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A New Species of *Didogobius* (Perciformes: Gobiidae) from the Canary Islands

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ABSTRACT

A new species of gobiid fish is described from the Canary Islands. The close resemblance in cephalic sensory papillae patterns with those of the monotypic Mediterranean genus *Didogobius* has

led to its inclusion within that genus. The generic description has been revised to include the new species.

INTRODUCTION

In the course of studying the fishes of the Canary Islands (Dooley et al., 1985), several undescribed gobiids were collected by the present author off the south coast of Gran Canaria. The gobiid fauna of temperate Macaronesia has been described as impoverished by Miller (1984) with 8 species present as compared to over 50 in the Mediterranean and western European areas (Miller, 1973a; Miller, 1986). Having collected seven additional species in the last three years (Van Tassell, personal observ.), I believe the impoverishment may be due more to inadequate collecting in the past than natural causes.

The gobiid described herein is placed in the formerly monotypic genus *Didogobius*

Miller based on the close agreement in the sensory papillae pattern with that of the type species, *D. bentuvii* Miller, 1965, from the eastern Mediterranean. The importance of sensory papillae patterns in gobiid classification is well known (Sanzo, 1911; Miller and Wongrat, 1979; Prince Akihito and Meguro, 1975; Hoese, 1983) and may be of primary importance in defining genera (Miller, personal commun.). Although *D. kochi* differs from *D. bentuvii* in having preopercular canal pores, an additional vertebra, and a lower number of lateral scales (37 vs. 70), the almost complete agreement in the pattern of sensory papillae has led me to include it within *Didogobius* rather than erect a new genus.

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TABLE 1
Lengths and Percentages of Standard Length for Holotype and Paratypes

Body dimension	Lengths (mm)			Percentage of SL		
	Holotype	Paratypes		Holotype	Paratypes	
	55659 ^a	55660	51700	55659	55660	51700
Standard length	44.9	40.1	44.2	—	—	—
Head length	11.1	11.1	11.4	24.7	27.6	25.8
Head width	8.6	7.7	7.2	19.1	19.2	16.3
Snout to first dorsal origin	14.8	14.6	14.7	32.9	36.4	33.3
Snout to second dorsal origin	22.9	22.6	23.9	51.0	56.4	54.1
Snout to above anus	24.3	22.6	23.4	54.1	56.4	52.9
Snout to above anal fin origin	25.1	23.4	26.0	55.9	58.4	58.8
Snout to above pelvic disk origin	12.8	11.0	12.1	28.5	27.3	27.4
Caudal peduncle length	8.0	6.8	8.2	17.8	17.0	18.6
First dorsal fin base	7.3	7.9	6.6	16.3	19.7	14.9
Second dorsal fin base	14.95	12.4	13.1	33.3	30.9	29.6
Anal fin base	10.95	9.4	10.1	24.4	23.4	22.9
Caudal fin length	11.5	11.5	10.7	25.6	28.7	24.2
Pectoral fin length	9.2	9.0	8.1	20.5	22.4	18.3
Pelvic disk length	7.7	7.3	*	17.1	18.2	*
Body depth at pelvic fin origin	5.4	4.9	5.5	12.0	12.2	12.4
Body depth at anal fin origin	5.0	4.1	4.6	11.1	10.2	10.4
Body width at anal fin origin	4.2	3.3	4.1	9.3	8.2	9.3
Caudal peduncle depth	3.95	3.3	3.5	8.8	8.2	7.9
Snout length	2.2	2.1	1.9	4.9	5.2	4.3
Eye diameter	2.2	2.3	2.2	4.9	5.7	5.0
Postorbital length	6.2	5.9	6.4	13.8	14.7	14.5
Cheek depth	3.1	2.8	3.3	6.9	7.0	7.5
Head width	8.35	7.4	7.0	18.6	18.5	15.8
Interorbital width	0.85	1.0	0.75	1.9	2.5	1.7

^a AMNH catalog numbers.

* = no data.

The generic diagnosis of *Didogobius* is revised to include the new species.

METHODS AND MATERIALS

A total of three specimens were collected from near Puerto Rico, Gran Canaria and are deposited at the American Museum of Natural History (AMNH) in New York. One specimen was collected in 1983 (paratype AMNH 51700) and two in 1984 (holotype AMNH 55659, paratype AMNH 55660). Although the first specimen resembles the others, its pelvic fin is malformed, its skeleton is not ossified in the preserved condition, and canine tooth development is lacking. The meaningful data than can be obtained from it have been included in table 1 but omitted from the species description.

Counts and measurements were made on

the left side of the specimen and conform to Miller (1961, 1969). The sensory papillae and cephalic lateral line system terminology conforms to Sanzo (1911). Pterygiophore formula follows Birdsong (1975).

Measurements were recorded to the nearest 0.1 mm with needlepoint dial calipers. The paratype (AMNH 55660) was cleared by trypsin digestion and stained using Alcian Blue 8GN and Alizarin Red stain according to Dingerkus and Uhler (1977).

The only known specimen of *D. bentuvii* (36.5 mm SL, female) is deposited at British Museum of Natural History (reg. no. 1965.2.1.1).

Didogobius (Miller, 1965)

TYPE SPECIES: *Didogobius bentuvii* Miller, 1965.

TABLE 2
Comparison of the Species *Didogobius* with Species Showing Similar Characters

Character	Genus, species					
	<i>Didogobius</i>		<i>Chromogobius</i>			<i>Asra</i>
	<i>kochi</i>	<i>bentuvii</i>	<i>quad.</i>	<i>zeb. zeb.</i>	<i>zeb. lev.</i>	<i>turc.</i>
Fin ray counts						
Second dorsal	I/12	I/14	I/3–11	I/11	I/11	I/14
Anal	I/11	I/12	I/7–9	I/10	I/9	I/11–12
Pectoral	18–19	19	16–18	15–16	16	*
Ventral	I/5	I/5	I/5	I/5	I/5	*
Branched caudal	15–17	15	15–16	14–17	*	*
Predorsal scales	present	absent	absent	absent	absent	absent
Scale type	all cycloid	all cycloid	all cycloid	ctenoid on caudal	ctenoid on caudal	no scales
LL scales	33–37	65–70	56–72	41–49	45–52	—
Transverse scales	11–12	18–20	22–25	18–21	18–19	—
Vertebrae	27	28	27	27	27	*
Sensory papillae						
Transverse rows	6	6	7	7	7	6
No. in row 7	1	1	1–4	1–3	1–4	2–3
Row 5	long	long	short	short	short	long
Standard lengths	40–45	36.5	34–53	31–43	31–42	30–46
Cranial roof musculature	present	present	present	present	present	absent

Species names: *quad.* = *quadrivittatus*, *zeb. zeb.* = *zebratus zebratus*, *zeb. lev.* = *zebratus levanticus*, *turc.* = *turcomanus*; * = no data.

DIAGNOSIS: The body is elongate and laterally compressed. The head is depressed with the cranial roof mostly covered by dorsal axial musculature. All scales are cycloid with 37–70 in the lateral series; the head and breast are naked. The anterior nostril is tubular, overlying the upper lip, but without a process or tentacle from the rim. The pectoral girdle is without flaps on the anterior edge and pectoral fins with uppermost rays not free or with tips only slightly projecting from the membrane. Teeth in jaws are erect, in three or four rows with one to three lateral canine teeth in lower jaw, upper jaw with an outer row of enlarged teeth followed by several large recurved canine teeth.

There are six transverse suborbital rows of sensory papillae (fig. 2), row two missing, and row seven represented by one papilla near pore α . The sixth row has a long ventral extension below the level of row d. Row b closely approaches or meets row 5 and the vertical row z at pore γ . Row d is continuous and row z ends anterior to pore ρ . The anterior dorsal row o approaches the fellow in midline.

Vertebrae, 27–28, including the urostyle. The first dorsal fin pterygiophore pattern is 3(22110). No ossified scapula is present.

Comparisons of the species of *Didogobius* with species showing similar characters are given in table 2.

Didogobius kochi, new species
(fig. 1)

HOLOTYPE: The holotype, AMNH 55659, male, 44 mm SL, was collected from a deep, narrow crevice in the side of a rock outcrop, depth of 15 m, off the south shore of Gran Canaria between the harbor of Puerto Rico and the Barranco de Balito, 15 August 1984.

PARATYPES: AMNH 55660 (female), 40.1 mm SL, collected with holotype and AMNH 51700 (male), 44.2 mm SL, collected on 6 August 1983 on the south shore of Gran Canaria between the harbor of Puerto Rico and the Barranco de Balito, at a depth of 15 m.

DIAGNOSIS: *D. kochi* is distinguished from *D. bentuvii* by the presence of predorsal scales, a lower lateral scale count (33–37 vs. 65–70),

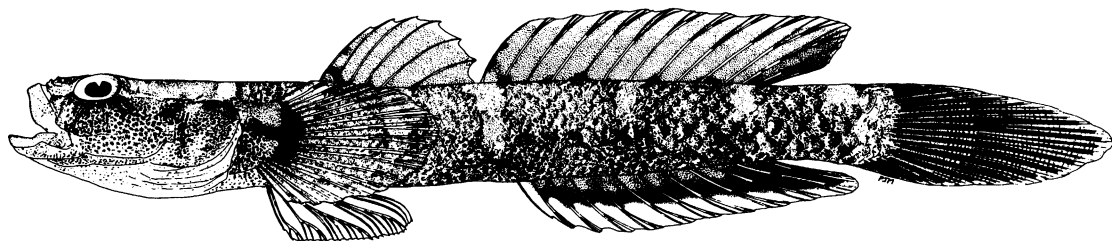


Fig. 1. *Didogobius kochi*, n. sp., holotype AMNH 55659, preserved coloration in 70% ETOH.

a lower transverse scale count (10–12 vs. 18–20), one less vertebra, the presence of a preopercular canal, a shorter anterior nostril, and larger eyes.

DESCRIPTION: The counts and measurements for the paratype (AMNH 55660) are in parentheses. The first dorsal with VI (VI) spines; second dorsal I, 12 (I, 12); anal I, 11 (I, 11); pectoral 19 (18); pelvic 10 (10); caudal 17 (15) branched rays. The first and second dorsal fins are distinctly separate. The tips of the rays in the pectoral fin extend slightly from the fin membrane on the dorsal and ventral margins; those on the posterior edge are filamentous and extend twice the distance of the dorsal rays.

The mouth is moderately oblique and the jaws are subequal. The posterior margin of the jaw is below the anterior third of the eye, and the upper lip width is less than half that of the lateral preorbital area. The tongue is truncate with a slight emargination along the anterior edge. The branchiostegal membrane is entirely attached to the lateral edge of the isthmus.

The scales are all cycloid with approximately 37 (33) in lateral series and 10 or 11 (12) in transverse series from the anterior end of the second dorsal to the anal fin. Predorsal scales cover the posterior third of the head. There are no scales on the cheeks or opercles. The uppermost and lowermost scales on the posterior margin of the caudal peduncle are not enlarged.

The cephalic lateral-line system (fig. 2) with anterior oculoscapular canals and pores σ , λ , κ , ω , α , β , ρ ; preopercular canals and pores γ , δ , ϵ . The pores are raised with pigmented edges. There are six transverse suborbital rows of sensory papillae, the seventh row represented by one papilla near pore α . The first transverse row is vertical; rows 3, 4, and 5

end dorsally near the lower border of the orbit; row 6 has a long ventral extension below the level of row d. Row b does not reach row 4 and connects to the vertical row z at pore γ . Row d is continuous and row z ends ventrally, anterior to pore γ . The anterior end of the oculoscapular row x' ends above the anterior edge of pore β . The anterior dorsal row o on each side closely approaches, but is separate from, the dorsal midsagittal groove. Row g extends in advance of the lateral end of row o and almost joins with row n. The snout has four median preorbital series of papillae. The body has nine short transverse rows and the caudal fin has papillae rows 1c, 1c', 1c''.

The body is elongated, the head is depressed; the eyes are dorsolateral with interorbital space slightly less than eye diameter and the cranial roof is covered by dorsal axial musculature. The caudal fin is rounded and slightly longer than the head length. The anterior incurrent nostril is short, tubular, and erect, tapering dorsally and overlapping the posterior edge of the upper lip when depressed. There is no well defined dermal process or tentacle on the anterior nostril rim. The posterior nostril is short, tubular, erect, and near the anterior margin of the orbit.

The pectoral and pelvic fins are transparent. The base of the pectoral fin is outlined in black, and there is a projection from the midpoint of the outline extending to the proximal junction with the body. The dorsal edges of the dorsal and caudal fins are yellowish in living specimens and clear in preserved specimens, becoming darker brown ventrally. The anal fin is translucent at the tip, becoming dark brown at the base.

OSTEOLOGY OF PARATYPE: Pedicle of premaxilla extends ventrally to anterior extension of lateral ethmoid and premaxillary crest extends to midpoint of pedicle. Maxilla has

strongly recurved anterior saddle-shaped head, the anteromedial margin of which articulates with crest of premaxilla along half its length; dorsolateral margin articulates with anterior process of palatine.

Hyomandibular has two struts which articulate with sphenotic (anteriorly) and pterotics (posteriorly). Metapterygoid (fig. 4A) articulates with the hyomandibular and extends to quadrate. No foramen present at symphysis with quadrate. Symplectic elongate, larger than metapterygoid, and articulates anteriorly with quadrate, dorsally with metapterygoid, and posteriorly with hyomandibular. Posterior edge of symplectic has extension toward the preoperculum and uniting with an anterior extension of the preoperculum below lower margin of hyomandibula. Operculum, preoperculum, and suboperculum are without spines; and margins are entire.

Ectopterygoid is broad, united with the palatine along most of ventral margin. Palatine forks anteriorly with anterior strut articulating with anterior edge of the maxilla and posterior strut with median ethmoid. No mesopterygoid.

Five branchiostegal rays. The first articulates with anterior extension of ceratohyal near midpoint, the second, third, and fourth with posterior region of the ceratohyal, and fifth with epihyal. Basihyal fan-shaped with straight anterior margin. Urohyal extending posteriorly to anterior articulation of second branchiostegal ray. Posterior margin strongly concave and crescent shaped, dorsal and ventral edges are equally extended posteriorly. Four basibranchials, 1 and 4 cartilaginous, 2 and 3 ossified. Three hypobranchials, third articulating with third and fourth ceratobranchials. Five ceratobranchials, first and second articulating with separate hypobranchials with the fifth free.

Pectoral girdle (fig. 4D) with four radials. Ventral margin of fourth related to midpoint of hypocoracoid. Scapula not ossified and with large foramen at dorsal end. Supracleithrum articulates anteriorly with posttemporal and posteriorly with cleithrum.

Caudal skeleton (fig. 4C) with one epural, ventral margin of which embraces dorsal proximal margin of hypural plate 3 + 4; posterior margin is thickened. Five hypurals

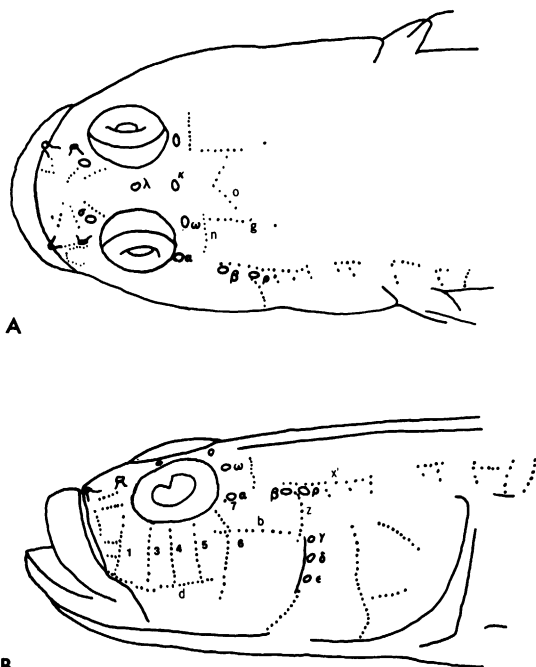


Fig. 2. Sensory papillae pattern and cephalic lateral-line system of *D. kochi*.

present, hypural five separate with 1 + 2 and 3 + 4 fused. The two fused plates are joined at anterior margin only. A short parhypural is present. Dorsal and ventral basal cartilage present.

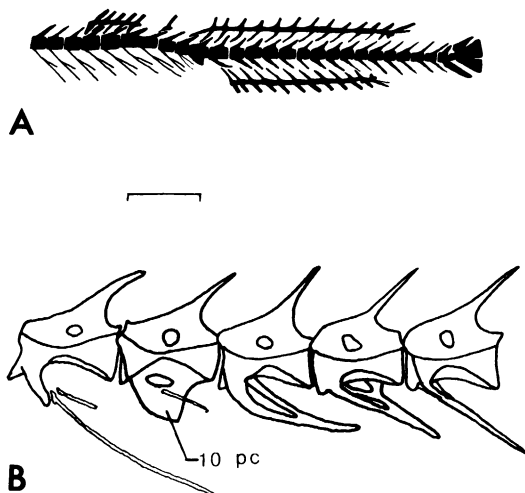


Fig. 3. Vertebral column of paratype (AMNH 55660); A. silhouette showing pterygiophore pattern; B. last two precaudal vertebrae and first three caudal vertebrae showing expanded transverse process of tenth precaudal; scale = 1 mm.

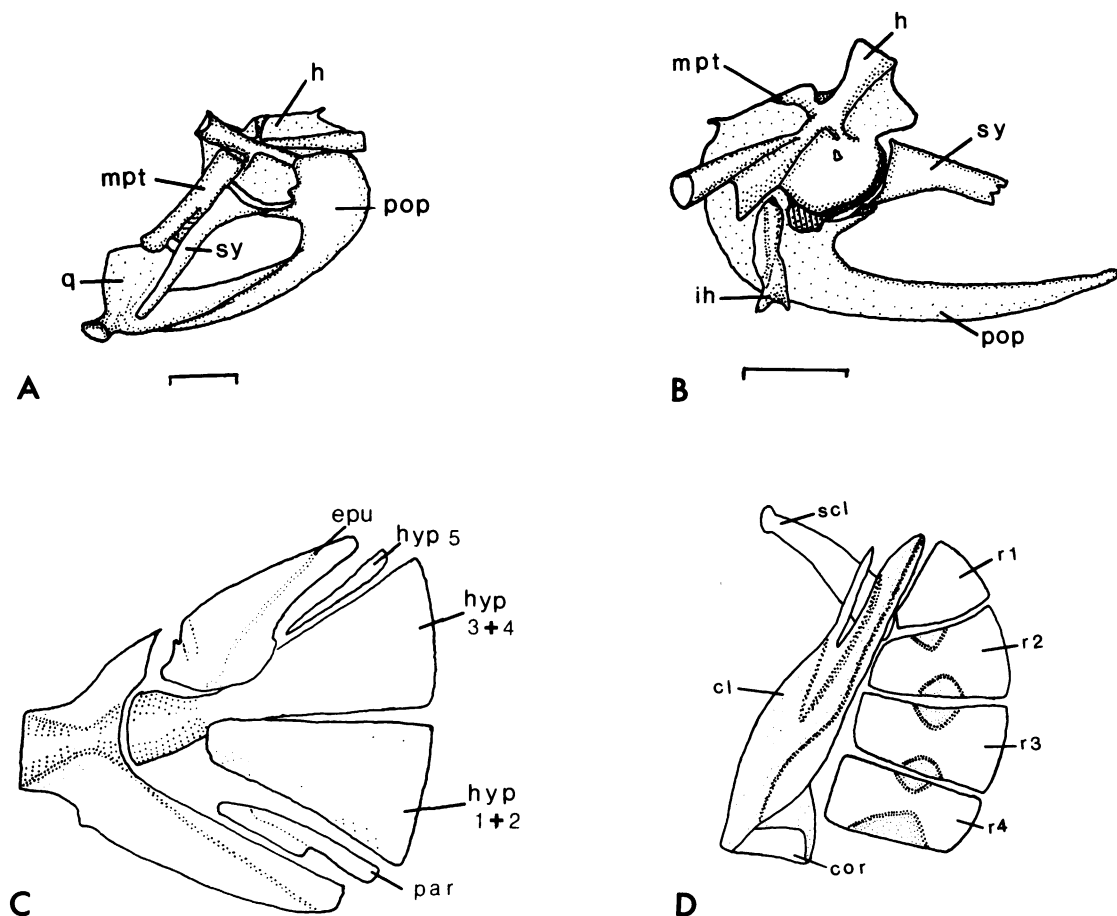


Fig. 4. A. Lateral view; B. medial view of hyomandibula (h), preoperculum (pop), metapterygoid (mpt), quadrate (q), symplectic (sy), and interhyal (ih); C. caudal skeleton with eplural (epu), and hyplurals (hyp); D. pectoral skeleton, lateral view showing position of supracleithrum (scl), cleithrum (cl), hypocoracoid (cor), and radials (r) 1-4. Scale = 1 mm.

Vertebrae 10 + 17 include ural centrum (fig. 3A). Tenth precaudal vertebra has a broad transverse process (fig. 3B), its median edge extending entire length of vertebra. This vertebra lacks a pleural rib, although a small epipleural rib is visible in cleared and stained specimen.

Lower jaw possesses an outer row of three enlarged teeth on each side and an inner row with six, moderately enlarged teeth, followed by three, strongly recurved canines on each side. Upper jaw has 12 enlarged teeth in an outer row followed by two large recurved canines and one to three series of small caniniform teeth. Pharyngeal teeth are numerous, slender, and caniniform.

DISTRIBUTION: Known only from the type locality.

COMPARISONS: *Didogobius kochi* has typical gobiine skeletal features such as the connecting bridge between the symplectic and preopercular bones and an extended metapterygoid/quadrate bridge (Miller, 1973b).

D. kochi shows close affinities (table 2) with the Mediterranean gobiid genus *Chromogobius* De Buen (type species *Gobius quadrivittatus* Steindachner), as revised by Miller (1971). It differs from *Chromogobius* in the following features: (1) total lack of scale ctenii, (2) one less transverse sensory papillae row, (3) shapes of the urohyal, anterior process of the maxilla, and epural plate, (4) a lower lat-

eral scale count in contrast to *C. zebratus* (41–52) or *C. quadrivittatus* (56–72), and (5) pelvic fin is a complete circular disk as opposed to that of *Chromogobius*, which has a well developed anterior membrane with lateral lobes. *D. bentuvii*, also a Mediterranean species, shows closer affinity to *Chromogobius* in its higher lateral scale count of 65–70.

Atlantic species which share similar characters with *D. kochi* include the European species *Zebrus zebrus* (Risso) and the South African genera *Nematogobius* Boulenger and *Caffrogobius* Smitt. They resemble *D. kochi* in possessing a short seventh suborbital row of sensory papillae, in the absence of post-orbital scales, and in possessing a body pattern consisting of vertical bars across the flanks. The South African genera further resemble *D. kochi* in possessing an elongation of suborbital row 6 well below the level of row d. Of the two genera, *Nematogobius* is closer to *D. kochi* due to its smaller-scale ctenii and lower lateral-line scale count (37–40) as compared to *Caffrogobius* (44–70).

There is an amazing resemblance of *Didogobius* with the monotypic gobiid genus, *Asra* Iljin, known only from the Caspian Sea. Both *Didogobius* and *Asra* possess an elongate, compressed body and flattened head, second dorsal and anal fins of similar counts (D2: I/12–14 vs. I/14; anal: I/11–12 vs. I/11–12), a tubular anterior nostril without a tentacle, and very close resemblance of the sensory papillae. They differ in that *Asra* lacks scales, the cranium is not covered by dorsal axial musculature, and there are no cephalic canal systems.

HABITAT: The general area is typified by rock outcroppings, generally projecting from volcanic headlands, with large expanses of sand between outcroppings. Associated fish species inhabiting the outcrops include: *Trypterygion delaisi* Cadenat and Blache, 1970; *Apogon imberbis* (Linnaeus, 1758); *Abudefduf luridus* (Cuvier, 1830); *Chromis limbatus* (Valenciennes, 1833); *Ophioblennius atlanticus atlanticus* (Valenciennes, 1836); *Thalassoma pavo* (Linnaeus, 1758); *Scorpaena maderensis* Valenciennes, 1833; *Centrolabrus trutta* (Lowe, 1833); and *Coris julis* (Linnaeus, 1758); (Dooley et al., 1985).

ETYMOLOGY: This species is named in honor of Rudolf Koch of Patalavaca, Gran Ca-

naría, who helped discover several new species of gobies from the Canary Islands.

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