

A New Genus of Macrophthalmine Crab (Crustacea: Decapoda: Ocypodidae) from Eastern Australia

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ABSTRACT. A new genus and species of macrophthalmine is described from eastern Australia. *Enigmaplax* is separable from *Macrophthalmus* by its exceptionally wide front and the pointed not spooned chelae.

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For some years a small graspid crab has been appearing in samples made from various coastal and estuarine localities along the eastern coast of Australia. This species was first reported on from the Brisbane River by Snelling (1959) and tentatively referred to *Cyrtograpsus*. Since then it has been found from numerous localities, and the discovery of a large collection of this species from *Zostera* beds around Pittwater, Sydney, in the Australian Museum, prompted the author to investigate its status. Its rightful place is in the family Ocypodidae where a new genus must be described to accept it.

Abbreviations are as follows: QM - Queensland Museum, AM - Australian Museum. All measurements are of maximum carapace breadth unless otherwise stated. Drawings were made using a camera lucida.

Enigmaplax n.gen.

Type species. *Enigmaplax littoralis* n.sp., by original

designation.

Gender. Feminine.

Diagnosis. Carapace flattened, quadrangular, lateral margins subparallel, dentate. Frontal width about 0.4 times fronto-orbital width. Postfrontal lobes sharply defined, straight. Orbits large, lower border complete, no infraorbital crest. Antennules transverse or slightly oblique; inter-antennula septum narrow. Antennae in the orbital hiatus. Central region of epistome distinctly convex. Maxillipeds do not close the buccal cavern; flagellum inserted medially on the anterior margin; merus smaller than ischium; no hairy ridge; exopod narrow. Chelipeds weak, cylindrical, cutting margins evenly serrated, but with basal molariform tooth differentiated in adult males, tips of fingers pointed. Legs slender; dactyls long, curved, unarmed; merus with subdistal tooth on anterior margin; no hairy ridged pouch between bases of first and second walking legs. Abdomen of male of 7 segments; evenly tapering; no medial constrictions.

Enigmaplax littoralis n.sp.

Figs 1a-l, 2a,b

Type material. HOLOTYPE, AM P20789, male (6.0 mm), Careel Bay, Pittwater, Sydney, NSW. Upper *Zostera*, 31 Oct. 1974, P. Hutchings. PARATYPES, QM W15087, 1 male, 2 females (3.0 - 4.0 mm), in front of Redbank Creek, Trinity Inlet, Cairns, north-east Qld, 11 Dec. 1974, R. Timmins. QM W11905, 2 males (4.5, 4.5 mm), Triangular Island, Shoalwater Bay, north-east Qld, Nov. 1982. QM W11906, female (4.5 mm), Triangular Island, Shoalwater Bay, north-east Qld, Nov. 1982. QM W7441, female (2.8 mm), rocky platform at mouth of Pulgul Creek, Urangan, Hervey Bay, south-east Qld, in crevice under rock, 23 July 1975, P. Davie. QM W7442, 2 males, 9 females (3.0 - 5.0 mm), from *Zostera*, south of Urangan Harbour, Hervey Bay, south-east Qld, 23 July 1975, P. Davie. QM W7415, 2 females (3.2, 4.1 mm), East Huth

Creek, main channel between Dinner Island and mainland, Moreton Bay, south-east Qld, subtidal *Zostera* using sweep net, 9 June 1976, J. McNalty & P. Shanco. QM W8950, 2 males (3.3, 4.1 mm), between Dinner Island and Mainland, southern Moreton Bay, south-east Qld, sieved, subtidal, *Zostera*, 9 June 1976, P. Shanco. QM W8775, male (3.9 mm), mouth of Brisbane River, along old Bar Cutting, past Bishop Island, south-east Qld, 22 July 1975, L.H. Park. QM W8774, male (3.7 mm), female (3.7 mm), mouth of Brisbane River, past Luggage Point, south-east Qld, 9 Dec. 1976, L.H. Park. AM P20372, 2 males (6.1, 7.5 mm) 1 female (9.0 mm), Careel Bay, Pittwater, NSW, 8 Nov. 1973, P. Hutchings. AM P20370, 2 females (8.4, 6.7 (ovig.) mm) 2 males (4.3, 4.2 mm), Careel Bay, Pittwater, NSW, 8 Nov. 1973, P. Hutchings. AM P20764, 2 males (5.5, 4.5 mm), Careel Bay, Pittwater, NSW, upper *Zostera*, 31 Oct. 1974, P. Hutchings. AM P20366, 1 female (7.7 (ovig.) mm) 1 male (5.7 mm), Careel Bay, Pittwater, NSW, 8 Nov. 1973, P. Hutchings. AM P9211, 2 ovig. females (6.2, 9.4 mm) 1 male (5.6 mm), Cunnamatta Bay, Port Hacking,

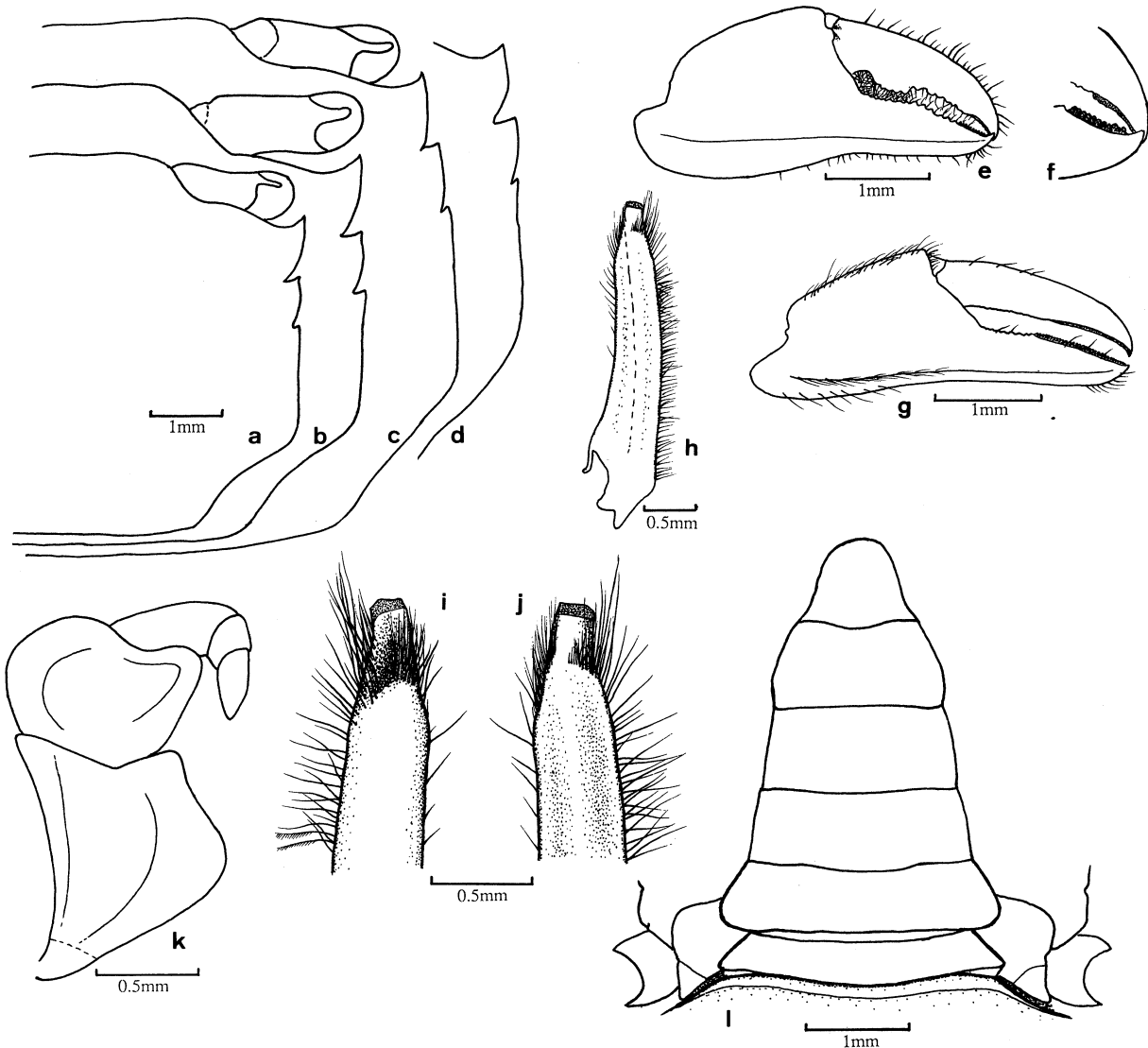


Fig.1. *Enigmaplax littoralis* n.sp., a-d, outline of carapace shapes showing variation in anterolateral borders and degree of frontal lobe development (a = male 6.1 mm, b = male 7.5 mm, c = female 9.0 mm, d = female 9.4 mm); e, right chela of holotype male; f, detail of distal chitinous crests on fingers of holotype male; g, right chela of AM P9211, an ovigerous female; h-j, first male pleopod of AM P20372; k, third maxilliped of holotype; l, abdomen of holotype.

NSW, among weeds on tidal flats at low tide, Oct. 1925, Pres. M. Ward. AM P20364, 1 male (6.7 mm), Riley's Island, Brisbane Waters, NSW, *Zostera*, May 1973, P. Hutchings. AM P20185, 1 female (5.4 mm) 2 males (3.8, 4.2 mm), Towra Point, Botany Bay, NSW, *Zostera*, 1974, P. Ikin. AM P19946, 1 male (4.0 mm), Careel Bay, Pittwater, NSW, 30 July 1973, P. Hutchings. AM P20363, female (ovig.) (7.3 mm), Careel Bay, Pittwater, NSW, lower *Zostera*, 8 Nov. 1973, P. Hutchings. AM P24989, ovig. female (7.3 mm), Careel Bay, Pittwater, Broken Bay, NSW, amongst *Zostera* grass, 16 Feb. 1946, E. Pope. AM P19948, male (3.4 mm), female (4.9 mm), Careel Bay, Pittwater, NSW, 10 June 1973, P. Hutchings. AM P20377, 3 ovig. females (8.6, 6.1, 5.6 mm), Careel Bay, Pittwater, NSW, lower *Zostera*, 8 Nov. 1973, P. Hutchings. AM P19944, ovig. female (8.3 mm), Careel Bay, Pittwater, Sydney, NSW, 30 July 1973, P. Hutchings. AM P19949, female (6.1 mm), Careel Bay, Pittwater, Sydney, NSW, 10 June 1973, P. Hutchings. AM P20373, immat. female (4.9 mm), Careel Bay, Pittwater, Sydney, NSW, *Zostera*, 30 July 1973, P. Hutchings. AM P20787, 2 immat. females (5.3, 5.0 mm), Careel Bay, Pittwater, NSW, *Zostera*, 31 Oct. 1974, P. Hutchings. AM P20766, ovig. female (7.2 mm), Careel Bay, Pittwater, NSW, *Zostera*, 31 Oct. 1974, P. Hutchings.

Description. Carapace: flattened; subquadrate, breadth 1.1 - 1.2 times length; regions slightly defined; distinct gastrocardiac groove; surface smooth or microscopically granular. Lateral borders variable, from subparallel in small specimens to markedly convergent especially in large females, such that point of greatest carapace breadth varies between external orbital angles and posterolateral angles (about level of third walking legs). Three anterolateral teeth; first (external orbital angle) the largest; second of same form but smaller; third the smallest but distinct; sometimes a slight indication of a fourth. Lateral edges more or less minutely granulated; a longitudinal low granulate crest on posterobranchial region near posterolateral carapace margin.

Front prominent; distinctly less than hind width (about 0.7 times); approximately equal to, or even wider than width of orbit; and about 0.42 times fronto-orbital width. Anterior edge in dorsal view usually straight but sometimes may be shallowly bilobed. Upper orbital margin sinuous, slanting towards external orbital angle. Postfrontal lobes sharply defined, straight, separated by

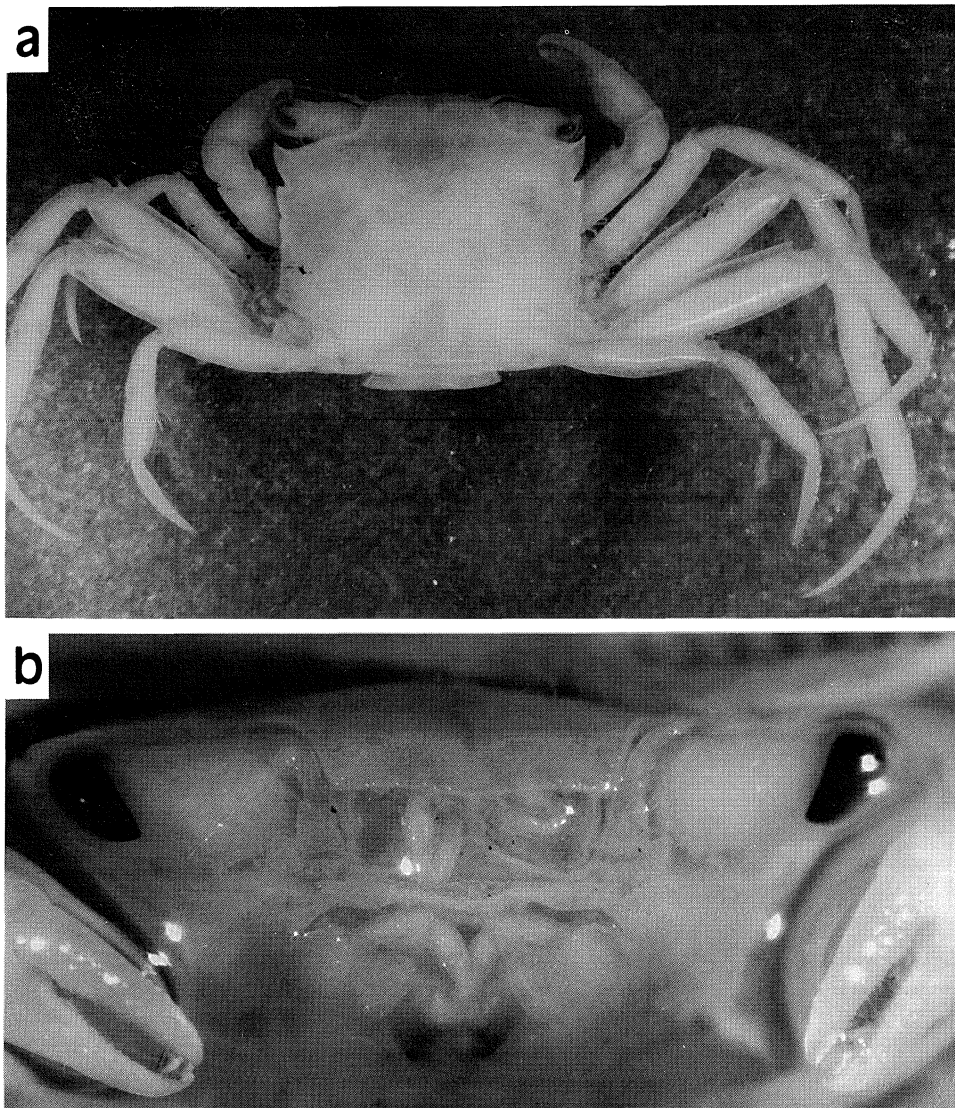


Fig.2. *Enigmaplax littoralis* n.sp., paratype male (QM W7442): a, dorsal aspect; b, frontal view.

narrow notch, and marked by a horizontal line of granules and a row of long feathered setae. Long setae also present along lateral edges of carapace and bases of walking legs.

Eyes large; may reach slightly beyond external orbital angles but usually well short of these, especially in large females. Antennae long reaching almost to tips of corneas; lie within orbital hiatus. A single simple seta arises from tip of penultimate segment of flagellum and varies in length from short to two thirds length of flagellum.

Antennules separated by a narrow septum, basal segment inflated, flagellum lies transversely or slightly obliquely. Epistome quite broad, lower edge sinuous, clearly convex medially. Lower orbital margin entire, finely granular.

Third maxillipeds separated by a median hiatus and do not close buccal cavern; hairy along internal margins. Merus about three quarters length of ischium. Anterior edge of ischium slants down towards upwardly directed lobe of inner anterior margin. External margin of merus rounded; anterior margin concave with carpus emerging more or less centrally. Exopod narrow (length about 5.5 times breadth); width of exopod about 0.4 times width of ischium.

Abdomen does not occupy entire space between hind walking legs; composed of 7 free segments; third segment expanded and forms greatest breadth; other segments taper gradually. Telson breadth 1.4 times length; breadth of penultimate segment 2.5 times length. Telson 1.3 times length of penultimate; breadth of penultimate 1.4 times breadth of telson at base. Telson the longest; segments 4 and 6 subequal; segment 5 slightly longer than 4 and 6. Telson rounded anteriorly.

Chelipeds subequal. Merus with patch of setae on internal face, thickest distally; setae continue onto internal edge of carpus and form a thick mat on inside of palm and fixed finger, extending around gape and along inner margins of both fingers. Merus and carpus unarmed. Palm not especially robust. Length of moveable finger 0.5 - 0.6 times length of palm in males. Fingers pointed distally, cutting margins of both fingers evenly serrated over most of their length, but with distal quarter having chitinous crests; on immovable finger this crest is pectinate, while on dactyl it is a continuous sharp crest. Males sometimes with a more or less distinct differentiated tooth near base of moveable finger. A granulated ridge arises on tip of fixed finger and runs the length of the palm. Lower margin of palm and fixed finger shallowly concave. Moveable finger slightly curved.

Female chelae smaller and more slender than males, without patches of setae on inside of merus, carpus and palm, and with distal chitinous crests on cutting margins of fingers extending back about a half to two thirds of distance towards articulation.

Walking legs: (ratios apply to third walking leg); long (about 2 times carapace width), and slender with length of merus about 3.5 times width. Merus with sharp spine subdistally on anterior margin. Dactylus long, equal in length to propodus, unarmed. Length of merus and basis

equal to length of carpus and propodus. Margins of meri of first 3 pairs are slightly convex, but of last pair are straight and parallel. Row of fine long setae on posterior margin of propodus of fourth leg and on posterior and anterior margins of dactylus.

First male pleopod as figured.

Habitat. Intertidal or very shallow subtidal, in *Zostera* beds, algal mats, and under rocks. Snelling (1959) recorded it from the Brisbane River from under stones in the littoral zone from the mouth to about 10 km upstream where salinity would fluctuate from about 15-30 parts per thousand.

Distribution. Eastern Australia from Cairns in the north to Sydney in the south.

Discussion. Snelling (1959) recorded a species from the Brisbane River which she tentatively referred to *Cyrtograpsus*. She wrote to M.W.F. Tweedie of the, then, Raffles Museum in Singapore for confirmation of identification and the following reply was received: 'The series contains two species. One is, I think, conspecific with *Camptandrium paludicola* Rathbun...The other seems to be a species of the same genus... probably undescribed. However, the genus to which these both belong is not, I am almost certain, *Camptandrium*'. Barnard (1955) erected a new genus, *Ilyograpsus*, to receive his *I. rhizophorae*. This species proved to be a junior synonym of *C. paludicola* but the genus *Ilyograpsus* remained valid and so *C. paludicola* was transferred from the Ocypodidae to the Grapsidae.

The other species from Snelling's collections referred to by Tweedie would seem to be *Enigmaplax littoralis* as this species does bear certain resemblances to *Ilyograpsus paludicola* and during extensive collecting in the Brisbane River and from other south-eastern Queensland localities no other species has been found which could be considered a close ally. *Shenius anomalum* (Shen, 1935) is also of similar appearance to *I. paludicola* but has not yet been reported from Australia. According to Serène (1974) it belongs in the Dotillinae (= Scopimerinae). The strong medial constriction of the male abdomen and the shape of the first male pleopod in *S. anomalum* both indicate that there is no close affinity with *Enigmaplax*.

Enigmaplax is difficult to place into either the Ocypodidae or the Grapsidae because of the overlap in the familial definitions. It does, for example, look far closer to species of *Hemigrapsus* and *Euchirograpsus* than to any of the ocypodids. Within the Grapsidae, however, only members of the subfamilies Varuninae and Sesarminae have the male abdomen not covering the surface of the sternum between the last pair of ambulatory legs. It must be excluded from the Varuninae because the lower orbital border is complete and not supplemented by a lower orbital crest, and the Sesarminae is not suitable as there is no hairy ridge on the third maxillipeds.

Of the subfamilies of the Ocypodidae, the Macrophthalminae alone is suitable. Sakai (1976: 598)

defines this subfamily as follows: 'Carapace broadly quadrilateral and flattish. Eystalks often remarkably long; antennules folded transversely and their flagellum developed; inter antennular septum very narrow. External maxillipeds leave a more or less wide median hiatus; no hairy-ridged pouch between bases of first and second ambulatory legs'. *Enigmaplax littoralis* agrees well with this definition and therefore it is placed here. The front is exceptionally wide when compared with other species within the Macrophthalminae although *Australoplax tridentata* does represent a comparatively wide condition. Barnes (1967, 1968) postulates that predation has been the major factor influencing the evolution of long ocular peduncles (and consequent narrowing of the front). *Enigmaplax littoralis* being of small size, cryptic colouration, and living in littoral or shallow sublittoral habitats which provide good concealment (e.g., algal mats, *Zostera* beds, under stones) would suffer little from 'terrestrial' predators and consequently there would be no selective advantage in particular elongation of the eystalks.

Enigmaplax littoralis agrees on most points with the hypothesised ancestral *Macrophthalmus* of Barnes (1967). The main points of departure are that the merus of the external maxilliped is smaller than the ischium as opposed to subequal; and the epistome has a distinctly convex central region, not straight. It cannot be placed in the genus *Macrophthalmus* because of the relatively much broader front, and the pointed, non-spooned fingers of the chelae. Nevertheless it agrees with *Macrophthalmus* in many ways including the presence of a differentiated molariform tooth on the cutting margin of the dactyl and in the general form of the first male pleopod. Species of the subgenus *Mopsocarcinus* approach *Enigmaplax* in their quadrate carapace and broader front but even so the frontal width is still considerably narrower - *M. boscii* has a frontal width of about 0.25 times fronto-orbital width; *M. punctulatus*, about 0.29 times; *Enigmaplax littoralis*, about 0.42 times. Also those two species differ significantly in the fact that the merus and ischium of the third maxillipeds are subequal. *Macrophthalmus (Hemiplax) hirtipes* also has a very wide front without a medial constriction, but the carapace is much broader

than long, and the eystalks are longer and comparatively slender.

The only other genus recognised within the Macrophthalminae, *Australoplax*, differs in the shape of the carapace, which is stout and relatively deep; the chelae, which do not have differentiated teeth on the cutting margins, and have an external mat of hair in the gape; and by the remarkable shape of the male abdomen.

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