





On a new genus and species of freshwater crab from Vietnam, with comments on the nomenclatural status of *Orientalia* Dang, 1975 (Crustacea: Brachyura: Potamidae: Potamiscinae)

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Abstract

A new potamiscine genus, *Laevimon*, is established for two species of semi-terrestrial freshwater crabs from Vietnam, viz., *Laevimon kottelati*, new species (type species) and *L. tankiensis* (Dang & Tran, 1992). The genus is morphologically closest to *Hainanpotamon* Dai, 1995, but is easily distinguished by distinct sternal and gonopodal characters. The status of *Orientalia* Dang, 1975, a synonym of *Hainanpotamon*, as a junior homonym of *Orientalia* Radoman, 1972 (Mollusca), is also discussed.

Key words: Crustacea, Brachyura, Potamidae, Potamiscinae, *Laevimon, Orientalia, Hainanpotamon*, new genus, new species, freshwater crab, Vietnam, Hainan, taxonomy

Introduction

In a nomenclatural note, Yeo & Ng (1998) commented that the generic name *Orientalia* Dang, 1975, was a junior homonym of *Orientalia* Radoman, 1972 (Mollusca) and thus unavailable, and that it should be replaced by a junior subjective synonym *Hainanpotamon* Dai, 1995. In the process, one species, *Orientalia tankiensis* Dang & Tran, 1992 [known from northern and central Vietnam] was also transferred to *Hainanpotamon*. Dang & Ho (2001), however, opted to retain *Orientalia* Dang, 1975, as a valid genus regardless, an action that will be discussed later in this paper.

The present study shows that *Hainanpotamon tankiense* differs significantly in sternal as well as G1 characters from other *Hainanpotamon* species, and should be referred to a new genus, here named *Laevimon*. In addition, a second species that shares the same diagnostic generic characters is also described from Vietnam.



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In *Laevimon*, new genus, the eighth thoracic sternite is not fused by a transverse ridge, and is completely separated by an uninterrupted longitudinal median line (Fig. 1) (see Yeo & Ng 2003). This character identifies *Laevimon* as a member of the recently revalidated subfamily Potamiscinae (sensu Yeo & Ng 2003).

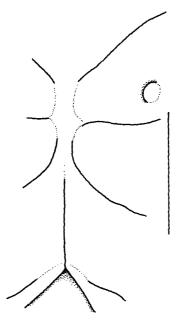


FIGURE 1. *Laevimon kottelati*, new species. Holotype, male (45.1 by 33.4 mm) (ZRC). Posterior thoracic sternum. Scale = 5.0 mm.

The following abbreviations are used: G1 for male first pleopod, G2 for male second pleopod. Measurements are of carapace width and length respectively and measure in millimetres (mm). Terminology used essentially follows Ng (1988). Specimens are deposited in the Vietnam National Centre for Natural Science and Technology (VNCNST), and Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore.

Taxonomy

Family Potamidae Ortmann, 1896 Subfamily Potamiscinae Ortmann, 1896 *Laevimon*, new genus

Type species. Laevimon kottelati, new species, by present designation.

Diagnosis. Carapace distinctly transverse, high; dorsal surface strongly convex longitudinally and transversely; smooth; grooves weak to indistinct; regions poorly defined; epigas-



tric cristae very weak, indistinct, confluent with postorbital cristae; postorbital cristae indistinct, rounded; antennular fossae slit-like; external orbital angle acutely triangular, separated from epibranchial tooth by distinct, rounded cleft; epibranchial tooth distinct, very low, rounded; anterolateral margin distinctly convex, entire, very weakly cristate; median tooth of posterior margin of epistome low, lateral and outer parts forming continuous sinuous margin, with lateral part convex and outer part gently concave. Ischium of third maxilliped broadly rectangular; exopod reaching beyond upper edge of ischium, with well developed flagellum subequal to or exceeding width of merus. Chelipeds distinctly unequal. Ambulatory legs moderately long, with long, slender dactyli. Suture between thoracic sternites 3 and 4 demarcated by strong ridge; abdominal cavity reaching imaginary line joining median points of coxae of chelipeds. Male abdomen narrowly triangular. G1 terminal segment about 0.3 times length of subterminal segment, subcylindrical, straight, tip truncate with inner distal angle produced as sharp, narrow projection, proximal part with narrow, hump-like, dorsal flap; subterminal segment relatively slender. G2 with distal segment longer than half of basal segment.

Etymology. The genus name is derived from *laevis*, Latin for smooth or polished, in arbitrary combination with the genus name, *Potamon*, in allusion to the carapace form of the genus. The gender is neuter.

Remarks. Laevimon, new genus, is morphologically closest to Hainanpotamon Dai, 1995, owing to its high, swollen and smooth carapace; long exopod flagellum of third maxilliped; long, slender ambulatory dactyli; and slender G1 with a short, straight terminal segment and narrow, proximal dorsal flap. Laevimon, however, can be immediately distinguished from *Hainanpotamon* by the following characters: i) carapace proportionately more strongly convex and raised laterally (versus carapace relatively less strongly convex); ii) postorbital cristae indistinct (versus postorbital cristae distinct); iii) epibranchial tooth very low, rounded (versus epibranchial tooth relatively more developed, triangular); iv) anterolateral margin entire, very weakly cristate (versus anterolateral margin weakly serrated, relatively more distinctly cristate); v) posterior margin of epistome with the lateral and outer parts forming a continuous sinuous margin, with the convex lateral part confluent with the gently concave outer part (versus posterior margin of the epistome with the lateral parts straight and distinct from gently concave outer parts); vi) suture between thoracic sternites 3 and 4 demarcated by distinct, strong ridge (versus suture between thoracic sternites 3 and 4 not discernible); and vii) G1 terminal segment subcylindrical, with tip truncate (versus G1 terminal segment conical, with tip tapered) (Figs. 2–6; Dang 1967: fig. 6, 1980: fig. 242; Dang & Tran 1992: figs. 1, 2; see also Table 1; Dai 1995).

Other Indochinese potamiscine genera that have swollen, smooth, egg-shaped carapaces similar to *Laevimon* are *Thaipotamon* Ng & Naiyanetr, 1993 [Thailand], *Thaiphusa* Ng & Naiyanetr, 1993 [Thailand], and *Pudaengon* Ng & Naiyanetr, 1995 [Thailand, Laos]. *Laevimon* is immediately differentiated from these by its unique suite of characters of the third maxilliped, thoracic sternum and G1 (see Table 1).



Crabs of the genus *Tiwaripotamon* Bott, 1970 [central Vietnam to southern China] also have a relatively smooth carapace (Bott 1970, Ng & Yeo 2001). However, the genus can immediately be distinguished by their distinctly lower and flatter carapace; slender, elongated legs; and third maxilliped with a squarish ischium having a shallow or no sulcus, and a short exopod with a short flagellum. This contrasts with *Laevimon* species, all of which have a high, swollen carapace; ambulatory legs that are not unusually elongated; and a third maxilliped with a rectangular ischium possessing a distinct sulcus, and a long exopod with a long flagellum (Figs. 2A, B, 3A, 4A, B; cf. Bott 1970, Dai 1999, Ng & Yeo 2001).

Distribution. Hai Phong, Thanh Hoa Province, northern Vietnam; Nghe Tinh Province, central Vietnam (Dang & Tran 1992).

TABLE 1. Key characters separating *Laevimon*, new genus, from *Hainanpotamon* Dai, 1995, *Thaipotamon* Ng & Naiyanetr, 1993, *Thaiphusa* Ng & Naiyanetr, 1993, and *Pudaengon* Ng & Naiyanetr, 1995.

	Laevimon	Hainanpotamon	Thaipotamon	Thaiphusa	Pudaengon
Flagellum of exopod of third maxil- liped	Present. Long, subequal to merus width	Present. Long, subequal to merus width	Present. Short, subequal to half merus width	Present. Short, subequal to half merus width	Absent
Thoracic sternum		Suture between sternites 3 and 4 not discernible	Suture between sternites 3 and 4 demarcated by distinct, broad, shallow groove	Suture between sternites 3 and 4 not discern- ible	Suture between sternites 3 and 4 not discernible
G1 terminal segment shape	Subcylindrical; tip broad and truncate, with inner distal angle produced as sharp, narrow projection	Conical, with tip comparatively slenderer and tapered, lacking projection on inner distal angle	Conical, with tip compara- tively slen- derer and tapered, lack- ing projection on inner distal angle	Conical, with tip compara- tively slen- derer and tapered, lack- ing projection on inner distal angle	Conical, with tip compara- tively slen- derer and tapered, lack- ing projection on inner distal angle
	part, distinctly shorter than half	like, in proximal	Broad, large, semicircular, distinctly longer than half length of terminal seg- ment	Broad, low, distinctly longer than half length of terminal seg- ment	Broad, large, semicircular, distinctly longer than half length of terminal seg- ment

Laevimon kottelati, new species (Figs. 1–3)



Material examined. Holotype: male (45.1 by 33.4 mm) (ZRC 2004.695), unnamed stream on road from National Park HQ to Gia Luan (Ra Luan), about 1 km, Cat Ba Island, Hai Phong, northern Vietnam, coll. M. Kottelat *et al.*, 25 Sep.1998. Paratypes: 1 female (44.9 by 33.5 mm) (ZRC 2004.696), unnamed stream on road from National Park HQ to Gia Luan, about 2–3 km, northern Vietnam, coll. M. Kottelat *et al.*, 26 Sep.1998; 3 males (largest 27.6 by 20.9 mm) (ZRC 2004.697), Cat Ba Island, 20°4757"N 107°00'05"E, northern Vietnam, coll. T. Whitten, 1998.

Description. Carapace (Fig. 2A, B) distinctly transverse, 1.32–1.35 times broader than long, high; dorsal surface strongly convex longitudinally and transversely, glabrous; regions indistinct; cervical grooves faint; H-shaped groove also indistinct. Epigastric cristae poorly developed, rounded, smooth, very weakly separated by faint groove, slightly anterior to postorbital cristae, confluent with postorbital cristae; postorbital cristae indistinct, straight, rounded, smooth, confluent with epibranchial teeth; regions behind epigastric and postorbital cristae smooth. Frontal margin very gently sinuous, cristate; frontal region strongly deflexed downwards, smooth; antennular fossae slit-like when viewed from front; supraorbital margin very gently sinuous, cristate; infraorbital margin straight, cristate; orbital region relatively narrow; eyes normally developed; sub-hepatic and subbranchial regions rugose. External orbital angle well developed, acutely triangular, outer margin subequal to inner margin, margins cristate, with shallow, narrow, rounded cleft separating it from epibranchial tooth; epibranchial tooth weak, low, rounded; anterolateral margin strongly convex, indistinctly cristate, almost smooth, entire, not confluent with posterolateral margin, running inwards posteriorly; posterolateral margin strongly converging posteriorly, entire, gently convex; branchial region smooth, inflated; metabranchial region smooth, lacking oblique striae. Epistome with median triangle on anterior margin; median tooth on posterior margin very low, broadly triangular, lateral and outer parts forming continuous sinuous margin, with gently concave outer parts and convex lateral parts; median endostomial ridge hardly visible (Fig. 2B).

Third maxilliped glabrous; ischium broadly rectangular, with distinct longitudinal median sulcus; merus squarish, subequal to half of ischium length, with concave outer surface, with smooth margins; palp three-segmented, with tip exceeding proximal margin of merus, lacking any distinctive feature; exopod long, exceeding distal margin of ischium, straight, distally tapered, inner margin of distal part produced as a tooth, flagellum well developed, longer than or subequal to width of merus (Figs. 2B, 3A).

Chelipeds unequal, outer surface of merus, carpus and palm weakly rugose; fingers strongly gaping, longer than palm, tips hooked and overlapping, carpus armed with robust, obliquely directed subdistal spine on inner margin; merus without subterminal spine (Fig. 2A). Chelipeds similar in males and females.



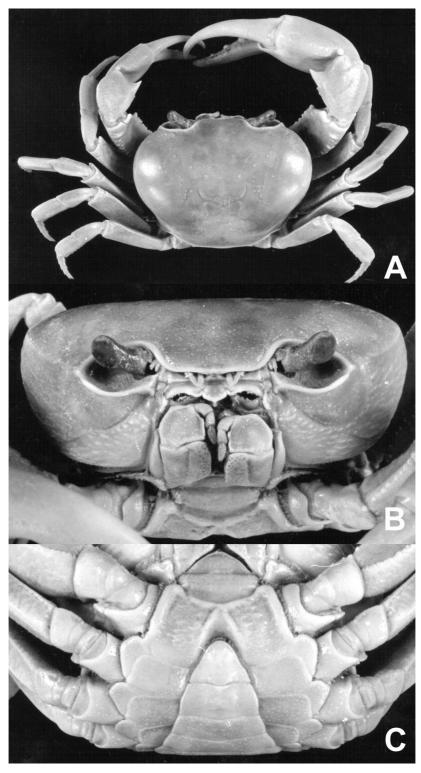


FIGURE 2. *Laevimon kottelati*, new species. Holotype, male (45.1 by 33.4 mm) (ZRC 2004.695). A, dorsal view; B, frontal view; C, ventral view.

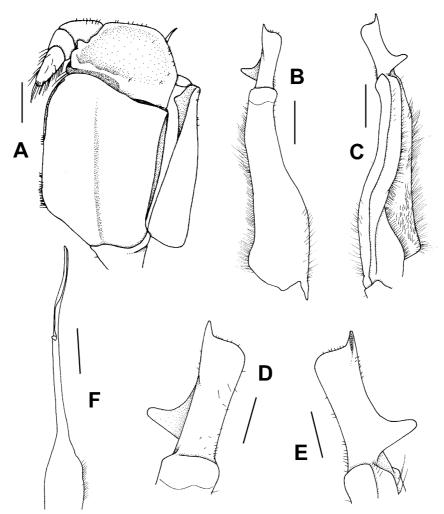


FIGURE 3. *Laevimon kottelati*, new species. Holotype, male (45.1 by 33.4 mm) (ZRC 2004.695). A, outer view of left third maxilliped; B–E, right G1: B, dorsal view; C, ventral view; D, dorsal view of terminal segment; E, ventral view of terminal segment; F, dorsal view of left G2. Scales: 2.0 mm in A–C, F; 1.0 mm in D, E.

Ambulatory legs glabrous, relatively short and stout; dactyli elongated, slender; merus unarmed, with upper margin weakly serrated; dactylus of fourth ambulatory leg about 1.3 times as long as propodus, about 6.2 times longer than proximal width; propodus, carpus and merus rugose (Fig. 2A).

Suture between thoracic sternites 2 and 3 distinct, complete, straight; groove or suture between thoracic sternites 3 and 4 demarcated by distinct, strong, complete ridge, fused with tip of margin of abdominal cavity; thoracic sternites 5 and 6 medially interrupted; thoracic sternite 7 completely separated by longitudinal median line; thoracic sternite 8 completely separated by longitudinal median line, lacking transverse ridge; abdominal cavity reaching imaginary line joining median part of coxae of chelipeds (Figs. 1, 2C).

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Male abdomen narrowly triangular; telson narrowly triangular, longer than or subequal to proximal width, slightly longer than sixth segment, lateral margins gently concave, tip rounded, proximal margin almost straight; segment 6 elongate rectangular or trapezoidal, median length about half of proximal width, proximal margin almost straight, lateral margins convex; lateral margins of segments 3 to 5 convex (Fig. 2C).

G1 gently sinuous, slender; terminal segment clearly separated from subterminal segment, relatively short and stout, about 0.3 times length of subterminal segment, subcylindrical, straight, without longitudinal torsion, without swelling on inner margin, dorsal flap present in proximal part, relatively high, narrow, hump-like, tip truncate with inner distal angle produced as sharp, narrow projection; groove for accommodation of G2 marginal; subterminal segment slender, not distinctly constricted or neck-like distally, without shelf on upper part of outer margin (Fig. 3B–E). G2 with distal segment distinctly longer than half of basal segment, slender, tapering distally, without distal projection; outer margin of basal segment gently convex (Fig. 3F).

Etymology. The species is named after its collector, Dr. Maurice Kottelat.

Remarks. Laevimon kottelati, new species, is very similar to L. tankiense (Dang & Tran, 1992). Laevimon kottelati can, however, still be easily separated from L. tankiense by the differences of the carapace and G1: i) carapace relatively less broad, 1.32-1.35 times broader than long (versus carapace broader, 1.43–1.52 times broader than long); ii) anterolateral and posterolateral margins relatively less strongly convex and less strongly converging, respectively (versus anterolateral and posterolateral margins relatively more strongly convex and more strongly converging, respectively); iii) cleft separating external orbital angle and epibranchial tooth relatively narrower, less distinct (versus cleft relatively broader, more distinct); iv) epibranchial tooth relatively lower and weaker (versus epibranchial tooth relatively higher and more strongly developed); v) ridge demarcating suture between thoracic sternites 3 and 4 complete, fused with tip of margin of abdominal cavity (versus ridge demarcating suture between thoracic sternites 3 and 4 incomplete, broken medially, not fused with tip of margin of abdominal cavity); vi) male abdominal segment 6 lateral margins distinctly convex (versus male abdominal segment 6 lateral margins very gently convex to almost straight); vii) G1 terminal segment relatively more slender, with a relatively higher and narrower dorsal flap (versus G1 terminal segment relatively stouter, with a relatively lower and broader dorsal flap); and viii) G1 subterminal segment is relatively more slender (versus subterminal segment relatively broader) (Figs. 2-6).

Ecological note. The specimens of *Laevimon kottelati* were collected from along the stream banks as well as a short distance from the streams (M. Kottelat, pers. comm.). This semi-terrestrial habit is unusual for freshwater crabs with such carapace physiognomy (high, swollen carapace), instead normally being associated with more terrestrial forest habitats (e.g., *Terrapotamon abbbotti*, *Thaiphusa sirikit*, *Thaipotamon chulabhorn*, *Pudaengon* spp.) or poorly-oxygenated aquatic habitats (e.g., *Somanniathelphusa* spp.)

(Naiyanetr 1992, 1993; Ng 1993; Ng & Naiyanetr 1993, 1995, 1998; Ng & Kosuge 1997; pers. observ.).

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Distribution. Hai Phong, northern Vietnam.

Laevimon tankiense (Dang & Tran, 1992) (Figs. 4-6)

Orientalia tankiensis Dang & Tran, 1992: 19, Fig. 2; Dang & Ho, 2001: 74, Fig. 9. Hainanpotamon tankiensis.— Yeo & Ng, 1999: 641.

Material examined. Holotype: male (40.0 by 26.4 mm) (VNCNST), Tan Ky District, Nghe Tinh Province, northern Vietnam, coll. Jul.1987. Paratype: 1 female (33.5 by 23.4 mm) (VNCNST), same data as holotype.

Diagnosis. Carapace distinctly transverse, 1.43–1.52 times broader than long, high; dorsal surface strongly convex longitudinally and transversely, smooth; epigastric cristae very weak, indistinct; postorbital cristae indistinct, rounded; external orbital angle acutely triangular, separated from epibranchial tooth by distinct, broad rounded cleft; epibranchial tooth low but distinct, rounded; anterolateral and posterolateral margins very strongly convex and strongly converging, respectively. Third maxilliped exopod reaching beyond distal margin of ischium, flagellum well developed, subequal to or exceeding width of merus. Ambulatory dactyli long, slender. Suture between thoracic sternites 3 and 4 demarcated by strong incomplete ridge, not fused with tip of margin of abdominal cavity. Male abdomen narrowly triangular; segment 6 with lateral margins very gently convex. G1 terminal segment about 0.3 times length of subterminal segment; subcylindrical, straight, tip truncate with inner distal angle produced as sharp, narrow projection, with narrow, hump-like, dorsal flap in proximal part; subterminal segment relatively slender. G2 with distal segment longer than half-length of basal segment.

Remarks. Laevimon tankiense (Dang & Tran, 1992) differs from its only congener, L. kottelati, new species, by several characters of the carapace, thoracic sternum and G1 (see Remarks for Laevimon kottelati). The first author examined the types of this species while visiting the VNCNST but, unfortunately, was unable to illustrate specimens. Dang & Tran's (1992) figure 2 and Dang & Ho's (2001) figure 9 are therefore reproduced here in Figs. 5 and 6 for comparison. Although the drawings by Dang & Tran (1992) and Dang & Ho (2001) are rather diagrammatic, they nevertheless agree relatively well with the types re-examined. Dang & Tran's (1992: fig. 2) drawing of the G1 was made with the structure tilted on its side and hence their figure may be somewhat misleading. In any case, the G1 of L. kottelati, when viewed and compared from all possible orientations, neither matches the G1 of the holotype examined by the first author nor the published illustrations of L. tankiense (Dang & Tran 1992, Dang & Ho 2001). Therefore, we are certain that we are dealing with inter-specific differences between L. kottelati and L. tankiense.



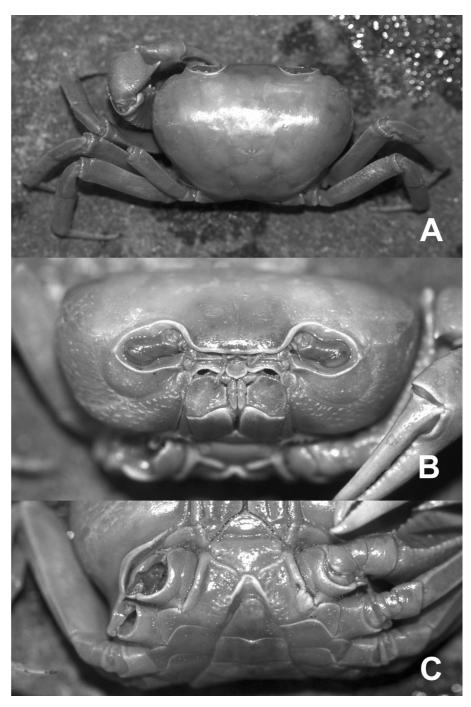


FIGURE 4. Laevimon tankiense (Dang & Tran, 1992). Holotype, male (40.0 by 26.4 mm) (VNCNST). A, dorsal view; B, frontal view; C, ventral view.

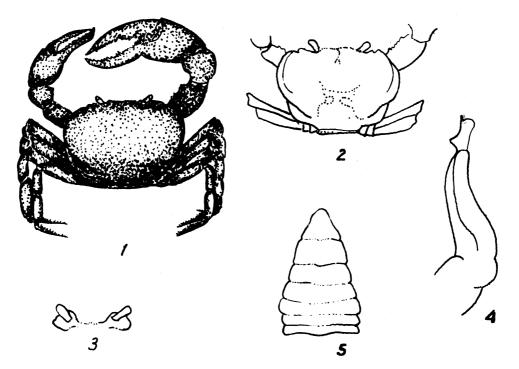


FIGURE 5. *Laevimon tankiense* (Dang & Tran, 1992). 1, dorsal view; 2, carapace; 3, frontal area; 4, ventral view of left G1; 5, male abdomen. Reproduced from Dang & Tran (1992: fig. 2).

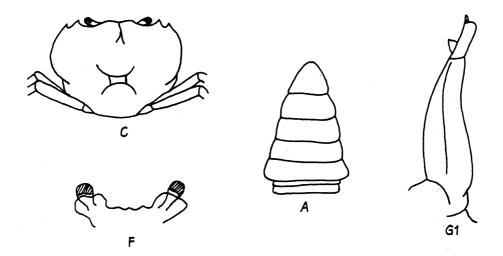


FIGURE 6. Laevimon tankiense (Dang & Tran, 1992). A, male abdomen; C, carapace; F, frontal area; G1, ventral view of left G1. Reproduced from Dang & Ho (2001: fig. 9).

Ecological note. The species occurs in streams in hilly or mountainous areas (Dang & Ho 2001).

Distribution. Thanh Hoa Province, northern Vietnam; Nghe Tinh Province, central Vietnam (Dang & Tran 1992).

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Comments on the nomenclatural status of Orientalia Dang, 1975

Dang (1975) established *Orientalia* for a semi-terrestrial crab species from Vietnam, *Orientalia glabra* (Dang, 1967) [designated type species], and "*Ranguna (Ranguna) orientalis* (Parisi, 1916)" from Hainan Island (southern China). Not realizing that Parisi's species had already been included in *Orientalia* by Dang (1975) and Dang & Tran (1992), Dai (1995) established a new genus, *Hainanpotamon*, for a similar group of crabs from Hainan, with *Potamon orientale* Parisi, 1916, as the type species.

Yeo & Ng (1998) pointed out the synonymy of the two genera and further reported that *Orientalia* Dang, 1975, was actually a junior homonym of a Yugoslavian land snail genus, *Orientalia* Radoman, 1972. *Hainanpotamon* Dai, 1995, being a subjective synonym of *Orientalia* Dang, 1975, was thus the next available name. All species of *Orientalia* Dang, 1975, were therefore transferred to *Hainanpotamon* (see Yeo & Ng 1998). In addition to *H. tankiense*, Yeo & Ng (1998) also recognized the following other members of *Hainanpotamon*: *H. orientale* (Parisi, 1916), *H. helense* Dai, 1995, and *H. fuchengense* Dai, 1995, all from Hainan; and *H. glabrum* (Dang, 1967), and *H. rubrum* (Dang & Tran, 1992) from central to northern Vietnam.

Dang & Ho (2001), however, continued to use the name *Orientalia* Dang, 1975, arguing that "...whether the two genera *Orientalia* Dang, 1975, and *Hainanpotamon* Dai, 1995, are synonyms should be subject to further consideration because, in our opinion, the male gonopod structure of all *Orientalia* species from north Vietnam differ from that of *Hainanpotamon orientale*, the type species of *Hainanpotamon*; and especially because of the disjunct distribution of these two genera (north Vietnam and Hainan Island)"[translated from original Vietnamese text].

Unfortunately, regardless of the doubts raised by Dang & Ho (2001) on the synonymy or distinctiveness of *Orientalia* Dang, 1975, and *Hainanpotamon* Dai, 1995, the former name remains a junior homonym of molluscan *Orientalia* Radoman, 1972. It is therefore unavailable for use, as mandated by the International Code of Zoological Nomenclature (ICZN 1999). If the synonymy were invalid as suggested by Dang & Ho (2001), a new genus would have to be created for the species of *Orientalia* Dang, 1975, that are clearly distinguishable from *Hainanpotamon*. In any case, this study has shown that one of these species, *Orientalia tankiense* actually belongs to a new genus, *Laevimon*.

Yeo & Ng (1998), on re-examining the types of *Potamon orientale* Parisi, 1916, and *Orientalia rubra* Dang & Tran, 1992, found them to be clearly congeneric, and expressed confidence that *Orientalia* Dang, 1975, and *Hainanpotamon* Dai, 1995, were subjective synonyms. However, the holotype of the type species of *Orientalia, Potamon (Geothelphusa) glabra* Dang, 1967, could not be located for re-examination (see Yeo & Ng 1998), but the species is very similar to *O. rubra*; and furthermore, comparison between specimens of *Hainanpotamon orientale* and published information on *Orientalia glabra* (cf. Dang 1967, 1980; Dang & Ho 2001) failed to detect any differences separating the two species in different genera. Therefore, the generic name *Hainanpotamon* should be used

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as the next available name for the generic taxon; and *O. glabra* thus must be referred to *Hainanpotamon*. Moreover, in the original paper describing *Orientalia*, Dang (1975) himself noted the congenericity of the two species: "...*Ranguna (Ranguna) orientalis* (Parisi, 1916) from Hainan is closely related to *O. glabra* in the similar carapace and G1 characters, and should be included in *Orientalia*, new genus" [translated from original Vietnamese text].

With regards to Dang & Ho's (2001) contention that the synonymy is questionable "... especially because of the disjunct distribution of these two genera (northern Vietnam and Hainan island)", we beg to differ. While it is true that islands often hold endemic taxa distinct from mainland species, in the present case, the species involved are all actually in the same general area. Hainan is separated from southern China and northern Vietnam only by the Gulf of Tonkin, and the last glacial event would have connected all the landmasses concerned. Among the species assigned to *Orientalia* Dang, 1975, only *O. tankiense* showed major differences in sternal and G1 structure separating it from *H. orientale*, and is here assigned to *Laevimon*. We therefore contend that *Orientalia* Dang, 1975, and *Hainanpotamon* Dai, 1995, are subjective synonyms, with the latter name being nomenclaturally valid, and the former being preoccupied and nomenclaturally unavailable.

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