

Three new goatfishes of the genus *Parupeneus* from the Western Indian Ocean, with resurrection of *P. seychellensis*

John E. Randall¹ and Elaine Heemstra²

¹Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA
e-mail: jackr@hawaii.rr.com

²South African Institute for Aquatic Biodiversity, Private Bag 1015,
Grahamstown 6140, South Africa. e-mail: e.heemstra@saiab.ac.za

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ABSTRACT. Three new mullid fishes of the genus *Parupeneus*, previously misidentified as *P. heptacanthus* (Lacepède), are described from the western Indian Ocean. All share with *P. heptacanthus* a symmetrical posterior margin of the maxilla (compared to species with an asymmetrical maxilla from a dorsoposterior extension) and low gill-raker counts. All differ by having a more elongate body, flatter interorbital space, and in lacking a dark reddish spot on the body above the pectoral fin. *Parupeneus angulatus*, described from two specimens trawled from 57 m on the Seychelles Bank, has a slightly angular instead of rounded posterior margin to the maxilla and 20 lower-limb gill rakers. *Parupeneus minys*, named from six specimens from the Seychelles, Mozambique and India, all sexually mature at only 70–106 mm SL, is pink in life with an indistinct yellow stripe along the lateral line. *Parupeneus nansen* is represented by four type specimens taken by trawl from 43–51 m off southern Mozambique and seven nontype specimens from off the northeastern coast of Somalia in 25–29 m. It is unique in having three red spots in life on the caudal fin, one in each lobe and one at base. *Parupeneus seychellensis* (Smith & Smith) is a valid species distinct from *P. heptacanthus*. Although similar in body shape and in having a convex interorbital, it differs in having shorter pelvic fins, 18–21 lower gill rakers (vs. 21–23 for *P. heptacanthus*) and in colour, notably lacking the dark reddish spot on the upper side and in having a striped colour pattern from a red spot on each scale of the dorsal three longitudinal scale rows. A key is provided for the 19 species of *Parupeneus* of the western Indian Ocean.

KEYWORDS: Mullidae, *Parupeneus*, new species, key to Western Indian Ocean species

INTRODUCTION

The goatfishes of the perciform family Mullidae are easily recognised by the pair of chemosensory barbels at the front of their chin with which they probe for a wide variety of benthic prey, such as crustaceans, polychaetes and small bivalves. The Indo-Pacific genus *Parupeneus* Bleeker, the second largest of the family, is distinct in having a single row of bluntly conical teeth in the jaws and lacking teeth on the vomer and palatines. Randall (2004) revised the genus and reduced the 69 nominal species to 27 valid species. Many of the species lack markings that persist in museum specimens. Without knowledge of life colour, some specimens can be difficult to identify to species. All of the species of *Parupeneus* have the same number of rays of the median fins and the same number of lateral-line scales. The counts of pectoral-fin rays are modally 15 or 16, except one species with 17. The gill-raker counts proved to be helpful to differentiate the species, but these counts are broadly overlapping for all species (Randall, 2004: Table 2). The most useful proportional measurements

are body depth, head length, snout length, cheek depth, barbel length and the length of the paired fins.

Two of the species, the wide-ranging *Parupeneus heptacanthus* (Lacepède) and *P. janseni* (Bleeker) from Indonesia and the Philippines, were separated in the key to the species of the genus by having the posterior end of the maxilla symmetrically rounded (Fig. 3 A); the remaining 25 species have a broad dorsoposterior extension on the maxilla (Fig. 3 B).

An undescribed species of *Parupeneus*, recognised more than five years ago from an underwater photograph taken off the coast of KwaZulu-Natal, was recently collected and described as *P. fraserorum* Randall and King (2009). It also has a rounded maxilla.

Two Bishop Museum specimens taken by trawl in 57 m from the Seychelles Bank, previously identified as *Parupeneus heptacanthus*, represent an undescribed species. The posterior end of the maxilla is symmetrical but not perfectly rounded. Instead, there is a slight angularity (Fig. 3 C) that led to closer examination. The body of these two fish is more elongate than *P. heptacanthus* of the same size, and the gill-raker count

of 6 + 20 confirmed the separation from *P. heptacanthus*, which has 6 or 7 + 21–23 gill rakers.

Six small specimens, 70–106 mm SL, of a second new species of *Parupeneus* from the Seychelles, India and Mozambique were previously considered as juveniles of *P. heptacanthus* until all were found to be sexually mature. They are now differentiated by a more slender body, shorter snout, and especially the shorter barbels, compared to *P. heptacanthus* of small size. They also lack the small dark spot on and below the eighth lateral-line scale that is typical of *P. heptacanthus*. This spot is often faded on old museum specimens of *P. heptacanthus*.

A recent expedition in the western Indian Ocean, with scientific staff taking colour photographs of

freshly caught specimens, has revealed a third new species with a symmetrical maxilla. It is described here from four specimens taken by trawling off the coast of southern Mozambique in 43–51 m. Seven additional specimens of this species were found in the Bishop Museum fish collection misidentified as *P. heptacanthus* (Lacepède); they were taken by trawl in 25–29 m off the northeastern coast of Somalia. Because information is lacking on the life colour of these specimens, they are not designated as paratypes.

In their book *The Fishes of the Seychelles*, Smith & Smith (1963: 22, pl. 88 B) named a new species of *Parupeneus* as *Pseudupeneus seychellensis* from one specimen from a market in Mahé, Seychelles. Their



Fig. 1. *Parupeneus heptacanthus*, BPBM 29732, 130 mm SL, Lombok, Indonesia (Photo by J. E. Randall).



Fig. 2. *Parupeneus heptacanthus*, HUI 8330, 225 mm SL, Gulf of Aqaba, Red Sea (Photo by J. E. Randall).

description consisted of the following, "Many at Seych, differs from all known species in markings and 6 +18 gillrakers. Type, male, 10 in.". Their Figure B on Plate 88 is a colour painting of the holotype. Ben-Tuvia in Smith & Heemstra (1986: 611) placed *Parupeneus seychellensis* in the synonymy of *P. cinnabarinus* Cuvier in Cuvier & Valenciennes (1829). Randall (2004: 30) followed Ben-Tuvia, but treated *P. cinnabarinus* as a junior synonym of *P. heptacanthus* (Lacèpede). Figure 2 is a colour photograph of a specimen of *P. heptacanthus* from the Red Sea. We report here that *P. seychellensis* is a valid species from examination of the holotype, a second SAIAB specimen from Mahé obtained with rotenone in 2005 of which a colour photograph was taken, and one lot of 17 rotenone specimens from Mahé sent on loan by the Academy of Natural Sciences of Philadelphia.

Parupeneus heptacanthus remains a common species throughout the Indian Ocean, including the Red Sea, Persian Gulf, and Andaman Sea, east in the Pacific to the Caroline Islands and Fiji, with 46 lots examined in the Indian Ocean (Randall, 2004: 31, fig. 6) -- see Figs. 1 and 2.

Valuable information on life colour and depth range of species of *Parupeneus* was provided by the publication of Taquet & Diringer (2007) on fishes of the Indian Ocean. Their figure of *Parupeneus procerigena* (as *P. chrysopleuron*) is the first record of life colour of this species.

We present a key to the 19 species of *Parupeneus* from the western Indian Ocean.

MATERIALS AND METHODS

Specimens for this study of species of *Parupeneus* are from the fish collections of the Academy of Natural Sciences of Philadelphia (ANSP); Bernice P. Bishop Museum, Honolulu (BPBM); Hebrew University of Jerusalem (HUJ); Muséum National d'Histoire Naturelle, Paris (MNHN); South African Institute for Aquatic Biodiversity, Grahamstown (SAIAB); and the National Museum of Natural History, Washington, D.C. (USNM).

Lengths of specimens are given as standard length (SL), measured from the front of the upper lip to the base of the caudal fin (posterior end of the hypural plate); head length (HL) is measured from the same anterior point to the posterior end of the opercular flap; body depth is taken vertically from the base of first dorsal

spine where it emerges from the body (not the internal base); body width is the maximum width just posterior to the gill opening; orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width; cheek depth is measured from the lower fleshy edge of the orbit vertically to the ventral edge of the preopercle; upper-jaw length is taken from the front of the upper lip to the posterior end of the maxilla; depth of the maxilla is the maximum vertical fleshy depth; barbel length is the maximum straight length of the longest barbel; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of fin spines and rays of the dorsal and anal fins are measured from where they emerge from the body; caudal-fin length is the horizontal distance from the base of the fin to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest rays; pectoral-fin length is the length of the longest ray; pelvic-fin length is measured from the origin of the pelvic spine to the tip of the longest soft ray. Lateral-line scale counts do not include two or three pored scales on the caudal-fin base; pectoral-ray counts include the upper rudimentary ray; gill-raker counts were made on the first gill arch of the right side. They include all rudiments; the raker at the angle is contained in the count of the lower-limb gill rakers.

Table 1. Lower-limb gill-raker counts of *Parupeneus heptacanthus* and similar Indian Ocean species.

Species	Number of gill rakers					
	18	19	20	21	22	23
<i>P. angulatus</i>			2			
<i>P. heptacanthus</i>				7	10	4
<i>P. minys</i>				3	3	
<i>P. nansen</i>				6	4	1
<i>P. seychellensis</i>	2	5	9	5		

In the description of the new species, data in parentheses refer to paratypes. Proportional measurements in the text of the diagnosis and description are rounded to the nearest 0.05. Counts of pectoral rays were made on both sides, and gill-raker counts only on the right side.

KEY TO THE SPECIES OF PARUPENEUS OF THE WESTERN INDIAN OCEAN

- 1a. A black spot as large or larger than eye centred on lateral line below rear base of first dorsal fin, with a large white spot behind and adjacent (Indo-Pacific except Red Sea and Persian Gulf, 1-75 m) *pleurostigma*
- 1b. Colour not as in 1a; a black spot as large or larger than eye, if present, on caudal peduncle 2
- 2a. Two narrow black bars, one below each dorsal fin, nearly reaching ventral margin of body (a faint third dark bar sometimes present dorsally on caudal peduncle) (Oman and east coast of Africa to Andaman Sea and southwestern Indonesia, 1-80 m) *trifasciatus*

- 2b. Colour not as in 2a 3
- 3a. Posterior end of maxilla symmetrical (Fig. 3 A, C) 4
- 3b. Posterior end of maxilla not symmetrical, either with a broad dorsoposterior lobe, or slanting forward ventrally (Fig. 3 B) 10

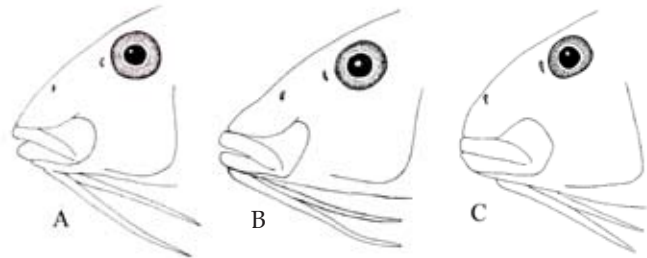


Fig. 3. Shape of maxilla of species of *Parupeneus*.

A. *P. heptacanthus*, 130 mm SL.

B. *P. macronemus*, 115 mm SL.

C. *P. angulatus*, 141.5 mm SL (Drawn by E. Heemstra).

- 4a. Cheek depth 1.9–2.1 in HL; dorsal profile of snout steep, forming an angle of about 60° to horizontal axis of body; two pale yellow stripes in life, one above and one below lateral line (Seychelles and Saya de Malha Bank, 20–220 m) *procerigena*
- 4b. Cheek depth 2.2–3.5 in HL; dorsal profile of snout forming an angle of 35–50° to horizontal axis of body; a yellow stripe, if present, on lateral line 5
- 5a. Pectoral fins long, 1.2–1.25 in HL; a dark brown spot about half pupil size at upper end of gill opening (KwaZulu-Natal and southern Madagascar, 28–81 m) *fraserorum*
- 5b. Pectoral fins not long, 1.25–1.55 in HL; no dark brown spot at upper end of gill opening 6
- 6a. Barbels long, 1.0–1.3 in HL; lower-limb gill rakers 21–23; a small dark red to brown spot usually present on and below seventh and eighth lateral-line scales; interorbital space convex (Red Sea and east coast of Africa to Caroline Islands and Fiji, 12–88 m) *heptacanthus*
- 6b. Barbels not as long, 1.2–1.45 in HL; lower-limb gill rakers 18–22; no dark red or brown spot on and below seventh and eighth lateral-line scales; interorbital space convex or medially flat 7
- 7a. Interorbital space convex; body depth 3.1–3.5 in SL; barbels 1.2–1.35 in HL; pelvic fins 1.35–1.5 in HL; lower-limb gill rakers 18–21; a striped pattern dorsally on body from a red spot on scales (Seychelles) *seychellensis*
- 7b. Interorbital space medially flat; body depth 3.6–4.3 in SL; barbels 1.35–1.45 in HL; pelvic fins 1.5–1.65 in HL; lower-limb gill rakers 20–23; no striped pattern dorsally on body 8
- 8a. Posterior end of maxilla slightly wedge-shaped (Fig. 1 C); longest dorsal spine 1.55–1.75 in HL; lower-limb gill rakers 20 (Seychelles, 57 m) *angulatus*, new species
- 8b. Posterior end of maxilla smoothly convex (Fig. 1 B); longest dorsal spine 1.8–2.0 in HL; lower-limb gill rakers 21–23 9
- 9a. Body depth 3.6–3.85 in SL; snout length 1.9–2.05 in HL; three red to deep pink spots in a triangular pattern on basal half of caudal in life (Mozambique, 25–51 m) *nansen*, new species
- 9b. Body depth 3.95–4.3 in SL; snout length 2.05–2.3 in HL; caudal fin without three red to deep pink spots (Seychelles, Mozambique, and southwest India, 43–55 m) *minys*, new species
- 10a. Body with a large elliptical yellow spot between lateral line and interdorsal space in life; a roundish black spot larger than eye on side of posterior half of caudal peduncle, more above than below lateral line; peritoneum of adults dark brown; lower-limb gill rakers 18–21 *indicus*
- 10b. Colour of body not as in 10a (though a black or blackish spot may be present on caudal peduncle or caudal-fin base); peritoneum pale (except *barberinus*); gill rakers 21–27 11
- 11a. Scales of body below lateral line with a distinct white to light blue spot in life; mouth small, the upper-jaw

- length 3.0–3.55 in head length; a large elliptical white spot anteriorly on upper side of caudal peduncle (Persian Gulf to west coast of Pakistan) *margaritatus*
- 11b. Scales of body below lateral line without a white to light blue spot; mouth not small, the upper-jaw length 2.3–3.0 in head length (except *forsskali*, its jaw length 2.75–3.15 in head length); a large white spot present or absent dorsally on caudal peduncle 12
- 12a. Basal one-third to one-half of second dorsal fin black, the dark pigment extending to distal end of last membrane. 13
- 12b. Basal one-third to one-half of second dorsal fin not black 14
- 13a. An oblique dark red to black band from upper end of gill opening to below rear base of second dorsal fin; no large black spot on side of caudal peduncle; barbels 1.35–1.55 in HL; penultimate dorsal ray 1.05–1.2 in length of last dorsal ray (Réunion and Mauritius, 5–100 m) *diagonalis*
- 13b. A black stripe from upper end of gill opening following lateral line to caudal peduncle; a large black spot on upper half of caudal peduncle; barbels 1.1–1.25 in HL; penultimate dorsal ray 1.25–1.6 in length of last dorsal ray (Red Sea and east coast of Africa to East Indies, 3–40 m) *macronemus*
- 14a. One or two dark brown to red stripes on head and body, the uppermost passing through eye.; barbels not long, 1.35–1.6 in HL 15
- 14b. No dark brown to red stripes on body; barbels long, from longer than head to 1.15 in HL 18
- 15a. A single dark brown or red stripe from front of snout through eye to below origin of second dorsal fin or beyond; a roundish black spot as large or larger than eye posteriorly on caudal peduncle 16
- 15b. Two red to brown stripes on head and body, the uppermost passing through eye and following anterior part of lateral line, bordered above and below by a whitish stripe; a saddle-like blackish spot on caudal peduncle preceded by a whitish spot 17
- 16a. Pectoral rays 16–18 (usually 17); peritoneum dark brown or black; caudal fin bluish in life; largest examined, 346 mm SL (Indo-Pacific, except Arabian seas and the Hawaiian Islands, 1–100 m) *barberinus*
- 16b. Pectoral rays 14–17 (usually 16); peritoneum pale; caudal fin yellow in life; largest examined, 217 mm SL (Red Sea and Gulf of Aden, 1–30 m) *forsskali*
- 17a. Pectoral rays 14–16 (usually 15); barbels short, 1.5–1.8 in HL; lower-limb gill rakers 21–25 (western Indian Ocean to Micronesia and French Polynesia, 2–90 m) *ciliatus*
- 17b. Pectoral rays 15–17 (usually 16); barbels not short, 1.35–1.55 in HL; lower-limb gill rakers 19–22 (Red Sea and Gulf of Oman to South Africa, Seychelles, and Mascarene Islands, 2–200 m) *rubescens*
- 18a. Grayish blue with a saddle-like yellow spot on caudal peduncle, or entirely yellow; lower-limb gill rakers 22–26; pectoral fins 1.5–1.7 in HL (Indo-Pacific, 5–125 m) *cyclostomus*
- 18b. Red with a deeper red bar posteriorly on caudal peduncle; lower-limb gill rakers 27–29; pectoral fins 1.35–1.55 in HL (Réunion, 90–250 m). *posteli*

***Parupeneus angulatus* sp. nov.**

Figs. 3 C, 4; Table 2

Parupeneus heptacanthus (non Lacepède) Randall 2004: 31 (Seychelles).

Holotype. SAIAB 82215, male, 141.5 mm, Seychelles Bank, southwest of Denis Island, 3°54'S, 55°49'E, ORSTOM-Seychelles Expedition, R/V *Coriolis*, station 49, bottom trawl, 57 m, detritic sand, 15 September 1980.

Paratype. BPBM 31309, male, 142.5 mm, same data as holotype.

DIAGNOSIS. Pectoral-fin rays 15 or 16; gill rakers 6 + 20; body elongate, the depth 3.75–3.8 in SL; head length 3.0 in SL; interorbital space flat medially; snout length 2.0 in HL; posterior end of maxilla symmetrical, but angular, forming an angle of about 135°; depth of maxilla 4.6–4.8 in HL; barbel length 1.35–1.4 in HL; longest dorsal spine 1.55–1.75 in HL; pectoral fins 1.45–1.55 in HL; pelvic fins 1.6 in HL; colour in alcohol uniform light brown; caudal fin light brown, grading to pale yellowish distally; remaining fins pale yellowish; no information on colour in life.

DESCRIPTION. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal and anal-fin rays branched, except first; last dorsal and anal-fin rays branched to base; pectoral-

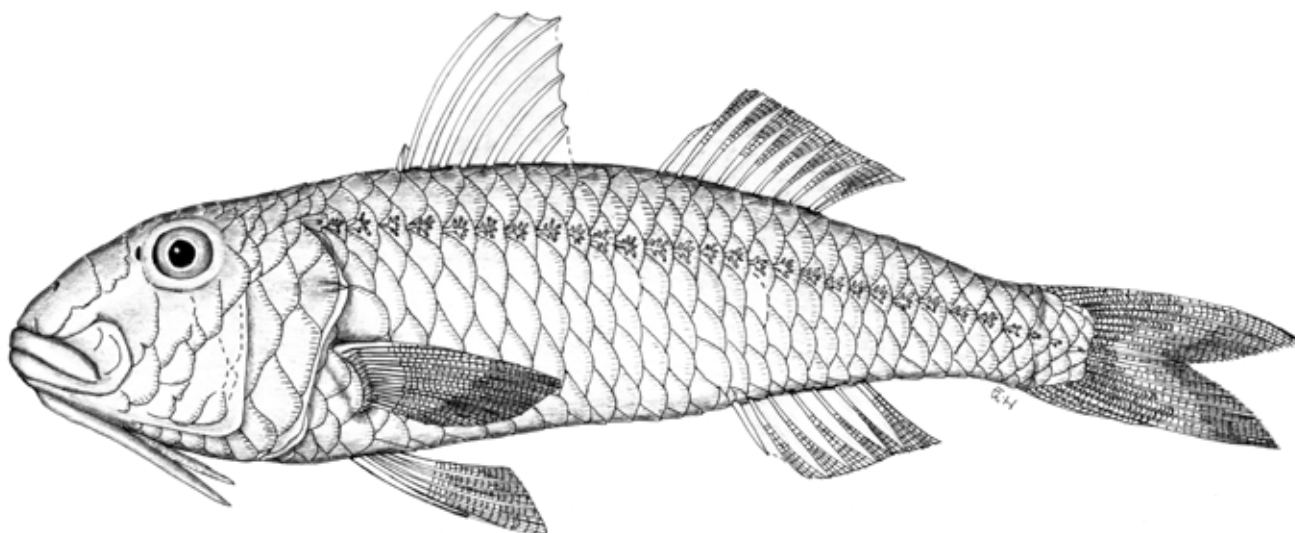


Fig. 4. Holotype of *Parupeneus angulatus*, SAIAB 82215, 141.5 mm SL, Mahé, Seychelles, 57 m (Drawn by E. Heemstra).

fin rays 15 or 16 (15 on one side, 16 on other in both holotype and paratype); upper two pectoral-fin rays unbranched; pelvic-fin rays I,5; principal caudal-fin rays 15, the middle 13 branched; upper and lower procurent caudal-fin rays 9, the posterior 2 segmented; lateral-line scales 27 (plus 3 pored scales on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales about 14 (anterior scales embedded); median preopercular scales at least 7 (anterior scales missing); gill rakers 6 + 20; pseudobranchial filaments 26 (27); branchiostegal rays 3; vertebrae 10 + 14.

Body elongate, the depth 3.8 (3.75) in SL; body width 1.6 (1.55) in body depth; head length 3.0 in SL; snout length 2.0 in HL; orbit diameter 5.75 (5.8) in HL; interorbital space flat medially, rounded laterally, the bony width 3.65 (3.45) in HL; cheek depth 2.4 in HL; barbels just reaching or extending slightly beyond posterior margin of preopercle, their length 1.4 (1.35) in HL; caudal-peduncle depth 3.55 (3.6) in HL; caudal-peduncle length 1.5 (1.4) in HL.

Mouth ventral, and slightly oblique, the cleft forming an angle of about 15° to horizontal axis of head and body; mouth small, the maxilla nearly or just reaching a vertical at anterior edge of orbit; upper-jaw length 2.3 (2.2) in HL; depth of maxilla 4.8 (4.6) in head length; posterior edge of maxilla symmetrical but slightly angular, forming an angle of about 135° (discounting rounded apex); many teeth missing on holotype; each side of upper jaw of paratype with a single row of 11 stout conical teeth, the first eight curving inwardly and posteriorly, the last three curving anteriorly; lower jaw with nine similar teeth, the first seven strongly curving posteriorly and inwardly, the last two nearly erect; largest tooth in jaws almost half pupil diameter in length; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a near-vertical slit at front of bony edge of orbit, in line with ventral half of pupil; anterior nostril a small, narrow, oblique aperture with a low rim, on a line two-thirds distance from dorsal edge of orbit to groove above front of upper lip. Longest gill raker about three-fourths length of longest gill filament on first gill arch.

Opercle with a single horizontal spine at level of ventral edge of orbit, its tip nearly or just reaching edge of opercular membrane; free edge of preopercle extending dorsally to level where covered by a large postorbital scale (beneath scale, free edge extends to level of lower edge of pupil); free ventral edge of preopercle extending forward to a vertical at posterior edge of maxilla.

Scales finely ctenoid; scales dorsally on head extending forward to an orbit diameter from groove at base of upper lip (anterior scales strongly embedded); six oblique rows of large scales on cheek to edge of preopercle; the first embedded, extending above anterior half of curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively smaller anteriorly; two embedded scales on expanded posterior side of maxilla, the anterior much smaller and overlapping base of posterior scale, both scales partly covered by upper lip; fins naked except for base of caudal fin with three near-vertical series of scales like those of body, followed by columns of small slender scales that extend more than half distance to posterior margin of fin (many scales missing); slender pelvic axillary scale nearly one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the first slightly larger and broadly overlapping the second; sensory canals on lateral-line scales with three to nine branches.

Table 2. Proportional measurements of type specimens of *Parupeneus angulatus* as percentages of SL.

	Holotype	Paratype
	SAIAB 82215	BPBM 31309
Standard length (mm)	141.5	142.5
Sex	male	male
Body depth	26.3	26.8
Body width	16.6	17.3
Head length	33.4	33.6
Snout length	16.9	17.0
Orbit diameter	5.8	5.8
Interorbital width	9.2	9.7
Cheek depth	13.8	14.0
Upper-jaw length	14.5	15.1
Depth of maxilla	7.3	7.3
Barbel length	23.9	25.1
Caudal-peduncle depth	9.4	9.4
Caudal-peduncle length	22.6	23.6
Pre-dorsal length	38.7	39.3
Pre-anal length	63.6	64.2
Pre-pelvic length	32.3	31.2
First dorsal-fin spine	2.8	2.9
Second dorsal-fin spine	17.5	19.3
Third dorsal-fin spine	aberrant	21.3
Fourth dorsal-fin spine	19.3	19.5
First dorsal-fin ray	7.8	6.4
Second dorsal-fin ray	10.3	11.7
Eighth dorsal-fin ray	7.6	7.4
Ninth dorsal-fin ray	9.2	8.4
Anal-fin spine	5.8	5.4
Seventh anal-fin ray	9.4	8.8
Caudal-fin length	23.7	22.4
Caudal concavity	14.0	12.7
Pectoral-fin length	22.4	21.8
Pelvic-fin spine length	12.8	12.5
Pelvic fin length	21.1	21.0

Origin of dorsal fin over third lateral-line scale, the predorsal length 2.65 (2.6) in SL; first dorsal spine very short, 12.0 (11.5) in HL; third dorsal spine aberrantly fused to fourth spine in holotype (1.6 in HL in paratype); first ray of second dorsal fin 4.3 (5.25) in HL; second dorsal ray longest, 3.15 (2.9) in HL; eighth dorsal ray 1.2 (1.15) in length of ninth dorsal ray; ninth dorsal ray 3.65 (4.0) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 in SL; anal spine 5.75 (6.2) in HL; seventh anal soft ray longest, 3.55 (3.8) in HL; caudal-fin length 1.35 (1.5) in HL; caudal fin strongly forked, the caudal concavity 2.25 (2.65) in HL; fourth and fifth pectoral rays longest, 1.45 (1.55) in HL; pelvic spine 2.6 (2.7) in HL; pelvic fins short, 1.6 in HL.

Colour of holotype in alcohol uniform light brown; caudal fin light brown, grading to pale yellowish distally; remaining fins pale yellowish.

ETYMOLOGY. This species is named *Parupeneus angulatus* from the Latin *angulus*, in reference to the obtusely angular posterior edge of the maxilla.

REMARKS. The two type specimens of *Parupeneus angulatus*, both mature males, were collected by trawl in 57 m on the Seychelles Bank from the French research vessel *Coriolis* in September 1980. They were sent as a gift from the Muséum National d'Histoire Naturelle in Paris to the Bishop Museum in 1984, and were initially misidentified as *P. heptacanthus*. They should have been recognised as different from *P. heptacanthus* by the more slender body, the flat median interorbital, and the lack of any trace of the dark spot on the side of the body that is characteristic of the latter species (Figs. 1 and 2). More definitive differences are the slightly angular posterior shape of the maxilla and the low count of 6 + 20 gill rakers, compared to 6–7 + 21–23 for *P. heptacanthus* (Table 1). No additional specimens of this species are present in the Muséum National d'Histoire Naturelle, and no information is available on the fresh colouration of the two type specimens.

The new species *Parupeneus minys*, described below, has the same general head and body shape and might have been considered as the young of *P. angulatus*, were it not for their being fully mature. Although there is complete separation of the two on gill-raker counts, the sample size is too small to be definitive. If a comparison is made of the morphometrics (Tables 1 and 2), some obvious differences will be noted, such as the more slender body, larger eye, and shorter first dorsal fin of *P. minys*. However, these three differences are to be expected with growth. Other differences, such as the depth of the maxilla and pectoral-fin length, are more constant with increasing size. The maxillary depth measurements of *P. minys* of Table 3 do not show a trend with specimen length. The 19 specimens of *P. seychellensis* (ANSP 108697, 114–231 mm SL) have a maxillary depth that varies from only 5.2–5.5 in the head length, with no correlation with size. Therefore, a maxillary depth of 4.6–4.8 in the head length for *P.*

Table 3. Proportional measurements of type specimens of *Parupeneus minys* as percentages of SL.

	Holotype	Paratypes				
	BPBM 35553	USNM 395007	BPBM 40948	BPBM 27693	MNHN 08-2473	SAIAB 81381
Standard length (mm)	70	79	83.5	84	106	106.5
Sex	male	female	female	female	male	male
Body depth	23.3	25.0	25.4	25.2	24.3	23.8
Body width	15.5	15.0	15.8	15.3	15.3	15.5
Head length	33.2	33.8	32.9	33.2	34.2	34.1
Snout length	14.4	14.5	15.8	15.2	16.5	16.5
Orbit diameter	8.6	8.7	8.3	8.2	7.0	7.5
Interorbital width	7.9	7.8	7.6	7.3	7.8	7.9
Cheek depth	10.3	10.8	11.7	11.2	12.1	11.5
Upper-jaw length	11.6	12.0	12.2	11.6	12.9	12.6
Depth of maxilla	5.7	6.2	6.0	5.9	6.1	6.0
Barbel length	24.3	25.2	24.6	25.0	24.0	23.6
Caudal-peduncle depth	8.8	9.0	9.4	9.1	9.2	9.2
Caudal-peduncle length	23.9	22.6	22.5	23.3	23.2	24.0
Pre-dorsal length	39.3	39.6	40.6	40.4	39.5	39.5
Pre-anal length	64.5	64.7	65.7	65.9	64.0	63.9
Pre-pelvic length	32.3	32.0	32.2	32.5	32.3	32.0
First dorsal-fin spine	1.8	2.1	2.3	2.0	2.6	2.1
Second dorsal-fin spine	16.4	15.3	15.5	14.5	15.3	15.4
Third dorsal-fin spine	18.5	broken	18.2	17.7	17.6	17.3
Fourth dorsal-fin spine	17.0	16.4	17.3	16.5	16.3	16.2
First dorsal-fin ray	8.2	8.5	7.3	7.4	6.8	5.8
Second dorsal-fin ray	12.9	12.6	12.7	11.9	11.8	10.9
Eighth dorsal-fin ray	7.1	7.5	7.8	7.4	7.6	7.5
Ninth dorsal-fin ray	8.3	8.8	8.6	8.5	8.4	7.8
Anal-fin spine	7.2	7.6	7.3	7.2	6.8	6.8
Seventh anal-fin ray	8.3	8.7	8.6	8.4	8.0	8.6
Caudal-fin length	27.2	28.7	28.2	27.3	broken	27.0
Caudal concavity	16.0	16.6	15.7	16.3	–	15.8
Pectoral-fin length	24.8	25.4	24.8	24.5	24.1	24.8
Pelvic-fin spine length	14.7	14.5	13.4	14.2	13.2	12.4
Pelvic fin length	21.7	22.8	22.2	22.0	20.7	23.2

angulatus is clearly different from the range of 5.45–5.8 for *P. minys*. A comparison of Tables 2 and 3 also shows the significant difference in pectoral-fin length of the two species.

***Parupeneus minys* sp. nov.**

Figs. 5, 6; Table 3

Parupeneus janseni (non Bleeker) Randall & van Egmond 1994: 54, fig. 28 (Vizhinjam, Kerala, India).

Parupeneus heptacanthus (non Lacepède) Randall 2004: 31, pl. IV D (Poivre Atoll, Amirantes, Seychelles, and Vizhinjam, Kerala, India).

Holotype. BPBM 35553, male, 70 mm, Seychelles, Amirantes, Poivre Atoll, 5°44'S, 53°20'E, coarse calcareous sand bottom with rhodolites, 43–48 m, rectangular dredge, R/V *Tyro*, Station 766, J. van der Land et al., 29 December 1992.

Paratypes. BPBM 40948, female, 83.5 mm, USNM 395007, female 79.5 mm, both with same data as holotype; BPBM 27693, female, 83 mm, India, Kerala, Vizhinjam fishing harbour (south of Trivandrum), purchased from fisherman, J. E. Randall, 13 February 1980; MNHN 2008-2473, male, 106 mm, same data as preceding; SAIAB 81381, male, 106.5 mm, Mozambique, 20°14.8'S, 35°48.4'E – 20°16.3'S, 35°48.4'E, R/V *Dr. Fridtjof Nansen* Station 76, trawl, 54–55 m, P.C. & E Heemstra, 12 October 2007.



Fig. 5. Holotype of *Parupeneus minys*, BPBM 35553, 70 mm SL, Poivre Atoll, Amirantes, Seychelles, 43–48 m (Photo by J. E. Randall).



Fig. 6. Paratype of *Parupeneus minys*, BPBM 27693, 83.5 mm SL, Kerala, India (Photo by J. E. Randall).

DIAGNOSIS. Pectoral-fin rays 15 or 16; gill rakers 6 + 21–22; body elongate, the depth 3.95–4.3 in SL; head length 2.9–3.05 in SL; interorbital space flat medially; snout length 2.05–2.3 in HL; posterior edge of maxilla symmetrically convex; maximum depth of maxilla 5.45–5.8 in HL; barbel length 1.35–1.45 in HL; longest dorsal spine 1.8–1.95 in HL; pectoral fins 1.3–1.4 in HL; pelvic fins 1.5–1.65 in HL; colour in alcohol uniform tan except for specimens from the Seychelles with areas of white ventrally on head below eye and on lower two-fifths of body; no dark markings; fins translucent pale yellowish; colour when fresh, pink dorsally, pale pink to white ventrally, with an indistinct pale yellow stripe along lateral line; some lateral-line scales with a bluish white dash; a bluish white line encircling ventral part of eye and continuing obliquely to upper lip; three small bluish white blotches dorsally on head, one directly above eye; barbels white; median and pelvic fins translucent blotchy yellow with small pale blue to whitish spots along rays that outline faint transverse yellowish bands. Largest specimen, 106.2 mm SL.

DESCRIPTION. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal- and anal-fin rays branched, except first, the last branched to base; pectoral-fin rays 15, 16 (15 or 16, mostly 16), the upper 2 unbranched; pelvic rays I, 5; principal caudal-fin rays 15, the middle 13 branched; upper procurrent caudal-fin rays 8 (8 or 9, usually 8); lower procurrent caudal-fin rays 9 (8 or 9, usually 9); the posterior 2 segmented; lateral-line scales 27 (plus 3 on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales 14; median prepelvic scales 9, increasingly smaller anteriorly; gill rakers 6 + 22 (6 + 21–22); pseudobranchial filaments 19 (22–24); branchiostegal rays 3; vertebrae 10 + 14.

Body elongate, the depth 4.3 (3.95–4.0) in SL; body width 1.5 (1.55–1.65) in body depth; head length 3.0 (2.9–3.05) in SL; snout length 2.3 (2.05–2.3) in HL; orbit diameter 3.85 (3.9–4.9) in HL; interorbital space flat medially, rounded laterally, the bony width 4.5 (4.25–4.4) in HL; cheek depth 3.2 (2.8–3.5) in HL; barbels reaching slightly beyond posterior edge of preopercle, their length 1.35 (1.35–1.45) in HL; caudal-peduncle depth 3.8 (3.5–3.75) in HL; caudal-peduncle length 1.4 (1.4–1.5) in HL.

Mouth ventral, and slightly oblique, the gape forming an angle of about 20° to horizontal axis of head and body; mouth small, the upper jaw not reaching a vertical at anterior edge of orbit; upper-jaw length 2.85 (2.65–2.85) in HL; posterior edge of maxilla symmetrically rounded; maximum depth of maxilla 5.8 (5.45–5.65) in HL; upper jaw of holotype with a single row of 15 unevenly spaced, incurving conical teeth, and lower jaw with 13; longest teeth in jaws the fifth or sixth; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a vertical slit at front edge of orbit

Table 4. Proportional measurements of type specimens of *Parupeneus nansen* as percentages of SL.

	Holotype	Paratypes		
	SAIAB 81380	BPBM 40949	SAIAB 81683	USNM 395047
Standard length (mm)	125	114	133	139
Sex	male	female	male	male
Body depth	27.0	33.8	26.0	27.8
Body width	17.3	16.5	16.4	18.8
Head length	33.8	33.8	34.7	35.2
Snout length	17.3	16.5	17.7	18.5
Orbit diameter	6.7	7.0	6.6	6.5
Interorbital width	8.0	8.1	8.3	8.8
Cheek depth	12.7	12.4	13.7	14.0
Upper-jaw length	13.2	13.2	14.1	14.4
Depth of maxilla	6.7	6.4	6.5	6.8
Barbel length	24.8	24.5	26.5	25.1
Caudal-peduncle depth	9.1	10.0	8.8	9.0
Caudal-peduncle length	22.8	21.1	21.2	23.1
Pre-dorsal length	39.3	39.4	40.1	39.8
Pre-anal length	64.6	66.4	66.5	65.1
Pre-pelvic length	31.9	32.2	33.5	35.6
First dorsal-fin spine	2.1	1.9	1.9	1.7
Second dorsal-fin spine	17.2	17.6	17.6	16.5
Third dorsal-fin spine	18.4	broken	18.3	17.8
Fourth dorsal-fin spine	17.4	13.9	broken	15.5
First dorsal-fin ray	8.4	broken	8.5	8.2
Second dorsal-fin ray	11.4	11.6	11.8	10.1
Eighth dorsal-fin ray	7.6	7.7	7.6	7.5
Ninth dorsal-fin ray	8.8	8.8	8.6	8.8
Anal-fin spine	7.2	7.4	7.5	7.2
Seventh anal-fin ray	9.6	9.2	9.0	9.5
Caudal-fin length	24.8	24.3	25.0	24.1
Caudal concavity	13.8	13.0	13.8	12.8
Pectoral-fin length	24.0	25.1	24.8	25.0
Pelvic-fin spine length	13.2	14.2	14.0	13.9
Pelvic fin length	21.6	22.6	21.6	21.6

slightly below centre of eye, its length about one-fourth pupil diameter; anterior nostril a small aperture with a low rim at level of ventral edge of orbit one-half distance from posterior nostril to front of upper lip. Longest gill raker as long as longest gill filament on first gill arch.

Opercle with a single horizontal spine at level of centre of orbit, its tip nearly reaching edge of opercular membrane; free edge of preopercle extending dorsally to level where covered by a large postorbital scale (on specimens with this

scale missing, free edge extends to level of lower edge of pupil); free ventral edge of preopercle extending forward to a vertical at anterior edge of orbit.

Scales finely ctenoid; scales dorsally on head extending forward two-thirds orbit diameter from front of upper lip (anterior scales embedded); six oblique rows of large scales on cheek to edge of preopercle; the first embedded, extending above anterior half of curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively shorter anteriorly; two scales on expanded posterior side of maxilla, the anterior about one-half size of posterior and overlapping base of posterior scale; fins naked except for base of caudal fin with three rows of scales like those of body, followed by columns of small, slender scales extending about halfway along fin (many scales missing); slender pelvic axillary scale more than one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the first broadly overlapping second scale and slightly larger than second scale; sensory canals on lateral-line scales with three to five branches, very short posteriorly (three to seven branches on largest paratype).

Origin of dorsal fin over third lateral-line scale, the predorsal length 2.6 (2.55–2.6) in SL; first dorsal spine very short, 18.4 (13.3–16.5) in HL; third dorsal spine longest, 1.8 (1.9–2.1) in HL; first ray of second dorsal fin 4.05 (4.0–5.9) in HL; second dorsal ray longest, 2.6 (2.5–3.1) in HL; eighth dorsal ray 1.25 (1.15) in length of ninth dorsal ray; ninth dorsal ray 3.8 (3.9–4.0) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 (1.5–1.55) in SL; anal spine 4.6 (4.45–5.05) in HL; seventh anal soft ray longest, 4.0 (3.8–4.25) in HL; caudal-fin length 1.2 (1.15–1.4) in HL; caudal fin strongly forked, the caudal concavity 2.05 (2.0–2.1) in HL; fourth and fifth pectoral rays longest, 1.35 (1.35–1.4) in HL; pelvic spine 2.25 (2.3–2.75) in HL; pelvic fins short, 1.55 (1.45–1.65) in HL.

Colour of holotype in alcohol uniform tan except for a series of vertically elongate whitish patches ventrally on body posterior to pectoral fins; scaled portion of cheek and operculum white; no dark markings; fins translucent pale yellowish. Colour of holotype when fresh shown in Fig. 5, and colour of 84.2-mm paratype from Kerala, India in Fig. 6.

ETYMOLOGY. We name this species *Parupeneus minys* from the Greek word meaning small, in reference to its very small adult size for a species of the genus.

REMARKS. The first author was one of the scientific party of the Dutch expedition to the Seychelles on the R/V *Tyro* in 1992 (van der Land 1994). Three small specimens of a pink goatfish with a yellow stripe were collected in a dredge haul from 43–48 m. A photograph was taken of the smallest, which was the least damaged by the dredge. It was identified as *Parupeneus jansonii* (Bleeker) by Randall & van Egmond (1994: 54, fig. 28), and reidentified by Randall (2004: 31, pl. IV D) as *P. heptacanthus* (Lacepède). The specimen was presumed to be a juvenile of the species, in view of its small size. The abdomen was slit during the present study to see if the sex could be determined. It is a ripe female. *Parupeneus heptacanthus* attains a standard length of at least 290 mm, so the small mature Seychelles fish are not apt to be *P. heptacanthus*. Counts of pectoral rays and gill rakers are the same, but the barbels are shorter, 1.35–1.45 in HL, compared to 1.1–1.35 for *P. heptacanthus*, and the snout is longer, 2.05–2.3 in HL, compared to 1.75–2.1 for *P. heptacanthus*. Comparison was made with two lots of juveniles of *P. heptacanthus* collected by the first author at Flores, Indonesia, BPBM 32216, 3: 60–72 mm, and BPBM 34097, 84 mm, and there was no overlap in these two measurements. All four specimens from Flores show the typical dark spot on and below the eighth lateral-line scale, which is not present in *P. minys*.

***Parupeneus nansen* sp. nov.**

Figs. 7, 8; Table 4

Holotype. SAIAB 81380, male, 125 mm, Mozambique, 24°33.7'S, 35°15.6'E – 24°32.3'S, 35°15.6'E, R/V *Dr. Fridtjof Nansen*, station 46, trawl, 50–51 m, E. & P.C. Heemstra, 12 October 2007.

Paratypes. USNM 395047, male, 139 mm, Mozambique, 26°9.4'S, 32°58.6'E – 26°10.4'S, 32°58.3'E, R/V *Dr. Fridtjof Nansen*, station 6, trawl, 43–45 m, E. & P.C. Heemstra, 30 September 2007; BPBM 40949, female, 114 mm, same data as holotype; SAIAB 81683, male, 133 mm, Mozambique, 18°39.6'S, 37°3.3'E – 18°41.9'S, 37°3.6'E, R/V *Dr. Fridtjof Nansen*, station 95, trawl, 36–37 m, E. & P.C. Heemstra, 29 October 2007.

Nontype specimens. BPBM 31276, 7: 125–160 mm, Indian Ocean, off coast of Somalia, 11°18'N, 51°8'E, 25–29 m, R/V *Anton Bruun*, cruise 9, station 459, trawl, A. Fehlmann, 17 December 1964.

DIAGNOSIS. Pectoral-fin rays 15 or 16; gill rakers 6 or 7 + 21–23; body moderately elongate, the depth 3.6–3.85 in SL; head length 2.85–2.95 in SL; interorbital space flat medially; snout length 1.9–2.05 in HL; interorbital space flat medially; maxilla symmetrically rounded posteriorly; depth of maxilla 5.05–5.3 in HL; barbel length 1.35–1.45 in HL; longest dorsal spine 1.85–2.0 in HL; pectoral fins 1.35–1.4 in HL; pelvic fins 1.5–1.6 in

HL; colour in alcohol pale tan, the edges of the scales a little darker; a faint orangish brown stripe following lateral line; no dark spot on eighth lateral-line scale; fins translucent pale yellowish; colour when fresh light yellowish grey dorsally, the scale edges narrowly red, grading to silvery grey below, the red edges of scales progressively fainter ventrally; head broadly red dorsally, grading to silvery white on cheek and operculum; barbels white; caudal fin with three large deep pink to red spots, one in each lobe and one at midbase of fin.

DESCRIPTION. Dorsal-fin rays VIII + 9; anal-fin rays 7; second dorsal- and anal-fin rays branched, except first, the last branched to base; pectoral-fin rays 16 (16, one with 15 on one side), the upper 2 unbranched; pelvic-fin rays I, 5; principal caudal-fin rays 15, the middle 13 branched; upper and lower procurrent caudal-fin rays 9, the posterior 2 segmented; lateral-line scales 27 (plus 3 on caudal-fin base); scales above lateral line to origin of first dorsal fin 2; scales below lateral line to origin of anal fin 5; circumpeduncular scales 14; median predorsal scales 15; median prepelvic scales 9, increasingly smaller anteriorly; gill rakers 6 + 22 (6 or 7 + 21–23); branchiostegal rays 3; vertebrae 10 + 14.

Body depth 3.7 (3.6–3.85) in SL; body width 1.55 (1.45–1.6) in body depth; head length 2.95 (2.8–2.95) in SL; snout length 1.95 (1.9–2.05) in HL; orbit diameter 5.05 (4.95–5.4) in HL; interorbital space flat medially, rounded laterally, the bony width 4.25 (4.0–4.2) in HL; cheek depth 2.65 (2.2–2.5) in HL; barbels reaching slightly beyond posterior margin of preopercle, their length 1.35 (1.3–1.4) in HL; caudal-peduncle depth 3.7 (3.4–3.95) in HL; caudal-peduncle length 1.5 (1.5–1.65) in HL.

Mouth ventral, and slightly oblique, the gape forming an angle of about 20° to horizontal axis of head and body; mouth small, the upper-jaw length 2.55 (2.45–2.55) in HL; posterior edge of maxilla symmetrically convex; maximum depth of maxilla 5.1 (5.25–5.55) in HL; jaws with a single row of well-spaced, bluntly conical teeth, 10–12 on each side of upper jaw, and 8 or 9 in lower jaw (counting gaps for missing teeth), the anterior teeth very short; teeth curving inwardly and posteriorly, except last which curves anteriorly; no teeth on vomer or palatines. Tongue fused to floor of mouth.

Posterior nostril a short vertical slit at front edge of orbit slightly below centre of eye; anterior nostril a small aperture with a low rim at level of ventral edge of orbit half way to front of upper lip. Longest gill raker nearly one-half length of longest gill filament.

Opercle with a single horizontal spine at level of centre of orbit, its tip nearly reaching edge of opercular membrane; free edge of preopercle extending dorsally to level of lower edge of orbit where covered by a large postorbital scale; free ventral edge of preopercle ending a pupil diameter anterior to a vertical at front edge of orbit.



Fig. 7. Holotype of *Parupeneus nansen*, SAIAB 81380, 125 mm SL, Mozambique, 24°33'S, 35°15'E, 50–51 m (Photo by P.C. Heemstra).



Fig. 8. Paratype of *Parupeneus nansen*, USNM 395047, male, 139 mm SL, Mozambique, 26°9.5'S, 32°58.5'E, 43–45 m (Photo by P.C. Heemstra).

Scales finely ctenoid; scales dorsally on head extending forward to an orbit diameter from front of upper lip; six oblique rows of large scales on cheek to edge of preopercle; the first two rows embedded, extending above curved posterior part of maxilla, the last row of two scales at corner of preopercle; opercle largely covered by seven partially fused scales of variable size; subopercle and interopercle covered by a row of six scales, progressively shorter anteriorly; two scales on expanded posterior side of maxilla, the anterior about one-third size of posterior and overlapping base of posterior scale; fins naked except for base of caudal fin with three rows of scales like those of body, followed by columns of small slender scales extending about half way out in fin; slender pelvic axillary scale nearly one-half length of pelvic spine; a midventral scaly process of two rounded scales at base of pelvic fins, the anterior broadly overlapping the posterior; sensory canals on

lateral-line scales with four to ten branches.

Origin of dorsal fin above third lateral-line scale, the predorsal length 2.25 (2.5–2.55) in SL; first dorsal spine very short, 16.1 (17.8–20.7) in HL; third dorsal spine longest, 1.85 (1.9–2.0) in HL; first ray of second dorsal fin 2.9 (3.0–4.1) in HL; second dorsal ray longest, 3.25 (2.9–3.5) in HL; eighth dorsal ray 1.25 (1.15–1.55) in length of ninth dorsal ray; ninth dorsal ray 3.8 (3.9–4.05) in HL; origin of anal fin below base of first ray of second dorsal fin, the preanal length 1.55 (1.5) in SL; first anal ray 4.7 (4.55–4.8) in HL; seventh anal soft ray longest, 3.5 (3.7–4.25) in HL; caudal-fin length 1.35 (1.4–1.45) in HL; caudal fin strongly forked, the caudal concavity 2.45 (2.5–2.75) in HL; fourth and fifth pectoral rays longest, 1.4 (1.35–1.4) in HL; pelvic spine 2.55 (2.4–2.5) in HL; pelvic fins short, 1.55 (1.5–1.6) in HL.

Colour of holotype in alcohol pale tan, the edges of scales a little darker; a faint midlateral orangish

brown stripe on body, beginning above pectoral-fin base, where about an eye diameter in width, narrowing posteriorly, ending in a faint spot of the same colour about two-thirds size of eye; no dark spot on eighth lateral-line scale; fins translucent pale yellowish.

Colour of holotype when fresh shown in Figure 7.

ETYMOLOGY. We name this species *Parupeneus nansen*, treating it as a noun in apposition, for the research vessel *Dr. Fridtjof Nansen*, from which the type specimens were collected, and to honour the famous Norwegian explorer and scientist for whom the vessel was named. During the cruise, the scientific staff referred to the specimens of this fish as the "Nansen Goatfish."

REMARKS. On 30 September 2007, when the catch of a trawl haul off the coast of southern Mozambique in 43–45 m from the *Dr. Fridtjof Nansen* was being sorted, the second author noticed that one specimen of a goatfish was unusual in having three red spots on the caudal fin. She set it aside to be photographed. Three more specimens with the same caudal colouration were

collected by trawling nearby at a depth of 50–51 m in October. These four fish are the type specimens of *Parupeneus nansen*.

Seven additional specimens of this species (BPBM 31276, 7: 125–160 mm) were found in the Bishop Museum fish collection that had been misidentified as *P. heptacanthus*. They were taken by trawling in 25–29 m off the northeastern coast of Somalia at 11°18'N during the International Indian Ocean Expedition in 1964. No information is available on the colouration in life. These specimens are not designated as paratypes.

The pectoral-ray counts of 15 or 16 (mainly 16) and the gill-raker counts of 6 or 7 + 21–23 of *Parupeneus nansen* are the same as those of *P. heptacanthus*. The two species are readily distinguished in life colouration (compare Figs. 2 and 3 of *P. heptacanthus* with Figs. 7 and 8 of *P. nansen*). The most important morphometric differences are the longer barbels of *P. heptacanthus*, 1.0–1.3 in HL in 15 Bishop Museum specimens, 60–257 mm SL, compared to 1.3–1.45 in HL of *P. nansen*, and the pelvic fins are longer in *P. heptacanthus*, 1.3–1.5 in HL, compared to 1.5–1.65 in *P. nansen*.



Fig. 9. *Parupeneus seychellensis*, SAIAB 77868, 170 mm SL, Mahé, Seychelles, 17 m (Photo by P. C. Heemstra).

Parupeneus seychellensis (Smith & Smith)
Fig. 9

Pseudupeneus seychellensis Smith & Smith, 1963: 22, pl. 88, fig. B (Seychelles).

Material Examined. Holotype of *Pseudupeneus seychellensis*, SAIAB 32, 200 mm, Seychelles, Mahé market, J.L.B. Smith and M.M. Smith, 19 October 1954; ANSP 108689, 19: 115–231 mm, Mahé, Beau Vallon Bay, NNW of Hotel des Seychelles; 4°37'S, 55°26'E, 12–15 m, isolated patch of rock and coral, with sponges and much sand, rotenone, J. E. Böhlke, D. Dockins, R. Rosenblatt, W. Starck II and

J. Tyler, 19 March 1964; SAIAB 77868, 170 mm, Mahé, Baie aux Chagrins, 4.6290998°S, 55.3767014°E, rotenone, 17 m, P.C. Heemstra, E. Heemstra, M. Smale, K. Moots, and M. Mwale, 7 May 2005.

DIAGNOSIS. Pectoral-fin rays 16; gill rakers 6 + 18–21; body depth 3.1–3.5 in SL; head length 3.0–3.15 in SL; snout length 1.8–1.95 in HL; interorbital space convex; length of barbels 1.2–1.35 in HL; depth of maxilla 5.2–5.5 in HL; longest dorsal spine 1.6–1.75 in HL; pectoral-fin length 1.25–1.35 in HL; pelvic-fin length 1.35–1.5 in HL; colour in alcohol tan, with an indistinct midlateral yellowish brown stripe on body, beginning as broad as eye above pectoral-fin base, narrowing posteriorly,

then broadening on caudal peduncle (stripe not present in life); colour when fresh as in Fig. 9. Noteworthy is the striped pattern dorsally on the body from a red spot on each scale of the first three longitudinal scale rows.

REMARKS. *Parupeneus seychellensis* (Smith & Smith) was described principally from a colour painting by Margaret M. Smith. The only diagnostic character given in the one-line description was the gill-raker count of 6 + 18 (corrected from examination of the holotype to 6 + 19). As mentioned, this species was considered a synonym of *P. cinnabarinus* by Ben-Tuvia in Smith & Heemstra (1986) and *P. heptacanthus* by Randall (2004). We have determined that it is a valid species, distinct from *P. heptacanthus* by having 18–21 lower-limb gill rakers, compared to 21–23 for *P. heptacanthus* (Table 1), shorter pelvic fins, 1.55–1.6 in HL, vs. 1.3–1.5 for *P. heptacanthus*, and in colour, mainly in lacking the dark reddish spot on and below the eighth lateral-line scale, and in having a striped pattern dorsally on the body from a red spot on each scale of the upper three longitudinal scale rows (compare Figs. 1 and 2 of *P. heptacanthus* with Fig. 9 of *P. seychellensis*).

The specimens of *Parupeneus heptacanthus* were examined from 31 different institutions for the revision of the genus. Because *P. seychellensis* was not distinguished from *P. heptacanthus* in the revision, and undescribed species were misidentified as *P. heptacanthus*, the comparative material of the latter for this study was restricted to the specimens listed below.

MATERIAL OF PARUPENEUS HEPTACANTHUS EXAMINED. Marshall Islands, Enewetak Atoll: BPBM 18393, 223 mm; BPBM 19950, 175 mm. New Caledonia: BPBM 27097, 163 mm. Lord Howe Island: BPBM 14894, 221 mm. Indonesia, Ambon: BPBM 19210, 2: 165–176 mm; Flores, BPBM 32216, 3: 60–70 mm; BPBM 34097, 84.5 mm; Lombok, BPBM 29732, 3: 119–130 mm. Andaman Sea, off southwestern Thailand: BPBM 31261, 137 mm.

Seychelles: MNHN 1982-31, 185 mm; MNHN 1982-36, 4: 178–209 mm. Persian Gulf, Bahrain: BPBM 29415, 257 mm. Red Sea, Gulf of Aqaba: HUIJ 8330, 225 mm. Tanzania, Pemba Channel: BPBM 33438, 123 mm.

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LITERATURE CITED

- RANDALL, J. E. 2004. Revision of the goatfish genus *Parupeneus* (Perciformes: Mullidae), with description of two new species. *Indo-Pacific Fishes*, no. 36: 1–64.
- RANDALL, J. E. & D. R. KING. 2009. *Parupeneus fraserorum*, a new species of goatfish (Perciformes: Mullidae) from South Africa and Madagascar. *Smithiana Bulletin* 10: 31–35.
- RANDALL, J. E. & J. VAN EGMOND. 1994. Marine fishes from the Seychelles: 108 new records. *Zoologische Mededelingen* (Leiden), no. 297: 43–83.
- SMITH, M. M. & P. C. HEEMSTRA (eds.). 1986. *Smiths' Sea Fishes*. Macmillan South Africa, Johannesburg. xx + 1047 pp.
- SMITH, J. L. B. & M. M. SMITH. 1963. *The Fishes of Seychelles*. Department of Ichthyology, Rhodes University, Grahamstown. 215 pp.
- TAQUET, M. & A. DIRINGER. 2007. *Poissons de l'océan Indien et de la mer Rouge*. Editions Quæ, Versailles. 527 pp.
- VAN DER LAND, J. (ed.). 1994. *Oceanic Reefs of the Seychelles. Report on a Cruise of RV Tyro to the Seychelles in 1992 and 1993*. National Museum of Natural History, Leiden. 192 pp.