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SUMMARY: Species of the parapagurid genus *Strobopagurus* Lemaitre, 1989 are reviewed based primarily on abundant specimens obtained during French campaigns across the Indo-Pacific region. A new species, *S. breviacus*, is described. The genus contains two other species, *S. gracilipes* (A. Milne-Edwards, 1891), the type of the genus, and *S. sibogae* (de Saint Laurent, 1972). One taxon, *Parapagurus kilburni* Kensley, 1973, originally described from off eastern Africa, has been found to be a junior synonym of *S. sibogae*. An updated diagnosis of the genus, and diagnoses and comparative illustrations of all three species, are presented together with a key to aid in their identification. Information on live coloration is provided for *S. gracilipes* and *S. sibogae*; live coloration of *S. breviacus* is not known.

Key words: Crustacea, Decapoda, Anomura, Paguroidea, Parapaguridae, deep-water hermit crabs, *Strobopagurus*, Indo-Pacific, eastern Atlantic, new species.


INTRODUCTION

The genus *Strobopagurus* Lemaitre, 1989, was established by Lemaitre (1989) for a small group of distinctive parapagurids characterized primarily by their short, broad shields with oblique rows of long setae dorsally, stout ocular peduncles with strongly dilated corneas, slender chelipeds, straight dactyls on the ambulatory legs, and in males, the strongly twisted distal segments of the second pleopods. Lemaitre (1989) included three taxa in this genus: *S. gracilipes* (A. Milne-Edwards, 1891), at the time known from the eastern Atlantic and Hawaii; *S. sibogae* (de Saint Laurent, 1972), from the western Pacific; and *S. kilburni* (Kensley, 1973), from off eastern Africa. New specimens of *S. gracilipes* and

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S. sibogae have rarely been reported since their original descriptions, whereas S. kilburni has remained exclusively known from the type material.

While continuing the study of the remarkably rich parapagurid collections obtained during the French campaigns of the last three decades to the western Indian Ocean, New Caledonia and other Pacific regions, numerous specimens assignable to S. gracilipes, the type species of the genus, and S. sibogae, were found. Also, abundant specimens of an undescribed species were discovered. The evaluation of this and all other materials of Strobopagurus taxa found in various museums, has provided the opportunity to update the diagnosis of the genus, as well as the morphology and distribution of its species. Furthermore, a comparison of the type materials of S. kilburni and S. sibogae showed that the former is a junior synonym of the latter.

In this study, the genus Strobopagurus is rediagnosed, the newly discovered species is fully described, and the other two species herein recognized as valid are reviewed and diagnosed, including comparative illustrations of diagnostic characters, and color information where available. A key to aid in the identification of species is also presented.

MATERIALS AND METHODS

The morphological terminology employed, and measurements, follows those defined by Lemaitre (1989, 1999, 2004). However, on the fourth pereopod, the length of the propodus is measured in a straight line from the proximal end of the ventral margin to the tip of the distalmost scale of the rasp; the height of the propodus is measured perpendicularly to the dorsal margin, from its midpoint, to the ventral margin. The numbers or range in millimeters (mm) included in the Material examined and figure legends, are measurements for shield length (sl), measured from the midpoint of the rostral lobe to the midpoint of the posterior margin of the shield.

The specimens from the French campaigns remain deposited in the Muséum national d'Histoire naturelle, Paris (MNHN), except for some representatives sent to the National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM). Other specimens used have been returned to the following museums: Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A. (BPBM); Fisheries Research Station, Hong Kong, China (FRS); Musée Océanographique, Monaco (MO); National Taiwan Ocean University, Keelung, Taiwan (NTOU); South African Museum, Cape Town, South Africa (SAM); Zoologisch Museum, Universiteit van Amsterdam, The Netherlands (ZMA); Zoologisk Museum, Copenhagen, Denmark (ZMK); Zoological Museum, Moscow State University, Russia (ZMUM).

Other abbreviations used are: M, male(s); F, female(s); ch, “chalutage”, shrimp trawl; CP, beam trawl; DW, Waren dredge; FRV, Fishery Research Vessel; juv, juvenile; N.O., Navire Océanographique; ov, ovigerous; stn, station; R/V, Research Vessel.

The station data for the French campaigns from which Strobopagurus material was examined, can be found in the following publications or unpublished reports, or through the MNHN website (http://cimbad.mnhn.fr/musorstom/):

- BATHUS 1-4: Richer de Forges and Chevillon, 1996.
- BENTHAUS: MNHN website.
- BENTHEDI: unpublished report (A. Crosnier, pers. comm.).
- BORDAU 1: Richer de Forges et al., 2000a.
- BORDAU 2: MNHN website.
- HALIPRO 1: Richer de Forges and Chevillon, 1996.
- LIFOU: unpublished report (A. Crosnier, pers. comm.).
- MUSORSTOM 2: MNHN website.
- MUSORSTOM 4-6: Richer de Forges, 1990.
- MUSORSTOM 8: Richer de Forges et al., 1996.
- MUSORSTOM 10: Richer de Forges et al., 2000b.
- NORFOLK 1: MNHN website.
- SALOMON 1: MNHN website.
- SMIB 8: Richer de Forges and Chevillon, 1996.
- SMIB 10: MNHN website.

SYSTEMATIC ACCOUNT

Family Parapaguridae Smith, 1882
Genus Strobopagurus Lemaitre, 1989

Type species: By original designation: Sympagurus gracilipes A.
Diagnosis: Eleven pairs of biserial or quadriserial gills weakly divided distally. Shield slightly to distinctly broader than long, evenly calcified: with oblique rows of long setae. Ocular peduncles stout. Corneas strongly dilated. Posterior carapace densely setose, membranous to weakly calcified. Antennal peduncle with or without small dorsodistal spine on fourth segment. Epistomial spine absent. Right cheliped elongate, often more slender in males than in females; palm with rounded mesial face, and weakly to well delimited dorsolateral margin. Left cheliped evenly or sometimes weakly calcified on merus, carpus, and proximal portion of palm. Ambulatory legs with dactyls straight or nearly so. Fourth pereopod with propodal rasp consisting of 1 row of corneous scales at least distally. Fifth pereopod with small, subterminal corneous tooth on prehensile margin of dactyl laterally (Fig. 6). Second abdominal somite with left pleuron terminating ventrally in small subtrangular lobe. Males with well developed paired first and second gonopods; first gonopods each with short, broad subtrangular distal lobe; second gonopods each with strongly twisted distal segment, with rudimentary exopod on both left and right gonopods, or only on left or right.

Distribution: Eastern Atlantic; western Indian Ocean; and western and central Pacific. Depth: 40-1200 m.

Remarks: Lemaitre (1993) and Zhadan (1997) summarized the morphological similarities and differences between Strobopagurus and Bivalvopagurus Lemaitre, 1993, and suggested the existence of a close phylogenetic relationship between the two. Species of these two genera have broad, short shields typically with dense setae, strongly dilated corneas, short basal antennular segments, densely setose posterior carapaces, slender chelipeds and ambulatory legs, the latter with straight dactyls, and second pleopods with twisted distal segments. Strobopagurus does differ from Bivalvopagurus in the degree of calcification of the shield and posterior carapace (weak in the former, strong in the latter), and first and second abdominal somites (membranous in the former, calcified in the latter): the rostrum and lateral projections of the shield are weakly produced in the former whereas they are well produced and often spinose in the latter; in both sexes the third to fifth pleopods are unpaired in the former, and paired albeit asymmetrical (reduced on the right side) in the latter; the telson and uropods are asymmetrical in the former, whereas they are symmetrical or nearly so in the latter.

A small, subterminal corneous tooth laterally on the prehensile margin of the dactyl of the fifth pereopod (Fig. 6) has been found to be present on all Strobopagurus species. Its function is unknown. The presence or absence of this tooth has not been reported in other parapagurids, although during this study it was found to occur at least in the monotypic genus Bivalvopagurus, and at least one species of Paragiopagurus, P. fasciatus Lemaitre and Poupin, 2003.

Key to species of Strobopagurus

1. Fourth pereopod with propodus short, at most about 1.5 times as long as high, often subcircular (Fig. 5F); meri of ambulatory legs slender, 3.6 (first leg) or 2.7 (second leg) times as long as high; posterior lobes of telson nearly symmetrical

Strobopagurus gracilipes (A. Milne-Edwards, 1891) (eastern Atlantic; western, central, and South Pacific)

2. Fourth pereopod with propodus long, about 1.9 or more times as long as high (Fig. 5A, H); meri of ambulatory legs not slender, at most 2.5 (first leg) or 2.0 (second leg) times as long as high; posterior lobes of telson distinctly asymmetrical

Strobopagurus sibogae (de Saint Laurent, 1972) (western Indian Ocean; western Pacific)

2. Right chela with dorsomesial and dorsolateral margins strongly spinose (Fig. 3E, G); carpus of left cheliped armed with spines on dorsal surface (Fig. 3F, H); antennal acicles exceeding distal margin of corneas by 0.2 or more length of acicles

Strobopagurus sibogae (de Saint Laurent, 1972) (western Indian Ocean; western Pacific)

Strobopagurus breviacus (Figs. 1A-D; 2: 3A, B; 4A-G; 5A-E; 6)

Types: Holotype: M 6.1 mm. New Caledonia. SMIB S, stn DW 76, 23°41.20'S, 168°00.50'E, 280 m, 07.09.1989 (MNHN Pg 7081). Paratypes: All other specimens listed below.
Material examined: Solomon Islands. SALOMON 1: stn DW 1772, 8°15.8'S, 160°40.4'E, 570-756 m, 28.09.2001: 1 M 3.5 mm (MNHN Pg 6563); stn CP 1858, 165°76.8'E, 373 m, 07.02.1989: 1 M 3.5-3.3 mm (MNHN Pg 6565).

New Caledonia. (No expedition name), Dr 3, (no depth), 23.05.1978: 1 M 6.4 mm (MNHN Pg 7082). Dragage 3, N.O. Vauban, 22°17'S, 167°12'E, 390 m, 23-28.05.1978: 1 M 5.7 mm (MNHN Pg 7083).

Description:

Etymology: The specific name is a compound noun used as an adjective, from the Latin brevis, short, and acus, needle. The latter is also the stem of the word "acicle". The name makes reference to the short antennal acicle, one of the characters that distinguishes this new species from its congeners.
ally with small terminal spine (Fig. 1C). Anterior margins weakly concave; lateral projections broadly sub-triangular, unarmed; anterolateral margins sloping; posterior margin broadly rounded. Anterodistal margin of branchiostegite rounded, setose.

Ocular peduncles slightly more than 0.5 length of shield, constricted at about midpoint; with short row of setae dorsally. Ocular acicles subtriangular, each terminating in prominent simple spine (rarely bifid), separated by about basal width of 1 acicle.

Antennular peduncles long, exceeding distal margins of corneas by about half length of penultimate segments; with scattered setae. Basal segment with strong ventromesial spine distally; lateral face with distal subrectangular lobe usually unarmed, and strong spine proximally. Ventral flagellum with about 10 articles.

Antennal peduncles (Fig. 1D) exceeding distal margins of corneas by 0.3 or more length of fifth segments. Fifth segment with scattered setae. Fourth
segment unarmed or with minute dorsodistal spine, with scattered setae. Third segment with small, blunt or sharp ventromesial distal spine. Second segment with dorsolateral distal angle produced, terminating in strong spine; mesial margin rounded distally, with or without small spine. First segment with unarmed lateral face. Flagellum long, nearly twice as long as ambulatory legs, naked or at most with scattered short setae less than 1 flagellar article in length. Acicale (Fig. 1A,B) not reaching or slightly exceeding distal margin of cornea, sparsely setose, frequently strongly curved outward, and terminating in strong spine; with 4-9 small spines on mesial margin.

Mandible (Fig. 2A) as figured. Maxillule (Fig. 2B, C) with external lobe of endopod weakly developed, internal lobe with long seta distally. Maxilla (Fig. 2D) with endopod exceeding distal margin of scaphognathite. First maxilliped (Fig. 2E) with endopod exceeding exopod in distal extension. Second maxilliped (Fig. 2F) without distinguishing
characters. Third maxilliped (Fig. 2G,H) with crista dentata consisting of about 14 small corneous-tipped teeth; basis with 1 small tooth mesially. Sternite of third maxillipeds with spine on each side of midline.

Chelipeds markedly dissimilar. Right cheliped (Fig. 3A) elongate, usually not exceeding tip of dactyls of ambulatory legs when cheliped and legs fully extended; chela nearly naked or with setae on lateral and mesial margins, and scattered setae dorsally. Fingers straight, tips curving inward and terminating in corneous claws; cutting edges each with 2 or 3 large calcareous teeth separated by smaller similar teeth. Palm smooth dorsally, or at
FIG. 4. — *Strobopagurus brevicius* sp. nov., New Caledonia, SMIB 5, stn DW 76, holotype M 6.1 mm (MNHN Pg 7116): A, B, right first (A) and second (B) ambulatory legs, lateral view; C, D, dactyls of same, mesial view (C, first; D, second); E, F, meri of left first (E) and second (F) ambulatory legs, lateral view; G, sternite of sixth thoracic sternite (second ambulatory legs), ventral view. *Strobopagurus gracilipes* (A. Milne-Edwards, 1891), New Caledonia, BIOCAL, stn DW 33, M 3.7 mm (MNHN Pg 7119): H, left first ambulatory leg, lateral view; I, left second ambulatory leg, lateral view. *Strobopagurus sihogae* (de Saint Laurent, 1972), Indonesia, "Siboga" Expedition, stn 12, holotype ov F 7.4 mm (ZMA De103.109): J, left first ambulatory leg, lateral view; K, left second ambulatory leg, lateral view. Scales equal 5 mm (A, B, J, K), 4 mm (c, D), 1 mm (G), and 2 mm (H, I).

most with scattered minute tubercles; dorsomesial margin straight, with irregular rows of small spines or tubercles; dorsolateral margin nearly straight or weakly curved in outline (dorsal view), with irregular row of small blunt spines; ventral surface smooth or with scattered small tubercles. Carpus with longitudinal rows of small setose tubercles on dorsal surface, and row of small spines or tubercles on dorsodistal margin; mesial and lateral surfaces with moderately dense setae, ventral surface often with dense setae. Merus unarmed but with setae on dorsal surface, and often dense setae on ventral
surface. Ischium and coxa each with ventromesial margin setose.

Left cheliped (Fig. 3B) with dense setae on dorsal surfaces of chela and carpus, and ventral surfaces of carpus and merus; frequently iridescent (preserved) on dorsal surface of palm and carpus. Fingers straight, tips curving inwards and terminating in corneous claws; cutting edge of dactyl with comb-like row of small corneous spines, cutting edge of fixed finger with small blunt to sharp calcareous teeth. Palm unarmed but with setae. Carpus with small dorsodistal spine. Merus unarmed except for ventral row of short tufts of setae. Ischium and coxa each with ventromesial margin setose.

Ambulatory legs (Fig. 4A-F) similar from right to left except for slightly shorter meri on left. Dactyl about 1.9-2.2 times as long as propodus, terminating in sharp corneous claw; with dorsodistal row of bristle-like setae; mesial face with median longitudinal row of about 9 minute corneous spines. Propodus with dorsal row of short setae. Carpus with small dorsodistal spine, and dorsal row of short setae. Merus about 2.4 times (first leg) or 1.9 (second leg) as long as high; with dorsal row of short setae; ventrodistal margin armed with irregular rows of small spines (first leg), or unarmed (second leg). Ischium unarmed. Coxa with ventromesial row of setae. Anterior lobe of sixth thoracic sternite (Fig. 4G), with or without small subterminal spine.

Fourth pereopod (Fig. 5A) semichelate. Dactyl subtriangular, longer than dorsal margin of propodus, terminating in corneous claw; with ventrolateral row of corneous spines. Propodus ovate (lateral view), about 1.9 times or more as long as high; rasp consisting of 1 row of ovate scales; ventral margin with long setae.
Fig. 6. — *Strobopagurus brevicaudus* sp. nov., New Caledonia, MUSORSTOM 4; stn DW 226, F 6.4 mm (MNHN Pg 7085), SEM micrographs: A, distal portion of propodus and dactyl of left fifth pereopod, lateral view; B, distal portion of dactyl of same, lateral view. Scales equal 1 mm (A), and 100 µm (B).

Fifth pereopod (Fig. 6) semichelate. Dactyl with small subterminal corneous tooth laterally. Propodal rasp extending to midpoint or more of lateral face of propodus.

Uropods and telson asymmetrical. Telson (Fig. 5B, C) with weak lateral indentations; dorsal surface frequently with scattered, low blister-like tubercles; terminal half divided into 2 distinctly asymmetrical posterior lobes separated by shallow, unarmed U-shaped cleft; terminal margins of posterior lobes armed with row of corneous spines stronger, and curved, on left side; females frequently with several submarginal rows of spines on terminal margin of left posterior lobe (Fig. 5C).

Males first and second gonopods (Fig. 5D, E) as diagnosed for genus; second gonopods sometimes missing rudimentary exopod on left or right gonopod (Fig. 5E).

Coloration in life: Unknown.

Distribution: Western Pacific: New Caledonia region; Fiji; Tonga; Vanuatu; and Solomon Islands. Depth: 150 to 756 m.

Similarities: This new species is most similar to *S. sihogae*. The two can be separated by differences in shape and armature of the right cheliped (chela and carpus), and relative length of the antennal acicles. The mesial and lateral margins of the right chela in *S. brevicaudus* are nearly straight in outline (viewed dorsally), whereas they are arched in all but the largest sized specimens (sl > 8.0 mm) of *S. sihogae*. The dorsomesial and dorsolateral margins of the chela, and the dorsal surface of the carpus are unarmed or have small blunt spines in *S. brevicaudus*, whereas the margins of the chela are strongly spinose, and the carpus has many spines on the dorsal surface in *S. sihogae*. The antennal acicles at most reach to about the distal margins of the corneas in *S. brevicaudus*, whereas the acicles exceed the corneas by 0.2 or more the length of each acicle in *S. sihogae*. Unfortunately the coloration of *S. brevicaudus* is not known, and thus cannot be compared to the distinct color pattern of *S. sihogae*.

*Strobopagurus gracilipes*  
(A. Milne-Edwards, 1891)  
(Figs. 1E; 3C,D; 4H,1; 5F,G; 7, 8 A-D)


*Strobopagurus cf. gracilipes*: Lemaire, 1994: 377, figs. 1, 2; Poupin 1996: 96. (See Remarks).


Types: Syntypes: 1 M 4.1 mm, 1 F 3.6 mm, 1 ov F 3.4 mm, L’Hirondelle stn 198, Azores, 38°26′25″N, 30°59′10″W, 800 m, 25.07.1888 (MO).

Material examined (see also Lemaire, 1990, 1994): Taiwan, TAIWAN 2000: stn CP 20, 22°21′0.0″N, 120°41′2.2″E, 720 m, 28.07.2000: 1 ov F 4.7 mm (NTOU A00011); stn CP 55, 24°26′9.9″S, 122°18′1.1″E.
FIG. 7. — *Strobopagurus gracilipes* (A. Milne-Edwards, 1891), New Caledonia, BIOCAL, stn DW 33, megalopa 1.7 mm (MNHN Pg 7119): A, shield and ocular peduncles; B, right cheliped; C, left cheliped; D, left first ambulatory leg; E, left second ambulatory leg. Scales equal 0.5 mm (A), and 1 mm (B-E).

bifid). Antennal peduncles exceeding distal margin of corneas by slightly more than length of ultimate segments. Antennal peduncles at most exceeding distal margin of corneas by about 0.2 length of ultimate segments; fourth segment usually lacking or occasionally with dorsodistal spine; second segment with dorsolateral distal angle produced, terminating in strong spine, mesial margin with or without small spine at dorsodistal angle; first segment with row of short spines on ventrodistal margin. Antennal acicle exceeding distal margin of corneas by at most 0.2 length of acicle; mesial margin armed with 3-7 small spines on proximal half. Sternite of third maxillipeds usually lacking spines on each side of midline. Right cheliped (Fig. 3C) usually broader and shorter in females than in males; in large males (sl > 4.0 mm) carpus and chela frequently very elongated, each 2.0-2.5 times as long as broad; dactyl with row of small blunt spines on mesial margin proximally; palm unarmed dorsally but with scattered setae, dorsomesial and dorsolateral margins with small blunt or sharp spines; carpus with scattered or numerous small spines or tubercles dorsally. Left cheliped (Fig. 3D) with setae or bristles on dorsal surface of chela, carpus, and merus; dorsal surface of carpus with or without small spines, and small dorsodistal spine. Ambulatory legs (Fig. 4H, I) with meri shorter on left legs than on right legs; merus about 3.6 (first leg) or 2.7 (second leg) times as long high. Fourth pereopod (Fig. 5F) semichelate; dactyl stout, about as long as dorsal margin of propodus; propodus short, about 1.4 times as long as
Fig. 8.— Live coloration. A-D, Strobopagurus gracilipes (A. Milne-Edwards, 1891): A, ov F 5.1 mm, TAIWAN 2003, stn CP 214 (NTOU A00001); B, M 6.0 mm (with abnormal right cheliped), same station (NTOU A00001); C, M 6.1 mm, French Polynesia, BENTHAUS, stn CP 1965 (MNHN Pg 6594); D, ov F 3.8 mm, French Polynesia, BENTHAUS, stn DW 1863 (MNHN Pg 7003). E, Strobopagurus sibogae (de Saint Laurent, 1972): F 6.2 mm, TAIWAN 2003, stn CP 216 (NTOU A0007). Photographs by T.-Y. Chan (A, B, E), and J. Poupin (C, D).
high, often subcircular in outline (lateral view); propodal rasp with 1 row of rounded scales. Anterior lobe of sternite of sixth thoracic sternite (second ambulatory leg) usually unarmored, setose. Uropods strongly asymmetrical, telson (Fig. 5G) weakly so. Terminal half of telson divided into 2 nearly symmetrical, rounded posterior lobes separated by wide U-shaped cleft, and armed with often curved corneous spines.

Coloration in life (Fig. 8A-D): Somewhat variable. Shield and cephalic appendages white or light orange, antennular and antennal peduncles sometimes light red. Chelipeds white or light orange becoming darker distally on carpi, and propodi partially light orange or with light orange stripe; dactyls light orange proximally near propodi, white distally.

Distribution: Eastern Atlantic: from Portugal to Morocco, including the Azores, Canary and Cape Verde Islands. Western, central, and South Pacific: New Caledonia region; Vanuatu; Solomon Islands; Taiwan; Hawaiian Islands; and French Polynesia. Depth: 75 to 1200 m.

Variations: As stated in the diagnosis, the right cheliped in large males of this species can be quite long, and slender. One male examined (Taiwan 2003, stn CP 214, sl 6.0 mm, NTOU A00001) has what appears to be an abnormal right cheliped, similar in size to the left cheliped (Fig. 8B). Small specimens (sl < 2.0 mm), and immature individuals usually have paired, asymmetrical pleopods.

Similarities: This species can be distinguished from the other two congeners, S. sibogae and S. brevicaus sp. nov., primarily by the shape of the propodus and dactyl of the fourth pereopod, the more slender segments (the meri in particular) of the ambulatory legs, and shape of telson. On the fourth pereopod, the propodus is short and subcircular (in lateral view) in S. gracilipes, whereas it is long and ovate in the other two species; the dactyl is stout and short, about as long as the dorsal margin of the propodus in S. gracilipes, whereas the dactyl is elongate, and longer than the dorsal margin of the propodus in the other two congeners. The length/height ratio of the meri of the ambulatory legs varies from 2.7 to 3.6 in S. gracilipes; from 1.9 to 2.4 in S. brevicaus sp. nov.; and from 2.0 to 2.5 in S. sibogae. The terminal half of the telson is divided into nearly symmetrical posterior lobes in S. gracilipes, whereas the lobes are distinctly asymmetrical in the other two congeners. Also, the two species differ in coloration (Fig. 8) of chelipeds and ambulatory legs.

Remarks: Lemaitre (1994) tentatively reported a female specimen from French Polynesia as S. cf. gracilipes. This same specimen has been reported by Poupin (1993) as Strobopagurus cf. sibogae. Reexamination of the specimen has removed any doubts on its identity, and represents S. gracilipes. So far, S. sibogae is not known to occur in French Polynesia.

Zhadan (1997) reported a number of specimens from the ridges of Sala y Gómez, in the southeastern Pacific, as Strobopagurus aff. gracilipes. He found the specimens to be intermediate between S. gracilipes and Bivalvopagurus sinensis. To explain their morphology Zhadan invoked a process of "progressive carcinization" similar to that presumed by Blackstone (1989) for southern and northern populations of Pagurus hirsutiusculus (Dana, 1851) in the eastern Pacific. Zhadan chose to assign his specimens tentatively to S. gracilipes based on the presence of unpaired left third to fifth pleopods. However, the degree of development of right third to fifth pleopods in B. sinensis can vary substantially (pers. obs.), and they can often be small or obscured by tufts of setae. The description and characters depicted by Zhadan (1997) suggest instead that his specimens represent either B. sinensis or perhaps an undescribed species of that currently monotypic genus. It should be pointed out that the concept of carcinization, as traditionally applied to the Paguridae, and Blackstone's (1989) assumption, have both been shown to be erroneous (Crain and McLaughlin, 1993; McLaughlin and Lemaitre, 1997; McLaughlin et al., 2004).

Strobopagurus gracilipes has a broad, disjunct distribution that includes the eastern Atlantic, and western, central and South Pacific. At least two other parapagurids, Paragiopagurus ruticheles (A. Milne-Edwards, 1891) and Sympagurus acinops Lemaitre, 1891, have similar, disjunct distributions (Lemaitre, 1990, unpub. obs.). It is conceivable that such distributions may reflect the existence of cryptic species. However, so far no adult morphological characters have been found that allow separation of Atlantic and Pacific populations of any of these three species.

Two megalopas inhabiting gastropod shells, believed to be of S. gracilipes, were found at BIOCAL station DW 33 (MNHN Pg 7119) along with adults of this species. These megalopas differ from other parapagurid megalopas previously reported.
(see de Saint Laurent-Dechancé, 1964; Lemaître and McLaughlin, 1992; Lemaître, 1997) by the short, broadly subtriangular rostrum (Fig. 7A) with a shallow, median indentation, and the straight dactyls (Fig. 7D, E) of the first and second ambulatory legs, which lack ventromesial spines. In other parapagurid megalopas, the dactyls of the Pereops have a row of ventromesial spines, and are evenly curved; the rostrum is obtusely subtriangular, rounded, more produced anteriorly than in S. gracilipes, and lacks a median indentation. The chelipeds (Fig. 7B, C) of the megalopas of S. gracilipes are smooth, unarmed, similar to those of the megalopa of Sym-pagurus dimorphus (see Lemaître and McLaughlin, 1992). In other characters so far studied, all parapagurid megalopas are nearly identical.

**Strobopagurus sibogae** (de Saint Laurent, 1972)

(Figs. 1F; 3E-H; 4J, K; 5H, I, 8E)

*Parapagurus kilburni* Kelsey, 1973: 285, figs. 1, 2; 1974: 66; 1981: 33. (See Remarks)


*Typos:* Holotype: ov F 7.4 mm, Indonesia, “Siboga” Expedition, stn 12, 07°15'S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.109). Preserved paratypes (see Remarks): China Seas, Fisheries Research Station, Hong Kong, coll. O. T. Chan: M 5.9 mm, Cr. 4/64, stn 146, trawl 227, 285 m, 24.08.1964, (MNHN Pg 2204); M 4.3 mm, Cr. 4/64, T 227, 285 m (MNHN Pg 2206); F 3.6 mm, Cr. 4/64, stn 114, trawl 216, 251-256 m, 22.08.1964 (MNHN Pg 2207); M 8.2 mm, Cr. 1265, stn 65, T 380 (MNHN Pg 2205). 1 F 4.3 mm, Indonesia, Borneo, Sibuko Bay, off Malab Island, Albatactillus stn 5589, 04°12.10'N, 118°38.08'E, 260 m, 29.09.1909 (USNM 169010). 1 F 6.5 mm, (exact locality unknown), Gier no. 12, 07°15'S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.114). Types of *Parapagurus kilburni* Kelsey, 1973: all from off Durban, South Africa, 270 m. (unknown Albatross Expedition, stn 12, 07°15'S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.109). Preserved paratypes: 4 M 6.0-7.5 mm (SAM A13186). Holotype: ov F 7.4 mm, Indonesia, “Siboga” Expedition, stn 12, 07°15'S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.109). Preserved paratypes (see Remarks): China Seas, Fisheries Research Station, Hong Kong, coll. O. T. Chan: M 5.9 mm, Cr. 4/64, stn 146, trawl 227, 285 m, 24.08.1964, (MNHN Pg 2204); M 4.3 mm, Cr. 4/64, T 227, 285 m (MNHN Pg 2206); F 3.6 mm, Cr. 4/64, stn 114, trawl 216, 251-256 m, 22.08.1964 (MNHN Pg 2207); M 8.2 mm, Cr. 1265, stn 65, T 380 (MNHN Pg 2205). 1 F 4.3 mm, Indonesia, Borneo, Sibuko Bay, off Malab Island, Albatactillus stn 5589, 04°12.10'N, 118°38.08'E, 260 m, 29.09.1909 (USNM 169010). 1 F 6.5 mm, (exact locality unknown), Gier no. 12, 07°15'S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.114). Types of *Parapagurus kilburni* Kelsey, 1973: all from off Durban, South Africa, 270 m. (unknown Albatross Expedition, stn 12, 07°15’S, 115°15.6'E, 289 m, 14.03.1899, coll. M. Weber (ZMA De103.109). Preserved paratypes: 4 M 6.0-7.5 mm (SAM A13186).

Diagnosis: Shield (Fig. 1F) convex in lateral view. Rostrum broadly rounded, with short longitudinal dorsal ridge. Ocular peduncles more than half length of shield. Ocular acicles each terminating in strong spine (occasionally bifid). Antennular peduncles exceeding distal margin of corneas by slightly more than length of ultimate segments. Antennal peduncles exceeding distal margin of corneas by about 0.3 or less length of basis segments; second segment with dorso-lateral distal angle produced, terminal in strong spine (occasionally bifid), mesial margin with short, low spines on ventrodorsal margin. Antennal acicles exceeding distal margin of corneas by as much as 0.3 length of acicles; mesial margin armed with 5-7 spines on proximal half. Sternite of third maxillipeds with small spine on each side of midline. Right cheliped (Fig. 3E, G) with chela usually ovate, or oblong in large specimens (sl > 8.0 mm); dactyl with row of spines on mesial margin; palm with dorsal surface covered with short, fine setae not hiding surface beneath; dorsal surface lacking spines or tubercles, and with dorso-mesial and dorso-lateral margins well delimited by row of often strong spines (usually double row on mesial margin); carpus armed with often numerous small spines on dorsal surface. Left cheliped densely setose; carpus with dorso-lateral, and often also dorso-mesial rows of spines. Ambulatory legs with
meri shorter on left side than on right; merus about 2.5 (first leg) or 2.0 (second leg) times as long as dorsoventral height. Fourth pereopod (Fig. 5H) semichelate; dactyl elongate, as long or longer than dorsal margin of propodus; propodus ovate (lateral view), about 1.8 times as long as greatest height; propodal rasp with 1 row of ovate scales. Anterior lobe of sixth thoracic sternite (second ambulatory legs) usually unarmed, setose. Uropods and telson (Fig. 5f) strongly asymmetrical; terminal half of telson divided into 2 rounded, distinctly asymmetrical posterior lobes by broad, U-shaped cleft, and armed with strong, often curved cornaceous spines.

Coloration in life (Fig. 8E): Shield and cephalic appendages mostly white except for light orange antennules. Chelipeds mostly light orange, with white fingertips, dark orange ventrolateral margins of carpi, and dark orange band near dorso distal margin of meri; chelae sometimes mostly white with light orange dorsomesial face. Ambulatory legs white; dactyl light orange proximally; carpi and propodi with dorsolateral and dorsovelventral stripes; meri with dark orange band near dorso distal margin, and light orange proximally fading to white distally.

Distribution: Western Indian Ocean: Mozambique Channel; Madagascar. Western Pacific: Indonesia; Philippines; New Caledonia region; Solomon Islands; Taiwan; China Sea; and Japan. Depth: 40 to 980 m.

Variations: Variations in shape of the right cheliped of S. sibogae are related to size, particularly in males. Most specimens of both sexes have the lateral margins of palm and fixed finger, and the mesial margin of the palm, distinctly arched (Fig. 3E), with chela and carpus each about 1.4 times as long as broad. In contrast, large males (sl > 8.0 mm) have the lateral margins of palm and fixed finger, and mesial margin of palm, nearly straight, with chela and carpus each about 2.1 times longer than broad (Fig. 3G).

Similarities: (See S. breviacus).

Remarks: In the original description of this species by de Saint Laurent (1972: 116) the paratypes were not listed in detail, although it was mentioned that they came from “Indonesia (“Siboga”, and coll. Mortensen), China Sea (F.R.S. Hong Kong), and Japan (coll. K. Sakai).” Thus, it is unclear which were to be considered paratypes. Of the specimens used and labeled by de Saint Laurent, only those listed above under “presumed paratypes” have been located and examined.

Kensley (1973), in his description of Parapagurus kilburni, contrasted his species with Parapagurus gracilipes (A. Milne-Edwards, 1891) (= Strobopagurus gracilipes), and Parapagurus macrocerus Forest, 1955 (= Paragiopagurus macrocerus). Kensley justified his new species on the basis of differences in the antennal acicles, cheliped armature, and telson. It appears that Kensley was unaware of de Saint Laurent’s (1972) description of Parapagurus sibogae (= Strobopagurus sibogae) as he did not mention her taxon or 1972 publication. A comparison of Kensley’s (1973) description and type material of Parapagurus kilburni with Strobopagurus sibogae, has shown that the two are indistinguishable morphologically, and therefore the former must be considered a junior synonym of the latter.

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