

original scientific article
received: 2003-11-05

UDK 597.5:591.9(262.3-11)

NEW ADDITIONAL RECORDS OF IMPERIAL BLACKFISH, *SCHEDOPHILUS OVALIS* (CUVIER, 1833), WHITE TREVALLY, *PSEUDOCARANX DENTEX* (BLOCH & SCHNEIDER, 1801), AND ATLANTIC POMFRET, *BRAMA BRAMA* (BONNATERRE, 1788), IN THE EASTERN ADRIATIC

Jakov DULČIĆ & Armin PALLAORO

Institute of Oceanography and Fisheries, HR-21000 Split, P.O.BOX 500
E-mail: dulcic@izor.hr

Vlado ONOFRI & Davor LUČIĆ

Institute of Oceanography and Fisheries, Dubrovnik Laboratory, HR-20000 Dubrovnik

Ivan JARDAS

Institute of Oceanography and Fisheries, HR-21000 Split, P.O.BOX 500

ABSTRACT

The imperial blackfish, Schedophilus ovalis, white trevally, Pseudocaranx dentex, and Atlantic pomfret, Brama brama, specimens were caught in the eastern Adriatic. The main morphometric and meristic data are given. In spite of a number of scientific records regarding these species, we could still treat the imperial blackfish and white trevally as very rare species, and the Atlantic pomfret as a rare species in the Eastern Adriatic.

Key words: imperial blackfish, white trevally, Atlantic pomfret, additional records, Eastern Adriatic

NUOVE TESTIMONIANZE AGGIUNTIVE DI CONTROFOLO VIOLA, *SCHEDOPHILUS OVALIS* (CUVIER, 1833), CARANGO DENTICE, *PSEUDOCARANX DENTEX* (BLOCH & SCHNEIDER, 1801) E PESCE CASTAGNA, *BRAMA BRAMA* (BONNATERRE, 1788), IN ADRIATICO ORIENTALE

SINTESI

Esemplari di controfolo viola, Schedophilus ovalis, carango dentice, Pseudocaranx dentex, e pesce castagna, Brama brama, sono stati catturati in Adriatico orientale. L'articolo riporta i più importanti dati morfometrici e meristici. Conformemente a un numero di dati scientifici gli autori continuano a considerare controfolo viola e carango dentice specie molto rare, mentre il pesce castagna risulta essere una specie rara nell'Adriatico orientale.

Parole chiave: controfolo viola, carango dentice, pesce castagna, testimonianze aggiuntive, Adriatico orientale

INTRODUCTION

The imperial blackfish, *Schedophilus ovalis* (Cuvier, 1833), is a marine and benthopelagic species living in the Eastern Atlantic from Spain and throughout most of the Mediterranean southward, while in the Western Central Atlantic some small specimens have been recorded off Bermuda (Haedrich, 1986a; Jardas, 1996). It could also be found in Australia (Haedrich, 1990). This species is rare in the Adriatic Sea (Jardas, 1985, 1996).

The white trevally, *Pseudocaranx dentex* (Bloch & Schneider, 1801), is a reef-associated, marine and brackish species living at depths ranging from 80 to 200 m (Smith-Vaniz, 1986; Jardas, 1996). It lives in the Western Atlantic (from Bermuda, North Carolina and south to southern Brazil), in the Eastern Atlantic (Azores, Madeira, Canaries, Cape Verde, Ascension and Saint Helena Island), in the Mediterranean, in the Indo-Pacific (South Africa, Japan, Hawaii, Australia, Lord Howe and Norfolk Islands), in New Zealand, and in New Caledonia (Smith-Vaniz, 1986; Jardas, 1996). This species is very rare in the Adriatic Sea (Jardas, 1985, 1996).

The Atlantic pomfret, *Brama brama* (Bonnaterre, 1788), is a bathy- and epipelagic species occurring at depths ranging from 0 to 1,000 m. This oceanic and highly migratory species lives in the South Pacific, Indian Ocean, Western Atlantic (from Nova Scotia, Canada and Bermuda to Belize and the Antilles), and in the Eastern Atlantic (from central Norway southward to Algoa Bay and South Africa) (Haedrich, 1986b; Jardas, 1996). It could also be found in Australia (May and Maxwell, 1986), New Zealand (Paulin *et al.*, 1989) and Chile (Frimodt, 1995). This species is fairly rare in the Adriatic Sea (Jardas, 1985, 1996).

The data on biology and ecology of the above mentioned species in the Adriatic are very scarce. The aim of this paper is to provide first data on the morphometric and meristic characteristics of these species for the Adriatic Sea, some preliminary data on food items and data on their additional occurrence in the Eastern Adriatic.

MATERIAL AND METHODS

A specimen of the imperial blackfish (Fig. 1) was caught on 28 July 2003 with "brankarela" (ripping hook mounted together on the iron or wooden stick) in the open waters of Southern Adriatic, 35 Nm SE from Dubrovnik (Southern Adriatic), at about 1,000 m depth (Fig. 4: location A). A specimen of the Atlantic pomfret (Fig. 2) was caught on 30 August 2002 with bottom trawl in the Pomo Pit, at about 150 m depth (Fig. 4: location C). A specimen of the white trevally (Fig. 3) was caught on 30 October 2001 with trammel bottom set in Gvozdenac Cove (Vis Island) at 20 m depth (Fig. 4: location B).

The specimens were identified according to Jardas (1996). They are deposited (in jars with formaldehyde)

in the Ichthyological Collection of the Institute of Oceanography and Fisheries in Split, Croatia.

The specimens were preserved in 4% buffered formaldehyde, subsequently measured to the nearest 0.1 mm, and weighed to the nearest 0.1 g. Meristic characteristics considered were dorsal, anal, pectoral, ventral, caudal fins, and number of scales in the longitudinal line. Immediately after capture, fish were dissected and

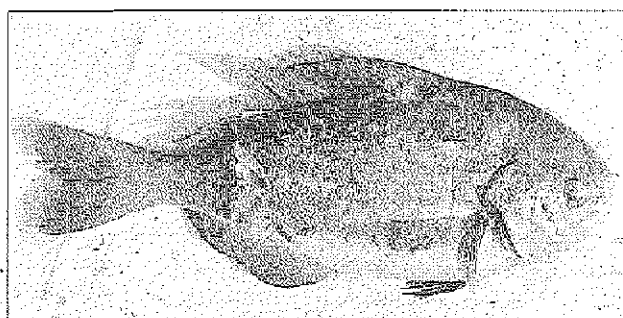


Fig. 1: *Schedophilus ovalis* caught in the Southern Adriatic. (Photo: V. Onofri)

Sl. 1: *Schedophilus ovalis*, ujet v južnem Jadranskom morju. (Foto: V. Onofri)

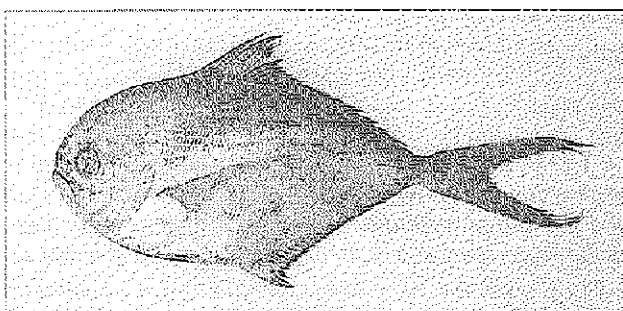


Fig. 2: *Brama brama* caught in Pomo Pit. (Photo: A. Pallaoro)

Sl. 2: *Brama brama*, ujeta v kotanji Pomo. (Foto: A. Pallaoro)

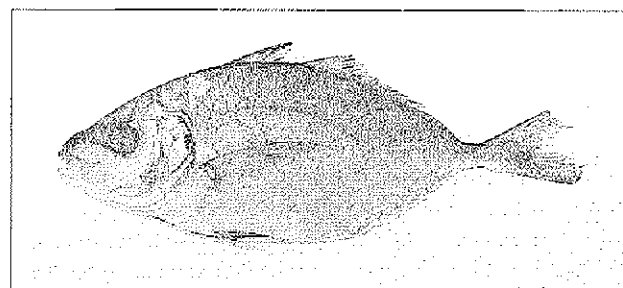


Fig. 3: *Pseudocaranx dentex* caught near Island Vis. (Photo: A. Pallaoro)

Sl. 3: *Pseudocaranx dentex*, ujet v blizini Visa. (Foto: A. Pallaoro)

the gut removed and preserved in 4% formalin solution to prevent food digestion. In the laboratory, identification of prey was carried out to the species level whenever possible.

RESULTS AND DISCUSSION

In Table 1, the main morphometric and meristic data of the three mentioned species are presented.

The specimen of the imperial blackfish was caught in the open waters of Southern Adriatic, at about 1,000 m depth ($T=25^{\circ}\text{C}$). This species prefers deep water at the edge of continental shelves and around oceanic islands; larger specimens dwell near the bottom (Jardas, 1996). According to literature, this record is the fourth so far of this species in the Adriatic Sea. In the Adriatic, *S. ovalis* was recorded for the first time by Kolombatović (1902) who named it *Centrophilus corcyrensis*, as it was

caught in the vicinity of Korčula Island (Southern Adriatic). The second specimen (without measures) of this species was captured together with *S. medusophagus* in the Pelješac Channel (Southern Adriatic) in 1982 (at a depth of 2 m, $T=25^{\circ}\text{C}$) where *Pelagia noctiluca* were also present (Onofri, 1986). On 26 June 1979, a single specimen (third record) of the imperial blackfish was caught with deep bottom trawl in the open waters of Southern Adriatic, about 20 Nm SE from Dubrovnik at a depth of about 1,000 m. Total length of the caught specimen was $TL = 25.2$ cm (no data on its weight and sex) (D. Viličić, pers. comm.). We assume that these periodical occurrences could be explained by the Adriatic ingressions, NAOi (North Atlantic Oscillation Index) and warming of Adriatic waters (Đulčić *et al.*, 1999). Observations on the Adriatic ichthyofauna (period 1973-1998) showed changes in the quantitative and qualitative composition of the fish fauna. The number of thermo-

Tab. 1: Morphometric (in mm) and meristic data of the imperial blackfish, white trevally and Atlantic pomfret in the Eastern Adriatic.

Tab. 1: Morfometrični (u mm) i meristični podatci o vrstah *Schedophilus ovalis*, *Pseudocaranx dentex* in *Brama brama*, ujetih u vzhodnem Jadranskom morju.

Species	<i>Schedophilus ovalis</i>	<i>Pseudocaranx dentex</i>	<i>Brama brama</i>
Weight (g)	820.8	142.3	644.2
Morphometric characters (mm)			
Total length (TL)	387.5	226.7	406.2
Standard length (SL)	311.8	193.4	308.6
Head length (C)	83.8	59.4	79.2
Predorsal length (LPD)	69.3	68.5	95.8
First dorsal fin length (LD1)	191.2	24.2	153.4
Second dorsal fin length (LD2)	-	72.1	-
Preanal length (LPA)	168.4	113.8	145.3
Anal fin length (LA)	80.8	53.9	105.7
Prepectoral length (LPP)	77.7	57.3	84.1
Pectoral fin length (LP)	72.1	56.5	110.3
Preventral length (LPV)	84.1	55.9	102.7
Ventral fin length (LV)	55.2	26.9	29.4
Caudal fin length (LC)	98.2	48.2	136.2
Eye diameter (O)	18.6	13.3	19.2
Interorbital length (IO)	37.2	15.6	25.2
Preorbital length (PO)	14.0	24.1	19.9
Postorbital length (OLO)	51.2	21.9	40.1
Maximal body height (H_{max})	128.3	71.4	130.9
Minimal body height (H_{min})	32.8	8.6	20.2
First dorsal fin (D1)	VII / 30	VIII	III / 33
Second dorsal fin (D2)	-	I / 25	-
Anal fin (A)	III / 22	II + I / 21	II / 28
Pectoral fin (P)	21	I / 20	20
Ventral fins (V)	I / 5	I / 5	I / 5
Caudal fin (C)	4 + 16 + 4	9 + 8 + 9	5 + 17 + 5
Linea lateralis (LI)	95	28	83

philic species has increased; several species, scarce or rare until now, are more abundant, while others are new records (Đulčić et al., 1999). The authors (*ibid.*) believe that the occurrence of the imperial blackfish and Cornish blackfish *S. medusophagus* in the Adriatic waters is the result of water warming. The northward extension of *S. ovalis* to the Bay of Biscay (Quero et al., 2000) and recent occurrences of young *S. ovalis* along the French Mediterranean coasts (Francour & Javel, 2003) could support this hypothesis. Francour & Javel (2003) assume that the observations of small to medium sized *S. ovalis* they made in 2000-2001 in the Alpes-maritimes department (Cannes, Antibes, Beaulieu/Mer) could be also explained by the present water warming (Francour et al., 1994). According to Orsi-Relini et al. (1990), the size of the imperial blackfish specimen of about 45 cm TL corresponds to the first year of its life, and taking this into consideration, the caught specimen from our study is a juvenile (0+). The results of Deudero et al. (1999) confirm the rare observations of the imperial blackfish made by Relini et al. (1994) in the Ligurian Sea. Moreover, only 3 catches of this species have been reported from the Balearic Sea (Massuti & Stefanescu, 1994).

Several different groups of organisms were found in the stomach of the specimen: Narcomedusae (7 specimens of *Solmissus albescens*), Decapoda (12 pieces of legs and remains of carapax), Chaetognatha (1 specimen of *Sagitta* sp.), Tunicata (Appendicularia, 3 specimens of *Oikopleura longicauda*, some parts of *Pyrosoma* community), and fish scales ($n=5$). Maul (1964) found several indigested *Pyrosoma* sp. in the stomachs of the black imperial fish. Orsi-Relini et al. (1990) also found a lot of *Pyrosoma* sp., as well as 8 specimens of pteropod *Cymbulia peroni* (in one stomach) and euphausiidae shrimp *Meganyctiphanes norvegica* (in one stomach). Relini et al. (1994) discovered undigested pyrosomes and few fragments of jelly plankton in the stomachs of young black imperial fish.

The meristic and morphometric data on the imperial blackfish presented in Table 1 are the first for this species from the Adriatic Sea and are in agreement with the data presented for the specimen from the Corvo Island (Azores) (www.fishbase.org) and with partially presented data by Haedrich (1986a).

The specimen of white trevally caught during this study is the fourth of this species in the Eastern Adriatic. *P. dentex* was recorded for the first time in the Eastern Adriatic near Duba area (Pelješac Peninsula). This specimen was (TL=34.4 cm) caught on 11 July 1986 at 6 m depth with a net called "prostica" (Pallaoro & Jardas, 1996). Second specimen was caught with long line near Lastovo Island in 1986 (Milišić, 1994). Third specimen was captured in November 2001 near Vis Island (TL=35.8 cm) with trammel bottom set (Matić, pers. comm.).

The meristic and morphometric data for the white trevally presented in Table 1 are the first for this species

from the Adriatic Sea and are in agreement with the data presented for the specimen from Branco Islet (Cape Verde Islands) (www.fishbase.org) and the data presented by Smith-Vaniz (1986).

We found digested fish larvae and postlarvae and specimens of Mysidacea in the caught specimen's stomach (we were unable to determine any species, since the material was completely digested). This species feeds on plankton by ram-filtering and suction on bottom invertebrates (Smith-Vaniz, 1986). Russell (1983) reported that this species (Goat Island, northeastern coast of New Zealand) feeds on euphausiids (larvae), amphipods (juveniles and adults), copepods (juvenile and adults) and gastropods (juvenile and adults). Its diet is also composed of squid, cuttlefish, finfish, crabs, shrimps, sea stars, sea urchins and bivalves (www.fishbase.org).

Records of the Atlantic pomfret in the Adriatic are not as scarce as of the previous two species. It should be pointed that all records of this species were made in relatively shallow waters, in spite of the fact that this bathy- and epipelagic species could be found at depths of 1,000 m. It is highly migratory and occasionally comes close to shore. It is a seasonal migrant occurring in small schools and its movements are apparently temperature-related (Jardas, 1996). Three records for the Eastern Adriatic were reported in local newspapers (in 1980, 1981 and 1982 near the town of Rijeka), while one record was made by Pallaoro & Jardas (1996) in the Kaštela Bay-Split area on 7 February 1984 (TL=45.7 cm). One specimen is deposited in the Ichthyological Collection of the Natural History Museum in Rijeka (Croatia) without any data (Kovačić, 1998). Two larval stages

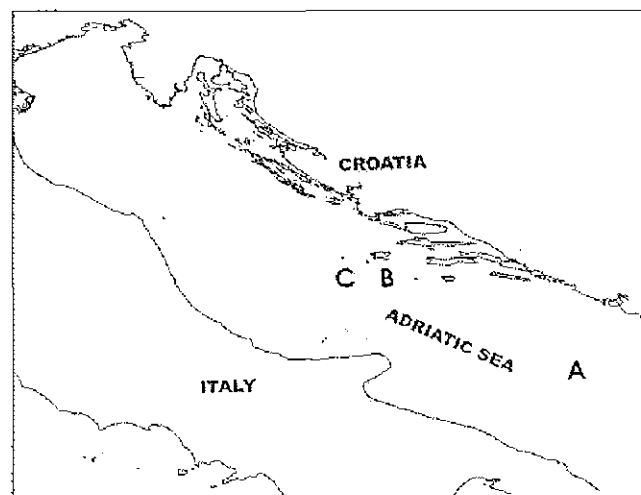


Fig. 4: Map with the locations of records (A – *Schedophilus ovalis*, B – *Pseudocaranx dentex*, C – *Brama brama*).

Sl. 4: Zemljevid s lokacijama zabeleženih vrst (A – *Schedophilus ovalis*, B – *Pseudocaranx dentex*, C – *Brama brama*).

were recorded for the first time in the River Neretva Estuary at a depth of 22 m (TL=4.36 mm and TL=5.00 mm) (Dulčić, 1999).

The meristic and morphometric data for the Atlantic pomfret presented in Table 1 are the first for this species from the Eastern Adriatic and are in agreement with the data presented by Haedrich (1986b), while they slightly differ from those regarding the specimen from Boavista Island (Cape Verde Islands) (www.fishbase.org).

We found only two specimens of *Argentina sphyraena* fish in the stomach of the caught Atlantic pomfret from Pomo Pit. Haedrich (1986b) described the Atlantic pomfret as an opportunistic feeder on small fishes, cephalopods, amphipods and euphausiids.

According to Morović (1973), the rarity of certain fish species could be evaluated from the records in scientific literature. Same author have pointed that if the species is recorded less than five times, it should be

treated as a very rare species. According to this suggestion we could treat the imperial blackfish and white trevally (4 records in scientific literature until now) as very rare species in the Eastern Adriatic, and the Atlantic pomfret as a rare species. We must also be careful with tools (gears) for providing target species if wishing to evaluate their rarity, as it is hard to sample the imperial blackfish (during different life phases) using conventional methods. FADs (Fishing Attractive Devices) provide a useful tool for studying the mentioned species (Deudero et al., 1999), so it could be proposed for next studies on fish assemblages in the Adriatic.

The status of investigated species needs to be evaluated on a continuous basis, as it is becoming increasingly apparent that uncommon species, and particularly those on the edge of their distribution, can be essential indicators of environmental change (Swabby & Potts, 1990).

NOVI PODATKI O VRSTAH *SCHEDOPHILUS OVALIS* (CUVIER, 1833), *PSEUDOCARANX DENTEX* (BLOCH & SCHNEIDER, 1801) IN *BRAMA BRAMA* (BONNATERRE, 1788), UJETIH V VZHODNEM JADRANSKEM MORJU

Jakov DULČIĆ & Armin PALLAORO

Inštitut za oceanografiju in ribištvo, HR-21000 Split, P.O.BOX 500

E-mail: dulcic@izor.hr

Vlado ONOFRI & Davor LUČIĆ

Inštitut za oceanografiju in ribištvo, Laboratorij v Dubrovniku, HR-20000 Dubrovnik

Ivan JARDAS

Inštitut za oceanografiju in ribištvo, HR-21000 Split, P.O.BOX 500

POVZETEK

V vzhodnem Jadranu so bile v zadnjih dveh letih ujete vrste *Schedophilus ovalis*, *Pseudocaranx dentex* in *Brama brama*, v tem morju sicer neobičajne ribe. V članku so podani morfometrični in meristični podatki vseh treh vrst. Kljub dejstvu, da o njih obstaja vrsta znanstvenih zapisov, smemo reči, da sta *Schedophilus ovalis* in *Pseudocaranx dentex* zelo redki, *Brama brama* pa redka vrsta v vzhodnem Jadranu.

Ključne besede: *Schedophilus ovalis*, *Pseudocaranx dentex*, *Brama brama*, novi podatki, vzhodni Jadran

REFERENCES

- Deudero, S., P. Merella, B. Morales-Nin, E. Massutí, & F. Alemany (1999): Fish communities associated with FADs. *Sci. Mar.*, 63, 199-207.
- Dulčić, J. (1999): First record of larval *Brama brama* (Pisces: Bramidae) and *Coryphaena hippurus* (Pisces: Coryphaenidae) in the Adriatic Sea. *J. Plankton Res.*, 6, 1171-1174.
- Dulčić, J., B. Grbec & L. Lipej (1999): Information on the Adriatic ichthyofauna – Effect of the water warming? *Acta Adriat.*, 40, 33-43.
- Francour, P. & F. Javel (2003): Recent occurrences of young *Schedophilus ovalis* (Centrolophidae) along French Mediterranean coasts. *Cybium*, 27, 57-58.
- Francour, P., C. F. Boudouresque, J. G. Harmelin, M. Harmelin-Vivien, & J. P. Quignard (1994): Are the Mediterranean waters becoming warmer? Information from biological indicators. *Mar. Poll. Bull.*, 28, 523-526.
- Frimodt, C. (1995): Multilingual illustrated guide to the world's commercial coldwater fish. Fishing News Books, Osney Mead, Oxford, England. 215 pp.
- Haedrich, R. L. (1986a): Centrolophidae. In: Whitehead, P. J. P., M. L. Bauchot, J. C. Hureau, J. Nielsen & E. Tortonese (eds.): *Fishes of the North-eastern Atlantic and the Mediterranean*. Vol. 2. UNESCO, Paris, p. 1177-1182.
- Haedrich, R. L. (1986b): Bramidae. In: Whitehead, P. J. P., M. L. Bauchot, J. C. Hureau, J. Nielsen & E. Tortonese (eds.): *Fishes of the North-eastern Atlantic and the Mediterranean*. Vol. 2. UNESCO, Paris, p. 847-853.
- Haedrich, R. L. (1990): Centrolophidae. In: Check-list of the fishes of the eastern tropical Atlantic (CLOFETA). In: Quero, J. C., J. C. Hureau, C. Karrer, A. Post, & L. Saldanha (eds.): JNICT, Lisbon; SEI, Paris, and UNESCO, Paris, p. 1011-1013.
- <http://www.fishbase.org/search.html>
- Jardas, I. (1985): Pregled riba (*sensu lato*) Jadranskog mora (Cyclostomata, Selachii, Osteichthyes) s obzirom na taksonomiju i utvrđeni broj. *Biosistematika*, 11, 45-74.
- Jardas, I. (1996): Jadranska ihtiofauna. Školska knjiga, Zagreb, 533 pp.
- Kolombatović, J. (1902): Contribuzioni alla Fauna dei vertebrati della Dalmazia. *Glas. naravoslov. društva*, 13, 22-37.
- Kovačić, M. (1998): Ichthyological collection (Cyclostomata, Selachii, Osteichthyes) of the Natural History Museum Rijeka. *Prirodoslovna istraživanja Riječkog područja*, 1, 685-698.
- Massutí, E. & C. Stefanescu (1994): Sobre la presència de dues espècies de peixos pelàgics associats a objectes flotants en el Mar Català. *Boll. Soc. Hist. Nat. Balears*, 37, 117-123.
- Maul, P. (1964): Observation on young live *Mupus maculatus* and *Mupus ovalis*. *Copeia*, 1964, 93-97.
- May, J. L. & J. G. H. Maxwell (1986): Trawl fish from temperate waters of Australia. CSIRO Division of Fisheries Research, Tasmania, 492 pp.
- Milišić, N. (1994): Sva riba Jadranskog mora. NIVA, Split, 463 pp.
- Morović, D. (1973): Riječke ribe u Jadranu. Pomorski zbornik, 11, 367-383.
- Onofri, I. (1986): The rare saw-cheeked fish (*Schedophilus medusophagus* Cocco, 1839) (Pisces, Centrolophidae) in central Adriatic. *Zbornik Matice srpske za prirodne nauke*, 70, 135-141. (in Serbian)
- Orsi-Relini, L., B. Fida & M. Relini (1990): Notes about *Schedophilus ovalis* (Osteichthyes, Centrolophidae) in the Ligurian Sea. *Rapp. Comm. Int. Mer Médit.*, 31, p. 272.
- Pallaoro, A. & I. Jardas (1996): Ichthyological Collection of the Institute of Oceanography and Fisheries in Split (Croatia). *Nat. Croat.*, 3, 177-219.
- Quero, J. C., M. H. Du Buit, J. L. Laborde & J. J. Vayne (2000): Observations ichthyologiques effectuées en 1999. *Ann. Soc. Sci. nat. Charente-Marit.*, 8, 1039-1045.
- Relini, M. L., L. Relini & G. Relini (1994): An offshore buoy as a FAD in the Mediterranean. *Bull. Mar. Sci.*, 55, 1099-1105.
- Russell, B. C. (1983): The food and feeding habits of rocky reef fish of north-eastern New Zealand. *N. Z. J. Mar. Freshw. Res.*, 17(2), 121-145.
- Smith, M. M. (1986): Bramidae. In: Smith, M. M. & P. C. Heemstra (eds.): *Smiths' sea fishes*. Springer-Verlag, Berlin, p. 633-636.
- Smith-Vaniz, W. F. (1986): Carangidae. In: Whitehead, P. J. P., M. L. Bauchot, J. C. Hureau, J. Nielsen & E. Tortonese (eds.): *Fishes of the North-eastern Atlantic and the Mediterranean*. Vol. 2. UNESCO, Paris, p. 815-845.
- Swabby, S. E. & G. W. Potts (1990): Rare British marine fishes – identification and conservation. *J. Fish. Biol.*, 37, 133-143.