



A REVIEW OF THE GENUS *ERIOCHEIR* DE HAAN, 1835 AND RELATED
GENERA, WITH THE DESCRIPTION OF A NEW GENUS AND A NEW
SPECIES (BRACHYURA, GRAPSOIDEA, VARUNIDAE)

BY

KATSUSHI SAKAI¹⁾

Shikoku University, Tokushima 771-1192, Japan

ABSTRACT

Mitten crabs (Brachyura, Varunidae, Varuninae) are currently classified into six species belonging to three genera: *Eriocheir* De Haan, 1835, *Neoeriocheir* T. Sakai, 1983, and *Platyeriocheir* Ng, Guo & Ng, 1999, i.e., *Eriocheir japonica* (De Haan, 1835), *E. hepuensis* Dai, 1991, *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006, and *E. sinensis* H. Milne Edwards, 1853; *Neoeriocheir leptognatha* (Rathbun, 1913); and *Platyeriocheir formosa* (Chan, Hung & Yu, 1995). The results of the present study, however, indicate a reclassification into four genera including one new genus, together lodging seven species, including one new species, and with an eighth currently nameless species remaining as a species inquirenda, as follows: *Eriocheir* De Haan, 1835, with *E. japonica* (De Haan, 1835) and *E. ogasawaraensis* Komai et al., 2006; *Paraeriocheir* gen. nov., with *P. hepuensis* (Dai, 1991) and *P. sinensis* (H. Milne Edwards, 1853); *Platyeriocheir* Ng et al., 1999, with *P. formosa* (Chan et al., 1995) and *P. guangdonga* sp. nov.; and *Neoeriocheir* T. Sakai, 1983, with *N. leptognatha* (Rathbun, 1913); under the prevailing circumstances, the species now indicated as *Eriocheir* sp. [= *Eriocheir recta* sensu Stimpson, 1858] is to be considered a species inquirenda.

ZUSAMMENFASSUNG

Die Wollhandkrabben (Brachyura, Varunidae, Varuninae) werden gegenwärtig in sechs Arten untergeteilt, die den folgenden drei Gattungen angehören: *Eriocheir* De Haan, 1835, *Neoeriocheir* T. Sakai, 1983 und *Platyeriocheir* Ng, Guo & Ng, 1999. Bei den Arten handelt es sich um *Eriocheir japonica* (De Haan, 1835), *E. hepuensis* Dai, 1991, *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006 und *E. sinensis* H. Milne Edwards, 1853; *Neoeriocheir leptognatha* (Rathbun, 1913); und *Platyeriocheir formosa* (Chan, Hung & Yu, 1995). Die Ergebnisse der vorliegenden Studie legen eine Neueinteilung in vier Gattungen (einschließlich einer neuen) und sieben Arten (einschließlich einer neuen und einer achten noch namenlosen als species inquirenda) nahe. Die Neueinteilung sieht wie folgt aus: *Eriocheir* De Haan, 1835 mit *E. japonica* (De Haan, 1835) und *E. ogasawaraensis* Komai et al., 2006; *Paraeriocheir* gen. nov. mit *P. hepuensis* (Dai, 1991) und *P. sinensis* (H. Milne Edwards, 1853); *Platyeriocheir* Ng et al., 1999 mit *P.*

¹⁾ e-mail: ksakai@mf.pikara.ne.jp

formosa (Chan et al., 1995) und *P. guangdonga* sp. nov.; und *Neoeriocheir* T. Sakai, 1983 mit *N. leptognatha* (Rathbun, 1913). Unter den gegebenen Umständen muss die Art, die jetzt als *Eriocheir* sp. [= *Eriocheir recta* sensu Stimpson, 1858] bezeichnet wird, als species inquirenda betrachtet werden.

INTRODUCTION

The mitten crabs (Brachyura, Varunidae, Varuninae) as currently conceived (e.g., Naser et al., 2012), would allegedly comprise six species belonging to three genera, i.e., *Eriocheir japonica* (De Haan, 1835), *E. hepuensis* Dai, 1991, *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006, *E. sinensis* H. Milne Edwards, 1853, *Neoeriocheir leptognatha* (Rathbun, 1913), and *Platyeriocheir formosa* (Chan, Hung & Yu, 1995). In the present study, however, it has turned out through exact examination and detailed comparison of the external morphological characters of these forms, including the male Plp1, that in the opinion of the present author they are to be reclassified into four genera including one new genus, and seven species including one new species, while one species, currently unnamed, remains as a species inquirenda. These results require a new classification of the mitten crabs, which is herein proposed and explained, with keys for the identification of all the genera and species.

MATERIAL AND METHODS

The present author has examined as many specimens of mitten crabs as possible, i.e., of those species until now ascribed to the genera *Eriocheir* De Haan, 1835, *Neoeriocheir* T. Sakai, 1983, and *Platyeriocheir* Ng, Guo & Ng, 1999. In order to determine their status in taxonomy, he has compared those with one another using characteristic features of their external morphology, including those of the male Plp1. These characters now appear to serve well in the present revision of genera and species, as they have served previously in the study on the genus *Helice* (cf. Sakai et al., 2006). The descriptions and conclusions in the Results section, below, are based on those observations and considerations.

Abbreviations.— CL, carapace length; CW, carapace width; GO, genital opening; HE, horny endpiece; P, pereopod(s); Plp1, pleopod 1; COI, Cytochrome oxidase subunit I; ITS, nuclear DNA internal transcribed spacer; CBM, Natural History Museum and Institute, Chiba; KPM, Kanagawa Prefectural Museum of Natural History, Odawara; NSMT, National Science Museum, Tokyo; Ecosystem, Ecosystem Co., Kochi; NTOU, National Taiwan Ocean University, Keelung, Taiwan.

RESULTS AND DISCUSSION

The present author has reviewed descriptions of the mitten crabs classified until now in three genera, *Eriocheir*, *Neoeriocheir*, and *Platyeriocheir* and in all six species, as mentioned in the above. The results indicate that:

1. *Eriocheir ogasawaraensis* Komai et al., 2006 is to be redefined because of some ambiguous characters presented for its definition by Komai et al. (2006) (not Komai, 2006). Those authors described *E. ogasawaraensis* as a new species, mentioning nine characters to distinguish the new species from *Eriocheir japonica* (De Haan, 1835), but six out of those nine features are, as a result of the present study, considered to be unreliable. Therefore, in the opinion of the present author, these characters can hardly be regarded to be of value in distinguishing one species from the others. Thus it is proposed herein to redefine *E. ogasawaraensis* based on six reliable, unambiguous morphological features, including one taken from the male pleopods.

2. *Paraeriocheir* gen. nov. is herein established, to include two species, *P. sinensis* (H. Milne Edwards, 1853) and *P. hepuensis* (Dai, 1991). As a result of the present examination it was found that *Eriocheir sinensis* and *E. hepuensis* are not to be classified under the genus *Eriocheir* De Haan, 1835, because they are different from *E. japonica* (De Haan, 1835), the type species of *Eriocheir*, in the frontal margin of the carapace, the lateral teeth of the carapace, and the male pleopod. These differences are safely regarded as good characters to redetermine their status in taxonomy at the generic level. Hence, a new genus, *Paraeriocheir* is now established for them.

3. The status of the nominal species *Eriocheir recta* Stimpson, 1858 has been that of a species inquirenda, until a neotype was established to define its name, viz., by Chan et al. (1995). As Stimpson's (1858) type-material is no longer extant (R. Lemaitre, USNM, in litt.) and no new material has ever been reported that could with certainty be matched with the descriptions of Stimpson (1858, 1907), the true identity of the form described by Stimpson necessarily remained undisclosed.

In an obvious attempt at solving at least the nomenclatural problem of a nominal species, *E. recta* Stimpson, 1858, with an uncertain status, Chan et al. (1995) designated a neotype for this *E. recta*. Having done so, they remarked (Chan et al., 1995: 303): "As all the available evidence shows that the type of *E. recta* is likely to be a juvenile female of *E. japonica*, a male (48.0 mm cw, NTOU N-90-93, transferred from SCSIO) of *E. japonica* from the Pearl River Estuary obtained by a commercial trawler next to Macau (salinity 15‰) and collected by Dr. Q. C. Chen in 1990-1993, is here selected as the neotype of *E. recta* (Fig. 2C). *Eriocheir recta* (Stimpson, 1858) now becomes a subjective junior synonym of *E. japonica* de Haan, 1835." As those authors (Chan et al., 1995) already indicated, their neotype

can with certainty be identified as *E. japonica* (De Haan, 1835), which means that the name *Eriocheir recta* Stimpson, 1858 has indeed become a junior synonym of *Eriocheir japonica* (De Haan, 1835).

Although Chan et al. (1995) have undoubtedly made an effort in selecting a neotype that they considered to approach the identity of the descriptions by Stimpson (1858, 1907) as closely as possible, the establishment of a neotype only has nomenclatural consequences, not taxonomic ones. This means that, while now the **name** *Eriocheir recta* has got an unambiguous meaning, the actual **status** of the material on which Stimpson's (1858, 1907) descriptions are based still remains unresolved: at least, in the opinion of the present author, who has found sufficient morphological characteristics in those descriptions to keep the form described by Stimpson apart from the other species described in the genus *Eriocheir* and its close relatives, albeit now without a species name.

4. So, as any attempts at a more refined definition of the species named and defined by Stimpson (1858, 1907) as *Eriocheir recta* seem to have failed so far in establishing its true identity, the actual identity of the form Stimpson (1858, 1907) described must remain doubtful. For this reason, we seem to have no other option than to characterize that form provisionally as *Eriocheir* sp. [= *Eriocheir recta* sensu Stimpson, 1858] and treat it as a species inquirenda. This is because, for an unambiguous characterization of the form Stimpson (1858, 1907) tried to define, (a) his descriptions are insufficiently detailed and (b) no specimen that can safely be matched with those descriptions has been found since.

5. Another "neotype" for *E. recta* Stimpson, 1858, was subsequently (but incorrectly) established by Tang et al. (2004). This specimen, however, can have no status in either nomenclature or taxonomy, at least not in this respect, as only one neotype, i.e., the first, defines the meaning of the name it has been established for. That second "neotype" can, in the opinion of the present author, be safely identified as a new species, clearly different from the description of *E. recta* by Stimpson (1858, 1907), which new form is thus herein described as *Platyeriocheir guangdonga* sp. nov. (see further below).

Hence, as a result of the present review of the genus *Eriocheir* and its direct relatives at the generic level, a new classification is proposed for these, as listed below, comprising four genera, including one new genus, and seven species including one new species, the diagnostic characteristics of which are presented in table I:

1. Genus *Eriocheir* De Haan, 1835: *E. japonica* (De Haan, 1835), *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006.
2. Genus *Paraeriocheir* gen. nov.: *P. hepuensis* (Dai, 1991), *P. sinensis* (H. Milne Edwards, 1853).

TABLE I

Comparison of features in *Eriocheir japonica* (De Haan, 1835), *Eriocheir ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006, *Paraeriocheir hepueensis* (Dai, 1991), *Paraeriocheir sinensis* (H. Milne Edwards, 1853), *Platyriocheir formosa* (Chan et al., 1995), *Platyriocheir guangdonga* sp. nov., and *Neoeriocheir leptognatha* (Rathbun, 1913)

	<i>Eriocheir japonica</i> (De Haan, 1835)	<i>Eriocheir ogasawaraensis</i> Komai et al., 2006	<i>Paraeriocheir hepueensis</i> (Dai, 1991)	<i>Paraeriocheir sinensis</i> (H. Milne Edwards, 1853)	<i>Eriocheir formosa</i> Chan et al., 1995 (= <i>Platyriocheir formosa</i> (Chan et al., 1995))	<i>Platyriocheir guangdonga</i> sp. nov. (= <i>Eriocheir recta</i> , cf. Tang et al., 2004)	<i>Neoeriocheir leptognatha</i> (Rathbun, 1913)
CL/CW (CW/CL)	NSMT-Cr 1994I, male, 78.3/87.9 mm (1.12)	CBM-ZC 8571, paratype male, 65.7/76.0 mm (1.16)	NTOU B00083, male, 47.8/53.9 mm (1.13)	NSMT-Cr 22178, male, 67.7/73.4 mm (1.08)	NTOU H-1991, male, CW, 62 mm	Holotype female, 35.6/37.6 mm (1.06)	Type female, immature, 10.6/11.6 mm (1.09)
P1p1	Slender and straight	Slender and slightly curved	Slender and slightly curved	Stout and straight	Slender	Slender	Slender
P1p1 HE	Wider than long, slightly incurved around shallow median hollow, and located obliquely at 45° to thoracic sternites	Wider than long, slightly incurved around shallow median hollow, and located obliquely at 45° to thoracic sternites	Wider than long, distinctly incurved around deep median hollow, and located parallel with thoracic sternites	Wider than long, distinctly incurved around deep median hollow, and located parallel with thoracic sternites	Shaped as crescents, located vertically at 90° to thoracic sternites	Shaped as crescents, located vertically at 90° to thoracic sternites	Shaped as crescents, located vertically at 90° to thoracic sternites

TABLE I
(Continued)

	<i>Eriocheir japonica</i> (De Haan, 1835)	<i>Eriocheir oga-sawaraensis</i> Komai et al., 2006	<i>Paraeriocheir hepuensis</i> (Dai, 1991)	<i>Paraeriocheir sinensis</i> (H. Milne Edwards, 1853)	<i>Eriocheir formosa</i> Chan et al., 1995 (= <i>Platyeriocheir formosa</i> (Chan et al., 1995))	<i>Platyeriocheir guangdonga</i> sp. nov. (= <i>Eriocheir recta</i> , cf. Tang et al., 2004)	<i>Neoeriocheir leptognatha</i> (Rathbun, 1913)
Distolateral half of Pip1	Developed as low bank	Developed as low bank	Developed as high bank	Developed as high bank	Developed as low bank	Developed as low bank	Developed as low bank
Distomesial half of Pip1 (lateral view)	Wide and flat	Wide and flat	Wide and convex	Wide and flat	Wide and flat	Wide and flat	Wide and convex
Pip1 genital opening	Located distally at mesial half of HE	Located distally at mesial half of HE	Located distomesially behind HE	Located distomesially behind HE	Located distomesially behind HE	Located distomesially behind HE	Located distomesially behind HE
Frontal margin of carapace	Granulated, 4-lobed, separated medially by shallow sinus	Granulated, 4-lobed, separated medially by shallow sinus	With 4 distinct teeth	With 4 distinct teeth	Essentially straight	Straight	Granulated, indistinctly undulated
Surface of carapace	Convex	Convex	Convex	Convex	Flat	Depressed	Flat except convex anterior surface
4 th lateral tooth of carapace	Present or rudimentary	Absent	Present	Present	Absent	Absent	Absent
Dorsal margins of P2-5 meri	Smooth	Smooth	Smooth	Smooth	Dense long setae	Dense long setae	Fine setae

TABLE I
(Continued)

	<i>Eriochair japonica</i> (De Haan, 1835)	<i>Eriochair ogasawaraensis</i> Komai et al., 2006	<i>Pareriocheir hepuensis</i> (Dai, 1991)	<i>Pareriocheir sinensis</i> (H. Milne Edwards, 1853)	<i>Eriochair formosa</i> Chan et al., 1995 (= <i>Platyerocheir formosa</i> (Chan et al., 1995))	<i>Platyerocheir formosa</i> (Chan et al., 1995)	<i>Platyerocheir guangdonga</i> sp. nov. (= <i>Eriochair recta</i> , cf. Tang et al., 2004)	<i>Neeriocheir leptognatha</i> (Rathbun, 1913)
Ventral margins of P2-5 meri	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Fine setae
Dorsal margins of P2-5 carpi	Long setae	Long setae	Long setae	Long setae	Smooth	Dense short stiff setae	Smooth	Fine setae
Ventral margins of P2-5 carpi	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Fine setae
Dorsal margins of P2-5 propodi	Long setae	Long setae and pubescence	Long setae	Long setae	Smooth	Dense short stiff setae	Smooth	Fine setae
Ventral margins of P2-5 propodi	Long setae in P2-3, 5; scanty long setae in distal half of P4	Long setae in P2, 5; scanty long setae in distal half of P3, 4	Long setae in P2, 5; smooth in P3-4	Long setae in P2, 5; smooth in P3-4	Smooth	Dense short stiff setae in P2-4, and dense long soft setae in P5	Smooth	Fine setae
Type locality	Japan	Ogasawara Is., Japan	Hepu, Guangxi Province, southern P.R. China	P.R. China	I-Lan County, Taiwan	E. Taiwan	Zhujiang Rever, Guangdong, P.R. China	Shanghai, P.R. China

HE, horny endpiece.

3. Genus *Platyeriocheir* Ng, Guo & Ng, 1999: *P. formosa* (Chan, Hung & Yu, 1995), *P. guangdonga* sp. nov.
4. Genus *Neoeriocheir* T. Sakai, 1983: *N. leptognatha* (Rathbun, 1913).

The molecular systematics of the genus *Eriocheir* as analysed by Tang et al. (2003) showed phylogenetic trees based on COI and combined COI and ITS sequences. According to their results, the genus *Eriocheir* would include *E. japonica* (De Haan, 1835), *E. sinensis* H. Milne Edwards, 1853, *E. recta* Stimpson, 1858, *E. leptognatha* Rathbun, 1913, *E. hepuensis* Dai, 1991, and *E. formosa* Chan et al., 1995. However, the neighbour-joining tree (A) and the maximum-likelihood tree (B) (Tang et al., 2003: 313-314, figs. 3, 4) appear much complicated and are hence confusing, as they result in just six species of *Eriocheir*, which are not arranged in the order that would be appropriate from the viewpoint of classical systematics based on morphology. In these molecular results, it might be possible to cluster specimens, but it seems hardly possible to conclusively define the status in taxonomy of such groups, either at the species level or at the generic level. This is because, it is far from clear which base-arrangements correspond to which patterns of morphological character states, at species level or at generic level. This means the DNA analysis, though useful, would have to be regarded not as a primary but instead as a subordinate tool for classification, until the actual relationships between the patterns of base-arrangements and of morphological characters will have been unambiguously established.

The DNA analysis performed by Naser et al. (2012) indicates that mitten crabs are to be assigned to six species belonging to three genera, i.e., *Eriocheir japonica* (De Haan, 1835), *E. sinensis* H. Milne Edwards, 1853, *E. hepuensis* Dai, 1991, and *E. ogasawaraensis* Komai et al., 2006, as well as *Neoeriocheir leptognatha* (Rathbun, 1913) and *Platyeriocheir formosa* (Chan et al., 1995) (cf. Naser et al., 2012, fig. 12A, the minimum evolution tree of *Eriocheir* COI sequences with bootstrap support values). However, the classification proposed by Naser et al. (2012) does not seem to be sufficiently supported by their DNA analysis, mainly because the partial sequences of COI used by them seem to be rather short (<700 bps) for the case of *Eriocheir*. Moreover, from the ecology of the crabs of the genus *Eriocheir* it is known that strong migration and frequent cross-breeding are commonly observed (see, e.g., Naser et al., 2012: 71-72, and references cited therein), phenomena that obviously influence intraspecific as well as interspecific variability. Thus, comparisons of at least longer, or even better whole sequences of COI (ca. 1.5 kbps) among relevant species, as well as the simultaneous use of several kinds of genes (from both mitochondrial and nuclear genomes) should be made in order to obtain data on which reliable taxonomic decisions can be based. As already remarked above, DNA analysis may be useful in some ways, but it

remains still unknown how the patterns observed in the base-arrangements reflect the patterns found in the morphological characters. Individual specimens are more or less different in their base-arrangement, even if they belong to the same species, as seen in other animals, so differences or similarities in base-arrangements could only be used very carefully in making final decisions about species boundaries, and then only in combination with reliable morphological characters (perhaps in the sense of the study by Naser et al., 2012, but then even more extensively). In view of this observation, it would seem to be still harder to make decisions at generic level using DNA analysis.

Though the ultimate goal of taxonomy is to arrive at a natural classification, i.e., one that reflects the historical course of evolution in the arrangement of the taxa recognized, the practical classification eventually adopted should constitute a workable scheme. Such a useful classification should be evident and clear, and understandable not only to taxonomists but also to the general public, for which purpose it would be more important to classify animals of any kind primarily by morphological characters, including, inter alia, genital organs.

The above considerations have led me to base the classification proposed herein on morphological characters only, thus ignoring the data gained from molecular analysis until, in some future stage, those will present more consistent and hence reliable results.

KEY TO THE GENERA OF MITTEN CRABS (SUBFAMILY VARUNINAE)

1. Frontal margin of carapace four-lobed or four-toothed; dorsal margins of P2-5 meri smooth 2
 - Frontal margin of carapace wholly straight or medially straight with small lateral convexities; dorsal margins of P2-5 meri with dense long setae or fine setae 3
2. Frontal margin of carapace four-lobed *Eriocheir*
 - Frontal margin of carapace four-toothed *Paraeriocheir* gen. nov.
3. Frontal margin of carapace wholly straight; dorsal margins of P2-5 meri with dense long setae *Platyeriocheir*
 - Frontal margin of carapace medially straight with small lateral convexities; dorsal margins of P2-5 meri with fine setae *Neoeriocheir*

Genus *Eriocheir* De Haan, 1835

Grapsus (*Eriocheir*) De Haan, 1835: 32.

Eriocheirus H. Milne Edwards, 1853: 176 [incorrect spelling].

Eriocheir — Tesch, 1918: 106; Dai & Yang, 1991: 521; Guo et al., 1997: 448.

Diagnosis.— Carapace rectangular; dorsal surface slightly convex or slightly flat transversely, with epigastric and protogastric cristae. Frontal margin of carapace granulated and four-lobed; median lobes low. Lateral margins of carapace granulated and provided with 3-4 teeth. Male Plp1 slender, and straight or slightly

curved; horny headpiece broader than long, slightly incurved around shallow median hollow, and located obliquely at 45° to thoracic sternites; distolateral half of Plp1 developed as a low bank; distomesial half broad and flat; genital opening located distally at mesial half of horny endpiece.

Remarks.— Guo et al. (1997: 448) defined the genus *Eriocheir* De Haan, 1835 as “Epigastric, protogastric cristae present. The frontal margin of the carapace is granulated with four teeth, . . .” However, this diagnosis is not always applicable, because in *E. japonica* (De Haan, 1835) and *E. ogasawaraensis* Komai et al., 2006, the epigastric and protogastric cristae are present, but less distinct, and the frontal margin of the carapace is granulated, but four-lobed, though in *E. sinensis* H. Milne Edwards, 1853 and *E. hepuensis* Dai, 1991 (now separated from *Eriocheir*, and reclassified under *Paraeriocheir* gen. nov.) the epigastric and protogastric cristae are present and distinct, and the frontal margin of the carapace is four-toothed.

Type species.— *Grapsus (Eriocheir) japonicus* De Haan, 1835, by monotypy; gender of generic name feminine.

Species included.— *Eriocheir japonica* (De Haan, 1835); *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006

KEY TO THE SPECIES OF THE GENUS *ERIOCHEIR*

1. Carapace slightly flat transversely on dorsal surface; frontal margin less distinctly four-lobed; anterolateral margins of carapace broadly and roundly convex; lateral margins of carapace with 3 teeth; Plp1 slender and slightly curved *E. ogasawaraensis*
- Carapace slightly convex dorsally; frontal margin four-lobed; anterolateral margins of carapace almost straight and directed obliquely backwards; lateral margins of carapace with 4 teeth, though 4th tooth small or rudimentary, sometimes reduced to a granule; Plp1 slender and straight *E. japonica*

***Eriocheir japonica* (De Haan, 1835)**

(figs. 1A, 2A, B, 3A-D)

Grapsus (Eriocheir) japonicus De Haan, 1835: 59, pl. 17.

Eriocheir japonicus — Ortmann, 1894: 716; Maki & Tsuchiya, 1923, 3: 192, pl. 22 fig. 1; Nakazawa, 1927: 1115, fig. 2149; 1947: 656, fig. 1891; Kikuchi, 1932: 17; Sakai, T., 1935a: 73; 1935b, 5, text-figs. 2B, 3A, E, F, 4, pl. 1 (lower fig.); 1940: 50; 1954: 77; 1954: 75; 1960: 5, pl. 13 (5); 1976: 646; Kamita, 1936a: 319; 1936b (21): 34; 1941a: 84; 1941b: 242; 1941c: 195, text-fig. 110; Satō, 1936: 3 (?); Panning, 1938: 105, 106; Urita, 1940: 15; 1942: 67; Kim, 1970: 21; 1971: 13; 1973: 467, text-figs. 201, 203; 1985: 84; Miyake, 1970: 289; 1983: 174; Shokita & Nishijima, 1976: 37; Kim & Chang, 1985: 55; Sakai, K. & Matsuoka, 1987: 1-16, figs. 1-7; Shokita, 1990: 6; Shy & Yu, 1992: 27, tab. IV; Yamaguchi & Baba, 1993: 460-466, fig. 176A-E.

Eriocheir formosa (?) — Nakagawa, 1915a: 1036 [nomen nudum; det. by Terao, 1915b as *Eriocheir japonica*]; Koba, 1936: 164.

Eriocheir japonica — Terao, 1915b: 555; Chan et al., 1995: 301, figs. 1A, 2C, 3C; Ng, N. K. et al., 1999, fig. 5D, I; Hamano et al., 2000: 15; Ng, P. K. L. et al., 2008: 228 (list); Naser et al., 2012: 75, figs. 1, 4 (right one), 8 (right one) 11, 12, tabs. 2, 3.

Eriocheir japonicus — Urita, 1917: 67.

Eriocheir sp. — Nakagawa, 1915b: 314.

Sesarma dehaani H. Milne Edwards, 1853, Terao, 1915a: 457.

Eriocheir recta — Chan et al., 1995: 302 (partim); Tang et al., 2003: 256.

Material examined.— SMF 8057, 1 male (CL/CW, 52.4/57.4 mm) [CW/CL, 1.1 times], Formosa [Taiwan], 1932, det. T. Sakai; SMF 8052, 1 male (CL/CW, 47.5/51.8 mm), South-Korea, 1934, leg. T. Sakai, det. M. Apel as *Eriocheir hepuensis* Dai, 1991; NTOU B00086, 1 male (CL/CW 48.5/52.6 mm), Taipei country, N. Taiwan, 17.x.1990, det. T.-Y. Chan; NSMT-Cr 19941, 1 male (CL/CW, 78.3/87.9 mm) [CW/CL, 1.12 times], Yokote-city, Akita Pref., Japan, 13.xi.1931, leg. K. Ono, det. H. Komatsu; RMNH.D.51758, paralectotype, 1 male (CL/CW, 63.6/68.8 mm) [CW/CL, 1.08 times], Japan; CBM-ZC 8501, 3 males (CL/CW, 54.6/58.4 mm) [CW/CL, 1.07 times]; (CL/CW, 53.4/55.8 mm) [CW/CL, 1.04 times]; (CW/CL, 50.7/55.4 mm) [CW/CL, 1.09 times], Hokkaido, Japan, purchased at fish market, 15.ix.2005, by T. Komai; Ecosystem, 2 males (CL/CW, 49.5/53.0 mm) [CW/CL, 1.07 times]; (CL/CW, 45.6/48.8 mm) [CW/CL, 1.07 times], Kochi Pref., leg. M. Hosogi.

Diagnosis.— Carapace rectangular and slightly convex dorsally; frontal margin of carapace (fig. 1A) granulated and four-lobed, and median lobes low and

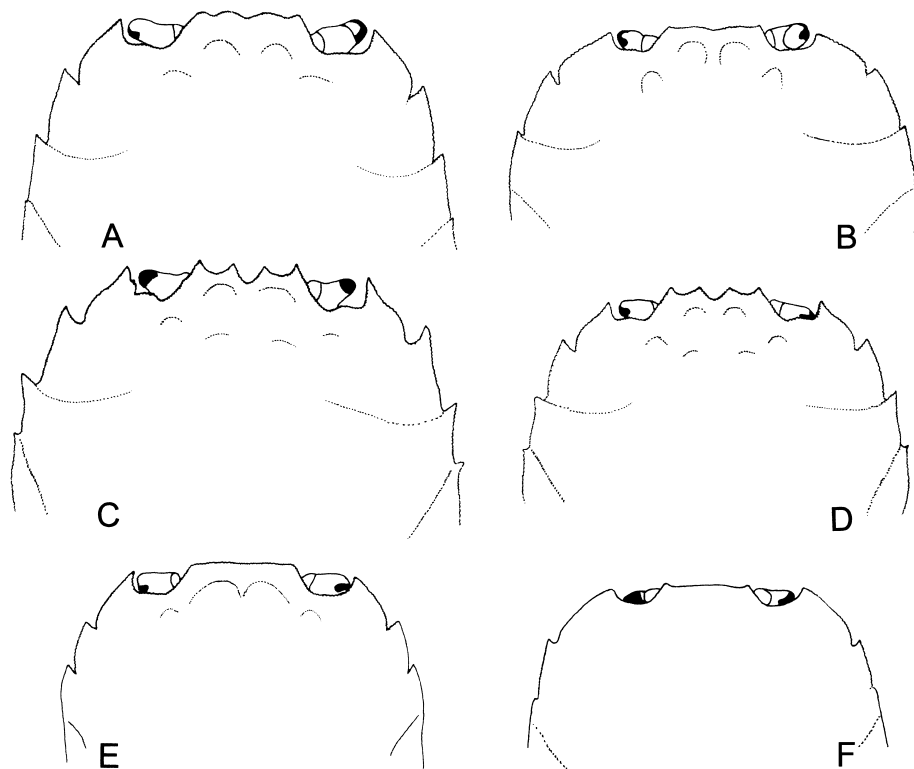


Fig. 1. Dorsal view of carapace of: A, *Eriocheir japonica* (De Haan, 1835); B, *Eriocheir ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006; C, *Paraeriocheir sinensis* (H. Milne Edwards, 1853); D, *Paraeriocheir hepuensis* (Dai, 1991); E, *Platyeriocheir formosa* (Chan, Hung & Yu, 1995); F, *Neoeriocheir leptognatha* (Rathbun, 1913).

separated medially by shallow or U-shaped sinus; anterolateral margins almost straight and directed obliquely backward; lateral margins with 4 teeth, though 4th tooth small, sometimes reduced to a granule. Chelipeds chelate, usually covered with thick setae on dorsal surface but smooth on ventral surface, or occasionally wholly covered. Dorsal and ventral margins of P2-5 meri smooth; dorsal margins of P2-5 carpi with long setae, but ventral margins of P2-5 carpi smooth; dorsal margins of P2-5 propodi with long setae, and ventral margins of P2-3, 5 propodi with long setae, and ventral margin of P4 propodus with scanty long setae in distal half, but smooth in proximal half. Male Plp1 slender and straight (fig. 2A); Plp1 horny endpiece broader than long, slightly incurved around shallow median hollow, and located obliquely at 45° to thoracic sternites (fig. 3A-D); distolateral half of male Plp1 developed as a low bank; distomesial half wide and flat, and developed distally as low, thin collar around genital opening; genital opening located distally at mesial half of horny endpiece.

Remarks.— *Eriocheir japonica* (De Haan, 1835) has a wide distribution; Sakhalin, Japan (Hokkaido, Honshu, Shikoku, Kyushyu, the Ryukyu Islands including Kuroshima between Ishigaki-jima and Iriomote-jima), the western coast

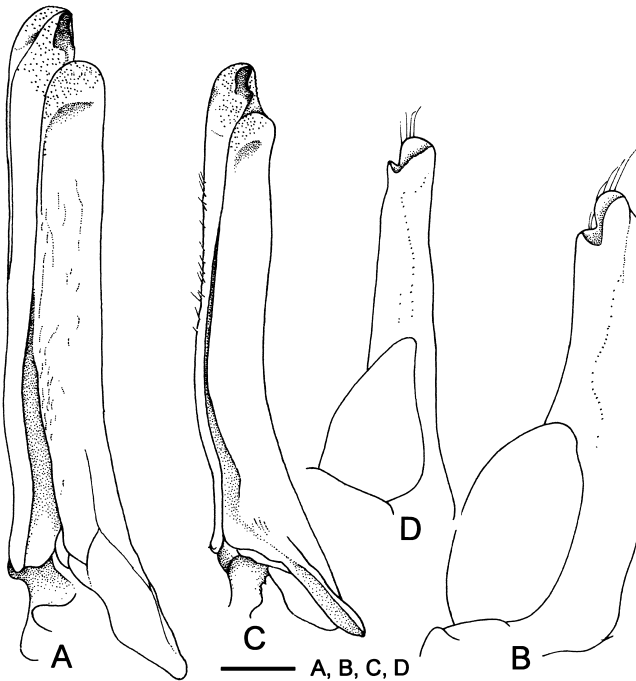


Fig. 2. Male pleopods 1-2 of: A, *Eriocheir japonica* (De Haan, 1835), right male Plp1, mesial view; B, Plp2 of the same species; C, *Eriocheir ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006, right male Plp1, mesial view; D, Plp2 of the same species.

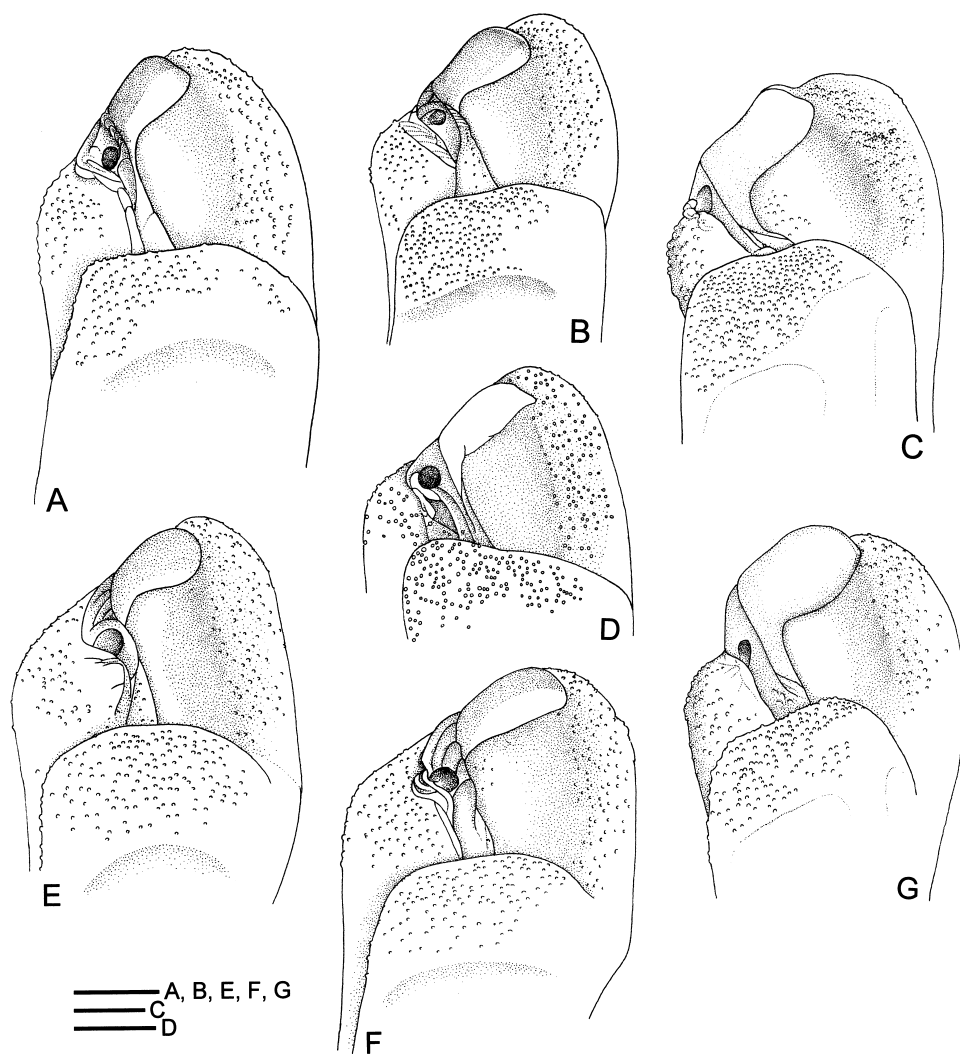


Fig. 3. Distal parts of Plp1 of: A, *Eriocheir japonica* (De Haan, 1835), right male Plp1, mesial view, CBM-ZC 8501, male (CL/CW, 54.6/58.4 mm), Hokkaido, Japan; B, *E. japonica*, right male Plp1, mesial view, NTOU B00086, male (CL/CW 48.5/52.6 mm), Taipei country, N. Taiwan; C, *E. japonica*, right male Plp1, lateral view, NSMT-Cr 19941, male (CL/CW, 78.3/87.9 mm), Yokote-city, Akita Pref.; D, *E. japonica*, right male Plp1, mesial view, RMNH.D.51758, male (CL/CW, 63.6/68.8 mm), Japan, lateral view; E, *Eriocheir ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006, right male Plp1, mesial view, paratype, CBM-ZC 8571, male (CL/CW, 65.5/76.2 mm), rocky beach near Yatsuse-gawa river mouth, Chichi-jima I., Ogasawara Is.; F, *E. ogasawaraensis*, right male Plp1, mesial view, paratype, NSMT-Cr 16818, male (CL/CW, 61.5/71.7 mm), Yatsuse-gawa river, Chichi-jima I., Ogasawara Is.; G, *E. ogasawaraensis*, right male Plp1, lateral view, paratype, CBM-ZC 8571, male (CL/CW, 65.5/76.2 mm), rocky beach near Yatsuse-gawa river mouth, Chichi-jima I., Ogasawara Is.

of Taiwan (Guo et al., 1997), the south-eastern coast of the Korean Peninsula, and the central and southern coasts of China (Naser et al., 2012).

Type locality.— Japan (De Haan, 1835).

Distribution.— South Sakhalin (Urita, 1940); Hokkaido, Honshu, Toyama Bay (Kikuchi, 1932), Hachijo Island (Sakai, T., 1954), Tokushima, Shikoku (Sakai, K. & Matsuoka, 1987; Hamano et al., 2000), Shikoku, Kagoshima (Urita, 1917), Amami-Oshima (Oh-river), Tokuno-shima (Minato river), Okinoerabu-jima (Amata-river) (Shokita & Nishijima, 1976: 37), Ryukyu Islands including Kuroshima between Ishigaki-jima and Iriomote-jima (Miyake, 1983); Taiwan [as Formosa] (Maki & Tsuchiya, 1923); southern region of China (Chan et al., 1995; Naser et al., 2012); and the Korean Peninsula (Kamita, 1935); Oregon, U.S.A. (Naser et al., 2012).

***Eriocheir ogasawaraensis* Komai, Yamasaki, Kobayashi,
Yamamoto & Watanabe, 2006
(figs. 1B, 2C, D, 3E-G)**

Eriocheir japonica — Takeda & Miyake, 1976: 112 (list, material not examined by them, Takeda in litt.); Miyake, 1983: 174, fig. 263 (distribution map); Muraoka, 1998: 52; Kobayashi, 2005: 17-22, figs. 1, 3, 6, 8, 9 [in Japanese].

Eriocheir ogasawaraensis Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006: 1-20, figs. 1A, B, 2A, B, 3A, B, 4A-D, 5A-E, 6A-F, 7, 9A; Ng et al., 2008: 228 (list); Kobayashi & Satake, 2009: 209-222; Naser et al., 2012, figs. 1, 11, 12, table 3.

Material examined.— CBM-ZC 8571, paratype, 1 male (CL/CW, 65.5/76.2 mm) [CW/CL, 1.16 times], rocky beach near Yatsuse-gawa river mouth, Chichi-jima I., Ogasawara Is, subtidal, Yatsuse-gawa river, iv.2005, leg. S. Yoneyama; CBM-ZC 8572, paratype, 1 male (CL/CW, 46.5/53.6 mm) [CW/CL, 1.15 times], Okumura River, Chichi-jima I., 1 km from river mouth, 13.vii.2005, hand coll., J. Kimura & F. Yumura; NSMT-Cr 16818, paratype, 1 male (CL/CW, 61.5/71.7 mm) [CW/CL, 1.17 times], Yatsuse-gawa river, Chichi-jima I., Ogasawara Is., iv.2005, leg. S. Yoneyama; KPM-NH0106553, 1 male (CL/CW, 24.3/27.4 mm) [CW/CL, 1.13 times], Chichi-jima I., Ogasawara Is., 1937, leg. T. Sakai.

Diagnosis.— Carapace rectangular; dorsal surface nearly transversely flat; frontal margin (fig. 1B) granulated and less distinctly four-lobed than in *E. japonica*, median lobes low and separated medially by shallow sinus; anterolateral margins largely and roundly convex; lateral margins with 3 teeth, lacking 4th tooth. Chelipeds chelate and covered with thick setae on dorsal surface but smooth on ventral surface. Dorsal and ventral margins of P2-5 meri smooth; dorsal margins of P2-5 carpi with pubescence and long setae, but ventral margins of P2-5 carpi smooth; dorsal margins of P2-5 propodi with long thick setae, and ventral margins of P2, 5 propodi with long setae, and ventral margins of P3, 4 propodi with scanty long setae in distal half, but smooth in proximal half. Male Plp1 slender and slightly curved; horny endpiece broader than long, slightly incurved around

shallow median hollow, and located obliquely at 45° to thoracic sternites (fig. 3E-G); distolateral half of male Plp1 developed as low bank; distomesial half broad and flat, and developed distally as low, thin collar around genital opening; genital opening located distally at mesial half of horny endpiece.

Remarks.— Kobayashi (2005) described *Eriocheir japonica* (De Haan, 1835) in Japanese, based on specimens from the Ogasawara Islands, adding, by pointing out morphological differences with *E. japonica* as shown in photos of a male and a female collected there, that his specimens might be defined as a new species: (1) a relatively broader carapace, (2) absence of the 4th lateral tooth of the carapace, (3) relatively large size of reproductive individuals, and (4) relatively large chela in both adult male and female specimens, of which the ventral surface of the male chela always lacks setae, and then he sent the specimens to Dr. T. Komai. Komai et al. (2006) identified them as a new species, and described *Eriocheir ogasawaraensis* Komai et al., 2006.

Komai et al. (2006) distinguished *E. ogasawaraensis* Komai et al., 2006 from *E. japonica* (De Haan, 1835) as a new species by pointing out the following nine characters:

1. “The carapace is broader in *E. ogasawaraensis* Komai et al., 2006 than in *E. japonica* (De Haan, 1835) at least adults. The ratio “breadth/length” of the carapace in adults (CL > 45.0 mm) is 1.15-1.20 in *E. ogasawaraensis*, 1.07-1.13 in *E. japonica*”. It seems that *E. ogasawaraensis* tends to have a larger ratio of width/length than *E. japonica*, though some smaller individuals of *E. ogasawaraensis* have a smaller ratio. It would be better to add two more differences in morphology of the carapace for distinction between the two species: in *E. ogasawaraensis* the frontal margin is indistinctly four-lobed; the anterolateral margins of the carapace are largely and roundly convex, while in *E. japonica* the frontal margin is distinctly four-lobed; the anterolateral margins are almost straight and directed obliquely backwards.

2. “In *E. japonica* (De Haan, 1835) the fourth anterolateral tooth is sometimes greatly reduced to a granule, being only slightly larger than other granules bordering the anterolateral margin, but it is never completely absent as in specimens of *E. ogasawaraensis* Komai et al., 2006”.

3. “The ventral surface of the chelae of the chelipeds are always naked in *E. ogasawaraensis* Komai et al., 2006, while it is occasionally covered by a dense mat of setae in *E. japonica* (De Haan, 1835)...” However, in *E. japonica* the chelae of the male chelipeds are usually naked on the ventral surface as in *E. ogasawaraensis*, though this surface is occasionally covered with thick setae. In a small male (CL/CW, 24.3/27.4 mm) (KPM-NH0106553) of *E. ogasawaraensis*, the chelipeds are slightly unequal; the larger left cheliped is provided with a dense mat of setae at the shallow concavity of the lateral surface of the chela, but naked

on the mesial surface, and the smaller right cheliped is provided with a dense mat of setae only below the dorsolateral concavity of the chela. Such an external character, which tends to be influenced by circumstantial conditions during the process of growth, cannot be considered to be an unequivocal character to distinguish one species from the other.

4. “The dorsal surface of the carapace is nearly transversely flat in *E. ogasawaraensis* Komai et al., 2006 (fig. 2B), whereas it is slightly convex in *E. japonica* (De Haan, 1835)”.

5. “The 3rd anterolateral tooth is smaller than the second anterolateral tooth in *E. ogasawaraensis* Komai et al., 2006, rather than being subequal in *E. japonica* (De Haan, 1835)”. However, in two male specimens, a larger and a smaller one (CBM-ZC 8501) of *E. japonica*, the 3rd anterolateral tooth is smaller than the 2nd as in *E. ogasawaraensis*, thereby indicating this feature depends on the individual and may thus be considered to vary within individual variation. Accordingly, it can safely be said that such a character is not to be considered unambiguous in distinguishing one species from the other.

6. “The ventral margin of the epistome is usually nearly flat or faintly sinuous with a trace of a median lobe in *E. ogasawaraensis* Komai et al., 2006, whereas it is similarly sinuous but provided with a distinct median tubercle in *E. japonica* (De Haan, 1835)”. However, this character found on the ventral margin of the epistome in *E. japonica* is also found in *E. ogasawaraensis* (CBM-ZC 8571, paratype, male, CL/CW, 65.5/76.2 mm; NSMT-Cr 16818, male, CL/CW, 61.5/71.7 mm), apparently depending on the individual, and hence this difference between the two species cannot be adopted as a characters that is unequivocal in distinguishing one species from the other.

7. “The lateral margins of the sixth abdominal somite of males are more noticeably arched in *E. ogasawaraensis* Komai et al., 2006 than in *E. japonica* (De Haan, 1835)”. However, the lateral margins of the sixth abdominal somite of males are more or less arched in both species, and also this character appears to depend on the individual. It can hardly be considered that this minor difference might have any relation as a character instrumental in the distinction between these two species.

8. “The G1 is less stout in *E. ogasawaraensis* Komai et al., 2006 than *E. japonica* (De Haan, 1835) (8.1-8.5 times longer than broad in *E. ogasawaraensis* in contrast to 6.5-7.0 in *E. japonica* (De Haan, 1835))”. However, it was found in the present examination that the Plp1 of *E. ogasawaraensis* has, at least in its two paratypes (NSMT-Cr 16818, CBM-ZC 8571) almost the same ratio of length/width as that of *E. japonica* in its three males (NSMT-Cr 19941, CBM-ZC 8501, NTOU B00086), though that of another smaller paratype of *E. ogasawaraensis* (CBM-ZC 8572) has a slightly larger ratio, as presented in table II. The present ratios

TABLE II

Ratio of width to length of Plp1 in *Eriocheir japonica* (De Haan, 1835) and *E. ogasawaraensis* Komai, Yamasaki, Kobayashi, Yamamoto & Watanabe, 2006

	Length on ventral face (mm)	Width at proximal part of mesiolateral face (mm)	Ratio length/width
<i>E. japonica</i> , NSMT-Cr 19941, male (CL/CW, 78.3/87.9 mm), Yokote-city, Akita Pref.	30.1	5.2	5.8
<i>E. japonica</i> , CBM-ZC 8501, male (CL/CW, 54.6/58.4 mm), Hokkaido	22.1	3.8	5.8
<i>E. japonica</i> , CBM-ZC 8501, male (CW/CL, 50.7/55.4 mm), Hokkaido	21.1	4.0	5.2
<i>E. japonica</i> , NTOU B00086, male (CL/CW, 48.5/52.6 mm), Taipei country, N. Taiwan	20.6	3.5	5.9
<i>E. ogasawaraensis</i> , NSMT-Cr 16818, paratype, male (CL/CW, 61.5/71.7 mm), Yatsuse-gawa river, Chichi-jima I., Ogasawara Is.	26.6	4.6	5.8
<i>E. ogasawaraensis</i> , CBM-ZC 8571, paratype, male (CL/CW, 65.5/76.2 mm), near Yatsuse-gawa river mouth, Chichi-jima I., Ogasawara Is.	29.1	5.0	5.8
<i>E. ogasawaraensis</i> , CBM-ZC 8572, paratype, male (CL/CW, 46.5/53.6 mm) (CW/CL, 1.15 times), Okumura River, Chichi-jima I., Ogasawara Is.	19.3	2.8	6.7

are different from those given by Komai et al. (2006), but those data seem less reliable, because, it was not clearly indicated by Komai et al. (2006), what portions of the Plp1 of those specimens were measured as width and length, and still less those of many other specimens measured, which have turned out to be inaccessible for further study at present, because of loss. Hence, this character of *E. ogasawaraensis* pointed out by Komai et al. (2006) is hardly admissible as a distinguishing character. The Plp1 of *E. japonica*, as shown in Ng, N. K. et al. (1999: 164, fig. 5D), is safely considered as slender as in *E. ogasawaraensis*. Attention should rather be paid to another difference between *E. ogasawaraensis* and *E. japonica*: the Plp1 is slightly curved in *E. ogasawaraensis*, while it is straight in *E. japonica*.

9. "The dorsal surface of the carapace is almost uniformly dark brown in *E. ogasawaraensis* Komai et al., 2006 (fig. 9A), whereas a complicated reticulate pattern of black and pale yellowish gray is found on the carapace in *E. japonica* (De Haan, 1835) (fig. 9B)". However, it would be better not to regard these differences in coloration and colour pattern as unambiguous characters to distinguish one species from the other, because, generally speaking, colours and colour patterns of animals tend to be influenced by geographical and environmental conditions,

which in various cases indeed show some relation to differences in coloration and pattern, and might hence cause changes in these in accordance with differences in habitat, even in the same species.

As mentioned above, six characters out of the nine that were presented by Komai et al. (2006), by which the new species *E. ogasawaraensis* Komai et al., 2006 was established, are not unequivocal and thus cannot support the diagnosis of that species. However, in the present study specimens identified by the original authors (Komai et al., 2006) have been carefully examined and the present author can now redefine *E. ogasawaraensis* Komai et al., 2006 by presenting six features that are truly characteristic. Thus, he herein proposes an alternative definition to separate *E. ogasawaraensis* from *E. japonica* as follows:

1. The carapace is wider in *E. ogasawaraensis* Komai et al., 2006 (vs. less wide in *E. japonica* (De Haan, 1835)).

2. The carapace is nearly transversely flat in *E. ogasawaraensis* (vs. being slightly convex on the whole dorsal surface in *E. japonica*).

3. The frontal margin of the carapace is less distinctly four-lobed in *E. ogasawaraensis* (vs. distinctly four-lobed in *E. japonica*).

4. The anterolateral margins of the carapace are largely and roundly convex in *E. ogasawaraensis* (vs. almost straight and directed obliquely backwards in *E. japonica*).

5. The 4th lateral tooth is absent in *E. ogasawaraensis* (vs. being present, though small or rudimentary, sometimes reduced to a granule, in *E. japonica*).

6. The male Plp1 is slightly curved in *E. ogasawaraensis* (vs. being straight in *E. japonica* (fig. 2A-D)).

In the present study, four males of *E. ogasawaraensis* Komai et al., 2006 including two individuals from Ogasawara Is. that are in the collection kept by T. Komai, and nine males of *E. japonica* (De Haan, 1835), including two individuals from Taiwan, were re-examined for comparison. Obviously it would have been desirable if more CBM-ZC specimens, also of different sizes, of *E. ogasawaraensis* could have been re-examined from the collection on which Komai et al. (2006) had based their species definition, but unfortunately more material proved to be unavailable for a loan. Many other specimens of *E. ogasawaraensis*, earlier registered by the Chiba Prefectural Museum (CBM), whose measurements are presented in the paper by Komai et al. (2006), have turned out not to be kept in the collections of the Chiba Prefectural Museum, but should instead be in the collections of the Tokyo University of Marine Science and Technology (S. Miyatsu of CBM, in litt.), but apparently nobody knows where these are located at present, after having been measured by students. In this regard I wish to point out that it should be noted that specimens on which scientific publications have been based

should be preserved in good order, and be easily accessible and thus traceable, for further studies and review purposes.

Distribution.— Ogasawara Is. (Takeda & Miyake, 1976; Kobayashi, 2005; Komai et al., 2006).

Eriocheir sp. [= *Eriocheir recta* sensu Stimpson, 1858; species inquirenda]

Eriocheir rectus Stimpson, 1858: 103; 1907: 125 [species inquirenda]; Kingsley, 1880: 210 (name only); Tesch, 1918: 107 (key); Kikuchi, 1932: 17; Panning, 1938: 107; Sakai, T., 1938: 305-307, text-fig. 2, pl. 16(3); 1939: 669, text-fig. 117, pl. 90 fig. 3 (same as in 1938); Kamita, 1941a: 85; 1941b: 242; 1941c: 198 (Wönsan-si, N. Korea at the Japanese Sea; R. Lemaitre in litt., no specimen in USNM); Kim, 1970: 21; 1973: 469; Chan et al., 1995: 302 (partim); Tang et al., 2004: 256.

Remarks.— Stimpson (1907) redescribed *Eriocheir recta* Stimpson, 1858 in English after his original description of the species in Latin in 1858, as: “Carapax depressed, broad posteriorly, narrowing anteriorly; length to greatest breadth as 1 : 1.06. Surface somewhat uneven, as in *E. japonicus* (De Haan, 1835), but smooth and punctate. Pregastric lobes little salient. Front waved, indistinctly four-lobed; median sinus very shallow. Lateral margins nearly straight, converging; four teeth on each side, the posterior one rudimentary. Outer maxillipeds and pterygostomial regions pubescent. Chelipeds of moderate size; meros with granulated edges, the tooth near its summit very small; carpus with the encircling ridge of upper surface pubescent, and the tooth at the inner angle small; hand with a thick tuft of hair on outer surface; fingers strongly sulcated. The first three ambulatory feet are slender toward their extremities. The meros-joint of the ambulatory feet is ciliated above. The dactyli are shorter than in *E. japonicus* (De Haan, 1835) and less curved. Dimensions of the unique female specimen described: Length of carapax 0.92 (23.368 mm); breadth, 0.975 (24.795 mm); length of third ambulatory foot, 2 inches (50.8 mm). It is allied to *E. japonicus* (De Haan, 1835), but is more depressed, and easily distinguished by its straight converging sides and less distinctly lobed front. Taken near Macao, China” (Stimpson, 1907: 125).

It is evident from Stimpson’s (1907) description that he distinguished his species, then *E. recta* Stimpson, 1858, from *E. japonica* (De Haan, 1835), and his description was confirmed by the present author through examining specimens of *E. japonica* (De Haan, 1835) and comparing these with that description: (1) In *E. sp.* [= *E. recta* sensu Stimpson, 1858] the carapace is depressed dorsally (vs. slightly convex dorsally in *E. japonica* (De Haan, 1835)); (2) in *E. sp.* [= *E. recta* sensu Stimpson, 1858] the lateral margins of the carapace are nearly straight and converging (vs. curved and convergent in *E. japonica*); (3) in *E. sp.* [= *E. recta* sensu Stimpson, 1858] the frontal margin of the carapace is indistinctly four-lobed, and the median sinus is very shallow (vs. distinctly four-lobed and the median

sinus shallow or U-shaped in *E. japonica*); (4) in *E. sp.* [= *E. recta* sensu Stimpson, 1858] the meri of P2-5 are ciliated on the dorsal margin (vs. smooth in *E. japonica*), though the two species are similar to each other in that (1) the lateral margin is provided with four teeth, though the 4th tooth is rudimentary; (2) the chelae of the chelipeds are covered with thick setae on the outer surface (though occasionally wholly covered in *E. japonica*).

E. sp. [= *E. recta* sensu Stimpson, 1858] is also different from *Neoeriocheir leptognatha* (Rathbun, 1913) in that (1) the frontal margin of the carapace is waved and indistinctly four-lobed (vs. straight medially with small lateral convexities in *Neoeriocheir leptognatha*), and (2) the 4th lateral tooth of the carapace is rudimentary (vs. absent in *N. leptognatha*).

Dai & Yang (1991) described “*E. recta* Stimpson, 1858”. However, judging from the photo (their pl. 67 fig. 1) by Dai & Yang (1991), their “*E. recta*” is safely determined as *Platyeriocheir formosa* (Chan et al., 1995) in the present study, because (1) the carapace is depressed and flat, (2) the frontal margin of the carapace is nearly straight and simple, (3) the anterolateral margins are provided with 3 teeth, lacking a 4th one, (4) the dorsal margin of the P2-5 meri are provided with dense long setae, (5) the dorsal margins of the P2-5 carpi and propodi are provided with dense short, stiff setae.

Chan et al. (1995: 303) described *Eriocheir recta* Stimpson, 1858 and designated a male specimen from the Pearl River Estuary near Macao as a neotype for *E. recta* Stimpson, 1858, and subsequently treated *E. recta* as a subjective junior synonym of *E. japonica* (De Haan, 1835). However, *E. recta* sensu Stimpson is clearly different from *E. japonica* as mentioned above, so this neotype, though defining the nominal species *E. recta* and establishing it as a synonym of *E. japonica*, still gives no clue as to the true identity of the specimen described by Stimpson (1858, 1907). Judging from the photo-figure (Chan et al., 1995, fig. 2C) of the neotype for *E. recta* designated by Chan et al. (1995), and as already clearly stated by those authors themselves (Chan et al., 1995: 303, as cited above herein, p. 1105), this neotype is safely determined as *E. japonica*, because (1) the frontal margin is distinctly four-lobed, (2) the lateral margins are curved and provided with 4 teeth, though the 4th one is rudimentary, and (3) the dorsal margins of the P2-5 meri are smooth.

Apparently unaware of the earlier action of Chan et al. (1995), Tang et al. (2004: 255) designated a female collected near the type locality of *E. recta* Stimpson, i.e., the Zhujian River, Guangdong, China, as a “neotype” for *E. recta* Stimpson, 1858. However, (a) this “neotype” has no status in zoological nomenclature, as it was preceded by the legitimate neotype designated by Chan et al. (1995) for that same nominal species, and, moreover, (b) it has turned out in the present study to be also different from the original description of *E. recta* by Stimpson

(1858, 1907), because (1) the frontal margin of the carapace is nearly straight (vs. wavy and indistinctly four-lobed, and the median sinus is very shallow in Stimpson's original species *E. recta*) and (2) the lateral margins of the carapace are curved and converging, and armed with three strong teeth (vs. being nearly straight and converging, and provided with 4 teeth, though the 4th one is rudimentary in Stimpson's original *E. recta*), as already indicated by Chan et al. (2005), who published a rebuttal against Tang et al.'s (2004) neotype for *E. recta* Stimpson, 1858.

No record of any specimen that would match the description of *E. recta* by Stimpson (1858, 1907) has been reported since 1858, but as the name *Eriocheir recta* Stimpson, 1858 has now been established as a junior synonym of *Eriocheir japonica* (De Haan, 1835) (cf. Chan et al., 1995; Chan et al., 2005), this leaves the true form described by Stimpson (1858, 1907) currently without a name. It should, pending the discovery of more specimens, consequently be referred to as *Eriocheir* sp. [= *Eriocheir recta* sensu Stimpson, 1858] and this form can safely be regarded as constituting a species inquirenda, and separate from *E. japonica*, as clearly demonstrated herein.

Genus **Paraeriocheir** gen. nov.

Diagnosis.— Carapace rectangular, dorsal surface convex, and epigastric and protogastric cristae distinct. Frontal margin of carapace granulated and four-toothed, and separated medially by V-shaped sinus. Lateral margins of carapace granulated and provided with 4 distinct teeth. Male Plp1 stout and straight, or slender and slightly curved; horny endpiece broader than long, distinctly incurved around median deep hollow, and located parallel with thoracic sternites; distolateral half of Plp1 developed as a high bank.

Remarks.— The present new genus *Paraeriocheir* gen. nov. is different from the genus *Eriocheir* as follows; in *Paraeriocheir* gen. nov. the frontal margin of the carapace (fig. 1C, D) is granulated and provided with 4 distinct teeth, and separated medially by a V-shaped sinus; the 4th lateral tooth of the carapace is distinct; and the male Plp1 horny endpiece is distinctly incurved around the deep median hollow, and located parallel with the thoracic sternites (fig. 3E-G), whereas in the genus *Eriocheir* De Haan, 1835 the frontal margin of the carapace is granulated, four-lobed, and separated medially by a shallow sinus; the 4th lateral tooth of the carapace is rudimentary or absent; and the male Plp1 horny endpiece is slightly incurved around the shallow median hollow, and located obliquely at 45° to the thoracic sternites.

It has been mentioned in the literature that the Chinese species, *Eriocheir sinensis* H. Milne Edwards, 1837 (now *Paraeriocheir sinensis*), though belonging

in the same genus as *Eriocheir japonica*, is not distributed in the Japanese seas beyond the East China Sea because of differences in salinity between the Japanese seas and the Chinese seas. In the present study, however, it has turned out by re-examining specimens formerly identified as *Eriocheir sinensis* that they do not belong in the genus *Eriocheir*, but instead should be accommodated in a new genus, *Paraeriocheir* gen. nov., which might be one of the reasons why *Eriocheir sinensis* (= *Paraeriocheir sinensis*) is indeed not distributed in the Japanese seas under natural conditions, viz., by suggesting that such a taxonomic separation at the generic level might be indicative of a larger discrepancy between the biological features of *E. sinensis* auct. and *E. japonica* auct., than might be expected if these species were actually members of the same genus. Such larger differences may well have prevented the Chinese species from having extended its distribution into the Japanese region.

Etymology.— The new generic name *Paraeriocheir* is composed of the Greek “para”, meaning “near or beside”, and the existing generic name *Eriocheir*; gender feminine.

Type species.— *Eriochirus sinensis* H. Milne Edwards, 1853.

Species included.— *Paraeriocheir hepuensis* (Dai, 1991); *P. sinensis* (H. Milne Edwards, 1853).

KEY TO THE SPECIES OF THE GENUS *PARAERIOCHEIR*

1. Median teeth on frontal margin of carapace bluntly triangular; distomesial half of Plp1 broad and convex, and developed distally as low thin collar around genital opening . . . *P. hepuensis*
- Median teeth on frontal margin of carapace acutely triangular; distomesial half of Plp1 broad and flat, developed distally as high thin lid covering genital opening *P. sinensis*

***Paraeriocheir hepuensis* (Dai, 1991)**

(figs. 1D, 4A, B)

Eriocheir japonica hepuensis Dai, 1991: 61, figs. 1-11.

Eriocheir hepuensis — Guo et al., 1997; Naser et al., 2012: 75, figs. 1, 3, 4 (middle one), 5b, 6b, 7b, 8 (middle one), 9, 10, 11, 12, tables 1, 2, 3.

Material examined.— NTOU B00083, 1 male (CL/CW, 47.8/53.9 mm), Hepu, 10.xii.1995, det. Ngeekee Ng.

Diagnosis.— Carapace convex dorsally; epigastric and protogastric cristae distinct. Frontal margin of carapace (fig. 1D) four-toothed, and median teeth bluntly triangular and separated medially by V-shaped sinus; 4th lateral tooth present. Dorsal and ventral margins of P2-5 meri smooth; dorsal margins of P2-5 carpi with long setae, but ventral margins of P2-5 carpi smooth; dorsal margins of P2-5 propodi with long setae, and ventral margins of P2, 5 propodi with long setae, but ventral margins of P3-4 propodi smooth. Male Plp1 slender and slightly

curved; horny endpiece broader than long, distinctly incurved around deep median hollow, and located parallel with thoracic sternites (fig. 4A, B); distomesial half of male Plp1 broad and convex, developed distally as low thin collar around genital opening; distolateral half of male Plp1 developed as a high bank; genital opening located distomesially behind horny endpiece.

Remarks.— The present species, *Paraeriocheir hepuensis* (Dai, 1991) and *Eriocheir japonica* (De Haan, 1835) are closely similar, but distinguished from each other not only at the species level but also at the generic level by the differences in external morphology and structure of the male Plp1. In *Paraeriocheir hepuensis* the frontal margin of the carapace is four-toothed, the median two of those teeth are bluntly triangular and separated medially by a V-shaped sinus; the ventral margins of the P3-4 propodi are smooth; the male Plp1 horny endpiece is distinctly incurved around the deep median hollow and located parallel with the thoracic sternites; and the distolateral half of the male Plp1 is developed as a high bank, while in *Eriocheir japonica* the frontal margin of the carapace is four-lobed, with the two median lobes are low and separated medially by a shallow or U-shaped sinus; the ventral margin of the P3 propodus is provided with long setae, and the ventral margin of the P4 propodus is provided with scanty long setae in its distal half but smooth in its proximal half; the male Plp1 horny endpiece is slightly incurved around the shallow median hollow and located obliquely at 45° to the thoracic sternites; and the distolateral half of the male Plp1 is developed as a low bank.

Type locality.— Hepu, Guangxi Province, southern China.

Distribution.— South China, Kuwait, Iran and Iraq, Gulf region, U.S.A. (Nasar et al., 2012).

***Paraeriocheir sinensis* (H. Milne Edwards, 1853)**

(figs. 1C, 4C, D)

Eriochirus sinensis H. Milne Edwards, 1853, (3) 20: 177.

Eriocheir sinensis — Kingsley, 1880: 210; Doflein, 1902: 665; Parisi, 1918: 102; Balss, 1922: 152; Urita, 1926: 433; Schellenberg, 1928: 140, text-fig. 110; Shen, 1932: 172, text-fig. 108, 110, pl. 8 fig. 5; 1937a: 308; 1937b: 170, 179; 1940: 98; Panning, 1933: 51; 1938: 106, figs. 1, 2; Sakai, T., 1935a: 2, text-figs. 1, 2a, 3B, C, D, 4, pls. 1 (upper), 2; 1935b, 7, text-figs. 1A, B, 2A, 3B, C, D, 4, pls. 1 (upper fig.), 2, 3; 1939: 667, pl. 109 fig. 1; 1944: 43; Koba, 1936: 164; 1943: 49-81, 13 text-figs, 21 tables, pls. 5-10; Kamita, 1935: 67; 1941a: 85; 1941b: 242; 1941c: 189, text-figs. 107a, b (juv. male), 108, 109a, b; Kim, 1962: 54; 1970: 21; 1973: 465, text-figs. 201, 202, pl. 40 fig. 154; Miyake, 1970: 289; Dai & Yang, 1991: 523, fig. 268-2; Chan et al., 1995: 301, fig. 3B; Guo et al., 1997: 449, figs. 2, 3; Ng, N. K. et al., 1999: 165, figs. 2, 5B, G, 6B, tables 1, 2; Türkay, 2001: 292; Ng, P. K. L. et al., 2008: 228 (list); Naser et al., 2012: 75, figs. 1, 4 (left one), 5a, 6a, 7a, 8 (left one) 11, 12, tables 1, 2, 3.

Grapsus nankin Tu, Tu, Wu, Ling & Hsu, 1923: 819; Lin, 1926: 409; Lowe et al., 2010: 403.

Eriocheir sinensis var. — Panning, 1938: 109, figs. 3, 4.

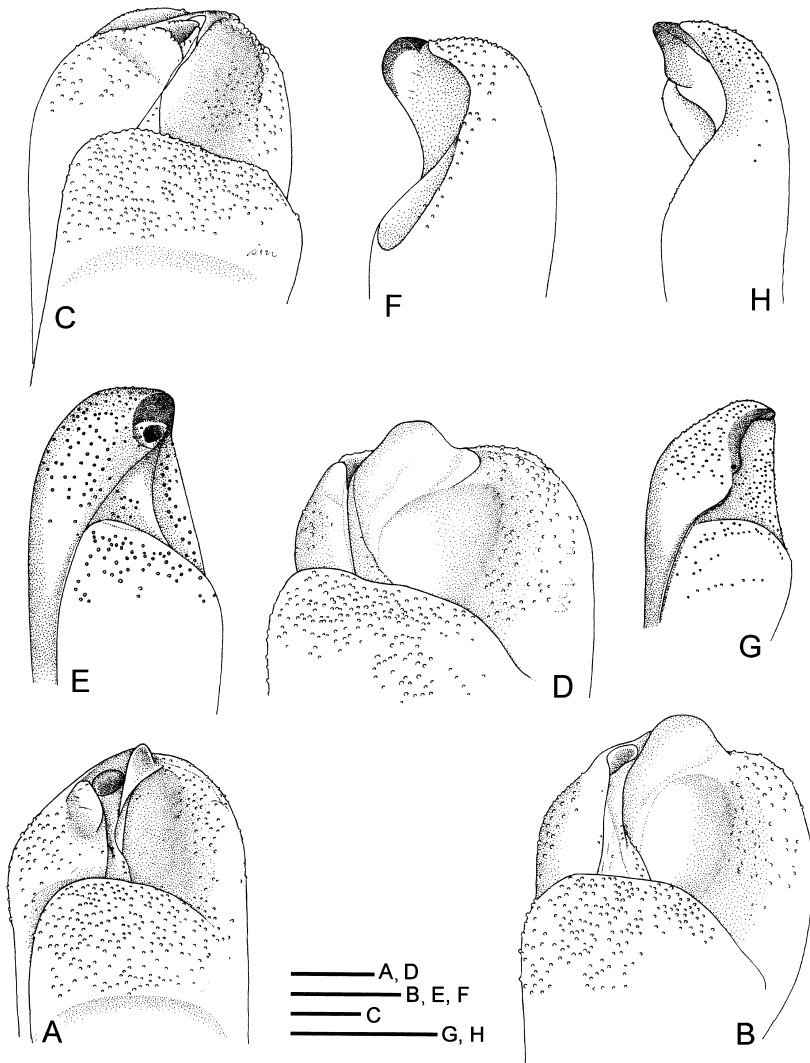


Fig. 4. Distal parts of Plp1 of: A, *Paraeriocheir hepuensis* (Dai, 1991), right male Plp1, mesial view, NTOU B00083, male (CL/CW, 47.8/53.9 mm), Hepu, Guangxi, southern China; B, *P. hepuensis*, right male Plp1, lateral view, NTOU B00083, male (CL/CW, 47.8/53.9 mm), Hepu, Guangxi, southern China; C, *Paraeriocheir sinensis* (H. Milne Edwards, 1853), right male Plp1, mesial view, NTOU B00084, male (CL/CW, 69.9/74.8 mm), imported; D, *P. sinensis*, right male Plp1, lateral view, NTOU B00084, male (CL/CW, 69.9/74.8 mm), imported; E, *Platyeriocheir formosa* (Chan, Hung & Yu, 1995), right male Plp1, mesial view, NTOU B00085, male, (CL/CW 42.0/43.3 mm), E. Taiwan, 26.viii.1992, det. T.-Y. Chan; F, *P. formosa*, right male Plp1, lateral view, NTOU B00085, male (CL/CW 42.0/43.3 mm), E. Taiwan, 26.viii.1992, det. T.-Y. Chan; G, *Neoeriocheir leptognatha* (Rathbun, 1913), right male Plp1, mesial view, NTOU B00087, male (CL/CW, 19.6/21.1 mm, frontal margin of carapace cracked), Chang River, China, x.1998; H, *N. leptognatha*, right male Plp1, lateral view, NTOU B00087, male (CL/CW, 19.6/21.1 mm, frontal margin of carapace cracked), Chang River, China, x.1998, det. T.-Y. Chan.

Eriocheir sinensis forma *rondatifrons* Panning, 1938: 109, fig. 5.

Eriocheir sinensis forma *acutifrons* Panning, 1938: 109, fig. 6.

Eriocheir sinensis forma *trilobata* Panning, 1938: 110, fig. 7 [syn.: *E. sinensis* forma *leptognathus* Panning, 1933 (not 1934) (4): 52, fig. 22A, b, c].

Eriocheir sinensis forma *rostratus* Panning, 1933: 53, fig. 22B; 1938: 110, fig. 8.

Material examined.— NSMT-Cr 22178, 1 male (CL/CW, 67.7/73.4 mm), North Sea, estuary of Elbe River, middle strait (53°52.43'N 8°50.72'E-53°52.30'N 8°52.40'E), 9 m, 07.xii.1981, ded. M. Türkay, leg. R.V. "Senckenberg"; NTOU B00084, 1 male (CL/CW, 69.9/74.8 mm), imported, x.1996, det. T.-Y. Chan.

Diagnosis.— Carapace convex dorsally; epigastric and protogastric cristae distinct. Frontal margin of carapace four-toothed, and median teeth acutely triangular and separated medially by V-shaped sinus; 4th lateral tooth present. Dorsal and ventral margins of P2-5 meri smooth; dorsal margins of P2-5 carpi with long setae, but ventral margins of P2-5 carpi smooth; dorsal margins of P2-5 propodi with long setae, and ventral margins of P2, 5 propodi with long setae, but ventral margins of P3-4 propodi smooth. Male Plp1 stout and straight; horny endpiece broader than long, distinctly incurved around deep median hollow, and located parallel with thoracic sternites (fig. 2C, D); distomesial half of male Plp1 broad and flat, and developed distally as high thin lid covering genital opening; distolateral half of male Plp1 developed as a high bank; genital opening located distomesially behind horny endpiece.

Remarks.— Urita (1926: 433) mentioned that this species is distinguished from *E. japonica* and can often be found at the fish-market in Qingdao in autumn, and T. Sakai (1944) reported this species from Central China from the collections of Drs. D. Miyaji, M. Ueno, and G. Tomita.

Panning (1938) described one variety and four formae of *E. sinensis* based on specimens from the Elbe, whose frontal margins of the carapace are various in form, but these were identified as *E. sinensis* by Guo et al. (1997).

Type locality.— China (H. Milne Edwards, 1853).

Distribution.— Entire China and the Yellow Sea side of Korea; Germany (Panning) and entire northern Europe; North America (Naser et al., 2012).

Genus **Platyeriocheir** Ng et al., 1999

Platyeriocheir Ng, Guo & Ng, 1999: 163.

Diagnosis.— Carapace depressed dorsally; frontal margin granulated, and almost straight and simple. Hepatic region slightly depressed; gastro-cardiac, cardio-branchial, cardio-intestinal grooves shallow; branchial region flat; epibranchial ridge high and granulated; mesibranchial ridge granulated, extending obliquely backwards; supra-orbital margin concave. Lateral margins of carapace granulated, slightly convergent anteriorly, and provided with 3 teeth, lacking 4th tooth. Dorsal

margins of P2-5 meri with dense long setae. Male Plp1 horny endpiece shaped as crescent and located vertically at 90° to thoracic sternites.

Remarks.— Ng, N. K. et al. (1999: 153) established the genus *Platyeriocheir* Ng et al., 1999 with as type species *Eriocheir formosa* Chan, Hung & Yu, 1995 from I-Lan County, Taiwan. The genus *Platyeriocheir* Ng et al., 1999 is clearly different from the genus *Eriocheir* De Haan, 1835, because in *Platyeriocheir* the carapace is depressed dorsally, the frontal margin of the carapace is essentially straight, and the dorsal margins of the P2-5 meri are provided with dense long setae; while in *Eriocheir* the carapace is slightly convex dorsally, the frontal margin of the carapace is four-lobed, and the median lobes are low and separated medially by a sinus, and the dorsal margins of the P2-5 meri are smooth.

Type species.— *Eriocheir formosa* Chan et al., 1995, by monotypy and subsequent designation; gender of the generic name feminine.

Species included.— *Platyeriocheir formosa* (Chan et al., 1995); *P. guangdonga* sp. nov.

KEY TO THE SPECIES OF THE GENUS *PLATYERIOCHEIR* NG ET AL., 1999

1. Dorsal margins of P2-5 carpi and propodi with dense short, stiff setae *P. formosa*
– Dorsal margins of P2-5 carpi and propodi smooth *P. guangdonga* sp. nov.

***Platyeriocheir formosa* (Chan, Hung & Yu, 1995)**

(figs. 1E, 4E, F)

Eriocheir rectus Stimpson, 1858; Sakai, T., 1935b: 5; 1939: 669, text-fig. 118, pl. 109 fig. 3; 1976: 647, text-fig. 355a-c; Miyake, 1970: 289, fig. 262D; Dai & Yang, 1991: 522, fig. 257-2.

Eriocheir rectus — Dai & Yang, 1991: 521, fig. 267(2), pl. 67 fig. 1; Shy & Yu, 1992: 27, figs. 1-7, tables I-IV (det. T.-Y. Chan, in litt.).

Eriocheir formosa Chan et al., 1995: 306; figs. 1B, 2A, 3A; Chan et al., 2005: 457-464.

Platyeriocheir formosa — Ng, N. K. et al., 1999: 165, figs. 3, 4, 5E, J, 6C, tables 1, 2; Naser, et al., 2012: figs. 11, 12, table 3 (as *E. formosa/recta*).

Material examined.— NTOU B00085, 1 male (CL/CW, 42.0/43.3 mm), *E. formosa*, 26.viii.1992, det. T.-Y. Chan.

Diagnosis.— Carapace depressed dorsally. Frontal margin of carapace granulated, almost straight and simple; lateral margins of carapace with 3 teeth; 4th lateral tooth absent. Dorsal margins of P2-5 meri with dense long setae, but ventral margins of P2-5 meri smooth; dorsal margins of P2-5 carpi with dense short stiff setae, but ventral margins of P2-5 carpi smooth; dorsal margins of P2-5 propodi and dactyli with dense short stiff setae, and ventral margins of 2-4 propodi with dense short stiff setae, but ventral margin of P5 propodus with dense short stiff setae and long soft setae, ventral margins of P2-4 dactyli with dense short stiff setae, but ventral margin of P5 dactylus with dense short stiff setae and long soft setae.

Male Plp1 slender; horny endpiece shaped as crescent, and located vertically at 90° to thoracic sternites; distomesial half of Plp1 broad and flat; distolateral half of Plp1 developed as a low bank; genital opening located distomesially behind horny endpiece.

Remarks.— Chan et al. (1995) established a new species *E. formosa* Chan et al., 1995 (= *Platyeriocheir formosa* (Chan et al., 1995)) based on specimens from eastern Taiwan. *P. formosa* (Chan et al., 1995) is characterized as follows: the carapace is depressed dorsally, the frontal margin is not four-lobed, but almost straight and simple, the lateral margins of the carapace are armed with three teeth, lacking a 4th one, the dorsal margins of the P2-5 meri are provided with dense long setae. Those characters are distinctly different from those of *E. japonica*, in which the carapace is slightly convex dorsally, the frontal margin is four-lobed, the lateral margins of the carapace are usually armed with 4 teeth, the dorsal margins of the P2-5 meri are smooth, so that *P. formosa* (Chan et al., 1995) is admissible as a good species.

T. Sakai (1939: 669, text-fig. 118, pl. 109 fig. 3) described *E. recta* Stimpson, 1858 from a male and a female from Mokka-kai, Taiwan (as: Formosa) (leg. S. Takahashi). T. Sakai's male specimen measuring CL/CW, 31.0/33.5 mm (Kamita, 1941c: 199), then identified as *E. recta* Stimpson, 1858, is characterized by the flat dorsal surface of the carapace, the almost straight granulated frontal margin of the carapace, the absence of a 4th lateral tooth, the dorsal margins of the P2-5 carpi with dense short stiff setae and the smooth ventral margins of the P2-5 carpi; the dorsal margins of the P2-5 propodi with dense short stiff setae, and the ventral margins of the P2-4 propodi with dense short stiff setae, but the ventral margin of the P5 propodus with dense short stiff setae and long soft setae (distinctly shown on photo), which shows that T. Sakai's male specimen identified *E. recta* is not Stimpson's (1858) *E. recta*, but instead *P. formosa* (Chan et al., 1995), because it is identical with the male specimen (NTOU B00085, CL/CW, 42.0/43.3 mm, E. Taiwan), which was once identified as *E. formosa* by Chan et al. (1995) as a new species.

Dai & Yang (1991) described *E. recta* Stimpson, 1858, but, judging from their photograph (their pl. 67 fig. 1), their *E. recta* is safely determined as *Platyeriocheir formosa* (Chan et al., 1995) in the present study, because (1) the carapace is depressed dorsally, (2) the frontal margin of the carapace is nearly straight and simple, (3) the anterolateral margins are provided with 3 teeth, lacking a 4th one, (4) the dorsal margins of the P2-5 meri are provided with dense long setae, (5) the dorsal margins of the P2-5 carpi and propodi are provided with dense short stiff setae.

It is most probable that Dai & Yang (1991) described as *E. recta* Stimpson, 1858, a number of specimens from Taiwan, from among a collection of specimens

both from Taiwan and Guangdong, China, which turned out to be in reality to be referable to *Platyeriocheir formosa* (Chan et al., 1995). Then later Tang et al. (2004) designated a female from Guangdong from among Dai & Yang's (1991) specimens as a "neotype" for *E. recta* Stimpson, 1858, which has now turned out to be in reality a new species, *Platyeriocheir guangdonga* sp. nov.

Type locality.— Eastern Taiwan.

Distribution.— Endemic to the river and streams of eastern Taiwan from I-Lan County to Ping-Tong Country (Chan et al., 1995).

***Platyeriocheir guangdonga* sp. nov.**

Eriocheir rectus — Dai et al., 1986: 976 (partim); 1991: 522 (partim).

Eriocheir recta — Tang, Zhou & Song, 2004: 255, figs. 1-6.

Diagnosis.— Carapace depressed dorsally; frontal margin not waved but almost straight; lateral margins of carapace with 3 teeth, lacking 4th tooth. Dorsal margins of P2-5 meri with dense long setae, but ventral margins of P2-5 meri smooth; dorsal and ventral margins of P2-5 carpi and propodi smooth (Tang et al., 2004: 256-258, figs. 1, 4).

Remarks.— Dai & Yang (1991) described *Eriocheir recta* Stimpson, 1858 based on specimens from Taiwan from among their specimens originating both from Taiwan and Guangdong, but, as already mentioned above, Dai & Yang's (1991) *E. recta* is determined as *Platyeriocheir formosa* (Chan et al., 1995) in the present study.

It is most probable that Tang et al. (2004) chose a female from Zhujiang River, Guangdong, China, near the type locality of Macao, from among Dai & Yang's specimens, and designated it as a "neotype" for *E. recta* Stimpson 1858, which has turned out, however, to be different from Stimpson's (1858, 1907) *E. recta*, as already indicated by Chan et al. (2005), in that (1) the frontal margin of the carapace is almost straight (vs. waved and obscurely four-lobed in Stimpson's *E. recta*) and (2) the lateral margin of the carapace is provided with three strong teeth, lacking a 4th one (vs. being provided with 4 teeth, though the 4th one is rudimentary in Stimpson's *E. recta*).

Tang et al.'s (2004) "neotype" for *Eriocheir recta* Stimpson, 1858 is very similar to *Platyeriocheir formosa* (Chan et al., 1995) in that the carapace is depressed dorsally, the frontal margin of the carapace is almost straight, and the lateral margins of the carapace are armed with three teeth, lacking a 4th one, but different in that the dorsal and ventral margins of the P2-5 carpi and propodi are smooth (vs. the dorsal margins of the P2-5 carpi provided with dense short stiff setae, and the ventral margins of the P2-5 carpi smooth, the dorsal margins of the P2-5 propodi with dense short stiff setae, and the ventral margins of the P2-4 propodi with dense

short stiff setae, but the ventral margin of the P5 propodus with dense short stiff setae and long soft setae in *P. formosa*).

Hence, this female specimen (invalidly) designated as a “neotype” for *Eriocheir recta* Stimpson, 1858 by Tang et al. (2004) is safely identified as a new species and named *Platyeriocheir guangdonga* sp. nov. herein.

Though Tang et al. (2004) report an “almost perfect match” between the sequences in the COI gene both of their “neotype” and of *E. formosa* Chan et al., 1995, I consider the evidence derived from the external morphological features presented herein so strong, that it convinces me the specimen described by Tang et al. (2004) truly represents a new species. After all, even if the whole COI gene were sequenced, which it was not, then still that would represent only a very small percentage of the total genome of these crabs. The “safety limit” for decisions at species level, allegedly set at ca. 700 bp by molecular systematists, seems to me rather a threshold set for convenience (and hence for want of a better criterion) than being based on sound theoretical considerations. I thus do not see how such data could be used to overrule the morphological distinctness of the forms as here established.

As regards the locality from which the specimen described by Tang et al. (2004) may or may not have originated and of which the discussion has been carefully articulated by Chan et al. (2005), as long as we have no other data than those reported by Tang et al. (2004), indicating any other locality as the type locality would be speculative, reason why I cannot do anything else at the moment than recite their locality data.

Etymology.— The new species name is derived from its locality, Guangdong, China, and added with the suffix “-a” as an agreement in gender with the generic name *Eriocheir*, gender feminine. The specific name thus is to be treated as an adjective.

Type locality.— Guangdong, China, fide Tang et al. (2004) (but see also Chan et al., 2005).

Distribution.— Known only from the type locality.

Genus **Neoeriocheir** T. Sakai, 1983

Neoeriocheir Sakai, T., 1983: 20, pl. III fig. 3.

Diagnosis.— Carapace flat dorsally or slightly convex anteriorly without epigastric or protogastric cristae; frontal margin granulated, almost straight and simple with small lateral convexities. Hepatic region slightly depressed; gastroduodenal, cardio-branchial, cardio-intestinal grooves shallow; branchial region flat; epibranchial ridge high and granulated; mesibranchial ridge granulated, extending obliquely backwards; supra-orbital margin concave. Lateral margins of carapace granulated, slightly convergent anteriorly, and provided with 3 teeth, lacking

4th tooth. Dorsal margins of P2-5 meri with fine setae. Male Plp1 horny endpiece shaped as crescent and located vertically at 90° to thoracic sternites.

Remarks.— T. Sakai (1983) established the present genus *Neoeriocheir* based on the type species, *Eriocheir leptognatha* Rathbun, 1913, and separated it from the genus *Eriocheir* by morphological characters of the carapace, P1 chela and carpus, and Mxp3.

In the present study, however, the genus *Neoeriocheir* T. Sakai, 1983 is redefined as a result of examinations of two male specimens of *Neoeriocheir leptognatha* (Rathbun, 1913) as follows: the carapace is flat, but slightly convex anteriorly; the frontal margin of the carapace is almost straight and simple, and provided with small lateral convexities; the lateral margin of the carapace lacks a 4th tooth; and the dorsal and ventral margins of the P2-5 meri are provided with fine setae.

Neoeriocheir is similar to *Platyeriocheir* in that the dorsal surface of the carapace is almost flat, and a 4th lateral tooth of the carapace is absent, but they differ in that in *Neoeriocheir* the dorsal and ventral margins of the P2-5 meri are provided with fine setae, while in *Platyeriocheir* the dorsal margins of the P2-5 meri are provided with dense long setae, while the ventral margins of the P2-5 meri are smooth.

Type species.— *Eriocheir leptognathus* Rathbun, 1913, by monotypy and subsequent designation; gender of the generic name feminine.

Species included.— Only the type species is known.

***Neoeriocheir leptognatha* (Rathbun, 1913)**

(figs. 1F, 4G, H)

Eriocheir leptognathus Rathbun, 1913: 353, pl. 33 figs. 2, 3; Kemp, 1918: 232; Tesch, 1918: 107; Balss, 1922: 152; Urita, 1926: 433; Sakai, T., 1935b: 7, 16; 1939: 671, pl. 109 fig. 2; 1976: 649, text-fig. 359; 1976: 469, text-fig. 356; Panning, 1938: 106; Kamita, 1938: 383, text-figs. 1-3, table 1; 1941a: 84; 1941b: 242; 1941c: 199, text-figs. 108, 111, pl. 1 (colour); Kim, 1962: 54; 1970: 21; 1973: 157, text-figs. 201, 204; 1985: 84; Shen & Dai, 1964: 128, fig.; Miyake, 1970: 289, fig. 262A; Dai & Yang, 1991: 521, fig. 267 (1); Ng, N. K. et al., 1999: 159-163, figs. 1A-G, 2Ai-Fi, 5A, F, 6A; Kosuge, 2000: 72, 87, 91, 92; 2003: 67-70, fig. 1, table 1.

Neoeriocheir leptognatha — Sakai, T., 1983: 20, pl. III fig. 3, pl. VIII fig. F; Chan et al., 1995: 302 (as *Eriocheir rectus*), fig. 2D; Henmi, 2012: 202, fig.; Niwa, N. et al., 2012: 53, figs. 1, 2-3 (colour).

Eriocheir rectus — Shen, 1932: 178, figs. 111, 112, 113 a, b, c, d, pl. VII fig. 6; 1937a: 308; 1937b: 170, 179 (name only); Shen, 1940: 98.

Material examined.— NTOU B00087, 1 male (CL/CW, 19.6/21.1 mm, frontal margin of carapace cracked), Chang River, China, x.1998, det. T.-Y. Chan; 1 male (CL/CW, 17.9/18.3 mm), Shinden Ohashi, Okawa-city, Chikugo-gawa, Fukuoka Pref., leg. Y. Henmi, 20.ix.2002.

Diagnosis.— Carapace flat dorsally, but slightly convex on anterior surface; frontal margin of carapace almost straight and simple, and provided with small lateral convexities, and 4th lateral tooth absent. Dorsal and ventral margins of P2-5

meri, carpi, and propodi with fine setae. Male Plp1 slender; horny endpiece shaped as crescent, and located vertically at 90° to thoracic sternites; distolateral half of Plp1 developed as a low bank; distomesial half of Plp1 broad and convex; genital opening located distomesially behind horny endpiece.

Remarks.— Urita (1926: 433) mentioned that few specimens of this species were found together with shrimps at the fish-market in Qingdao in autumn and winter.

Type locality.— Shanghai, China (Rathbun).

Distribution.— N. Vietnam (Kosuge, 2003-2006); northern China, Yellow Sea side and western coast of Korea (Kamita, 1938); Saga, mouth of Shida river, Japan (Sakai, T., 1983); tidal flat of Ariake-Bay, mouth of Chikugo-river, Okawa-city, Fukuoka Pref. (Henmi, 2012).

ACKNOWLEDGEMENTS

The author is most thankful to Dr. J. C. von Vaupel Klein and to Prof. Dr. M. Türkay, Senckenberg Gesellschaft für Naturforschung, Frankfurt am Main, who gave him advice and suggestions on the manuscript. My thanks are also extended to Dr. C. H. J. M. Fransen and Mrs. Karen van Dorp, Netherlands Center for Biodiversity Naturalis, Leiden; Mrs. K. Pietratus, Senckenberg Gesellschaft für Naturforschung, Frankfurt am Main; Dr. T.-Y. Chan, Institute of Marine Biology, National Taiwan Ocean University; and Dr. T. Satō, Kanagawa Prefectural Museum of Natural History; Dr. H. Komatsu, National Museum of Nature and Science, Tokyo; Mr. J. Ueno, director, and Dr. T. Komai, Chiba Prefectural Museum, who helped me with the specimens available for the present study. Thanks are also due to Dr. R. Lemaitre of the National Museum of Natural History, Maryland, who informed me about the specimen of *Eriocheir rectus* from N. Korea; and to Dr. S. Kobayashi, Department of Applied Biological Sciences, Faculty of Agriculture, Saga University, Saga, Japan.

REFERENCES

- BALSS, H., 1922. Ostasiatische Decapoden. IV. Die Brachyrhynchen (Cancridea). Arch. Naturgesch., **88**(A)(11): 94-166, figs. 1-2, pls. 1-2.
- CHAN, T.-Y., M.-S. HUNG & H.-P. YU, 1995. Identity of *Eriocheir recta* (Stimpson, 1858) (Decapoda: Brachyura), with description of a new mitten crab from Taiwan. Journal of Crustacean Biology, **15**: 301-308, figs. 1-3.
- CHAN, T.-Y., P. K. L. NG & N. K. NG, 2005. The nomenclature and taxonomy of *Eriocheir formosa* Chan, Hung & Yu, 1995 (Brachyura, Varunidae) from Taiwan: a rebuttal to Tang et al. (2003, 2004). Crustaceana, **78**: 457-464.

- DAI, A., 1991. Studies on the subspecies differentiation of the genus *Eriocheir* (Decapoda: Brachyura). Scientific Treatise on Systematics and Evolutionary Zoology, **1**: 61-71, figs.
- DAI, A. & S. YANG, 1991. Crabs of the China seas: 1-682, 295 text-figs., 74 pls. (China Ocean Press, Beijing).
- DE HAAN, W., 1833-1850. Crustacea. In: Ph. F. von Siebold, Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suscepit, Annis 1823-1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit: i-xvii, i-xxxii, ix-xvi, 1-243, pls. A-J, L-Q, 1-55, circ. tab. 2. [For dates see Sherborn & Jentink, 1895 and Holthuis, 1953.]
- DOFLEIN, F., 1902. Ostasiatische Dekapoden. Abhandlungen der Königlichen Bayerischen Akademie der Wissenschaften, Munich, (2) **21**(3): 613-670, figs. 1-4, pls. 1-6.
- GUO, J. Y., N. K. NG, A. DAI & P. K. L. NG, 1997. The taxonomy of three commercially important species of mitten crabs of the genus *Eriocheir* De Haan, 1835 (Crustacea: Decapoda: Brachyura: Grapsidae). Raffles Bull. Zool., **45**(2): 445-476, text-figs. 9.
- HAMANO, T., M. KAMADA & T. TANABE, 2000. Distributions of freshwater decapod crustaceans in Tokushima Prefecture, Japan, with notes on conservation methods for local populations. Bulletin of the Tokushima Prefectural Museum, **10**: 1-47. [In Japanese.]
- HENMI, Y., 2012. In: Benthos Society, Japan (ed.), Threatened animals of Japanese tidal flat: Red Data Book of seashore benthos: 306. (Association of Japanese University Presses).
- HOLTHUIS, L. B., 1953. On the dates of publication of W. de Haan's volume on the Crustacea of P. F. von Siebold's "Fauna Japonica". The Journal of the Society for the Bibliography of Natural History, **3**(1): 36-47, 1 pl.
- KAMITA, T., 1935. Crabs from the west coast of Corea. Zool. Mag., **47**(556): 61-69. [In Japanese.]
- —, 1936a. Crabs from Cheju-do, Korea. Zool. Mag., **48**(6): 314-321.
- —, 1936b. Crabs from the coast of Corea Strait. J. Chosen Nat. Hist. Soc., **21**: 30-35. [In Japanese.]
- —, 1938. Some observations of *Eriocheir leptognathus* Rathbun in Corea. Zool. Mag., **50**(8): 383-390, 3 text-figs., 1 table. [In Japanese.]
- —, 1941a. List of Korean crabs. Chosen, **309**: 61-90. [In Japanese.]
- —, 1941b. On the distribution of brachyuran Crustacea in Corea. Zool. Mag., **53**(5): 232-244. [In Japanese.]
- —, 1941c. Studies of the decapod crustaceans of Chosen. Pt. I. Crabs. The Fisheries Society of Chosen, Keijo (= Seoul): 1-289, figs. 1-146, 2 pls., 1 map. [In Japanese.]
- KEMP, S. W., 1918. Crustacea Decapoda and Stomatopoda. In: N. ANNANDALE (ed.), Zoological results of a tour in the Far East. Part 5. Mem. Asiat. Soc. Bengal, **6**: 217-297, figs. 1-12.
- KIKUCHI, K., 1932. Decapod Crustacea of Toyama Bay: 1-23. (Toyama Kyoyuku).
- KIM, H. S., 1962. Fauna of the crabs on the coasts of the western islands of Korea. Korean J. Zool., **5**: 51-55.
- —, 1970. A checklist of the Anomura and Brachyura (Crustacea, Decapoda) of Korea. Seoul Nat. Univ. J. Biol. Agric., (B) **19**: 1-34, 5 pls.
- —, 1971. On the distribution of the benthic animals of Korean coastal seas. 1. Jeju Island region. Report for the IBP, Korean National Committee, **5**: 7-27, fig. 1.
- —, 1973. Anomura-Brachyura. In: Illustrated Encyclopedia of Fauna & Flora of Korea, **14**: 1-694, text-figs. 1-265, 2 tables, 112 pls.
- —, 1985. Systematic studies on crustaceans of Korea, 1. Decapods. Proc. Coll. Nat. Sci., SNU, Seoul, **10**(1): 63-94, figs. 1-4.
- KIM, H. S. & C.-Y. CHANG, 1985. The brachyuran crabs of Cheju Island, Korea (Crustacea: Decapoda). Korean J. Syst. Zool., **1**(1-2): 41-60, text-figs. 1-4.
- KINGSLEY, J. S., 1880. Carcinological notes. No. IV. Synopsis of the Grapsidae. Proceedings of the Academy of Natural Sciences of Philadelphia, **32**: 187-224.

- KOBA, K., 1936. Studies on the Japanese Potamonidae (I): Notes on *Potamon rathbuni* De Man as a second intermediate host of *Paragonimus westermani* (Kerbert) in Formosa. Transactions of the Natural History Society of Formosa, **26**: 164-174. [In Japanese.]
- —, 1943. Notes on the fisheries and rearing culture of *Eriocheir sinensis* in the Liao-ko Districts, Manchukuo (II). Bulletin of the Central National Museum of Manchukuo, **5**: 49-81, 13 text-figs., 21 tables, pls. v-x. (Hsinking (Shinkyo), Jilin, China). [In Japanese.]
- KOBAYASHI, S., 2005. Survey on the enormous mitten crabs in Bonin Islands. Cancer, Carcinological Society of Japan, **14**: 17-22. [In Japanese.]
- KOBAYASHI, S. & K. SATAKE, 2009. Distribution patterns of the Ogasawara mitten crab *Eriocheir ogasawaraensis* and brachyuran crabs in the rivers and streams of Chichi-jima, Ogasawara (Bonin) Islands. Japanese J. Limnol., **70**: 209-224, 3 figs., 4 tables.
- KOMAI, T., I. YAMASAKI, S. KOBAYASHI, T. YAMAMOTO & S. WATANABE, 2006. *Eriocheir ogasawaraensis* Komai, a new species of mitten crab (Crustacea: Decapoda: Brachyura: Varunidae) from the Ogasawara Islands, Japan, with notes on the systematics of *Eriocheir* De Haan, 1835. Zootaxa, **1168**: 1-20.
- KOSUGE, T., 2000. In: M. SATŌ (ed.), Sea-shore animals of the Ariake-Sea, biodiversity at the tidal flat of the estuary: 1-379. (Kaiyu-sha, Tokyo). [In Japanese.]
- —, 2003-2006. Notes on *Eriocheir leptognathus* (Crustacea, Brachyura, Grapsidae) collected from northern Vietnam. Nanki-seibutu, **45**: 67-70. [In Japanese.]
- LIN, G.-H., 1926. Chemical analysis of the muscle of the crab *Grapsus nankin* (pang-hsieh). J. Biochem., Tokyo, **6**(4): 409-415, tables I-III.
- LOWE, M. E. Y., S. H. TAN, N. K. NG & P. K. L. NG, 2010. The identities of *Grapsus nankin* Tu, Tu, Wu, Ling & Hsu, 1923, and *Grapsus nankin* Lin, 1926 (Decapoda, Brachyura, Varunidae). Crustaceana Monographs, **14**: 403-413, text-fig. 1.
- MAKI, M. & K. TSUCHIYA, 1923. Decapod Crustacea from Formosa. Report of the Agricultural Department, the Central Institution of the Government-General of Taiwan, Taipei Formosa, **3**: 153-155, 4 text-figs., 42 pls.
- MILNE EDWARDS, H., 1853. Mémoire sur la famille des Ocypodiens. Annales des Sciences Naturelles, (Zoologie) (3) **20**: 163-226, pls. 6-11.
- MIYAKE, S., 1970. Crustacea. In: [Modern biology], **1**, Invertebrates A: 256-296, figs. 262-268. (A. Nakayama-shoten, Tokyo). [In Japanese.]
- —, 1983. Japanese crustacean decapods and stomatopods in color, **2**: 1-277, pls. 1-64. (Hoikusya, Ōsaka).
- MURAOKA, K., 1998. Catalogue of the brachyuran and anomuran crabs donated by Prof. Dr. Tune Sakai to the Kanagawa Prefectural Museum. Catalogue of the Collection in the Kanagawa Prefectural Museum of Natural History, **11**: 1-67, 16 pls. (Kanagawa Prefectural Museum of Natural History, Odawara). [In Japanese.]
- NAKAGAWA, K., 1915a. Research on the development of *Paragonimus* (no. 3). I. The intermediate host of *Paragonimus*: an opinion on their entry and release. II. *Paragonimus* larval behaviour and resistance. Chyugai-Igaku-Shinpu [= Chugai New Report], **850**: 1035-1043. [In Japanese.]
- —, 1915b. Research on the development of *Paragonimus*: on the intermediate host. Jyuzen-Kai-Zatsushi (= Jyuzen-kai Journal), **20**: 311-329. [In Japanese.]
- NAKAZAWA, K., 1927. Crustacea. In: Nippon Dobutsu Zukan [Figuraro de Japanaj Bestoj]: 992-1124, figs. 1910-2166. (Tokyo). [In Japanese.]
- —, 1947. Brachyura. In: Nippon Dobutsu Zukan [Illustrated Encyclopedia of the Fauna of Japan] (1st rev. ed.): 1-1898, 1-89, pls. 1-12, figs. 1-5213. (Tokyo). [In Japanese.]
- NASER, M. D., T. J. PAGE, N. K. NG, M. APEL, A. G. YASSER, J. M. BISHOP, P. K. L. NG & P. F. CLARK, 2012. Invasive records of *Eriocheir hepuensis* Dai, 1991 (Crustacea: Brachyura: Grapsoidea: Varunidae): implications and taxonomic considerations. BioInvasions Records, **1**: 71-86, 16 figs., appendix 1.

- NG, N. K., J. GUO & P. K. L. NG, 1999. Generic affinities of *Eriocheir leptognatha* and *E. formosa* with description of a new genus (Brachyura: Grapsidae: Varuninae). *J. Crust. Biol.*, **19**(1): 154-170.
- NG, P. K. L., D. GUINOT & P. J. F. DAVIE, 2008. Systema Brachyurorum: Part. 1. An annotated checklist of extant brachyuran crabs of the world. *Raffles Bull. Zool.*, (Suppl.) **17**: 1-286.
- NIWA, N., H. SANAGAWA & M. OTANI, 2012. *Neeriocheir leptognathus* found on Chinese commercial fishing bait known as "Isogani". *Cancer*, **21**: 53-55, figs. 1, 2-3 (colour).
- OKADA, Y. K. & Y. MIYASHITA, 1935. Sacculinization in *Eriocheir japonica* (De Haan) with remarks on the occurrence of complete sex-reversal in parasitized male crabs. *Memories of the College of Science, Kyoto Imperial University*, (B) **10**: 169-208, pls. 8-9.
- ORTMANN, A. E., 1894. Die Decapoden-Krebse des Strassburger Museums mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu-Inseln gesammelten und zur Zeit im Strassburger Museum aufbewahrten Formen. Theil VIII. Abtheilung: Brachyura (*Brachyura genuina* Boas), III. Unterabtheilung: Cancroidea. 2. Section: Cancrinea, 2. Gruppe: Catametopa. *Zoologische Jahrbücher, Abtheilung für Systematik, Geographie und Biologie der Thiere*, **7**: 683-772, 23 pls.
- PANNING, A., 1933. In: N. PETERS, A. PANNING & W. SCHNAKENBECK (eds.), Die chinesische Wolhandkrabbe in Deutschland. *Zoologischer Anzeiger, Leipzig*, **104**: i-viii, 1-180, 145 figs.
- —, 1938. Systematisches über *Eriocheir sinensis* H. Milne-Edwards. *Mitt. Hamburg. zool. Mus. Inst.*, **47**: 105-111, 8 figs.
- PARISI, B., 1918. I Decapodi Giapponesi del Museo di Milano. VI. Catometopa e Paguridea. *Atti Soc. Ital. Sci. nat.*, **57**: 90-115, figs. 1-5, pl. 8.
- RATHBUN, M. J., 1913. Descriptions of new species of crabs of the families Grapsidae and Ocypodidae. *Proc. U.S. natn. Mus.*, **46**(2030): 353-358, pls. 30-33.
- SAKAI, K. & T. MATSUOKA, 1987. Sacculinization of the crab, *Eriocheir japonicus* (Decapoda, Crustacea) (affected by *Sacculina gregaria* Ikada and Miyashita, 1935) collected from the Katsura-gawa. *Tokushima Naturalists, Shikoku Woman's University*, **1**(1): 1-15, figs. 7, tables 1-2, 3-1-6.
- SAKAI, K., M. TÜRKAY & S.-L. YANG, 2006. Revision of the *Helice/Chasmagnathus* complex (Crustacea: Decapoda: Brachyura). *Abhandlungen des Senckenbergischen Naturforschenden Gesellschaft*, **565**: 1-76, 98 text-figs., 3 tables.
- SAKAI, T., 1935a. A list of marine animals around Shimoda area. *Biological Report of Shimoda Marine Biological Station, Tokyo University of Literature and Science*, **1**: 23-85, 3 pls., 2 maps. [In Japanese.]
- —, 1935b. Crustacea of Jehol (Brachyura). *Rep. First Scient. Exp. to Manchoukuo 1933*, (Sect. 5) (Div. 1) (Part 2) (Art.) **7**: 1-16, text-figs. 1-4, pls. 1-3, 1 map.
- —, 1938. On three systematically interesting crabs from Japan, one of which is new to science. *Annotationes Zoologicae Japonenses*, **17**(3-4): 301-307, pl. 16.
- —, 1939. Studies on the crabs of Japan. IV. Brachygnatha Brachyrhyncha, **3**: 365-741, figs. 1-129, pls. 42-111, table 1. (Yokendo Co., Tokyo).
- —, 1940. Bio-geographic review on the distribution of crabs in Japanese waters. *Records of Oceanographic Works in Japan*, **11**(1): 27-63, 3 text-figs.
- —, 1944. A report on four freshwater crabs from Central China. (Reports on the limnological survey of Central China. XIV.) *Annotations of Shanghai Natural History Institute*, **14**(1): 37-43, 4 text-figs. [In Japanese.]
- —, 1954. Preliminary report on the brachyuran Crustacea of Hachijo Island. *Records of Oceanographic Works in Japan*, (N.S.) **1**(2): 73-77.
- —, 1960. Crabs of Akita Prefecture, Japan. [17 pls.]. (Funagawa Fisheries Co.).
- —, 1976. Crabs of Japan and the adjacent seas. [In 3 volumes: (1) English text: i-xxix, 1-773, figs. 1-379; (2) Plates volume: 1-16, pls. 1-251, (3) Japanese text: 1-461, figs. 1-2, 3 maps]. (Kodansha Ltd., Tokyo).

- —, 1983. Description of new genera and species of Japanese crabs, together with systematical and biogeographically interesting species (1). *Researches of Crustacea*, Tokyo, **12**: 44, pls. 1-8.
- SATO, H., 1936. [...]. *Science of Taiwan*, **4**(4): 1-8. [In Japanese.]
- SHELLENBERG, A., 1928. *Krebstiere oder Crustacea. II. Decapoda, Zehnfußer (14. Ordnung)*. In: F. DAHL (ed.), *Die Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise*, **10**: 1-146, 110 figs. (Gustav Fischer, Gera).
- SHEN, C. J., 1932. The brachyuran Crustacea of North China. *Zoologia Sinica*, (A) **9**(1): i-x, 1-320, figs. 1-171, pls. 1-10, 1 map. (Peiping).
- —, 1937a. Second addition to the Fauna of Brachyuran Crustacea of North China, with a check list of the species recorded in this particular region. *Contributions from the Institute of Zoology, National Academy of Peiping*, **3**(6): 277-313, text-figs. 1-11.
- —, 1937b. On some account of the crabs of North China. *Bull. Fan Mem. Inst. Biol., (Zool.)* **7**(5): 167-185. (Peiping).
- —, 1940. On the collection of crabs of South China. *Bull. Fan Mem. Inst. Biol., (Zool.)* **10**(2): 69-104. (Peiping).
- SHEN, C. J. & A. Y. DAI, 1964. *Illustrations of animals in China (Crustacea Part 2)*: 1-142, 227 figs. (Peking). [In Chinese.]
- SHERBORN, C. D. & F. A. JENTINK, 1895. On the dates of the parts of Siebold's *Fauna Japonica* and Giebel's *Allgemeine Zoologie* (first edition). *Proc. zool. Soc. Lond.*, **1895**: 149, 150.
- SHOKITA, S., 1990. Inland-water macrofauna and their fluctuations in the northern part of Okinawa Island, the Ryukyus. *Biol. Mag. Okinawa*, **27**: 3-13, 5 figs., 3 tables. [In Japanese.]
- SHOKITA, S. & S. NISHIJIMA, 1976. Faunal list of inland-water Malacostraca of Amami Group, the Ryukyu Islands. *Ecol. Stud. Nat. Cons. Ryukyu Isl.*, **2**: 31-38.
- SHY, J.-Y. & H.-P. YU, 1992. Complete larval development of the mitten crab *Eriocheir rectus* Stimpson, 1858 (Decapoda, Brachyura, Grapsidae) reared in the laboratory. *Crustaceana*, **63**(3): 277-290, text-figs. 1-7, tables I-IV.
- STIMPSON, W., 1858. *Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. Pars V. Crustacea Ocyopodoidea*. *Proceedings of the Academy of Natural Science of Philadelphia*, **10**: 93-110.
- —, 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853-1856. *Smithsonian Miscellaneous Collections*, Washington, **49**(1717): 1-240, pls. 1-26.
- TAKEDA, M. & S. MIYAKE, 1976. Crabs of the Ogasawara Islands. 1. List of the known species. *Researches on Crustacea*, **7**: 101-115. [In Japanese.]
- TANG, B., K. ZHOU & D. SONG, 2004. A neotype of *Eriocheir recta* (Crustacea, Decapoda). *Acta Zootaxonomica Sinica*, **29**(2): 255-259.
- TANG, B., K. ZHOU, D. SONG, G. YANG & A. DAI, 2003. Molecular systematics of the Asian mitten crabs, genus *Eriocheir* (Crustacea: Brachyura). *Molecular Phylogenetics and Evolution*, **29**: 309-316, text-figs. 1-4.
- TERAO, A., 1915a. The second intermediate host of lung *Distoma*. Part 1. *Zoological Magazine*, **27**(322): 457-458. [In Japanese.]
- —, 1915b. The second intermediate host of lung *Distoma*. Part 2. *Zoological Magazine*, **27**(324): 555. [In Japanese.]
- TESCH, J. J., 1918. The Decapoda Brachyura of the Siboga-Expedition. I. Hymenosomidae, Retroplumidae, Ocypodidae, Grapsidae and Gecarcinidae. *Siboga-Exped. Monogr.*, **39C**: 1-148, pls. 1-6.
- TU, Y. T., T. T. TU, T. L. WU, C. H. LING & C. C. HSU (eds.), 1923. [= *Zoological nomenclature (A complete dictionary of zoological terms)*]: 1-3, 1-110, 1-2, 1-2635, 1-7, 1-82, 1-135. (Commercial Press Limited, China). [In Chinese.]

- TÜRKAY, M., 2001. Decapoda. In: M. J. COSTELLO, C. EMBLOW & R. WHITE (eds.), European register of marine species: a check-list of the marine species in Europe and a bibliography of guides to their identification. Collection Patrimoines Naturels, **50**: 284-293.
- URITA, T., 1917. Crabs around Kagoshima-city (1). Scientific World [Rigaku-kai], **14**: 67-72, figs. [In Japanese.]
- —, 1926. Crabs and shrimps around Tsingtao, China. Zool. Mag. [= Dobutugaku Zasshi], **38**(458): 421-438. [In Japanese.]
- —, 1940. Crabs in northern Japan. Journal of Hiroshima Bunrika-daigaku & Normal School Museum [Hiroshima Bunrika-daigaku & Kotou-shihan-gatsukou Hakubutugaku-Kaishi], **1940**: 15-17. [In Japanese.]
- —, 1942. Decapod crustaceans from Sakhalin, Japan. Bulletin of the Biogeographical Society of Japan, **12**(1): 1-78, 15 figs., 16 tables.
- YAMAGUCHI, T. & K. BABA, 1993. Crustacean specimens collected in Japan by Ph. F. von Siebold and H. Bürger and held by the Nationaal Natuurhistorisch Museum in Leiden and other museums. In: T. YAMAGUCHI (ed.), Ph. von Siebold and Natural History of Japan. Crustacea. Carcinological Society of Japan: 145-570, figs. 1-200a A-D + II A-F + 3 fig. n.n. + III A-D.