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Redescription of *Callianassa vigilax* DE MAN, 1916, a subjective senior synonym of *Neocallichirus denticulatus* NGOC-HO, 1994 (Crustacea: Decapoda: Callianassidae)

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Abstract

Investigation of newly collected material from the Philippines and Sulawesi – together with re-examination of the type materials of *Callianassa vigilax* DE MAN, 1916 and *Neocallichirus denticulatus* NGOC-HO, 1994 – revealed that the latter is identical with the former and thus a junior synonym of *Callianassa vigilax*. A redescription of this species is presented together with notes on its morphological variability and ecology. This is the first record of the species from the Philippines.

Key words: *Callianassa vigilax*, *Neocallichirus denticulatus*, synonymy, the Philippines, Sulawesi

Zusammenfassung

Untersuchungen von neuem Material von den Philippinen und Sulawesi, Indonesien – zusammen mit dem Studium des Typenmaterials von *Callianassa vigilax* DE MAN, 1916 und *Neocallichirus denticulatus* NGOC-HO, 1994 – haben ergeben, dass beide Arten ident sind und daher letztere mit der ersten synonym ist. Die Art wird wiederbeschrieben, die morphologische Variabilität dokumentiert und Informationen zur Ökologie präsentiert. Diese Art ist neu für die Philippinen.

Introduction

Callianassa (*Callichirus*) *vigilax* was described by DE MAN (1916) based on a single female which lacked the major cheliped. DE MAN (1916) mentioned that his new species was very similar to *Callianassa armata* A. MILNE-EDWARDS, 1870 (currently *Glypturus armatus*). DE SAINT LAURENT & LELOEUFF (1979) placed *C. vigilax* in the "acanthochirus" group of their genus *Callichirus* STIMPSON, 1866, together with species now placed into *Glypturus* STIMPSON, 1866 (*C. acanthochirus* STIMPSON, 1866, *C. armatus*) or *Corallianassa* MANNING, 1987 (*C. longiventris* A.MILNE-EDWARDS, 1870, *C. coutierei* NOBILI, 1904) and others with a trispinous front that are placed currently into *Neocallichirus* SAKAI, 1988 (*C. rathbunae* SCHMITT, 1935 [= *N. maryae* KARASAWA, 2004]) or *Sergio* MANNING & LEMAITRE, 1994 (*C. guassutinga* RODRIGUES, 1971). SUCHANEK & Colin (1986: 27) mentioned that the species they studied at Enewetak was tentatively identified by M. de Saint Laurent as *Callichirus vigilax* based on specimens collected by P.L. Colin & D.M. Devany in 1981. GARTH et al. (1987) list this species for Enewetak Atoll based on material collected by P. Colin and D.M. Devany from the lagoon by airlift pumps in 1980 and subsequently identified by M. de Saint Laurent.

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Neocallichirus denticulatus NGOC-HO, 1994 was described for two small (total length 19–21 mm) females collected NW of Townsville, QLD, Australia at 24 m depth. NGOC-HO (1994) concluded that the most closely related species was the western Atlantic *N. rathbunae* (= *N. maryae*).

During the Panglao 2004 expedition several small- to medium-sized (total length between 20 and 50 mm) callianassid specimens were collected from sublittoral bottoms. They were initially identified as *N. denticulatus*. Recent samplings by D. Kneer at Sulawesi revealed large specimens (total length between 62 and 92 mm) which resembled *C. vigilax*. Study of the type material of *Callianassa vigilax* showed that the Panglao material must be attributed to this species and that *N. denticulatus* is based on juvenile specimens of *C. vigilax*.

Material is deposited in the following museums: BPBM, Bernice Pauahi Bishop Museum, Hawai'i; MNHN, Muséum National d'Histoire Naturelle, Paris, France; NHMW, Naturhistorisches Museum Wien, Austria; NMCR, National Museum of the Philippines, Manila; RMNH, Naturalis, Nationaal Naturhistorisch Museum, Leiden, The Netherlands; ULLZ, University of Louisiana at Lafayette, Zoological Collection, USA; ZRC, Zoological Reference Collection, Raffles Museum of Biodiversity Research, Singapore.

Size is expressed as total length (tl in mm) from the tip of the rostrum to the end of the telson and as carapace length (cl in mm) from the tip of the rostrum to the posterior median edge of the carapace. Other abbreviations used are: A1, first antenna (antennule); A2, second antenna; Mxp2, second maxilliped; Mxp3, third maxilliped; P1, first pereopod; P3, third pereopod; Plp1, first pleopod; Plp2, second pleopod; coll., collector. Numbers preceeded by "PD" are field collection numbers. For details on sampling sites and methods of the Panglao 2004 expedition see BOUCHET et al. (2009).

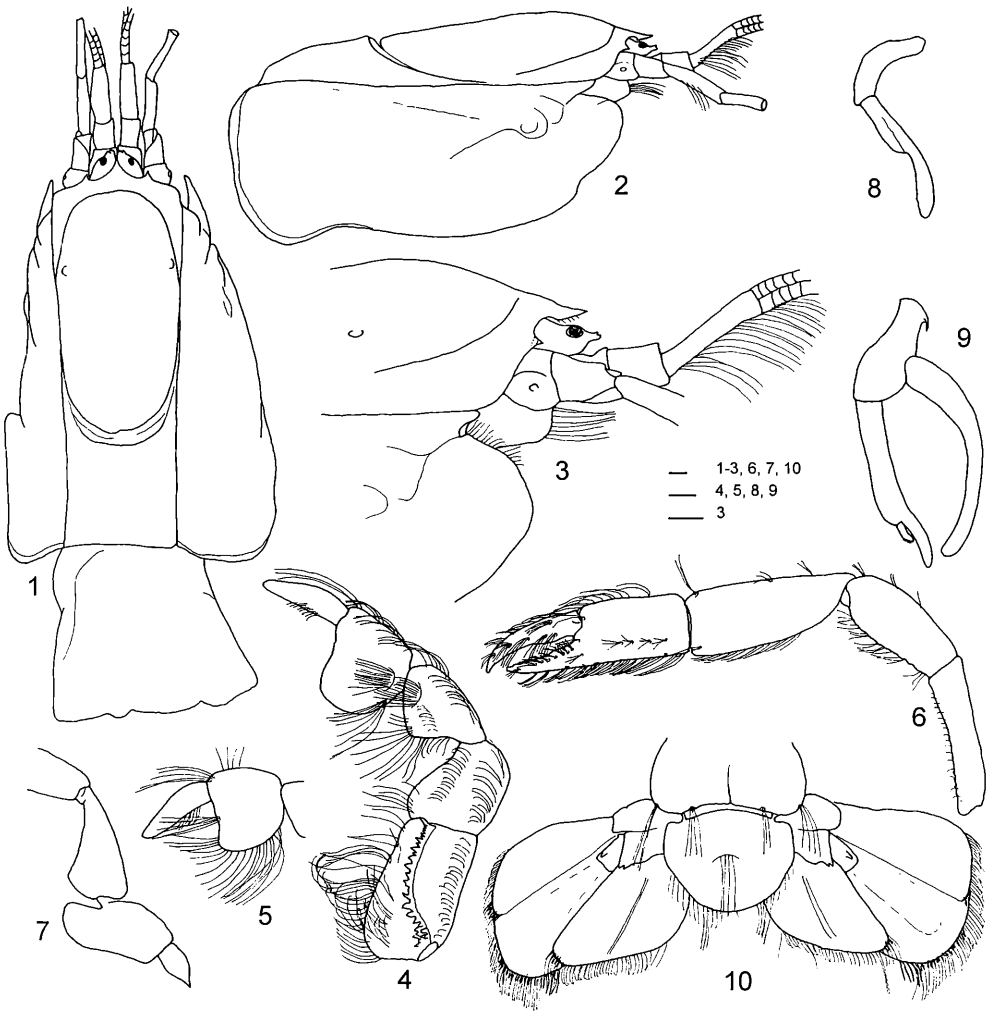
Taxonomy

Neocallichirus vigilax DE MAN, 1916

Figs. 1–79

Callianassa (*Callichirus*) *vigilax* DE MAN, 1916: 57, pl. 1 figs 1-6; 1928: 30 (list), 109 (key).
Callianassa vigilax –SUCHANEK & COLIN, 1986: 27; –TUDGE et al., 2000: 143 (list).
Callichirus vigilax –DE SAINT LAURENT & LELOEUFF, 1979: 97; –GARTH et al., 1987: 239 (checklist), 249 (collection records).
Neocallichirus vigilax –SAKAI, 1999: 108; 2005b: 183.
Neocallichirus denticulatus NGOC-HO, 1994: 56, fig. 4; –SAKAI, 1999: 98; 2005b: 178; –TUDGE et al., 2000: 144(list); –SCHWEITZER & FELDMANN, 2002: 942; –DAVIE, 2002: 461; –ROBLES et al., 2009: 314 (tree), 317 (list) [new synonymy].

Material examined. – INDONESIA, "Ind. Archipel, Molukken, Ambiona, E.W.A. Ludeking coll. 1863", RMNH D1481, holotype female (tl 85 cl 22, major P1, left P3-P5 missing, right mxp3, P2, P3, P4 detached); Indonesia, Sulawesi, Spermonde Archipelago, Bone Batang Island, D. Kneer coll. under a 5 x 6 m-plastic tarp which covered the sediment surface for one week, found alive May 2008, NHMW 24960, 1 female (#0, tl 92, cl 22.8); Indonesia, Sulawesi, Spermonde Archipelago, Bone Batang Island, D. Kneer coll. decaying under a 5 x 6 m-plastic tarp which covered the sediment surface for one week, May 2008,



Figs. 1–10. *Neocallichirus vigilax*, RMNH D1481, female holotype of *Callianassa vigilax* DE MAN, 1916 (tl 85 cl 22): 1, carapace and first abdominal somite in dorsal view; 2, carapace in lateral view; 3, front in lateral view; 4, right third maxilliped, mesial view; 5, left third maxilliped, propodus and dactylus, lateral view; 6, minor cheliped, lateral view; 7, third pereopod, distal articles in lateral view (setae omitted); 8, right first pleopod, posterior view (setae omitted); 9, right second pleopod, posterior view (setae omitted); 10, tailfan. Scale is 1 mm.

NHMW 24962, 1 female (#2, tl 62, cl 16.9, major P1 left, minor P1 missing); NHMW 24961, 1 male (#3, tl 88, cl 24.4, major P1 left); NHMW 24963, 1 female (#4, carapace damaged, abdomen 66 mm); NHMW 24964, 1 right major P1; NHMW 24966, 1 propodus of left major P1, NHMW 24965, 1 left major cheliped (ischium, carpus, propodus, dactylus).

THE PHILIPPINES, Bohol, Panglao Island: M7, Momo Beach, 4 m, reef platform with seagrass, 9°36.1'N, 123°45.2'E, P. Dworschak coll. with yabby pump 25 June 2004, ZRC 2010.0319, 1 male (tl 37 cl 10), (PD 207, photograph). – M5(M8), Doljo Point, mixed intertidal platform, fringe mangrove, seagrass, 9°35.5'N, 123°43.3'/123°44.3'E, P. Dworschak coll. with yabby pump 3 June 2004, NMCR 39009, 1 female (tl 50 cl 13.8) (PD015, photograph, dissected). – R26, Sungcolan Bay, 0-4 m, fringe mangrove, sand and seagrass

(*Enhalus*), 9°38.4/38.5'E, 123°49.1'N/49.4/49.7'N, P Dworschak coll. with yabby pump 9 June 2004, MNHN Th-1600, 1 male (tl 44 cl 12.2) (PD064); 16 June 2004, MNHN Th-1602, 1 female (tl 40 cl 10.2) (PD121); MNHN Th-1603, 1 female (tl 25 cl 7.5)(PD122). – R32, Pontod Islet lagoon, 4 m, sand with seagrass (*Thalassia*, *Enhalus*), *Halimeda*, *Cassiopeia*, 9°33.1'N, 123°44.0'E, P. Dworschak coll. with yabby pump 8 June 2004, NMCR 39011, 1 female (tl 30 cl 8.7) (PD057); NMCR 39010, 1 female (tl 23 cl 6.4)(PD060); 10 June 2004, NHMW 24983, 1 female (tl 19 cl 5) (PD072); ZRC 2010.0316, 1 female (tl 22 cl 5.6) (PD074); MNHN Th-1601, 1 unsexable (tl 23 cl 6.3) (PD076). – R39, lagoon, 3 m, sand with seagrass (*Thalassia*, *Enhalus*), *Halimeda*, *Cassiopeia*, 9°33.6'N, 123°43.4'E, P. Dworschak coll. with yabby pump 11 June 2004, ZRC 2010.0317, 1 male (tl 29 cl 8.3) (PD088); NHMW 24984, 1 male (tl 20 cl 6.0) (PD089). – R44, lagoon near Doljo Point, 4 m, fine sand with seagrass and *Halimeda*, 9°33.3'/9°34.6'N, 123°43.9'/123°43.4'E, P. Dworschak coll. with yabby pump 14 June 2004, NHMW 24985, 1 male (tl 37 cl 10.4) (PD091); NHMW 21945, 1 female (tl 49 cl 13.2) (PD092)(DNA voucher ULLZ 8441, GenBank EU874984 and EU874934, as *N. denticulatus*); ZRC 2010.0318, 1 female (tl 24 cl 6.2) (PD093); NHMW 24986, 1 female (tl 16 cl 5.0) (PD184).

AUSTRALIA, Queensland, Davies Reef Lagoon, 5 m depth [depth erroneously given as 26 m in Ngoc-Ho, 1994], coll. AIMS, #3, Site 2, MNHN Th-1246, 1 female (tl 19, cl 5.5, minor cheliped missing, paratype of *N. denticulatus*, dissected by Ngoc-Ho).

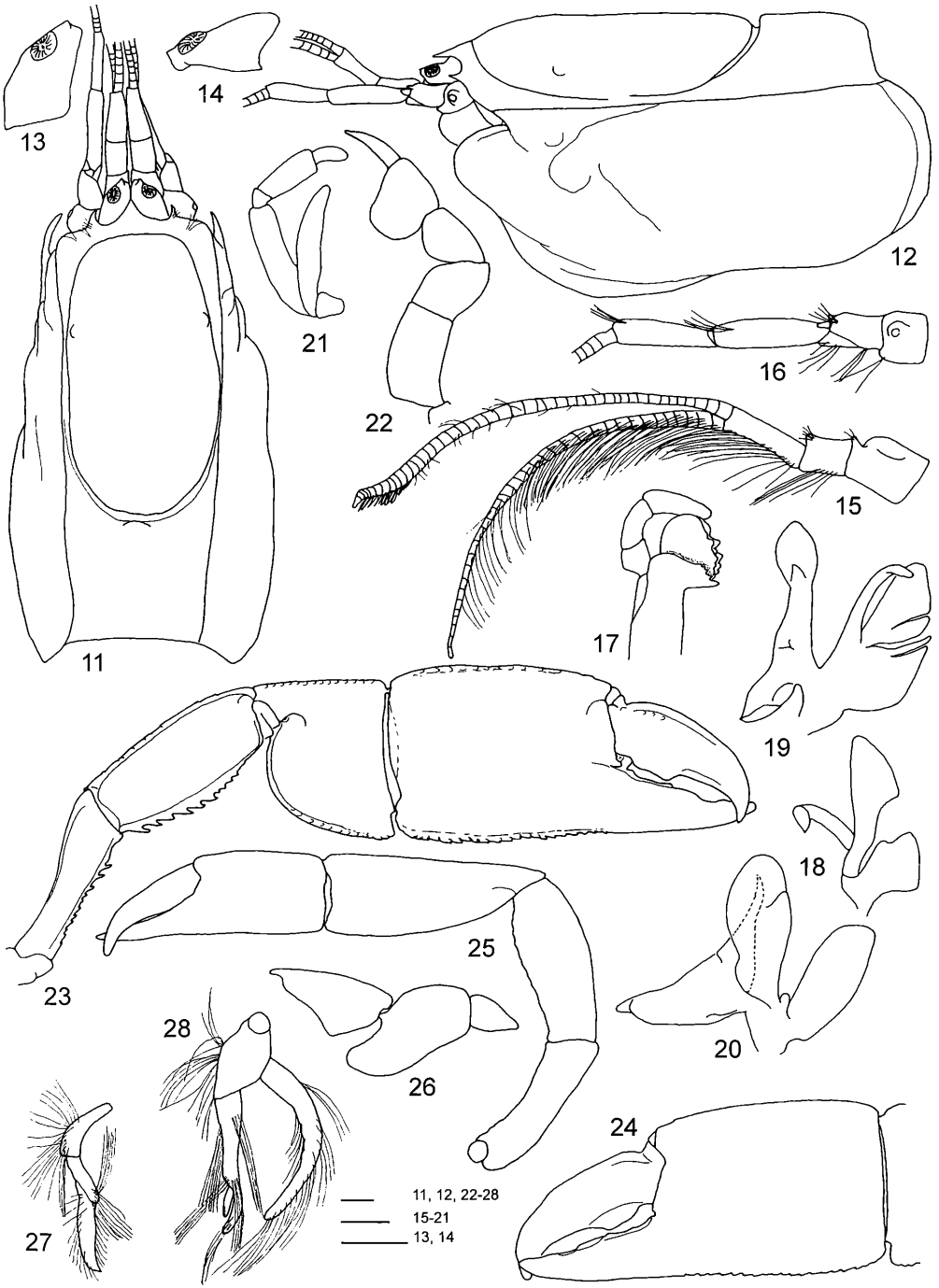
NO LOCATION DATA "841008 A/9 13gCl 229B", MNHN Th-1231, 1 female (tl 43, cl 10.7, major P1, both mxp3, left P3 missing).

Diagnosis. – Carapace 1/4 of total length (Figs 1, 11, 57). Carapace front including acute triangular rostrum reaching between 1/2 and 2/3 visible length of eyestalks, triangular lateral projections to each side reaching dorsally almost to end of basal article of antennal peduncle (Figs. 3, 12, 29, 42, 60). Carapace lacking cardiac prominence and dorsal carina, with distinct linea thalassinica; dorsal oval with distinct tubercle on each side of anterior half, oval distinctly marked posteriorly by deep transverse cardiac furrow, latter extending anteroventrally to either side above linea thalassinica as shallow groove marking posterior half of dorsal oval. Carapace frontal margin continued ventrolaterally beyond intersection with linea thalassinica as thickened oblique ridge ending anteriorly at prominent hepatic boss (Figs 2, 12, 57). Branchiostegal lobe with sclerotised ridge along anterodorsal margin articulating at junction of oblique ridge and linea thalassinica. Epistome subantennular region bearing dense tuft of long setae.

Eyestalks reaching to or beyond basal antennular article, slightly longer than broad, outer margins convex, slightly emarginated, terminating in a flat rounded lobe bearing a small tubercle at its outer margin (Figs 3, 13, 58), terminal lobe appearing flattened in lateral view (Figs 14, 58); cornea black, situated dorsolaterally in distal 1/2 of eyestalk, ca 1/3 to 1/2 width of eyestalk.

Antennular peduncle (Fig. 15) thicker, but shorter than antennal peduncle, reaching to end of penultimate antennal article; second article slightly longer than basal article; terminal article 2 times length of second.

Figs. 11–28. *Neocallichirus vigilax*, NMCR 39009 (M8_PD015), female (tl 50 cl 13.8). Carapace in dorsal (11) and lateral (12) view; left eyestalk in dorsal (13) and lateral (14) view; left antennule (15) and left antenna (16) in lateral view; 17, left mandible in mesial view; 18, left first maxilla, mesial view; 19, second left maxilla, mesial view; 20, right first maxilliped, lateral view; 21, left second maxilliped, mesial view; 22, third left maxilliped, lateral view; major cheliped in mesial (23) and propodus/dactylus in lateral (24) view; 25, minor cheliped in mesial view; 26, distal part of third pereopod in lateral view; left first (27) and second (28) pleopod in anterior view. All setae omitted except in 16, 17, 27, 28. Scale is 1 mm.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Antennal peduncle (Fig. 16) basal article with dorsolateral carina forming lip above excretory pore; second as long as first article; third article short, visible in lateral view as short triangle ventral to second article and vestigial antennal scale; fourth article elongate, as long as basal, second and third article combined; fifth article narrower, as long as fourth article.

Mouthparts as figured (Figs 17–22), typical for genus. Mandible (Fig. 17) with toothed molar process. Third maxilliped (Figs 4, 5, 22, 31, 38, 44, 61) lacking exopod, with large setose endopod; endopodal ischium 1.7 times as long as broad, mesial surface with row of teeth (crista dentata); merus triangular, as long as broad; carpus triangular, longer than broad; propodus large, ovoid, slightly broader than long; dactylus narrow, arcuate.

Major cheliped (Figs 23, 24, 32, 39, 62, 71–74) located on either right (9 cases) or left (13 cases) side of body, shape and ornamentation variable depending on size (see below); no obvious sexual dimorphism. Ischium slender, inferior margin with row of teeth, largest proximally; merus with teeth on inferior margin; carpus with straight superior and convex inferior margin; propodus with low smooth or tuberculated keel in proximal 3/4 of superior margin, inferior margin of palm smooth or serrated; fixed finger slightly curved, low triangular tooth at midlength; dactylus slightly curved, about as long as fixed finger.

Minor cheliped (Figs 6, 25, 40, 63) slender, about 0.8 times as long and 0.3 times as high as major cheliped; sparsely armed, ischium unarmed on inferior margin; merus unarmed or slightly undulated on lower margin, with rounded superior and inferior margins; carpus more than twice as long as high; palm of propodus 0.75 times the length of the carpus, fixed finger slightly shorter than palm, triangular; dactylus slightly curved; cutting edges of fixed finger and dactylus smooth.

Third pereopod (Figs 7, 26, 33, 45, 64) propodus rhomboidal, not heeled.

Abdomen long; dorsal length ratio (along midline) of first to sixth abdominal somites 1 1.28 0.98 0.71 0.92 1.58 (holotype).

Male first pleopod of two articles; second article as long as first, with rounded lobe and acute hooked tip distally (Figs 47, 50, 67). Female first pleopod (Figs 8, 27) simple, consisting of two articles; terminal article with shoulder at midlength.

Male second pleopod (Figs 51, 54, 68) biramous, variable with respect to length of endopod, exopod, shape and demarcation of appendix masculina and appendix interna

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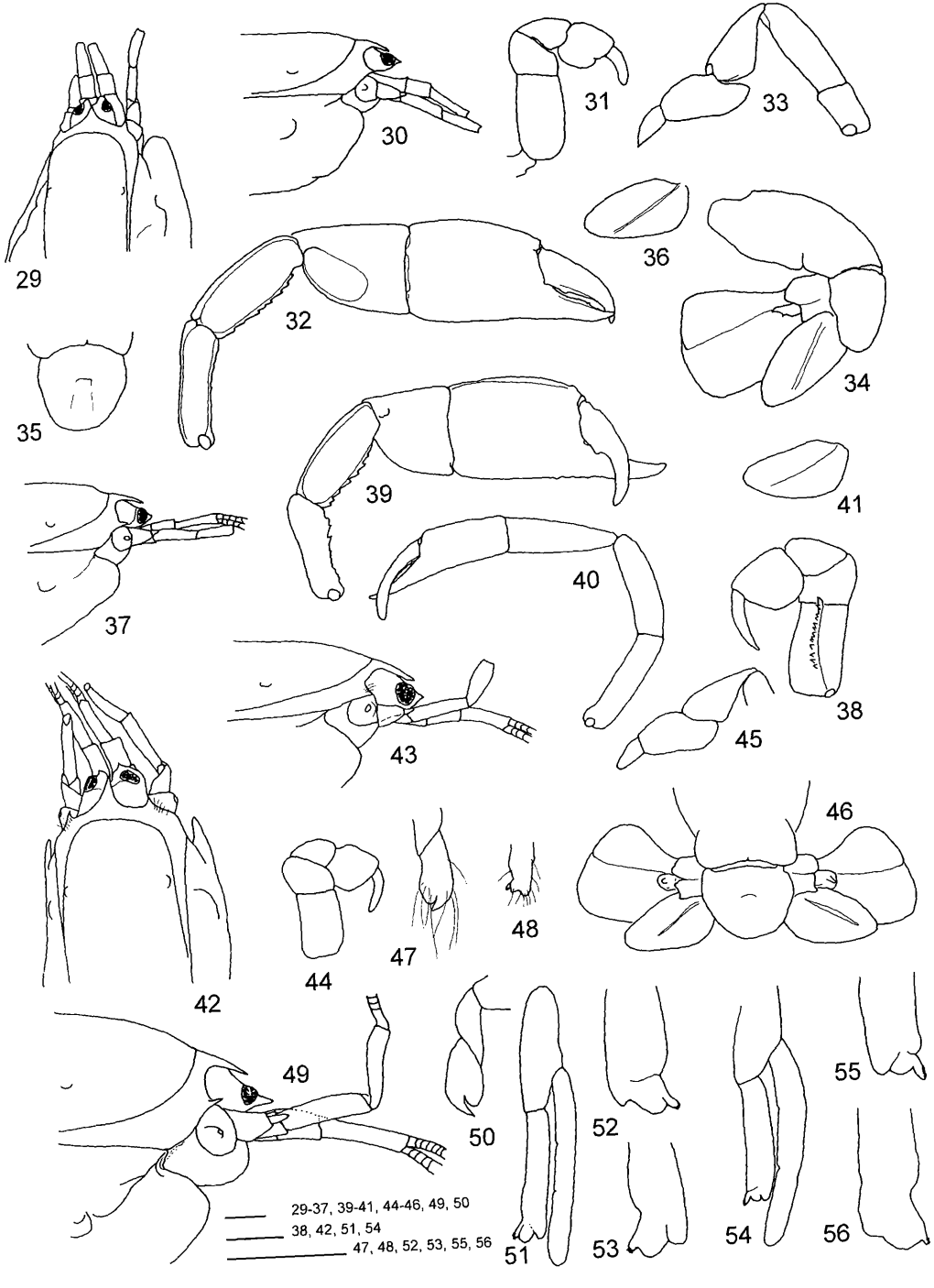
Figs. 29–56. *Neocallichirus vigilax*. 29–36, MNHN Th-1246, female (cl 5.5, paratype of *Neocallichirus denticulatus* NGOC-HO, 1994); 37–41, MNHN Th-1601 (R32_PD76), juvenile (cl 6.3); 42–48, NHMW 24984 (R39_PD089), male (cl 6.0); 49–53, MNHN Th-1600 (PD064), male (cl 12.2); 54, 55, NHMW 24985 (PD091), male (cl 10.4); 56, ZRC 2010.0319, (PD207), male (cl 10.0). 29, 42, front in dorsal view; 30, 37, 43, 49, front in lateral view; 32, 39, major cheliped in mesial view; third maxilliped in lateral (31, 44) and mesial (38) view; 33, 45, third pereopod in mesial view; tailfan in lateral (34) and dorsal (46) view; 35, telson in dorsal view; 36, 41, uropodal endopod in dorsal view; 40, minor cheliped in mesial view; first pleopod (47, 50) in lateral mesial (47) and lateral (50) view, second pleopod (51, 54) in posterior view and endopod apex of second pleopod in anterior (52, 55, 56) and posterior (48, 53) view. All setae omitted except in 46 and 47. Scale is 1 mm.



(see below). Female second pleopod biramous, exopod and endopod slender, latter with appendix interna (Figs 9, 28).

Third to fifth pleopods with stubby appendix interna, slightly projecting beyond mesial margin of endopod (Fig. 66).

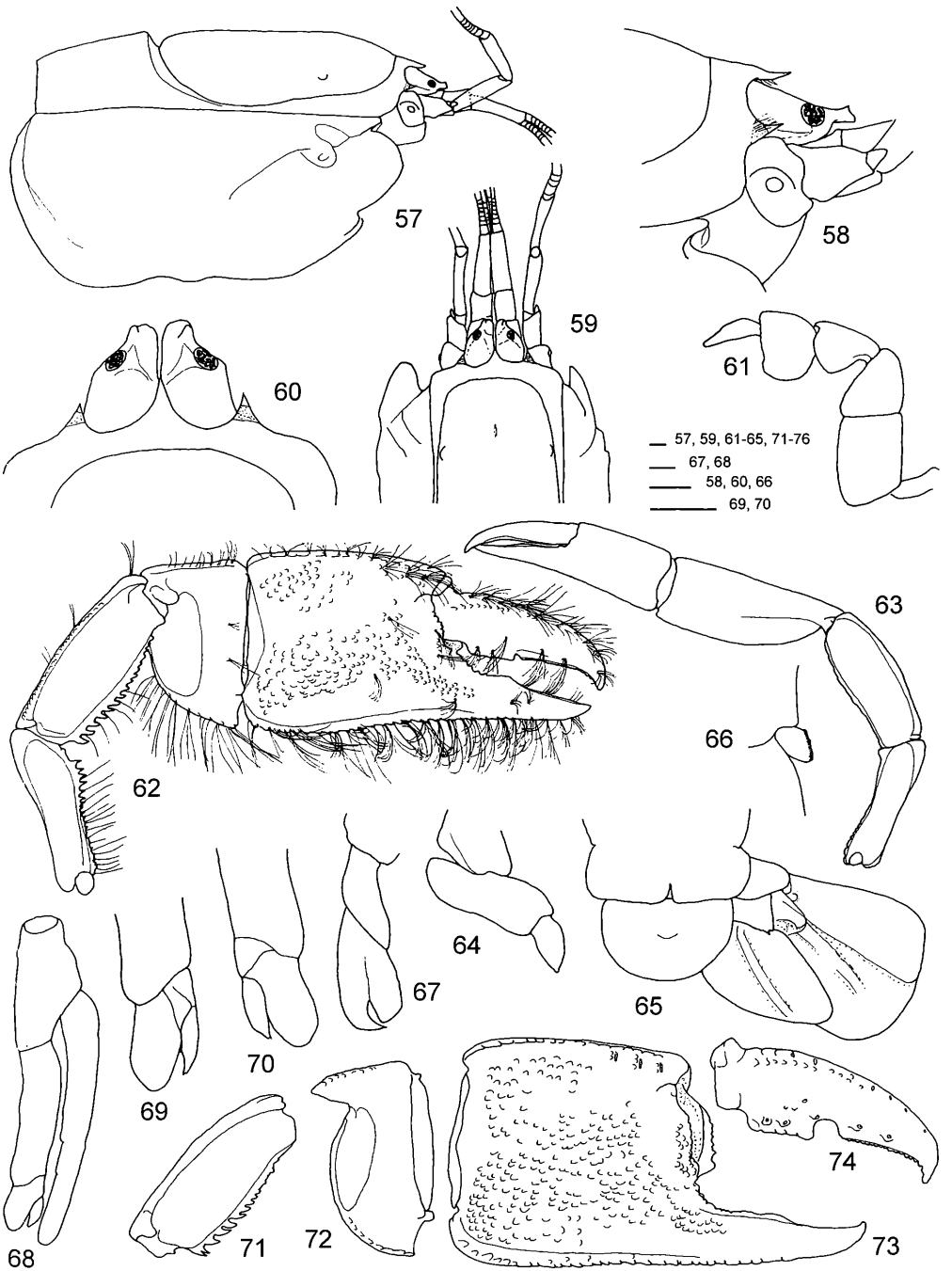
Telson (Figs 10, 35, 46, 65) broader than long, broadest proximally, lateral and posterior margins convex. Uropodal endopod (Figs 10, 36, 41, 46, 65) 1.5 times as long as telson, rhomboid, about twice as long as wide. Uropodal exopod (Figs 10, 34, 46, 65) longer than endopod, with low anterodorsal plate.

Variations: The shape of the eystalks and the rostrum varies greatly. In relation to the linea thalassinica, the rostrum may be downturned (Figs 30, 37, 43, 49), straight (Figs 3, 12) or upturned (Fig. 58). The eyestalks are short and triangular in small specimens with the cornea occupying the entire eyestalk height (Fig. 30, 43); it is smaller in relation to eyestalk height and width in larger specimens (Figs 3, 11, 12, 58, 60), which also show a flattened lobe distally on the eyestalk. In several specimens one or both lateral spines appear to be separated by a non-calcified membrane (Figs 3, 60). Denticulation on the lower border of major P1 propodus is absent or weakly developed in small specimens, e.g. not visible in mesial view in MNHN Th-1246 (Fig. 32) compared to NMV J22658 (Ngoc-Ho, 1994: fig. 4j) and prominent only in larger individuals (Figs 23, 24, 62, 73). The mesial surface of the propodus is smooth in small specimens (tl < 30, Figs 32, 39) and has a few tubercles below the dactylus articulation in medium-sized specimens (tl 30–50, Fig. 23), but is entirely tuberculate in large individuals (tl > 50, Figs 62, 73). It is also noted that the dactylus of the major cheliped crosses laterally over the fixed finger in the paratype of *N. denticulatus* (MNHN Th-1246), while it crosses mesially in all other specimens studied.

The male second pleopod is also variable. In males of tl < 44 the endopod is shorter than the exopod (Figs 51, 54) and the appendix interna short and weakly demarcated mesiodistally on the appendix masculina. The latter is weakly or barely damarcated from the rest of the endopod (Figs 52, 53, 55, 56). In the only large male (tl 88) the exopod and endopod of second pleopod are of the same length (Fig. 68) and the endopod shows no sign of an appendix interna with cincinnuli, though it is demarcated distally with sutures in a broadly rounded mesial part (appendix masculina?) and a shorter acutely tipped lateral part (Figs 69, 70).

Size: 16–92 mm tl, 5–22.8 mm cl, as represented by entire specimens. A decayed major cheliped from Spermonde indicates that this species grows up to tl 124 mm (cl 32.4 mm) as calculated from regressions of propodus length/carapace length and carapace length/total length.

Figs. 57–74. *Neocallichirus vigilax*, 57–65, NHMW 24960, female (cl 22.8); 66–69, NHMW 24961, male (cl 24.4); 70–73, NHMW 24965, decayed major cheliped (estimated cl 27). 57, carapace in lateral view; 58, same, detail; 59, front in dorsal view; 60, same, detail; 61, third maxilliped, lateral surface; major (62) and minor (63) cheliped, mesial surface; 64, propodus of third pereopod, mesial surface; 65, telson and right uropod; 66, appendix interna on third pleopod; 67, first right pleopod, lateral view; 68, left second pleopod, anterior view; distal part of left second pleopod, anterior (69) and posterior (70) view; 71, merus, 72, carpus; 73, propodus, 74, dactylus. All setae omitted except in 62. Scale is 1 mm.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Colour (from notes and colour photographs of live specimens): pale white with light pink on dorsal carapace and yellowish cheliped (Figs. 75, 76), pinkish on dorsal carapace, abdomen and chelipeds (Figs. 77–79).

Distribution: Indonesia, Ambon (type locality), Sulawesi (this study); Philippines, Bohol (this study); Australia, QLD (type locality of *N. denticulatus*); Enewetak (SUCHANEK & COLIN, 1986; GARTH et al., 1987).

Habitat: Sandy sediment without seagrass, common in 2 to at least 15 m depth (Spermonde, D. Kneer pers. comm.), muddy sand in 1–7 m depth (Panglao) and muddy sand in 24–26 m depth (NGOC-HO, 1994).

Remarks: The specimens mentioned by SUCHANEK & COLIN (1986) could not been located at the MNHN in 2009 (N. Ngoc-Ho, pers. comm. March 2009). Present in the collections of the MNHN is one specimen with major P1 and both mxp3 missing identified by M. de Saint Laurent as *Callichirus* cf. *vigilax* (see Material examined). An internet search revealed three males in the online catalogue of the BPBM (Bishop Museum Natural History Specimen Data at http://www2.bishopmuseum.org/natscidb/ accessed February 2010) identified as *Callianassa* (*Callichirus*) *vigilax*, which were collected at the Enewetak Atoll, Marshall Islands, Runit (islet), lagoon side, about 1/2 mile from shore at 9 m on 18 September 1980 by D.M. Devaney, P.L. Colin, and C. Arneson (BPBM S8843-S8845). These are obviously the specimens mentioned by GARTH et al. (1987). Unfortunately, it was not possible to study these specimens as they could not be located in the collections of the BPBM (Holly Bolick, pers. comm. March 2010).

SAKAI (1999) in his key to the Indo-Pacific species of *Neocallichirus* distinguishes in couplet 2: "Anterolateral spines of carapace developed ... *N. vigilax*" from those species with "Anterolateral spines of carapace undeveloped" under which *N. denticulatus* later keys out. This is rather misleading as NGOC-HO (1994) clearly mentioned and figured the anterolateral spines in *N. denticulatus*.

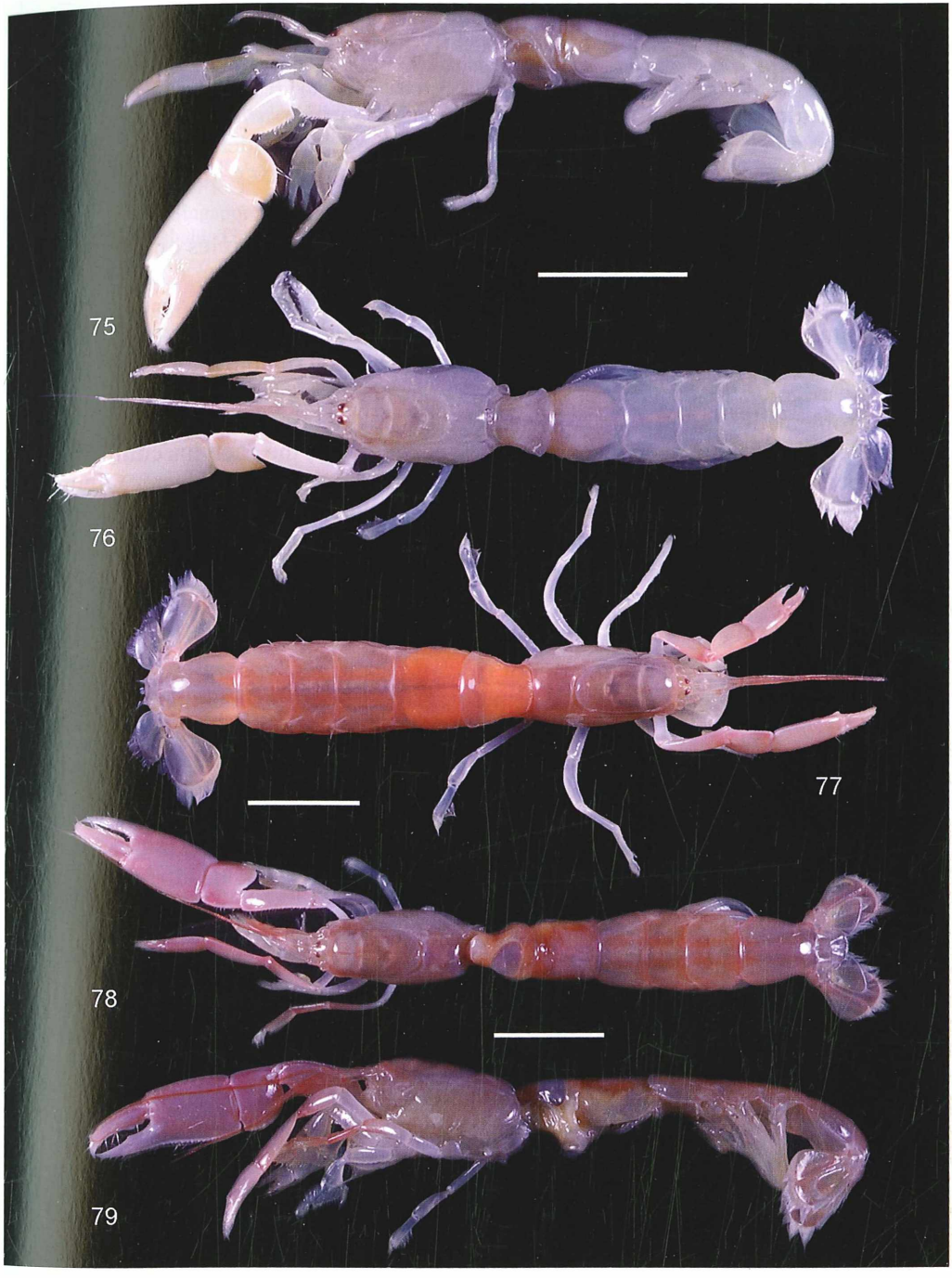
Discussion

As mentioned by NGOC-HO (1994), *N. vigilax* (as *N. denticulatus*) is very close to the western Atlantic *N. maryae* (as *N. rathbunae*). In addition, *N. vigilax* (as *Neocallichirus denticulatus*) is close to *N. maryae* in the phylogenetic tree from a Bayesian analysis of 16S and 18S rDNA data (ROBLES et al., 2009). NGOC-HO (1994) listed 4 morphological differences between the two species, which are, however, quite variable in *N. vigilax* (see above):

1) Rostral spine downturned in *N. denticulatus* (straight in *N. rathbunae*); this is variable and depends on size, the rostral spine appearing downturned in small specimens, straight or upturned in larger specimens.

2) Rounded eyes (dish-shaped in *N. rathbunae*); specimens of *N. denticulatus* are juveniles and thus the cornea is much larger in relation to eyestalk-width than in larger specimens

3) Ventral border of first pereopod carpus unarmed (denticulated in *N. rathbunae*); this character is also variable, the ventral border of the carpus is smooth in the paratype (of



Figs. 75–79. *Neocallichirus vigilax*. 75, 76, ZRC 2010.0319 (PD207), male (tl 37 cl 10); 77, NMCR 39009 (PD015), female (tl 50 cl 13.8); 78, 79, NHMW 21945 (PD092), female (tl 49 cl 13.2). 75, 79, lateral aspect; 76–78, dorsal aspect. Photographs: Tin-Yam Chan and Chia-Wei Lin. Scale is 1 cm.

N. denticulatus), a denticulation is barely visible in the carpus of the holotype (NGOC-HO, 1994: fig. 4j), and is visible in the presently reported material, but only when viewed mesiodorsally.

4) Uropod endopod oblong, slender (nearly quadrate in *N. rathbunae*); the endopod appears to be much wider in *N. maryae* than in *N. vigilax*, as evident comparing BIFFAR (1971: fig. 20e), MANNING & HEARD (1986: fig. 1d) and BLANCO-RAMBLA (2000: fig. 1d) with Figs. 10, 36, 41, 46, 64.

Neocallichirus maryae is characterised additionally by small tubercles on the thickened oblique ridge anterior and posterior to the hepatic boss (see BOTTER-CARVALHO et al., 1995: fig. 1b and BLANCO-RAMBLA, 2000: fig. 1a) which are lacking in *N. vigilax*. Another similar species is *N. raymanningi* BLANCO-RAMBLA & LEMAITRE, 1999, which differs from *N. maryae* by its rostrum being obtuse instead of spiny and by features on the cutting edge of the dactylus of the male major cheliped. The latter character, however, is problematic, as 1) BLANCO-RAMBLA & LEMAITRE (1999) had only one male, 2) this character is variable in many callianassid species and 3) the dactylus cutting edge of the chelipeds of male *N. maryae* (as *Callianassa rathbunae* or *N. rathbunae*) figured by BIFFAR (1971: fig. 20b), BOTTER-CARVALHO et al. (1995: fig. 1c) and BLANCO-RAMBLA (2000: fig. 1c) has exactly the same shape as that of *N. raymanningi* (BLANCO-RAMBLA & LEMAITRE, 1999: fig. 1c). SAKAI (2005) argued that the rostral spine (present in *N. maryae*, absent in *N. raymanningi*) is a variable character and synonymised the latter with the former species; FELDER et al. (2009) do not consider this justified.

DE MAN (1916) mentioned a similarity of *C. vigilax* with *C. armata* (now in *Glypturus*) and NGOC-HO (1994) mentioned that *N. denticulatus* resembles members of the genus *Corallianassa* MANNING, 1987 (erroneously as 1991) but argued convincingly that the lateral spines are much larger in the latter genus. Members of both the genera *Glypturus* and *Corallianassa* are characterized by lateral spines separated by a non-calcified (articular) membrane (often simply termed "articulated") (MANNING, 1987; SAKAI, 1999). This non-calcified membrane, however, is often difficult to detect even in live individuals and appears more distinct in "older" material (pers. obs.). The occurrence of lateral spines with a non-calcified membrane in some specimens of *N. vigilax* (see above) and *N. maryae* (pers. obs.) render this character not very useful separating *Glypturus* and *Corallianassa* from other genera of the Callianassidae.

Neocallichirus vigilax occurs also in a similar habitat as *N. maryae*. The subtidal muddy sand bottoms are characterised by numerous mounds and funnels produced by the activity of the shrimp; those of *N. maryae* are featured by SUCHANEK (1983: fig. 4 inset) and ABED-NAVANDI (2000: fig. 1). Also the mounds and funnels in the lagoon of Panglao shown in ANKER & DWORSCHAK (2007: fig. 8D) are rather those of *N. vigilax* than that of *Glypturus*. Resin casts of *N. vigilax* burrows made in Spermonde have the same same shape (pers. comm. D. Kneer) as those of *N. maryae* published by SUCHANEK (1983).

The material studied here was collected by three different methods. While dredging produced only in two small specimens, yabby pumping while SCUBA diving yielded small to medium-sized specimens. Only covering the sediment with a plastic tarp for one week brought to the surface very large specimens which represent the largest ever reported for the genus *Neocallichirus*. A disadvantage of the latter method, however, is that the shrimp are often in an advanced stage of decay when the tarp is removed.

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