

Ray:
Best regards,
J.W. Goy

**A new species of *Stenopus* from Australia,
with a redescription of *Stenopus cyanoscelis*
(Crustacea: Decapoda: Stenopodidea)**

J. W. GOY

Department of Biology, Texas A&M University,
College Station, Texas 77843-3258, USA

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A new species of shrimp in the genus *Stenopus* collected from off Queensland, Australia, is described and figured. Specimens have been collected from two widely separated locations on the Great Barrier Reef, at Heron Island to the south and Wheeler Reef northeast of Townsville. A preliminary diagnosis and colour plate of another *Stenopus* from Australia, *S. cyanoscelis*, was presented by Goy (1984). Recent collections of additional specimens of *S. cyanoscelis* from Indonesia and Kenya allow a detailed redescription of the holotype and morphological variation within the species. Both the new species, *Stenopus chrysexanthus* and *S. cyanoscelis*, are closely related to two Atlantic species, *S. spinosus* and *S. scutellatus*. However, both species are easily distinguished by differences in morphology and colour pattern. A key to the eight described Indo-West Pacific species of *Stenopus* is presented.

KEYWORDS: *Stenopus*, taxonomy, Decapoda, Crustacea, Australia.

Introduction

Collections over several years in the Australasian region of the Indo-Pacific have yielded numerous interesting specimens of new stenopodidean shrimps from deep and shallow water habitats. For the shallow water stenopodideans, colour pattern is an invaluable diagnostic field tool. Throughout the range of a given species the colour patterns are highly consistent, with variations only in the shade and intensity of colour from locality to locality. The discovery of the two new species of *Stenopus* from Australia was facilitated by their distinctive colour patterns.

A preliminary diagnosis and colour plate of one of these new species, *Stenopus cyanoscelis*, was presented by Goy (1984). Additional specimens of *S. cyanoscelis* recently collected from Indonesia and Kenya allow a detailed redescription of the holotype and morphological variation within the species. While examining some unidentified stenopodid material collected from the Great Barrier Reef, two specimens of the other new species, *Stenopus chrysexanthus*, were found.

Specimens of *Stenopus cyanoscelis* Goy, 1984 have been collected from Broadhurst Reef, off Townsville, Australia; Pulau Dapur and Pulau Ubi, off Djakarta, Java; and off Kilifi, Kenya. This species also has been photographed off Manila, Philippines and off Singapore. Monod (1976) identified a specimen from Nouméa, New Caledonia as *Stenopus tenuirostris* DeMan, 1888, but it is more likely *S. cyanoscelis* based on the colour pattern given by Monod. Specimens of *S. chrysexanthus* sp. nov. have been collected from two locations on the Great Barrier Reef, Heron Island and Wheeler

Reef. The two species are closely related to two Atlantic species, *S. spinosus* and *S. scutellatus*, but both are easily distinguished by numerous morphological differences, as well as striking differences in colouration. Specimens treated herein are deposited in the Northern Territory Museum of Arts and Sciences (NTM), Darwin, Australia; the Australian Museum (AM), Sydney, Australia; the Senckenberg Museum (SMF), Frankfurt, Germany; and the National Museum of Natural History (USNM), Washington, DC, USA.

Stenopus chrysexanthus sp. nov.

(Figs 1-4)

Material examined. Australia: Queensland, Heron Island, Capricorn Group, circa 23°25'S lat., 151°55'E long., southwest reef flat, algal crest, coral/coral rubble, poison station, M. Bruce coll., 6 September 1980, NTM CR006548, male (HOLOTYPE).

Wheeler Reef, northeast of Townsville, circa 19°00'S lat., 147°30'E long., west side of reef, under fallen plate coral, depth 18 m, I. Loch coll., 11 December 1977, AM-P26831 female (PARATYPE).

Diagnosis. Small stenopodid shrimp, body subcylindrical, densely covered with spinous processes; first two pairs of pereiopods with slightly inflated chelae; no basal spines on dorsal surface of telson, lateral margins of telson with 3 or 4 strong spines; spinules of last 3 abdominal somites arranged in distinct transverse rows; elongate, flattened labrum; body and appendages generally golden yellow; rostrum red, dorsolateral red spots on abdominal somites third pereiopods banded in red and golden-yellow.

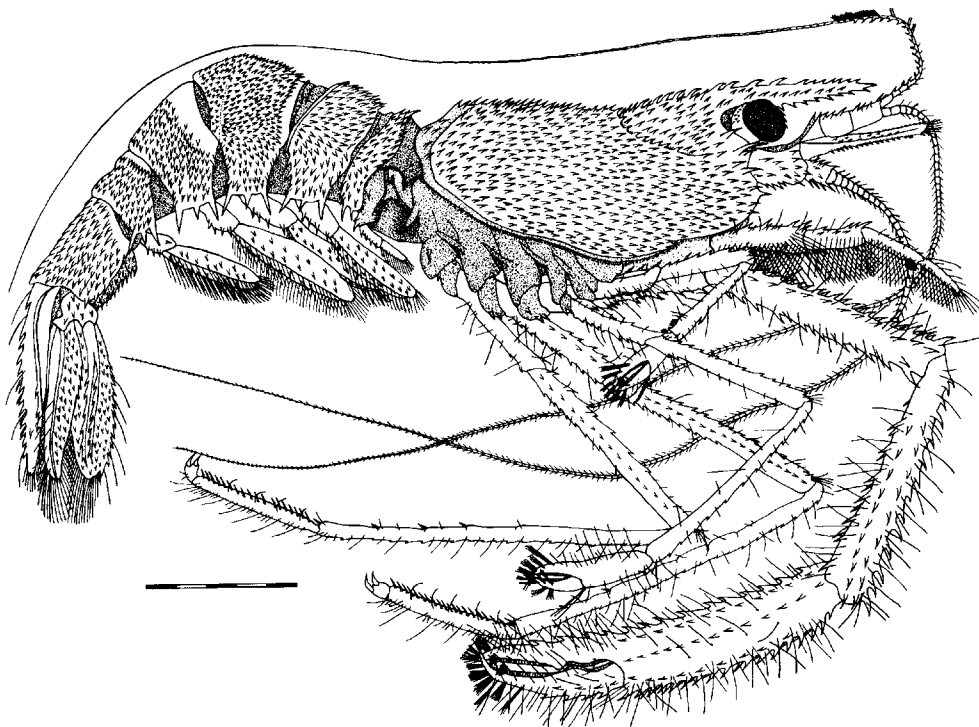


FIG. 1. *Stenopus chrysexanthus*, holotype, male. Increments of scale in mm.

Description. HOLOTYPE: (male, NTM CR006548). Rostrum (Figs 1, 2 A) broad at base, tapering and compressed anteriorly; not extending past last peduncular segment of antennule; dorsal margin with 11 spines, distal spine not reaching tip. Ventral margin with 8 spines. Lateral margins with row of 11 strong spines, 3 smaller proximal spines, carinae poorly developed.

Carapace (Figs 1, 2 A) densely covered with spinules not noticeably elongated, not in distinct longitudinal rows. Cervical groove distinct with 28 spines along posterior margin. Orbit without supraorbital spine; inferior orbital angle bearing large spine. Large antennal spine present, smaller spine directly below; small hepatic spine at lower end of cervical groove. Large branchiostegal, 3 smaller pterygostomial spines present. Ventrolateral angle somewhat rounded, only slightly produced anteriorly running into 2-spined notch; posterolateral angle of branchiostegite obtuse, posterior angle strongly thickened.

First 3 abdominal somites (Figs 1, 2 B) with forwardly directed spinules similar to those on carapace. Spinous region of first abdominal somite dorsally and laterally about 0.33 breadth of same region of second somite. Pleuron of first somite ending in 1 weak, 1 strong forwardly curved teeth; pleura of second to fifth somites truncate, each ventrolateral margin with 3 teeth. Third somite broadly produced, with narrow dorsal bare shield-shaped area bearing 3 or 4 lateral lobes. Fourth somite with large area of anterior and medial regions lacking spinules. Last 3 somites with distodorsal spinules depressed and posterolaterally directed, arranged in transverse rows. Sixth somite with somewhat convex posterior margin bearing 8 strong spines overlapping base of telson. Abdominal somites 1–5 bearing strong median ventral spine, those of somites 1–3 directed anteriorly, those of somites 4 and 5 directed posteriorly; ventral surface of sixth somite densely covered with short spinules.

Eyes (Fig. 2 A) well developed, with narrow peduncle slightly longer than cornea. Ophthalmic peduncle dorsally and medially with numerous small spinules; those on line separating cornea from stalk longest, curved over cornea, reaching about midpoint.

Telson (Fig. 2 C) lanceolate, with median groove flanked by 2 distinct longitudinal carinae. Outer margins of carinae with 8 strong, posteriorly directed spines, last spine overlapping rounded posterior margin of telson; inner margins with row of 4 weaker spines in anterior half. Dorsal surfaces of carinae with row of 7 spines having large gap between anterior 4 and posterior 3; another spine inside of row anteriorly. Two long plumose setae medially at base of telson; 4 long plumose setae on outer margins of carinae. Lateral margins of telson with 3 strong spines, somewhat equally spaced and extending to about anterior 0.33 to 0.5; also with plumose setae along posterior 0.75.

Uropods (Fig. 2 D) well developed with endopodite slightly longer than telson and slightly narrower, shorter than exopodite. Basal segment with 9 or 10 dorsomesial spinules. Exopodite bearing 12 acute teeth, 11 short plumose setae on outer margin; dorsal surface with 2 unarmed longitudinal carinae, numerous spinules arranged in somewhat transverse rows; ventral surface also with numerous spinules. Outer proximal margin of endopodite bearing 5 teeth; dorsal surface bearing distinct unarmed median ridge with transverse rows of outer spinules, inner row of 6 plumose setae; ventral surface without spinules. Unarmed margins of exopodites, endopodites with long plumose setae.

Epistome (Fig. 2 E) triangular anteriorly with 2 long slender submedian spines adjacent to small rounded point. Two pairs of smaller spines present laterally; labrum elongated, flattened anteriorly. Paragnath moderately bilobed, lobes separated by

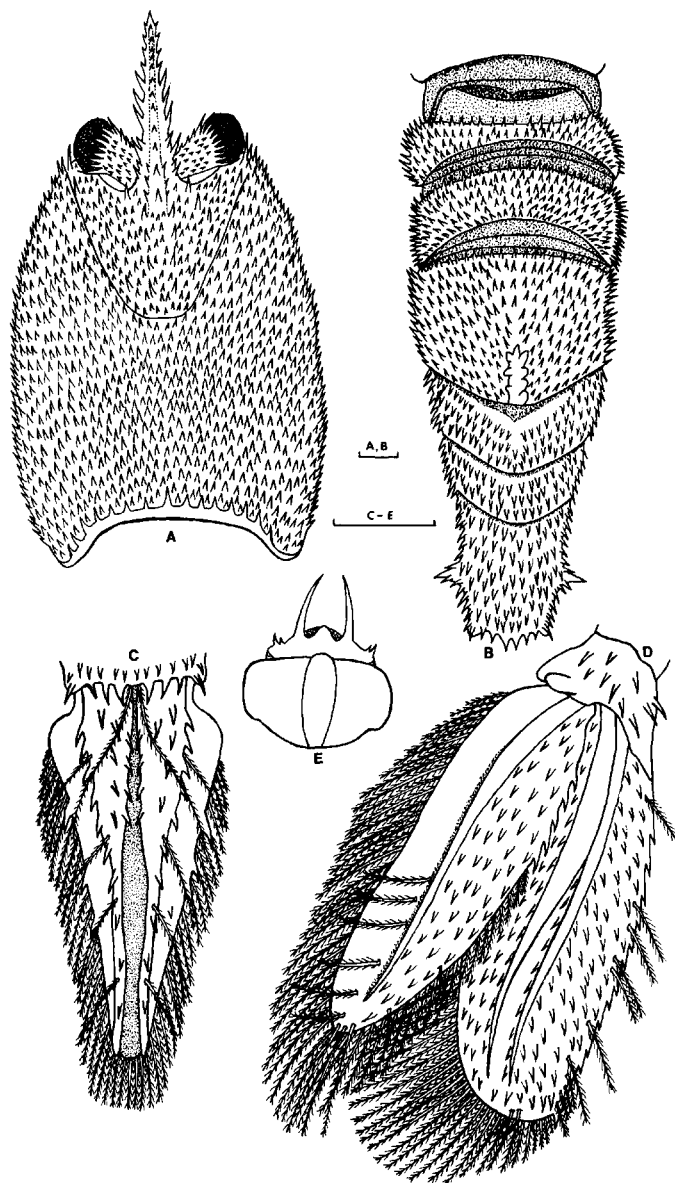


FIG. 2. *Stenopus chrysexanthus*, holotype, male: A, Carapace, dorsal view; B, abdominal somites, dorsal view; C, telson; D, uropods; E, epistome and labrum, ventral view. Scale bars represent 1.0 mm.

small median fissure, bordered by short setae. Thoracic sternites narrow, submedian spinules increasing posteriorly as follows: 4 on segment 4; 6 on segment 5; 8 on segment 6; 10 on segment 7; and 12 on segment 8.

Antennular peduncle (Fig. 3 A, B) moderately long, extending slightly past middle of scaphocerite. Basal segment slightly longer than middle segment, twice as long as distal segment. Basal segment twice as long as wide without rectangular process on inner proximodorsal margin; small, acute stylocerite on outer margin; inner dis-todorsal angle produced into prolonged ridge terminating in 5 strong spines, 6 small

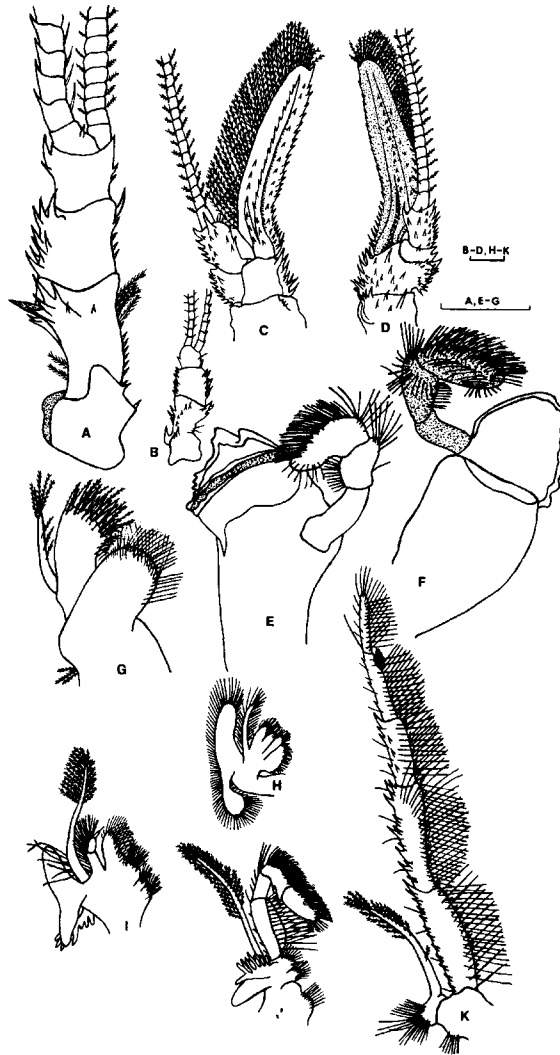


FIG. 3. *Stenopus chrysexanthus*, holotype, male: A, Left antennule and antennular peduncle, ventrolateral view; B, left antennular peduncle, dorsal view; C, antenna and scaphocerite, dorsal view; D, antenna and scaphocerite, ventral view; E, right mandible, ventral view; F, left mandible, dorsal view; G, maxillule; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped. Scale bars represent 1.0 mm. Setules not shown on all setae, for clarity.

dorsomedial spines in semicircular row; interior ventral angle with 3 strong spines. Middle segment with numerous spines on dorsal and ventral margins; distal segment with weak ventral and strong dorsal spines. Upper flagellum well developed, first 17 articles with dorsal spines, first 8 articles with spinous ventral setae; 28 aesthetascs, 2 on articles 10, 11, 13 and 19, 5 on articles 15, 16, 17, 18 and 20. Lower flagellum almost same strength as upper with delicate short plumose setae along entire length.

Antenna (Fig. 3 C, D) with stout basicerite; peduncular segments with numerous spines of different sizes. Antennal flagellum well developed with delicate short plumose setae along entire length; extending beyond tip of telson. Scaphocerite well developed, reaching about 0.5 times beyond tip of rostrum. Outer margin moderately concave

proximally with 8 spines; distal part bearing 15 teeth, followed by short non-serrate distance to final tooth. Dorsal surface with 2 distinct longitudinal carinae; inner carina with 3 proximodorsal spines, 14 distal spines on outer margin, extending nearly to distal margin; outer carina short, less than 0.25 length of inner carina, bearing 4 spines. Short row of 3 spines above outer carina, longitudinal row of 15 spines outside inner carina. Inner margin with long plumose setae. Ventral surface with 2 longitudinal rows of 7, 12 spines.

Mandibles (Fig. 3 E, F) robust with short, fused molar and incisor processes. Molar surface nearly smooth, incisor bearing 4 small, rounded teeth medially, 2 large, rounded lateral teeth. Palp well developed, 3-segmented. Proximal segment longest; middle segment with numerous setae distolaterally and medially; distal segment elongate, tapering distally, densely setose laterally and distally.

Maxillule (Fig. 3 G) with slender, undivided endopodite bearing 4 distal, 3 mesiolateral plumose setae. Proximal endite broad, truncate distally, with numerous distal compound spinose and plumose setae. Distal endite of equal size, rounded distally, bearing numerous plumose setae along most of margin.

Maxilla (Fig. 3 H) with numerous plumose setae on both lobes of coxal and basal endites, proximal coxal endite broadest. Endopodite long, slender, exceeding anterior margin of scaphognathite, with 11 lateral, 7 distal, and 9 inner marginal plumose setae. Scaphognathite long, narrow, about 4.0 times longer than maximum breadth with numerous plumose setae along margin.

First maxilliped (Fig. 3 I) with 3-segmented endopodite. Proximal segment longer than broad, with 10 long plumose setae laterally along outer margin. Middle segment about 0.5 length of proximal segment with 18 long plumose setae along outer margin. Distal segment slender, tapering, slightly less than 0.5 length of middle segment, with minute simple terminal seta. Basipodite large, acutely rounded anterior, concave middle, and rounded posterior, bearing dense fringe of long setae. Coxopodite bilobed, each lobe bearing numerous short setae. Exopodite well developed, flagellum with 7 long simple proximal setae, 20 long plumose distolateral setae. Large epipod with slender proximal and distal lobes approximately equal in length.

Second maxilliped (Fig. 3 J) with 4-jointed endopodite. Dactylus suboval, longer than broad, with dense fringe of short setae along distodorsal margin. Propodus equal to dactylar length, densely setose on dorsal margin, ventral margin bearing acute proximal tooth. Carpus short, narrow, almost as long as propodus, with 3 long simple setae at distodorsal angle, 3 short simple setae on dorsal margin. Merus about 2.0 times dactylar length, 2.5 times longer than broad, dorsal margin with 5 short simple setae, ventral margin slightly convex with fringe of numerous long simple setae. Ischium and basis fused, but distinguishable as densely setose lobes; coxa lobate with dense fringe of mesial setae. Exopodite long, slender, undivided with distal 0.5 bearing 31 plumose setae. Small, elongate epipod present; arthrobranch and podobranch also present.

Third maxilliped (Fig. 3 K) endopodite strongly developed, 5-segmented, with coxa and basis fused. Dactylus slender, tapering, about 4.0 times longer than basal width, 5 simple setae on outer margin, numerous long simple setae mesially and on inner margin. Propodus slightly longer than dactylus, about 6.0 times longer than broad, bearing 3 small spines, 4 simple setae on outer margin; setiferous organ distally, numerous long simple setae on inner margin. Carpus equal to propodal length, 3.0 times longer than broad, with 4 spines, 3 setae on outer margin; 3 spines submesiad; 4 small spines, numerous long simple setae on inner margin. Merus long, slender, about 1.5 times longer than carpal length, with 5 dorsal, 6 subdorsal spines, 4 long setae on

outer margin; 8 small spines, dense fringe of long setae on inner margin. Ischium long, slender, equal to meral length, with 12 subdorsal spines, 4 setae on outer margin; 10 small spines, dense fringe of long setae on inner margin. Basis and coxa fused, indistinguishable; laterally well-developed exopodite slightly longer than ischium, with prominent proximodorsal knob bearing dense fringe of long simple setae, plumose seta at ventral midline, 17 plumose setae on distal 0.5; also laterally small, elongate epipod.

First pereopod (Fig. 4 A) small, slender, when stretched almost reaching middle of scaphocerite. Palm of chela slightly inflated, dactylus less than 0.5 propodal length. Fingers compressed with somewhat hooked tips. Cutting edges distinct, both propodus and dactylus bearing 12 small, stout, peg-like teeth separated by rectangular chitinous lamellae. Dactylus with few simple setae, tufts of longer setae around distal part; propodus with few scattered short simple setae, tuft of long setae on distodorsal extremity, tufts of long setae around distoventral area. Distoventral carpus and proximoventral propodus with setiferous organ. Carpus longest segment, about 0.25 times longer than propodus, narrowing proximally, bearing scattered long and short simple setae, with 4 small proximal spines, larger distal spine on outer margin. Merus almost equal to carpal length, with 7 acute spines, 3 distal setae on outer margin, few simple setae on inner margin. Ischium slightly shorter than propodus, with 5 small spines on inner margin, few long and short simple setae. Basis and coxa short, unarmed, laterally small elongate epipod.

Second pereopod (Fig. 4 B) similar to first, but longer and stronger. No setiferous organ present. Palm of chela slightly inflated, dactylus less than 0.5 propodal length. Finger-tips hooked, dactylar cutting edge with rounded proximal tooth that fits into opposite propodal notch, both edges with 18 small, stout, peg-like teeth separated by rectangular chitinous lamellae. Fingers and distodorsal extremity of palm bearing small tufts of long setae; numerous scattered long and short simple setae on propodus. Carpus about 2.0 times propodal length, slightly longer than merus, bearing 11 small dorsal spines, few scattered long and short simple setae on margins. Merus about 1.5 times ischial length, with 10 small dorsal, 2 small proximoventral spines, 4 long distal setae on outer margin, few scattered setae on margins. Ischium with 3 spines, few short setae on dorsal margin, 6 spines, few long setae on ventral margin. Basis short, with 2 small ventral spines. Coxa short, unarmed, bearing small elongate epipod.

Third pereopod (Fig. 4 C) largest and strongest; longer than entire length of body, extending beyond scaphocerite by 0.25 length of merus and length of carpus and chela. Palm of chela longest segment, with dorsal row of 17 strong forwardly curved spines above less distinct row of 15 smaller spines on outer side; dorsal surface of propodus with 3 rows of 9, 13, 13 spines; ventral surface with 3 rows of 13, 11, 15 spines; ventral margin bearing 14 strong forwardly curved spines. Between dorsal, ventral marginal spines numerous long simple setae. Fingers elongate, with sharp hooked crossing tips, distally bearing small tufts of long setae. Dactylus bearing 4 dorsal acute spines, 4 smaller spines dorsomesially at proximal end, numerous long simple setae. Dactylar cutting edge with proximal chitinous ridge, large rounded tooth merging into row of 18 small, stout, peg-like teeth separated by rectangular chitinous lamellae. Cutting edge of propodus with proximal chitinous ridge bearing 2 large blunt teeth opposing rounded dactylar tooth, also distally bearing 18 peg-like teeth separated by chitinous lamellae. Carpus about 0.33 times shorter than propodus narrowing gradually proximally. Dorsal margin bearing 14 large spines increasing in size distally; ventral margin with row of 7 large spines above row of 7 smaller spines on outer border; dorsal surface with 2 rows of 9, 11 spines; ventral surface with 3 rows of 9, 11, 13 spines; scattered long setae

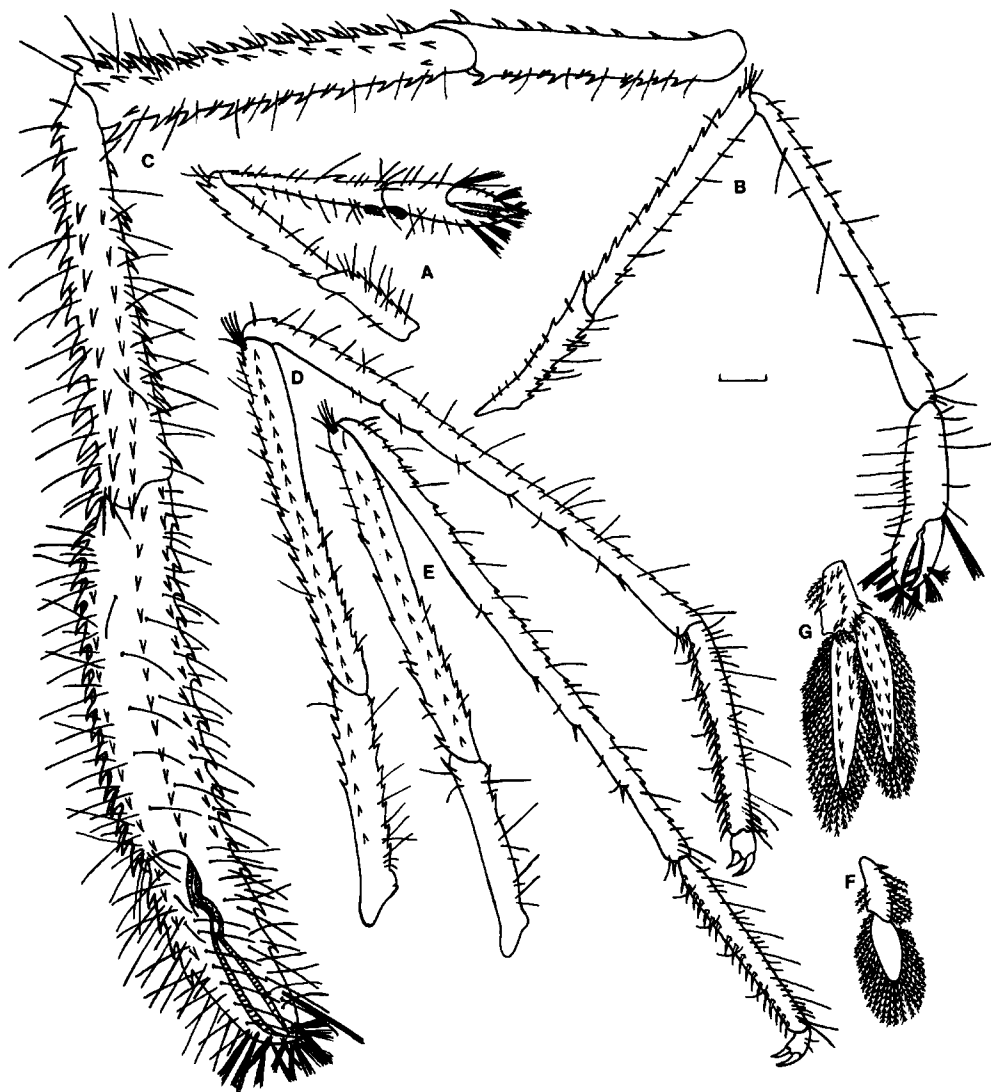


FIG. 4. *Stenopus chrysexanthus*, holotype, male: A, First pereiopod; B, second pereiopod; C, third pereiopod; D, fourth pereiopod; E, fifth pereiopod; F, first pleopod; G, second pleopod. Scale bar represents 1.0 mm.

on margins. Merus narrow, equal to carpal length with 12 large spines on dorsal margin above row of 11 smaller spines on outer border; 10 large spines on ventral margin, 5 ventromesial spines overlapping ventral margin; dorsal surface with row of 12 spines, small proximal, small distal spines; ventral surface with 3 rows of 6, 11, 14 spines; few scattered long setae on margins. Ischium short, about 0.5 propodal length with 9 spines on dorsolateral margin, 12 spines, few long setae on ventral margin. Basis short with 3 ventral spines. Coxa small, unarmed, bearing small elongate epipod.

Fourth and fifth pereiopods (Figs 4 D, E) long, slender, very similar. Dactylus of fourth biunguiculate with curved unguis slightly longer than curved accessory spine, both clearly separated from robust dactylar corpus. Propodus undivided, with 20 or 21 movable ventral spines, 5 long ventral setae, numerous long and short setae dorsally.

Carpus longest segment, about 2.5 times propodal length, indistinctly subdivided into 7 segments; dorsal margin with 15–20 small blunt spines, few long and short setae; ventrally few short marginal setae, distal third with 2 acute movable spines, also 2 acute movable spines at distoventral extremity. Merus long, 2.0 times propodal length; 14–16 small spines, few long setae dorsally, 4 long setae at distodorsal extremity; dorsomesial row of 10–20 spines, ventromesially 2 small spines; proximal ventral margin with 10 or 11 small spines, few short setae. Ischium equal propodal length, with 4 or 5 acute spines on dorsal margin; dorsomesial row of 4 spines on one fourth pereopod, absent on other; ventromesially 2 small spines on one fourth pereopod, absent on other; ventral margin with 7 or 8 spines, few long setae. Basis with 2 small ventral spines; coxa unarmed, bearing small elongate epipod. Fifth pereopod with dactylus similar to fourth, corpus more slender with 2 short dorsal setae. Propodus undivided with 18 or 19 movable ventral spines, 4 long ventral setae, numerous long and short setae dorsally. Carpus 2.5 times propodal length, indistinctly subdivided into 5 segments; dorsal margin with 17 small acute spines, few long and short setae; ventrally few short setae, distal 0.5 with 3 acute movable spines, also 1 or 2 acute movable spines at distoventral extremity. Merus 2.0 times propodal length; 7–15 small spines, few long setae dorsally, 4 long setae at distodorsal extremity; dorsomesial row of 13 or 14 spines; proximal ventral margin with 6 or 7 small spines, few short setae. Ischium slightly shorter than propodus, with 1 or 2 large distodorsal spines, ventral margin with 2–6 small spines, few long and short setae. Basis with ventral spine; coxa with ventromesial spine.

First pleopod (Fig. 4 F) uniramous, second (Fig. 4 G) to fifth biramous, all lacking appendices. First pleopod smallest, with exopodite equal in length to basipodite. External margin of basipodite with 4 spines, long plumose setae; dorsal margin with 3 distal long plumose setae. Exopodite lanceolate, with long plumose marginal setae. Rami of second pleopod more than 2.0 times length of basipodite. External margin of basipodite with distal spine, 8 spines on ventral surface, 3 proximal plumose setae and medial spine on internal margin. Ventral surface of exopodite bearing 2 rows of 8 acute spines, numerous long plumose marginal setae; that of endopodite with 2 rows of 3, 7 acute spines, numerous long plumose marginal setae. Third to fifth pleopod generally similar, decreasing in size and spination posteriorly.

Measurements (in mm). Postorbital carapace length, 7.5 (7.7). Rostral carapace length, 10.7 (11.5). Total length, approx. 28.2 (26.5). Length of third pereopod, 30.0 (30.5). Numbers in parentheses represent measurements of the paratype.

Colouration. Carapace, eyestalks, antennular and antennal peduncles golden yellow. Antennal scale yellow with numerous contracted red chromatophores; antennular and antennal flagella opaque white. Rostrum deep red in distal 0.75, proximal 0.25 golden yellow. Third pereopods banded as follows; coxa, basis, ishium golden yellow; proximal 0.5 of merus golden yellow, middle 0.25 with red band, distal 0.25 golden yellow; proximal 0.33 of carpus with narrow golden yellow band, short red band, short golden yellow band, middle 0.33 red band, distal 0.33 golden yellow; propodus with narrow band of golden yellow, short red band in proximal 0.33, long golden yellow band, short red band in middle 0.33, distal 0.33 of propodus and all of dactylus white. Rest of pereopods, third maxillipeds and mouthparts entirely golden yellow. Abdominal somites generally golden yellow with large dorsolateral red spots on second, third, posterior 0.5 of fourth somites; entire dorsolateral surface of fifth, and

Table 1. Branchial formula of *S. chrysexanthus*.

	Maxillipeds			Pereiopods				
	I	II	III	I	II	III	IV	V
Pleurobranchs	—	—	1	1	1	1	1	1
Arthrobranchs	1	1	2	2	2	2	2	—
Podobranchs	—	1	—	—	—	—	—	—
Epipods	1	1	1	1	1	1	1	—
Exopods	1	1	1	—	—	—	—	—

anterior 0.33 of sixth somite red. Telson with spined carinae red fading to orange red on proximal 0.75, distal 0.25 white. Uropods with orange carinae, rest golden yellow, tips white. Pleopods golden yellow. Colour notes accompanying paratype state carapace is a brilliant yellow.

PARATYPE. Female paratype generally similar to holotype, but differing in the following respects. The rostrum has 8 dorsal, 8 ventral, and 2 lateral rows of 3, 8 teeth. The telson has 3 lateral teeth on the right side and 4 teeth on the left side. There are 10 or 11 outer marginal teeth on the uropodal exopodites. The mouthparts show minor differences in spination. The thoracic sternites are broader and unarmed. There are no ventral spines present on the abdominal somites. The first pleopod is not shorter relative to the rest of the pleopods and the rami of all the pleopods are much broader.

Type locality. Heron Island, Queensland, Australia.

Habitat. Both specimens were collected along the Great Barrier Reef system. The holotype was collected amongst coral rubble on the algal crest of the reef flat, while the paratype was found under a fallen plate coral. The paratype was collected at a depth of 18 m, deeper than the shallow reef flat collection site of the holotype. The new species has long, prominent white antennal flagella, and even though it was not found in association with any fishes, it may enter into cleaning symbiosis with cooperating fishes, much like its congeners in the genus *Stenopus*.

Etymology. The specific name is derived from the two Greek words 'chryseos' meaning golden and 'xanthos' meaning yellow; it is given because of the distinctive body coloration of the living animal.

***Stenopus cyanoscelis* Goy, 1984**

(Figs 5–8)

Stenopus tenuirostris Monod, 1976, p. 7, fig. 49.

Stenopus cyanoscelis Goy, 1984, p. 116, colour plate p. 17.

Stenopus cyanoscelis Santos, 1985, p. 52, colour figure.

Material examined. Australia: Queensland, Broadhurst Reef, off Townsville, approx. 19°14'S lat., 147°33'E long., under plate of branching coral on sandy bottom, depth 9–12 m, D. Young coll., late 1975, AM-P25367, male (HOLOTYPE), female (ALLOTYPE). Indonesia: Java: Pulau Ubi, Bay of Djakarta, circa 06°08'S lat.,

106°45'E long., 16–18 January 1986, USNM 237732, male and female; reef off Pulau Dapur, 05°55'S lat., 106°43'E long., 18–20 January 1986, USNM 237731, male and female. Kenya: off Kilifi, shallow coral banks, 11–12 March 1989, SMF (uncatalogued), male and female.

Diagnosis. Small stenopodid shrimp, with slender, compressed body; densely covered with spinous processes; rostrum long, slender, bright red with 6–13 dorsal and ventral teeth, 2 rows of 2–10 lateral teeth; carapace with distinct cervical groove, groove separating hepatic and antennal regions, and long groove across branchial region; abdominal somites with numerous spinules, fourth somite with medial bare area shaped like a tau cross and edged with squamous spinules; telson median longitudinal carinae with 3 rows of spines; background colour yellow, most marked anteriorly; abdominal pleura yellow, abdomen dorsally red, heavily marked with white and black; caudal fan red and white; proximal parts of antennae, third maxillipeds and pereopods blue, except third pereopods with only ischium and proximal merus blue, rest banded in red, yellow and white.

Description. HOLOTYPE (male, AM-P25267). Rostrum (Figs 5, 6 A) long, extending past last antennular peduncle segment by 0.25 its length. Dorsal margin with 10 spines, distal spine little more than its length from tip, this space occupied by 2 stout setae. Ventral margin slightly concave proximally, with 10 spines distally. Lateral margins with 2 rows of 5–8 spines, carinae well developed.

Carapace (Figs 5, 6 A) densely covered with spinules, not in distinct longitudinal rows. Cervical groove distinct with 16 spines along upper margin. Distinct groove separating hepatic and antennal regions, long groove across branchial region extending to posterior margin. Orbit with large supraorbital and infraorbital spines. Large antennal spine present, moderate hepatic spine at base of cervical groove, large branchiostegal spine and 2 large spines shaped like fork below antennal peduncle, followed by 3 smaller spines at anterolateral margin, 4 small pterygostomial spines also present. Ventrolateral angle rounded, only slightly produced anteriorly, posterolateral angle of branchiostegite somewhat rounded.

First 3 abdominal somites (Figs 5, 6 B) with forwardly directed spinules similar to those on carapace. Spinous region of first abdominal somite dorsally and laterally about 0.5 breadth of same region of second somite. Pleura of first somite ending in 2 strong obliquely directed posterior spines; pleura of second to fifth somite truncate, ventrolateral margins ending in 2 strong spines, median blunt rounded process on second and third somites; 3 strong spines on fourth and fifth somites. Third somite broadly produced, with narrow dorsal bare shield-shaped area bearing 5 or 6 lateral lobes posteriorly merging into multilobed edge, spines anteriolaterally directed. Fourth somite with large medial bare area shaped like tau cross, edged with large squamous spinules. Last 3 somites with distolateral spinules depressed and posterolaterally directed, arranged in somewhat transverse rows. Posterior margin of sixth somite with small median spine. Each abdominal somite bearing strong ventral median spine; ventral surface of sixth somite densely covered with spinules.

Eyes (Fig. 6 A) well developed, with cornea nearly equal to peduncular length. Ophthalmic peduncle dorsally and medially with numerous small spinules; those on line separating cornea from stalk longest, curved over cornea, reaching almost to edge.

Telson (Fig. 6 C) lanceolate, equal in length to sixth abdominal somite, with median groove flanked by 2 distinct longitudinal carinae. Outer margins of carinae with 10

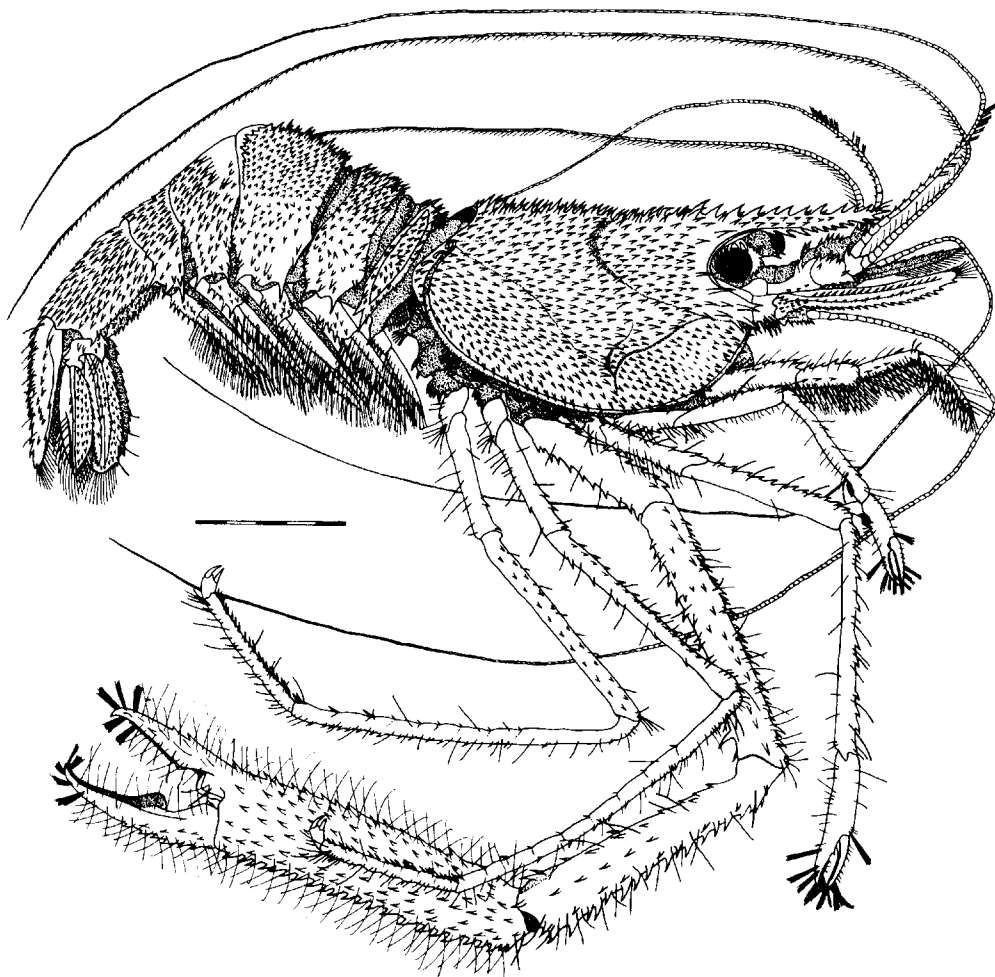


FIG. 5. *Stenopus cyanoscelis*, holotype, male. Increments of scale in mm.

strong, posteriorly directed spines, last spine overlapping rounded posterior margin of telson, 6 long plumose setae also present; row of 6 spines below outer marginal spines, 2 small spines outside each carina in posterior 0.5. Dorsal surface of carinae with row of 6–8 spines, 2 spines outside rows anteriorly. Inner margins of carinae begin with large spine at base of telson bearing long plumose seta medially, followed by row of 12 smaller spines. Lateral margins with strong spine about midway, provided with plumose setae along posterior 0.66.

Uropods (Fig. 6D) well developed with endopodite not exceeding telsonal tip, slightly narrower than exopodite. Basal segment with 8 or 9 dorsomesial spinules. Exopodite bearing 10–13 acute teeth, 8 or 9 long plumose setae on outer margin. Dorsal surface with 2 longitudinal carinae; transverse rows of numerous spinules outside external carina, fewer spinules outside internal carina and tip of exopodite. External carina bears 12–14 outer, 5 or 6 dorsal, 4 or 5 inner spinules; internal carina bears 5–7 outer, 2 or 3 dorsal, 10 or 11 inner spinules. Ventral surface densely covered with somewhat transverse rows of spinules. Outer proximal margin of endopodite

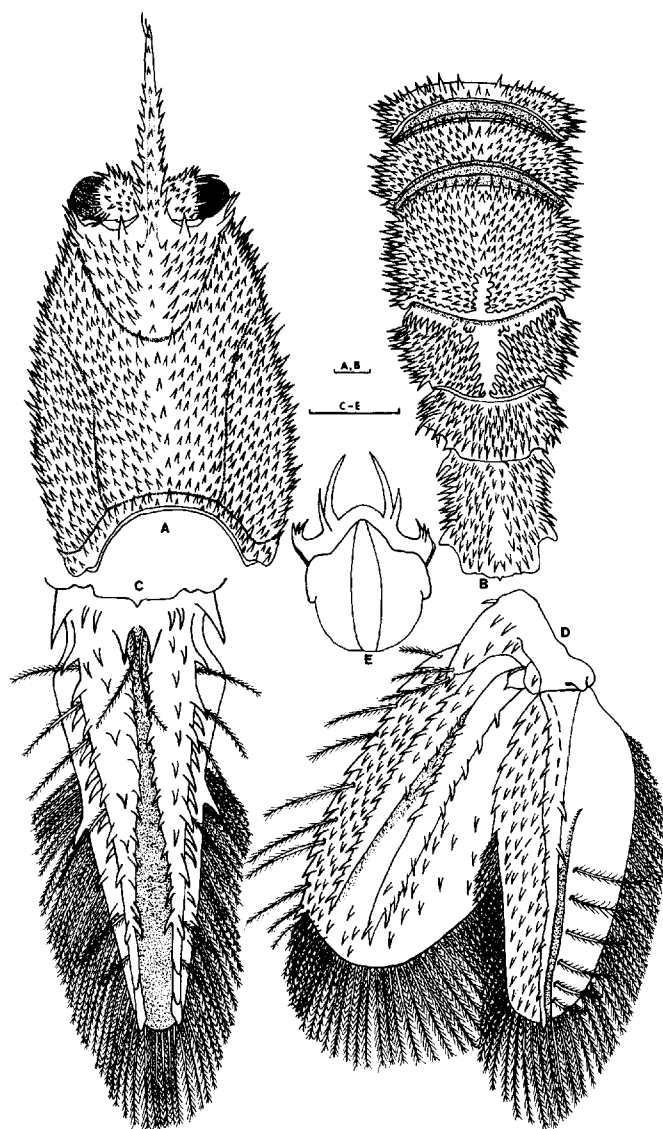


FIG. 6. *Stenopus cyanoscelis*, holotype, male: A, Carapace, dorsal view; B, abdominal somites, dorsal view; C, telson; D, uropods; E, epistome and labrum, ventral view. Scale bars represent 1.0 mm.

bearing 6 teeth. Dorsal surface bearing distinct median ridge with 11, 2 spines on outer and inner margins respectively, outside ridge numerous spinules in transverse rows, inside ridge row of 6 plumose setae; ventral surface with few scattered spinules. Unarmed margins of exopodite, endopodite with long plumose setae.

Epistome (Fig. 6 E) triangular anteriorly, with 2 long submedian spines, 2 shorter intermediate spines and 3 small spines laterally; labrum normally developed. Paragnath bilobed with lobes separated by median fissure, bordered by short setae. Thoracic sternites narrow, with 2, 4, 6, 8, 10 submedian spinules on segments 4 to 8 respectively.

Antennular peduncle (Fig. 7 A, B) short, extending to less than 0.5 of scaphocerite. Basal segment slightly longer than middle segment, 2.0 times as long as distal segment. Basal segment 2.0 times as long as broad, with short rectangular process on inner proximodorsal margin; small, acute stylocerite on outer margin; inner distodorsal angle produced into prolonged ridge bearing 4 strong spines, numerous plumose setae.

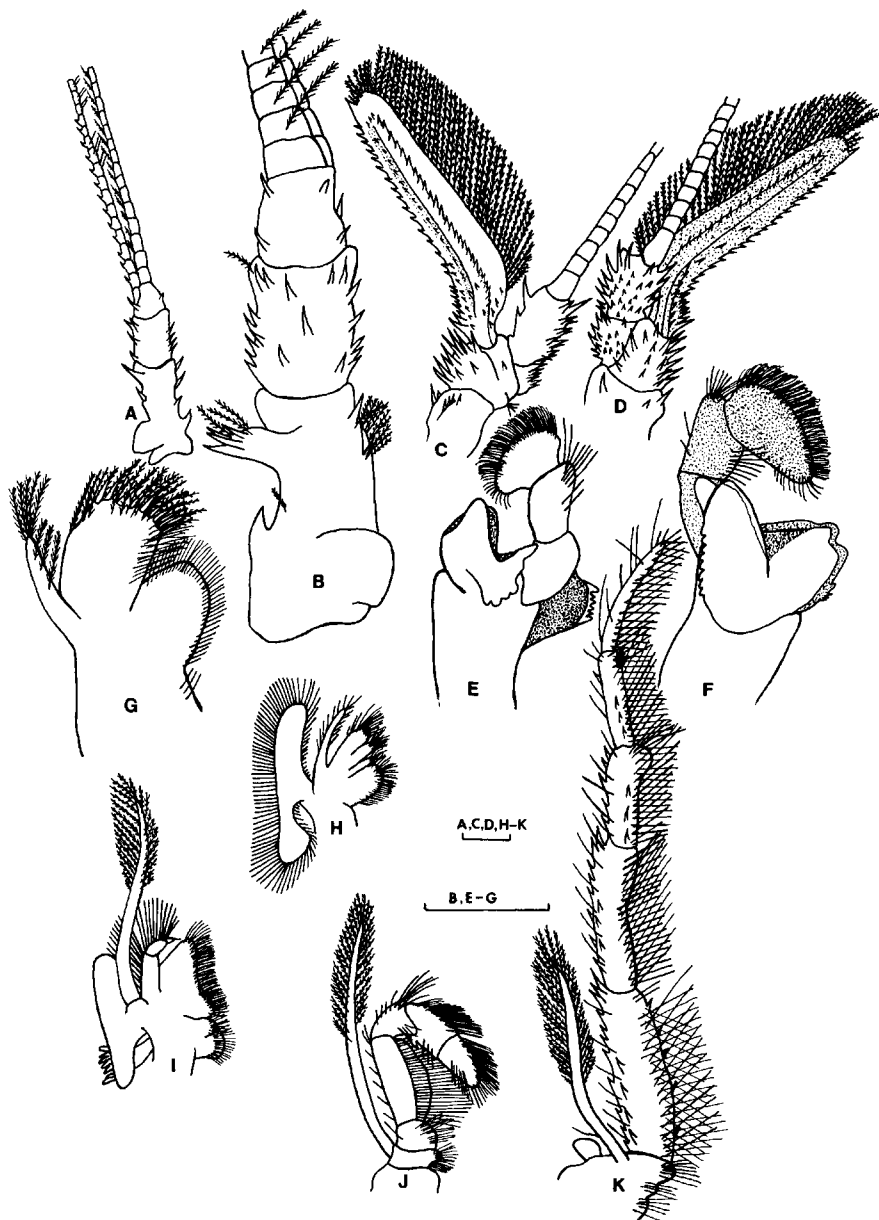


FIG. 7. *Stenopus cyanoscelis*, holotype, male: A, Left antennule and antennular peduncle, ventral view; B, left antennular peduncle, dorsolateral view; C, antenna and scaphocerite, dorsal view; D, antenna and scaphocerite, ventral view; E, right mandible, ventral view; F, left mandible, dorsal view; G, maxillule; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped. Scale bars represent 1.0 mm. Setules not shown on all setae, for clarity.

Middle segment with 5 spines on ventral margin, 5 dorsal submesially, 9 spines extending out dorsally; distal segment with few weak ventral and dorsal spines. Upper flagellum well developed, articles 2–14 with dorsal spines; 17 aesthetascs, 1 on articles 12 and 19, 2 on articles 10, 11, 15, 16, 17 and 18, 3 on article 20. Lower flagellum same strength as upper with dorsal plumose setae along entire length.

Antenna (Fig. 7 C, D) with strong basal segment; peduncular segments with numerous spines of different sizes. Antennal flagellum well developed, unarmed, extending beyond tip of telson. Scaphocerite well developed, reaching about 0.33 its length beyond tip of rostrum. Outer margin slightly concave proximally with 8 spines; distal part bearing 16–19 teeth, followed by short non-serrate distance to strong distal tooth. Dorsal surface with distinct longitudinal carina bearing 26 spines on outer margin, 2 proximodorsal spines, 2 rows of 8, 15 spines below carinal inner margin, 3 small spines at distal end of carina. Inner margin with long plumose setae. Ventral surface with longitudinal carina bearing 16 spines on outer margin, row of 9 spines and small distal spine below carinal inner margin.

Mandibles (Fig. 7 E, F) robust with short, fused molar and incisor processes. Molar surface with 6 small rounded teeth; incisor with 2 large heavily chitinized medial teeth, large median cleft, 6–8 small rounded lateral teeth. Palp well developed, 3-segmented, segments of equal length. Proximal segment lacking setae, middle segment setose on outer and inner surfaces, distal segment broad, tapering distally, densely setose along edges and outer surface.

Maxillule (Fig. 7 G) with slender, undivided endopodite bearing 3 plumose setae laterally, 5 distally. Proximal endite broad, truncate distally, with 2 plumose setae laterally, 11 compound spinose setae and numerous plumose setae distally. Distal endite of equal size, rounded distally, with numerous plumose marginal setae.

Maxilla (Fig. 7 H) with numerous plumose setae on both lobes of coxal and basal endites, proximal coxal endite broadest. Endopodite long, slender, exceeding anterior margin of scaphognathite, with 16 plumose setae around distal half. Scaphognathite long, narrow, about 5.0 times longer than maximum breadth, with numerous plumose setae along margin.

First maxilliped (Fig. 7 I) with 3-segmented endopodite. Proximal segment longer than broad, with 10 long plumose setae laterally along outer margin. Middle segment about 0.33 length of proximal segment, bearing 12 long plumose setae on outer margin. Distal segment tapering, about 0.33 length of middle segment, with minute simple terminal seta. Basipodite large, rounded anteriorly and posteriorly, concave near middle, with outer border bearing dense fringe of long setae. Coxopodite bilobed with numerous moderately long setae. Exopodite well developed, flagellum arising from unsegmented peduncle with 26 plumose setae distolaterally. Large epipod with slender proximal and distal lobes of equal length.

Second maxilliped (Fig. 7 J) with 6-jointed endopodite. Dactylus rounded, longer than broad, with dense fringe of short setae along margin. Propodus slightly longer than dactylus, densely setose on dorsal margin, ventral margin with acute proximal tooth, 3 distal setae. Carpus short, triangular, about 0.5 length of propodus, with numerous long and short simple setae on distal outer border, 4 short setae on inner border. Merus more than 2.0 times dactylar length, 2.5 times longer than broad, dorsal margin with 7 short, simple setae, ventral margin convex with dense fringe of long simple setae. Ischium and basis not fused, basis distinctly separated from coxa; ischium, basis with fringe of mesial setae, coxa unarmed. Exopodite long, slender, unsegmented with distal 0.5 bearing 31 plumose setae. Small, elongate epipod present; arthrobranch and podobranch also present. (Not shown in Fig. 7 J).

Third maxilliped (Fig. 7 K) endopodite strongly developed, 5-segmented. Dactylus slender, tapering, about 5.0 times longer than basal width, 9 simple setae on outer margin, numerous long simple setae mesially and along inner margin. Propodus slightly shorter than dactylus, bearing acute subdorsal spine, 4 simple setae on outer margin; 3 proximal spines submesiad; setiferous organ distally, numerous long simple setae on inner margin. Carpus equal to propodal length, with 3 proximodorsal, 2 distal subdorsal spines, 5 long setae on outer margin; 3 proximal spines submesiad; numerous long simple setae on inner margin. Merus long, slender, about 2.0 times carpal length, with 5 dorsal, 2 subdorsal spines, 6 long setae on outer margin; 4 proximal spines supramesiad; inner margin with dense fringe of long setae. Ischium long, slender, equal to meral length, with 11 dorsal spines, 7 long setae on outer margin; proximal row of 4 spines supramesiad; 5 small spines, numerous long setae on inner margin. Basis and coxa fused with long setae on margins. Exopodite slender, slightly longer than ischium, with proximodorsal simple seta, 34 plumose setae on distal 0.5; laterally small rounded epipod.

First pereopod (Fig. 8 A) small, slender, when stretched reaching just past scaphocerite. Palm of chela somewhat compressed, dactylus less than 0.5 propodal length. Fingers slightly compressed, with somewhat hooked tips. Cutting edges distinct; propodus with large rounded proximal tooth followed by 10 small, stout, peg-like teeth separated by rectangular chitinous lamellae; dactylus with 10 peg-like teeth. Fingers and distodorsal extremity of palm bearing small tufts of long setae. Dactylus with few short simple setae, propodus with few short and long simple setae. Distovertral carpus and proximoventral propodus with setiferous organ. Carpus longest segment, about 2.0 times as long as propodus, with scattered short and long simple setae, 3 large dorsal spines. Merus about equal to carpal length, with 10 acute spines, 3 long setae on outer margin, 2 proximal long setae on inner margin. Ischium 0.5 length of merus, with 3 acute spines, 6 long setae on inner margin, 4 simple setae on outer margin. Basis and coxa short, unarmed; with small elongate epipod laterally.

Second pereopod (Fig. 8 B) similar to first, but longer and stronger. No setiferous organ present. Finger-tips more strongly hooked than those of first, cutting edges with 18 small, stout, peg-like teeth separated by rectangular chitinous lamellae, proximal propodal edge with large acute tooth opposite rounded proximal dactylar tooth; scattered short and long simple setae on propodus; outer dactylar margin with 8 short setae. Carpus longest segment, 1.8 times propodal length, with 10 large dorsal spines, few scattered short and long setae on margins. Merus 2.0 times ischial length, with 12 large dorsal spines, few scattered long setae on margins. Ischium with 2 large distodorsal spines, 5 ventral spines, numerous short and long setae on margins. Basis short, with 2 large dorsal spines, 3 long ventral setae. Coxa short, with large dorsal spine; bearing small elongate epipod.

Third pereopod (Fig. 8 C) largest and strongest; longer than entire body length, extending past scaphocerite by 0.5 length of merus and length of carpus and chela. Palm of chela longest segment with dorsal row of 23 strong forward-curved spines on outer margin; dorsal and ventral surfaces of propodus with numerous spines not arranged in distinct rows; ventral margin bearing 13 spines. Numerous long simple setae between dorsal and ventral marginal spines. Fingers elongate, with sharp hooked crossing tips, distally bearing small tufts of long setae. Dactylus with 6 acute spines on outer margin, 7 spines dorsomesially, numerous long setae on margins. Dactylar cutting edge with 2 small rounded proximal teeth, medially large rounded protuberance followed by distal row of 16 small, stout, peg-like teeth separated by

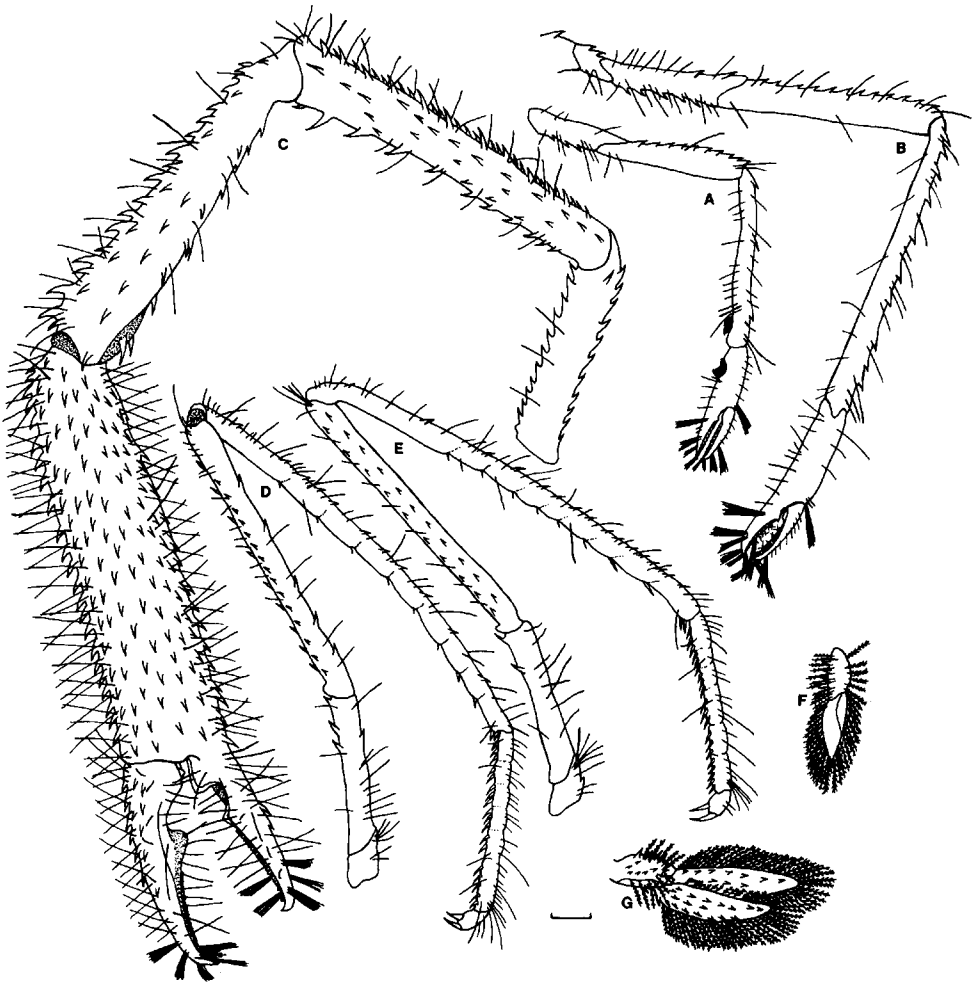


FIG. 8. *Stenopus cyanoscelis*, holotype, male: A, First pereopod; B, second pereopod; C, third pereopod; D, fourth pereopod; E, fifth pereopod; F, first pleopod; G, second pleopod. Scale bar represents 1.0 mm.

rectangular chitinous lamellae. Cutting edge of propodus with proximal chitinous ridge bearing 2 large teeth opposing rounded dactylar protuberance, distal row of 20 peg-like teeth separated by rectangular chitinous lamellae. Carpus about 0.25 times shorter than propodus, narrowing proximally. Dorsal margin bearing 6 spines, 2 subdorsal spines; ventral margin with 12 large spines increasing in size distally, 7 smaller spines below ventral margin; dorsal surface with 3 rows of 4, 5, 7 small spines; ventral surface with 2 rows of 5, 14 small spines; scattered long setae on margins. Merus equal to carpal length, with 10 large spines on dorsal margin; 12 spines on ventral margin, 28 smaller spines below margin; dorsal surface with 3 rows of 4, 5, 13 spines; ventral surface with 2 rows of 3, 10 small spines; few scattered long setae on margins. Ischium short, about 0.33 propodal length, with 11 spines on outer and inner margins, distodorsal spine submesiad, 3 long setae on outer margin. Basis short with 3 dorsal spines. Coxa small, with large dorsal spine, with small elongate epipod.

Fourth and fifth pereopods (Fig. 8 D, E) long, slender, very similar. Dactylus of fourth biunguiculate with unguis and accessory spine nearly equal in length, latter slightly shorter, both clearly separated from dactylar corpus. Propodus incompletely subdivided into 6 segments bearing 18 movable ventral spines, numerous short and long setae dorsally, few long setae ventrally. Carpus longest segment, 2.5 times propodal length, indistinctly subdivided into 9 segments; dorsal margin with 11 small fixed spines, numerous short and long setae; ventrally 6 short setae at indentation of each proximal 6 subsegments, subsegments 7, 8 with small acute movable spine, subsegment 9 with 2 small acute movable spines. Merus long, 2.0 times propodal length with row of 9 subdorsal spines, row of 15 spines submesiad on dorsal surface; 5 large spines on inner margin; ventral surface with medial row of 13 spines; few scattered setae on margins. Ischium almost equal propodal length, with 3 distodorsal spines on outer margin, distal spine on inner margin, few scattered setae on margins. Basis with 4 small ventral spines, few long dorsal setae; coxa unarmed, bearing small elongate epipod. Fifth pereopod with dactylar unguis and accessory spine narrower, slightly longer than fourth. Propodus indistinctly subdivided into 6 segments with 20 movable ventral spines, 3 long ventral setae, numerous short and long setae dorsally. Carpus 2.5 times propodal length, indistinctly subdivided into 9 segments; dorsal margin with 16 small spines, numerous short and long setae; ventrally 6 short setae at indentation of each proximal 6 subsegments, subsegments 7, 8 with acute movable spine, distal extremity of ninth subsegment with 2 acute movable spines. Merus 2.0 times propodal length, dorsal surface with 2 rows of 10, 11 small spines, ventral surface with 2 rows of 5, 8 small spines, outer margin with few long setae. Ischium slightly shorter than propodus, with 2 distodorsal spines on outer margin, few scattered setae on inner margin. Basis with 4 large ventral spines, few long dorsal setae; coxa with 2 large ventromesial spines.

First pleopod (Fig. 8 F) uniramous, second (Fig. 8 G) to fifth biramous, all lacking appendices. First pleopod smallest, with exopodite slightly longer than basipodite. Internal margin of basipodite with 4 spines, long plumose setae; external margin with 6 long plumose setae. Exopodite lanceolate, with long plumose marginal setae. Rami of second pleopod more than 2.0 times length of basipodite. External margin of basipodite with 2 small distal spines, 3 long plumose setae; 7 small spines on ventral surface; 4 small spines, 5 long plumose setae on internal margin. Ventral margin of exopodite with large proximal spine; ventral surface with 3 rows of 8, 3, 7 small spines; numerous long plumose marginal setae. Endopodite with 2 rows of 7, 4 small spines on ventral surface, numerous long plumose marginal setae. Third to fifth pleopods generally similar to second, decreasing in size and spination posteriorly.

Branchial formula: same as *Stenopus chrysexanthus* given above.

Measurements. Measurements of the holotype are included in Table 2 and compared with other specimens examined.

ALLOTYPE (female, AM-P25267). Sexual differences from the holotype include broader, unarmed thoracic sternites; no ventral median abdominal spines; first pleopod not shorter than other pleopods; rami of all pleopods much broader. Generally similar to holotype, but differing in following respects. Spines more dense on carapace and abdomen. Median bare areas of third and fourth abdominal somites not as well developed. Additional differences and variations in the number of appendage spines are included in Table 2.

Other material examined. Three additional mated pairs of *Stenopus cyanoscelis* from Indonesia and Kenya were examined and compared with the type material. The species is slightly variable in the number of body and appendage spines. Some of this variability is included in Table 2. Some of the morphological differences probably reflect allometric growth changes and normal variation in the species.

Colouration. Colour notes of Dr A. J. Bruce of the type material state: 'the species has a yellowish body, most marked anteriorly, with a deep red slender rostrum. Antennae pale bluish, also third maxillipeds to fifth pereopods, except third pereopod, which is white banded with red, but bluish at ischium-basis. Abdomen pleura yellow, rest white heavily marked with red; caudal fan red and white'.

Based on colour photographs of specimens from Singapore and the Philippines (H. Debelius, IKAN) and on personal observations of the living specimens from Indonesia and Kenya, the colour pattern of *S. cyanoscelis* is highly consistent throughout its range. The only variations are seen in the shade and intensity of the colours. The overall colour pattern is as follows: antennae white, but proximal segments and peduncle blue; scaphocerite yellow with wide red to reddish purple longitudinal stripe; carapace golden yellow to lemon yellow, sometimes carapacial spines red-tipped; rostrum bright red; abdominal pleura yellow, second and third somites dorsally with dark red to black spots surrounded by red, median bare areas of third and fourth somites white, fourth, fifth and sixth somites red dorsally with lateral dark red to black spots, distal third of sixth somite white; caudal fan proximally yellow, medially red, distally white, endopodite with median dark red to black spot; mouthparts, first and second pereopods blue; third pereopods with dactylus and equal length of propodus white, rest of propodus banded in red, yellow, red, carpus banded white, red, yellow, red, merus banded white, red, blue, ischium blue, basis and coxa yellow; fourth and fifth pereopods with dactylus, propodus clear but edged in blue, carpus reddish purple to violet, merus and ischium blue, basis and coxa yellow. The blue colour on the mouthparts and pereopods varies from light blue to dark navy blue. The ventral portions of the abdominal somites and the pleopods are yellow.

Monod (1976) reported on a male specimen (24 mm) of *Stenopus tenuirostris* collected at a depth of 3 m in Baie des Citrons, Nouméa, New Caledonia. He did not describe many morphological characteristics of this specimen and only illustrated the rostrum. However, he gave a detailed colour description as follows: 'rostre orange foncé—une ligne longitudinale violet-noir sur l'écaille antennaire—pléonites 2 et 3 avec chacun 2 ocelles à centre noir et couronne orange—pléonite 4 avec une bande orange postérieure, en croissant à convexité caudale avec une petite tache noire de chaque côté—pléonite 5 orangé avec une petite tache noire latérale—pléonite 6 avec un peu d'orange dans la région antérieure, et deux points noirs—telson, sauf base et apex, orangé—uropodes orangés avec sur l'endopode une tache plus foncée centrale, ocelliforme—pattes antérieures et 3^e maxillipèdes mauves (sauf propode et dactyle)—pattes postérieures mauves jusqu'au mérus inclus, carpe orangé, propode et dactyle incolores.' This does not match the colour pattern of *S. tenuirostris*, which has a purple rostrum, carapace, mouthparts and pereopods, except for banded third pereopods. Monod (1976) stated himself that his specimen's colour pattern did not coincide with the colour description of Holthuis (1946). However, Monod's colour description comes remarkably close to the pattern of *Stenopus cyanoscelis* given above. Some of the colour differences are probably due to fading, since Monod's specimen was preserved in alcohol before he described its colour pattern. On the basis of Monod's colour

Table 2. Meristic and spination data in *Stenpous cyanoscelis* (measurements in mm).

	AM: P-25267 holotype ♂	AM: P-25267 allotype ♀	USNM: 237731 Pulau Dapur ♂	USNM: 237731 Pulau Dapur ♀	USNM: 237732 Pulau Ubi ♂	USNM: 237762 Pulau Ubi ♀	SMF Kenya ♂	SMF Kenya ♀
<i>Lengths</i>								
Total	30.8	31.2	29.0	35.3	23.8	27.0	26.9	25.5
Rostral carapace	12.6	13.3	12.0	14.0	10.6	11.6	10.9	10.1
Postorbital carapace	7.9	8.3	7.7	9.4	6.4	7.2	7.2	6.4
Chela of third pereiopod	13.6	12.4	12.6	16.9	10.2	12.5	9.5	7.6
Third pereiopod	34.1	34.0	32.7	44.0	27.4	33.3	25.3	25.7
<i>Appendage spination</i>								
Rostrum								
Dorsal	10	8	10	9	10	6	10	10
Ventral	10	8	9	13	10	7	6	10
Lateral	5-8	6-7	6-9	5-10	2-5	4-8	5-6	7-9
Scaphocerite								
outer margin	17-20	17-29	21-23	21-26	15	18-20	18-19	19-20
Third maxilliped								
Ischial outer margin	11	10	10	11	—	11	6	8
Ischial inner margin	5	5	4	5	—	5	6	5
Meral outer margin	6	9	9	9	—	9	9	9
Carpal outer margin	5	5	8	6	—	4	5	5
Propodal outer margin	1	2	3	2	—	0	3	2

First pereiopod									
Ischial outer margin	0	0	0	3	—	—	0	0	0
Ischial inner margin	3	4	5	5	—	—	3	4	3
Meral outer margin	10	9	11	8	—	—	6	4	5
Carpal outer margin	3	4	4	5	—	—	3	4	7
Second pereiopod									
Ischial outer margin	2	3	3	5	—	—	3	1	0
Ischial inner margin	5	5	6	7	—	—	3	8	0
Meral outer margin	12	13	11	15	—	—	10	11	4
Meral inner margin	0	0	0	4	—	—	0	1	0
Carpal outer margin	10	11	11	13	—	—	12	9	7
Fourth and fifth pereiopods									
Propodal ventral movable	18–21	18	19–20	19–24	—	—	15–19	19	19–20
Uropodal endopodite margin	10–13	10–11	11–12	12	12–14	12–14	12	14–15	10–13
Uropodal exopodite margin	6	6	6	7	6	6	6	5–7	5

description and the few morphological characters he mentioned, the present author does not hesitate to place this specimen in *S. cyanoscelis*. Santos (1985) published a colour photograph of a specimen of *S. cyanoscelis* on exhibit in the Steinhart Aquarium, California.

Type locality. Broadhurst Reef, Townsville, Queensland, Australia.

Habitat. The type material was collected at a depth of 9–12 m under a plate of branching coral on a sandy bottom. The mated pair from Kenya was collected on shallow coral banks off Kilifi. The material from Indonesia was obtained from professional collectors for the saltwater aquarium trade, and habitat data were not available. This species has long white antennal flagella which may indicate that it is a fish cleaner, much like other members of the genus *Stenopus*.

Etymology. The specific name is derived from the two Greek words 'cyaneos' meaning blue and 'scelos' meaning leg; it was given because of the distinctive blue coloration of the pereopods.

Remarks. Both *Stenopus chrysexanthus* and *S. cyanoscelis*, closely follow the definition of the genus *Stenopus* given by Holthuis (1946). *Stenopus chrysexanthus* has 3 or 4 strong spines on the lateral margins of the telson, while all other known species *Stenopus* have 0 or 1 lateral telsonal spines. *Stenopus cyanoscelis* has a tau cross-shaped bare area on the dorsal surface of the fourth abdominal somite not present on other members of the genus. These two species are most closely related to the Atlantic species, *Stenopus spinosus* Risso, 1827 and *Stenopus scutellatus* Rankin, 1898, but differ in certain morphological characteristics as well as differing greatly in colouration. The new species and *S. cyanoscelis* may be conveniently separated from the other six described Indo-West Pacific species in the genus *Stenopus* by the following key:

- 1 Third abdominal somite without bare area posterodorsally. 2
- Third abdominal somite with bare area posterodorsally 3
- 2 Rostrum exceeding middle segment of antennular peduncle, with 0–5 ventral spines; telson with no lateral spines; carapace and rostrum pinkish-white in life; antennal flagella white; abdominal somites white with broad middorsal red stripe; third pereopods pinkish white for 4 proximal segments, rest opaque white; other pereopods and third maxillipeds pinkish-white *S. pyrsonotus* Goy and Devaney, 1980
- Rostrum not exceeding middle segment of antennular peduncle, no ventral spines; telson with 1 lateral spine on each side; carapace and rostrum white and red in life; antennal flagella white; abdomen white with red transverse bands on third and sixth somites; third pereopods blue for 2–33 proximal segments, rest banded in white and red; other pereopods and third maxillipeds white *S. hispidus* (Oliver, 1811)
- 3 Scaphocerite with no ventral spines, outer margin serrate up to final (terminal) tooth; third abdominal somite with bare medial posterior area edged by squamous spinules 4
- Scaphocerite with ventral spines, outer margin with considerable non-serrate space before final (terminal) tooth; third abdominal somite with narrow dorsal bare shield-shaped area with lateral lobes 5
- 4 Rostrum with no lateral spines; scaphocerite with no dorsal spines; carapace and rostrum reddish-white in life; antennal flagella white; abdomen white, lateral red stripes extending from posterior carapace along sides of abdomen, converging at telson; third pereopods reddish-white except opaque white finger-tips; other pereopods and third maxillipeds reddish white *S. earlei* Goy, 1984

- Rostrum with 1 to 5 lateral spines; scaphocerite with 2 rows of 6-12 dorsal spines; carapace and rostrum golden yellow in life; antennal flagella red; abdomen yellowish white with red oval patches on sides of second and fifth somites; third pereopods golden yellow 2 proximal segments, rest banded in white, red and yellow; other pereopods and third maxillipeds yellowish white, except distal 3 segments of fourth and fifth pereopods red *S. zanzibaricus* Bruce, 1976

- 5 Outer proximal margin of scaphocerite with 3-5, rarely 7, spines; pereopods stout and spinous; fourth and fifth pereopods with numerous dorsomesial spines on ischia, meri and carpi 6
- Outer proximal margin of scaphocerite with 7 or 8 spines; pereopods slender and spinous; fourth and fifth pereopods with no or few dorsomesial spines on ischia, meri and carpi 7

- 6 Exopodite of third maxilliped with no spines on outer margin, longer than ischium of endopodite; distoventral carpal extremity of fourth and fifth pereopods with 2-6 actuate movable spines; carapace and rostrum yellow-brown in life; antennal flagella white; abdomen white with bilobed red spot on second and third somites; other pereopods and third maxillipeds white *S. devaneyi* Goy, 1984
- Exopodite of third maxilliped with spines on outer margin, shorter than ischium of endopodite; distoventral carpal extremity of fourth and fifth pereopods without movable spines; carapace and rostrum purple in life; antennal flagella white; abdomen yellow, sixth somite and dorsal bare area of third somite white, red transverse bands on third and fifth somites; third pereopods with purple bases, coxa and proximal third of ischia, rest banded in red, white and yellow; other pereopods and third maxillipeds purplish white *S. tenuirostris* De Man, 1888

- 7 Labrum narrow, rounded; fourth abdominal somite with median tau cross-shaped bare area edged with squamous spinules; telson with 1 lateral spine on each side; carapace yellow with red-tipped spines, rostrum deep red in life; antennal flagella white; abdominal pleura yellow, second to sixth somites dorsally with dark red to black spots, median bare areas of third and fourth somites and distal third of sixth somite white; third pereopods yellow for 2 proximal segments, ischium and proximal one-third of merus blue, rest banded in red, white and yellow; other pereopods and third maxillipeds blue *S. cyanoscelis* Goy, 1984
- Labrum elongate, flattened; fourth abdominal somite with anteriomedial bare area, otherwise spinules arranged in transverse rows; telson with 3 or 4 lateral spines on each side; carapace and proximal 0.25 of rostrum golden yellow, rest of rostrum deep red in life; antennal flagella white; abdomen golden yellow with dorsolateral red spots on second and third somites, entire dorsolateral surface of fifth, 0.5 of fourth and one-third of sixth somites red; third pereopods golden yellow for 2.5 proximal segments, rest banded in red and golden yellow, except finger-tips white; other pereopods and third maxillipeds golden yellow *S. chrysexanthus* sp. nov.

Holthuis (1946) lists numerous Indonesian records of *Stenopus hispidus* and *S. tenuirostris*, and Yaldwyn (1968) reviewed the records of *S. hispidus* in Australia and New Zealand. I have examined specimens of *S. tenuirostris* in the Australian Museum taken from Seal Rocks, off New South Wales. Also, I have examined specimens of *S. zanzibaricus* from Indonesia in the collections of the Senckenberg Museum, Frankfurt; the Rijksmuseum van Natuurlijke Historie, Leiden; and the Zoologisches Museum, Berlin. *Stenopus earlei* was photographed near Kilifi, Kenya, under a boulder inside a cave at a depth of 16 m (H. Debelius, IKAN photographic collection). More extensive sampling in the Indo-West Pacific region will probably lead to records of *Stenopus chrysexanthus*, *S. cyanoscelis* and other stenopodidean shrimps from other localities throughout this tropical marine region.

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References

- BRUCE, A. J., 1976, Studies on Indo-West Pacific Stenopodidea. 1. *Stenopus zanzibaricus* sp. nov., a new species from East Africa, *Crustaceana*, **31** (1), 90–102.
- GOY, J. W., 1984, Diagnosis of three new *Stenopus* species, in H. Debelius (ed.), *Armoured Knights of the Sea* (Essen: Alfred Kernan Verlag), 120 pp.
- GOY, J. W. and DEVANEY, D. M., 1980, *Stenopus pyrrsonotus* a new species of stenopodidean shrimp from the Indo-West Pacific region (Crustacea: Decapoda), *Proceedings of the Biological Society of Washington*, **93** (3), 781–796.
- GOY, J. W. and RANDALL, J. E., 1986, Redescriptions of *Stenopus devaneyi* and *Stenopus earlei* from the Indo-West Pacific region (Decapoda: Stenopodidae), *Bernice P. Bishop Museum Occasional Papers*, **26**, 81–101.
- HOLTHUIS, L. B., 1946, Biological results of the Snellius Expedition XIV. The Stenopodidae, Nephropsidae, Scyllaridae, and Palinuridae, *Temminckia*, **7**, 1–178.
- MAN, J. E. DE, 1888, Bericht über die von Herrn Dr J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden, *Archiv für Naturgeschichte*, **53** (1), 215–600.
- MONOD, TH., 1976, Sur quelques Natantia (Crust. Décapodes) de Nouméa (Nouvelle Calédonie), *Cahiers du Pacifique*, **19**, 7–28.
- OLIVIER, A. G., 1811, Palémon. Palaemon, in A. G. Olivier (ed.), *Insectes, Encyclopédie méthodique Histoire naturelle*, **8**, 652–667.
- RANKIN, W. M., 1898, The Northrup collection of Crustacea from the Bahamas, *Annals of the New York Academy of Sciences*, **11** (12), 827–930.
- RISSO, A., 1827, *Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles des environs de Nice et des Alpes maritimes*, Volume 5, i–vii + 1–403, pls 1–10, figs 1–62.
- SANTOS, R. L., 1985, Notes on the boxer shrimp, *Stenopus hispidus*, in the home aquarium, *Tropical Fish Hobbyist*, **34** (3), 40–54.
- YALDWYN, J. C., 1968, Records of, and observations on, the coral shrimp genus *Stenopus* in Australia, New Zealand and the South-West Pacific, *Australian Zoologist*, **14** (3), 277–289.