A new species of *Polyonyx* Stimpson, 1858, of the *P. sinensis* group (Crustacea: Decapoda: Anomura: Porcellanidae) commensal with a chaetopterid worm from Peninsular Malaysia

P.K.L. Ng & A. Sasekumar

Ng, P.K.L. & A. Sasekumar. A new species of *Polyonyx* Stimpson, 1858, of the *P. sinensis* group (Crustacea: Decapoda: Anomura: Porcellanidae) commensal with a chaetopterid worm from Peninsular Malaysia.

Zool. Med. Leiden 67 (33), 24.xii.1993: 467-472, figs. 1-2.— ISSN 0024-0672.

Key words: Crustacea; Decapoda; Porcellanidae; *Polyonyx vermicola* spec. nov.; Chaetopteridae; Polychaeta; worm commensal; Peninsular Malaysia.

A new species of porcellanid crab, *Polyonyx vermicola*, belonging to the *P. sinensis* group is described from Selangor, Peninsular Malaysia. The species is an obligate commensal of tubes of the chaetopterid worm *Sasekumaria selangora* Rullier, 1976 (Polychaeta). *Polyonyx vermicola* is differentiated from all congeners by its small size, possessing a more rectangular carapace, proportionately longer carpus on the larger cheliped, strongly gaping cheliped fingers, the tips of which are turned outwards, the outer surface of each cheliped fingers lined with a row of small granules, and having the ventral margin of the third ambulatory propodus armed with strong spinules.

Peter K.L. Ng, Department of Zoology, National University of Singapore, Kent Ridge, Singapore 0511, Republic of Singapore.

A. Sasekumar, Department of Zoology, University of Malaya, 59100 Kuala Lumpur, Malaysia.

Introduction

In 1975, the second author collected specimens of a tube-dwelling polychaete worm from Morib in Selangor, Peninsular Malaysia which were subsequently described as a new genus and species of chaetopterid worm, *Sasekumaria selangora*, by Rullier (1976). Collected within the tubes of these polychaetes were a large number of crabs which Rullier (1976: 202) identified only as a species of Porcellanidae. The specimens have not been examined since. Recent studies of these specimens, as well as of fresh material, showed that these porcellanids represent a new species, *Polyonyx vermicola* spec. nov.

The description of *Polyonyx vermicola*, with notes on its biology, forms the text of the present paper. Measurements are of the carapace width and length respectively. Specimens are deposited in the Nationaal Natuurhistorisch Museum [previously Rijksmuseum van Natuurlijke Historie (RMNH)], Leiden, The Netherlands; Invertebrate Collection of the Department of Zoology, University of Malaya (UMJZ), Kuala Lumpur, Malaysia; National Museum of Natural History (USNM), Smithsonian Institution, Washington D.C., U.S.A.; and the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore.

Descriptive part

Family **Porcellanidae**
Genus **Polyonyx** Stimpson, 1858

Type species: *Porcellana macrocheles* Gibbes, 1850 (by original designation) (= *P. gibbesi* Haig, 1956, replacement name for *Porcellana macrocheles* Gibbes, 1850, junior homonym of *Porcellana macrocheles* Poeppig, 1836)

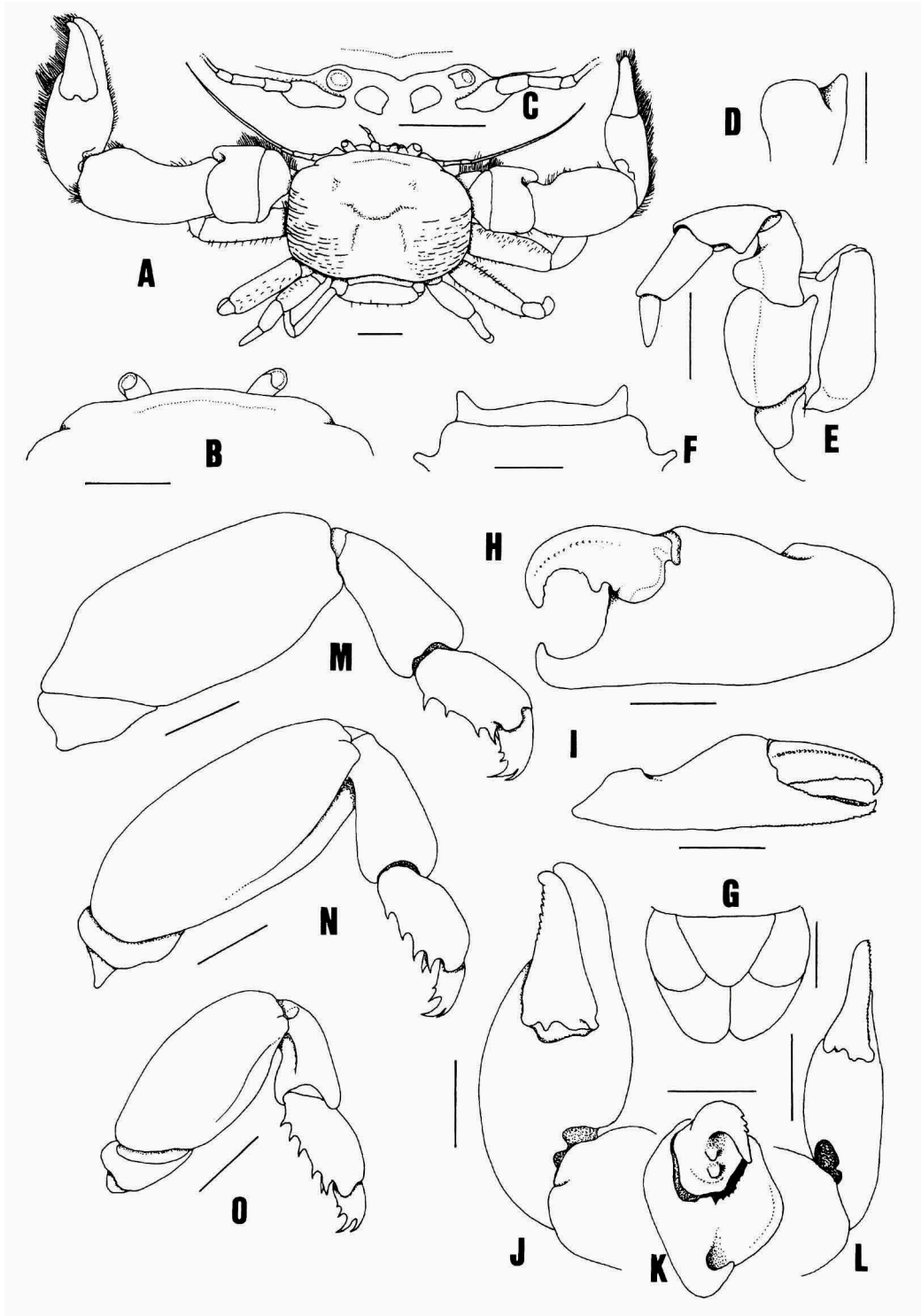
Polyonyx vermicola spec. nov.
(figs. 1, 2)

Material.— Holotype, ♂, 4.0 by 2.8 mm, (RMNH D 42509), in tubes of *Sasekumaria selangora* (Chaetopteridae, Polychaeta), sand flats, Morib, Selangor state, Peninsular Malaysia, ca 2°44'N 101°28'E, leg. A. Sasekumar, 1975. Paratypes: 1 ♀ (allotype), 4.8 by 3.2 mm, ovigerous (RMNH D 42510), 1 ♂, 1 ♀ (UMJZ), 1 ♂, 1 ♀ (USNM), 15 ♂♂, 18 ♀♀ (most ovigerous) (ZRC 1993.6785-6817), same data as holotype; 1 ♂ (RMNH D 42550), 13 ♂♂, 9 ♀♀ (ZRC 1993.6818-6839), same locality as holotype, leg. A. Sasekumar, 8.iii.1993.

Description.— Carapace subrectangular in shape; cervical grooves very shallow, indistinct; gastric grooves shallow but distinct; lateral regions, especially posterior half, covered by very low but distinct oblique striae; frontal region narrow; epigastric crista low but obvious, spanning distance between base of orbits; frontal margin appears straight from dorsal view, median part deflexed downwards, front appears trilobed; antero- and posterolateral margins not separated from each other; anterolateral margin entire, with distinct indentation at beginning of cervical groove; posterolateral margins appear subparallel for most of their distance before curving sharply to meet sinuous and medially indented posterior carapace margin. Basal segment of antennae broad, subcristate, visible from dorsal view, laterally inserted, flagellum can only turn forwards a short distance after the orbits. Eyes short, visible from dorsal view. Third maxilliped narrow, inner margins with long stiff hairs; inner margin of ischium sub-auriculiform, outer distal margin with short, blunt projection; merus narrow, proximal inner margin auriculiform; exopod relatively broad, not reaching midway length of merus, flagellum long. Anterior margin of sternum gently sinuous.

Chelipeds with long, stiff hairs on outer ventral margins of palm and fingers; outer surfaces and margins of palm, merus, carpus and fingers of larger cheliped smooth, glabrous; outer and lower surfaces of merus and carpus convex; inner surfaces distinctly concave. Merus with well developed cristate lobe on posterior margin. Carpus of larger cheliped elongate; posterior margin of carpus gently cristate. Outer surfaces of larger chela gently convex, that of smaller chela almost flat. Fingers subcylindrical in cross-section, not blade-like, that of larger chelae strongly hooked

Fig. 1. *Polyonyx vermicola* spec. nov. Holotype ♂, 4.0 by 2.8 mm, (RMNH D 42509). A, whole animal; B, frontal margin, showing weak epigastric crista; C, frontal view of antennules, antennae and front; D, left basal antennular segment; E, left third maxilliped; F, anterior sternal segments; G, telson; H, J, K, left chela; I, L, right chela; M, first right ambulatory leg; N, second right ambulatory leg; O, third right ambulatory leg. H, I, outer view; J, L, dorsal view; K, frontal view. Hairs denuded on figures except on A. Scales: A-C, H-L = 1.0 mm; D-G, M-O = 0.5 mm.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O

and curved outwards, forming a very broad gape when closed; dactylus with a large blunt sub-proximal tooth and a smaller tooth behind this, rest of cutting edge uneven but not toothed, outer surface with row of blunt denticles on distal part of subdorsal margin, forming ridge-like structure; pollex with entire cutting edge, outer surfaces smooth. Outer surfaces of smaller palm generally smooth; fingers subcylindrical in cross-section, outer surface somewhat flattened, tips strongly hooked; cutting edge of dactylus blade-like, lined with numerous denticles, subdorsal margin with row of forwardly-directed granules forming serrated ridge; cutting edge of pollex lined with very small denticles in distal part, distal part of cutting edge somewhat flattened, ventral margin serrated.

Ambulatory legs short, first leg longest. Merus broad, relatively short, without any spinules. Propodus short, ventral margins of legs 1 and 2 usually lined with 3 (rarely 2) distinct sharp spinules and a pair of distal spinules which bracket dactylus, ventral margin of leg 3 usually with 4 distinct sharp spinules and a pair of distal bracketing spinules. Dactylus short, hooked, with one large, curved main spine, one smaller immovable dorsal spine, ventral margin usually with 2 spinules (rarely 1), the distal one usually being larger.

Abdomen 7-segmented (including telson), broad, covering most of sternum; telson with seven elements. Male with a pair of distinct pleopods on third abdominal segment.

Remarks.— Johnson (1958: 97) was the first to divide the genus *Polyonyx* into three very distinct species-groups on the basis of their carapace, cheliped and ambulatory leg morphologies, viz. the *P. denticulatus*, *P. biunguiculatus* and *P. sinensis* groups. The *P. denticulatus* group was later recognised as a new genus, *Aliaporcellana*, by Nakasone & Miyake (1969) (redefined by Haig, 1978). Ng & Nakasone (in press) subsequently transferred one aberrant species, *P. cometes* Walker, 1887, placed by Johnson (1958: 97) in the *P. sinensis* group, to a new monotypic genus.

The *P. sinensis* group, as currently understood, contains the following known species: *P. sinensis* Stimpson, 1858, *P. transversa* (Haswell, 1882), *P. pedalis* Nobili, 1905, *P. utinomii* Miyake, 1943, *P. loimicola* Sankolli, 1965, *P. maccullochi* Haig, 1965, and *P. haigae* McNeill, 1968. This group of species may be defined by the following suite of characters: carapace broader than long; front narrow, trilobate; lateral margins of carapace without spinules; anterior margins of cheliped merus and carpus unarmed; the outer parts of the palm (at least the ventral margins) hairy; ambulatory dactyli with dorsal spine (claw) much smaller than ventral spine and with two or three accessory spinules on ventral margin.

Polyonyx vermicola is closest to *P. sinensis*, *P. utinomii*, *P. maccullochi* and *P. loimicola* in general appearance. It can be separated from these species in having a more slender and proportionately longer carpus on the larger cheliped (length ca 1.8-2.0 times width), the fingers of the larger chela strongly gaping with the tips distinctly turned outwards; having a row of sharp granules lining the sub-dorsal margin of each cheliped dactylus; and having more spinules (six, rarely five) on the ventral margin of the third ambulatory propodus. The subrectangular carapace shape of *P. vermicola* is very similar to species like *P. transversa* and *P. sinensis*, but they can be separated by the above-mentioned characters. *Polyonyx pedalis* is unique among members of the *P. sinensis* group in having spinules on the ventral margin of the ambulatory merus. *Polyonyx transversus* and *P. haigae* are distinct from all other mem-

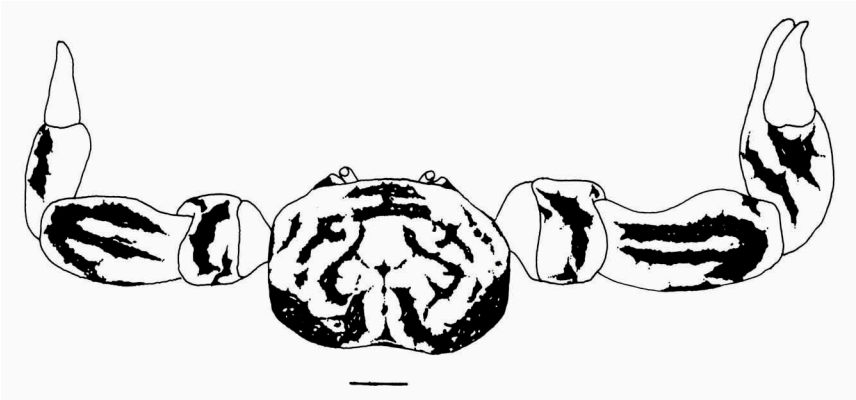


Fig. 2. *Polyonyx vermicola* spec. nov. Paratype ♂, 4.3 by 3.0 mm (ZRC 1993.6818), showing colour pattern on carapace and chelipeds on freshly preserved specimen (hairs denuded, legs not drawn). Scale = 1.0 mm.

bers in the *P. sinensis* group in possessing a large number (12 or more) of spinules on the ventral margin of the ambulatory propodus.

The characters of *P. vermicola* correponds well to all the features of the *P. sinensis* group, and the species clearly belongs there. It also shares the same symbiotic, worm-associated habits of many of the other members of the group. *Polyonyx sinensis* is believed to be associated with *Chaetopterus* tubes in China (Stimpson, 1907: 194; Shen, 1936: 283, as *P. asiaticus* Shen, 1936), *P. transversa* is a known *Chaetopterus*-commensal in Australia (McNeill & Ward, 1930: 363), whilst *P. utinomii* occurs with *Chaetopterus variopedatus* (cf. Miyake, 1943: 143). *Polyonyx loimicola* is commensal with polychaete worms of the genus *Loimia* (Sankolli, 1965: 287; Sankolli & Shenoy, 1965).

Colour.— The body is generally cream-coloured, the dorsal surfaces of the carapace and chelipeds have distinct grey patterns (fig. 2).

Ecology and habits.— *Polyonyx vermicola* occurs in heterogeneous pairs in the tube of the chaetopterid polychaete worm *Sasekumaria selangora*. The chaetopterid is abundant at the lower shore of the sheltered Morib beach. The beach is well drained with sediments of fine sand and less than 5% silt-clay fraction (Chong, 1987). The chaetopterid occurred in high densities of 36 to 148 per m^2 in the region between mid and low water tide levels.

The distinct outward curving finger tips of the larger cheliped are probably an adaptation to living in the narrow confines of the tube, helping the animal to grasp small objects more easily. The distinct row of granules on the outer surface of the cheliped fingers (more developed in the smaller cheliped) are probably an adaptation for scrapping the sides of the tube or surfaces of the worm to gather food. In life, the reduced last ambulatory leg has been observed to clean the dorsal surfaces of the carapace.

Etymology.— The species name is derived from the the common term for worms (Vermes), in combination with the Latin "cola", alluding to the commensal habits of the crab.

Acknowledgements

The first author gratefully acknowledges a research grant (RP 900360) from the National University of Singapore.

References

Chong, E.L., 1987. Macrofaunal distribution on a sandy shore.— Proc. 10th Annual Seminar, Malay. Soc. Mar. Sci., A. Sasekumar, S. M. Phang & E. L. Chong (eds.), Dept. Zool., Univ. Malaya, Kuala Lumpur: 30-39.

Haig, J., 1965. The Porcellanidae (Crustacea, Anomura) of Western Australia with descriptions of four new Australian species.— J. Roy. Soc. West. Aust. 48 (4): 97-118.

Haig, J., 1978. Contribution toward a revision of the porcellanid genus *Porcellana* (Crustacea: Decapoda: Anomura).— Proc. biol. Soc. Wash. 91: 706-714.

Johnson, D. S., 1958. The Indo-West Pacific species of the genus *Polyonyx* (Crustacea, Decapoda, Porcellanidae).— Ann. Zool., AGRA 2 (8): 95-118.

McNeill, F. & K. Ward, 1930. Carcinological notes. No. I.— Rec. Aust. Mus. 17 (9): 357-383, pls. 59-61.

Miyake, S., 1943. Studies on the crab-shaped Anomura of Nippon and adjacent waters.— J. Dept. Agric., Kyushu Imp. Univ. 7 (3): 49-158.

Nakasone, Y. & S. Miyake, 1969. A new porcellanid crab (Anomura: Porcellanidae) from Japan (*Aliaporcellana kikuchii* gen. et sp. nov.), with description of two species of the new genus.— Pub. Amakusa Mar. Biol. Lab. 2: 17-32.

Ng, P.K.L. & Y. Nakasone, in press. Taxonomy and ecology of the porcellanid crab *Polyonyx cometes* Walker, 1887 (Crustacea: Decapoda), with description of a new genus.— J. nat. Hist.

Rullier, F., 1976. Description d'un nouveau genre et d'une nouvelle espèce de Chaetopteridae *Sasekumaria selangora* (Annélides Polychètes) de Malaisie.— Bull. Soc. Zool. Fr. 101 (2): 199-202.

Sankolli, K.N., 1965. On a new species of commensal porcellanid crab, *Polyonyx loimicola* sp. nov., from India: (Crustacea, Anomura, Porcellanidae).— J. Bombay Nat. Hist. Soc. 62 (2): 285-291, pls. I, II.

Sankolli, K.N. & S. Shenoy, 1965. On the occurrence of the tube-worm *Loimia medusa* (Savigny) in Bombay waters and its commensalism with a porcellanid crab.— J. Bombay Nat. Hist. Soc. 62 (2): 316-320.

Shen, C.J., 1936. Notes on the genus *Polyonyx* (Porcellanidae) with description of a new species.— Bull. Fan Mem. Inst. Biol. (Zool.) 6 (6): 275-287.

Stimpson, W., 1858. Prodromus descriptionis animalium evertebratorum quoe in Expeditione ad Oceanum Pacificum Septentrionalem a Republica Federata Missa, Cadwaladaro Ringgold et Johann Rodgers Ducibus, observavit et descripsit - Part VII, Crustacea Anomura.— Proc. Acad. Nat. Sci., Phil. 10: 225-252.

Stimpson, W., 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition 1853-1856.— Smithsonian Misc. Coll., part of 49 (1717): 1-240, 26 pls.

Reiceived: 2.iv.1993
Accepted: 24.vi.1993
Edited: C.H.J.M. Fransen