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NEW CONTRIBUTIONS TO THE MARINE COASTAL FISH FAUNA OF SLOVENIA

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ABSTRACT

Seven new records of marine fish fauna have been reported for Slovenia: Pteroplatytrigon violacea, Gobius roulei, Pomatoschistus bathi, Millerigobius macrocephalus, Thorogobius ephippiatus, Apletodon incognitus and Parablennius zvonimiri. Additional information on the occurrence of certain less known species, such as Labrus viridis and Clinitrachus argentatus, are presented. The majority of fishes have been recorded by the use of new techniques, associated with the SCUBA equipment. These underwater techniques allowed us to observe, photograph and sometimes even catch certain fish species, which had not been normally detected with the use of traditional fishing gear due to their rarity or specific cryptic habitat type in which they live.

Key words: coastal ichthyofauna, first records, Gulf of Trieste, Adriatic

NUOVI CONTRIBUTI ALLA FAUNA ITTICA COSTIERA IN SLOVENIA

SINTESI

L'articolo riporta la presenza di sette nuove specie per la fauna ittica marina in Slovenia: Pteroplatytrigon violacea, Gobius roulei, Pomatoschistus bathi, Millerigobius macrocephalus, Thorogobius ephippiatus, Apletodon incognitus e Parablennius zvonimiri. Gli autori inoltre forniscono nuove informazioni riguardo alla presenza di specie poco conosciute, quali Labrus viridis e Clinitrachus argentatus. La maggior parte degli esemplari è stata campionata con l'ausilio di nuove tecniche subacquee. Tali metodologie permettono di osservare, fotografare e alcune volte catturare specie ittiche che non verrebbero campionate con le tradizionali tecniche di pesca, vista la loro rarità o l'habitat criptico specifico nel quale vivono.

Parole chiave: ittiofauna costiera, prime segnalazioni, Golfo di Trieste, mare Adriatico

INTRODUCTION

Despite the fact that the marine ichthyofauna has been relatively well investigated in the Adriatic Sea, the Gulf of Trieste remains one of the poorly studied areas. The knowledge about the marine fish fauna inhabiting the Slovenian coastal sea, *i.e.* the southern part of the Gulf, is therefore rather scarce. Only few reports exist on the Slovenian marine ichthyofauna and even these deal only with specific aspects, such as the list of fish species presented by Matjašič *et al.* (1975), demersal fish resources (Štirn & Bolje, 1989; Bolje, 1992; Marčeta, 1996), and some new records of fish species (Lipej *et al.*, 1996; Dulčić & Lipej, 1997). The checklist of all so far reported species can be found in the *Key for the determination of vertebrates of Slovenia* (Kryštufek & Janžekovič, 1999). In this particular work, Lipej (1999) states 23 species of elasmobranchs, and Marčeta (1999) 219 species of Osteichthyes (24 of them were defined as expected). Since then, no works of this kind have been published.

The aim of this paper is to present information on some new fish species, recorded for the very first time in Slovenian territorial waters, and some additional data on some rare or less known fish species currently treated as rare.

MATERIAL AND METHODS

The geographical area concerned in this study includes the southern part of the Gulf of Trieste (northern Adriatic Sea). During the comprehensive surveys of marine ichthyofauna in Slovenian coastal waters, certain fish species were caught or at least observed.

Information on the occurrence of studied species originates from: i) from visual census techniques (*e.g.* Lipej *et al.*, 2003; Orlando Bonaca & Lipej, 2005), ii), sampling of cryptobenthic species, iii) occasional catches, and iv) selective searching for particular coastal fish groups such as blennioids, gobiids or gobioides. During the spring-summer months from 1998 to 2005, 63 vertical transects, 100 horizontal transects, 48 all-occurrence samples and 48 linear cinetransects were performed at different along the Slovenian coast in order to assess the coastal fish assemblage. Cryptobenthic species were collected beneath stones and in crevices using a narcotizing solution of quinaldine. All collected specimens are housed in the collection of the Marine Biology Station Piran.

RESULTS AND DISCUSSION

In this paper we report on the occurrence of six new fish species for Slovenian territorial waters, which had previously not been reported or defined as expected by Marčeta (1999) and Lipej (1999) in their key to the de-

termination of marine fishes of Slovenia. We have also data on the occurrence of 2 rare and poorly known species from Slovenian coastal waters. *Millerigobius macrocephalus* and *Gobius roulei* had been previously already reported by Lipej *et al.* (2003) and Orlando Bonaca & Lipej (2005), *i.e.* in the papers dealing with the coastal fish assemblage and factors affecting habitat occupancy, assessed by means of visual methods.

***Pteroplatytrigon violacea* (Bonaparte, 1832)**

Syn. *Dasyatis violacea* Bonaparte, 1832

Jardas (1996) listed *Pteroplatytrigon violacea* as a very rare species for the Adriatic Sea. The pelagic stingray has been noticed only recently in the Gulf of Trieste (Fig. 1). A note on the feeding habits of this species with some data on its occurrence has been published by Mavrič *et al.* (2004). Between May and September 2004, nine specimens were caught in Slovenian coastal waters off Piran. In September 2005, more than 30 pelagic stingrays were caught in the same waters. The pelagic stingray has been seen entering the Gulf of Trieste only recently, for during the intensive 10-year monitoring of fisheries in Slovenia it had not been recorded at all (Marčeta, *pers. comm.*).

***Gobius roulei* De Buen, 1928**

Fiesa, 23 Jun 2000, 1 specimen; Portorož, 27 Jul 2000, 1 specimen; Portorož, 3 Aug 2000, 1 specimen; Cape Madona, 4 Aug 2000, 1 specimen; Cape Madona, 7 Aug 2000, 1 specimen; Moletto, 11 Aug 2000, *Posidonia oceanica* meadow, 1 specimen; Fiesa – Pacug, 18 Aug 2000, 1 specimen; Piran – under the church, 13 Jul 2001, *Cystoseira barbata* algal belt, 2 specimens, depth range 2–3 m; Moletto, *Posidonia oceanica* meadow, 3 Aug 2001, 2.5 m depth (Turk *et al.*, 2002); Fiesa, 24 Aug 2005, 2 specimens, depth range 6.3–6.4 m.

The very first record of Roule's goby for the Adriatic Sea was made in the infralittoral zone of the Kvarner area (Kovačić, 1995). In Slovenian coastal waters, this goby has been documented in the sandy patches of the upper infralittoral belt. The preferred habitat type is similar to that described by Kovačić (1995): sandy ground without vegetation in the biocoenosis of photophilic algae. We have never observed it on the rocky bottom. In the Slovenian part of the Adriatic Sea, it should be given the status of a rather common species (Fig. 2).

***Pomatoschistus bathi* Miller, 1982**

Pacug, 24 May 2001, *Cystoseira barbata* algal belt, 3 specimens, 2–3 m depth; Piran – below the church, 13 Jul 2001, infralittoral algal belt, 3 specimens, depth range 2–3 m; Pacug, 17 Aug 2001, *Cystoseira barbata* algal belt, 1 specimen; Strunjan – Salinera, 20 Aug 2001, *Cymodocea nodosa* meadow, 1 specimen,

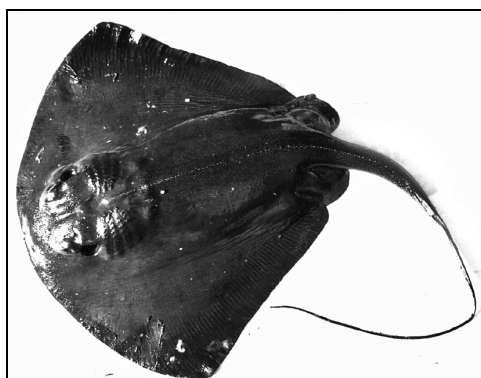


Fig. 1: Pelagic stingray (*Pteroplatytrigon violacea*). (Photo: L. Lipej)

Sl. 1: Vijoličasti morski bič (*Pteroplatytrigon violacea*). (Foto: L. Lipej)



Fig. 2: Roule's goby (*Gobius roulei*) has been ascertained as a new goby species for the Slovenian fauna. (Photo: T. Makovec)

Sl. 2: Roulejev glavač (*Gobius roulei*) je nova vrsta glavača v slovenski favni. (Foto: T. Makovec)



Fig. 3: Pomatoschistus bathi is a common species of littoral gobies in Slovenian coastal waters. (Photo: T. Makovec)

Sl. 3: Bathijev glavaček (*Pomatoschistus bathi*) je pogosta vrsta obrežnih glavačev v slovenskem morju. (Foto: T. Makovec)

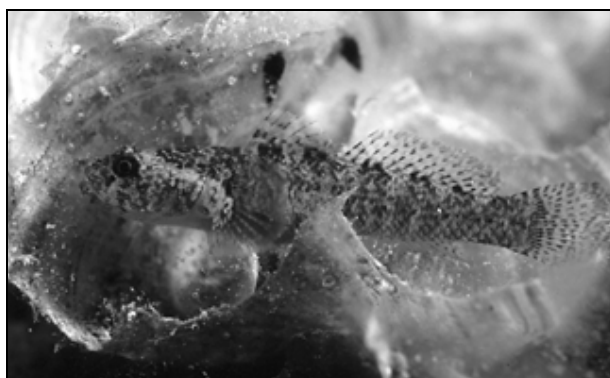


Fig. 4: Millerigobius macrocephalus is a cryptobenthic gobiid species, relatively common in the Slovenian sea. (Photo: T. Makovec)

Sl. 4: Millerigobius macrocephalus je kriptobentoška vrsta glavača, razmeroma pogosta je v slovenskem morju. (Foto: T. Makovec)



Fig. 5: Thorogobius ephippiatus, photographed at 9 August 2005 off Cape Madona. (Photo: M. Richter)

Sl. 5: Thorogobius ephippiatus, fotografiran 9 avgusta 2005 v naravnem spomeniku Rt Madona. (Foto: M. Richter)

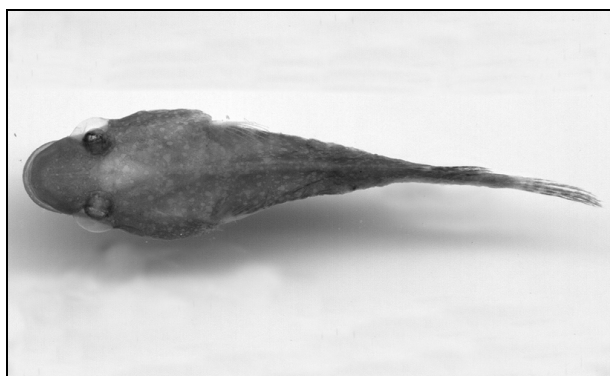


Fig. 6 / Sl. 6: Apletodon incognitus. (Photo / Foto: T. Makovec)



Fig. 7 / Sl. 7: *Labrus viridis*. (Photo / Foto: M. Richter)

depth range 2.5–3 m; 23 Aug 2001, Nature Monument Debeli rtič, infralittoral algal belt, 2 specimens, depth range 1–2 m; Fiesa, 24 Aug 2005, 4 specimens, depth range 3–3.4 m; Fiesa, 23 Sept 2005, 1 specimen, depth 4.2.

According to Jardas (1996), this species has been recorded only in the Central Adriatic. Recently, Kovačić (2005) found this goby at different sites in the Kvarner Archipelago (Northern Adriatic), as well as in the Central and Southern Adriatic. This species is missing in the Key of Marčeta (1999). In the 1998–2005 periods, we recorded *P. bathi* almost at every investigated locality in Slovenian coastal waters (Fig. 3). The species showed a high preference for gravel and coarse sand. Its distribution may depend mainly on the avoidance of surf wave action near the surface down to 5 m depth (Zander, 1990). To this end, *P. bathi* should be considered as a rather common gobiid species, very abundant in sandy patches of the upper infralittoral belt of the Slovenian coast.

***Clinitrachus argentatus* (Risso, 1810)**
Syn. *Cristiceps argentatus* (Risso, 1810)

Koper, 20 Sept 2004, 1 specimen, 1 m depth, g. V. Žiža.

In the survey of blennioids inhabiting Slovenian coastal waters, Lipej & Richter (1999) reported on the occurrence of two specimens of *Clinitrachus argenteus* at a depth range of 0.1–0.5 m. However, they mentioned that they failed to catch or at least to photograph the specimens. A specimen of *Clinitrachus argentatus* was caught at a pier in the Koper harbour by the use of hand-net for smelt (*Atherina hepsetus*).

***Millerigobius macrocephalus* Bath, 1973**

Bernardin, 3 Aug 2000, 3 specimens, 2 m depth; Pacug, 1 Aug 2001, *Cystoseira barbata* algal belt, 2 specimens, 2 m depth; Moletto, *Posidonia oceanica* meadow, 3 Aug 2001, 2.5 m depth (Turk *et al.*, 2002); Pacug – Salinera, 17 Aug 2001, 4 specimens, depth range 2.5–4 m; Strunjan – Salinera, 20 Aug 2001, *Cymodocea nodosa* meadow, 2 specimens, depth range 2.5–3 m; Piran – below the church, 27 Aug 2001, crevices of the precoralligenous belt, 2 specimens, depth range 5–6 m; Salinera, 11 Sept 2001, a single specimen in the upper infralittoral belt; Bernardin, 31 Aug 2005, 6 specimens, depth range 2.9–4.6 m; Bernardin, 27 Sept 2005, 9 specimens in a *Cystoseiretum* association, 2.4–3.2 m.

According to Jardas (1996), the data on this cryptobenthic gobiid species are very scarce in the Adriatic Sea. The localities, where this species has been recorded, include Brač Island, Medulin and Limski kanal. Kovačić (2005) reported on additional new sites from Šolta Island and the Central Adriatic. Marčeta (1999) defined it as an expected species for Slovenian coastal waters. *M. macrocephalus* has been already referred to in the two specific fish fauna surveys in the *Posidonia oceanica* meadow (Turk *et al.*, 2002) and in the comparative study of coastal ichthyofauna in marine protected areas (Lipej *et al.*, 2003). *M. macrocephalus* has been recorded at several localities in Slovenian coastal waters, mainly in the upper infralittoral belt, where it was found in endolithic holes (Fig. 4). Most of the specimens were collected under stones, while some specimens were caught by spraying quinaldine in the holes of endolithic bivalve *L. lithophaga*.

***Thorogobius ephippiatus* (Lowe, 1839)**

Thorogobius ephippiatus has been documented at various localities in the Northern Adriatic, but not in the Gulf of Trieste. A single specimen was observed on 9 Aug 2005 in a rocky environment encrusted with coralligenous algae within Cape Madonna Nature Monument off Piran. The goby was subsequently photographed (Fig. 5) in

a sheltered cavity beneath sandstone rocks at 10 m depth. It was a juvenile, approximately 6 to 7 cm in total length.

***Apletodon incognitus* Hofrichter & Patzner, 1997**

Piran – below the church, 10 May 2000, 1 specimen; Moletto, 14 Aug 2000, 3 specimens in a habitat type close to *Posidonia* seagrass meadow at depth 2.5–3 m; Bernardin, 5 Oct 2000, 1 specimen; Strunjan – Salinera, 20 Aug 2001, *Cymodocea nodosa* meadow, 1 specimen, depth range 2.5–3 m.

Recently, Hofrichter & Patzner (1997) described a new gobioid species *Apletodon incognitus* from the Mediterranean and Atlantic Seas. This species is missing in the Key of Marčeta (1999). Most of the specimens of *A. incognitus* have been found in infralittoral belt (Fig. 6), in habitat types dominated by *C. nodosa*. This is in agreement with Patzner (1999) and Hofrichter & Patzner (2000), who stated that *A. incognitus* is associated with seagrass meadows of *P. oceanica* or suitable habitats near seagrass meadows. They even pointed out that the abundance of this clingfish species is decreasing with the increasing distance from the seagrass meadow. Most of our records were made by the use of an anaesthetic. Only on a single occasion we recorded a specimen in a vertical transect sample, where it was found under an empty crab shell (*Maja* sp.).

***Labrus viridis* Linnaeus, 1758**

According to Jardas (1996), this wrasse is present mainly in the southern part of the Adriatic, whereas in the northern part it is quite rare. During the comprehensive monitoring of flora, fauna and habitat types in the coastal sea during the 1998–2004 period, this species was never observed or caught. A specimen of *Labrus viridis* (Fig. 7) was observed on 26 July 2005 off Cape Madonna (Piran), in the infralittoral belt (3.5 m depth), where stones are mainly covered with the brown algae *Cystoseira barbata*. A specimen was also photographed on 9 Aug 2005 at the same site (1.5 m depth).

***Parablennius zvonimiri* (Kolombatović, 1892)**

Syn. *Blennius zvonimiri* Kolombatović, 1892

Cape Ronek, 18 Sept 2003, 2 specimens, depth range 2.6–2.8 m; in front of the Marine Biology Station Piran, 23 Aug 2005, 1 specimen, 1.4 m depth; Bernardin harbour, 30 Aug 2005, 7 specimens, depth range 1.2–2.5 m; Bernardin harbour, 31 Aug 2005, 4 specimens, depth range 2.1–3.3 m; Cape Madonna, 1 Sept 2005, 5 specimens, depth range 5.3–8.1; Cape Madonna, 6 Sept 2005, 5 specimens, depth range 6.1–9.2 m; Fiesa, 12 Sept 2005, 1 specimen, 4 m depth; Pacug, 16 Sept 2005, 4 specimens, depth range 2.8–7.5 m; Fiesa, 23 Sept 2003, 1 specimen, 5.4 m depth.

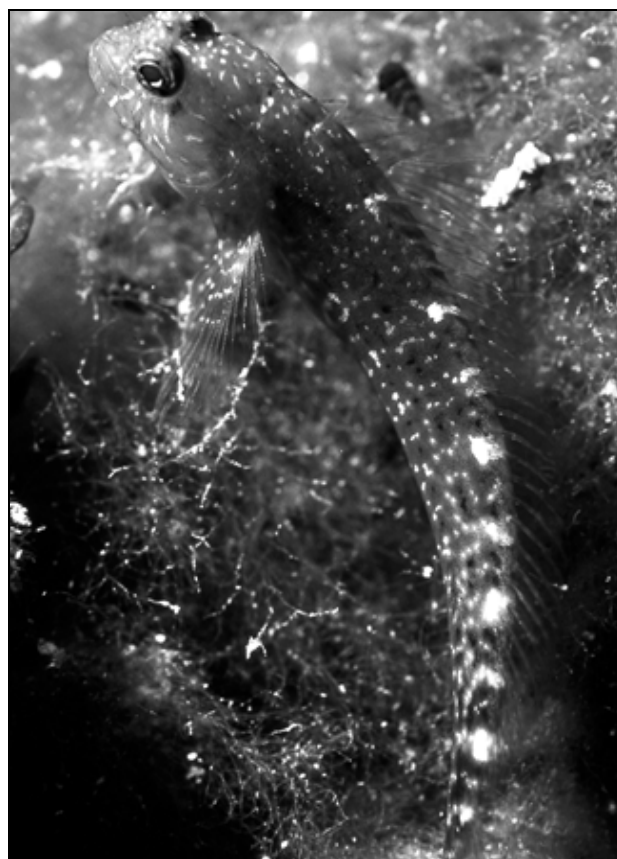


Fig. 8: *Parablennius zvonimiri* is an endolithic blennioid species. (Photo: T. Makovec)

Sl. 8: *Jelenjeroga babica* (*Parablennius zvonimiri*) je endolitska vrsta babic. (Foto: T. Makovec)

Lipej & Richter (1999) did not include this species in their survey of blennioids in Slovenian coastal waters, although they wrote that this species was an expected blenny in the area, since other authors had confirmed its occurrence in other adjacent northern Adriatic areas (Segantini, 1968; Patzner, 1985; Illich & Kotrschal, 1990). Marčeta (1999), too, described it as an expected species in Slovenian coastal waters. *Parablennius zvonimiri* has been recently recorded at several localities in these waters, in each case in a sheltered environment generally covered with algal turf and encrusted with coralligenous algae (Fig. 8), where it inhabits holes excavated by the endolithic bivalve *Lithophaga lithophaga*. In such shady biotopes it blends with the red-brownish substrata (Abel, 1993).

Factors involved in the new findings

Nowadays, new approaches and techniques, associated with the SCUBA equipment, enable exploration of otherwise inaccessible habitats (Quignard & Tomasini, 2000; Lipej & Dulčić, 2004). With these underwater

techniques we were able to observe, photograph and sometimes even catch certain fish species, which could previously not be detected with the use of traditional fishing gear due to their rarity or specific cryptic habitat type in which they live. To this end, divers need extensive training, especially for the detection of small cryptic species.

With the recently adopted SCUBA techniques, we recorded seven new elements in the Slovenian marine fish fauna. Only *C. argentatus* was caught with hand net for sand smelt (*Atherina* spp.), whereas the specimen of *L. viridis* was photographed and sighted. Due to the increasing research efforts in terms of selective sampling of peculiar fish families, such as Blenniidae and Gobiidae, we succeeded also in confirming *P. zvonimiri*, *Pomatoschistus bathi*, *G. roulei* and *T. ephippiatus*. The first three were recorded in specific habitat types at several localities. Despite *in vivo* observations, *P. bathi* has been overlooked in the past due to its small size and cryptic colouration, which reflects very well the colour pattern of its environment. *T. ephippiatus* has been observed only at a single locality. Due to its specific habitat type demands – crevices, cracks and cavities of steep rock faces, as reported by Miller (1986) – it is probable that the area off Cape Madona provides the only suitable habitat for this species in Slovenia. This unique site comprises habitat types with high spatial heterogeneity, where the detection of cryptobenthic species is even more difficult.

Certain authors have argued (e.g. Colterill & Dangerfield, 1997) that species' checklists without voucher specimens are pseudoscientific as their inventory identification can not be tested. In our opinion, the photographed records of certain rare species are very relevant and are in some cases even unique evidence, as it has

been the case of a bramble shark (*Echinorhinus brucus*), photographed with the ROV camera below 1200 m (Kabasakal *et al.*, 2005). Photographs could be proofs for records of fish species only if species could be positively identified from their shape and coloration. For example, very small number of gobiid species could be identified in this way, and the published records based on photographs are very rare, like Ballesta *et al.* (1998) on *D. schlieveni*.

With the use of quinaldine we were able to record two more cryptobenthic species, such as *M. macrocephalus* and *A. incognitus*. This method, however, could be highly toxic for fish as well as for divers. The records of *L. viridis* and *P. violacea* seem to be correlated with temperature increase during the last decades, but further findings will elucidate the real status of both species.

The findings reached during the present study extend the already known distribution of recorded species in the Mediterranean Sea. We expect that with the use of underwater visual techniques some new fish species for the Slovenian fauna will be found during the future investigations.

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NOVI PRISPEVKI K MORSKI RIBJI FAVNI SLOVENIJE

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SUMMARY

V prispevku navajamo podatke o sedmih novih vrstah rib za favno Slovenije: vijoličasti morski bič (*Pteroplatytrigon violacea*), Roulejev glavač (*Gobius roulei*), Bathijev glavaček (*Pomatoschistus bathi*), rdeči glavač (*Millerigobius macrocephalus*), leopardasti glavač (*Thorogobius ephippiatus*), prisesnik vrste *Apletodon incognitus* in jelenjeroga

babica (Parablennius zvonimiri). Nove podatke o pojavljanju navajamo še za dve manj znani oz. redki vrsti, in sicer za drozga (*Labrus viridis*) in srebrnico (*Clinitrachus argentatus*). Večino vrst smo vzorčili z novimi pristopi z uporabo avtonomne potapljaške opreme. Te podvodne tehnike omogočajo opazovanje in fotografiranje na mestu samem, obenem pa tudi ulov posebnih vrst rib, ki jih sicer ne moremo vzorčiti s tradicionalnim ribiškim priborom, saj so redke ali pa živijo v posebnem prikritem življenjskem okolju.

Ključne besede: obrežna ihtiofavna, prvi zapisi, Tržaški zaliv, Jadransko morje

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