

***Sesarmoides ultrapes* new species, a remarkable sesarmine crab from caves in the Solomon Islands (Decapoda: Brachyura: Grapsidae)**

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Abstract. — A new species of sesarmine crab, *Sesarmoides ultrapes* (Brachyura: Grapsidae) is described from anchialine caves in the Florida and Malaita Islands, Solomon Islands. This species has probably the longest ambulatory legs of any grapsid and one of the longest in any known Brachyuran. The new species is allied to *S. cerberus* (Holt-huis, 1964) and *S. novabritannia* Ng, 1988, but differs distinctly in the shape of the carapace, structure of the basal antennal segment, proportionately much longer ambulatory legs, in the form of the anterior sternites of the sternal plastron, by the broader male abdomen and by the male first pleopod.

Introduction

Recent explorations in caves of various Pacific islands by one of the authors (T. M. Iliffe) obtained several specimens of an interesting sesarmine crab (Grapsidae) from the Florida and Malaita Islands, Solomon Islands, which has the longest ambulatory legs known for any terrestrial Brachyuran. The sesarmine crab, a member of the genus *Sesarmoides* Serène & Soh, 1970, was undescribed. The present note serves to describe this remarkable species.

The two caves from which *S. ultrapes* was collected are situated in separate groups of islands located 80 km apart (Fig. 1). The Florida Islands group is located between Guadalcanal and Malaita

Islands. The two largest islands of the group, Nggela Pile and Nggela Sule, are separated by the narrow Utaha Passage. An area of Miocene limestone at the eastern end of Nggela Pile is dominated by karst features. The cockpit karst of this region consists of low clusters of mainly conical hills separated by hollows and dry valleys.

Malaita is a humid, thickly forested island in the Central Solomons. Basakana Island is a three km long limestone island separated from the northern end of Malaita by a one km wide channel.

Specimens of the new species are deposited in the Museum National d'Histoire Naturelle (MNHN), Paris; and the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore. Measurements, in millimetres, are of the carapace width and length respectively. The abbreviations L1-L4 refer to the first to fourth ambulatory legs respectively, while M, C, P and D refer to the ambulatory merus, carpus, propodus and dactylus respectively.

Taxonomy

Grapsidae MacLeay, 1838

Sesarmoides Serène & Soh, 1970

Type species. — *Sesarma kraussi* De Man, 1888, by original designation.

Remarks. — The genus *Sesarmoides* Serène & Soh, 1970, is characterised by a flattened carapace with strongly divergent lateral margin, a narrow frontal

margin which is shorter than the posterior carapace margins, swollen and globular basal antennal segment with a nearly longitudinal antennal peduncle, an epistome with a distinct transverse rim and deep median notch, and slender and long ambulatory legs, with the third leg more than twice the length of the carapace (fide Serène & Soh, 1970: 403). As understood at present, *Sesarmoides* (*sensu* Serène & Soh, 1970; Ng, 1988) contains seven Indo-West Pacific species - *S. longipes* (Krauss, 1843), *S. kraussi* (De Man, 1888), *S. jacobsoni* (Ihle, 1912), *S. jacksoni* (Balss, 1934), *S. borneensis* (Tweedie, 1950), *S. cerberus* (Holthuis, 1964), and *S. novabritannia* Ng, 1988 (Serène & Soh, 1970; Ng, 1988). The problems associated with Serène & Soh's (1970) revision of the generic classification of the Indo-West Pacific Sesarminae have never been completely resolved, and there are still many uncertainties. Not surprisingly, many workers continue placing their species in *Sesarma* s. lato.

Serène & Soh (1970) suggested that *Sesarmoides* also includes the Jamaican *Sesarma verleyi* Rathbun, 1914, and probably *S. jarvisi* Rathbun, 1914, but this seems most unlikely. The antennular, antennal, orbital, and third maxilliped structures of the American and Indo-West Pacific taxa differ very strikingly (as figured by Hartnoll, 1964, 1971; Guinot, 1988; Abele, 1992; unpublished data), and their generally similar carapace shapes and long legs have probably evolved via convergence. On this rationale, Ng (1988), restricted *Sesarmoides* to only species from the Indo-West Pacific.

Nevertheless, there are at least two clear groups belonging to what is now called *Sesarmoides*. The three Indo-West Pacific mangrove and/or coastal species, *S. longipes*, *S. kraussi* and *S. borneensis* are very distinctive in being generally smaller in size, possessing lower epigastric regions with a shallower groove be-

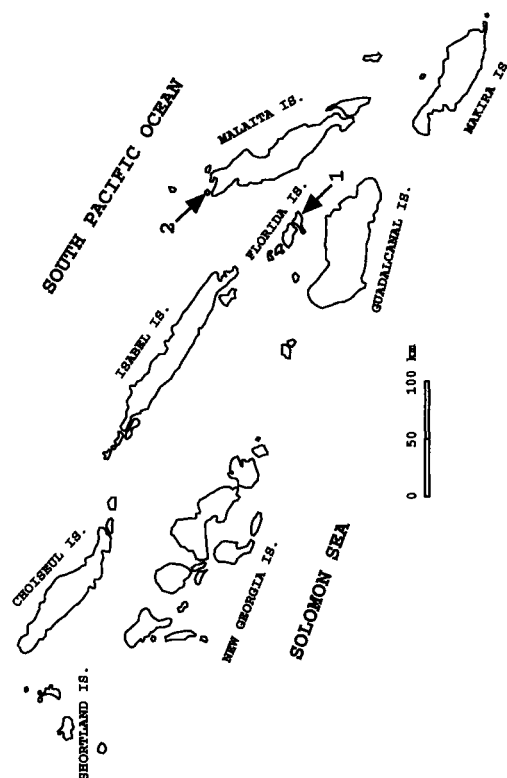


Fig. 1. Map of the Solomon Islands showing the location of (1) Mbetibula Cave, Nggela Pile Island, Florida Islands and (2) Kwakwaru Cave, Basakana Island near Malaita Island. Is. = Island(s).

tween them, having a longitudinal row of small granules or a ridge on the outer surface of the pollex, possessing more slender legs with a very sharp subdistal dorsal meral spine, and having more slender male first pleopods. The second group contains *Sesarmoides jacobsoni*, *S. cerberus*, *S. novabritannia* and *S. ultrapes* which are larger species, with very high and swollen epigastric regions, and have a row of granules on the dorsal margin of the dactylus of the chelipeds (none on the outer surface of the pollex). Of the second group, three of the species, *Sesarmoides jacobsoni*, *S. cerberus* and *S. ultrapes* are cave dwellers, and *S. novabritannia* is also believed to be a caverni-

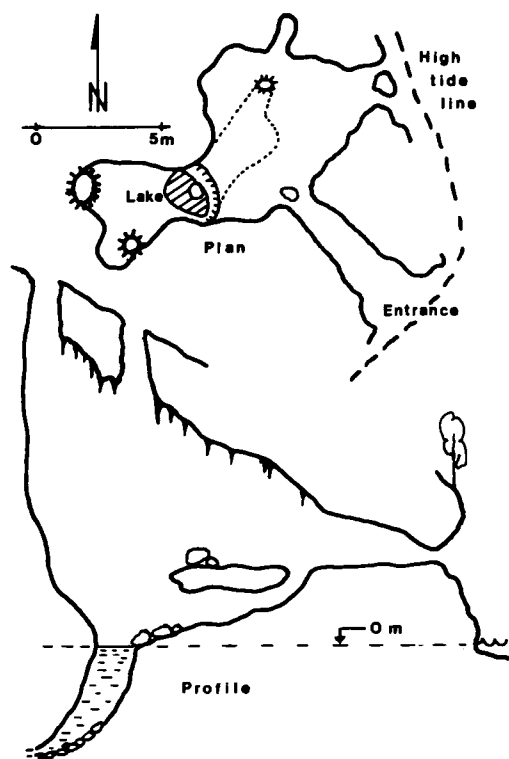


Fig. 2. Plan (top) and profile (bottom) views of Mbetibula Cave, Nggela Pile Island, Florida Islands.

colous species (Ng, 1988). The remaining species, *Sesarmoides jacksoni*, is probably closer to the second group of species in having granules on the dorsal margin of the dactylus of the chelipeds but is peculiar in having the meri of the ambulatory legs unarmed. *Sesarmoides ultrapes* stands out in having the lateral margins of sternites 1-3 convex (instead of straight), a distinctly concave suture between sternites 3 and 4 (instead of straight), a proportionately broader adult male abdomen (especially segment 6), and a straighter distal part of the male first pleopod.

In lieu of a complete reappraisal of the taxonomy of these species, the genus *Sesarmoides* is used in its broader taxonomic sense.

Sesarmoides ultrapes new species

Figs. 4-9

Material examined. — Holotype male (MNHN 24796), 28.6 by 22.8 mm, Mbetibula Cave (station 88-083), Florida Islands, Nggela Pile Island, Solomon Islands, coll. T. M. Iliffe & S. Sarbu, 15 August 1988. Paratype female (MNHN 24797), 39.6 by 32.1 mm, same data as holotype. Paratype female (ZRC 1993.7200), 20.4 by 15.5 mm, Kwakwaru Cave (station 88-087), Basakana Island, off northern Malaita Island, Solomon Islands, coll. T. M. Iliffe & S. Sarbu, 27 August 1988.

Description of male holotype. — Carapace approximately trapezoidal in shape; anterior regions well defined; dorsal surfaces distinctly rugose, especially on lateral regions, covered with scattered short stiff black hairs and denser short pubescence. Deep longitudinal groove present between epi- cum protogastric regions, margins of groove lined with numerous distinct inward curving hairs, the tips of which are partly interlocked, such hairs absent on other grooves; epi- cum protogastric groove branches laterally at meso- and metagastric regions; four corners of groove surrounding meso- and metagastric regions deeper than other parts; anterior part of cervical groove shallow but distinct, posterior part deep; gastro-cardiac and cardio-intestinal grooves shallow. Epigastric and postorbital crests swollen, rugose; epigastric crests separated by very deep narrow groove which extends to distinctly demarcated gastric region, anterior of postorbital crests and separated from it by shallow cleft. Frontal margin strongly deflexed downwards; no lateral lobule or tooth discernible; frontal region rugose to gently granulose. Supraorbital margin entire, sinuous. Infraorbital margin cristate, not meeting supraorbital angle. Antero- and anterior half of posterolateral

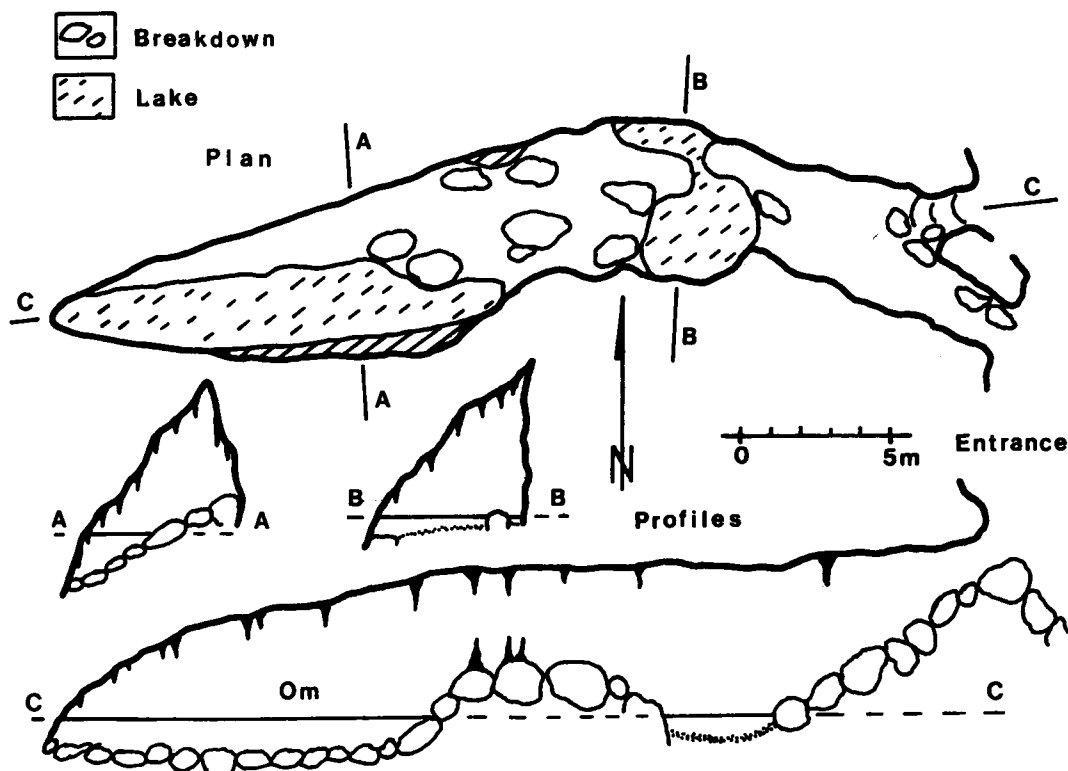


Fig. 3. Plan (top), section (middle) and profile (bottom) views of Kwakwaru Cave, Basakana Island near Malaita Island.

margin not demarcated, forming one continuous margin; lateral margin cristate, strongly diverging backwards, with three progressively weaker and less distinct subtruncate epibranchial teeth (including external orbital angle), first and second teeth separated by deep narrow fissure, second and third teeth separated by shallow notch, third tooth very low, indistinct. Posterior half of posterolateral margin subcristate, suddenly converging towards gently sinuous posterior carapace margin. Basal antennular segment large, covering most of fossa when antennule folded inwards. First antennal segment distinct, basal segment large, second segment two-thirds size of basal segment. Anterior and posterior halves of epistome clearly separated by transverse median ridge; median part of anterior half sunken in; posterior margin triangular, cristate. Eyes well de-

veloped, cornea and pigmentation distinct. Third maxilliped elongate; ischium with oblique median groove; merus with distinct crest adjacent to inner margin; exopod very slender, with long flagellum.

Chelipeds slender, subequal in size. Merus gently serrated on dorsal margin. Carpus without spine or sharp tooth on inner distal angle, outer distal angle with several low teeth, angle appearing serrated. Chelae not inflated, without any stridulatory structures or row of granules; palm slender, outer surface rugose; fingers slightly longer than palm, pollex with two median longitudinal ridges; cutting edges with numerous teeth and denticles.

Ambulatory legs very long, third pair longest, outer surfaces of merus rugose, margins of dactylus lined with very stiff black hairs. Proportions of segments (in %

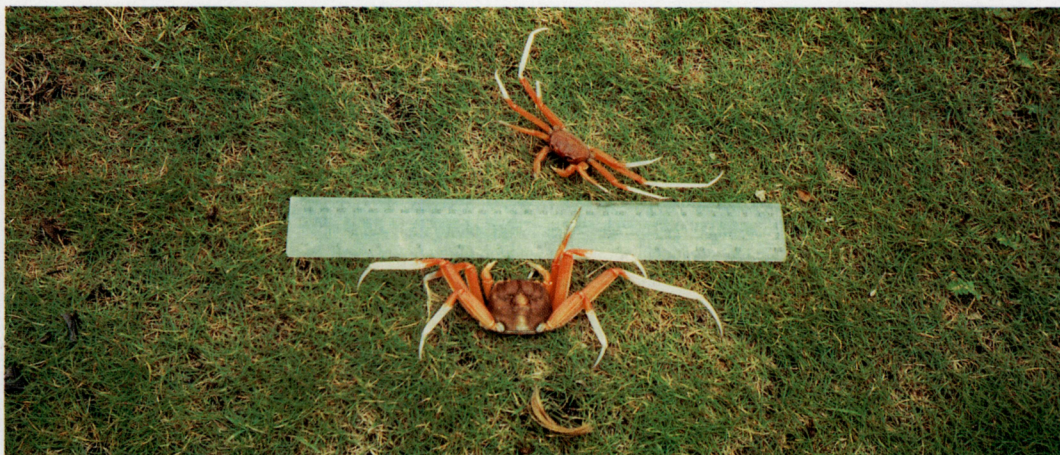


Fig. 4. *Sesarmoides ultrapes* new species. Life colours. Larger specimen, holotype male, 28.6 by 22.8 mm (MNHN 24796); smaller specimen, paratype female, 39.6 by 32.1 mm (MNHN 24797).

carapace length) as follows: L1 = 265% (M 90%, C 46%, P 70%, D 59%), L2 = 373% (M 131%, C 65%, P 98%, D 79%), L3 = 492% (M 166%, C 77%, P 132%, D 118%) and L4 = 281% (M 94%, C 48%, P 73%, D 66%).

Sternites 2 and 3 fused, suture not visible, lateral margin strongly convex outwards; suture between sternites 3 and 4 distinctly concave towards buccal cavity; all subsequent sternites free, all sutures interrupted medially.

Abdomen triangular, 7-segmented, all segments freely articulating. Segments 1 and 2 narrow; segment 3 with strongly convex lateral margins; lateral margins of trapezoidal segments 4 and 5 straight or gently sinuous; segment 6 subtrapezoidal, lateral margins distinctly convex, more than twice as wide as long; telson triangular, margins convex, tip rounded.

Penis sternal. First pleopod very stout, almost straight, outer margin and subdistal area covered with dense, long hairs which masks pectinated distal part; distal part dorso-ventrally flattened, spade-like. Second pleopod relatively short, ca. half length of first pleopod, distal part spatulate.

Paratypes. — The female paratypes agree with the male holotype very well in almost all non-sexual characters. The

adult female telson (MNHN 24797) is distinctly sunken into the posterior margin of segment 6. In the smaller paratype female (ZRC 1993.7200), the telson is not sunken into segment 6. The female vulva is complex, with the opening apparently surrounded by three pieces with a distinct operculum.

Etymology. — The species name is an arbitrary combination of the Latin words “ultra” (for beyond) and “pes” (for legs), and alludes to the extremely long legs of the species.

Taxonomic remarks. — *Sesarmoides ultrapes*, new species, has proportionately, the longest legs of any congener and any known grapsid species, and is one of the longest-legged brachyurans. It certainly has the longest legs of any known terrestrial crab. Its third ambulatory leg (merus to dactylus) is about 4.9 times the length of the carapace and is longer than that of other long-legged Indo-West Pacific species like *Cerberusa tipula* Holthuis, 1979 (Potamidae) (fide Holthuis, 1979; Guinot, 1988). The length of the legs of *S. ultrapes* is even slightly longer than that of the curious *Trogloplax jolivetii* Guinot, 1986 (Trogloplacinae, Goneplacidae s. lato) (fide Guinot, 1986, 1988). The chelipeds of *S. ultrapes* are

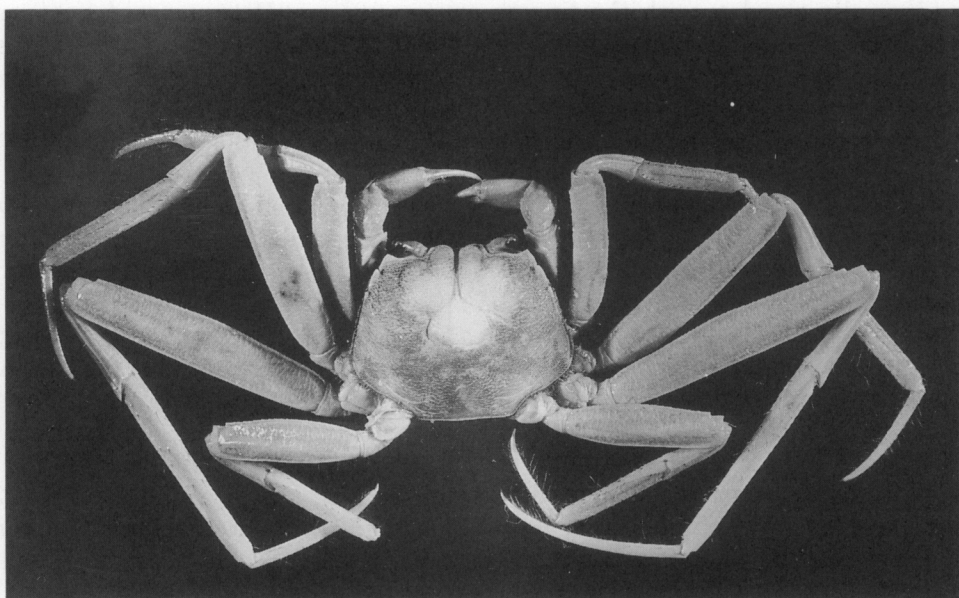


Fig. 5. *Sesarmoides ultrapes* new species. Holotype male, 28.6 by 22.8 mm (MNHN 24796), entire view.

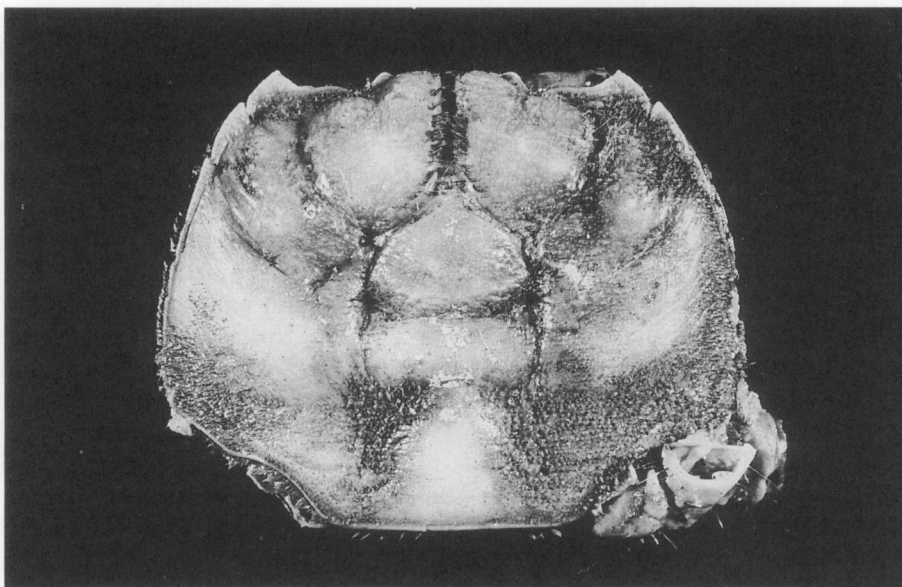


Fig. 6. *Sesarmoides ultrapes* new species. Paratype female, 39.6 by 32.1 mm (MNHN 24797), carapace.

also especially slender, with the fingers narrow and elongate, even in males.

Sesarmoides ultrapes seems to be closest to *S. cerberus* and *S. novabritannia* but differs sharply in having an even more divergent lateral carapace margin (the carapace hence appearing proportionately broader), more quadrate basal antennal segment, proportionately much longer ambulatory legs, different sternal structure (especially of sternites 1-3), broader male abdomen (especially segment 6), and a differently shaped male first pleopod.

Colour. — When alive, the holotype male had the mesogastric and intestinal regions white, the cardiac region light brown and the rest of the carapace reddish-brown (Fig. 4). The carapaces of the other specimens were a uniform brown. On all specimens, the ambulatory propodi and dactyli were white, the ambulatory meri bright orange, with the smaller cheliped being orange and the palm of the larger cheliped white in colour.

General biology. — The holotype and paratype female (MNHN 24796, 24797) from the Florida Islands were collected from inside an anchialine limestone cave (Mbetibula Cave) (Fig. 2). The crabs were observed both above, and in the water (up to 2 m depth). Mbetibula Cave is located about one km north of the village of Vuturua on the east coast of Nggela Pile island. This coastal cave has its entrance in a sea cliff just above the high tide line. The cave consists of a single chamber 10 m long by 5 m wide by 12 m high and 3 m deep. The substrate of the deepest pool (with clear waters) was sand. Salinities ranged from 9 ppt at the surface to 11.5 ppt at the bottom (about 3 m deep). Another crab collected with *S. ultrapes* was a badly damaged male specimen of the gecarcinucoid, *Sendleria* sp. (Parathelphusidae). Shrimps and mysids were also collected from the pool. The mysids have been preliminarily identified by Thomas Bowman (Smithsonian Institution) as a

new species of *Heteromysoides*, most similar to *H. dennisi* Bowman from Cemetery Cave in the Bahama Islands (T. Bowman, pers. comm.).

The paratype female (ZRC 1993.7200) of *S. ultrapes* was collected from an anchialine limestone cave (Kwakwaru Cave) located about 50 m inland from the western tip of Basakana Island (Fig. 3). Kwakwaru Cave is 30 m long by 5 m wide and 5 m high with two shallow pools floored with limestone rubble. Atyid shrimps were present in the pool nearer the entrance and receiving indirect sunlight. The pool at the rear of the cave (about 2 m deep, salinity between 2-9.5 ppt) had troglobitic amphipods described recently by Stock & Iliffe (1991) as *Liagoceradocus lobiferus*. The same species is also present in an anchialine cave in Western Samoa some 2000 km away (Stock & Iliffe, 1991). Also collected in Kwakwaru Cave were several juvenile specimens of the land crab *Cardisoma rotundum* (Gecarcinidae).

In true troglobitic crabs, the carapace tends to be dorso-ventrally compressed and not distinctly inflated, there is a general loss of pigmentation on the carapace and thoracic appendages, the pereopods are usually elongated, and the eye structures are often regressed. The length and diameter of the ocular peduncle is often reduced, and can sometimes be so atrophied that the crab is effectively blind and even the orbit itself is lost (e.g. *Cancrocaeca xenomorpha*, Hymenosomatidae, Ng, 1991). *Sesarmoides ultrapes*, like *S. cerberus* from Ambon, is relatively large compared to most known cave crabs which are usually much smaller (see Guinot, 1988).

In certain species which are supposedly confined to caves, there is only partial loss of body pigmentation and no obvious reduction in the ocular structures, although the pereopods are distinctly elongated. *Sesarmoides ultrapes* belongs to this category of cave crabs as its carapace

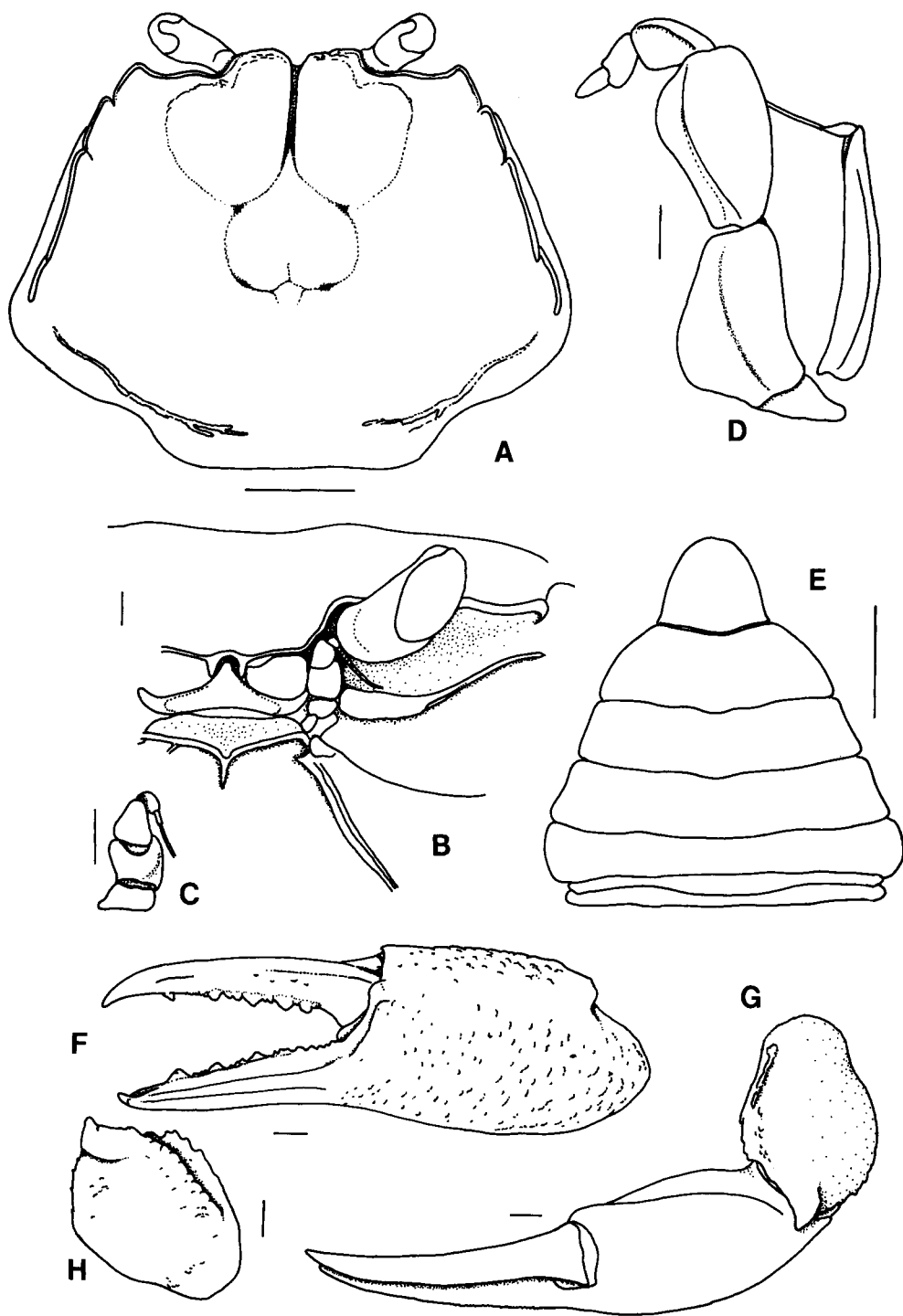


Fig. 7. *Sesarmoides ultrapes* new species. Holotype male, 28.6 by 22.8 mm (MNHN 24796). A, carapace (denuded); B, frontal view; C, left antenna; D, left third maxilliped (denuded); E, abdomen; F, left chela (outer view); G, left chela (dorsal view); H, left carpus of cheliped. Scales: A, E = 5.0 mm; B-D, F-H = 1.0 mm.

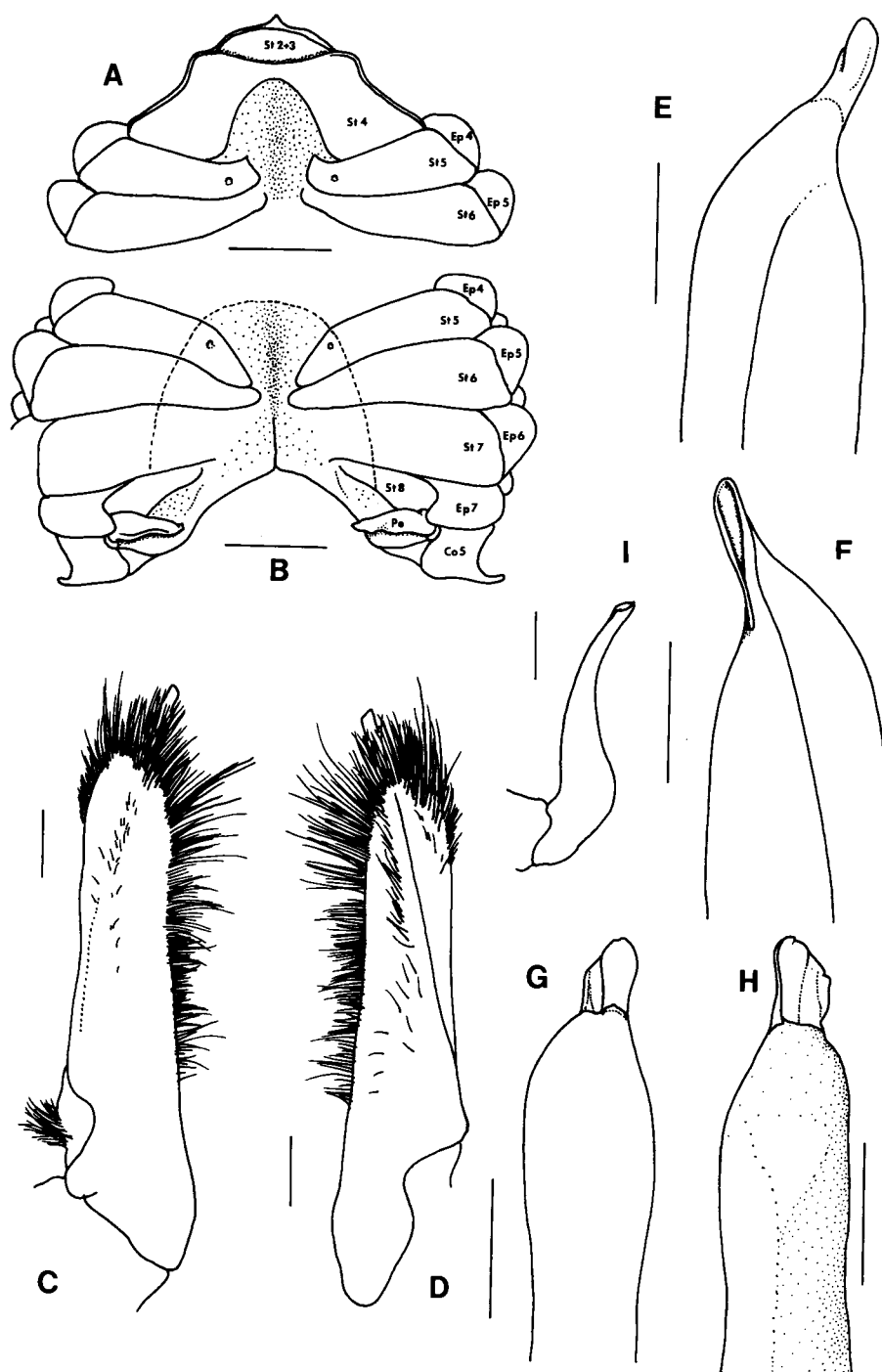


Fig. 8. *Sesarmoides ultrapes* new species. Holotype male, 28.6 by 22.8 mm (MNHN 24796). A, anterior sternal plastron; B, posterior sternal plastron; C, D, left first pleopod; E–H, distal part of left first pleopod (denuded); I, left second pleopod. E, ventral view; F, dorsal view; G, inner marginal view; H, outer marginal view. st = sternite; ep = episternite; co = coxa of ambulatory leg; pe = penis. Scales: A, B = 5.0 mm; C–H = 1.0 mm.

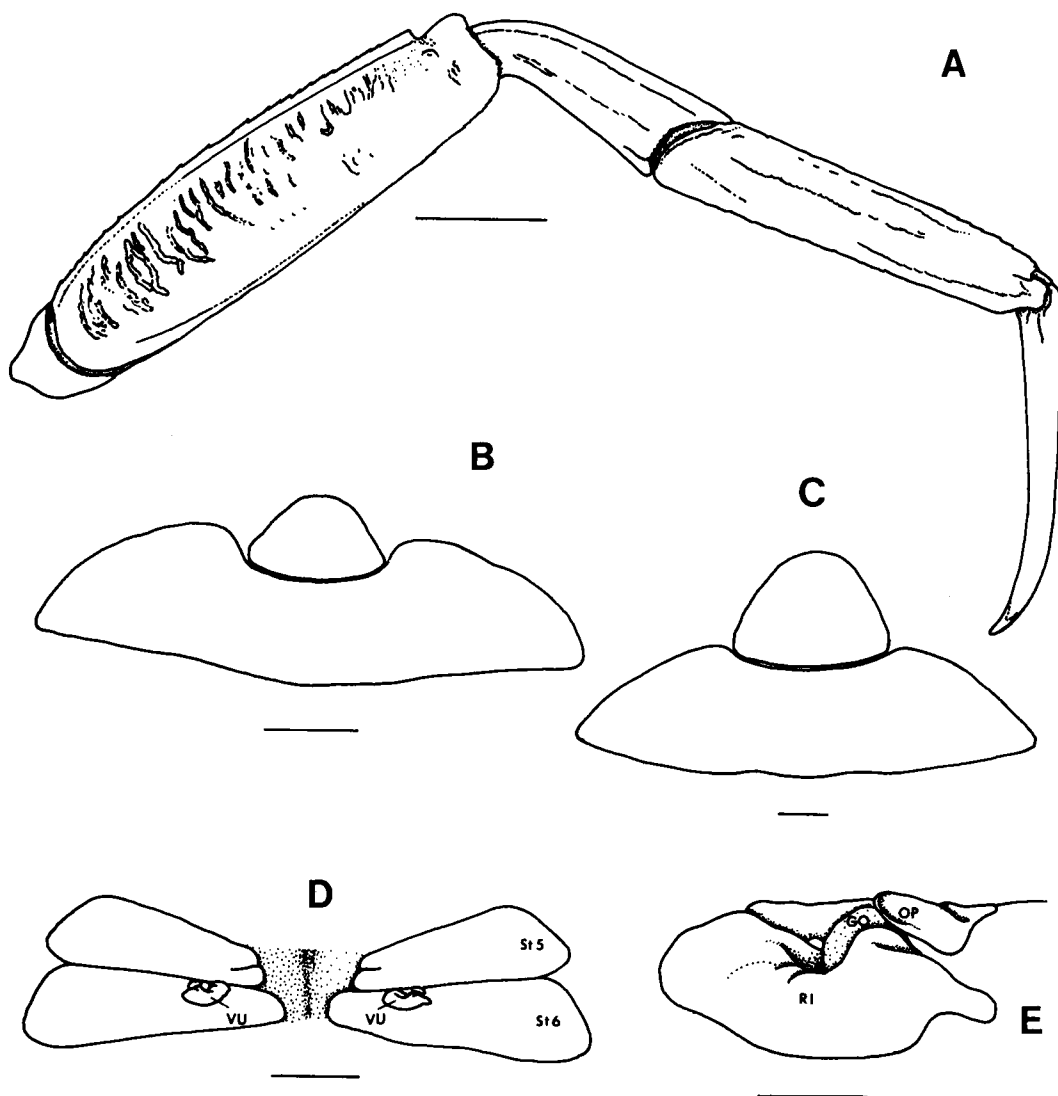


Fig. 9. *Sesarmoides ultrapes* new species. A, holotype male, 28.6 by 22.8 mm (MNHN 24796); B, D, E, paratype female, 39.6 by 32.1 mm (MNHN 24797); C, paratype female, 20.4 by 15.5 mm (ZRC 1993.7200). A, left fourth ambulatory leg; B, female abdomen (adult); C, female abdomen (juvenile); D, female sternites (st) 4 and 5, showing position of vulvae (VU), st = sternites; E, left vulva showing chitinized gonopore (GO), bulbous ridge (RI) and operculum (OP). Scales: A, B, D = 5.0 mm; C, E = 1.0 mm.

retains the brown pigmentation and its eyes are unreduced. The pattern of pigmentation loss in *S. ultrapes* however, is interesting as the distal parts of the ambulatory legs, chelae and posterior part of the carapace (in large specimens) are white or pale yellow. In many respects, *S. ultrapes* is similar to *Stygothelphusa*

bidiensis (Gecarcinucidae) from caves in Sarawak, Borneo (Ng, 1989; Ng & Yussof, 1990). These species may be regarded as "incipient" trogllobites, i.e. species which have only recently become obligate cave-dwellers and have thus not totally lost their body pigmentation, and do not show ocular atrophication.

In general, anchialine crab fauna is poorly known. In fact, *S. ultrapes* is one of the few known anchialine crabs, and it is the first confirmed anchialine Brachyuran from the Indo-West Pacific.

Acknowledgements

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