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## Two new species of *Potamon* Savigny, 1816 s. l. from Chiangmai Province, north-western Thailand with a note on *Potamon (Potamon) cochinchinense* De Man, 1898

(Crustacea, Decapoda, Brachyura, Potamidae)

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Two new species of potamid freshwater crabs, *Potamon doichiangdao*, spec. nov. and *Potamon doisutep*, spec. nov., are described from Chiangmai Province in north-western Thailand. The identity of *Potamon (Potamon) cochinchinense* De Man, 1898, is also discussed and clarified.

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### Introduction

De Man (1898) described a new species of potamid (without figures), *Potamon (Potamon) cochinchinense*, from three female specimens, one on his own collection (now in the Zoological Museum, Amsterdam), on which the description is based, and two in the Museum Nationale d'Histoire Naturelle, Paris, of which only measurements are provided, collected from an unspecified locality in "Cochinchina". He copied his descriptions of the species for a subsequent (1904) paper, but providing detailed figures of the Amsterdam Museum specimen. Rathbun (1904) recorded a further 12 specimens, all females, from somewhere in Cochinchina. Bott (1970) in his revision, transferred De Man's species to *Ranguna (Ranguna)* Bott, 1966. Bott had examined and figured a male in the Smithsonian Institution (USNM 132376) from Khao Sabab in Thailand. Chuensri (1973, 1974 a, b) utilised Bott's figures and data for his lists and keys to the Thai freshwater crab fauna. Specimens from north-eastern Thailand have also been identified on the basis of Bott's identification (Naiyanetr, 1978 a, b, 1980, 1988).

The problem however, is that the carapace features of the specimen figured by Bott (1970) are very different from those figured by De Man (1904) and Rathbun (1904), which cast serious doubts about Bott's conclusion that his specimen is conspecific with De Man's (Table 1). None of these differences are known to vary significantly with sex, size or locality in conspecific populations of freshwater crabs. Moreover, Bott had not examined the types in the Paris Museum, no type males of *Potamon cochinchinense* are known, and the taxonomically important male pleopods are not available for comparison.

The first author has examined the type specimens of *Potamon cochinchinense* in the Museum National d'Histoire Naturelle (Paris and the Zoological Museum in Amsterdam), but failed to locate the specimen in the Smithsonian Institution attributed to this species by Bott (1970). The specimen appears to be misplaced. In any case, Bott's specimen is sufficiently different from De Man's specimens to warrant recognising them as two separate species. No attempt however is made here to apply a name to Bott's specimen until the original specimen can be located. Bott's "*Ranguna cochinchinensis*" appears to share features of both *P. doichiangdao*, spec. nov. and *P. doisutep*, spec. nov. Externally, the carapace, external orbital angle and anterolateral armatures are very close to the condition in *P. doichiangdao*, but the male first pleopod is closer to that of *P. doisutep*, the terminal segment being distinctly elongate. The terminal segment of the male first pleopod of Bott's specimen however, appears to be even more elongate than in *P. doisutep*, and the subterminal segment is more slender and more distinctly tapering at the distal part.

Table 1

*Potamon cochinchinense*

De Man (1898, 1904)	Bott (1970)
carapace very squarish (width to length ratio about 1.23)	carapace quadrilateral (width to length ratio about 1.38)
anterolateral margin convex	anterolateral margin very convex
posterolateral margins almost parallel	posterolateral margins strongly converging
external orbital angle very acutely triangular, separated from anterolateral margin by deep V-shaped cleft	external orbital angle acutely triangular, separated from anterolateral margin by small cleft
frontal, supraorbital margins and margin of external orbital angle serrate	frontal, supraorbital margins and margin of external orbital angle almost smooth

There also appears to be some doubts about the locality cited by Bott (1970) for his "*Ranguna cochinchinense*". The locality, Khao Sabab is in eastern Thailand, although his specimen seems to be closer to the two new species from Chiangmai Province described here. In the Khao Sabab area, the only species of potamid even vaguely resembling *Potamon cochinchinense* is *Potamon smithianum* Kemp, 1923. The carapace features and G1 of *P. smithianum* however, are still quite different from that of *P. cochinchinense* sensu Bott. It is possible that Bott's specimen was incorrectly labelled.

Recent specimens collected from north-western Thailand appear to be quite close to Bott's specimen. These specimens can, however, be clearly separated into two groups on their carapace, male pleopod structures and third maxilliped exopod conditions. Consequently, they are here described as two new species, *Potamon doichiangdao*, spec. nov. and *Potamon doisutep*, spec. nov.

As for *Potamon (Potamon) cochinchinense*, the three females used by De Man (1898) in his original description are all syntypes since he did not designate a type. The specimen (carapace width 50.0 mm by length 39.0 mm) in the Amsterdam Museum used by De Man for his description and figure is hereby designated as the lectotype. Rathbun's (1904) figure of *Potamon (Potamon) cochinchinense* agrees quite well with De Man's descriptions and her specimens are tentatively regarded as conspecific with *P. cochinchinense*.

The present authors have not used Bott's (1966, 1970) generic classification of the Potamidae in this paper since there are some problems with several of the genera. Using Bott's criterion, the male pleopods of the two new species would place them in the genus *Ranguna* Bott, 1966. Bott (1966) designated *Potamon (Potamon) rangoonensis* Rathbun, 1904, as the type species. Bott however, had not examin-

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ed the single male type specimen of this species, and had assigned specimens from Assam and the Naga Hills to this species. Türkay & Naiyanetr (1987) reexamined the type male and showed that Bott had misidentified his material, and his specimens are not conspecific with Rathbun's. On the basis of the male first pleopod, they transferred Rathbun's species to *Potamiscus* Alcock, 1910, instead. *Ranguna* thus becomes a subjective synonym of the *Potamiscus*, with the latter having priority.

Pending a revision of potamid classification, the authors have instead, adopted Alcock's (1910) classification, whereby the genus *Potamon* includes taxa which have a distinct flagellum on the exopod of their third maxilliped.

In this paper, two new species, *Potamon doichiangdao*, spec. nov. and *Potamon doisutep*, spec. nov. are diagnosed and figured.

### Material and methods

All measurements are of the carapace widths and lengths respectively. The abbreviations G1 and G2 are used for the male first and second pleopods respectively. Morphological terms follow that used by Ng (1988). Specimens are deposited in the Zoologische Staatssammlung München (ZSM); Chulalongkorn University Museum of Zoology (CUMZ), Bangkok, Thailand; Muséum d'Histoire Naturelle, Geneva (MNG), Switzerland; and the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore.

### *Potamon doichiangdao*, spec. nov.

Figs 1–3

Types. Holotype: 1 ♂, 50.5 by 38.0 mm (ZRC), Srisungwarn Waterfall, Amphoe Chiang Dao, Chiangmai Province, northwestern Thailand, leg. P. Naiyanetr, 2. XI. 1975. – Paratypes: 1 young male, 1 ♀ (CUMZ), same data as holotype; 1 ♂, 47.5 by 35.0 mm (MNG), Doi Chiang Dao, Chiangmai Province, northern Thailand, leg. M. Kotelat, 5. IV. 1980.

Diagnosis. Carapace quadrilateral, distinctly broader than long; regions well defined, rugose at regions near margins, surfaces glabrous; epigastric and postorbital cristae well developed, strong, distinctly separated by deep and relatively broad notch; supraorbital margin appears serrated, infraorbital lined with small, low granules; external orbital angle acutely triangular, outer margin distinctly longer than inner, appears serrated; epibranchial tooth sharp, denticulate on margins; anterolateral margin lined with numerous sharp granules, appears serrated; anterolateral and frontal regions covered with numerous flattened granules; frontal margin strongly sinuous. Exopod of third maxilliped with distinct flagellum which does not extend beyond width of merus. Spine on inner angle of cheliped carpus usually long, sharp, with large blunt basal tooth; merus with very low, blunt subterminal granule. Surface of chelae covered with low striae, uneven, but appears smooth; fingers longer than palm. Margins of ambulatory meri slightly cristate, finely serrated. Male abdomen broadly triangular, lateral margins of second to sixth segments convex, seventh distinctly triangular, tip rounded, lateral margins almost straight or slightly concave. G1 sinuous, terminal segment about half length of subterminal, hooked outwards, strongly tapered, basal part broader than distal, appears dilated, slender distal part subequal in length to broader basal part. G2 flagellum well developed, longer than half length of basal segment.

Discussion. The holotype male of *Potamon doichiangdao*, spec. nov., is covered with calcareous deposits all over the carapace, chelipeds and ambulatory legs. The carapace and G1 features of *Potamon doichiangdao* are distinctive, and the species cannot be confused with any Thai species other than *P. doisutep*, spec. nov. *Potamon doichiangdao* can however, easily be separated by its glabrous carapace surfaces, more sharply serrated anterolateral margin, more denticulate epibranchial tooth, more acutely triangular external orbital margin, with the outer margins strongly serrate, slightly shorter





Fig. 1. *Potamon doichiangdao*, spec. nov. Male holotype, 50.5 by 38.0 mm.

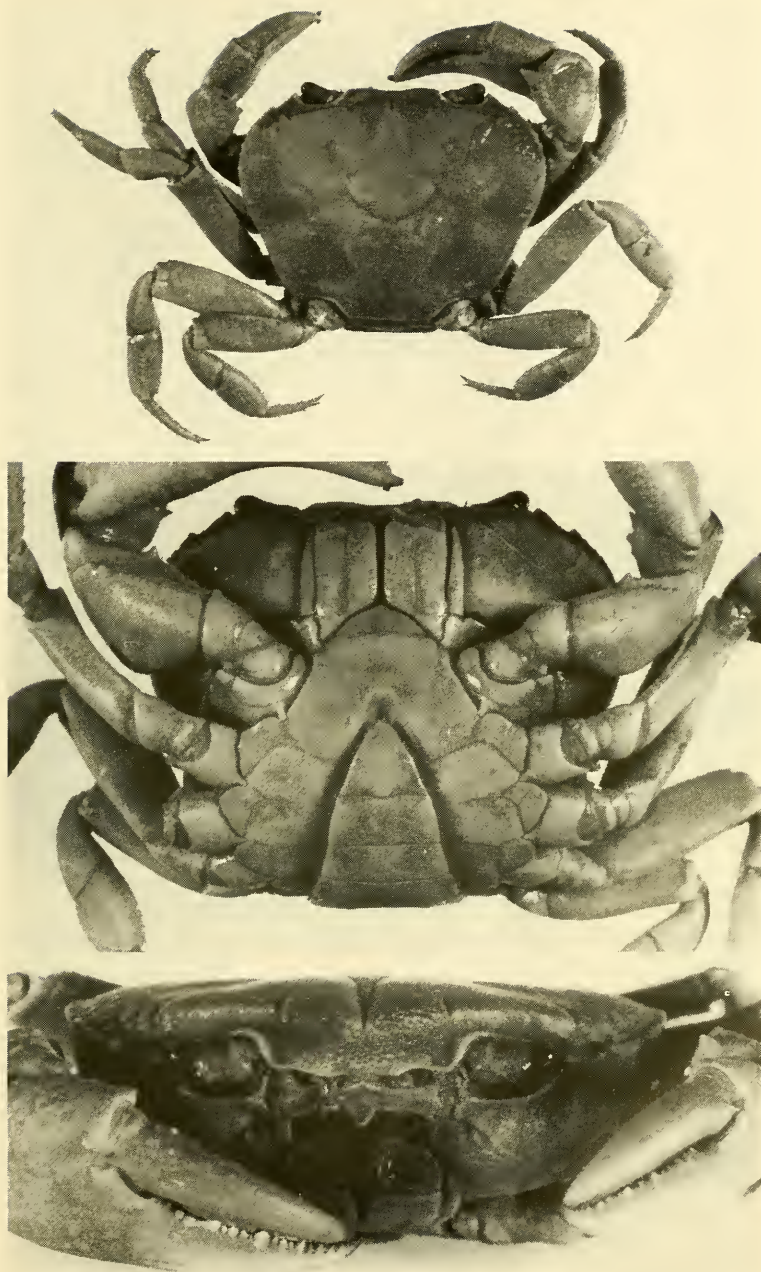


Fig. 2. *Potamon doichiangdao*, spec. nov. Male paratype (MNG), 47.5 by 35.0 mm.

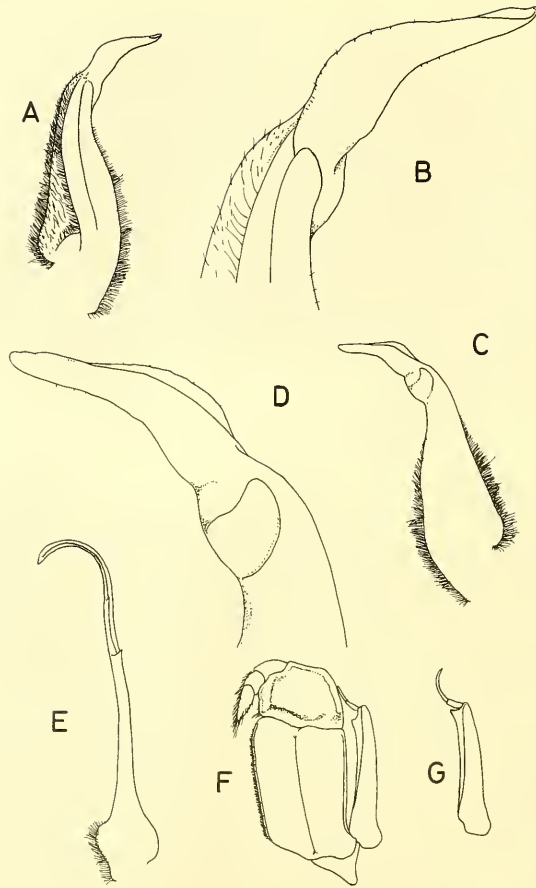


Fig. 3. A–G, *Potamon doichiangdao*, spec. nov. Male holotype, 50.5 by 38.0 mm; G, Male paratype (ZSM), 47.5 by 35.0 mm. A, B, Left G1, ventral view; C, D, Left G1, dorsal view; E, Left G2; F, Left third maxilliped; G, Exopod of left third maxilliped.

third maxilliped exopod flagellum, shorter G1 terminal segment, the distal slender part being subequal to, (not longer than) the more dilated basal part, and the longer G2 basal segment. These differences appear to be valid for specimens of comparable as well as smaller sizes. The non-sexual species characters of *P. doichiangdao* are shared by the females.

Although both *P. doichiangdao* and *P. doisutep* are found in the same province, the highlands inhabited by each are separate, and are sufficiently isolated to account for the differences observed at present.

**Etymology.** The species name is derived from the Thai word “doi” for mountain, alluding to the montane habitat of this species, and the type locality, Chiang Dao.

#### ***Potamon doisutep*, spec. nov.**

Figs 4, 5

**Types.** Holotype: 1 ♂, 57.0 by 43.0 mm (ZRC), Huai Fai Hin, Chiangmai Province, leg. Bookate Fongkaew, XI. 1983. – Paratypes: 1 ♂, 1 ♀ (CUMZ), same data as holotype.





Fig. 4. A–F, *Potamon doisutep*, spec. nov. Male holotype, 57.0 by 43.0 mm.

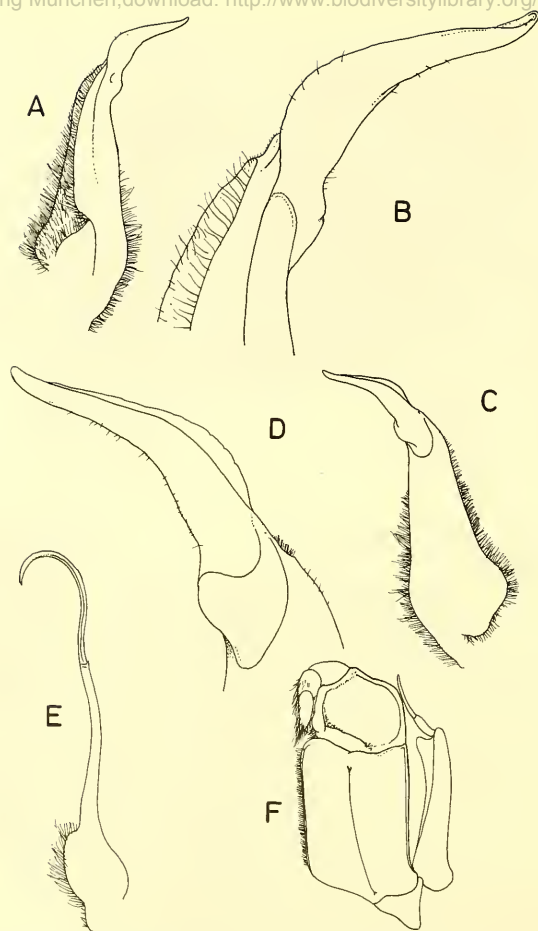


Fig. 5. *Potamon doisutep*, spec. nov. Male holotype, 57.0 by 43.0 mm. A, B, Left G1, ventral view; C, D, Left G1, dorsal view; E, Left G2; F, Left third maxilliped.

Other material: 1 ♂, 39.0 by 29.0 mm (ZSM), Nam Mae Chai, 300 m northeast of hot springs of Fang, 19°58'N, 99°10'E, Chiangmai Province, leg. M. Kottelat & P. Hobelman, 24. III. 1983.

**Diagnosis.** Carapace quadrilateral, distinctly broader than long; regions well defined, rugose at regions near margins, surfaces covered with numerous very short hairs, especially at lower part, appearing pubescent; epigastric and postorbital cristae well developed, strong, distinctly separated by deep and relatively broad notch; supraorbital margin appears serrated, infraorbital lined with small, low granules; external orbital angle triangular, outer margin longer than inner, lined with very small, low granules or appearing almost smooth; epibranchial tooth sharp; anterolateral margin lined with numerous rounded granules; anterolateral and frontal regions covered with numerous flattened granules; frontal margin distinctly sinuous. Third maxilliped exopod with distinct flagellum which reaches or extends slightly beyond half width of merus. Spine on inner angle of cheliped carpus well developed, sharp, with blunt basal tooth; merus with very low, blunt subterminal granule. Surface of chelae covered with low striae, uneven, but appears smooth; fingers longer than palm. Margins of ambulatory meri slightly serrated. Male abdomen broadly triangular, lateral margins of second to sixth segments convex, seventh distinctly triangular, tip rounded, lateral margins almost straight or slightly concave.



G1 sinuous, terminal segment about half length of subterminal, hooked outwards, strongly tapered, basal part broader than distal, appears dilated, slender distal part distinctly longer than broader basal part. G2 flagellum well developed, about half length of elongate basal segment.

Discussion. The paratype female of *Potamon doisutep*, spec. nov., although smaller than the male holotype, is already fully mature, the abdomen fully covering the sternum. Its non-sexual features agree very well with the holotype male.

The ZSM specimen differs from the type specimens in being distinctly more glabrous, the short carapace hairs being present mainly on the posterolateral regions, a slightly flatter carapace, a slightly more serrate external orbital angle outer margin, a slightly longer third maxilliped exopod flagellum, the subterminal exopod tooth being more developed and sharper, and a shorter, blunter cheliped carpal spine. Kottelat (in litt. to Ng, dtd. 21 February 1989) comments that it "... was collected about 200 km away from the type locality on the other side of the mountain range and in the Mekong Basin". The type locality is in the Chao Phraya Basin. The G1 of this specimen however, despite its smaller size, is almost identical with that of the holotype male, and there is no cause at present not to regard this specimen as conspecific with *P. doisutep*. More specimens (including large males comparable in size to the holotype) may later demonstrate that the various differences noted between the types and the ZSM specimen are constant, which may then necessitate a subspecific or even specific separation of the Mekong Basin specimens from *P. doisutep* s. str.

This species is closest to *P. doichiangdao*, spec. nov., but can be separated by several characters, notably the G1 terminal segment (see Discussion for *P. doichiangdao*).

Etymology: The species name is derived from the Thai words "doi" for mountain, and "sutep", a holy place of worship which is a landmark in the type locality, Chiang Mai.

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