

First record of the Roule's goby, *Gobius roulei* (Gobiidae), in the Levant

by

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RÉSUMÉ. - Premier signalement de *Gobius roulei* (Gobiidae) en mer Levantine.

Le spécimen de *Gobius roulei* de Chypre récemment trouvé dans la collection de poissons de l'Université hébraïque de Jérusalem est le premier signalement de cette espèce dans la mer du Levant et l'un des rares signalements de cette espèce.

Key words. - *Gobius roulei* - MED - Cyprus - Morphology - New record.

Roule's goby, *Gobius roulei*, was described by De Buen (1928), from a specimen collected in the Bay of Palma, Balearic Islands, in 1919. It was for a long time known only from the holotype. This, and the four later findings from the eastern Atlantic, the western Mediterranean and the Adriatic Sea (Maul, 1976; Miller, 1986; Kovačić 1995; Ahnelt and Dorda, 2004), have remained the only records of this species. However, this rarely found species can be quite abundant on characteristic grounds (Kovačić, 1995, 2001; Lipej *et al.*, 2003). This species was not included in the last comprehensive study of the ichthyofauna of the eastern Levant (Golani, 1996). A specimen of *G. roulei* from Cyprus, recently found in the Fish Collection of the Hebrew University of Jerusalem, represents the first record of this species in the Levant (Fig. 1). Identification was carried out according to Miller (1986) and Kovačić (1995).

MATERIAL AND METHODS

The specimen, a female, 42.4 + 10.1 mm, was collected c.a. 4 km south of Famagusta, Cyprus, on 20 November 1969 by SCUBA divers using rotenone on rocky habitat (the depth was not recorded). The specimen is deposited at the Hebrew University of Jerusalem (HUJ 14140). Morphometric and meristic methods follow Miller (1988). Meristic abbreviations: A, anal fin; C, caudal fin; D1, D2, first and second dorsal fin; P, pectoral fin; V, pelvic disc; LL, scales in lateral series; TR, scales in transverse series. Terminology of lateral-line system follows Sanzo (1911) and Miller (1986).

RESULTS

Body proportions are given in table I. Anterior nostril short, tubular, with short process from posterior part of rim. Branchiostegal membrane attached to entire side of isthmus. Teeth in jaws caniniform, in several rows. Fins: D1 VI, D2 I/12, A I/12, C 16 articulated rays, 14 branched, P left 17 and right 18, V I/5+5/I. D1 rays not elongate. P free rays moderately developed. V elliptical

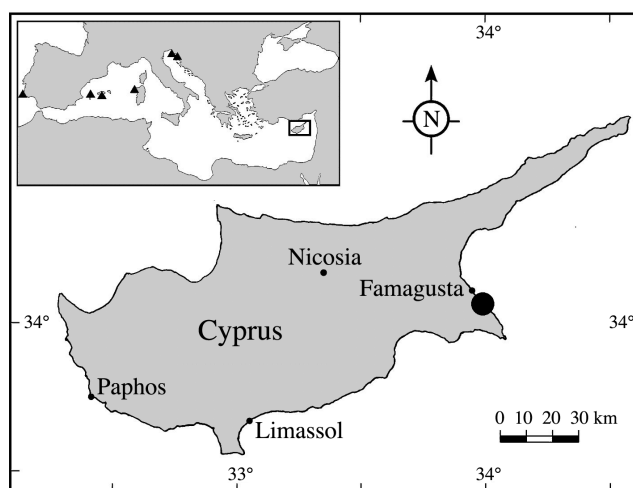


Figure 1. - Map of the Mediterranean showing previous records (▲) and Cyprus new record (●) of *Gobius roulei*. [Carte de la Méditerranée indiquant les signalements précédents (▲) et le nouveau signalement chypriote (●) de *Gobius roulei*.]

and complete, anterior membrane height in midline about 1/2 length of pelvic spinous ray. C rounded. Body with ctenoid scales, LL left side 32 and right side 33, TR 8. Head and predorsal area naked. Scales large, scale width on lateral midline at axilla 2.1 mm or 5.0% of standard length. Preserved specimen was almost uniformly light brown, with remains of dark pattern of blotches along lateral midline and of dots on the first spine of D1 and D2.

Head with anterior and posterior oculoscapular, and preopercular canals, with pores σ , λ , κ , ω , α , β , ρ , ρ^1 , ρ^2 , and γ , δ , ϵ respectively. Pores large, pore α width 0.4 mm or 3.2% of head length. Rows and, in parenthesis, number of sensory papillae as follows:

1. - *Preorbital*: snout with five median preorbital series, row *r* divisible into two sections, superior inner r^1 (4) and inferior outer r^2 (4), row s^1 (3) below pore σ , s^2 (3) and s^3 (2) more medially. Lateral series *c* in four parts: superior c^2 (4); middle c^1 (4); inferior upper c_2 (5) and lower c_1 (4).

2. - *Suborbital*: six transverse suborbital rows (1-6) of sensory papillae, rows 2 and 3 begin near orbit, inferior segment of row 6 not greatly extended below level of row *d* (1: 10, 2: 4, 3: 5, 4: 4, 5: 7, 6s: 5, 6i: 6). Longitudinal row *b* (9) extending forwards to row 5. Longitudinal row *d* continuous (20).

3. - *Preoperculo-mandibula*: *r*: external row *e* and internal row *i* divided into anterior (*e*: 20, *i*: 8), and posterior sections (*e*: 23, *i*: 8); row *f* (4).

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SL (mm)	42.4
%SL, H	29.5
Hw	20.5
SN/D1	33.0
SN/D2	54.4
SN/AN	51.7
SN/A	55.9
SN/V	28.3
CP	20.3
D1b	18.2
D2b	30.7
Ab	23.8
Cl	24.3
Pl	23.6
Vl	22.2
Vd	17.9
Ad	16.0
Aw	12.9
CPd	9.4
V/AN	23.4
%CP, CPd	46.5
%H, SN	21.6
E	29.6
PO	48.8
CHd	15.2
Hw	69.6
%E, I	16.2
%V/AN, Vl	95.0

Table I. - Body proportions of *Gobius roulei* (HUJ 14140). Abbreviations: Ab, anal fin base; Ad and Aw, body depth and width at anal fin origin; Cl, caudal fin length; CHd, cheek depth; CP and CPd, caudal peduncle length and depth; D1b and D2b, first and second dorsal fin base; E, eye diameter; H and Hw, head length and width; I, interorbital width; Pl, pectoral fin length; PO, postorbital length; SL, standard length; SN, snout length; SN/A and SN/AN, distance from snout to vertical of anal fin origin and anus; SN/D1 and SN/D2, distance from snout to origin of first and second dorsal fins; SN/V, distance from snout to vertical of pelvic fin origin; V/AN, distance from pelvic fin origin to anus; Vd, body depth at pelvic fin origin; Vl, pelvic fin length. [Mensurations de *Gobius roulei*. Abréviations : Ab, base de la nageoire anale ; Ad et Aw, hauteur et largeur du corps à l'origine de la nageoire anale ; Cl, longueur de la nageoire caudale ; CHd, hauteur de la joue ; CP et CPd, hauteur et profondeur du pédoncule caudal ; D1b et D2b : base de la première et de la seconde nageoire dorsale ; E, diamètre de l'œil ; H et Hw, longueur et largeur de la tête ; I, largeur interorbitale ; Pl, longueur de la nageoire pectorale ; PO, longueur postorbitale ; SL, longueur standard ; SN, longueur du museau ; SN/A et SN/AN, distance du museau à la verticale de l'origine de la nageoire anale et de l'anus ; SN/D1 et SN/D2, distance du museau à l'origine des premières et secondes nageoires dorsales ; SN/V, distance du museau à la verticale de l'origine de la nageoire pelvienne ; V/AN, distance de l'origine de la nageoire pelvienne à l'anus ; Vd, hauteur du corps à l'origine de la nageoire pelvienne ; Vl, longueur de la nageoire pelvienne.]

4. - *Oculoscapular*: anterior longitudinal row x^1 (8) above pore ρ^1 , posterior longitudinal row x^2 (5) above ρ^2 ; row z (3) with lower end close to pore γ , row q (4) between pores ρ and ρ^1 , row y (2) behind pore ρ^2 . Axillary rows as^1 (5), as^2 (6), as^3 (8), la^1 (3) and la^2 (3) well developed.

5. - *Opercular*: transverse row ot (19); superior longitudinal row os (10); and inferior longitudinal row oi (7).

6. - *Anterior dorsal*: anterior transverse row n (4) behind pore ω , row g (4) ending behind lateral part of row o , row o (4) separated from fellow in dorsal midline, row m (3), row h (9).

DISCUSSION

The present specimen possesses the characters that distinguish the genus *Gobius* from other gobiid genera (Kovačić and Miller, 2000). The elongated D1 is a character of limited use for identification of *G. roulei*, since it is present only in adult males (Kovačić, 2001). The following characters, found on samples from the Adriatic Sea and the Levant, are unique for *G. roulei* among the genus *Gobius*: (1) head and predorsal area naked; (2) scales large, compared to standard length; (3) pores large, compared to head length; (4) transverse suborbital rows short and all, included rows 2 and 3, begin near orbit. The specimen from the Hebrew University Fish Collection is similar in body morphology, fins, squamation, and lateral line system to population of *G. roulei* from the Adriatic Sea (Kovačić, 1995). The specimen from Cyprus differs from the Adriatic specimens (Kovačić, 1995) only in the higher number of sensory papillae in *oculoscapular* rows q and as^3 . No conclusion could

be done on the differences of body proportions between a single female from Cyprus and the single female in the Adriatic sample (Kovačić, 1995). However, several body proportions of both females were out of ranges of body proportions of males in the Adriatic sample.

The present record of *G. roulei* from Cyprus extended the geographical range of this species far to the east from the already known distribution in the eastern Atlantic, the western Mediterranean and the Adriatic Sea (De Buen, 1928; Maul, 1976; Miller, 1986; Kovačić, 1995) (Fig. 1). This finding also extended known ecological distribution to the warmer part of the Mediterranean Sea. Therefore, *G. roulei* may be expected to occur throughout the Mediterranean. It is supposed, moreover, that the restricted distribution of some of the gobiid species to the northern part of the Mediterranean (Miller, 1986) could reflect the intensity of work on gobies in different parts of Mediterranean and not the real geographical distribution of these species.

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REFERENCES

- AHNELT H. & J. DORDA, 2004. - Gobioid fishes from the north-eastern Atlantic and the Mediterranean: New records and rarely found species. *Ann. Naturhist. Mus. Wien*, 105B: 5-19.
- DE BUEN F., 1928. - Descripción de un nuevo *Gobius* (*G. roulei* nov. sp.). *Not. Resum., Inst. Esp. Ocean.*, 2(30): 1-6.
- GOLANI D., 1996. - The marine ichthyofauna of the eastern Levant. History, inventory and characterization. *Isr. J. Zool.*, 42: 15-55.
- KOVAČIĆ M., 1995. - *Gobius roulei* De Buen, 1928 (Pisces, Teleostei, Gobiidae), a fish new to the Adriatic fauna. *Nat. Croat.*, 4: 173-184.
- KOVAČIĆ M., 2001. - The biology of Roule's goby in the Kvarner area, northern Adriatic Sea. *J. Fish Biol.*, 59(4): 795-809.
- KOVAČIĆ M. & P.J. MILLER, 2000. - A new species of *Gobius* (Teleostei: Gobiidae) from the northern Adriatic Sea. *Cybium*, 24(3): 231-239.
- LIPEJ L., ORLANDO BONACA M. & M. ŠIŠKO, 2003. - Coastal fish diversity in three marine protected areas in the Gulf of Trieste (northern Adriatic). *Mar. Ecol.*, 24: 1-15.
- MAUL G.E., 1976. - The fishes taken in bottom trawls by R.V. "Meteor" during the 1967 seamounts cruises in the northeast Atlantic. *Meteor Forsch. Ergeb.*, 22: 1-69.
- MILLER P.J., 1986. - Gobiidae. In: Fishes of the north-eastern Atlantic and the Mediterranean, Vol. III (Whitehead P.J.P., Bauchot M.-L., Hureau J.-C., Nielsen J. & E. Tortonese, eds), pp. 1019-1085. Paris: UNESCO.
- MILLER P.J., 1988. - New species of *Corcyrogobius*, *Thorogobius* and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). *J. Nat. Hist.*, 22: 1245-1262.
- SANZO L., 1911. - Distribuzione delle papille cutanee (organi ciatiforme) e suo valore sistematico nei Gobi. *Mitt. Zool. Stat. Neapel*, 20: 249-328.

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