

**New species and further records of known species of
Polyplacophora from the tropical western Pacific**

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The Polyplacophora from seven French cruises in the western tropical Pacific (Philippines, Coral Sea and New Caledonia), during the years 1980-1986, are discussed. Altogether 17 samples of chitons contain 29 specimens, belonging to 11 species, 4 of which are new, viz. *Notoplax richeri*, *N. richardi*, *N. rostellata* and *Ischnochiton (Stenosemus) perforatus*. Two other species, hitherto only known from the Queensland coast, viz. *Leptochiton (Parachiton) capricornicus* (Iredale & Hull, 1925) and *Callistochiton granifer* Hull, 1923, were obtained in the Coral Sea (Capel Bank and Chesterfield-Bellona) at a depth of little more than 50 m.

Key words: Polyplacophora, taxonomy, distribution, Philippines, Coral Sea, New Caledonia.

INTRODUCTION

The material reported upon in the present paper originates from various French expeditions in the tropical western Pacific and belongs to the Muséum National d'Histoire Naturelle, Paris:

(a) Material collected by B. Métivier, on board R.V. 'Jean Charot' during the ESTASE 2 expedition to the Philippines (1984): 5 lots.

(b) Material collected by P. Bouchet and M.P. Triclot on Board R.V. 'Coriolis' during the MUSORSTOM 2 (1980) and MUSORSTOM 3 (1985) expeditions to the Philippines: 4 lots. The bulk of the Polyplacophora from these expeditions has already been reported upon in earlier papers (Kaas, 1982 and 1989), and the four samples studied here were made available through final sorting of some residues.

(c) Material collected by P. Bouchet, B. Richer de Forges and B. Métivier on board R.V. 'Coriolis' during the CHALCAL 1 (1984) and MUSORSTOM 5 (1986) expeditions to the Chesterfields and other banks in the Coral Sea: 5 lots.

(d) Material collected by B. Richer de Forges on board R.V. 'Vauban' during the 1985 phase of Programme Lagon around New Caledonia by ORSTOM, Nouméa: 2 lots.

(e) Material collected by P. Bouchet, B. Métivier and B. Richer de Forges on board R.V. 'Coriolis' during the CHALCAL 2 (1986) expedition to the northern part of Norfolk Ridge: 1 lot.

Deep water chitons from the New Caledonian region have already been reported upon by Kaas (in press).

Thanks are due to Dr. Philippe Bouchet, who participated in four of the seven expeditions, for enabling me to report upon the collection and for critically reading of and commenting on my manuscript.

SYSTEMATIC ACCOUNT

NEOLORICATA

Lepidopleurina

Leptochitonidae

Genus *Leptochiton* Gray, 1847Subgenus *Leptochiton* s.s.*Leptochiton* (*L.*) *belknapi* Dall, 1878

Leptochiton belknapi Dall, 1878: 1. — Kaas & Van Belle, 1987: 23, fig. 10 (bibliography and synonymy).

Material examined. — Philippines. Estase 2, sta. CP2, 14°05'N 120°02'E, 2050 m, 14.XI.1984: 1; sta. CP4, 06°08'N 125°58'E, 2800 m, 27.XI.1984: 1; sta. DR4, 05°02'N 125°15'E, 3250 m, 23.XI.1984: 2.

Leptochiton (*L.*) *lineatus* (Nierstrasz, 1905)

Lepidopleurus lineatus Nierstrasz, 1905: 8, pl. 1 fig. 4, pl. 2 figs. 48-51.

Leptochiton lineatus; Kaas & Van Belle, 1985: 113, fig. 49, maps 22, 44 (bibliography and synonymy).

Material examined. — Philippines. Musorstom 2, sta. 33, 135 m, 1980: 1 + 4 larval shells; Musorstom 3, sta. CP 139, 11°53'N 122°14'E, 240-267 m, 06.VI.1985: 1.

Leptochiton (*L.*) *foresti* (Leloup, 1981)

Lepidopleura (sic!) *foresti* Leloup, 1981: 321, fig. 2, pl. 2 figs. 7-10.

Leptochiton (*L.*) *foresti*; Kaas & Van Belle, 1985: 122, fig. 54, map 44.

Material examined. — Philippines. Musorstom 3, sta. CP 139, 11°53'N 122°14'E, 240-267 m, 06.VI.1985: 1.

Subgenus *Parachiton* Thiele, 1909*Leptochiton* (*Parachiton*) *capricornicus* (Iredale & Hull, 1925)

Parachiton capricornicus Iredale & Hull, 1925: 345, pl. 39 fig. 13 (not 14, = *P. litoreus* Iredale & Hull, 1925).

Leptochiton (*Parachiton*) *capricornicus*; Kaas & Van Belle, 1985: 172, fig. 80, map 25.

Material examined. — Coral Sea. Musorstom 3, sta. 264, 25°20'S 159°44'E (Capel Bank), 56 m, 08.X.1986: 1.

Observations. — The finding of this fine, slightly curled specimen extends the range of distribution considerably. So far it has only been found off the coast of southern Queensland, Masthead Reef in the Capricorn Group, at a depth of 30-40 m.

Ischnochitonina

Ischnochitonidae

Ischnochitoninae

Genus *Ischnochiton* Gray, 1847Subgenus *Stenosemus* Von Middendorff, 1847*Ischnochiton* (*Stenosemus*) *perforatus* sp. nov.

(figs. 33-42)

Material examined. — Philippines. Estase 2, sta. DR7, 05°57'N 126°14'E, 890 m, B. Métivier coll., 28.XI.1984, 1, valves VII-VIII smashed (holotype).

Diagnosis. — Animal very small, oval, little elevated, side slopes straight. Lateral areas hardly raised. Colour white. Tegmentum thin, centro-pleural areas with c. 4 rows of perforations parallel to the vaguely defined diagonal ridges. Lateral areas quincuncially pustulose; the pustules hardly discernible. Articulamentum thin, glossy, apophyses evenly rounded, insertion plates with 12-1-? slits. Girdle moderately wide, dorsally covered with juxtaposed, elongate ovoid, striated, spiculose scales.

Description. — The only specimen (holotype) is very small, 3.5×2 mm, valves VII and VIII badly damaged, oval in circumference, the valves very thin and brittle, little elevated (dorsal elevation 0.37), carinate, beaked, side slopes straight.

Head valve semicircular, anterior slope straight, the apex emarginate, dorsally covered with quincuncially arranged, hardly elevated, round pustules. Valve II much longer than the other intermediate valves, the anterior margin convex, the hind margin slightly concave at both sides of the protruding apex. Valves III-VII broadly rectangular, front margin slightly convex, with concave jugal sinus, hind margin as in valve II, parallel to front margin. Valve VIII badly damaged, but from the remnants it is clear that the mucro must have been about central, little elevated, posterior slope almost straight. The central areas of the valves show 4-5 oblique series of fine perforations, parallel to the diagonal ridges, not reaching the jugum. The lateral areas are hardly raised, sculptured like the head valve, but the pustules are hardly perceptible.

Articulamentum very thin and glossy, the apophyses evenly rounded, in valves II-VII they occupy $4/5$ of the anterior margin, leaving a shallow sinus. Head valve with 12 (or 13?) small slits in the insertion plate; slit rays not perceptible; intermediate valves with one slit on either side, no slit rays. The slits of the tail valve could not be counted.

Girdle moderately wide, dorsally clothed with juxtaposed, elongate ovoid, striated, scale-like spicules, up to $120 \times 48 \mu\text{m}$, the more or less heart-shaped base deeply implanted in the chitinous cuticula. Among them, randomly disposed, small spindle-shaped spicules on long chitinous bristles are found. There is a marginal fringe of straight, pointed, striated spicules, $120 \times 20 \mu\text{m}$. Ventral side of girdle covered with radiating rows of rectangular scales, $48 \times 16 \mu\text{m}$.

Radula not examined. Gills merobranchial, adanal with interspace; c. 16 ctenidia per side.

Etymology. — The specific name refers to the perforations in the centro-pleural areas of the intermediate valves.

Observations. — This new species appears to be closest related to *I. (S.) vitreolus* Kaas, 1985, from Réunion Island, Indian Ocean, which differs, however, in having the insertion plates of the intermediate valves bislit. The recently described *I. (S.) delicatus* Kaas, 1991, and *I. (S.) robustus* Kaas, 1991, both from the New Caledonian region, differ widely in the tegmental sculpture.

Callistoplacinae
Genus *Callistochiton* Dall, 1879

Callistochiton granifer Hull, 1923

Callistochiton granifer Hull, 1923: 161, pl. 25 figs. 5-8.

Lophochiton granifer; Iredale & Hull, 1924: 356, pl. 7 figs. 9-13.

Material examined. — Coral Sea. Chalcal 1984, sta. CP16 (Plateau Chesterfield-Bellona), 21°41.6'S 159°21.92'E, 53 m: 1.

Observations. — This beautiful little species has been found on the Queensland coast from the Capricorn Group to Thursday Island, Torres Strait, at depths of 0-18 m. The present report considerably extends the range.

Schizochitonidae

Genus *Loricella* Pilsbry, 1893

Loricella profundior (Dell, 1956)

Paricoplax profundior Dell, 1956: 157, pl. 21 figs. 213-219.

Loricella profundior; Kaas, 1990: XXX, figs. 68-73 (bibliography and synonymy).

Material examined. — Coral Sea (Chesterfield Bank). Musorstom 5, sta. 337, 19°54'S 158°58'E, 412-430 m, 15.X.1986: 4; sta. 338, 19°52'S 158°40'E, 540-580 m, 15.X.1986: 3. New Caledonia. Programme "Lagon", sta. 444, 18°15'S 162°59'E (Atoll of Surprise), sta. 444, 18°15'S 162°59'E, 300-350 m, 28.II.1985: 1; Chalcal 2, sta. DW77, 23°38'S 164°43'E, 435 m, 20.V.1986: 3.

Acanthochitonina

Acanthochitonidae

Acanthochitoninae

Genus *Notoplax* H. Adams, 1861

Subgenus *Notoplax* s.s.

Notoplax (N.) *richardi* sp. nov.

(figs. 1-10)

Material examined. — Coral Sea, Capel Bank. Musorstom 5, sta. 264, 25°20'S 159°44'E, 56 m, P. Bouchet, B. Métivier and B. Richer de Forges coll., 08.X.1986: holotype.

Diagnosis. — Animal rather small, c. 14 × 5 mm, elongate, almost parallel-sided, rather elevated (dorsal elevation c. 0.44), the back rounded, side slopes straight, valves beaked. Tegmentum brick red, only the apex of the head valve and most of the tail valve white. Girdle wide and fleshy, encroaching at the sutures, the 18 tufts well exposed.

Description. — Head valve with five radial, little elevated ribs, corresponding with the slits of the insertion plate, the outer margin straight between the ribs. Tegmental sculpture consisting of small, roundish, hardly elevated, flat pustules, quincuncially arranged, the ribs and posterior margins marked by a series of oval granules.

Intermediate valves roughly pentagonal, with a broad, wedge-shaped jugal area, separated from the centro-pleural areas by a series of short, oblique sulci. The centro-pleural areas are separated from the somewhat raised latero-pleural ones by a faint rib from the apex to the side margin, corresponding with the slit in the insertion plate. Both pleural areas are covered with flat, oval granules arranged in longitudinal rows as well as in rows radiating from the apex. Anterior margin slightly concave, sides of centro-pleural areas obliquely truncated, forming an obtuse angle with those of the latero-pleural areas. Posterior margin concave at both sides of the sharp, protruding

apex. Posterior valve relatively small, much wider than long, the mucro posterior when viewed from above, posterior slope steep.

Articulamentum thin, white, the colour of the tegmentum shining through, insertion plates long, striated on the outside, with five equidistant slits in the anterior valve, the slits merging into deep channels towards the margin of the tegmentum. Apophyses of intermediate valves directed forward, broadly rounded, leaving a wide, slightly concave, trapezoidal, anteriorly crenulated jugal sinus. Valve VIII with two distinct slits, relatively close together, and several secondary slits or rugosities in between.

The girdle is dorsally covered with a carpet of very small, thin, bluntly pointed, white spicules, 48 μm long, the thickened base deeply embedded in the chitinous cuticula. Among them, randomly disposed, stout, curved, white spines are found, up to 360 μm long, 56 μm thick at the base. The sutural tufts are clearly exposed, consisting of a few dozen fine, straight, white, ringed spicules of different lengths, up to 700 \times 35 μm . There is a marginal fringe of long, straight to slightly curved spicules, up to 800 \times 40 μm . Ventral side of girdle closely covered with sharply pointed, straight, white spicules, 128 \times 16 μm .

Central tooth of radula a little longer than wide, somewhat expanded at the base, with an almost straight, narrow blade; minor laterals shorter, distally truncated, without a blade; major laterals with a tridentate dental cap, the cusps pointed, the central one decidedly longer; there is a tiny, finger-like cusp on the interior side near the base.

Gills merobranchial, adanal with interspace, about 16 gills in a row, extending for 1/3 the length of the foot.

Etymology. — Named after my fellow-worker on chitons, Richard A. Van Belle of St.-Niklaas, Belgium.

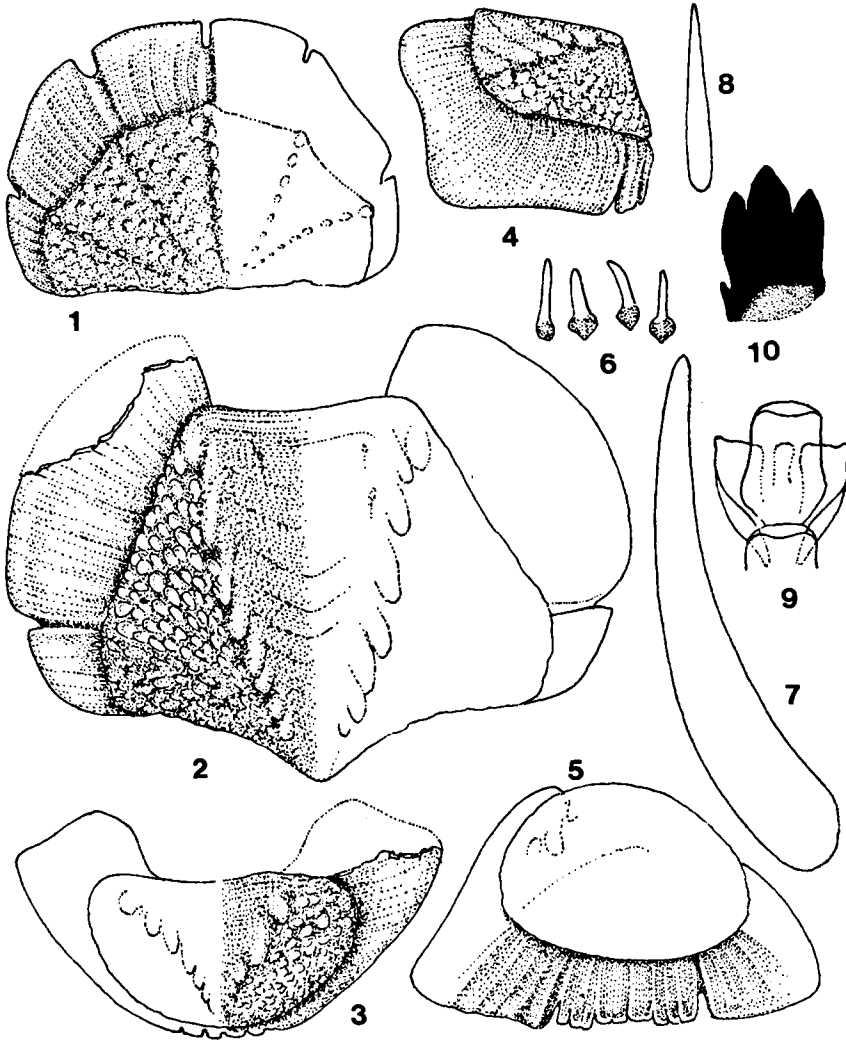
Observations. — Of all the known *Notoplax* species in the tropical western Pacific *N. richardi* seems closest related to *N. aenigma* (Iredale & Hull, 1925) from New South Wales, but valve VIII of that species is longer than wide and the anterior valve is only obscurely 5-slitted.

***Notoplax* (N.) *rostellata* sp. nov.**
(figs. 11-20)

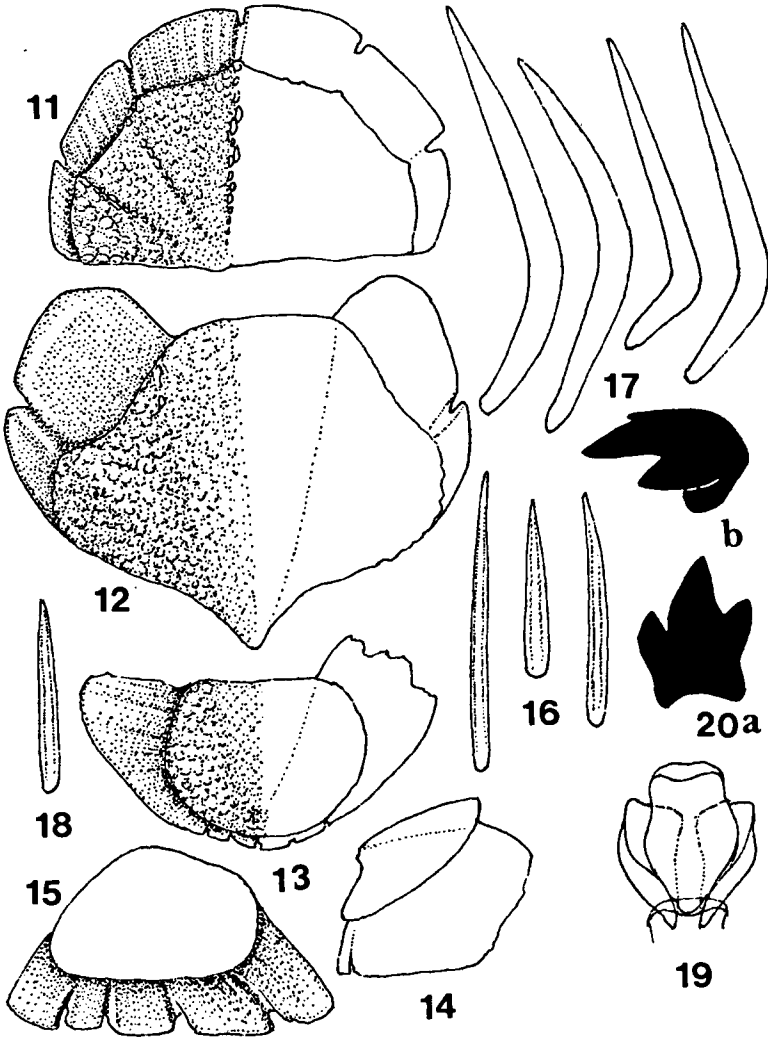
Material examined. — Philippines. Musorstom 3, sta. CP134, 12°01' N 121°57' E, 92-95 m, P. Bouchet and H.P. Triclot coll., 05.VI.1985: holotype.

Diagnosis. — Animal small, elongate oval, rather elevated, subcarinated, side slopes a little concave. Head valve with five radial rays, intermediate valves strongly beaked, with a longitudinally punctostriate jugal area, wide at the base. Side areas ornamented with roundish, flat pustules in rows radiating from the apex. Colour white, irregularly blotched with brick red. Girdle moderately wide, encroaching at the sutures, covered with small, fine, striated spicules. Sutural tufts indiscernible, marginal fringe consisting of relatively strong, sharply bent, smooth spicules. The tridentate dental cap of the major lateral radula tooth with a rather long, sharply pointed central cusp.

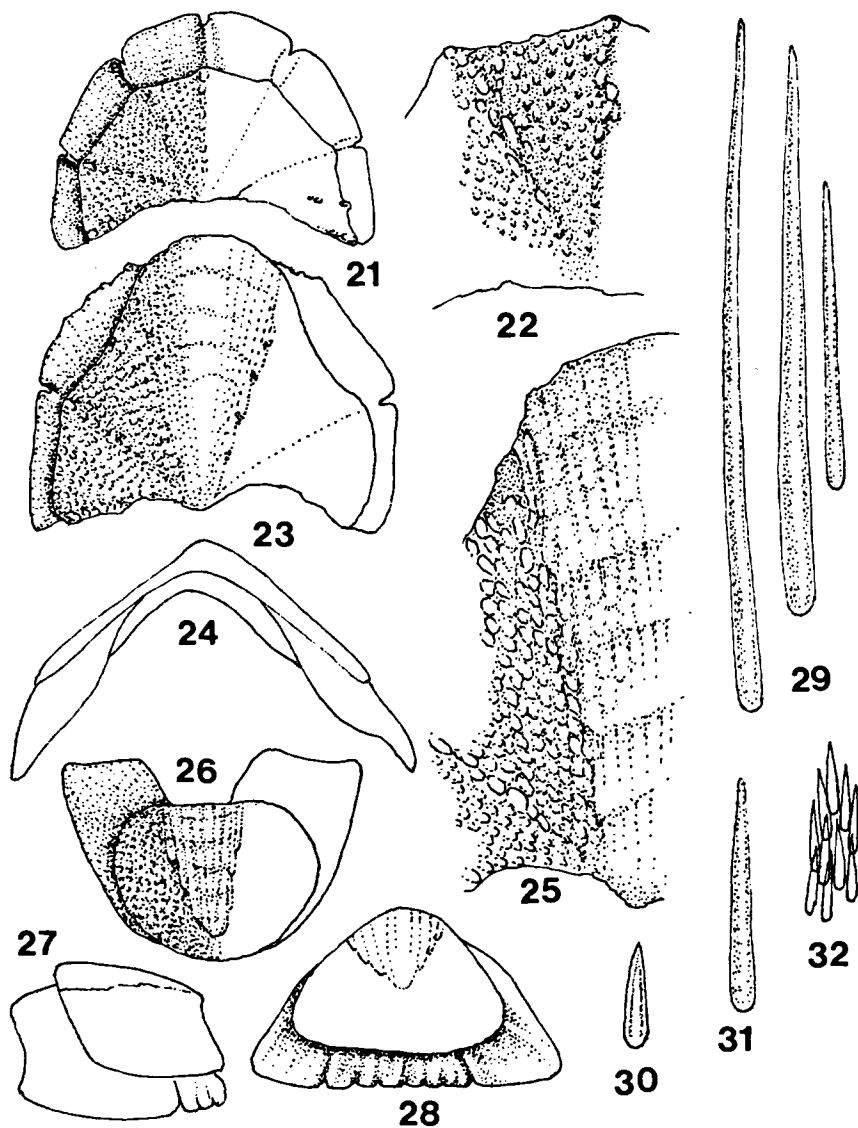
Description. — Animal small, holotype 10.8 \times 3.6 mm, elongate oval, parallel-sided, elevated (dorsal elevation 0.42), subcarinated, side slopes straight to a little concave. Head valve semi-circular, with five weakly raised radial rays corresponding with the slits of the insertion plates, the outer margin between the rays slightly concave, the rays marked with elongate oval pustules. Posterior margin almost straight, with



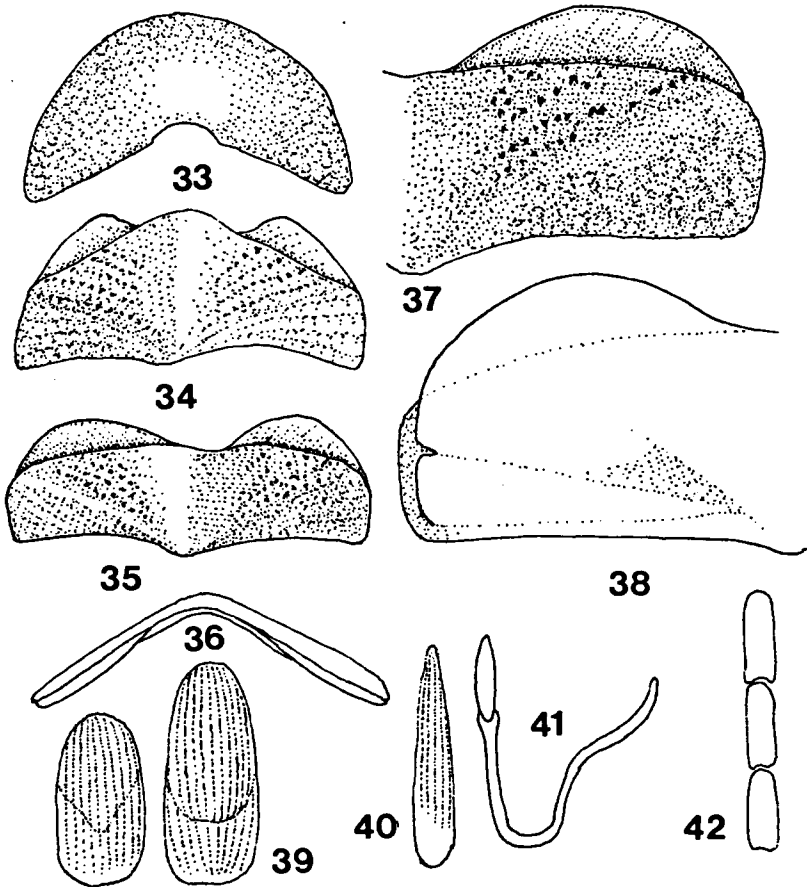
Figs. 1-10. *Notoplax (N.) richardi* sp. nov. Holotype from Musorstom 5 cruise, sta. 264, Coral Sea, Capel Bank, 56 m. 1, Valve I, dorsal view; 2, valve II, dorsal view; 3, valve VIII, dorsal view; 4, do., lateral view; 5, do., caudal view; 6, small dorsal spicules; 7, dorsal spine; 8, ventral spicule; 9, central and first lateral radula teeth; 10, dental cap of major lateral tooth (1-5: $\times 20$; 6-10: $\times 200$)



Figs. 11-20. *Notoplax (N.) rostellata* sp. nov. Holotype from Musorstom 3 Philippines cruise, sta. CP 134, 92-95 m. 11, valve I, dorsal view; 12, valve II, dorsal view; 13, valve VIII, dorsal view; 14, do., lateral view; 15, do., caudal view; 16, dorsal girdle spicules; 17, marginal spicules; 18, ventral spicules; 19, central and first lateral radula teeth; 20a, dental cap of major lateral tooth, ventral view; 20b, do., later view (11-15: $\times 25$; 16-20 $\times 250$).



Figs. 21-32. *Notoplax (N.) richeri* sp. nov. Holotype from New Caledonia, Grand Récif Sud, Programme "Lagon", sta. 387, 225 m. 21, valve I, dorsal view; 22, part of same valve; 23, valve II, dorsal view; 24, do., rostral view; 25, part of same valve, dorsal view; 26, valve VIII, dorsal view; 27, do., lateral view; 28, do., caudal view; 29, needles from sutural tufts; 30, dorsal girdle spicule; 31, marginal spicule; 32, ventral spicules (21, 23-24, 26-28: $\times 12$; 22, 25: $\times 25$; 29, 31-32: $\times 100$; 30: $\times 250$).



Figs. 33-42. *Ischnochiton (Stenosemus) perforatus* sp. nov. Holotype from Estase 2 Philippines cruise, sta. DR7, 90 m. 33, valve I, dorsal view; 34, valve II, dorsal view; 35, valve IV, dorsal view; 36, do., rostral view; 37, do., part of valve, dorsal view; 38, do., ventral view; 39, dorsal girdle spicules; 40, marginal spicule; 41, dorsal bristle; 42, ventral scales (33-36: $\times 25$; 37-38: $\times 50$; 39-42: $\times 250$).

a small, not protruding apex. Intermediate valves roughly pentagonal, little wider than long, the anterior margin about straight, the outer margins of the centro-pleural areas decidedly concave, forming an obtuse angle with the sides of the latero-pleural areas. Posterior margin concave at both sides of the strongly protruding apex. Jugal area wedge-shaped, wide at the base, indistinctly separated from the side areas, marked with about a dozen punctostriate longitudinal lines. Side areas sculptured with well-raised, roundish, flat pustules arranged in rows radiating from the apex; the centro-pleural areas slightly concave, the latero-pleural areas more or less convex, a little raised. Tail valve only little wider than long, somewhat pentagonal, rounded behind, sculptured like intermediate valves, mucro sharp, terminal when viewed from above, posterior slope steep, with a small but deep excavation directly behind the mucro. Colour of tegmentum white, sparsely spotted or blotched with deep brick red.

Articulamentum well developed, thin, white, the colour of the tegmentum shining through. Insertion plates rather long, dorsally striated, strongly thrown forward, with five equidistant slits in the anterior, two in the intermediate, four in the posterior valve.

Girdle moderately wide, highly encroaching at the sutures, the dorsal side covered with outwardly directed, small, slender, straight spicules, two distinct longitudinal grooves on the visible side, up to 160 μm long, 12 μm thick. Sutural tufts not discernible. There is a marginal fringe of relatively thick, acutely bent, smooth, white spicules, up to 220 μm long, 16 μm thick; ventral spicules like the dorsal ones, but smaller, up to 100 \times 10 μm .

Central tooth of radula longer than wide, somewhat bulging in the middle, with a straight, narrow blade; minor lateral shorter, elongate triangular, distally truncated, without a blade; major lateral with a tridentate dental cap, the cusps sharply pointed, the central one decidedly longer than the others.

Gills merobranchial, adanal with interspace, c. 14 ctenidia per side.

Etymology. — The Latin adjective *rostellatus* is derived from *rostellum* = little beak, referring to the strongly beaked intermediate valves.

Observations. — As it would seem, this new species is closest related to *Chiton acutirostratus* Reeve, 1847, from Cape Rivers, Celebes, which, however, from the original figures, is larger, more elongate and has the jugal area much narrower and well separated from the side-areas. Moreover, Reeve states that there is "at the side of each valve ... a small crest of spicula", whereas in *N. rostellata* no sutural tufts can be detected. None of the many other species of *Notoplax* in the central-western Pacific have the intermediate valves so strongly beaked as in *N. acutirostrata* and *N. rostellata*.

Notoplax (*N.*) *richeri* sp. nov.

(figs. 21-32)

Material examined. — New Caledonia (Grand Récif Sud). Programme "Lagon", sta. 387, 22°39'S 167°07'E, 225 m, B. Richer de Forges coll., 22.I.1985: holotype.

Diagnosis. — Animal small, elongate, rather elevated, carinated, the valves beaked, side areas thrown backward, rose coloured, variegated with white. Valve I with five radiating riblets, intermediate valves with a somewhat raised, forwardly produced, striated jugal area, the sides divided into a centro-pleural and a latero-pleural area by a faintly raised radial riblet. Tail valve roundish, with the mucro almost terminal, the back slope steep, straight. Sculpture consisting of small, flat, oval granules, arranged

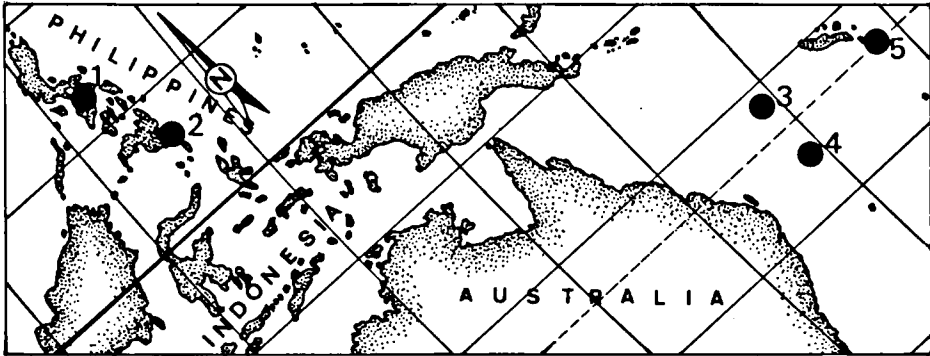


Fig. 43. Map showing stations of principal species reported in this paper. 1, *Notoplax rostellata* sp. nov.; 2, *Ischnochiton (Stenosemus) perforatus* sp. nov.; 3, *Callistochiton granifer* Hull; 4, *Notoplax (N.) richardi* sp. nov. and *Leptochiton (Parachiton) capricornicus* Iredale & Hull; 5, *Notoplax (N.) richeri* sp. nov.

in rows radiating from the apex. Girdle moderately wide, encroaching at the sutures, closely covered with small, striated spicules. Sutural tufts not prominent, marginal fringe consisting of rather long, straight spicules.

Description. — Animal rather small, holotype 15×6.5 mm, elongate oval, parallel-sided, elevated (dorsal elevation 0.45), carinated, side slopes straight. Tegmentum thin, granulated, rose coloured variegated with white.

Head valve with a small but distinct beak, the tegmentum semi-hexagonal, with five equidistant radial riblets and two accompanying the posterior margin; the outer margin shallowly concave between the riblets, sculptured with small, close-set, oval granules arranged in quincunx; the riblets and hind margin crowned with larger, elongate granulae. Intermediate valves only little wider than long, the jugal area weakly raised, wedge-shaped, longitudinally striated, rather wide and forwardly produced between the apophyses. Centro-pleural areas somewhat depressed, with decidedly concave side-margins, separated from the latero-pleural areas by a faint rib corresponding with the slit in the insertion plate. Posterior margin concave at both sides of the moderately beaked apex, the sides strongly thrown backward. Tail valve regularly rounded, the anterior margin almost straight, mucro pointed, almost terminal when viewed from above, hind slope straight, a little excavated directly behind the mucro.

Articulamentum thin, white, glossy, finely striated exteriorly, with five equidistant slits in the head valve, corresponding with the tegmental riblets; intermediate valves with 1-1- slits, the apophyses directed forward, leaving a rather wide, convex sinus; tail valve with the usual normal two slits and five small secondary slits in between.

Girdle moderately wide, encroaching at the sutures, thickly beset with small, bistriate, pointed spicules, 56×12 μ m. Sutural tufts not prominent, consisting of a few dozen spicules of different lengths, up to 900×40 μ m; marginal and sutural spicules white, smooth, pointed, c. 300×35 μ m. Ventral side of girdle thickly beset with small, smooth, outwardly directed spicules, c. 100×20 μ m.

Radula not examined.

Gills merobranchial, adanal with interspace; c. 14 ctenidia per side.

Etymology. — After Dr. B. Richer de Forges who has been a key person in the exploration of the deep sea fauna of New Caledonia since 1984.

Observations. — The only *Notoplax* species ever described from New Caledonia is *N. tridacna* (De Rochebrune, 1881), which, however, is totally different, with strong, scaly ribs on all valves, including the tail valve. *N. richeri* appears to be closest related to *N. unica* (Nierstrasz, 1905) from shallow water S. of Saleyer, Indonesia, but that species has the jugal area narrower and more strongly striated, the inside of the valves decidedly rose tinged. *N. coarctata* (Sowerby, 1841) from the Philippines has a smooth jugal area, *N. formosa* (Reeve, 1847) and *N. eximia* Thiele, 1909, have a narrow jugal area and long sutural tufts. They all differ markedly from the present new species.

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