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Gammogobius steinitzi BATH, 1971, A FISH NEW TO THE ADRIATIC SEA

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Two specimens of *Gammogobius steinitzi* Bath, 1971 were caught during scuba diving, 16th October 1998, in a sea cave near Vrbnik, Island of Krk, northern Adriatic Sea. This provided the first positive record of the species in the Adriatic Sea, and one of the few records at all of this species.

Keywords: Gobiidae, *Gammogobius steinitzi*, Adriatic Sea, first finding

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Dva primjerka vrste *Gammogobius steinitzi* Bath, 1971 ulovljena su tijekom ronjenja autonomnom ronilačkom opremom 16. listopada 1998. u podvodnoj špilji blizu Vrbnika, otok Krk. To je prvi nalaz te vrste za Jadran, i jedan od nekoliko nalaza uopće.

Ključne riječi: Gobiidae, *Gammogobius steinitzi*, Jadransko more, prvi nalaz

INTRODUCTION

Many small, cryptic gobies are known only from one or a few localities (AHNELT *et al.*, 1994; AHNELT *et al.*, 1998; AHNELT & PATZNER, 1995; 1996; KOVAČIĆ, 1997; MILLER, 1986; 1992). Among them, *Gammogobius steinitzi* was for a long time known only from types (BATH, 1971; MILLER, 1986). The species was described from three specimens by BATH (1971). It is mentioned again in Miller's lists of Gobiidae in the Mediterranean and north-eastern Atlantic (MILLER, 1973; 1986), but only with data known from the types. More specimens were found recently off the Balearic Islands (AHNELT & PATZNER, 1996; PATZNER, *in press*) and Elba (AHNELT *et al.*, 1998). These papers have provided more data on the morphology and habitat of the species.

During scuba investigation of the biology and geology of a sea cave near Vrbnik, island of Krk, northern Adriatic Sea, specimens of *G. steinitzi* were seen, and two

specimens were collected (Fig. 1). Determination was carried out according to BATH (1971) and MILLER (1986). The present finding is the first record based on specimens collected from the Adriatic Sea, and from outside the western Mediterranean.

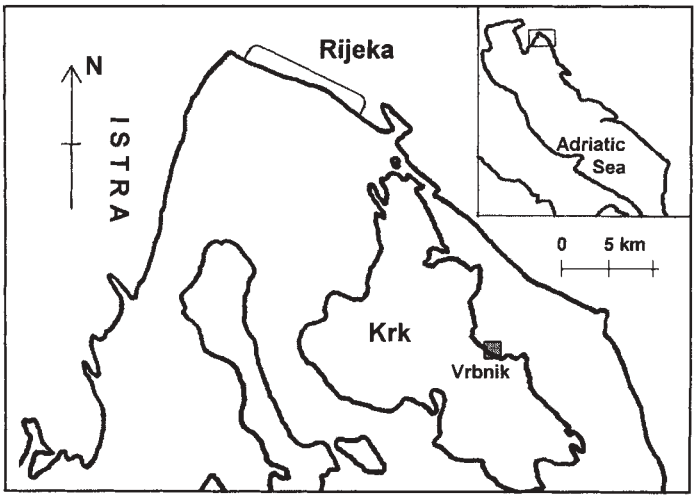

Fig. 1. The Kvarner area. Collecting site (■) Vrbnik, island of Krk, Croatia.

MATERIAL AND METHODS

Material. Two females, 26.2+5.2 (Fig. 2) and 24.8+5.0 mm, PMR P610, Croatia, Vrbnik, Island of Krk, October 16, 1998, leg. M. Kovačić. They were caught with a handnet and anaesthetic, fixed in 7 % formaldehyde, and preserved in 4 % formaldehyde. The specimens are deposited at the Prirodoslovni muzej Rijeka.

Methods. Morphometric and meristic methods as in MILLER (1988). Meristic abbreviations: A, anal fin; C, caudal fin; D1, D2, first and second dorsal fins; LL, scales in lateral series; TR, scales in transversal series; P, pectoral fin; V, pelvic disc. Terminology of lateral line system follows SANZO (1911) and MILLER (1986).

RESULTS

Morphology

Body proportions for the first (26.2+5.2 mm) and the second (24.8+5.0 mm) specimen: as percentage of standard length, head length 32.1 and 31.9; head width 22.1 and 21.0; snout to D1 origin 38.9 and 39.1; snout to D2 origin 57.6 and 57.3; snout to anus 53.8 and 54.4; snout to anal fin 57.6 and 58.1; snout to pelvic fin ori-

Fig. 2. *Gammogobius steinitzi*, female, 26,2 + 5,2 mm, Vrbnik, island of Krk, Croatia, October 16, 1998.

gin 32.1 and 31.5; caudal peduncle 24.8 and 25.0; D1 base 15.7 and 14.9; D2 base 23.3 and 23.4; A base 17.6 and 16.9; C 19.9 and 20.2; P 21.8 and 22.3; V disc 22.9 and 23.0; body depths at V origin 20.2 and 21.4; at A origin 16.0 and 17.3; body width at A origin 12.2 and 12.1; depth of caudal peduncle 9.5 and 10.1; pelvic origin to anus 21.8 and 22.6; as percentage of caudal peduncle length, caudal peduncle depth 39.7 and 40.3; as percentage of head length, snout 31.0 and 31.7; eye 25.0 and 24.1; post-orbital length 44.1 and 44.3; cheek depth 16.7 and 17.7; head width 69.1 and 65.8; as percentage of eye length, interorbital width 14.3 and 15.0.

Fins. D1 VI, D2 I/8, A I/8, C 14, P 15, V I/5+5/I. P without free rays. V disc rounded; anterior membrane well developed, height in midline about 2/3 (larger specimen) to ¾ size (smaller specimen) length of pelvic spinous ray.

Scales. Body with ctenoid scales, except for the cycloid scales on the ventral side of the abdomen and on the base of the pectoral fin; LL 30–32 (the first specimen, 26.2+5.2 mm, left and right side 32 scales, the second specimen, 24.8+5.0 mm, left side 30, right 31 scales); TR 10–11 (the first specimen, 26.2+5.2 mm, left and right side 10 scales, the second specimen, 24.8+5.0 mm, left and right side 11 scales).

Coloration (from slides of freshly caught specimens). The first specimen (26.2+5.2 mm) brownish yellow (Fig. 2), and the second (24.8+5.0 mm) specimen brownish. Both specimens with 7 lateral vertical pale bands, the first in front of C origin, the seventh beginning at the origin of D1. Two more bands on the predorsal area, and three bands on cheek. Black spots along dorsal fin bases, and more dark area between the first pale band and C origin.

Lateral-line system. Head with anterior oculoscapular canal present, with all pores; posterior oculoscapular and preopercular canal absent. Rows and number (the first specimen, 26.2+5.2 mm, left, right; the second specimen, 24.8+5.0 mm, left, right) of sensory papillae as follows: *preorbital*: *r* (3+4,3+4; 3,3), s^1 (4,4; 3,3), s^2 (3,3; 3,3), c^1 (3,3; 3,3), c^2 (3,3; 2,3), c_1 (5,5; 5,6), c_2 (3,3; 2,2); *suborbital*: *1* (6,6; 6,6), *2* (6,8; 7,6), *3* (7,7; 7,6), *4* (8,8; 8,8,), *5* (4,4; 4,4), *6s* (4,7; 5,5), *6i* (10,10; 10,11), *7* (1,1; 1,1), *b* (8,9; 10,9), *d* (9+9,9+11; 7+11,7+10); *preoperculo-mandibular*: *e* (21+16,20+15; 21+20, 22+17), *i* (8+7,8+8; 9+9,11+9), *f* (13,12; 8,8); *oculoscapular*: x^1 (7,7; 9,10), x^2 (4,5; 4,4), *z* (7,6; 5,5), *q* (3,5; 3,3), *y* (2,2; 2,3), *tr* (3,4; 3,3), as^1 (5,6; 5,5), as^2 (5,6; 6,7), as^3 (5,6; 6,7), la^1 (2,3; 2,3), la^2 (5,3; 4,6); *opercular*: *ot* (16,16; 14,14), *os* (8,8; 7,6), *oi* (6,6; 7,6); *anterior dorsal*: *n* (7,7; 6,6), *g* (5,5; 4,4), *o* (3,3; 4,4), *m* (2,2; 2,2), *h* (8,10; 7,7).

Ecology

The specimens were collected in a cave, the width of the opening being 6 to 8 m. The base of the entrance is at the depth of 17 m, and the top is at 10.5 m. The cave is about 25 m deep, becoming narrower and rising to shallower depths from the entrance to the end. No specimens of *G. steinitzi* were found at the cave opening with the characteristic precoralligenous facies of the corallinous biocoenosis (PERES & GAMULIN-BRIDA, 1973). The species were observed through the entire cave, from the front part rich with sessile invertebrates (Porifera, Polychatea, Bryozoa, Tunicata) to the almost empty middle and end, both with rarely present sponges. The specimens were positioned on walls and roof with many holes and cavities. During a half hour check of the open rocky surface of walls and roof nearly a dozen specimens were seen, but it may be expected that many more specimens were hidden in holes and cavities. The front part of the cave was rich with other fishes (*Lipophrys nigriceps, Parablennius rouxi, Thorogobius ephippiatus, Labrus bimaculatus*). Besides *G. steinitzi* and the very common *T. ephippiatus*, only a few specimens of the fishes *Serranus hepatus, Serranus scriba, Scorpaena scrofa* and *Scorpaena notata* were observed in the middle part. In the deepest part of the cave the only recorded fishes were *G. steinitzi* and *T. ephippiatus.*

Geographical distribution

Until this record for the Adriatic Sea, *G. steinitzi* was known only from the type locality near Marseilles (BATH, 1971), from the Balearic Islands (AHNELT & PATZNER, 1996), and from Elba (AHNELT *et al.*, 1998). However, although all known findings are from the western Mediterranean and the Adriatic Sea, the species may be expected to occur throughout the Mediterranean.

DISCUSSION

The recently collected specimens from the Adriatic Sea correspond in coloration and shape of body and head, including eyes, snout and jaws, with the original species description (BATH, 1971). The fins differ only in the measurements of D2 and A.

The number of rays in D2 and A agrees with later findings for the western Mediterranean Sea (AHNELT *et al.*, 1998; AHNELT & PATZNER, 1996). Authors assigned the deviations from BATH (1971) to different counting of the last bifid ray in D2 and A. TR and LL are within the values of BATH (1971). The lateral-line system corresponds to BATH's description (1971) in canals with pores and in the presence and arrangement of the sensory papillae rows, except for another small row *c* (c_2) under the larger c_1 (c') in the specimens from the Adriatic Sea. The only papilla in row *u* in BATH (1971) is counted here within row *q*. The discrepancy in the number of sensory papillae in rows between the present finding and the original species description could be part of the normal variability within the same species.

Values for Western Mediterranean specimens obtained from similar morphometric methods to the present work were given in AHNELT *et al.* (1998) and AHNELT & PATZNER (1996). The only important variation is in the head width, but being so large, it is probably the result of different measuring techniques. The other notable morphological differences are in the lateral-line system. According to AHNELT *et al.* (1998) the specimen from Elba has row s^3 (AHNELT *et al.*, 1998). The arrangement of rows *c* on specimens from the Balearic Islands (figure in AHNELT & PATZNER, 1996) is different from that of the present findings. A discrepancy in the number of sensory papillae in rows is also present. Thus, the specimens from the northern Adriatic Sea are very similar in morphology to specimens collected near Marseilles, off the Balearic Islands and Elba. Larger samples from various locations will show a certain extent of variability in the number of sensory papillae in rows within one population and possible significant differences between samples from distant localities.

The present collected specimens and all previously known findings (AHNELT & PATZNER, 1996; AHNELT *et al.* 1998; BATH, 1971; PATZNER, *in press*) are from sea caves. The depth of the present finding is within the known depth range from 2 to 43 m (BATH, 1971; PATZNER, *in press*). The investigated cave is deeper than caves of previous records, and specimens noticed at the back are the most distant finding from a cave entrance. The behaviour of the specimens and their reactions to attempts at collecting were very similar to those described by PATZNER (*in press*).

Before the present finding, possible photographs of *G. steinitzi*, by Borut Furlan, from the Adriatic Sea were published twice (TURK, 1996; DEBELIUS, 1997), but no specimens were collected. The specimen in TURK (1996) was photographed in a sea cave, depth 7 m, the island of V. Čutin, in the northern Adriatic Sea, in 1994, and was identified as *Chromogobius zebratus* (Furlan, personal communication). The specimen in DEBELIUS (1997) was photographed in a sea cave, depth 35 to 40 m, the island of Biševo, in the central Adriatic Sea, in 1995, and was identified as *G. steinitzi.* The location in DEBELIUS (1997) was wrongly mentioned as the famous Blue Cave of Biševo (Furlan, personal communication). Both specimens in the photographs look very much like the present specimens, although no positive identification could be done without collected specimens.

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SAŽETAK

Gammogobius steinitzi Bath, 1971, nova vrsta ribe za Jadransko more

M. Kovačić

Dva primjerka vrste *Gammogobius steinitzi* Bath, 1971 ulovljena su 16. listopada 1998. tijekom istraživanja autonomnim ronjenjem u podmorskoj špilji blizu Vrbnika, otok Krk. Prethodno je ta vrsta bila poznata na osnovu tri nalaza u zapadnom Sredozemlju, pa je ovo prvi nalaz za Jadran, i jedan od nekoliko nalaza ove vrste uopće. Ulovljeni primjerci su ženke, a dobivene merističke vrijednosti su D1 VI, D2 I/8, A I/8, C 14, P 15, V I/5+5/I, LL30–32, TR 10–11. Obojenje, morfometrijske i merističke vrijednosti, te morfološke osobine tijela, glave, peraja i ljusaka pronađenih primjeraka odgovaraju podacima prethodnih nalaza. Razlike u sustavu bočnih pruga između jadranskih i zapadnosredozemnih primjeraka nisu veće nego li razlike između samih zapadnosredozemnih primjeraka. Stanište i ponašanje primjeraka u njemu slični su prethodno opisanim. Dubina mora u špilji kod Vrbnika je unutar poznatih granica dubinskog raspona vrste, ali neki primjerci opaženi su dosta dalje od ulaza špilje nego što je to bilo ranije zabilježeno.