DEPTH. — Depth range of the material examined is 18-400 m, although most records are from 100-300 m. The specimens reported by BABA *et al* (1986) came from the Okinawa Trough, 362-540 m, but given the other more precise depth records, it does not seem justifiable to conclude that the lower depth limit for this species is 540 m. The lower depth limit is probably around 400 m. This species has been collected from rocky bottoms covered in lithothamnion algae, sponges, and corals. *Dynomene pilumnoides* does not seem to be associated with particular corals, although this could be the result of most specimens being collected from deeper water by dredge and separated from their host. The range obviously includes depths at which corals do not occur.

SIZE. — The maximum size for males is 28.5 x 22.1 mm, for females 20.7 x 17.6 mm, and the smallest ovigerous female is 9.5 x 7.5 mm. This female carried around 590 eggs while the largest ovigerous female with a complete brood (14.8 x 12.0 mm) carried about 1600 eggs. Mean egg diameter was 0.49 mm. The breeding season may be tentatively estimated as extending from February to September although no ovigerous females have been collected during the months from April to July. The maximum size for *Dynomene pilumnoides* is somewhat larger than for the preceding *Dynomene* spp. and the size of the smallest ovigerous female is also correspondingly larger. The larval stages of *D. pilumnoides* are unknown.

One female specimen (7.5 x 6.2 mm) collected in 1993 from a reef in the New Caledonia lagoon shows some peculiar features: there are no gonopores on the coxae of the second walking legs and the only indication of its sex is the presence of sternal sutures 7/8, terminating in the spermathecal openings, and five pairs of pleopods. However all pleopods are remarkably poorly developed, perhaps indicating that it has been parasitized.

DISCUSSION. — The exact status of *Dynomene pilumnoides* has been one of the main problems in understanding the relationships between the species of *Dynomene*, especially those from the Indian Ocean. ALCOCK's type specimen was a male 11.0 x 10.0 mm from 54-90 m off the Laccadive Ids. Although he created a new species for this single specimen, ALCOCK (1900) suggested that it could well prove to be a variety of *D. hispida*. Both species have a similar carapace shape, although the CW/CL ratio tends to be larger (approx. 1.30) for *D. hispida*, and the anterolateral carapace margins have four teeth, but the teeth are much smaller in *D. hispida*. The features which clearly distinguish *D. pilumnoides* from *D. hispida* are the presence of clumps of long filiform setae which are much longer than the surface covering of short setae (*D. hispida* carapace setae mostly short and not clumped), a notch in the supraorbital margin (no notch), postorbital corner without spines (five small acute spines), and only a single spine on the suborbital margin (five small acute spines). *D. pilumnoides* grows to a larger size and is usually collected from 100-300 m depth whereas *D. hispida* is a small dynomenid which occurs in shallow waters, often intertidally. It seems likely that ALCOCK did not have a specimen of *D. hispida* at his disposal which would have allowed a detailed comparison with *D. pilumnoides*. The differences between the species listed by ALCOCK (1900) are not diagnostic. However, the differences listed by ALCOCK (1901) are more useful and here he withdrew the suggestion that *D. pilumnoides* might be a variety of *D. hispida*. ALCOCK's description is seriously wrong in only one aspect: his statement that there are no rudimentary pleopods on the third to fifth abdominal segments in the male. (This feature is present in all dynomenid males although they are sometimes difficult to see clearly without special preparation.) Also his illustration does not show the longer carapace setae arranged in clumps.

Other features of *Dynomene pilumnoides*, not illustrated here, can be found in STEBBING (1921) (as *Maxillothrix actaeiformis*): mandible, second maxilla, second and third maxillipeds, and the first male pleopod. ODHNER (1925) pointed out that *Maxillothrix* is a junior synonym of *Dynomene* and therefore should not be placed amongst the Xanthidae as STEBBING had proposed. The synonymy of *M. actaeiformis* and *D. pilumnoides* was first recognized by BARNARD (1947).

The generic name *Maxillothrix* Stebbing, 1921 was created to reflect the presence of three long, unequal setae on the scaphognathite of the second maxilla. In fact similar setae had already been reported by BOUVIER (1896) for *Dynomene filholi* (see above) but STEBBING had placed his new genus amongst the Xanthidae, comparing the second maxilla with that found in *Nursia*, so the apparent uniqueness of these setae is understandable. STEBBING (1921) noted that the setae were reminiscent of the long scaphognathite spine in *Axius longispina* and he drew attention to the two long terminal setae on the second maxilla of *Homola andamanicus* (ALCOCK, 1901, pl. A). These setae probably have a role in cleaning the epibranchial surface of the gills.

BARNARD (1947, and 1950) continued to suggest that *Dynomene pilumnoides* is probably a synonym of *D. hispida,* but this cannot be correct because the suborbital margin is visible dorsally (suborbital margin straight and not projecting), CW/CL = 1.17-1.2 (CW/CL = 1.3), and the longer setae on carapace are clumped (setae not clumped). The specimens available to BARNARD were collected from 90 m depth, whereas *D. hispida* is an intertidal-shallow water species. The confusion about the status of the name *D. pilumnoides* Alcock, 1900 arose, at least in part, because of the errors and omissions of the original descriptions of ALCOCK and STEBBING (for *Maxillothrix actaeiformis*).

BARNARD (1950: 336) gave the branchial formula for *Dynomene pilumnoides* as 18 gills + 3 epipods. But this is incorrect because he missed the two arthrobranchs on the third maxilliped and overlooked the epipods on the pereopods. The branchial formula is 19 gills + 7 epipods. The gill structure of *D. pilumnoides* more closely resembles that of *D. filholi* than of *D. hispida* and *D. praedator.* The epibranchial surface of the gills is made up of four rows of elongate lobes which radiate out from the afferent vessel. The epipods and hypobranchial setae are similarly developed in all these species. Another character which *D. pilumnoides* and *D. filholi* share, is the presence of three long setae on the posterior margin of the scaphognathite. The other species of *Dynomene* only have two setae. In *D. pilumnoides* the hypobranchial margin of each podobranch carries long cleaning setae as found in *D. hispida* and *D. praedator.*

The subchelate structure of the last pairs of legs of females shows several differences from the other species of *Dynomene*: the propodal extension of the female bears six spines (four in the other species), and the teeth on the inner surface of these spines are fewer in number (12-20 teeth) and arranged in marginal rows in the middle region (rather than scattered along most of the spine). The dactylar spines of the female are strengthened by a longitudinal ridge. Male *D. pilumnoides*, along with *D. filholi*, lack the teeth on the propodal spines which are found in the other two species.

The second male pleopod of *Dynomene pilumnoides* is similar to that of *D. filholi* in having a large number (15) of subterminal spines. Also the rudimentary last three pairs of pleopods are biramous in both species.

Examination of the stomach contents of a *Dynomene pilumnoides* female 14.6 x 12.0 mm (MNHN-B 6913) from Madagascar revealed mostly soft amorphous material with a few sand grains and some chitinous brown tube-like fragments that may be hydroid in origin. It may be that this crab uses its chelae to spoon up sediment from which organic fragments are separated by the groups of setae on the cheliped fingers.

Dynomenid crabs very rarely have epizoites on their exoskeleton, perhaps because of the dense layer of setae. However, one large *Dynomene pilumnoides* male 28.5 x 22.1 mm (SMF 17127) from Japan, had a small polychaete tube on the right dorsal side of the carapace. It may be possible for fouling organisms to colonize larger crabs because of their longer intermoult intervals.

Dynomene pugnatrix de Man, 1889

Figs 5 d, 11, 22 a-g

Dynomene pugnatrix de Man, 1889: 444, pl. 10, fig. 13. — ALCOCK, 1901: 75 (list). — IHLE, 1913: 92 (list). — GUINOT, 1967: 242 (list). — SERÈNE, 1968: 36 (list). — TAKEDA, 1977: 35 (list).
Dynomene pugnatrix brevimana Rathbun, 1911: 196. — GUINOT, 1967: 242 (list). — SERÈNE, 1968: 37 (list).

MATERIAL EXAMINED. — **Mauritius**: No details, no depth, no date: 1 ♂ 9.8 x 7.2 mm, type specimen (SMF 4857).

Providence Island. PERCY SLADEN TRUST EXPEDITION: stn D4, 9°14.00'S, 51°02.00'E, 90-140 m, 4.10.1905: 1 ♀ ovig. 6.3 x 4.8 mm. type specimen of *D. pugnatrix brevimana* (USNM 41047).

TYPES. — *Dynomene pugnatrix* de Man, 1889: holotype is a male 9.8 x 7.2 mm, from Mauritius, held by the Natur-Museum Senckenberg, Frankfurt, registration number SMF 4857.

Dynomene pugnatrix brevimana Rathbun, 1911: holotype is an ovigerous female 6.3 x 4.8 mm, collected by the R/V *"Sealark"*, Percy Sladen Trust Expedition, from stn D4, 9°14.00'S, 51°02.00'E, Providence Id, north of Madagascar, 90-140 m, 4.10.1905, held at the Smithsonian Institute, Washington, registration number USNM 41047.

DESCRIPTION. — Carapace wider than long, ratio of CW/CL approx. 1.30, squarish in outline, surface convex, minutely granular. Carapace surface and pereopods sparsely covered with two kinds of setae of varying lengths up to 0.3 x CW. There are short stiff setae and longer "feathered" setae. The density of setae does not completely obscure body surface. Microscopic details of setae not examined.

Frontal carapace groove very faint, extending only a short distance from frontal margin. The normal pair of prominent rounded protuberances, separated by frontal groove, absent. Just in front of cardiac region two laterally-directed grooves originate: first groove (cervical) crosses mid-line and runs directly anterolateral on to branchial region and mid-way along its length there is a short groove in the direction of median frontal margin. The second, shallower groove extends across mid-line and initially runs almost directly towards lateral margin but then splits into a short anterior portion which follows the first groove for a short distance, while the second portion curves posterolaterally, bordering anterior cardiac region. In effect this second groove connects two crescent-shaped grooves. No branchial groove evident and posterior cardiac area only faintly defined. Anterolateral carapace margin begins below level of postorbital corner, initially it is a horizontal margin directed laterally, with two or three small granules, until meeting two small, subacute anterolateral teeth close together at corner. Behind these teeth margin runs posteriorly and has three similar equidistant teeth, first directed almost anteriorly, next two directed laterally, and finally there is a smaller submarginal tooth part-way along convergent posterolateral margin alongside which lies the reduced last leg. This gives a total of six teeth on the right-hand side, but on the left-hand side there is only one initial tooth, giving the more normal pattern for this genus of five teeth (the last of which is treated as being posterolateral). In the case of this species, absence of the branchial groove makes this distinction rather arbitrary. Posterior carapace margin recessed in order to accommodate first segment of abdomen which is visible dorsally.

Frontal margin continuous, V-shaped, ventrally-directed, joined to epistome (which separates orbits). Supraorbital margin not projecting, continuous above orbits, interrupted by a distinct notch closer to postorbital corner, following margin minutely granulated; suborbital margin with two small granules. Orbits clearly exposed dorsally.

First article of antennule large, filling a large part of ventral orbital region, distal margin obliquely angled and not continuous with distal margin of second antennal article. Remainder of antennule folded into orbit. First article of antenna moveable, wider than long, medially beaked, inferior tooth well developed, blunt, superior tooth above the opening of antennal gland slightly smaller. Second article wider than long, distal margin widest, to which is fixed the exopod curving over base of eyestalk and becoming broader and terminating bluntly. Third antennal article longer than wide, and attached to remaining distal border of second article, slotting in behind exopod, and just matching length of exopod. Fourth antennal article smaller, as long as wide, remaining antennal articles directed laterally, extending well beyond postorbital corner, and can be partially folded under supra-orbital margin. Ratio of length of antennal flagella to CW = 0.67. Eyestalk can be completely folded into orbit, and cornea well developed, occupying all of tip. Epistome broadly triangular, surface slightly concave; dorsal arm, joined to tip of carapace, very elongate and narrow; lateral arms shorter and thicker. Joint between epistome and carapace is marked by a narrow suture. Antennae, antennules and epistome fit closely together.

Subhepatic area convex, minutely granulated. A groove begins near base of antenna, curving round under branchial region and meeting lateral carapace margin just anterior to last tooth at beginning of posterolateral border. A short cervical groove branching off and ascending towards first anterolateral tooth. Third maxillipeds operculiform, bases widely separated by tip of sternum. Crista dentata has five or six small, blunt, distally placed teeth on each side. Female sternal sutures 7/8 short, ending wide apart on low tubercles just behind bases of second walking legs.

No information about gill formula due to insufficient material, but structure of an arthrobranch taken from the cheliped is as follows: in cross section, the anterior and posterior margins of the gill are notched, dividing it into hypobranchial plates and epibranchial plates which end bluntly. The epibranchial plate on the anterior margin is larger and between these plates is a single row of short elongate lobes.

Cheliped slender, slightly longer than first leg. Merus trigonal, inner face smooth and fitting closely against pterygostomial region of carapace, borders granulate, outer face has a subterminal shallow, restriction which separates a thickened distal ridge devoid of granules from a pair of small subacute granules, preceded by a row of several smaller granules on superior border. Inner inferior margin of merus has an acute lateral spine. Outer face of carpus convex, smooth, inner superior border with a distomedially directed, sharp spur which abuts against proximal inner surface of propodus thereby restricting closure of cheliped against frontal area. In a similar way, inferior carpal margin is produced as a smooth, obtuse, flange fitting against merus when limb is withdrawn. These two structures give carpal article an unusual and distinctive shape: inner face very narrow and outer face much broader. Surface of propodus smooth; fixed finger almost straight with three teeth at tip; moveable finger strongly curved with a single, blunt proximal tooth and three teeth at tip. Both fingers, thick, hollowed out internally, touching only at tips where last three teeth interlock. Just below proximal teeth on fixed finger are two distinct pits in which several long setae are inserted.

First three pairs of walking legs decreasing in length posteriorly. Meri elongate, both faces of meri of first two legs and anterior face third leg merus smooth and nacreous, inferior distal margin hollowed out to accommodate carpal article. Superior border of meri of these legs with five well developed spines in a row, increasing in size distally, separated by a gap from a single distal spine, and five well developed spines on posterior margin; length of merus of second leg about 2.4 x its width and equal to about three-quarters of CL. Dorsal surface of carpi bearing a row of five acute spines, and produced distally to overhang base of propodi. Dorsal surface of propodi with a row of four small spines. Dactyli curved, inferior margin armed with 10 small spines, tip brown and subacute.

Last pair of legs greatly reduced, adorned with long setae distally, lying along posterolateral border of carapace, reaching only as far as one third along meral article of preceding limb; borders of articles unarmed. Legs subchelate, sexually dimorphic: female with well developed distal extension of propodus which opposes dactyl; male with only weakly developed propodal extension. Structural details of dactyl and propodus have not been investigated.

All segments of abdomen freely moveable, surface smooth, margins unarmed but fringed with setae. Second segment narrowest, anterior margin sinuous, medial region convex, lateral margins produced as a flange which fits over posterior margin of first segment (which is the shortest) preventing forward slippage of abdomen. Subsequent segments increasing in length and breadth distally, not overlapping with preceding segments. Telson much wider than long, anterior margin angled to accommodate uropod, posterior margin broadly rounded. In male, uropod plates large, filling about three-quarters of the space between last abdominal segment and telson, excluding much of last abdominal segment and telson from reaching lateral margin of abdomen. No effective abdominal locking mechanism: abdomen only loosely held against sternum. Abdomen extends as far as bases of the third maxillipeds.

Five pairs of pleopods in female, first pair vestigial, remainder biramous. Five pairs of pleopods in male, first pleopod a semi-rolled tube ending in a curved, blunt apical plate surrounded by long setae, second pleopod needle-like with an exopod on the basis, remaining pleopods rudimentary. Microscopic details of second male pleopod unavailable.

COLOUR. — Unknown.

GEOGRAPHIC DISTRIBUTION. — The type locality is Mauritius and the other specimens reported by RATHBUN (1911) as *Dynomene pugnatrix brevimana* came from Providence Id, both of which are in the vicinity of Madagascar, although *D. pugnatrix* is not known from Madagascar itself. Thus *D. pugnatrix* is a western Indian Ocean species. It is interesting to compare this species with *D. filholi* which is an insular South Atlantic species.

DEPTH. — The depth range for *Dynomene pugnatrix* is 90-140 m (based on the specimens reported by RATHBUN (1911), as *D. pugnatrix brevimana*.

SIZE. — Only three specimens of *Dynomene pugnatrix* are known: one male, 9.8 x 7.2 mm (the type specimen), and two ovigerous females, one of which is 6.2 x 5.0 mm. The size of the other ovigerous female reported by RATHBUN (1911) is unknown. It is evident that this species reaches sexual maturity at a small size as do *D. hispida* and *D. praedator*. The specimen of *D. pugnatrix* examined carried 30 eggs but some eggs may have been lost because the brood did not fill the entire abdominal space. Egg diameter is 0.4 mm. These reproductive aspects are similar to the other *Dynomene* species.

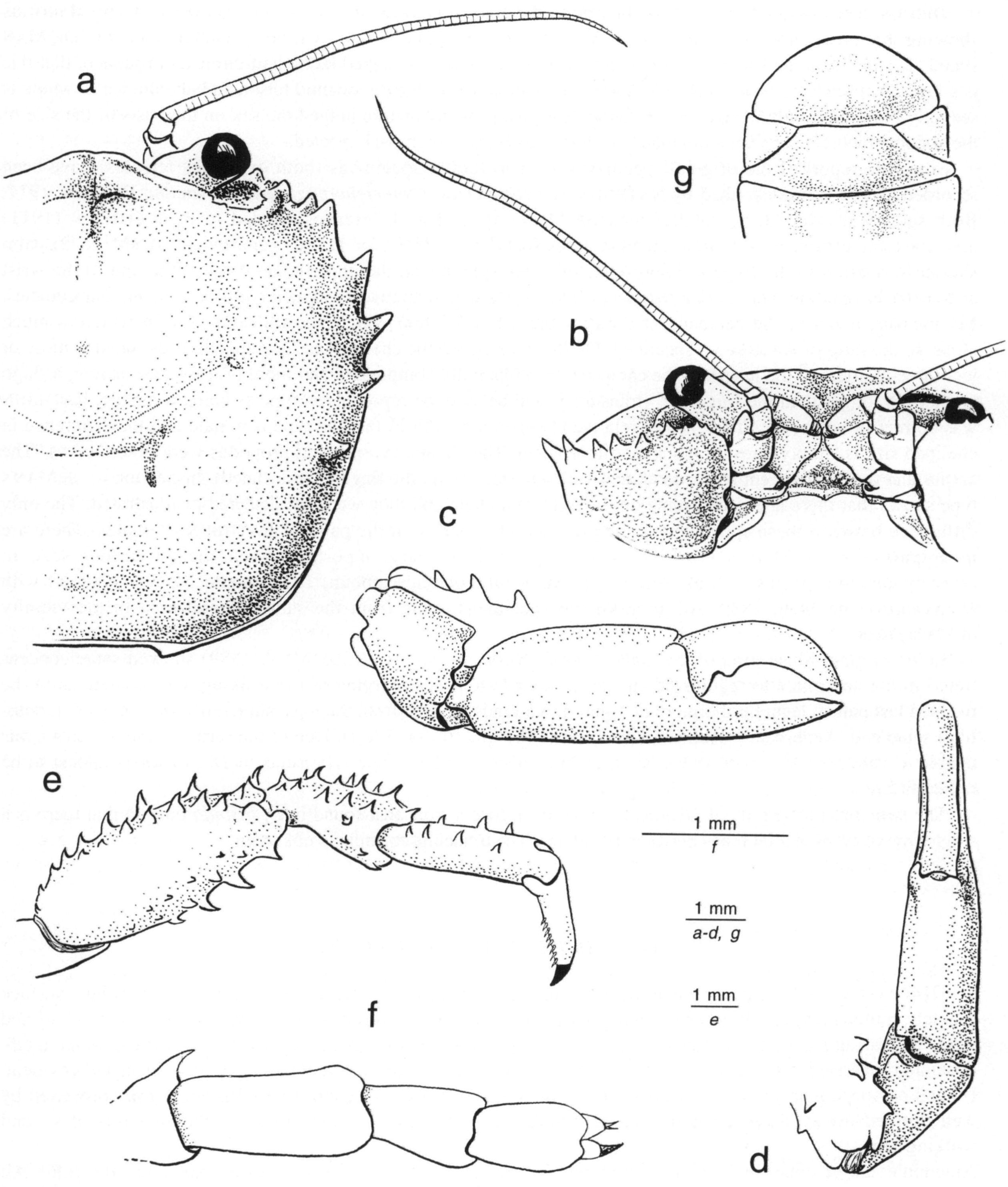

FIG. 22. — *Dynomene pugnatrix* de Man, 1889: **a-g**, ♂ 9.8 x 7.2 mm, type specimen, Mauritius (SMF 4857): **a**, dorsal view of right half of carapace; **b**, ventral view of right orbital area; **c**, outer face of right cheliped; **d**, dorsal view of right cheliped; **e**, posterior view of terminal articles of right fourth pereopod; **f**, posterior view of terminal articles of right fifth pereopod; **g**, ventral view of telson and terminal segments of male abdomen.

DISCUSSION. — DE MAN (1889) illustrated the type specimen of *Dynomene pugnatrix* from Mauritius showing the left cheliped missing and stating that it was a female, but in fact the specimen is a male. DE MAN stated "I judge from the shape of the telson, whose last segment is shaped like a half circle and rounded, that this is a female" (translated from German). Apart from the pleopods, the dynomenid telson and abdomen as a whole is sexually dimorphic only in size, not in shape. It is also possible that he judged the sex on the basis of the size of the abdomen which, in dynomenid males, is much larger than might be expected.

Since the report of the original specimen only two further specimens (both ovigerous females) have been recorded. These were described by RATHBUN as a subspecies, *Dynomene pugnatrix brevimana* Rathbun, 1911. Both specimens are a little smaller than DE MAN's type. The differences alluded to by RATHBUN (1911) are 1) greater carapace width/length ratio, 6.3/4.8=1.3 vs 9.75/8.25= 1.2 (as reported by DE MAN, 2) palm shorter in relation to the fingers, 3) presence of a few spinules on the upper edge of the palm, and 4) the wrist and chelae have a few setae. A comparison of RATHBUN's specimen reveals some inconsistencies and inaccuracies. My measurements of the carapace of the type are 9.8 x 7.2 mm which gives a ratio of 1.36 which is much closer to the ratio of RATHBUN's specimen. DE MAN described the cheliped as "The length of the hand is more or less three-quarters of the length of the carapace. Hand laterally compressed and more or less twice as long as high and a little longer than the fingers..." (translated) and because he reported his type as being a female, RATHBUN was correct in noting the difference in relative cheliped size. But in fact the type is a male and the difference in cheliped size is simply a result of sexual dimorphism. The cheliped carpus and propodus were described as "The carpus and the hand are entirely smooth and without setae except the fingers" (translated). Inspection of DE MAN's type shows that there are in fact setae on the wrist and chela and they were not detected or illustrated. The only difference between these specimens is the presence of spinules on the palm of RATHBUN's females. There are no spinules on DE MAN's type but this does not seem very important given the variability seen in other dynomenid species. I think that *D. pugnatrix brevimana* Rathbun, 1911 should be synonymized with *D. pugnatrix* de Man, 1889. All three known specimens come from the same general area in the vicinity of Madagascar.

In his original illustration of the male type of *Dynomene pugnatrix*, DE MAN (1889) showed setae concentrated in the anterolateral regions of the carapace and along the margins of the walking legs as well as on the reduced last pair of legs. Furthermore he figured two kinds of setae from the legs: short, stiff "Kammhaar" (comb-like) setae and "Federhaar" (feather-like") setae (1889, pl. 10, fig. 13e-f). Due to the rarity of this species I was unable to verify DE MAN's observations using the electron microscope. The setae of *D. pugnatrix* appear to be rather different from those of the other species of this genus.

The structure of the gills of *Dynomene pugnatrix* differs from that found in *D. hispida* only in that there is a single row of epibranchial lobes between the plates. The branchial formula is unknown.

Genus ***HIRSUTODYNOMENE*** nov.

DIAGNOSIS. — Carapace much wider than long, moderately convex, commonly subcircular. Surface sparsely spinous (especially in anterobranchial region), areolate, covered with coarse setae, which are short and long, and arranged in tufts. Lateral carapace margin always well defined and armed with distinct teeth. Frontal groove well marked, split in two posteriorly; cervical, postcervical and branchial grooves usually evident. Frontal carapace margin broadly triangular, continuous; no rostrum or teeth. Eyestalks short, eyes protected by well defined orbits. Sternal sutures 7/8 of female end well apart on low tubercles behind bases of second walking legs.

Antennule can be concealed inside orbit at base of eyestalk. Antennal flagella shorter than carapace width. All articles of antenna moveable; first article (urinal) always beaked medially; second article has an exopod firmly fixed. Third maxillipeds opercular, completely covering buccal cavern, separated at their bases by a plate at same level as sternum; basis and ischium of endopod fused but joint always marked by a shallow groove. Crista dentata present. Chelipeds equal, stouter than walking legs; dactyl strongly curved; fingers gaping basally. Last pair of legs very reduced; dactyl rudimentary, forming an obsolete subchelate mechanism with an extension of propodus. Gills usually 19 (including 6 podobranchs) + 7 epipods. Gill structure basically phyllobranchiate but plates are very variable in shape.

Abdomen of six segments and telson folded loosely under thorax; uropods large; no effective abdominal locking mechanism. Lateral movement of abdomen restricted by small sternal tubercle, at base of each of first walking legs, which lies alongside each uropod. Both sexes have five pairs of pleopods; first pair vestigial in female; last three pairs rudimentary in male. Male pleopods uniform in structure; first pair consist of a stout, setose semi-rolled tube with an apical plate; second pair needle-like with numerous subdistal spines, some of which overlap, sinuously arranged around the axis.

TYPE SPECIES. — *Dynomene spinosa* Rathbun, 1911.

OTHER SPECIES. — *Dynomene ursula* Stimpson, 1860.

ETYMOLOGY. — *Hirsutodynomene* is a combination of the latin *hirsutus*, meaning shaggy, alluding to the tomentum of these species, and the genus *Dynomene*. Gender is feminine.

DISCUSSION. — This new genus is erected for two species originally assigned to *Dynomene*. They clearly stand out amongst the other species because of their "shaggy" appearance, resulting from long, stiff setae, and their spiny, areolate carapace. The distribution of these two species does not overlap in the Pacific and they are clearly sister species.

Hirsutodynomene spinosa (Rathbun, 1911)

Figs 3 f, 5 e-f, 8 f, 9 c, 11, 13 a-b, d, 14 d, 17 e, 23 a-g

Dynomene spinosa Rathbun, 1911: 196, pl. 17, fig. 1. — IHLE, 1913: 92 (list). — BALSS, 1935: 115; 1938: 7. — MIYAKE, 1939: 198 (list). — WARD, 1942: 71. — HOLTHUIS, 1953: 3. — MORRISON, 1954: 13. — GUINOT, 1967: 242 (list); 1985: 448 (list). — SERÈNE, 1968: 36 (list). — TAKEDA, 1973: 81; 1977: 35 (list). — PEYROT-CLAUSADE & SERÈNE, 1976: 1343, pl. 2 A. — CHEN, 1980: 119, pl. 1, fig. 2. — DAI, YANG & LAN, 1981: 117, tex- fig. 1-4. — PEYROT-CLAUSADE, 1981: 750; 1984: 114. — DAI, YANG, SONG & CHEN, 1986: 27, pl. 3, 1. — GARTH, HAIG & KNUDSEN, 1987: 241. — DAI & YANG, 1991: 31, pl. 3, fig. 3. — POUPIN, 1996a: 24 (list).
Dynomene hispida - DE MAN, 1902: 689. [Not Guérin-Méneville, 1832].

MATERIAL EXAMINED. — **Madagascar**. Tuléar, stn 14-11-2, pente externe, 5 m, M. PEYROT-CLAUSADE coll., 1968: 1 ♀ 11.3 x 8.9 mm (MNHN-B 22077) (see PEYROT-CLAUSADE & SERÈNE, 1976; and PEYROT-CLAUSADE, 1984).

Glorieuses Islands. Grande Glorieuse. Intertidal zone, A. CROSNIER coll., 30.01.1971: 1 ♂ 16.4 x 14.3 mm (MNHN-B 6899).

Australia. *W coast*: Exmouth Gulf, Bundegi Reef, 21°53'S, 114°22'E, 3 m, under rock, N. COLEMAN coll., 14.08.1972: 1 ♂ 19.6 x 14.5 mm (AMS-P 19118).

Southeast Queensland, Flinders Reef, 26°59'S, 153°29'E, 6-20 m, 10.03.1989: 1 ♀ 27.7 x 20.4 mm (QM W16277).

Tasman Sea, Middleton Reef, 29°29.5'S, 159°06.2'E, no depth, P. FILMER-SANKEY coll., 5.12.1987: 1 ♂ 28.7 x 21.3 mm (10 poecilasmid barnacles on chelipeds) (AMS-P 39242). — No depth, P. HUTCHINGS coll., 8.12.1987: 1 ♀ ovig. 32.3 x 24.4 mm (AMS-P 39245). — Elizabeth Reef, 29°57.2'S, 159°01.2'E, 12 m, dead coral rubble, R. SPRINGTHORPE coll., 10.12.1987: 1 ♀ 19.5 x 14.8 mm (AMS-P 38264).

Cocos Keeling Islands. Horsburgh Id, 0-37 m, 9.02.1989: 1 ♂ 14.2 x 10.8 mm (WAM 139-94). — N end of West Id, 0-30 m, 21.02.1989: 1 ♀ 13.0 x 10.3 mm (WAM 138-94.). — NW end of West Keeling Id, 0-28 m, 23.02.1989, F. WELLS coll.: 1 ♀ 23.8 x 17.8 mm (WAM 723-89).

Indonesia. *Moluccas*. Amboina: no details, J. BROCK coll., 7.09.1885, J. G. DE MAN (1888) det.: 1 ♂ 17.8 x 13.7 mm (SMF 164). — Seram, Gorong Id. RUMPHIUS 2, stn GO 3, no depth, 27.01.1975, T. MONOD & R. SERÈNE coll. and det. as *Dynomene pilumnoides* : 1 ♂ 17.5 x 14.0 mm (MNHN-B 9906). — Ternate: no details, W. KUKENTHAL coll., 1894: 1 ♀ 18.5 x 14.3 mm (SMF 4856) (See DE MAN, 1902 who reported this specimen as *Dynomene hispida*). — *Timor*, Atapupu, coral reef, leg. *"Gazelle"*, no depth, no date: 1 ♂ 24.3 x 18.8 mm (ZMB 5138).

Vietnam. Institut océanographique, Nhatrang (coll. and det. R. SERÈNE): stn 1060, no locality, no depth, 1950: 1 ♂ 18.0 x 14.3 mm (ION. 9265) (ZRC 1970.6.20.1). — Stn. 87, no locality, no depth, 1950: 1 ♂ (dry) 7.4 x 6.0 mm (ION 1556) (ZRC 1970.6.20.2).

Mariana Islands. *Asuncion Id*, 19°40'N, 145°24'E, 1-6 m along rock wall in holes and corals, P. SCHUPP coll., 7.06.1992: 1 ♀ 24.2 x 18.0 mm (UGM).

Guam, Piti Lagoon, 13°27'N, 144°47'E, 1.0-2.5 m among dead coral, 20.09.1992: 1 ♂ 20.3 x 15.9 mm. — 1-2 m under rubble, H. T. CONLEY coll., 04.1997: 1 ♂ 10.2 x 8.1 mm. — Tumon Bay, 11 m on dead finely branched coral, R. K. KROPP & J. H. DOMINGUEZ coll., 7.11.1984: 1 ♀ 4.4 x 3.9 mm (UGM)

Japan. Kurashima Ids, Yaeyama Id, Okinawa, in dead coral branches, inner reef, M. OSAWA coll., 1993: 1 ♂ 22.2 x 17.0 mm.

Line Islands. WHIPP EXPEDITION: Palmyra Id, 5°52'N, 162°6'W, no depth, 1924: 1 ♂ 10.5 x 8.6 mm (BPBM 2297).

French Polynesia. *Tuamotu Ids*, Raroia Atoll, Homohomo Id, 16°3'S, 142°23'W, under rocks near shore in pavement pool zone, J. P. E. MORRISON coll., 21.07.1952: 1 ♀ 25.0 x 19.8 mm (USNM 94559) (see HOLTHUIS, 1953).

TYPES. — *Dynomene spinosa* Rathbun, 1911: holotype is a male 24.7 x 19.6 mm, collected by the R/V *"Sealark"*, Percy Sladen Trust Expedition, from 7°08.00'S, 56°16.00'E, Coetivy Id, 1905, held at the Smithsonian Institution, Washington, registration number USNM 41048 (note that there are two dry specimens in this lot, but the larger specimen is the holotype).

DESCRIPTION. — Carapace wider than long, ratio of CW/CL approx. 1.25-1.30, broadly rounded in outline but frontal and posterior margins truncated; surface convex, areolate, granulate, and spinous. There are about twenty five to thirty distinct areolae, more medial areolae smooth or minutely granulate, more lateral areolae adorned with larger acute granules, and those above anterolateral margin are adorned with short, acute spines. Behind branchial groove is a laterally directed region of granules, grading into spines towards last marginal tooth. Carapace surface and pereopods covered with setae of two kinds: short setae, bent at right angles near tip, clothing surface, but interspersed with longer filiform setae (6 x length of short setae and 0.20-0.25 x CW) which fringe limbs and are arranged in clumps on carapace where there are about twenty five distinct tufts, each with up to seven setae, which tend to be associated with areolae. The density of setae almost completely obscures body surface but most of this is attributable to short setae which, in some places, are separated by narrow areas lacking setae. Structure of short and long setae are different. In short setae proximal 40% of shaft is erect and lacks ornamentation, then a region occupying about 55% where setae are bent at right angles and long, stout setules radiate from shaft only on external side, forming a dense bunch, and finally distal 5% which is smooth, slightly curved, and narrows to an acute tip. In long setae proximal 95% is covered with small setules which distally increase in density, but not in size, and last 5% is smooth, slightly curved and narrows to an acute tip.

A narrow frontal carapace groove separates a pair of prominent rounded protuberances, and then divides into separate grooves which diverge and then curve back medially. Between these grooves is an elongate granulate ridge. Just in front of cardiac region two laterally-directed grooves originate: first groove (cervical) arises separately from small pits and runs directly anterolateral on to branchial region and mid-way along their length they are joined by grooves running back from frontal groove The second, shallower groove extends across mid-line and initially runs almost directly towards lateral margin but then splits into an anterior portion which follows first groove for a short distance, while second portion curves posterolaterally, bordering anterior cardiac region. In effect groove crossing mid-line, connects two crescent-shaped grooves. A faint branchial groove is evident and posterior cardiac area is defined. Anterolateral carapace margin begins at level of postorbital corner, is evenly convex and bears four distinct, broad-based, equidistant teeth, each ending in a well developed, upwardly curved, acute spine; first tooth directed anterolaterally and remainder directed laterally. Each anterolateral tooth has an associated tuft of long setae. A posterolateral tooth, which is smaller than preceding anterolateral teeth, marks beginning of convergent posterolateral border alongside which lies the reduced last leg. Posterior carapace margin is recessed in order to accommodate first segment of abdomen which is visible dorsally.

Frontal margin continuous, V-shaped, ventrally-directed, joined to epistome (which separates orbits). Supraorbital margin not projecting, continuous above orbits, interrupted by a distinct notch closer to postorbital corner, followed by four or five acute spines; suborbital margin with three similar spines followed by an acute tooth (visible dorsally when setae are removed) and then descending to a much smaller tooth at its inner corner. Orbits clearly exposed dorsally.

First article of antennule large, filling a large part of ventral orbital region; distal margin bearing a dense fringe of longer setae, obliquely angled and not continuous with distal margin of second antennal article. Remainder of antennule folded into orbit. First article of antenna moveable, wider than long, medially beaked; inferior tooth well

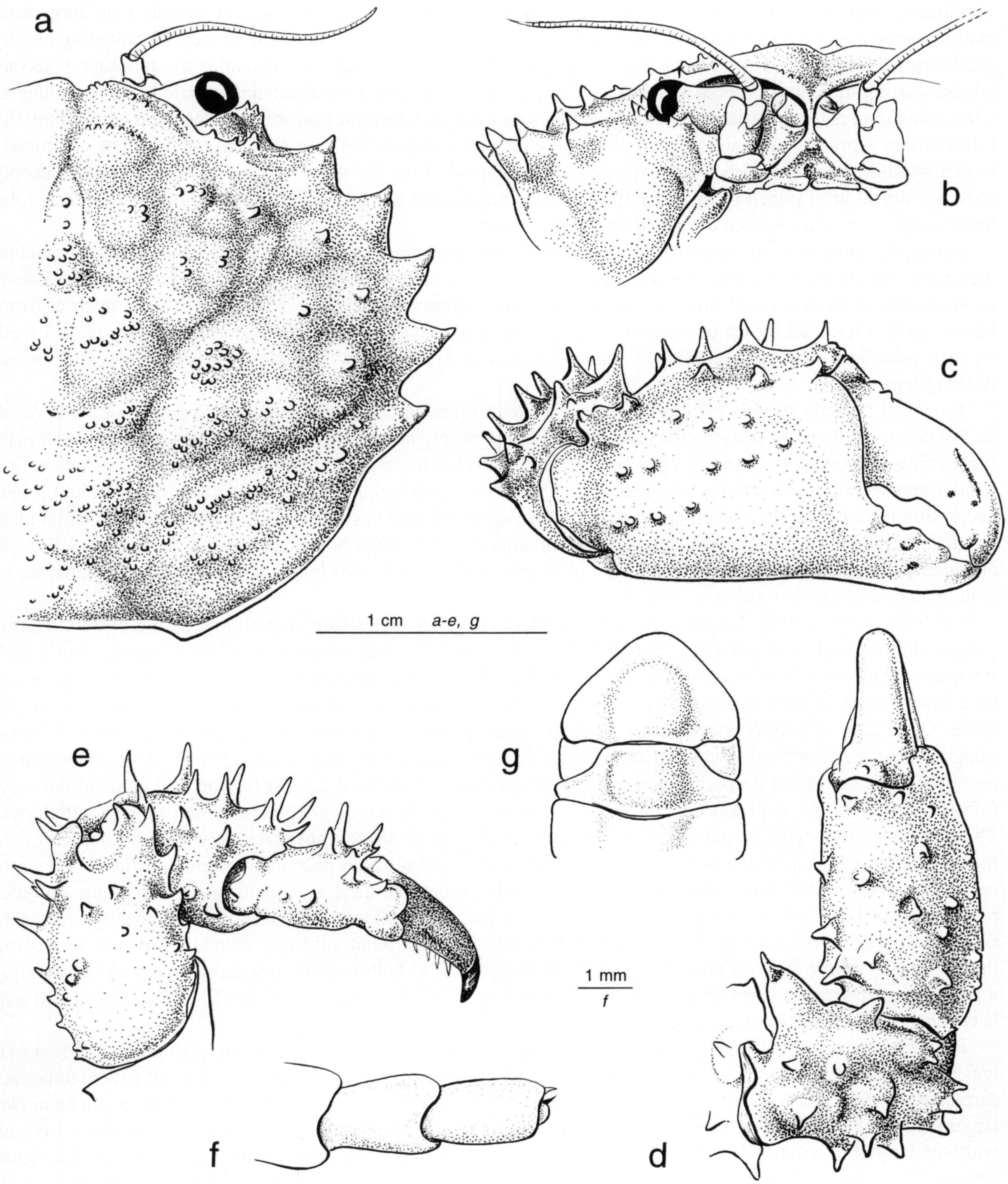

FIG. 23. — *Hirsutodynomene spinosa* (Rathbun, 1911): **a-g**, ♂ 16.4 x 14.3 mm, Glorieuses Ids (MNHN-B 6899): **a**, dorsal view of right half of carapace; **b**, ventral view of right orbital area; **c**, outer face of right cheliped; **d**, dorsal view of right cheliped; **e**, posterior view of terminal articles of right fourth pereopod; **f**, posterior view of terminal articles of right fifth pereopod; **g**, ventral view of telson and terminal segments of male abdomen.

developed, blunt, superior tooth above opening of antennal gland is smaller. Second article wider than long, distal margin widest, to which is fixed the exopod curving over base of eyestalk, becoming broader, terminating bluntly and bearing longer setae. Third antennal article longer than wide, and attached to remaining distal border of second article, slotting in behind exopod, and just matching length of exopod. Fourth antennal article smaller, as long as wide; remaining antennal articles directed laterally, extending well beyond postorbital corner, and can be partially folded under supra-orbital margin. Ratio of length of antennal flagella to CW = 0.45. Eyestalk can be completely folded into orbit, and cornea is well developed, occupying all of tip. Epistome broadly triangular, surface deeply concave; dorsal arm, joined to tip of carapace, very elongate and narrow; lateral arms shorter and thicker. Joint between epistome and carapace is marked by a narrow suture.

Subhepatic area smooth, very convex. A groove begins near base of antenna, curving round under branchial region and meeting lateral carapace margin just anterior to last tooth at beginning of posterolateral border. A short cervical groove branches off and ascends towards first anterolateral tooth. Third maxillipeds operculiform, bases widely separated by tip of sternum. Crista dentata has five or six well developed, distally placed teeth on each side. Female sternal sutures 7/8 short, ending wide apart on low tubercles just behind bases of second walking legs.

Branchial formula 19 gills + 7 epipods on each side as found in *Dynomene hispida*. No epipod or podobranch on last pereopod. In cross section gills have lateral margin deeply notched, dividing gill into a hypobranchial plate (containing efferent vessel) and an epibranchial lobe. Between these marginal lobes are two pairs of lobes, first similar and second much shorter than marginal lobes. Thus epibranchial surface shows six rows of blunt lobes, decreasing in size medially, which are arranged above afferent blood vessel. These lobes and hypobranchial plate are distally thickened, maintaining spaces between adjacent rows. Hypobranchial setae on posterior wall of gill chamber poorly developed. Posterior margin of scaphognathite bears two long setae. Hypobranchial margin of podobranchs bears same setae as on epipod.

Cheliped stout, slightly longer than first leg. Merus trigonal, inner face smooth and fitting closely against pterygostomial region of carapace, borders granulate, outer face has a subterminal broad, restriction which separates a thickened distal ridge on which there are three large acute spines from a pair of similar spines preceded by a row of three smaller acute granules on superior border. Inner inferior margin of merus has an acute lateral spine. Outer face of carpus convex with six large, acute granules, two more prominent acute spines on distal margin; inner superior border with a distomedially directed, but dorsally curved, sharp spur which abuts against proximal inner surface of propodus thereby restricting closure of cheliped against frontal area. In a similar way, inferior carpal margin is produced as a smooth, obtuse, flange fitting against merus when limb is withdrawn. These two structures give carpal article an unusual and distinctive shape: inner face very narrow and outer face much broader. Outer and superior faces of propodus with about a dozen prominent granules which form acute spines on superior face; inner and inferior faces smooth, except that there is a small proximal granule on inner propodal face. Fixed finger almost straight with four or five proximal teeth increasing in size distally; moveable finger strongly curved also with four or five teeth; first tooth large, blunt, mid-way along margin, rest increasing in size distally where last two teeth interlock. Both fingers, thick, hollowed out internally, touching only at tips; a group of stiff setae is inserted proximally on each finger and these curve towards tips. These setae fill gap between the fingers and form a screen.

First three pairs of walking legs decreasing in length posteriorly. Meri elongate, both faces of meri of first two legs and anterior face third leg merus smooth and nacreous, inferior distal margin hollowed out to accommodate carpal article. Superior border of meri of these legs with three small spines, in a row, separated by a gap from two larger distal spines, and three large distal spines on posterior margin, length of merus of second leg about 1.6 x its width and equal to about half of CL. Dorsal surface of carpi bearing three longitudinal rows each of five acute spines, and produced distally to overhang base of propodi. Dorsal surface of propodi with three similar rows each of two or three spines. Dactyli curved, inferior margin armed with 4-5 small spines, tip brown (in some cases the whole dactyl is black) and subacute.

Last pair of legs greatly reduced, lying along posterolateral border of carapace, reaching only as far as half way along meral article of preceding limb, borders of articles unarmed. Last pair of legs subchelate, sexually dimorphic: female with well developed distal extension of propodus which opposes dactyl, male with only weakly developed propodal extension. Female propodal extension bearing eight, unequal, stout, hooked, acute, spines, the four largest lined with tiny, striated flattened and conical teeth along almost their entire inner surface, the remaining four more sparsely covered with teeth. Female dactyl as long as propodal extension, bearing sixteen unequal, stout, hooked spines (arranged asymmetrically around perimeter of dactyl) whose concave inner surface is wrinkled and mostly devoid of tiny teeth. Male propodal extension bearing five unequal curved spines the four largest of which have lateral rows of about six tiny teeth. Male dactyl longer than propodal extension and ending in a single acute claw.

All segments of abdomen freely moveable, surface smooth, margins unarmed but fringed with long setae. Second segment narrowest, anterior margin sinuous, medial region convex, lateral margins produced as a flange which fits over posterior margin of first segment (which is shortest) preventing forward slippage of abdomen. Subsequent segments increasing in length and breadth distally, not overlapping with preceding segments. Telson much wider than long, anterior margin angled to accommodate uropod, posterior margin broadly rounded. In female uropod plates large, filling about two thirds of space between last abdominal segment and telson, excluding most of last abdominal segment and telson from reaching lateral margin of abdomen. In male last abdominal segment occupies about a half of length. No effective abdominal locking mechanism: abdomen only loosely held against sternum in both sexes; sideways movement restricted by small sternal tubercle beside telson. In mature female abdomen occupies all of ventral surface, covering coxae of all pereopods with telson covering proximal half of third maxillipeds. In male abdomen not quite so broad and telson only extends as far as bases of third maxillipeds.

Five pairs of pleopods in female, first pair vestigial, remainder biramous. First male pleopod a semi-rolled tube with a small apical plate surrounded by long setae. Second male pleopod with an exopod on the basis, needle-like distally, armed with a series of sixteen tiny, straight, acute, inset spines and ending in two larger straight spines. Subterminal spines unevenly spaced, ninth and tenth spines overlap, and follow a sinuous path. Third to fifth male pleopods rudimentary and biramous, exopod longer and jointed to basal article.

COLOUR. — Preserved specimens have a dense covering of light brown setae and the dactyli (or only their tips) of the first four pereopods are black or dark brown.

GEOGRAPHIC DISTRIBUTION. — In the Indian Ocean *Hirsutodynomene spinosa* is known from Madagascar, Mauritius, Glorieuses Ids, Coetivy Id (the type locality, Western India), Chagos Archipelago, Cocos Keeling Ids, and Western Australia. Records from Indonesia include Timor, Ternate, and Moluccas. In the Pacific this species is known from Southeast Queensland, Middleton Reef, Elizabeth Reef, Palau, Marshall Ids, Vietnam, Mariana Ids, Xisha Ids, Japan, Enewetak Atoll, Palmyra Id, Tuamotu, Raroia, Marquesas Ids. The material examined in this study establishes new records for Australia, Middleton and Elizabeth Reefs (Tasman Sea), Mariana Ids, Japan, and Palmyra Id. It should be noted that although BALSS (1935) included this species in his report on the collections made by the Hamburg Museum Expedition to South Western Australia, 1905, the material cited did not come from Western Australia but from the Marquesas and Palau Ids. *H. spinosa* is clearly a widespread Indo-Pacific species.

DEPTH. — *Hirsutodynomene spinosa* has been collected from intertidal habitats and to a depth of approximately 15 m. *H. spinosa* is an inhabitant of shallow water coral reefs.

SIZE. — The maximum size for males is 28.7 x 21.3 mm, for females 32.3 x 29.4 mm. Only one ovigerous female (32.3 x 29.4 mm) has been recorded in December from Middleton Reef, Tasman Sea and it carried about 3800 eggs with a diameter of 0.5 mm. Although *H. spinosa* is one of the larger dynomenids, it evidently produces eggs of similar size to the other species and probably has planktotrophic larvae.

DISCUSSION. — *Hirsutodynomene spinosa* (Rathbun, 1911) was first described by RATHBUN on the basis of three males collected from Coetivy Id by the Percy Sladen Trust Expedition of 1905. The first female was reported by BALSS (1935) from the Marquesas Ids.

RATHBUN (1911) referred to the shorter setae of *Hirsutodynomene spinosa* as being "club-shaped" and the bunches of setae as being long and slender. Microscopic examination shows that the distal portion of the short setae is bent at right angles and ornamented, on the outer side, with sharp setules which might give the setae a club-shaped appearance. The long setae are clothed for almost their entire length with much smaller setules.

The gills of *Hirsutodynomene spinosa* are similar to those of *Dynomene filholi*. On the epibranchial surface there are sequential rows of six lobes along the length of the gill, except towards the tip where the smaller medial lobes are lost. In prepared material the lobes tend to be clumped together, even interlocking, but in live animals the lobes are probably free, kept apart by their thickened tips. As in the species of *Dynomene*, the hypobranchial setae in the posterior region of the branchial chamber of *H. spinosa* are poorly developed. The posterior margin of the scaphognathite bears two long setae and the hypobranchial margin of each podobranch carries cleaning setae as found in *H. ursula*.

The male pleopods of *Hirsutodynomene spinosa* are similar to those of the species of *Dynomene*. The tip of the first pleopod bears a dense ring of long setae surrounding an oval apical plate. The second pleopod has a large number of subterminal spines, not all evenly spaced, which follow a sinuous path along the shaft and it ends with two straight terminal spines. Also the last three pairs of pleopods are biramous and the connection of the exopod with the basal article is marked by a joint.

The two species in this genus have non-overlapping distributions with *Hirsutodynomene spinosa* being a widespread Indo-West Pacific species and *H. ursula* being restricted to the eastern Pacific. The main differences between these species (see Table 2) are discussed below under *H. ursula*.

The habitat of *Hirsutodynomene spinosa* seems to be dead coral branches and rubble. MORRISON (1954) recorded *H. spinosa* from the inshore, more pooled area of the leeward outer reef at Raroia, Tuamotu along with hermit crabs, *Cryptodromia canaliculata*, *Pachygrapsus plicatus*, *Micippoides angustifrons*, *Thalamita picta*, *Eriphia sebana* and several xanthids. PEYROT-CLAUSADE (1981) recorded it from dead clumps of *Acropora* sp. on Tuléar Reef, Madagascar where (along with *Dynomene hispida*) it made up only about 1-2% of the anomuran and brachyuran fauna. On both the Tuléar and Reunion reefs *H. spinosa* was always less common than *D. hispida* which had a greater depth range (PEYROT-CLAUSADE, 1984). Although both these species are shallow water dynomenids, *H. spinosa* grows to a much larger size.

Examination of the gut contents of a male *Hirsutodynomene spinosa* 14.2 x 10.8 mm from the Cocos Keeling Ids revealed a stomach packed almost entirely with sand grains and a small amount of aggregated amorphous organic material. There were no recognizable animal or plant fragments. Food is probably obtained by using the spooned cheliped fingers and their stiff setae to sift out fine particulate organic material from coral sediments.

Hirsutodynomene ursula (Stimpson, 1860)

Figs 4 a-c, 6 a-b, 9 a-b, 11, 14 f, 17 f, 24 a-g

Dynomene ursula Stimpson, 1860: 239. — A. MILNE EDWARDS, 1879: 9, figs 16-19. — ALCOCK, 1901: 74 (list). — RATHBUN, 1937: 54, pl. 12, figs 1-4. — SCHMITT, 1939: 25. — GARTH, 1946: 349, pl. 61, figs 5-6; 1948: 16; 1961: 121 (list); 1965: 6; 1966: 5; 1991: 125. — BIRKELAND *et al.*, 1975: 67. — TAKEDA, 1977: 35 (list). — PRAHL & ALBERICO, 1986: 98 (list). — PRAHL, 1986: 96. — RODRIGUEZ DE LA CRUZ, 1987: 113. — VILLALOBOS-HIRIART *et al.*, 1989: 53 (list). — CORREA-SANDOVAL, 1991: 2. — LEMAITRE & ALVAREZ-LEON, 1992: 50. — AGUILERA & GUZMAN, 1992: 4 (list). — HENDRICKX, 1995: 127 (list); 1997: 29, fig. 39 a-c. — VARGAS *et al.*, 1996: 99 (list).

MATERIAL EXAMINED. — **Galapagos**. ALLAN HANCOCK GALAPAGOS EXPEDITION: stn 30-33, Hood Id, Gardner Bay, no depth, W. L. SCHMITT coll., 26.01.1933, M. J. RATHBUN id.: 1 ♂ 11.7 x 9.6 mm; 1 ♀ 15.0 x 12.3 mm (USNM 68313). — Charles Id, no depth, W. L. SCHMITT coll., 27.01.1933, M. J. RATHBUN id.: 2 ♂ 9.1 x 7.4 mm, 11.1 x 8.6 mm (USNM 68314).

Mexico. *Espiritu Santo Id. "Velero"*: stn 638-37, San Gabriel Bay, shore, 7.03.1937: 1 ♂ 13.4 x 10.3 mm; 1 ♀ 13.0 x 10.3 mm (LACM). — Stn 1110-40, 2-4 m, 14.02.1940, J. GARTH id.: 1 ♀ 7.2 x 5.7 mm (LACM).

Panama. *Secas Ids*. Stn 252-34, on *Porites* coral, 22.02.1934, M. J. RATHBUN id.: 1 ♀ ovig. 10.9 x 8.8 mm (LACM).

"Velero": stn 867-38, shore, 2.03.1938: 8 ♂ 8.4 x 6.6 - 12.7 x 10.0 mm; 5 ♀ ovig. 9.5 x 7.5 - 12.3 x 9.8 mm (LACM).

Ecuador. *La Plata Id. "Askoy"*: stn 80, 12.04.1941, J. GARTH id.: 3 ♂ 7.5 x 6.3 - 19.4 x 15.7 mm; 1 ♀ 5.0 x 4.4 mm; 1 ♀ ovig. 15.0 x 12.2 mm (LACM).

ARGOSY 34: no depth, J. GARTH coll., 5.03.1963: 1 ♀ ovig. 19.4 x 14.7 mm (USNM 247230).

TYPES. — *Dynomene ursula* Stimpson, 1860: holotype is a male 15.2 x 12.7 mm, collected by Mr J. XANTUS from 22°50.00'N, 109°55.00'W, Cape St. Lucas, Baja California, and according to the original paper is held by the Smithsonian Institute, Washington, but RATHBUN (1937) stated that the specimen is not extant. However there is a syntype held by the Museum of Comparative Zoology, Harvard, registration number MCZ 1378.

DESCRIPTION. — Carapace wider than long, ratio of CW/CL approx. 1.25-1.30, broadly rounded in outline but frontal and posterior margins truncated; surface convex, areolate, sparsely granulate, and spinous. There are about twenty to twenty five distinct areolae, more medial areolae smooth or minutely granulate, more lateral areolae adorned with larger acute granules, and those above anterolateral margin adorned with short, acute spines. Behind branchial groove is a laterally directed region of granules ending at base of last marginal tooth. Carapace surface and pereopods covered with setae of two kinds: short erect serrate setae clothing surface, but interspersed with longer serrate setae (3 x length of short setae and 0.05-0.07 x CW) which also fringe limbs and arranged in clumps on carapace where there are about twenty distinct tufts, each with up to five setae, which tend to be associated with areolae. Density of setae does not completely obscure body surface. Structure of short and long setae differs. In short setae the proximal 23% of shaft lacks ornamentation, followed by a region of 45% where tiny setules arranged in bands, then a region occupying about 22% where long, stout setules radiate from all sides of shaft, forming a dense bunch, and finally the distal 5% which is smooth, and narrows to an acute tip. The whole seta may be slightly curved but is not bent at right angles. In long setae the proximal 15% is smooth, following 80% covered with small setules which increase distally in density and size (but not reaching size of setules on short setae), and the last 5% is smooth, slightly curved and narrows to an acute tip.

A narrow frontal carapace groove separates a pair of prominent rounded protuberances, and then divides into separate grooves which diverge and then curve back medially. Between these grooves is an elongate granulate ridge. Just in front of cardiac region two laterally-directed grooves originate: first groove (cervical) arises separately from small pits and runs directly anterolateral on to branchial region and mid-way along their length they are joined by grooves running back from frontal groove. Second shallower groove extends across mid-line and initially runs almost directly towards lateral margin but then splits into an anterior portion which follows the first groove for a short distance, while the second portion curves posterolaterally, bordering anterior cardiac region. In effect groove crossing mid-line, connects two crescent-shaped grooves. A faint branchial groove is evident and posterior cardiac area is defined. Anterolateral carapace margin begins at level of postorbital corner, evenly convex and bears four distinct, broad-based, equidistant well developed teeth, each ending bluntly; first tooth directed anteriorly, second anterolaterally, and remainder directed laterally. Each anterolateral tooth has an associated tuft of long setae. A posterolateral tooth marks beginning of convergent posterolateral border alongside which lies the reduced last leg. Posterior carapace margin recessed in order to accommodate first segment of abdomen visible dorsally.

Frontal margin continuous, V-shaped, ventrally-directed, joined to epistome (which separates orbits). Supraorbital margin not projecting, continuous above orbits, interrupted by a distinct notch closer to postorbital corner, followed by three small blunt granules before corner; suborbital margin with three larger blunt granules, first two visible dorsally, second and third (tooth-like) closer together but separated by a deep notch with third terminating the suborbital margin. Orbits clearly exposed dorsally.

First article of antennule large, filling a large part of ventral orbital region; distal margin bearing a dense fringe of longer setae, obliquely angled and not continuous with distal margin of second antennal article. Remainder of antennule folded into orbit behind second antenna. First article of antenna moveable, wider than long, medially beaked; inferior tooth well developed; blunt, superior tooth above opening of antennal gland smaller. Second article about as wide as long; distal margin widest, to which is fixed the exopod curving over base of eyestalk, becoming broader, terminating bluntly and bearing longer setae. Third antennal article longer than wide, and attached to remaining distal border of second article, slotting in behind exopod. Fourth antennal article smaller, as long as wide, together with third article just matching length of exopod; remaining antennal articles directed laterally, extending well beyond postorbital corner, and partially folded under supraorbital margin. Ratio of length of antennal flagella to CW = 0.45. Eyestalk can be completely folded into orbit, and the cornea is well developed,

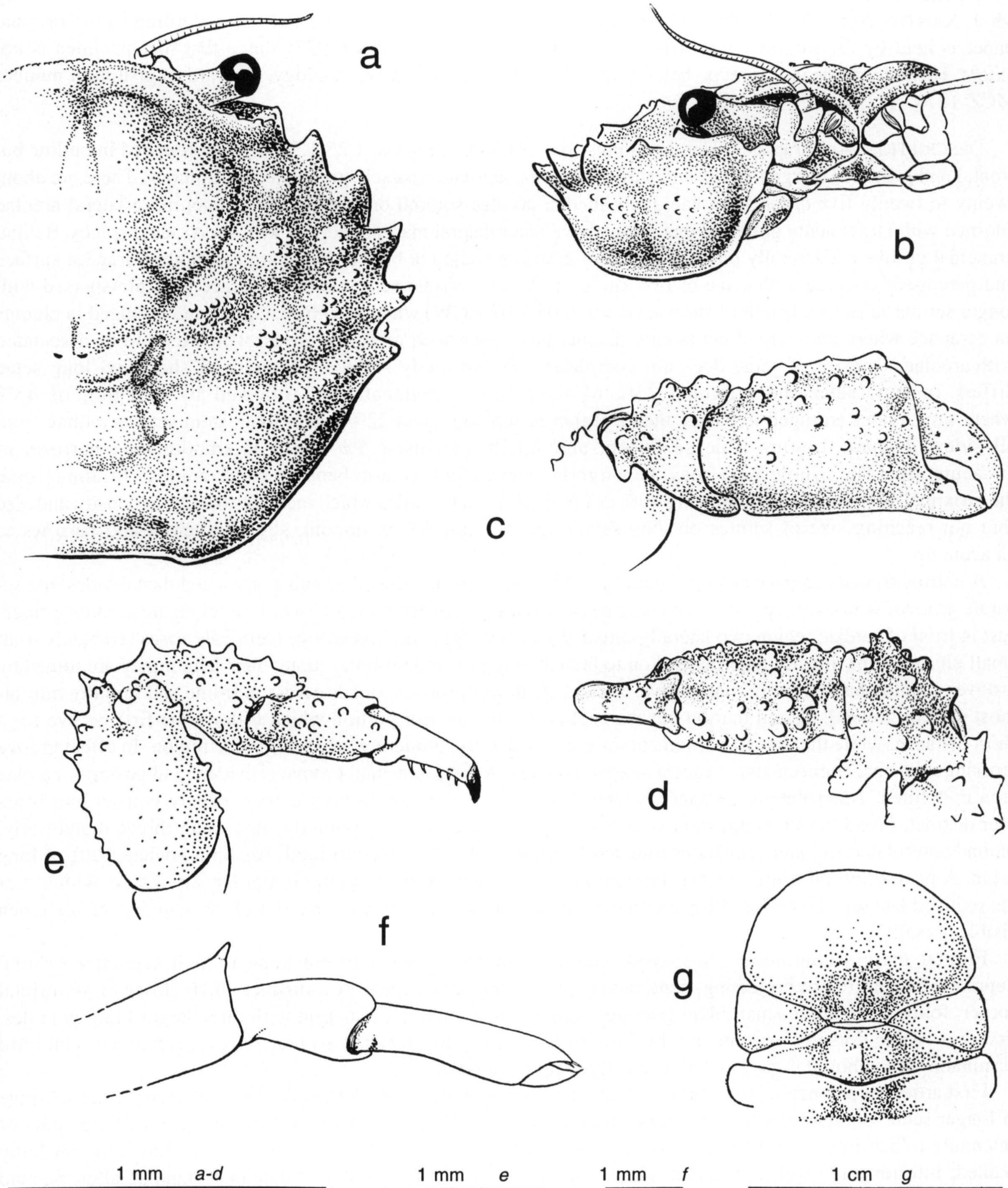

FIG. 24. — *Hirsutodynomene ursula* (Stimpson, 1860), ♀ ovig. 19.4 x 14.7 mm, La Plata Island, Ecuador (USNM 247230): **a**, dorsal view of right half of carapace; **b**, ventral view of right orbital area; **c**, outer face of right cheliped; **d**, dorsal view of right cheliped; **e**, posterior view of terminal articles of right fourth pereopod; **f**, posterior view of terminal articles of right fifth pereopod; **g**, ventral view of telson and terminal segments of female abdomen.