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A NEW SPECIES OF THE DORID NUDIBRANCH GENUS *POLYCERA* CUVIER, 1816 (GASTROPODA: OPISTHOBRANCHIA) FROM NEW ZEALAND

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ABSTRACT

Polycera melanosticta n.sp. is described and illustrated, the first species of the genus *Polycera* Cuvier, 1817 to be recorded for New Zealand. A detailed diagnosis of the genus is provided. The history of the use and classification of the genus *Polycera* is reviewed, and Odhner's 1941 amalgamation of the closely related genera *Palio* Gray, 1857 and *Greilada* Bergh, 1894 with *Polycera* is upheld and reinforced by the mixture of various generic diagnostic characters in some species re- or newly described since then. *Polycera* is compared with the closely related *Polycerella* Verrill, 1881 and the latter genus is confirmed as being distinct. The family Polyceridae is also reviewed, and the characterisation adopted is that of Odhner (in Franc, 1968) in which the extent is reduced by the separation of the triophids and gymnodorids as family groups. The new species is compared in detail with the eight most similar species (out of more than 50). Of these it is closest to the Caribbean *P. herthae* Marcus & Marcus, 1963, differing in possessing orange markings, unevensized velar processes, a larger number of gills which are simple pinnate, long foot angles, and lacking knobs on the back.

INTRODUCTION

Three species of the dorid nudibranch family Polyceridae have been recorded as occurring in New Zealand waters. The earliest record is of 'a small black and orange *Polycera* species' (Morton & Miller, 1968 pp. 169, 412 and 414). This unnamed species is new and is described here. A few years later Miller (1975) referred to *Polycera hedgpethi* Marcus, 1964 as being a member of the New Zealand fauna. The third species, *Thecacera pennigera* (Montagu, 1815), was the first to be recorded properly (Willan, 1976, Powell, 1979 p. 500, Addendum).

SYSTEMATICS

Order Doridacea
Suborder Phanerobranchia
Superfamily Polyceroidea (= Nonsuctoria)
Family Polyceridae

Genus ***Polycera*** Cuvier, 1817

Polycera Cuvier, 1817:390. Alder & Hancock, 1845–55: 45, and Appendix xviii, and Part 6 Genus 6 Bergh, 1880: 599–600. Eliot 1910: 153. Odhner, 1939: 28. Odhner, 1941. 12–13. Pruvot-Fol, 1954: 315. MacNae, 1957:352. Marcus v. & Er., 1963. 35. Odhner in Franc, 1968. 864 Schmekel & Portmann, 1982: 110. Garcia & Bobo, 1984: 361 Cattaneo-Vietti *et al.*, 1990: 106–109.
Themisto Oken, 1815 x and 278, non Oken, 1807 1168
Cufaea Leach, 1852.21.
Palio Gray, 1857: 213 Bergh, 1892: 1142. Thiele, 1931: 424. Burn, 1958: 6–7. Baba, 1960: 76. Thompson & Brown, 1984. 72.
Greilada Bergh, 1894:1 Baba, 1960: 75–76. Thompson & Brown, 1984: 72.

Diagnosis. Body long, narrow, highest at middle, slightly constricted between head and mid region; edge of notum a low ridge, high on sides of body, continuous around dorsolateral region and sometimes connecting with a median tail ridge, or indistinct at side and rear, i.e. behind gill circlet, or with a small gap at the anterior end, ridges weakly or strongly tuberculate, with or without one simple or divided, or several small or large processes on each side of gill circlet (extra or exobranchial), edge enlarged at head end forming a veil with tubercles (up to 9 each side), or short or long digitiform processes (up to 6 each side); surface smooth, partially or totally tuberculate or papillate, such outgrowths often heavily

pigmented. Rhinophores and gills not retractable into pockets, rhinophores with up to 26 lamellae, gills up to 11, simple pinnate to tripinnate; pair of oral lobes (lappets). Radula of up to 20 rows, 2–8.2.0.2.2–8 teeth per row; vestigial rachidian recorded for some species, laterals large, second larger than first, hamate with spur, marginals small, fairly simple plates. Paired jaws with or without a large wing-like extension. Penis acrembolic, armed with spines; large prostate; spermatheca and spermatocyst semi-serial.

Type species: *Doris quadrilineata* Müller, 1776, by subsequent designation (Gray, 1847).

Polycera is a well-known and seemingly distinctive genus of phanerobranch dorid nudibranch. However, the delineation of this genus has not always been clear. Odhner (1941), in his review of the family Polyceridae, examined the history of the use of *Polycera* and two very closely related genera, *Palio* and *Greilada*. He concluded that these two entities did not justify separate generic status, and reduced them to divisions of *Polycera*. At this stage the three genera were distinguished as follows:

Polycera - large exobranchial processes, long digitiform velar processes, simple pinnate gills, jaws with a wing-like process;

Palio - small, lobed (compound) exobranchial processes, tuberculate velar processes, bi- or tripinnate gills, back and sides of body tuberculate, triangular jaws, i.e. lacking a wing-like process;

Greilada - no exobranchial processes, short digitiform velar processes, tripinnate gills, jaws with wing, body smooth.

Not all subsequent workers have followed Odhner's lead. Burn (1958), Baba (1960), Thompson & Brown (1984) have recognised these three genera, but without explanation for doing so. Several species described since Odhner's paper have lessened further the distinctiveness of these genera. *Polycera fujitai* Baba, 1937, *P. odhneri*, Marcus, 1955, *P. herthae* Marcus & Marcus, 1963, and the new species described here lack exo or extrabranchial processes (*Greilada*), have a papillate body (*Palio*) and wing-like jaw processes (*Polycera*). In *Polycera odhneri* and *P. fujitai* the velar processes are long (*Polycera*), in *P. (Greilada) abei* Baba, 1960 and the new species the gills are simple pinnate (*Polycera*). Extrabranchial processes, as small papillae, are present in *P. (Greilada) elegans* (See Edmunds, 1961), and large compound ones (*Palio*) in *Polycera hedgpethi* (personal observation) and *P. tricolor* Robilliard, 1971. Thus much of the distinction given above has merged and there is presently little to justify maintaining the three taxa even as subgenera. The genus *Polycerella Verrill*, 1881 is very similar to Polycera, but is still clearly separable, the radula having a greater number of rows (31–46) and on each side just one lateral tooth and two hooked marginals, rhinophores lacking lamellae, and all of the exobranchial processes being situated posteriorly to the gill circlet.

The use of the family name Polyceridae has not been untroubled. MacNae (1957) has given an account of the usage of the name since its introduction. At that time MacNae himself favoured a wide coverage of the phanerobranch dorids, the Polyceridae including three groups as subfamilies, the Triophinae, Polycerinae, and Gymnodoridinae. Earlier Odhner (1941) had preferred these same divisions raised to familial rank (as Eliot, 1910). Since MacNae there have been various rearrangements. Pruvot-Fol (1954) retained the grouping Triophinae (as the Caloplocaminae) as a section of the family Poly-ceridae: the gymnodorids were not considered. Odhner in Franc (1968) established the families Triophidae and Gymnodorididae. This arrangement was retained by Boss (1982), the Polyceridae spelt Polyceratidae, and Vaught in Abbott & Boss (1989). There have been two striking changes in recent years, the transfer of the genus *Limacia* O.F. Müller, 1781 to the family Triophidae (Schmekel & Portmann, 1982), and the grouping of the Triophidae in a superfamily which includes the suctorial dorids (Cattaneo-Vietti *et al.*, 1990).

Polycera melanosticta new species (Figs 1–4)

Morphology. Extended length up to 17 mm, body long and narrow, constricted between, and widest at, level of rhinophores and gill circlet, latter situated nearer head than tail, posteriorly tapering to rounded tip (Fig. 2A): notal margin very narrow except at anterior end where it extends as a veil, margin traces out an hour-glass shape seen from above; sides covered with quite large, soft, conical papillae,

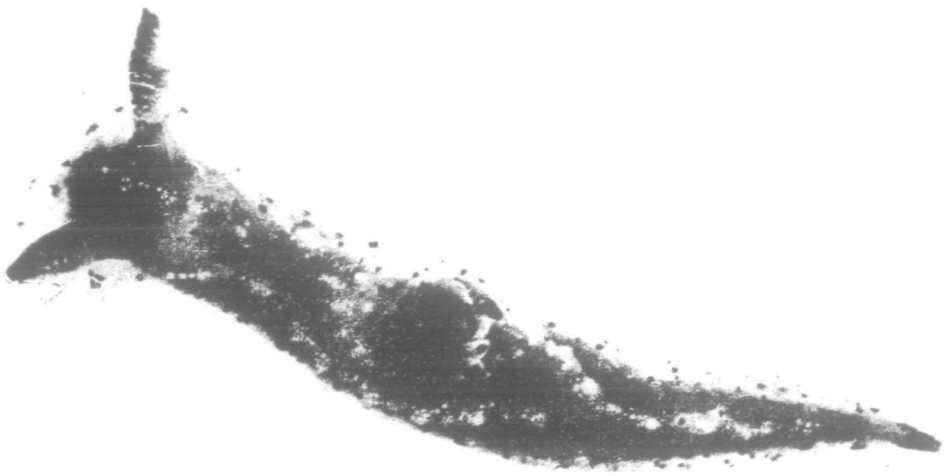

Figure 1. *Polycera melanosticta* n.sp., a living animal (L. 10 mm) collected from the paint test raft at the Devonport Naval Base (27 March 1962), dorsal view

densest in mid region, thinning out towards ends of body, some papillae along notal margin, largest opposite rhinophores and gills, one or two short, curved rows of smaller papillae before and behind gills, a single median row from pericardial swelling (immediately in front of gills) to front of notum; head end of notum (veil) with up to 4 pairs of finger-like processes (modified papillae), first two pairs (two on each side) long, second two short; line of papillae running medially from rear of notal ridge part-way to tip of tail (Fig. 2A); front and hind ends of body without papillae. Rhinophores only slightly reflexed between stalk and club, latter swollen with up to 15 lamellae (Fig. 2C): gills up to 10, incipiently bipinnate in adult (Fig. 2D), largest at front of circlet; rhinophores and gills contractile but not retractable into pockets (phanerobranch). Oral region rounded, narrow flap-like process (oral ten-tacle) on each side of mouth. Foot narrow, linear, anterior end grooved and corners drawn-out as tapered processes in length more than half the width of foot, curving posteriorly (Fig. 2B).

Colour. White, translucent, grey or greyish brown all over subepidermally, sometimes very dense, opaque white spherules within bases of papillae; black pigment, as spots evenly and widely spaced over surface of body, on terminal knob, lamellae of rhinophores, outer face of gills at tip and base, lightly on inner face, tip of tail and middle section of foot angles; orange pigment in between base of velar processes and subterminally on tail, i.e. anterior of black patch, on lower rhinophore lamellae and stalk, middle section of outer face of gills, upper surface of base of foot angles, anterior foot groove; sole of foot pigmentless; viscera showing through yellowish brown.

Alimentary System. Oral tube simple; buccal bulb very muscular, short and broad, angular at front, rounded behind, radular sac short, broad, projecting below hind part: salivary glands short, narrow, slightly compressed, succulate along edges: oesophagus wide at junction with buccal bulb: caecum short, lies hidden beneath intestine where latter arises from stomach.

Buccal armature. Radula, up to 11 (1 developing) rows, 3.2.0.2.3 teeth/row. No central tooth: two lateral teeth hook-like from side (Fig. 3B), from behind first trapezium-like with posteriad extensions mid-way down shaft on each side, spur-like on outer edge, flange-like on inner, base pointed, cusp (apex) bent outward and rearward (hook) (Fig. 3A); second larger, shape as first except lateral extensions nearer base, latter ending broadly, cusp longer and more pointed (Fig. 3A); sometimes cusp

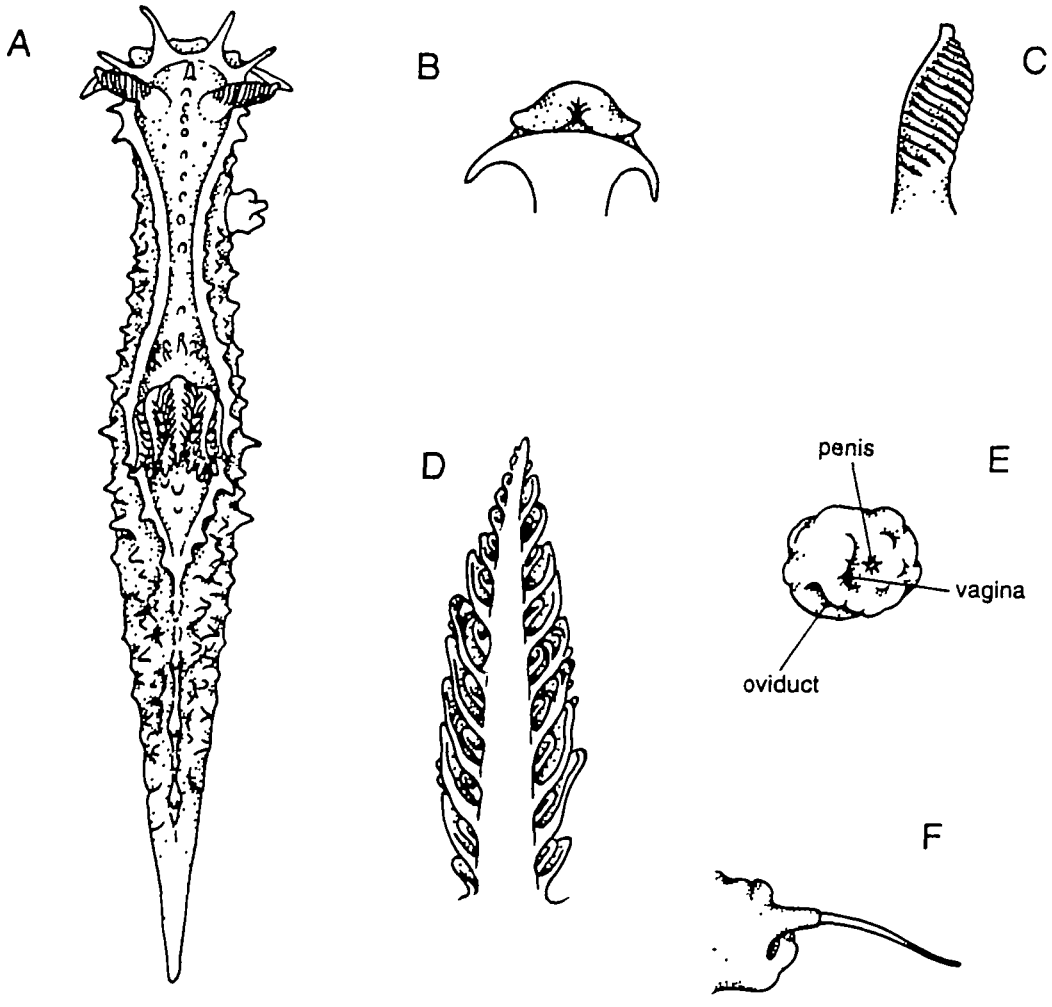

Figure 2. *Polycera melanosticta* n.sp. (A) Living animal, adult (largest specimen collected), dorsal view (genital papilla everted, right side); (B) mouth, oral lobes and anterior foot angles, ventral view; (C) rhinophore, side view; (D) a gill, inner face; (E) genital papilla everted, side view; (F) penis everted, dorsal view.

incipiently bifid: marginal teeth small, peg-like, somewhat irregular in outline, narrowing basally, decreasing in size from inner to outer; first with short cusp at top-inner corner and rounded flange half way down inner side; second with rounded tip and small flange; third with curved, pointed cusp directed outwards, no flange; sometimes cusp of marginals 1 and 3 rounded.

Jaws. Paired, joined dorsally by thick pad-like ligament, axe head-like in outline (Fig. 3C); gripping (anterior) edge curved, thickened, upper end, where jaws joined by ligament raised into waffle-like thickenings (hinge); rest ('wing') of jaw a curved plate widening to rounded posterior edge.

Reproductive system. Ovotestis invests most of digestive gland; hermaphrodite duct leads to fairly elongate, kidney-shaped ampulla, entering half way along on indented side ('hilus of kidney'); narrow common duct arises at anterior end, bends then divides, left branch short, widish vas deferens, right a short, wide common female duct enlarging quickly into (fertilisation) chamber. Vas deferens enlarges suddenly into prostatic section; first part short, very wide, partly lobulated, second narrower, surface smooth, tapering gradually to a long,

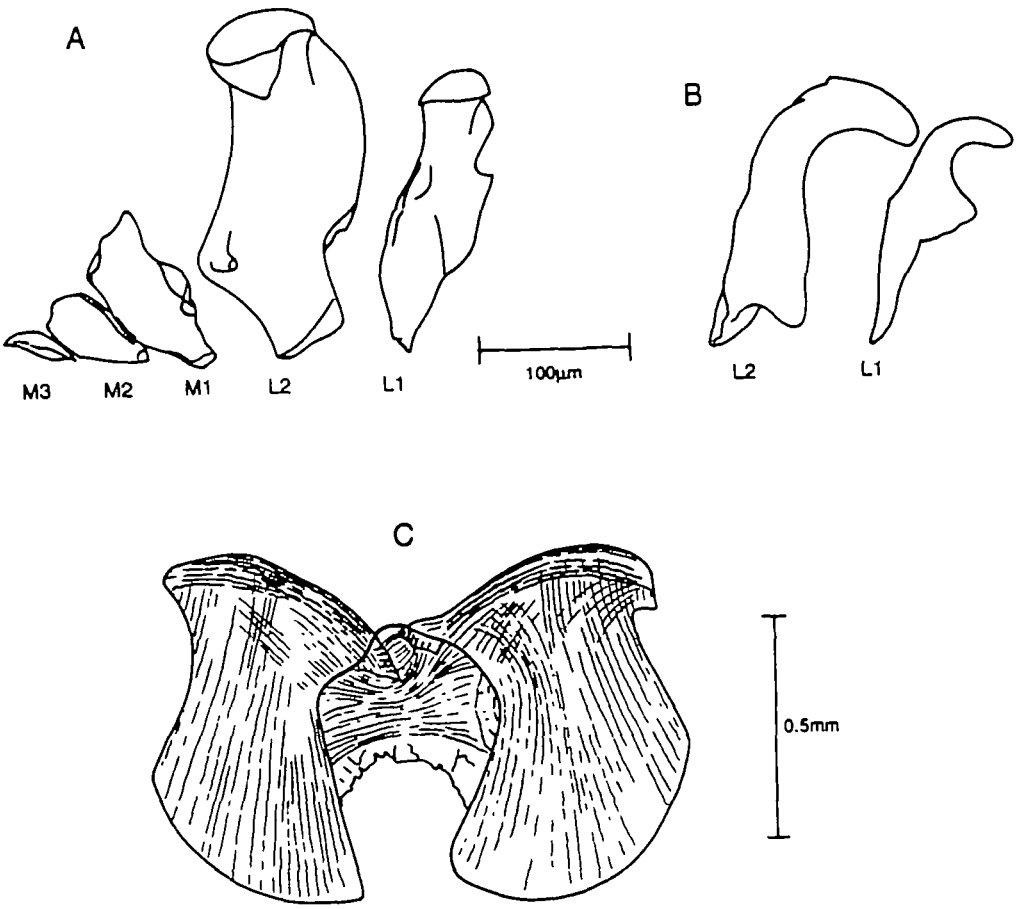

Figure 3. *Polycera melanosticta* n.sp. (A) Radular teeth, left half of row 6, rear view; (B) lateral teeth, left side of row 1, side view; (C) jaws, spread out, dorsal view

widish tube (distal vas deferens): penis acrembolic (Figs. 2F, 4B), armed with spines, long and straight near aperture, shorter, curved at inner end of spinous section (Fig. 4C). Allosperm duct arises dorsally from fertilisation chamber, first wide, then narrow, soon widening again; at this point connects with narrow duct of small, ovoid spermatocyst, then continues for some distance to connection with wide duct of large spherical/ovoid spermatheca, and then as a longer tube, widening slightly distally as vagina, opening alongside and posteriorly of penis (Figs. 2E, 4B).

Locality and habitat. New Zealand, the North Island, east coast, Auckland, Waitemata Harbour: Devonport Naval Base, paint raft, on *Bugula neritina* (L.) and *B. stolonifera* Ryland growing on continuously immersed paint test panels or *Ecklonia radiata* plants attached to the panels, 1 specimen on 9, 2 specimens on 27 March, 2 on 19 and 1 on 28 June 1962, 1 on 9 and 31 May, 1 on 20 June, and 1 on 1 August 1963.

Type Material. HOLOTYPE. the larger (L.17 mm) of the two individuals collected at the Devonport Naval Base, 19 June 1962 (NMNZ. 127235).
PARATYPE: the individual collected from the Devonport Naval Base, 28 June 1962 (NMNZ. 127236)

Remarks. More than 50 species of *Polycera* (including *Palio* and *Greilada*) have been named. However, only those lacking extra or exobranchial processes need be discussed here in determining the distinctiveness of the local

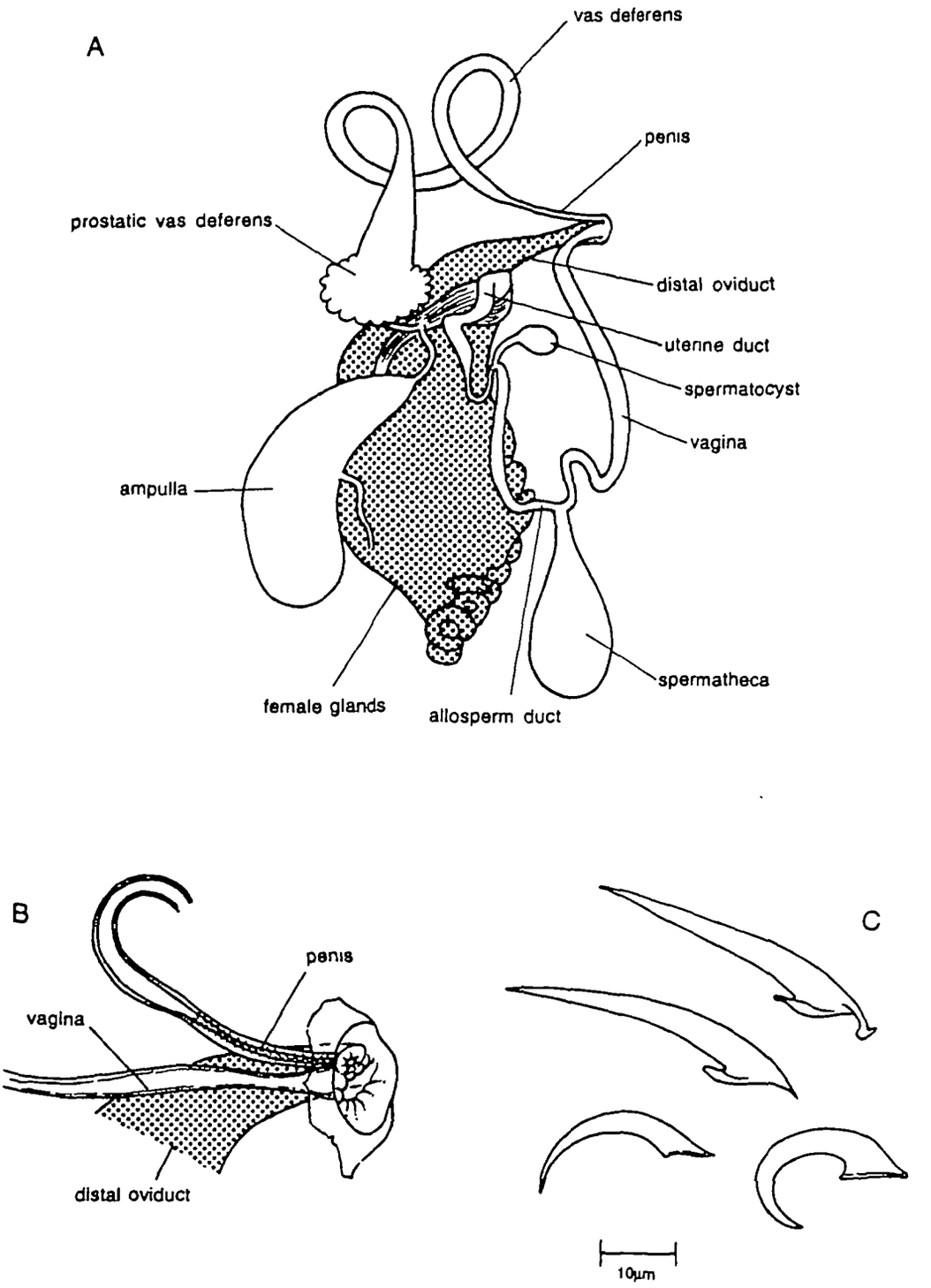

Figure 4. *Polycera melanosticta* n.sp. (A) reproductive system unravelled, dorsal view; (B) distal or outer part of the reproductive system, view from above, stained in borax carmine, cleared in PVLP; (C) penial spines.

species. All of these species differ, particularly in colour, some more than others. *Polycera (Greilada) elegans* (Bergh, 1894 from Europe (see Edmunds, 1961), the type of the genus *Greilada*, is strikingly different in being brilliant orange sparsely spotted (on the tubercles) with blue, and in having a few widely separated tubercles on the pallial ridge (also blue), bi-or tripinnate gills and short foot angles. The Japanese *P. (Greilada) abei* is yellowish white spotted with orange and black, the latter pigment also present on the rhinophores, velar processes and gills, has a smooth body, lacks a pallial (= notal) ridge, and has a radula with just 2 marginal teeth on each side. *Polycera alabe* Collier & Farmer, 1964 from the Bay of California is blue-black with orange spots, more or less in rows, with two black and two white velar processes, and has a sparsely mammillate body, the mammillae being colourless on the body and black on the crest of the tail. Also markedly different are the Australian species *Poly-cera parvula* (Burn, 1958) and *P janjukia* Burn, 1962, the former being maroon or blood red and having two large velar processes and rounded foot angles, the latter pink with dark brown or yellow spots, and possessing very large rhinophores and velar processes of an irregular size and shape. Body surface features have not been reported for either of these species. Closer to the new species are the warm western Atlantic *Polycera odhneri* and Japanese *P. fujitai*. *Polycera odhneri* is tuberculated and spotted with black. However, the coloration includes brick red and yellow spotting, the velar processes are long, pallial tubercles irregular in disposition, and foot angles blunt. The body of *Polycera fujitai* is spotted with black and streaked irregularly with brown, and the papillae are tipped with yellow, and has a maximum of 7 gills which are tripinnate, rhinophores with a long stalk and short club, and rounded foot angles. Closest of all is the Caribbean *Polycera herthae* which is spotted with black and white, has 5 gills, the larger tripinnate, large knobs on the notal ridge and in the midline in front of the gills. Thus the local specimens are separable from *P. herthae* on the orange markings, uneven-sized veil processes, larger number of gills (9) which are pinnate and, possibly, long foot angles, and lack of large knobs on the back. These characters altogether, and because the description of *P. herthae* is based on juveniles only, have compelled me to create a new species.

Etymology. This new species has been named for an obvious component of its colour pattern, the trivial name *melanosticta* being the latinized Greek adjective *melanostiktos* meaning black dotted.

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