

## *Ptereleotris carinata*, a new species of hovering goby (Perciformes: Microdesmidae) from the tropical eastern Pacific

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**Abstract:** A new hovering goby or dartfish is described from material collected in Mexico, Costa Rica and Panama. It is the only species of the cosmopolitan genus *Ptereleotris* known from the eastern Pacific. It is distinguished from its Western Atlantic and Indo-Pacific congeners by its low fin-ray counts, prominent median keel on the ventral margin of the head, lanceolate caudal fin with dusky lower half and dusky blue or lavender body in adults.

**Key words:** New species, *Ptereleotris*, Microdesmidae, Perciformes, Mexico, Costa Rica, Panama.

The slender gobioid fishes of the genus *Ptereleotris* are found hovering over burrows on sand substrata. Twelve species are known from the Indo-Pacific region, two from the western Atlantic and undescribed fishes of the genus from the eastern Pacific (Mexico and Panama) have been known for some time (Randall 1968). The New World species have usually been considered generically distinct and maintained in the genus *loglossus* (Randall 1968; Thomson et al. 1979). However, Randall and Hoese (1985) revised the Indo-Pacific members of the genus and relegated several genera including *loglossus* to the synonymy of *Ptereleotris*. The genus has often been placed in the family Eleotridae and Gobiidae, however Hoese (1984) has provisionally classified *Ptereleotris* in the Microdesmidae.

Over the years numerous specimens of unidentified *Ptereleotris* have been deposited in collections containing eastern Pacific fishes and it has been suggested that two species were present (Randall 1968). The present study, however, indicates that a single species of hovering goby occurs from Mexico to Panama, and it is described herein.

### MATERIAL AND METHODS

Counts and measurements follow Randall and Hoese (1985). Pterygiophore formulae follow Birdsong et al. (1988). All measurements of length in mm refer to standard length (SL). Terminology of lateralis system head pores follows Hoese (1971) and also the lettering system of Akihito et al. (1984) and Pezold (1993). Institutional abbreviations are listed in Leviton et al. (1985).

*Ptereleotris carinata*, new species  
(Fig. 1-3)

*Ioglossus* sp., Thomson et al. 1979 (Gulf of California; b & w photograph). López & Bussing 1982 (listed from Panama).

*Ptereleotris* sp., Allen & Robertson 1994 (Gulf of California to Panama; color photograph).

**Holotype:** USNM 322699, gravid female, 62.7 mm, collected at Isla San José, Perlas Islands, Panama (08°14'N, 79°02'W). Collected with rotenone over sand bottom at 12-15 m depth; 6 May 1990 by G.R. Allen and D.R. Robertson.

**Paratypes:** USNM 356855, 9 specimens (47.4-65.7), same data as holotype. USNM 322701, 2 (65.6-58.4 mm), San Carlos, Sonora, Mexico (27°56'N, 111°04'W). Collected with rotenone at 1-12 m depth; 24-27 June 1990 by G.R. Allen and D.R. Robertson. SIO 65-290-58, 3 (52.5-82.8 mm), Punta Agua Verde, Gulf of California, Mexico (25°31.0'N, 111°04.0'W). Collected with rotenone at 14-26 m depth; 11 July 1965 by R. Rosenblatt and party. UCR 2269-1, 2 (27.3-31.6 mm), Playa Escondida, Costa Rica (9°39'5"N, 84°40'30"W). Collected with quinaldine at 15 m depth; 5 April 1992 by W.A. Bussing. UCR 2400-1, 1 (33.0 mm), Playa Escondida, Costa Rica (9°40'00"N, 84°40'30"W). Collected with quinaldine at 12 m depth; 10 June 1993 by W.A. Bussing.

**Diagnosis:** A species of *Ptereleotris* which is distinguished from its congeners by the presence of: short dorsal (VI-I,20-22), and anal (I,19-22) fins; first and second dorsal fins of about equal height; a conspicuous median fold or keel on the isthmus; a lanceolate caudal fin with a dusky band on lower caudal rays in adults; and a blue or lavender body without other markings.

**Description:** Body elongate (Fig. 1), depth at first dorsal-fin origin 6.5-7.5 times in standard length (SL); laterally compressed, width 10.2-12.4 in SL. Dorsal profile of body slightly convex; ventral outline nearly straight or slightly convex. Upper head profile convex from first dorsal fin origin to snout tip. Lower head profile equally convex. Least depth of caudal peduncle 8.9-10.5 in SL; caudal peduncle length 9.3-11.5 in SL.

Head length 4.3-5.0 in SL. Eye near dorsal margin of head, horizontal diameter of orbit 3.6-4.6 in head length (HL). Snout length 4.2-5.5 in HL. Postorbital distance 1.6-1.8 in HL. Bony interorbital width 5.4-7.4 in HL. Nasal openings large, anterior nares only with slightly raised margin.

Mouth very oblique, opening dorsally; the lower jaw protruding, the maxilla reaching a vertical near anterior margin of pupil. Length of upper jaw 2.3-2.6 in HL; lower jaw 2.4-2.8 in HL. Teeth on upper jaw biserial anteriorly; the outer row of moderately large recurved canines becoming smaller posteriorly; the inner row of smaller canines and a pair of greatly enlarged recurved fangs at the symphysis; four irregular rows of smaller teeth posteriorly. Three irregular rows of teeth anteriorly on dentary similar in size, but less curved than teeth of upper jaw; a single row of smaller teeth posteriorly; a very large fang anterolaterally (three or four adjacent canines enlarged on some paratypes) in inner row, as large as upper symphyseal fangs. No palatine or vomerine teeth noted. Gill rakers on three paratypes 6 + 17 = 23. A

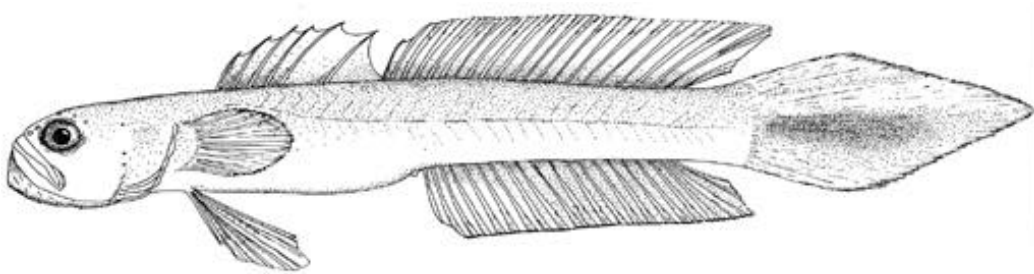


Fig. 1. *Ptereleotris carinata* n. sp., USNM 322699, holotype, female 62.7 mm from Isla San José, Perlas Islands, Panama.

TABLE 1

Proportional measurements in percent of SL of holotype and 17 paratypes of *Ptereleotris carinata*, new species.

	Holotype	Panamanian Paratypes (n = 9)	Mexican Paratypes (n = 5)	Costa Rican Paratypes (n = 3)
SL(mm)	62.7	47.4-65.7	52.5-82.8	27.3-33.0
Body depth	14.2	13.4-15.5	14.2-15.4	16.1-18.3
Body width	9.7	8.2-9.8	8.1-9.8	9.4-10.6
Head length	21.9	21.7-23.5	21.7-23.1	24.9-25.6
Snout length	4.8	4.4-5.5	4.2-5.3	5.5-5.7
Orbit diameter	5.9	5.6-6.3	4.8-6.3	7.6-7.9
Postorbital length	12.8	12.5-13.5	12.5-13.5	13.6-14.3
Bony interorbital distance	4.0	3.0-4.0	3.0-4.1	3.2-3.9
Upper jaw length	9.1	8.4-9.9	8.7-9.8	10.3-10.8
Lower jaw length	8.6	8.4-9.5	7.9-9.8	9.7-10.6
Caudal peduncle depth	9.9	9.6-10.7	9.5-11.3	11.1-11.7
Caudal peduncle length	9.6	8.7-10.8	8.5-10.5	9.5-9.7
First predorsal distance	27.6	26.2-30.0	27.5-30.5	30.0-33.0
Second predorsal distance	49.0	47.7-50.2	47.0-51.0	51.6-53.0
Preanal distance	55.8	52.9-54.6	53.3-55.0	55.0-55.4
Prepelvic distance	23.1	22.1-25.6	22.5-23.8	25.3-27.1
Caudal fin length	39.1	32.7-44.5	34.3-47.4	24.9-26.0
Pectoral fin length	14.8	12.9-15.6	12.7-16.9	16.1-17.6
Pelvic fin length	20.1	17.4-23.5	20.0-23.7	18.7-19.1
Length first dorsal spine	7.2	6.7-9.2	7.2-8.8	8.9-10.6
Length longest dorsal ray	12.1	11.6-18.3	12.1-19.4	14.7-17.1
Length penultimate D ray	16.4	14.4-20.6	16.6-21.7	11.8-13.0
Length penultimate A ray	16.8	14.4-20.0	15.2-18.9	12.0-13.6
Length first dorsal base	14.2	12.6-16.6	14.5-22.2	13.6-15.5
Length second dorsal base	41.6	39.9-43.7	40.2-43.2	37.6-41.1
Length anal-fin base	36.2	37.3-39.5	37.0-39.6	36.7-38.0

well-developed crenulated keel extends along entire isthmus (Fig. 2); anterior portion a fleshy pigmented extension of lower jaw becoming compressed as a median fold along the isthmus. Perhaps due to preservation, the median fold of the two specimens from Sonora, Mexico is not fully extended ventrally.

Pores of cephalic lateral line system and papillae are shown in Fig. 2. Head pores of lateral line system as follows: one posterior nasal pore (B') on each side of snout above posterior nostril; a pair of interorbital pores (D) straddling midline above center of eye; a supraorbital pore (E) slightly above eye and above or slightly anterior to a vertical at posterior margin of eye; an infraorbital pore (F) slightly behind eye and actually above upper margin of pupil; one terminal lateral canal pore (H') nearly in vertical line with two pre-

opercular pores (M', N'). The five pores of the anterior oculoscapular canal of Randall (1968) in the description of *P. helenae* correspond closely to the above mentioned upper head pores.

Cephalic cutaneous papillae mostly small, elevated and forming tracts of two to 15 papillae. The number of papillae in each tract varies slightly between individuals, but the position of major tracts is stable. *Suborbital series* - Five rows on cheek closely below eye, four approximately vertical series, a curved series slightly behind eye. *Postorbital series* - A vertical row curving toward, but not reaching dorsal midline. *Antedorsal series* - A row of about seven papillae on each side of midline on nape. *Median preorbital series* - About a dozen papillae scattered before eye around nasal openings. *Lateral*

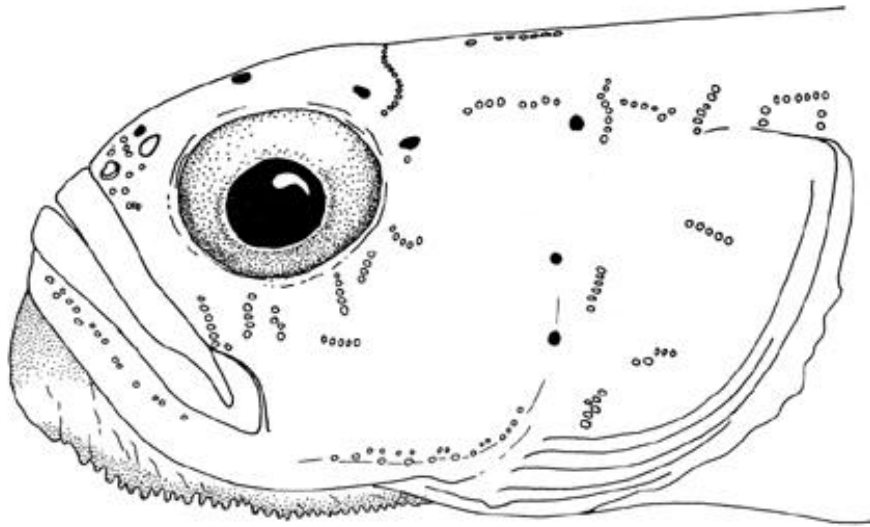


Fig. 2. *Ptereleotris carinata* n. sp., USNM 322699, holotype, female 62.7 mm from Isla San José, Perlas Islands, Panama. Detail of head to show head pores and cephalic papillary tracts.

*preorbital series* - A vertical row on side of snout below eye, extending down to maxilla. *Mandibular series* - An irregular row of about 15 papillae parallel to and below dentary. *Preopercular series* - A double series of several papillae parallel to lower margin of preopercle. *Opercular series* - Two short vertical series near posterior margin of preopercle; an oblique series on mid-opercle and a short irregular longitudinal series closer to ventral margin. *Oculoscapular series* - Seven papillary tracts of diverse orientation along oculoscapular sulcus, three longitudinal series and two long and two short vertical or oblique series.

Scales embedded and extremely small dorsally, increasing in size ventrally and only partially embedded on belly; cycloid and nonimbricate except on caudal peduncle and caudal fin where weakly ctenoid scales overlap each other.

Vertebral formulae of three Costa Rican paratypes  $11 + 15 = 26$  (this differs from Birdsong *et al.* (1988) who cite a vertebral formula of  $10 + 16 = 26$  for eight species of *Ptereleotris*).

First dorsal fin with six flexible spines (one aberrant juvenile with seven

spines); the first two spines shorter than succeeding spines, initial spine 11.3-14.9 in SL, longest spine 5.2-8.3 in SL. Second dorsal fin with one flexible spine and 20-22 segmented rays; the longest (penultimate) ray 4.6-6.9 in SL. Anal fin with one flexible spine and 20-23 segmented rays; the longest (penultimate) ray 5.3-7.2 in SL. Pectoral fin with 20-23 rays; longest ray 5.9-7.9 in SL. Pelvic fins separate with a short frenum; on flexible spine and four soft rays; length 4.2-5.8 in SL. Caudal fin long and lanceolate with rounded tip in adults, much shorter and rounded in juveniles; 15 principal rays, the median 13 branched, the upper and lower unbranched; principal caudal rays preceded by one short segmented ray and 9 nonsegmented procurrent rays; length of fin 2.1-3.1 in SL. No sexual dimorphism in fin length was noted.

Predorsal (first) distance 3.3-3.8 in SL; length of first dorsal fin base 4.5-7.9 in SL. Predorsal (second) distance 2.0-2.1 in SL; length of second dorsal fin base 2.3-2.5 in SL. Preanal distance 1.8-1.9 in SL; length of anal fin base. Prepelvic distance 3.9-4.5 in SL.

Head and body of ethyl alcohol-preserved holotype and other adults pale straw-

TABLE 2

*Segmented fin-ray counts for Ptereleotris carinata, new species (holotype with \*)*

	Dorsal-fin rays			Anal-fin rays			
	20	21	22	19	20	21	22
Mexico	1	2	2	1	2	1	1
Panama		6	4*		1	8*	
Costa Rica	2		1		2		1
	Pectoral-fin rays						
	20	21	22	23			
Mexico	1	2	1	1			
Panama		9*	1				
Costa Rica	1	1					

colored without dark markings; scattered melanophores more concentrated dorsally and along predorsal midline. Anal fin and posterior half of second dorsal fin dusky and with thin black margin; ventral half of caudal fin dusky, especially on medial rays posteriorly.

Color of adult *P. carinata* in life is described by Thomson et al. (1979) as: "Our specimens (Guaymas) of this large, distinctive, and strikingly beautiful goby have an elongated, compressed, pale body with lavender overtones and long-based orange to lavender unpaired fins. The entire top of the caudal fin has a bluish white streak." Allen & Robertson (1994) describe *Ptereleotris* sp. (= *P. carinata*) as: "...generally pale gray or slightly bluish; scattered blue spots and/or lines on head; a silvery white to blue-white stripe from above eye to origin of dorsal fins; fins pale except lower part of caudal dusky reddish." Costa Rican adult specimens at a distance appear bluish gray; the upper half of the tail white, contrasting with the dark lower half.

**Ecology:** The eastern Pacific hovering goby was observed in Costa Rica between 12 and 25 m depth off Playa Escondida. The fish were seen poised 10-20 cm above small mounds encircling the small openings to their

burrows. In Mexican waters, Thomson et al. (1979) found burrows always close to a reef. The Costa Rican gobies, however, were unassociated with reefs, and were instead grouped in small colonies on gently sloping mud-sand bottoms usually hundreds of meters from any rocky substrata. Quinaldine was used to obtain three juvenile specimens which had darted into the same burrows as adults. Numerous efforts to obtain adults by squirting Quinaldine solution into the burrows were unsuccessful and there was no indication that the current exited from any adjacent burrows, unlike the U-shaped burrows described by Randall (1968) for *Ioglossus* (= *Ptereleotris*) *helenae* in the Caribbean. Often two adults or an adult and one or two juveniles were seen to occupy the same burrow. When prevented from entering their own burrow, individuals would sometimes swim away rather than enter neighboring burrows.

**Etymology:** From the Latin *carina* meaning keel, *carinata* meaning keeled in reference to the pronounced membranous keel extending beneath the head of *P. carinata*.

**Distribution:** The species has been reported from both sides of central and lower Gulf of California, Costa Rica and Panama. I am unaware of any populations from eastern Pacific offshore islands.



Fig. 3. *Ptereleotris carinata* n. sp., Mexico. Photograph by G.R. Allen.

**Remarks:** The absence of any morphological or meristic differences between adults from Mexican and Panamanian populations (Tables 1 & 2) suggests continuous gene flow along the eastern Pacific mainland. Although Pacific reef habitat is apparently absent from most of Central America north of Costa Rica as well as southern Mexico, the habitat of mixed mud or fine and coarser sand substrata probably permits a fairly continuous extended population along this vast stretch.

The relative scarcity of hovering gobies in collections is easily explained. Most collections made with ichthyocides and SCUBA gear are made near reefs whereby colonies of sand-dwelling *Ptereleotris* are seldom affected. Also as noted by Randall (1968), squirting substances down the burrows is unsuccessful, however several of these gobies are occasionally collected when currents sweep low concentrations of rotenone-containing products over a colony

where the gobies are out of their burrows.

The new species resembles *Ptereleotris helenae* Randall of the West Indies in having lower fin-ray counts than most of the Indo-Pacific species, and in the bluish gray body coloration with blue lines on the head and fore part of the body. *P. carinata* differs from *P. helenae* in having the lowest fin-ray counts of any *Ptereleotris* species, the pronounced median keel on the ventral margin of the head, and a lanceolate caudal fin with dusky lower half. The only other Atlantic form, *Ptereleotris calliurus* Bean known from continental Western Atlantic, resembles *P. carinata* in its more lanceolate tail with dark lower half, but differs from *P. carinata* in possessing a variety of other fin markings absent from the new species.

Indo-Pacific *Ptereleotris* (Randall & Hoese 1985) have either a median, fleshy barbel on the chin or, as in *P. carinata*, a low fleshy protuberance followed by a median

fold. From the latter, *P. carinata* differs in possessing the following combination of characters: a lanceolate caudal fin, dorsal fins of about equal height, low dorsal-fin ray count (20-22) and lack of markings on the body.

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#### RESUMEN

Se describe una especie nueva del género *Ptereleotris* de los gobios dardo que viven en madrigueras sobre fondos arenosos. Se recolectaron los ejemplares en México, Costa Rica y Panamá y la especie es el único representante de este género cosmopolita en el Pacífico Oriental. Se distingue de sus congéneres del Atlántico Occidental e Indo-Pacífico por el bajo número de radios en las aletas, una quilla debajo de la cabeza, aleta caudal en forma lanceolada con mancha en la mitad inferior y color azul o púrpura del cuerpo.

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