.

Shih, H.T., Mok, H.K., Chang, H.W. & Lee, S.C. 1999. Morphology of *Uca formosensis* Rathbun, 1921 (Crustacea: Decapoda: Ocypodidae), an endemic fiddler crab from Taiwan, with notes on its ecology. *Zoological Studies*, 38: 164–177.

Shih, H.T., Naruse, T. & Yeo, D.C.J. 2008. A new species of *Geothelphusa* Stimpson, 1857, from Taiwan (Crustacea: Brachyura: Potamidae) based on morphological and molecular evidence, with notes on species from western Taiwan. *Zootaxa*, 1877: 37–48.

Shih, J.T., Lue, K.Y. & Wang, C.H. 1991. Crab fauna and the activities of ten crab species in Tanshui mangrove swamp of Taiwan. *Annuals of the Taiwan Museum*, 34: 121–140. (In Chinese)

Shy, J.Y., 2005. A new species of freshwater crab of the genus *Geothelphusa* Stimpson, 1858 (Crustacea: Decapoda: Brachyura: Potamidae) from Taiwan. *Raffles Bulletin of Zoology*, 53: 99–102.

Shy, J.Y., Chen, W.J. & Cheng, J.H. 2000. Redescription of the freshwater crab *Geothelphusa neipu* Chen, Cheng and Shy, 1998 (Crustacea: Decapoda: Brachyura: Potamidae) from southern Taiwan. *Raffles Bulletin of Zoology*, 48: 147–151.

Shy, J.Y., Lai, H.T. & Yu, H.P. 1996. On the freshwater shrimps and crabs from the three southwestern counties Yunlin, Chiayi and Tainan of Taiwan. *Annual of Taiwan Museum*, 39: 201–247. (In Chinese)

Shy, J.Y. & Ng, P. K. L. 1998. On two new species of *Geothelphusa* Stimpson, 1858 (Decapoda, Brachyura, Potamidae) from the Ryukyu Islands, Japan. *Crustaceana*, 71: 778–784.

Shy, J.Y., Ng, P. K. L. & Yu, H.P. 1994. Crabs of the genus *Geothelphusa* Stimpson, 1858 (Crustacea: Decapoda: Brachyura: Potamidae) of Taiwan, with descriptions of 25 new species. *Raffles Bulletin of Zoology*, 42: 781–846.

Shy, J.Y. & Yu, H.P. 1999. *The Freshwater Crabs of Taiwan*. National Museum of Marine Biology and Aquarium, Kaohsiung. 116 pp. (In Chinese)

Spears, T., Abele, L.G., Kim, W. 1992. The monophyly of brachyuran crabs: a phylogenetic study based on 18S rRNA. *Systematic Biology*, 41: 446–461.

Stebbing, T.R.R. 1902. South African Crustacea Part II. *Marine Investigations in South Africa*, 2: 1–92, pls. 5–16.

Stebbing, T.R.R. 1920. South African Crustacea (Part X of S.A. Crustacea, for the Marine Investigations in South Africa). *Annals of the South African Museum*, 17: 231–272.

Števčić, Z. 2005. The reclassification of Brachyuran Crabs (Crustacea: Decapoda: Brachyura). *Fauna Croatica*, 14 (1): 1–159.

Stimpson, W. 1858a. Prodromus descriptionis animalium evertebratorum quoe in Expeditione ad Oceanum Pacificum eptentrionalem a Republica Federata Missa, Cadwaladaro Ringgold et Johann Rodgers Ducibus, observavit et descripsit — Part V, Crustacea Ocypodoidea. *Proceedings of the Academy of Natural Science, Philadelphia*, 10: 93–110. (In Latin)

Stimpson, W. 1858b. Prodromus descriptionis animalium evertebratorum in expeditione ad Oceanum Pacificum Septentrionalem missa, C. Ringgold et Johanne Rodgers ducibus, observatorum et descriptorum. Pars VII. Crustacea Anomoura. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 10: 225–252 [63–90].

Su, H.J. & Lue, K.Y. 1984. The crab fauna of Tan-shui mangrove swamp. Biological *Bulletin of National Taiwan Normal University*, 19: 61–70. (In Chinese)

Suzuki, H. 1985. A list of the macro-crustaceans collected from Formosa. *Report on the Ocean Environment of the southern Ryukyu Islands*, 2: 49–59.

Takahasi, S. 1934a. An ecological study of the littoral animals near the mouth of Tamsui. *Transactions of the Natural History Society of Formosa*, 24: 1–14. (In Japanese)

Takahasi, S. 1934b. The ecology of Ocypodidae near the mouth of Tamsui. *Zoological Magazine*, 45: 73–74. (In Japanese)

Takahasi, S. 1935. Ecological notes on the Ocypodian crabs (Ocypodidae) in Formosa, Japan. *Annotationes Zoologicum Japonense*, 15: 78–87.

Takeda, M. 1973. Report on the crabs from around the sea around Tsushima Islands collected by the Research Vessel "Genkai" for the Trustees of the National Science Museum, Tokyo. *Bulletin of the Liberal Arts and Sciences Course, Nihon University School of Medicine*, 1: 17-68.

Takeda, M. 1977. Two interesting crabs from Hawaii. *Pacific Science*, 31: 31–38, figs 1–4.

Takeda, M. 2001. Annotated list of crabs from Tosa Bay, Southwest Japan, collected by the R/V Kotaku Maru during the years 1997–2000. *In*: Fujita, T., Saito, H. & Takeda, M. (eds), *Deep-Sea Fauna and Pollutants in Tosa Bay*. *National Science Museum Monographs*, 20: 217–262.

Takeda, M., Watabe, H. & Ohta, S. 2005. Deep-sea crabs collected by the R.V. Hakuho Maru during KH-05-01 cruise off the Ryukyu Islands. *Bulletin of the National Science Museum, Tokyo*, A31: 105–114.

Tan, C. G. S. & Huang, J.F. 1995. *Baruna sinensis*, a new camptandriine crab from Taiwan (Crustacea: Decapoda: Brachyura: Ocypodidae). *Raffles Bulletin of Zoology*, 43: 447–452.

Tan, S. H. & Huang, J.F. 2000. Description of a new species of *Tymolus* (Crustacea: Decapoda: Brachyura: Cyclodorippidae) from Taiwan. *In*: Hwang, J.S., Wang, C.H. & Chan, T.Y. (eds.), *Proceedings of the International Symposium on Marine Biology in Taiwan — Crustacean and Zooplankton Taxonomy, Ecology and Living Resources*. *National Taiwan Museum Special Publication Series*, No. 10: 135–140.

Tan, S. H., Huang, J.F. & Ng, P. K. L. 1999. Crabs of the family Parthenopidae (Crustacea, Decapoda, Brachyura) from Taiwan. *Zoological Studies*, 38: 196–206.

Tan, S. H., Huang, J.F. & Ng, P. K. L. 2000a. The deep-water crabs of the families Homolidae and Latreilliidae (Crustacea: Decapoda: Brachyura) from Taiwan. *In*: Hwang, J.S., Wang, C.H. & Chan, T.Y. (Eds.), *Proceedings of the International Symposium on Marine Biology in Taiwan – Crustacean and Zooplankton Taxonomy, Ecology and Living Resources*. *National Taiwan Museum Special Publication Series*, No. 10: 181–189.

Tan, S. H. & Liu, H.C. 1998. Two new species of *Geothelphusa* (Decapoda: Brachyura: Potamidae) from Taiwan. *Zoological Studies*, 37: 286–290.

Tan, S. H., Wu, S.H. & Huang, J.F. 2000b. Seven new records of marine crabs from Taiwan (Crustacea: Decapoda: Brachyura: Calappidae, Leucosiidae and Cancridae). *In*: Hwang, J.S., Wang, C.H. & Chan, T.Y. (eds.), *Proceedings of the International Symposium on Marine Biology in Taiwan — Crustacean and Zooplankton Taxonomy, Ecology and Living Resources*. *National Taiwan Museum Special Publication Series*, No. 10: 141–147.

Tavares M. 1991. Révision préliminaire du genre *Tymolus* Stimpson, avec la description de *Tymolus brucei* sp. nov. d'Australie occidentale (Crustacea, Brachyura, Cyclodorippidae). *Bulletin du Muséum national d'Histoire naturelle, Paris*, (4) 13A (3–4): 439–456.

Tavares, M. S. 1992. Tendances évolutives chez les Crabes primitifs, avec la description d'un nouveau type de chamber incubatrice (Crustacea, Decapoda: Cyclodorippinae Ortmann, 1892, et Xeinostomatinae subfam. nov.). *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences*, series 3, 312: 509–514, fig. 1–2.

Tavares, M. S. 1993a. Description préliminaire de quatre nouveaux genres et trois nouvelles espèces de Cyclodorippoidea Américains (Crustacea, Decapoda Brachyura). *Vie et Milieu*, 43: 137–144.

Tavares, M. S. 1993b. Crustacea Decapoda: Les Cyclodorippidae et Cymonomidae de l'Indo-Ouest-Pacifique à l'exclusion du genre *Cymonomus*. *In*: Crosnier, A. (ed.), *Résultats des Campagnes MUSORSTOM, Volume 10*. *Mémoires du Muséum national d'Histoire naturelle, Paris*, 156: 253–313.

Tavares, M. S. 1998. Phyllotymolinidae, nouvelle famille de Brachyoures Podotremata (Crustacea, Decapoda). *Zoosystema*,

20: 109–122.

Tavares, M. 2000. New and additional records of cyclodorippid crabs from Japan (Brachyura, Cyclodorippidae). *Crustaceana*, 73: 377–378.

Tavares, M. S. 2003. A new theoretical approach for the study of monophyly of the Brachyura (Crustacea: Decapoda) and its impact on the Anomura. *Memoirs of Museum Victoria*, 60 (1), 145–149.

Terao, A., 1915a. The second intermediate host of Lung Distoma. Part 2. *Zoological Magazine*, 27: 502–503. (In Japanese)

Terao, A., 1915b. The second intermediate host of Lung Distoma. Part 3. *Zoological Magazine*, 27: 555. (In Japanese)

Terao, A., 1915c. The second intermediate host of Lung Distoma. Part 4. *Zoological Magazine*, 27: 642. (In Japanese)

Terao, A., 1916. Crabs which molested the rice paddies. *Zoological Magazine*, 28: 188–189. (In Japanese)

Terasaki, T. 1902. General description of Japanese crabs. No. 5. *Zoological Magazine*, 14: 166–171. (In Japanese)

Terasaki, T., 1903. General description of Japanese crabs. No. 17. *Zoological Magazine*, 15: 431–440. (In Japanese)

Terasaki, T., 1904. General description of Japanese crabs. No. 19. *Zoological Magazine*, 16: 67–69. (In Japanese)

Tucker, A. B. 1998. Systematics of the Raninidae (Crustacea: Decapoda: Brachyura), with accounts of three new genera and two new species. *Proceedings of the Biological Society of Washington*, 111: 320–371.

Utinomi, H., 1944. Studies on the animals inhabiting reef corals III. A revision of the family Hapalocarcinidae (Brachyura), with some remarks on their morphological peculiarities. *Palao Tropical Biological Station Studies*, 2: 687–731.

Wang, C.H. 1984. Primary studies on the crabs in Kenting National Park in Taiwan. *Annual of Taiwan Museum*, 27: 39–44. (In Chinese)

Wang, C.H. 2003. Crabs. *In*: Chen, C.P. & J.Y. Wu (eds.), *Kinmen Coastal Creatures Guide*. Kinmen County Government, Taiwan.

Wang, C.H. 2008. My gratitude to the Taiwan National Museum. *Taiwan Natural Science, Taipei*, 98: 120–123.

Wang, C.H. & Chen, C.W. 1981. The list of brachyurous collections at Taiwan Museum (I). *Annals of Taiwan Museum*, 24: 149–156. (In Chinese)

Wang, C.H. & Liu, H.C. 1996a. *Common Seashore Crabs of Taiwan*. First edition. Taiwan Museum, Taipei. 136 pp. (In Chinese)

Wang, C.H. & Liu, H.C. 1996b. *Estuarine Crabs of Taiwan*. 113 pp. Wild Bird Society of Kaohsiung, Kaohsiung. (In Chinese)

Wang, C.H. & Liu, H.C. 1996c. Preliminary investigations of the crab diversity of Wu-Jiang estuary mangrove area in Kinmen. *In: Proceedings of a Conference on Mangrove Ecology*, Taiwan Endemic Species Institute, Nantou. Pp. 223-229. (In Chinese)

Wang, C.H. & Liu, H.C.1998. *Common Seashore Crabs of Taiwan*, Second edition. Taiwan Museum, Taipei. 136 pp. (In Chinese)

Ward, M. 1933. New genera and species of marine Decapoda Brachyura from the coasts of New South Wales and Queensland. *Australian Zoologist*, 5: 377–394.

Weber, F. 1795. *Nomenclator entomologicus secundum Entomologiam Systematicam ill. Fabricii adjectis speciebus recens detectis et varietatibus*. Chilonii and Hamburgi, viii+171 pp.

White, A. 1847. *List of the specimens of Crustacea in the collection of the British Museum*. British Museum, London.

Williams, A. B. 1982. Revision of the genus Latreillia Roux. *Quadereni del Laboratorio diTecnologia della Pesca, Ancona*, 3: 227–255.

Wood-Mason, J. 1887. Description of a new species of Crustacea belonging to the Brachyurous family Raninidae. *Journal of the Asiatic Society of Bengal*, 56: 206–209, pl. 1.

Wood-Mason, J., & Alcock, A. 1891. Natural history notes from H.M. Indian marine survey steamer Investigator, Commander R. F. Hoskyn, R.N., commanding. No. 21. Note on the results of the last season's deep-sea dredging. *Annals and Magazine of Natural History*, (5) 7: 270–271.

Wu, J.S. 1992. Biological study of mangrove swamp in Shin-Chu, Taiwan. *Biological Bulletin of National Taiwan Normal University*, 27: 97–111. (In Chinese)

Wu, Y.C., Ling, C.M., Shieh, J. & Wang, Y.H. M. 1962. Preliminary studies on the crabs found in the Tansui and the Keelung Rivers and the adjacent areas. *Quarterly Journal of the Taiwan Museum*, 15: 193–210.

Wu, S.H, Yu, H.P. & Ng, P. K. L. 1999. *Acanthonyx formosa*, a new species of spider crab (Decapoda, Brachyura, Majidae) from seaweed beds in Taiwan. *Crustaceana*, 72: 193–202.

Yang, H.C. & Chang, P.J. 1996. *The fish(e)s of Quemoy (Kinmen) (part IV)*. Quemoy (Kinmen) Fisheries Research Institute, Quemoy. 59 pp. (In Chinese)

Yang, S. & Dai, A. 1994. Further notes on the crabs (Brachyura Crustacea) from Nansha Islands and adjacent waters. *Marine fauna and flora and biogeography of the Nansha islands and neighbouring waters, Beijing*, 1: 125–147, pl. 1.

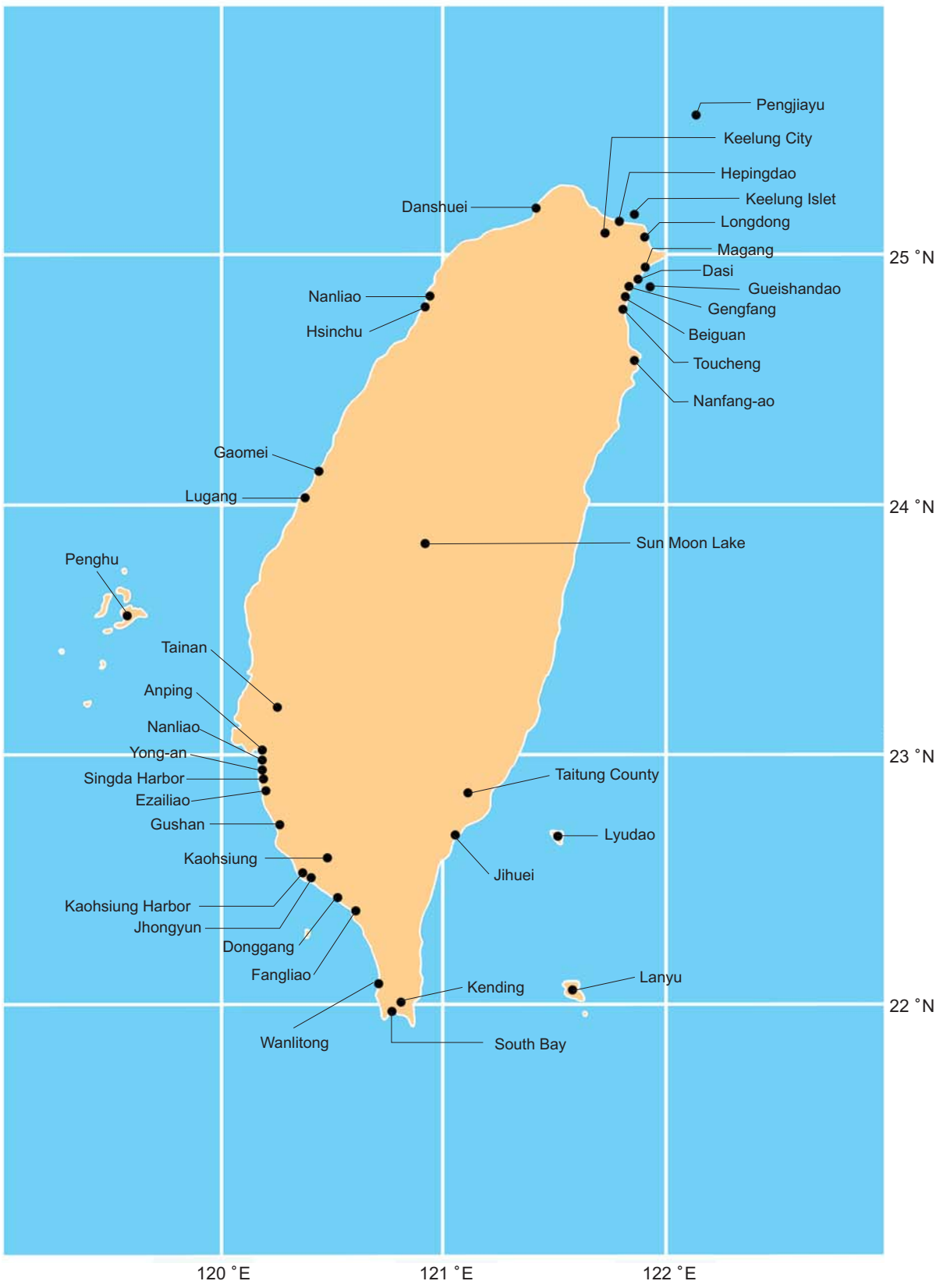
Yeh, T.Y., Hong, H.T. & Hsueh, P.W. 2006. On two new brachyuran records (Decapoda, Dromiidae and Xanthidae) from Taiwan. *Crustaceana*, 79: 69–76.

Yokoya, Y. 1933. On the distribution of Decapod Crustaceans inhabiting the continental shelf around Japan, chiefly based upon the materials collected by the S.S. Sôyô-Maru, during the year 1923-1930. *Journal of the College of Agriculture, Imperial University of Tokyo*, 12: 1–226, figs. 1–71, tabs. 1–4.

Yu, H.P., 1979. The swimming crabs (Crustacea, Decapoda, Portunidae) of Taiwan. *Aquaculture*, 2: 41–74. (In Chinese)

Yu, H.P., Jeng, M.S. Chan, T.Y. Ho, P.H. & Shy J.Y. 1996. *Studies on the land and aquatic decapod crustacean fauna of the Kenting National Park*. Ministry of the Interior, Taipei, ii+79 pp. (In Chinese)

Map of Taiwan



List of Localities in English and Chinese

Anping, Tainan City	台南市 安平
Beiguan, Yilan County	宜蘭縣 北關
Danshuei, Taipei County	臺北縣 淡水
Dasi, Yilan County	宜蘭縣 大溪
Diaoyutai (Senkaku)	釣魚台
Donggang, Pingtung County	屏東縣 東港
Dongsha (Pratas), South China Sea	東沙群島
Dongyin (near Matsu), Lienchiang County	連江縣 東引
Ezailiao, Kaohsiung County	高雄縣 蚵仔寮
Fangliao, Pingtung County	屏東縣 仿寮
Gaomei, Taichung County	台中縣 高美
Gengfang, Yilan County	宜蘭縣 梗枋
Gueishandao, Yilan County	宜蘭縣 龜山島
Gushan, Kaohsiung City	高雄市 鼓山
Hepingdao, Keelung City	基隆市 和平島
Hsinchu	新竹
Jhongyun, Kaohsiung County	高雄縣 中芸
Jihuei, Taitung County	台東縣 基翬
Kaohsiung County	高雄縣
Kaohsiung Harbor, Kaohsiung city	高雄市 高雄港
Keelung City	基隆市
Keelung Islet, Keelung City	基隆市 基隆嶼
Kending, Pingtung County	屏東縣 墾丁
Kinmen	金門
Lanyu, Taitung County	台東縣 蘭嶼
Longdong, Taipei County	臺北縣 龍洞
Lugang, Jhanghua County	彰化縣 鹿港
Lyudao, Taitung County	台東縣 綠島
Magang, Taipei County	臺北縣 馬崗
Matsu, Lienchiang County	連江縣 馬祖
Nanfang-ao, Yilan County	宜蘭縣 南方澳
Nanliao, Hsinchu City	新竹市 南寮
Nanliao, Mituo, Kaohsiung County	高雄縣 彌陀 南寮
Penghu	澎湖
Pengjiayu, Keelung City	基隆市 澎佳嶼
Singda Harbor, Kaohsiung County	高雄縣 興達港
South Bay, Pingtung County	屏東縣 南灣
Sun Moon Lake, Nantou County	南投縣 日月潭
Tainan	台南
Taiping Island, South China Sea	南沙 太平島
Taitung County	台東縣
Toucheng, Yilan County	宜蘭縣 頭城
Wanlitong, Pingtung County	屏東縣 萬里桐
Yong-an, Kaohsiung County	高雄縣 永安

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