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Decapoda, Lithodidae) from the Minami-Ensei
Knoll in the Mid-Okinawa Trough

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Abstract A new *Paralomis* species of the family Lithodidae (Crustacea, Decapoda) is described on four specimens from the Minami-Ensei Knoll in the Mid-Okinawa Trough collected by the submersible *Shinkai 2000* at a depth of 710 m. The species named *P. jamsteci* is distinguished from the congeners by combination of the features that the carapace is uniformly covered with minute rough granules, the hepatic and anterior branchial margins are armed with spiniform teeth, and that there is a crest at the posterior part of each branchial margin.

The research submersible *Shinkai 2000* of Japan Marine Science and Technology Center greatly contributes not only to the geological and topographical studies but also to the deep-sea fauna and ecosystem around Japan. During a series of recent dives, as provisionally mentioned by HASHIMOTO *et al.* (1989), the prolific biological communities dominated by sponges and deep-sea mussels were discovered at the Minami-Ensei Knoll, which is located at approximately 140 km west of Amami-Oshima Island (Fig. 1). The biological communities are spreading over outcrops and coarse sandy bottom showing grayish white alteration in color. Shimmering water with small gas bubbles was identified from the site. Water temperature of just above the flowing vent was 15°C, showing 8.8°C higher than ambient bottom water.

During any dive into the waters around the Minami-Ensei Knoll, the anomuran stone crabs apparently referable to the genus *Paralomis* were observed not a few in the vicinity of the seepage. The junior author succeeded in collecting four specimens with baited trap at the depression of southwestern slope of the knoll during the Dive 428 on July 26, 1989. The first glance showed at once that they might be distinguished from 45 species currently referred to the genus *Paralomis*.

In this paper, the specimens are described in detail under the name of *Paralomis jamsteci* after the research institute, Japan Marine Science Technology Center

(JAMSTEC), to which the submersible *Shinkai 2000* belongs together with her mother-ship *Natsushima*.

The holotype and one of the paratypes are preserved in the National Science Museum, Tokyo (NSMT), and the additional two paratypes will be sent to the National Museum of Natural History, Smithsonian Institution (USNM) and the Muséum National d'Histoire Naturelle, Paris (MNHN).

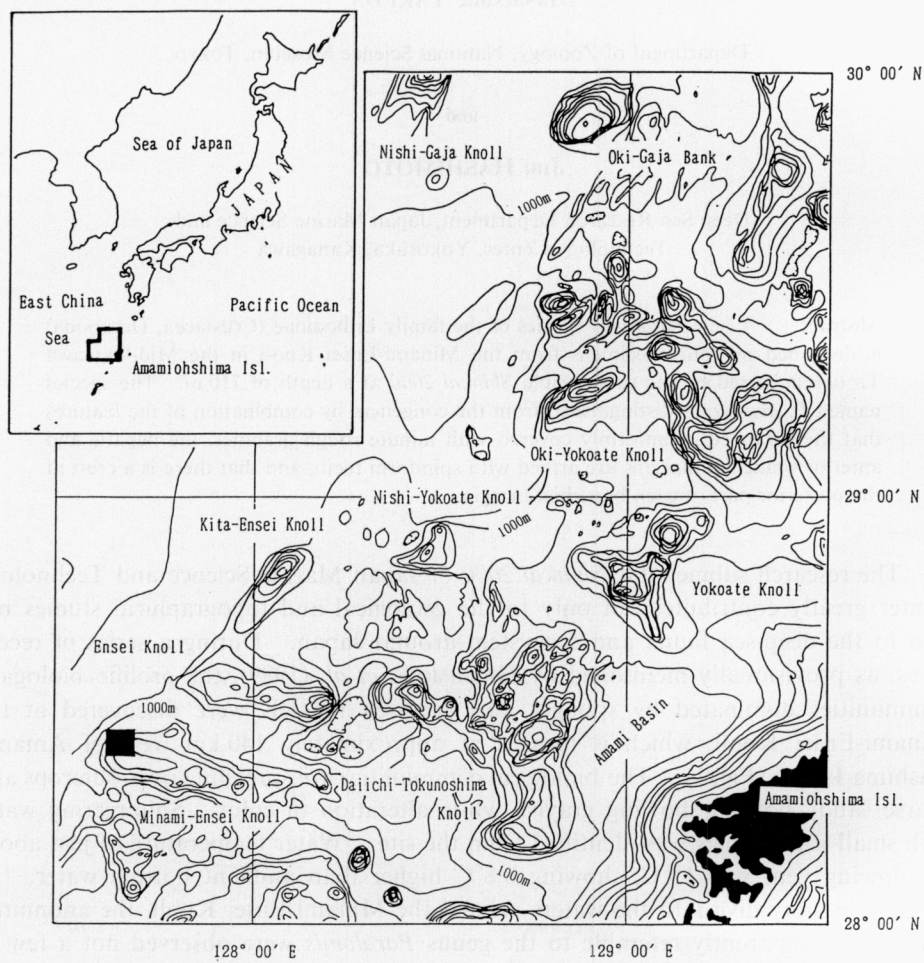


Fig. 1. Map showing the knolls in the Mid-Okinawa Trough, with the sampling station indicated by solid square.

Family Lithodidae

Genus *Paralomis* WHITE, 1846

Paralomis jamsteci sp. nov.

[New Japanese name: Ensei-ezo-ibaragani]

(Figs. 2-4; Pl. 1)

Material examined. Minami-Ensei Knoll (28°23.4'N, 127°38.4'E), 710 m deep, Dive 428 of the submersible *Shinkai 2000*; July 26, 1989; 1 ovig. ♀ (holotype, NSMT-Cr 10172), 1 ♂ (paratype, NSMT-Cr 10173), and 2 ovig. ♀♀ (USNM and MNHN).



Fig. 2. *Paralomis jamsteci* sp. nov., holotype ovig. ♀ (NSMT) in dorsal and ventral views.

Measurements. Holotype, ovig. ♀: Breadth of carapace including lateral teeth (BC), 68.8 mm; Length of carapace including median rostral tooth (LCI), 70.5 mm; Length of carapace excluding median rostral tooth (i.e., from level of bottom of orbit to posterior border of carapace) (LCE), 62.0 mm. Paratype, ♂: BC, 67.8 mm; LCI, 64.7 mm; LCE, 56.3 mm. Paratypes, 2 ovig. ♀♀: BC, 57.2 and 55.5 mm; LCI, 60.5 and 56.8 mm; LCE, 53.0 and 49.5 mm.

Description of holotype. Carapace pentagonal rather than pyriform in its outline; dorsum moderately convex as a whole, except for narrow regions along anterolateral and posterolateral borders of carapace, being separated into gastric, cardiac and branchial regions; dorsal surface densely and uniformly covered with minute, low tubercles of scab-like appearance; most of tubercles small and equal in size, being interspaced with minute ones; some or several microscopical setae around each tubercle make the touch to be very rough. Gastric region oblong, convex laterally, with a low mound at its anterior median part; a pair of scab-like flattened mounds side by side at its posterior median part; a clearly defined transverse prominence at outside of gastric region. Branchial region evenly convex laterally, with an ill-defined scab-like mound at median inner part; a large, but low mound near posterior border of carapace; an oblique furrow between branchial and gastric regions very deep, club-shaped, being discontinuous with a linear furrow surrounding the transverse furrow outside of gastric region. Cardiac region separated from gastric region by a very deep, smooth transverse furrow; anterior part provided with some scab-like prominences that are smaller than those of posterior median part of gastric region; lateral borders of cardiac region convergent posteriorly, but not in contact with each other.

Rostrum forwardly produced into a long central spine, distinctly curved upward, bearing a pair of spiniform small teeth dorsolaterally at its base; this subsidiary teeth weakly directed obliquely upward and hardly divergent; lower border of central spine regularly curved and unarmed. Right external orbital spine sharp, directed forward, or very weakly divergent outward, only slightly exceeding base of cornea; left spine broken off.

Hepatic margin oblique, nearly straight, armed with five small tuberculate teeth; last two teeth close to each other and placed posteriorly with long interval, being separated from first three. Branchial margin only shallowly separated from hepatic margin, armed with five sharp, triangular, depressed teeth for its anterior half, and with a thin crest at its posterior part; branchial margin convex along first three teeth, nearly longitudinal along last two teeth and unarmed part; crest as long as unarmed part, more or less undulate along its margin, but not armed at all.

Eyestalk medially constricted, armed with some spinules on its upper surface and along distal margin, terminal one of which is larger and protruded forward; cornea chiefly ventral.

Basal segment of antennal peduncle armed with a slender spine at its antero-external angle which is very weakly curved upward and inward; outer angle of second segment is armed with a long straight spine followed with three spinules, and inner

upper angle is armed with a stouter spine which is about half as long as outer spine; antennal acicle has a long terminal and three outer spines, and three spinules on inner upper surface, slightly overreaching end of rostral spine and nearly reaching distal end of last segment of antennal peduncle.

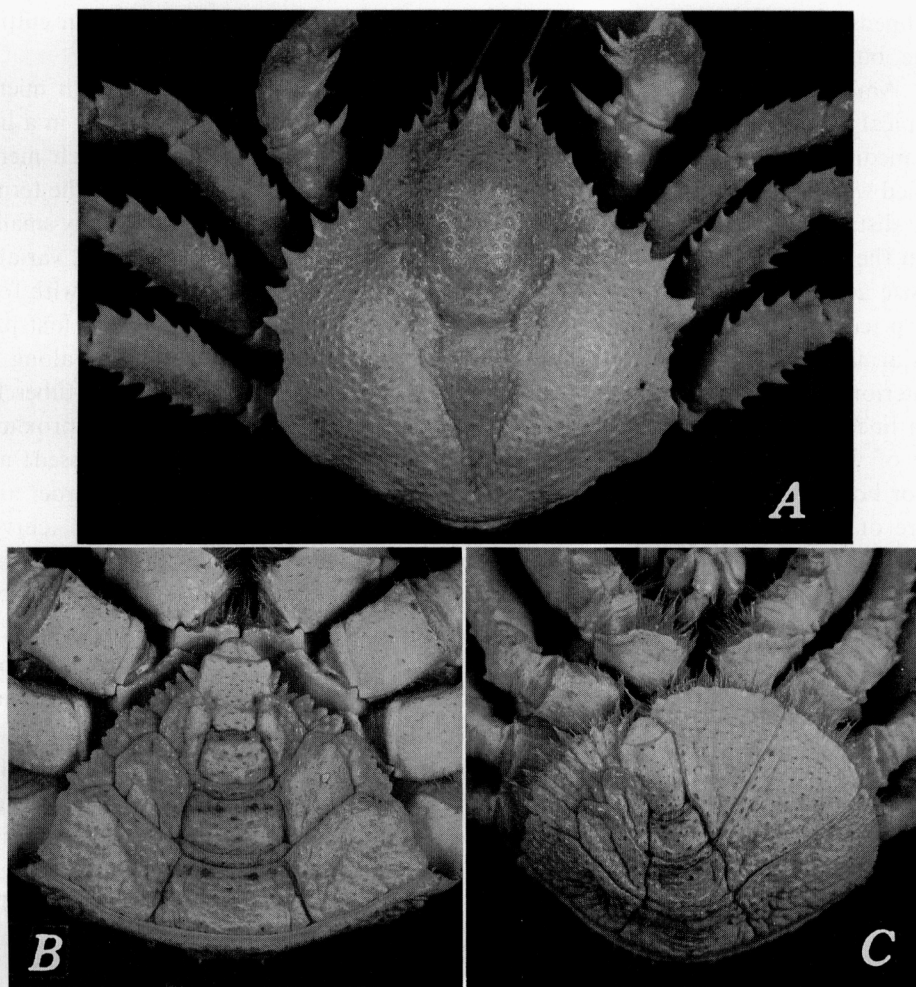


Fig. 3. *Paralomis jamsteci* sp. nov. — A, carapace of holotype ovig. ♀ (NSMT); B, abdomen of paratype ♂ (NSMT); C, abdomen of paratype ovig. ♀ (USNM).

Right cheliped larger than the left as usual, but subequal to and not much different from the left except for cutting edges of fingers; inner angle of merus armed with a long spine and a shorter spine close to it followed by some small tubercles in a curved row toward to upper border of merus; a subterminal shallow groove or depression along distal margin which is armed with some low teeth. Carpus flattened on its

outer surface, with minute rough granules of variable size; inner border armed with a proximal spine directed obliquely upward, and with a three-spined crest directed inward; both of antero-inner and antero-outer angles more or less tuberculated. Both surfaces of palm and fingers provided with many brush-like bundles of longish setae; upper border of palm armed with three tuberculate teeth directed forward in both chelipeds; both fingers of right cheliped each with some prominent teeth on cutting edge, but the fingers of left cheliped are prehensile in function without teeth.

Ambulatory legs elongate. Meri depressed moderately, roughened with microscopical granules and studded with some sharp granules which are arranged in a line on median part of proximal third of upper surface; anterior border of each merus armed with six sharp teeth along distal two thirds, one of which is placed at the terminal; distal three teeth always strongly developed, but the penultimate is slightly smaller than the adjacent ones; proximal three apparently smaller than distal three, variable in size and followed with one or two granules; posterior border also armed with four sharp teeth and one or two accessory small ones along its whole length; in first pair this armature is not prominent. Carpus widening distally, convex dorsally along its posterior border and truncated obliquely toward anterior border; three small tubercles in a line on upper surface; anterior border armed with four serrated teeth, proximal one of which is very small, but always distinct. Propodus strongly depressed; anterior border cut into several serrated teeth along whole length; posterior border also more or less serrated, with several tufts of setae. Dactylus also depressed, curved distally, two thirds, or more, as long as propodus, being armed with several to ten dark-colored horny spines along posterior border and fringed with tufts of setae.

Abdomen covers sternum and most parts of ventral surfaces of ambulatory coxae as usual; whole surface covered with somewhat scaly, rough granules similar to, but more prominent than, those on dorsum of carapace, and also with wrinkles mainly on and along median plates; margin of each plate weakly upturned.

Notes on paratypes. Two ovigerous females are in general very close to the holotype ovigerous female, but the number and size of the teeth along the hepatic and anterior branchial margins are individually variable. Also, the crest at the posterior part of branchial region is partly damaged at left side in the larger female and at right side in the smaller female. The armature of the antennal acicle is basically similar to that of the holotype, but the length of spines is also somewhat variable. The formation of the ambulatory legs is quite like that of the holotype in the larger female, but in the smaller female the right second and left third ambulatory legs are armed with sharp teeth unlike the serrated teeth in the holotype.

Remarks. It is really remarkable that many new species of the genus *Paralomis* have been described since 1970s, probably due to biological and fishery interests in the deep-sea fauna with better-equipped research vessels and fishing boats of larger tons. According to MACPHERSON (1988 a-c, 1989) who revised the Atlantic species and also described several new species from various parts of the Pacific, Indian and Antarctic Oceans, altogether 46 species are referred to the genus *Paralomis*. It is mentioned at

present that the systematic status of some species is still unstable and *P. heterotuberculata* TUNG, WANG et LI, 1984 is in all probability synonymous with *P. truncatispinosa* Takeda et Miyake, 1980, both from the East China Sea. This species is quite characteristic in having the carapace covered with high wart-like tubercles of good size and fringed with long spines.

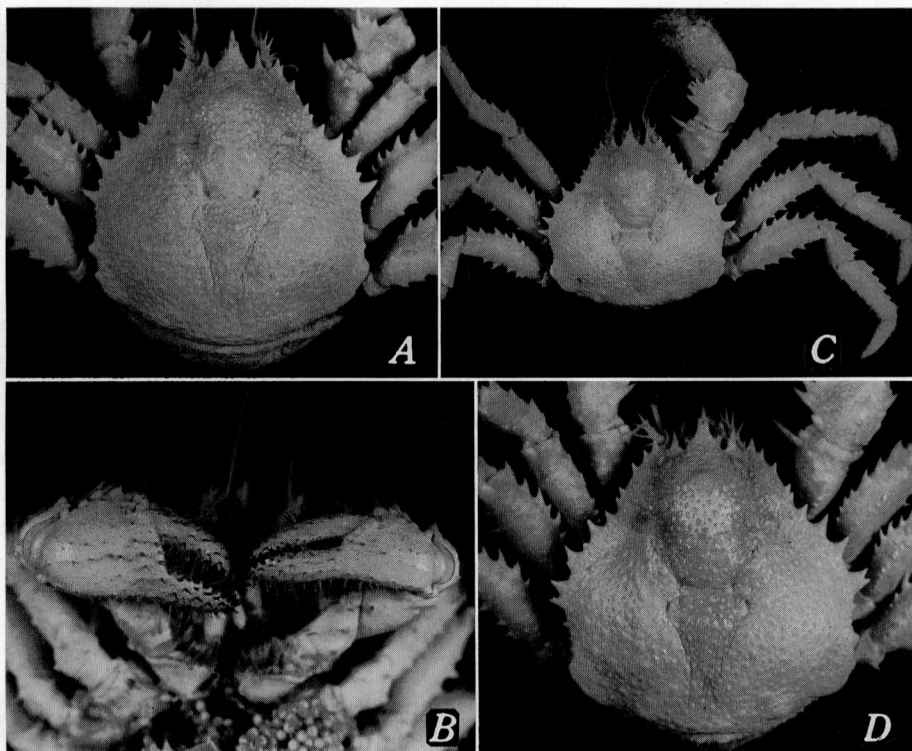


Fig. 4. *Paralomis jamsteci* sp. nov. — A and B, carapace and chelae of paratype ovig. ♀ (MNHN); C, paratype ♂ in dorsal view; D, carapace of paratype ovig. ♀ (USNM).

Among 45 species currently referred to the genus *Paralomis*, the closest congener of the present new species seems to be *P. africana* MACPHERSON from off Namibia between 20°31' and 24°50'S, 570–770 m deep. This means in turn that the new species has some resemblance in the formation of the carapace to *P. anamerae* MACPHERSON from north of the Falkland Islands, 132–135 m deep, *P. pectinata* MACPHERSON from Venezuela, 1,409–1,629 m deep, *P. cristulata* MACPHERSON from Guinea Bissau and Senegal, 261–650 m deep, and *P. cristata* TAKEDA et OHTA from Suruga Bay, Japan, 700–750 m deep.

The differences enumerated for *P. anamerae* and *P. africana* by MACPHERSON (1988 b) are also adapted to *P. anamerae* and the present new species. The carapace is thickly covered with small granules, the antennal peduncle is armed with three spines

on its outer border, the ambulatory legs are shorter, and the inner and distal borders of both chelipedal meri and the anterior borders of the ambulatory meri are more or less crested in the present new species. In addition, in the new species, the postero-lateral part of the carapace is provided with unarmed crest at each side. *Paralomis pectinata* is most characterized by rather pectinated spinulation of the ambulatory legs. The carapace is more or less pentagonal and covered with small granules of various sizes; the posterolateral part of the carapace is fringed with unarmed crest, but the hepatic and anterior branchial margins are armed with only some small tubercles. *Paralomis cristata* and *P. cristulata* are rather similar to each other and characteristic in having the crested hepatic, anterior and posterior branchial margins and also crested anterior margins of the ambulatory morei, carpi and propodi. The crests of the carapace are unarmed, but the anterior margin of each ambulatory leg is cut into some teeth. The basic formation of the carapace and ambulatory legs of the new species is probably referred to the same category, but the new species quite differs from both species in many features.

Paralomis africana is really close to the new species in its general formation of the carapace, chelipeds and ambulatory legs. The granulation of the dorsal surface of the carapace and the armature of the hepatic and anterior branchial margins are almost same with those of the new species. The distinctive difference is that the crest of the posterior branchial margin armed with some teeth in *P. africana* and unarmed in the new species. Otherwise, in the new species the anterior margins of the ambulatory carpi and propodi are cut into some truncated teeth, differing from those of *P. africana* armed with many spiniform teeth.

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Explanation of Plate 1

Upper, paratype ovig. ♀ (USNM); Lower, scene at the bottom, with four crabs and some shrimps feeding on a bed of mussels.

