

Offprint from:

Crustaceans and the Biodiversity Crisis

Proceedings of the Fourth International Crustacean Congress,
Amsterdam, The Netherlands,
July 20–24, 1998, vol. I

Edited by

Frederick R. Schram

and

J.C. von Vaupel Klein



BRILL
LEIDEN · BOSTON · KÖLN
1999

THE STATE OF FRESHWATER CRAB TAXONOMY IN INDOCHINA
(DECAPODA, BRACHYURA)

BY

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ABSTRACT

A checklist of the Indochinese freshwater crab species is presented, and 165 species from 33 genera are reported. The total number of species for Indochina is estimated to be 349 species. The Potamoidea constitute approximately 73% of the known fauna, with the Gecarcinoidea and Grapsoidea making up the remaining 27%. The relative proportion of gecarcinoid cum grapsoid to potamoid crabs shows a distinct latitudinal trend in eastern and southeastern Asia. Gecarcinoids and grapsoids are increasingly more dominant south of China, through Indochina, and ultimately replace the potamoids as the main freshwater crab group in Southeast Asia.

INTRODUCTION

The freshwater crabs of Indochina (here defined as Cambodia, Laos, Vietnam, Thailand and Myanmar (= Burma)) (fig. 1) are very diverse, and numerous species have been described over the last 30 years. The present paper endeavours to review the state of their taxonomy. The species treated here include the superfamilies Potamoidea and Gecarcinoidea, all members of which are wholly freshwater crabs, as well as the genus *Geosesarma* (superfamily Grapsoidea) whose members are true freshwater crabs (Ng, 1988). These grapsoids are often an important component of the freshwater crab fauna of the region and should not be excluded. Currently, 165 species in 33 genera of these freshwater crabs are known from Indochina (table I).

A brief review of the history of taxonomic studies on Indochinese freshwater crabs is provided. An updated checklist of the species in the region is included (table I). An estimate of the total number of species expected for Indochina is also attempted. Trends in the distributions of the Potamoidea, Gecarcinoidea, and the wholly freshwater Grapsoidea in East and Southeast Asia are discussed.



Fig. 1. Map of Indochina (Indochinese countries underlined).

TABLE I

Checklist of the known freshwater crab species of Indochina (165 species)

Note: In chronological order by genus

POTAMOIDEA Ortmann, 1896 (121 species)

- Potamon andersonianum* (Wood Mason, 1871)
 = *Potamon andersonianum tritum* Alcock, 1909
Potamon "atkinsonianum" (Wood Mason, 1871)?
Potamon edwardsi (Wood Mason, 1871)
Potamon edwardsi hirtum Alcock, 1909 #
Potamon hispidum (Wood Mason, 1871)
Potamon tumidum (Wood Mason, 1871) *
Potamon "pealianum" (Wood Mason, 1871)?
Potamon cochinchinensis De Man, 1898
Potamon brousmichei Rathbun, 1904 *
Potamon luangprabangensis Rathbun, 1904 *
Potamon mooleyitense Rathbun, 1904 #
Potamon orleansi Rathbun, 1904 #*
Potamon paludosus Rathbun, 1904 #
Potamon palustre Rathbun, 1904
Potamon tannanti Rathbun, 1904 *
Potamon bifarium Alcock, 1909 #
Potamon pruinsum Alcock, 1909 #
Potamon turgidulum (Alcock, 1909) *
Potamon turgidulimana (Alcock, 1910) *
Potamon fruhstorferi Balss, 1914 *
Potamon browneanum (Kemp, 1918) *
Potamon curtobates Kemp, 1918 #
Potamon alcockianum Kemp, 1923
Potamon klossianum Kemp, 1923 #
Potamon laevior Kemp, 1923 #*
Potamon loxophrys Kemp, 1923 #*
Potamon phymatodes Kemp, 1923 #
Potamon smithiana (Kemp, 1923) *
Potamon hafniensis Bott, 1966 *
Potamon mieni Dang, 1967 #*
Potamon phuluangensis (Bott, 1970) *
Potamon cucphuongensis (Dang, 1975) *
Potamon kimboiensis (Dang, 1975) *
Potamon yotdomense (Naiyanetr, 1984)
Potamon boonyaratae (Naiyanetr, 1987)
Potamon doichiangdao Naiyanetr & Ng, 1990
Potamon doisutep Naiyanetr & Ng, 1990
Potamon erawanense Naiyanetr, 1992
Potamon kanchanaburiense Naiyanetr, 1992
Potamon maehongsonense Naiyanetr, 1992
Potamon maesotense Naiyanetr, 1992
Potamon phupanense Naiyanetr, 1992
Potamon jarujini Ng & Naiyanetr, 1993
Potamon lipkei Ng & Naiyanetr, 1993

TABLE I
(Continued)

<i>Potamon maesariang</i> Ng & Naiyanetr, 1993
<i>Potamon namlang</i> Ng & Naiyanetr, 1993
<i>Potamon nan</i> Ng & Naiyanetr, 1993
<i>Potamon somchail</i> Ng & Naiyanetr, 1993
<i>Potamon ubon</i> Ng & Naiyanetr, 1993
<i>Potamon cua</i> Yeo & Ng, 1998
<i>Potamon guttus</i> Yeo & Ng, 1998
<i>Potamon ou</i> Yeo & Ng, 1998
<i>Potamon villosum</i> Yeo & Ng, 1998
<i>Potamiscus rangoonensis</i> (Rathbun, 1904) *
<i>Potamiscus oblitteratum</i> Kemp, 1913 #
<i>Lobothelphusa dayanum</i> (Wood Mason, 1871) *
<i>Lobothelphusa crenulifera</i> (Wood Mason, 1875)
= <i>Potamon (Parathelphusa) peguensis</i> Rathbun, 1905
= <i>Potamon (Acanthothelphusa) crenuliferum floccosum</i> Alcock, 1910
<i>Lobothelphusa feae</i> (De Man, 1898) #*
<i>Lobothelphusa woodmasoni</i> (Rathbun, 1905)
<i>Lobothelphusa calva</i> (Alcock, 1909)
<i>Lobothelphusa acanthia</i> (Kemp, 1918)
<i>Lobothelphusa burmensis</i> (Bott, 1966)
<i>Lobothelphusa gibbosa</i> Ng & Kosuge, 1997
<i>Larnaudia larnaudii</i> (A. Milne-Edwards, 1869)
<i>Larnaudia adiatretum</i> (Alcock, 1909)
<i>Larnaudia beusekoma</i> (Bott, 1970)
<i>Larnaudia chaiyaphumi</i> Naiyanetr, 1982
<i>Demanietta manii</i> (Rathbun, 1904)
<i>Demanietta renongensis</i> (Rathbun, 1904) *
= <i>Potamiscus (Ranguna) smalleyi</i> Bott, 1966 @
<i>Demanietta thagatensis</i> (Rathbun, 1904) #*
<i>Demanietta merguensis</i> (Bott, 1966)
<i>Demanietta tritrungensis</i> (Naiyanetr, 1986)
<i>Demanietta</i> sp. 1 *
<i>Demanietta</i> sp. 2 *
<i>Demanietta</i> sp. 3 *
<i>Demanietta</i> sp. 4 *
<i>Demanietta</i> sp. 5 *
<i>Stoliczia ekavibhathai</i> Ng & Naiyanetr, 1986
<i>Stoliczia panhai</i> Ng & Naiyanetr, 1986
<i>Tiwaripotamon araneum</i> (Rathbun, 1904)
<i>Tiwaripotamon simulum</i> (Alcock, 1909)
<i>Tiwaripotamon annamense</i> (Balss, 1914)
<i>Terrapotamon abbotti</i> (Rathbun, 1898)
<i>Neolarnaudia botti</i> Türkay & Naiyanetr, 1987
<i>Dromothelphusa longipes</i> (A. Milne-Edwards, 1869)
<i>Dromothelphusa pealianoides</i> (Bott, 1966) *

TABLE I
(Continued)

<i>Dromothelphusa namuan</i> Naiyanetr, 1994
<i>Dromothelphusa nayung</i> Naiyanetr, 1994
<i>Dromothelphusa phrae</i> (Naiyanetr, 1984)
<i>Dromothelphusa sangwan</i> Naiyanetr, 1997
<i>Phaibulamon stilipes</i> Ng, 1992
<i>Kanpotamon duangkhaei</i> Ng & Naiyanetr, 1993
<i>Thaipotamon siamensis</i> (A. Milne-Edwards, 1869)
<i>Thaipotamon sphaeridium</i> (Kemp, 1923) #*
<i>Thaipotamon smitinandi</i> (Naiyanetr & Türkay, 1984)
<i>Thaipotamon dansai</i> Ng & Naiyanetr, 1993
<i>Thaipotamon lomkao</i> Ng & Naiyanetr, 1993
<i>Thaipotamon varoonphornae</i> Ng & Naiyanetr, 1993
<i>Thaipotamon chulabhorn</i> Naiyanetr, 1993
<i>Thaiphusa tenasserimensis</i> (De Man, 1898)
<i>Thaiphusa chantaburiensis</i> (Chuensri, 1973)
<i>Thaiphusa sirikit</i> (Naiyanetr, 1992)
<i>Hainanpotamon glabra</i> (Dang, 1967)
<i>Hainanpotamon rubra</i> (Dang & Tran, 1992)
<i>Hainanpotamon tankiensis</i> (Dang & Tran, 1992)
<i>Pudaengon inornatum</i> (Rathbun, 1904)
<i>Pudaengon arnamicai</i> Ng & Naiyanetr, 1995
<i>Pudaengon hinpoon</i> Ng & Naiyanetr, 1995
<i>Pudaengon khammouan</i> Ng & Naiyanetr, 1995
<i>Pudaengon mukdahan</i> Ng & Naiyanetr, 1995
<i>Pudaengon sakonnakorn</i> Ng & Naiyanetr, 1995
<i>Pudaengon thatphanom</i> Ng & Naiyanetr, 1995
<i>Pudaengon wanonniwat</i> Ng & Naiyanetr, 1995
<i>Nemoron nomas</i> Ng, 1996
<i>Rathbunamon lacunifer</i> (Rathbun, 1904)
<i>Pilosamon laosense</i> (Rathbun, 1904)
<i>Flabellamon kuehnelti</i> (Pretzmann, 1963)
<i>Flabellamon pretzmanni</i> Ng, 1996
<i>Esanpotamon namsom</i> Naiyanetr & Ng, 1997
<i>Tomaculamon pygmaeum</i> Yeo & Ng, 1997
<i>Tomaculamon stenixys</i> Yeo & Ng, 1997
GEARCINUCOIDEA Rathbun, 1904 (42 species)
<i>Phricotelphusa limula</i> (Hilgendorf, 1882)
<i>Phricotelphusa callianira</i> (De Man, 1887)
<i>Phricotelphusa carinifera</i> (De Man, 1887)
<i>Phricotelphusa elegans</i> (De Man, 1898)
<i>Phricotelphusa aedes</i> (Kemp, 1923)
<i>Phricotelphusa ranongi</i> Naiyanetr, 1982
<i>Phricotelphusa deharvengi</i> Ng, 1988
<i>Phricotelphusa sirindhorn</i> Naiyanetr, 1989

TABLE I
(Continued)

Thaksinhelpusa yongchindaratae (Naiyanetr, 1988)
Siamthelphusa paviei (De Man, 1898)
Siamthelphusa improvisa (Lanchester, 1901)
Siamthelphusa faxoni (Rathbun, 1902)
Siamthelphusa holthuisi Naiyanetr & Ng, 1990
Siamthelphusa acutidens Ng & Naiyanetr, 1997
Siamthelphusa nan Ng & Naiyanetr, 1997
Siamthelphusa retimanus Ng & Naiyanetr, 1997
Siamthelphusa transversa Ng & Naiyanetr, 1997
Siamthelphusa variegata Ng & Naiyanetr, 1997
Salangathelphusa brevicarinata (Hilgendorf, 1882)
 = *Parathelphusa (Parathelphusa) anophrys* Kemp, 1923
 = *Parathelphusa salangensis* Ortmann, 1893
Somanniathelphusa kyphuensis Dang, 1975
Somanniathelphusa lacuvita Ng, 1995
Somanniathelphusa pax Ng & Kosuge, 1995
Somanniathelphusa sp. *
Mekhongthelphusa tetragona (Rathbun, 1902)
Mekhongthelphusa kengsaphu Naiyanetr & Ng, 1995
Heterothelphusa beauvoisi (Rathbun, 1902)
 = *Potamon (Parathelphusa) harmandi* Rathbun, 1902
Heterothelphusa fatum Ng, 1997
Sayamia germani (Rathbun, 1902)
Sayamia sexpunctata (Lanchester, 1906)
Sayamia bangkokensis (Naiyanetr, 1982)
Sayamia maehongsonensis (Naiyanetr, 1987)
Sayamia melanodactylus Ng, 1997
Esanthelphusa dugasti (Rathbun, 1902)
Esanthelphusa prolatus (Rathbun, 1902)
Esanthelphusa grayi (Alcock, 1909)
Esanthelphusa denchii (Naiyanetr, 1984)
Esanthelphusa nani (Naiyanetr, 1984)
Esanthelphusa fangensis (Naiyanetr, 1987)
Esanthelphusa chiangmai (Ng & Naiyanetr, 1993)
Esanthelphusa phetchaburi (Ng & Naiyanetr, 1993)
Chulathelphusa neisi (Rathbun, 1902)
Chulathelphusa brandti (Bott, 1968)
GRAPSOIDEA MacLeay, 1838 (2 species)
 Geosesarma foxi (Kemp, 1918)
 Geosesarma krathing Ng & Naiyanetr, 1992

? Tentatively included in checklist of Indochinese freshwater crab species.

* Tentatively included in this genus or undescribed species (Yeo & Ng, 1998b; Yeo et al., in press; Yeo & Nguyen, in press; unpubl. data).

Previously synonymized but tentatively resurrected here as a distinct species (Yeo et al., in press; Yeo & Ng, 1998b; unpubl. data).

@ *Potamiscus (Ranguna) smalleyi* Bott, 1966, has been found to be a junior subjective synonym of *Demanietta renongensis* (Rathbun, 1904) (Yeo et al., in press).

HISTORY

Between 1869 (when the first Indochinese freshwater crab species was named by A. Milne-Edwards) and 1923, 76 species and subspecies have been discovered, with 73 of these based on specimens from Indochina and three species originally described from outside the area. After 1923, however, there was a lull of some 40 years before the next new species was described (by Pretzmann, 1963), and since then, the number of new taxa has increased substantially. The number of species more than doubled between 1970 and the present, with 96 species described so far. The present checklist accepts the synonymy of six species by Bott (1970) and one species by Yeo et al. (in press). Therefore, a total of 165 species of Indochinese freshwater crabs are now known (table I). These are currently classified in about 33 genera.

The generic placement of a number of some species remains tentative. The major problem is with many potamid species previously referred to *Ranguna* Bott, 1966, by Bott (1966, 1970). *Ranguna* was synonymized under *Potamiscus* Alcock, 1909 (see Ng & Naiyanetr, 1993) and many species previously placed in *Ranguna* have been assigned to *Potamon*, *Demanietta*, *Dromothelphusa*, *Kanpotamon*, *Thaiphusa*, *Thaipotamon*, *Pudaengon*, *Hainanpotamon*, *Rathbunamon*, *Pilosamon*, and *Flabellamon* on the basis of their male first pleopods and external morphology (Naiyanetr, 1992; Naiyanetr & Ng, 1990; Ng & Naiyanetr, 1993, 1995; Ng, 1996a, b; Yeo & Ng, 1998a). The remaining *Ranguna* species are here referred to *Potamiscus* for the time being. Species that have not been re-examined have been referred to their original genus in the present checklist, except where their generic affinities can be more or less determined from the published descriptions.

THE NUMBER OF SPECIES IN INDOCHINA

We used Thailand as a reference for estimating the number of freshwater crab species of Indochina as a whole. Thailand shares similar characteristics such as latitude, types of habitat, and faunistic composition with most of Indochina. Extrapolating the species number per unit area of Thailand (1.8×10^{-4} species/km²) to that of Indochina sans Myanmar (c. 1,261,290 km²), we obtained a figure of 227 species (165 species currently known). This figure is relatively close to 260, the number estimated by Naiyanetr (1996: 357) for Thailand, Laos, Cambodia, and Vietnam. Considering that some species would occur in more than one of these countries, the total of Naiyanetr's figure can be expected to be reduced, bringing his and our figures closer. For Indochina as a whole (c. 1,939,320 km²), the application of the data from Thailand gives us what we believe is a reasonable

figure of 349 species for the region. It should be noted, nevertheless, that our data for Thailand (90 species currently known) are based exclusively on literature that has already been published or is in press. We are, however, aware of many more undescribed Thai species (unpubl. data) and agree with Naiyanetr's (1996) estimate of c. 120 for the total Thai fauna. Using this higher figure, we obtained an estimate of 290 species for Indochina sans Myanmar (against Naiyanetr's estimate of 260) and 446 species for the whole of Indochina. These, we believe, are not improbable figures.

TRENDS IN THE DISTRIBUTION OF SUPERFAMILIES IN EAST AND SOUTHEAST ASIA

One of the factors that prevent the accurate comparison of the fauna of different regions in eastern Asia is the non-uniform distribution of the various freshwater crab superfamilies at different latitudes. This makes the determination of a linear relationship between the number of species and land area very difficult and affects the calculation of total species estimates. The relative dominance of freshwater crab superfamilies shows a distinct north-south trend in eastern Asia (fig. 2). Potamoidea dominate in China (91% of the total freshwater crab fauna) to the north, but decrease in representation further south, in Indochina (73%) and in Peninsular Malaysia (51%). Gecarcinucoidea and freshwater grapsoid diversity on the other hand, correspondingly increases southwards, with the gecarcinucoidea being relatively poorly represented (9% of total freshwater crab fauna), and the grapsoids being totally absent from China. In insular Sundaic Southeast Asia, however, these two groups are dominant over the potamoidea. This trend lends

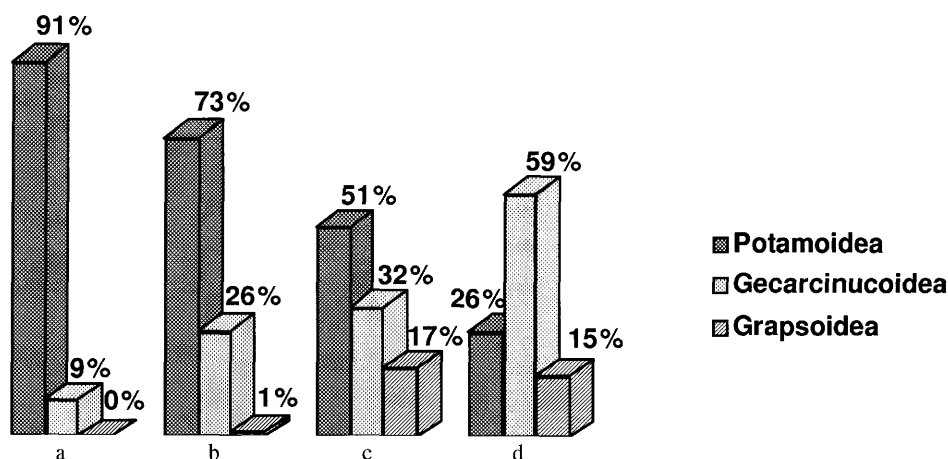


Fig. 2. Numerical distribution of freshwater crab species in eastern Asia. a, China; b, Indochina; c, Peninsular Malaysia; d, Insular Sundaic Southeast Asia.

some support to the idea that gecarcinucoid crabs have a Gondwanan origin (Ng et al., 1995).

ACKNOWLEDGEMENTS

The first author acknowledges financial support from the National University of Singapore (NUS) to attend the conference. The study was also partly supported by Research Grant RP950326 from NUS to the second author. This is contribution number 98/29 from the Systematics and Ecology Laboratory. Thanks also to A. Y. Dai (Academia Sinica, Beijing) for providing the data on Chinese freshwater crabs; and to members of the laboratory who helped out in various ways.

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First received 20 July 1998.

Final version accepted 26 October 1998.

Crustaceans and the Biodiversity Crisis
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Amsterdam, The Netherlands, July 20-24, 1998, Volume I*

Edited by Frederick R. Schram and J. Carel von Vaupel Klein

This important and extensive volume presents part of the Proceedings of the Fourth International Crustacean Congress held in Amsterdam in 1998. From the five subthemes covered at the conference, those of (1) *Diversity in Time and Space* (including Systematics, Phylogeny, and Palaeontology), (2b) *Biogeography*, (3c) *Larvae*, and (4) *Physiology and Biochemistry* (including Molecular Biology and Genetics) are represented in this volume, along with a few contributions from other subthemes (e.g. (2a) *Invasive Crustacea*, (3a) *Ecology*, (3b) *Behaviour*, and (5) *Fisheries and Aquaculture*).

The book is primarily meant for scientists working at institutes involved in research on the group (Crustacea: marine, freshwater, or terrestrial) and/or the disciplines covered. Individual carcinologists working on one of the themes discussed in this volume, will find a wealth of interesting and timely contributions, as will other scientists working in marine or freshwater biology or in soil ecology.

Frederick R. Schram, Ph.D. (1968) in Palaeontology, University of Chicago, is full professor at the University of Amsterdam. He is active in many fields of crustacean research, including high-level phylogeny of the Animal Kingdom, of the Arthropoda, and of the Crustacea, as well in theoretical issues as, e.g., the question of homology in view of HOX-gene expression; he has been Editor-in-Chief of *Crustacean Issues* since 1981.

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- June 1999. (1040 pp., richly illustrated)
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