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AN ANNOTATED CHECKLIST OF THE FAMILY GOBIIDAE IN THE ADRIATIC SEA

Marcelo KOVAČIĆ
Natural History Museum Rijeka, HR-51000 Rijeka, Lorenzov prolaz 1, Croatia
E-mail: Marcelo.Kovacic@public.srce.hr

ABSTRACT

An annotated checklist of the gobies of the Adriatic Sea is presented, including 46 species. All available data concerning the presence of gobiid species in the Adriatic Sea are compiled and critically re-examined.

Key words: check-list, Gobiidae, Adriatic Sea

LISTA AGGIORNATA DELLA FAMIGLIA GOBIIDAE IN MARE ADRIATICO

SINTESI

L'articolo presenta una lista aggiornata dei gobidi del mare Adriatico, completa di 46 specie. Vengono forniti e riesaminati con criterio critico tutti i dati disponibili inerenti la presenza delle specie di gobidi in Adriatico.

Parole chiave: lista, Gobiidae, mare Adriatico

INTRODUCTION

The first published data on gobies of the Adriatic Sea was the record of *Gobius jozo* for the Split and Trogir areas (the synonym of *Gobius niger* Linnaeus, 1758) published in the book «Ichthyologia massiliensis» Brünnich (1765). Numerous lists of the Adriatic fish species during the following two centuries also included gobiid species (Ševčić, 1977). However, the authors of these lists were not gobiologists, in the 19th century often not even ichthyologists. These papers were rarely written by specialists on original material, and numerous lists contained just the species name, while some, in addition, contained general comments on the species (Carrara, 1846; A. Stossich, 1869; Canestrini, 1872; M. Stossich, 1880; Faber, 1883; Brusina, 1891; Sucker, 1895; Griffini, 1903; E. Ninni, 1912; Šoljan, 1948, 1965; Jardas, 1985). The names of gobiid species were cited by rote from one list to another. These lists, due to unclear synonymy, also included non-valid names and names of species whose presence in the Adriatic Sea could not be proved. Only several lists were orientated just on gobies (Kolombatović, 1891; A. P. Ninni, 1882; Damiani, 1896; E. Ninni, 1938; Cavinato, 1952; Kovačić, 1994).

The synonymy of Mediterranean gobies was cleared by Miller (1973a). Ševčić (1977), using the synonymy of Miller (1973a), listed 40 gobiid species of the Adriatic Sea. This number was later increased by the reviews of Kovačić (1994) - 42 species, and Jardas (1996a) - 44 species, due to original papers published in the meantime. Recent years have been a dynamic period for the Adriatic gobiology. Therefore, the review of Lipej & Dulčić (2004), among other fishes, listed new gobiid species found in the Adriatic Sea since Jardas (1996a), and they concluded that, with 50 species, gobies are the best represented fish family in the Adriatic Sea. However, all these authors avoided critical reconsideration of the presence of species that were previously included in the Adriatic fauna. The only exception is the replacement of *Vanneaugobius pruvoti* (Fage, 1907) in Jardas (1996a) with *Vanneaugobius dollfusi* Brownell, 1978 by Lipej & Dulčić (2004). However, this is the result of an in-between published paper on re-examined specimens by Pallaoro & Kovačić (2000). The scope of the present paper is to give complete, actual list of gobiid species in the Adriatic Sea based on critical re-examination of all available data concerning the presence of gobiid species in the Adriatic Sea.

MATERIAL AND METHODS

This review was based on scientific literature and on unpublished data on ichthyological collection of the Natural History Museum Rijeka and on ichthyological collection of the Center for Marine Research Rovinj. The gobiid species are considered to be present in the Adriatic Sea if the following conditions are met: Adriatic specimens of these species are deposited in the collections, or the published descriptions of Adriatic specimens contained enough morphological data for positive identification. The mentioned criteria prevent that once wrongly cited species for the Adriatic Sea would repeatedly to be listed as the part of the Adriatic fauna. The published data on species previously listed for the Adriatic Sea that should be excluded from the Adriatic fauna are critically examined. The annotation for each species contained bibliography of published records of the species in the Adriatic Sea, and of preserved specimens in the collections. The localities of the published records were listed along the Adriatic Sea in north-south direction. All records of gobiid species already known for the Adriatic Sea but difficult for identification are considered to be without positive identification, if specimens were not described, deposited, or checked *in situ* by fish taxonomist.

CHECKLIST

The presented checklist contains 46 gobiid species recorded in the Adriatic Sea up to the present date (Tab. 1).

Aphia minuta mediterranea De Buen, 1931

Gobius Aphya: Naccari, 1822; Martens, 1838.
Gobius pellucidus: Nardo, 1827; Kolombatović, 1891.
Brachyochirus prototypes: Nardo, 1860.
Brachyochirus aphya: Trois, 1875.
Latrunculus pellucidus: Giglioli, 1880; Kolombatović, 1881, 1882; A. P. Ninni, 1882.
Gobius albus: Graeffe, 1888.
Aphia pellucida: D'Ancona, 1922; Zei, 1942, 1949.
Brachyochirus pellucidus: Županović, 1961; Marcuzzi, 1972.
Aphia minuta mediterranea: Jardas *et al.*, 1996; Pallaoro & Jardas, 1996.
Aphia minuta: Froglia & Gramitto, 1989; Ungaro *et al.*, 1994; Nocita & Vanni, 1997; Kovačić, 1998, 2003; La Mesa, 1999; Sorice & Caputo, 1999; Caputo *et al.*, 2000; Zavodnik & Kovačić, 2000; Crnković, 2001.

The species was first reported in the Adriatic Sea for the Venice Lagoon under the synonym *Gobius Aphya* (Naccari, 1822). The species was listed under various synonyms for the Venice Lagoon, the Gulf of Triest, the Rijeka Bay, the Kvarner area, Dalmatia, the Split area, and Dubrovnik (Nardo, 1827, 1860; Martens, 1838; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Graeffe, 1888; D'Ancona, 1922; Zavodnik & Kovačić, 2000). The specimens from Triest, the Kvarner area, the Šolta Island, and Dubrovnik

are deposited in the collection of the Natural History Museum Rijeka, in the collection of Museo di Storia Naturale dell' Università di Firenze, in the collection of Stazione Idrobiologica di Chioggia, and in the collection of the Institute of Oceanography and Fisheries, Split (Marcuzzi, 1972; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, 2003, unpublished *data).* Specimens were collected by the small scale fishery gear in the Kvarner area, the Kornati Islands, and the Murter Sea (Jardas *et al.*, 1996; Crnković, 2001), and by the trawl in the northern Adriatic, in the channels between the mid-Dalmatian islands, in the central Adriatic, and in the Manfredonia area (Zei, 1942, 1949; Županović, 1961; Froglia & Gramitto, 1989; Ungaro *et al.*, 1994). The samples of this species were also collected at Ortona and Ancona (central Adriatic Sea) (La Mesa, 1999; Sorice & Caputo, 1999; Caputo *et al.*, 2000).

***Buenia affinis* Iljin, 1930**

Buenia affinis: Kovačić, 2002a.

It was considered for a long time that the species was described in the Adriatic Sea by Kolombatović (1891). The discovery of Miller (1972a) that Kolombatović's syntypes in the collection of the Naturhistorischen Museum, Wien belong to another species, *Pomatoschistus pictus*, were ignored in later reviews. In these reviews the species was treated as present in the Adriatic Sea (Tortonese, 1975; Ševčić, 1977; Kovačić, 1994; Jardas, 1996a), or as a junior synonym of other valid species (E. Ninni, 1938; Šoljan, 1948; Cavinato, 1952; Bini, 1969). Kovačić (2002a) finally collected true specimens of *B. affinis* in 1996 and 1997 in the Kvarner area. The specimens from the Kvarner area and Seline (the Velebit Channel) are deposited in the collection of the Natural History Museum Rijeka (Kovačić, unpublished data). Visual census research recorded the species at Kostrena, the Rijeka Bay (Kovačić, 2002b).

***Chromogobius quadrivittatus* (Steindachner, 1863)**

Gobius quadrivittatus: Steindachner, 1863; Graeffe, 1888.
Gobius planiceps: Bellotti, 1879.
Gobius quadrivittatus=Gobius planiceps: Kolombatović, 1881, 1882, 1886.
Gobius planiceps v. quadrivitatta: Kolombatović, 1891.
Chromogobius quadrivittatus: Miller, 1971; Ahnelt, 1990; Zavodnik & Crnković, 1992; Kovačić, 1994, 1997, 1998, 2002b; Jardas et al., 1996, 1998; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Zavodnik & Kovačić, 2000.

The species was described by Steindachner (1863) on the specimens collected at the Hvar Island. The species was listed for Venice, Triest, the Rijeka Bay, the Hvar Island, and the Split area (Perugia, 1866; Bellotti, 1879; Kolombatović, 1881, 1882, 1886, 1891; A. P. Ninni, 1882; Graeffe, 1888; Kovačić, 1994; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000). The specimens from Triest, Rovinj, the Kvarner area, the Hvar Island, and the Split area are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Naturhistorisches Museum Wien, and in the collection of the Institute of Oceanography and Fisheries, Split (Miller, 1971; Ahnelt, 1990; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1997, 1998**,** unpublished data). The species was also recorded at numerous localities in the Kvarner area (Zavodnik & Crnković, 1992; Kovačić, 1997, 2002b). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996). Visual census research recorded the species at Kostrena, the Rijeka Bay (Kovačić, 2002b).

***Chromogobius zebratus zebratus* (Kolombatović, 1891)**

Gobius planiceps zebrata: Kolombatović, 1891.
Chromogobius zebratus zebratus: Miller, 1971; Kovačić, 1994.
Chromogobius zebratus: Ahnelt, 1990; Kovačić, 1997, 1998; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000.

The species was described by Kolombatović (1891) on the specimens collected in the Split area. The specimens from the Kvarner area (the northern Adriatic Sea), the Šolta Island, the Split area, and from Mala Duba (the central Adriatic Sea) are deposited in the collection of the Natural History Museum Rijeka, and in the collection of the Naturhistorisches Museum Wien (Miller, 1971; Ahnelt, 1990; Kovačić, 1997, 1998, unpublished data; Zavodnik & Kovačić, 2000). The species was also recorded at numerous localities in the Kvarner area (Kovačić, 1994, 1997**;** Jardas *et al.,* 1998).

***Corcyrogobius liechtensteini* (Kolombatović, 1891)**

Gobius liechtensteini: Kolombatović, 1891 *(part.).*
Corcyrogobius liechtensteini: Miller, 1972b; Kovačić, 1997, 1998; Arko Pijevac *et al.*, 2001.

The species was described by Kolombatović (1891) on the specimens collected in the Split area. The additional specimens at Split were collected also by Kolombatović (1895). The specimens from the Kvarner area (the northern Adriatic Sea), from Mala Duba, and the Korčula Island (the central Adriatic Sea) are deposited in the collection of the Natural History Museum Rijeka and in the collection of the Naturhistorisches Museum Wien (Miller, 1972b; Kovačić, 1997, 1998, unpublished data).

Benthic biocoenological research recorded the species in the Kvarner area (Arko Pijevac *et al.*, 2001).

***Crystallogobius linearis* (Von Düben, 1845)**

Crystallogobius Nilssonii: Kolombatović, 1900.
Crystallogobius nilssoni: Županović & Grubišić, 1958; Županović, 1961.
Crystallogobius Nilssoni: Jukić & Crnković, 1974.
Crystallogobius linearis: Županović & Jardas, 1989; Pallaoro & Jardas, 1996; Kovačić, 1998; La Mesa, 2001; Caputo *et al.*, 2003.

The species was first reported in the Adriatic Sea for Dalmatia (Kolombatović, 1900). The specimens from the central Adriatic Sea and the Split area are deposited in the collection of the Natural History Museum Rijeka and in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996; Kovačić, 1998). Specimens were collected by the bottom trawl in the channels of the north-eastern Adriatic Sea, the Jabuka Pit, near Rogoznica, and in the channels between the mid-Dalmatian islands (Županović & Grubišić, 1958; Županović, 1961; Jukić & Crnković, 1974; Županović & Jardas, 1989), without a positive identification. The samples of this species were also collected at Ortona (central Adriatic Sea) (La Mesa, 2001; Caputo *et al.*, 2003).

***Deltentosteus colonianus* (Risso, 1826)**

Gobius Liechtensteinii: Steindachner, 1883.
Gobius colonianus: Steindachner & Kolombatović, 1884; Kolombatović, 1886, 1891.
Deltentosteus colonianus: Jardas *et al.*, 1996; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998.

The species was first reported in the Adriatic Sea for the Šolta Island by Steindachner (1883). The additional specimens from the Split area were reported by Steindachner & Kolombatović (1884) and Kolombatović (1886, 1891). The specimens from the Kvarner area, the Vrgada Island, the Šolta Island, the Hvar Channel, and the Split area are deposited in the collection of the Natural History Museum Rijeka, in the collection of Museo di Storia Naturale dell' Università di Firenze, and in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996).

***Deltentosteus quadrimaculatus* (Valenciennes, 1837)**

Gobius marsio: Nardo, 1827, 1860.
Gobius quadrimaculatus: Perugia, 1866, 1881; Trois, 1875; Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Zei, 1942, 1949; Županović, 1961; Crnković, 1970.
Deltentosteus quadrimaculatus: Jukić & Crnković, 1974; Jukić, 1975, 1983; Gamulin-Brida *et al.*, 1980; Županović & Jardas, 1989; Cetinić & Pallaoro, 1990b; Jardas, 1996b; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Špan *et al.*, 1996; Nocita & Vanni, 1997; Kovačić, 1998; Zavodnik & Kovačić, 2000.
Deltentosteus (Gobius) quadrimaculatus: Usić, 2003.

The species was first reported in the Adriatic Sea for the Venice Lagoon under the synonym *Gobius marsio* (Nardo, 1827). Miller (1973a) doubted regarding identity of *G. marsio* in Nardo (1827). However, Nardo (1860) itself mentioned "*G. quadrimaculatus,* Valenc." as synonym of his *G. marsio*. The species was listed for the Venice Lagoon, Triest, Istria, the Kvarner area, and the Split area (Nardo, 1860; Perugia, 1866, 1881; Trois, 1875; Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Zavodnik & Kovačić, 2000). The specimens from Venice, Rovinj, Istria, the Kvarner area, the Split area, the Lastovo Channel, the Kaštela Bay, the Mali Ston Bay, the Murter Island, and Bari are deposited in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj, in the collection of the Natural History Museum Rijeka, in the collection of Museo di Storia Naturale dell' Università di Firenze, and in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*; Usić, 2003). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea, northern and central Dalmatia (Cetinić & Pallaoro, 1990b; Jardas *et al.*, 1996), and by the bottom trawl in the northern Adriatic, the Kvarner area, the channels of the north-eastern Adriatic Sea, the Jabuka Pit, the central Adriatic, the channels between the mid-Dalmatian islands, the Murter Sea, and Crnogorsko primorje (Zei, 1942, 1949; Županović, 1961; Crnković, 1970; Jukić & Crnković, 1974; Jukić, 1975, 1983; Županović & Jardas, 1989; Jardas, 1996b; Jardas *et al.*, 1998; Špan *et al.*, 1996). Benthic biocoenological research recorded the species at the Krk Island (Gamulin-Brida *et al.*, 1980).

***Didogobius schlieweni* Miller, 1992**

Didogobius schlieweni: Miller, 1992.

The species was described by Miller (1992) on the single male collected at the Unije Island, near the Cres Island, the Kvarner area on 26 June 1991. The holotype is deposited in the collection of the Zoologische Staatssammlung, München. Three additional specimens in the

Adriatic Sea were collected at the Krk Island (the Kvarner area), at the Šolta Island, and the Ugljan Island (the central Adriatic) (Pallaoro & Jardas, 1996; Kovačić, *unpubl. data*). These specimens are deposited in the collection of the Natural History Museum Rijeka and in the collection of the Institute of Oceanography and Fisheries, Split.

***Didogobius spletchnai* Ahnelt & Patzner, 1995**

Didogobius spletchnai: Herler & Patzner, 2002.

Single subadult was collected for the first time in the Adriatic Sea near Pula (the Istrian Peninsula) on 3 June 2001 (Herler & Patzner, 2002). The specimen is deposited in the collection of the Naturhistorisches Museum Wien.

***Gammogobius steinitzi* Bath, 1971**

Gammogobius steinitzi: Kovačić, 1999.

Two females were collected for the first time in the Adriatic Sea in the Vrbnik cave, at the Krk Island (the Kvarner area) on 16 October 1998 (Kovačić, 1999). The additional nine specimens were collected at the same locality on 9 and 13 September 1999 (Kovačić, *unpubl. data*). They all are deposited in the collection of the Natural History Museum Rijeka.

***Gobius ater* Bellotti, 1888**

Gobius ater: Ahnelt, 2001.

Three males, collected by Kolombatović at Split (the central Adriatic), were found in the collection of the Naturhistorisches Museum Wien and identified by Ahnelt (2001).

***Gobius auratus* Risso, 1810**

Gobius auratus: Perugia, 1866, 1881; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1882, 1891; Perugia, 1881; A. P. Ninni, 1882; Faber, 1883; Vinciguerra, 1883; Damiani, 1896; Langhoffer, 1904; D'Ancona, 1922; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Orepić *et al.*, 1997; Castellarin *et al.*, 2001; Novosel *et al.*, 2002; Herler *et al.,* 2005.
Gobius fallax: Kovačić, 1994, 1998; Jardas *et al.*, 1998.
Gobius xanthocephalus: Zavodnik & Kovačić, 2000; Kovačić, 2002b.

The species was first reported for the Adriatic Sea by Perugia (1866), without any notice on collection locality. The species was later listed for Venice, Triest, the Rijeka Bay, the Pašman Island, Zadar, the Zadar Channel, the Hvar Island, the Split area, Dalmatia, the Vis Island, and the Boka Kotorska Bay, without positive identification (Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1882, 1891; Perugia, 1881; A. P. Ninni, 1882; Faber, 1883; Vinciguerra, 1883; Damiani, 1896; Langhoffer, 1904; D'Ancona, 1922). The specimens from the Kvarner area, the central Adriatic, the Šolta Island, and Split are deposited in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of the Natural History Museum Rijeka**,** and in the collection of Museo di Storia Naturale dell' Università di Firenze (Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data).* The species belongs to *Gobius auratus* species complex (Miller & El-Tawil, 1974; Herler *et al.,* 2005) and specimens in the collections of Split and Firenza need re-examination because of morphological similarities between *G. auratus, G. fallax* and *G. xanthocephalus*. The specimens recorded in the Kvarner area as *G. fallax* in Kovačić (1994, 1998) and Jardas *et al.* (1998) belong to *G. auratus*. G. *xanthocephalus* reported in Zavodnik & Kovačić (2000) and Kovačić (2002b) for the Rijeka Bay is, according to Herler *et al.* (2005), north Adriatic color morph of *G. auratus*. Benthic biocoenological researches recorded the species in the Velebit Channel, and the Mljet Island (Orepić *et al.*, 1997; Novosel *et al.*, 2002)**,** and the visual census researches recorded the species at Triest (Castellarin *et al.*, 2001), without positive identification. Herler *et al.* (2005) collected specimens at Selce, the Krk Island, the Cres Island (the Kvarner area), and the Murter Island (the central Adriatic Sea). The part of these specimens is deposited in the collection of the Naturhistorisches Museum Wien (Herler *et al.,* 2005).

***Gobius bucchichi* Steindachner, 1870**

Gobius Bucchichi: Steindachner, 1870.
Gobius buchichi: Perugia, 1881.
Gobius Buchichii: Kolombatović, 1881.
Gobius buchichii: A. P. Ninni, 1882.
Gobius bucchichi: Kolombatović, 1891; Tortonese, 1975; Onofri, 1983; Ahnelt, 1984; Zavodnik & Zavodnik, 1986; Mušin, 1989; Kraljević & Pallaoro, 1991; Kovačić, 1994, 1998, 2002b; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Simonović *et al.*, 1996; Jaklin & Arko-Pijevac, 1997; Nocita & Vanni, 1997; Orepić *et al.*, 1997; De Girolamo *et al.*, 1998; Simonović, 1999; Guidetti & Bussotti, 2000; Zavodnik & Kovačić, 2000; Novosel *et al.*, 2002.
Gobius Bucchichii: Gridelli, 1931.
Gobius bucchichii: Guidetti, 2000; Castellarin *et al.*, 2001.

The species was described by Steindachner (1870) on the specimens collected at the Hvar Island. The syn-

types are deposited in the collection of the Museo Civico di Storia Naturale di Genova and in the collection of the Naturhistorisches Museum Wien (Tortonese, 1963; Miller, 1973a; Ahnelt, 1984). The species was listed for the Venice area, Triest, the Rijeka Bay, Zadar, and the Split area (Kolombatović, 1881, 1891; A. P. Ninni, 1882; Perugia, 1881; Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from Triest, the Kvarner area, the Kornati Islands, the Biograd area, Split, the Šolta Channel, the Brač Channel, the Hvar Island, the Korčula Island, and Dubrovnik area are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of the Natural History Museum of Split, in the collection of the Natural History Museum of the Biological Institute, Dubrovnik, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of the Museo Civico di Storia Naturale di Trieste, in the collection of the Naturhistorisches Museum Wien, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Gridelli, 1931; Tortonese, 1975; Onofri, 1983; Ahnelt, 1984; Mušin, 1989; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Kraljević & Pallaoro, 1991; Jardas *et al.*, 1996). Benthic biocoenological researches recorded the species in the Raša Bay, the Lošinj Island, the Sv. Marko Islet, the Velebit Channel, the Kornati Islands, the Murter Sea, and the Mljet Island (Zavodnik & Zavodnik, 1986; Jardas *et al.*, 1996; Jaklin & Arko-Pijevac, 1997; Orepić *et al.*, 1997; Novosel *et al.*, 2002), and the visual census researches recorded the species in the Slovenian coastal waters, Triest, the Rijeka Bay, Cavtat, the Tremiti Islands, and the Boka Kotorska Bay (Simonović *et al.*, 1996; De Girolamo *et al.*, 1998; Simonović, 1999; Guidetti, 2000; Guidetti & Bussotti, 2000; Castellarin *et al.*, 2001; Kovačić, 2002b; Jardas *et al.*, 1998).

Gobius cobitis Pallas, 1811

Gobius capito: Perugia, 1866; Trois, 1875 Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Graeffe, 1888; Langhoffer, 1904; E. Ninni, 1912; D'Ancona, 1922.
Gobius exanthematosus: Perugia, 1881; Vinciguerra, 1883; Usić, 2003.
Gobius cobitis: Cavinato, 1952; Marcuzzi, 1972; Tortonese, 1975; Mušin, 1989; Kovačić, 1994, 1998, 2002b; Jardas *et al.*, 1996; 1998; Pallaoro & Jardas, 1996; Caputo *et al.*, 1997; Nocita & Vanni, 1997; Orepić *et al.*, 1997; Caputo, 1998; De Girolamo *et al.*, 1998; Sorice & Caputo, 1999; Zavodnik & Kovačić, 2000; Castellarin *et al.*, 2001; Pallaoro, 2001; Novosel *et al.*, 2002; Turk *et al.*, 2002; Lipej *et al.* 2003.

The species was first reported in the Adriatic Sea for Triest (Perugia, 1866). The species was listed under various synonyms for Venice, the Venice Lagoon, Triest, Istria, the Rijeka Bay, the Zadar Channel, the Murter Island, the Split area, the Hvar Island, the Vis Island, the Mljet Island, and Dalmatia (Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Perugia, 1881; Vinciguerra, 1883; Graeffe, 1888; Langhoffer, 1904; E. Ninni, 1912; D'Ancona, 1922; Cavinato, 1952; Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from Venice, Triest, the Istrian peninsula, the Kvarner area, the Pag Island, Dalmatia, the Split area, the central Adriatic, and the Dubrovnik area are deposited in the collection of the Center for Marine Research Rovinj, in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of Museo di Storia Naturale dell' Università di Firenze, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of l'Istituto di Idrobiologica di Chioggia, and in the collection of the Natural History Museum of the Biological Institute, Dubrovnik (Marcuzzi, 1972; Tortonese, 1975; Mušin, 1989; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*; Usić, 2003; Zavodnik, *pers. comm.*). Specimens were collected by the small scale fishery gear in the Split area (Pallaoro, 2001). Benthic biocoenological researches recorded the species in the Velebit Channel, the Kornati Islands, the Murter Sea, and the Mljet Island (Jardas *et al.*, 1996; Orepić *et al.*, 1997; Novosel *et al.*, 2002), and the visual census researches recorded the species at Triest, the Slovenian coastal waters, the Rijeka Bay, the Kornati Islands, and the Murter Sea (Jardas *et al.*, 1996; 1998; De Girolamo *et al.*, 1998; Castellarin *et al.*, 2001; Kovačić, 2002b; Turk *et al.*, 2002; Lipej *et al.* 2003). The samples of *G. cobitis* were also collected at Ancona (Caputo *et al.*, 1997; Caputo, 1998; Sorice & Caputo, 1999).

Gobius couchi Miller & El-Tawil, 1974

Gobius couchi: Kovačić, 2001a.

Fourteen females and fifteen males were collected for the first time in the Adriatic Sea at Oštro (the Kvarner area), in 1996 and 1997 (Kovačić, 2001a). The specimens are deposited in the collection of the Natural History Museum Rijeka. The additional findings in the Adriatic Sea are from Bakar, Klenovica, Kačjak (the Kvarner area), and the Šolta Island (the central Adriatic) (Kovačić, *unpubl. data).* These specimens are also deposited in the collection of the Natural History Museum Rijeka.

Gobius cruentatus Gmelin, 1789

Gobius cruentatus: Nardo, 1827, 1860; Martens, 1838; Plucàr, 1846; Perugia, 1866; Canestrini, 1872;

Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Graeffe, 1888; Langhoffer, 1904; D'Ancona, 1922; Županović, 1961; Marcuzzi, 1972; Tortonese, 1975; Jardas & Pallaoro, 1989; Cetinić & Pallaoro, 1990a, 1990b; Zavodnik & Crnković, 1992; Kovačić, 1994, 1998, 2002b, 2004; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Simonović *et al.*, 1996; Nocita & Vanni, 1997; Orepić *et al.*, 1997; De Girolamo *et al.*, 1998; Simonović, 1999; Guidetti, 2000; Zavodnik & Kovačić, 2000; Arko Pijevac *et al.*, 2001; Castellarin *et al.*, 2001; Pallaoro, 2001; Novosel *et al.*, 2002; Turk *et al.*, 2002; Lipej *et al.* 2003; Usić, 2003.

The species was first reported in the Adriatic Sea for Venice (Nardo, 1827). The species was listed for the Venice Lagoon, Triest, the Rijeka Bay, the Ugljan Island, the Split area, the Brač Island, the Šolta Island, the Lastovo Island, the Korčula Island, the Mljet Island, and the Vis Island (Martens, 1838; Plucàr, 1846; Nardo, 1860; Perugia, 1866; Canestrini, 1872; Trois, 1875; Giglioli, 1880; A. P. Ninni, 1882; Vinciguerra, 1883; Graeffe, 1888; Kolombatović, 1881, 1891; Langhoffer, 1904; D'Ancona, 1922; Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from Triest, Rovinj, the Kvarner area, Zadar, the central Adriatic, Dalmatia, the Šolta Island, the Split area, and Dubrovnik are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of l'Istituto di Idrobiologica di Chioggia, in the collection of the Museo Civico di Storia Naturale di Genova, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Marcuzzi, 1972; Tortonese, 1975; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998; Usić, 2003). The finding by the bottom trawl in the channels between the mid-Dalmatian islands (Županović, 1961) is quite surprising, considering depth and habitat preferences of the species. Specimens were collected by the small scale fishery gear at the Kornati Islands, the Murter Sea, the northern and the central Dalmatia, the Split area, the Split Channel, and the Brusnik Island (Jardas & Pallaoro, 1989; Cetinić & Pallaoro, 1990a, 1990b; Jardas *et al.*, 1996; Pallaoro, 2001). Benthic biocoenological researches recorded the species in the Kvarner area, the Velebit Channel, the Kornati Islands, the Murter Sea, and the Mljet Island (Zavodnik & Crnković, 1992; Jardas *et al.*, 1996; Orepić *et al.*, 1997; Arko Pijevac *et al.*, 2001; Novosel *et al.*, 2002), and the visual census researches recorded the species at Triest, the Slovenian coastal waters, the Rijeka Bay, and the Tremiti Islands (De Girolamo *et al.*, 1998; Jardas *et al.*, 1998; Guidetti, 2000; Castellarin *et al.*, 2001; Kovačić, 2002b; Turk *et al.*, 2002; Lipej *et al.* 2003). The samples of this species were also collected in the Kvarner area and the Boka Kotorska Bay (Simonović *et al.*, 1996; Simonović, 1999; Kovačić, 2004).

***Gobius fallax* Sarato, 1889**

Gobius fallax: Gridelli, 1931; E. Ninni, 1938; Tortonese, 1975**;** Ahnelt, 1984; Cetinić & Pallaoro, 1990b; Jardas *et al.*, 1996; Pallaoro & Jardas, 1996; De Girolamo *et al.*, 1998; Zavodnik & Kovačić, 2000; Turk *et al.*, 2002; Lipej *et al.* 2003; Herler *et al.*, 2005.

The species was first reported in the Adriatic Sea for Triest and Šibenik (Gridelli, 1931). Miller (1973a) supposed that *G. auratus v. ruginosa* of Kolombatović (1891) from the Split area is a synonym of *G. fallax*. The species was listed for Venice and the Korčula Island (E. Ninni, 1938; Tortonese, 1975). Single specimen, among Steindacher's syntypes of *G. bucchichi* from 1870, were found in the collection of the Naturhistorisches Museum Wien and identified by Ahnelt (1984). The specimens from Triest, the Goli Island in the Kvarner area, Šibenik, and the Šolta Island are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Museo Civico di Storia Naturale di Trieste, and in the collection of the Institute of Oceanography and Fisheries, Split (Gridelli, 1931; Pallaoro & Jardas, 1996; Zavodnik & Kovačić, 2000; Kovačić, *unpubl. data)*. The species belongs to *Gobius auratus* species complex (Miller & El-Tawil, 1974; Herler *et al.*, 2005) and specimens in the collections in Triest and Split need re-examination considering morphological similarities between *G. auratus, G. fallax* and *G. xanthocephalus*. Specimens collected by the small scale fishery gear at the Kornati Islands and the Murter Sea, the northern and the central Dalmatia (Cetinić & Pallaoro, 1990b; Jardas *et al.*, 1996) were not positively identified. Benthic biocoenological researches recorded the species at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996), and the visual census researches recorded the species at Triest and the Slovenian coastal waters, (De Girolamo *et al.*, 1998; Turk *et al.*, 2002; Lipej *et al.* 2003), without positive identification. The specimens recorded in Kovačić (1994, 1998) and Jardas *et al.* (1998) as *G. fallax,* belong to another gobiid species, *G. auratus.* Herler *et al.* (2005) collected specimens at Triest, Piran, the Cres Island and the Šolta Island. The part of these specimens is deposited in the collection of Naturhistorisches Museum Wien.

***Gobius geniporus* Valenciennes, 1837**

Gobius geniporus: Perugia, 1866; Giglioli, 1880; Kolombatović, 1881, 1891; Faber, 1883; Vinciguerra, 1883; Marcuzzi, 1972; Tortonese, 1975; Cetinić & Pallaoro, 1990a, 1990b; Ahnelt & Elvira, 1991; Kraljević & Pallaoro, 1991; Kovačić, 1994, 1998, 2002b; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Guidetti, 2000; Zavod-

nik & Kovačić, 2000; Arko Pijevac *et al.*, 2001; Pallaoro, 2001; Lipej *et al.* 2003; Usić, 2003.

The species was first reported in the Adriatic Sea for Triest (Perugia, 1866). The species was listed for Venice, Ravenna, Triest, the Rijeka Bay, Dalmatia, the Split area, the Mljet Island, the Lastovo Island, the Korčula Island, and the Boka Kotorska Bay (Giglioli, 1880; Kolombatović, 1881, 1891; Faber, 1883; Vinciguerra, 1883; Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from Triest, Rovinj, the Kvarner area, the central Adriatic, Dalmatia, Dubrovnik and Kotor are deposited in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj, in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of Museo di Storia Naturale dell' Università di Firenze, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of l'Istituto di Idrobiologica di Chioggia, and in the collection of the Naturhistorisches Museum Wien (Marcuzzi, 1972; Tortonese, 1975; Ahnelt & Elvira, 1991; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*; Usić, 2003). Specimens were collected by the small scale fishery gear at the Kornati Islands, the Murter Sea, the northern and the central Dalmatia, the Split area, and the Split Channel (Cetinić & Pallaoro, 1990a, 1990b; Kraljević & Pallaoro, 1991; Jardas *et al.*, 1996; Pallaoro, 2001). Benthic biocoenological researches recorded the species in the Kvarner area, at the Kornati Islands, and the Murter Sea (Jardas *et al.*, 1996; Arko Pijevac *et al.,* 2001), and the visual census researches recorded the species in the Slovenian coastal waters, the Rijeka Bay, and the Tremiti Islands (Jardas *et al.,* 1998; Guidetti, 2000; Kovačić, 2002b**;** Lipej *et al.* 2003).

***Gobius kolombatovici* Kovačić & Miller, 2000**

Gobius kolombatovici: Kovačić & Miller, 2000.

The species was described by Kovačić & Miller (2000) on four females and six males collected at four closely situated localities at the Krk Island (the Kvarner area), in June and September of 1998. The holotype and paratypes are deposited in the collection of the Natural History Museum Rijeka. Single paratype was donated to the British Museum of Natural History. Single additional female in the Adriatic Sea was collected at the Ćutin Island, near the Cres Island, the Kvarner area (Kovačić, *unpubl. data).* It is also deposited in the collection of the Natural History Museum Rijeka.

***Gobius niger* Linnaeus, 1758**

Gobius jozo: Brünnich, 1765; Plucàr, 1846; Perugia, 1866, 1881; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Graeffe, 1888; Langhoffer, 1904; D'Ancona, 1922; Zei, 1942, 1949; Zavodnik, 1971; Marcuzzi, 1972.
Gobius Jozo: Nardo, 1827; Martens, 1838.
Gobius niger: Naccari, 1822; Nardo, 1827; Martens, 1838; Plucàr, 1846; Perugia, 1866, 1881; Giglioli, 1880; A. P. Ninni, 1882; Graeffe, 1888; D'Ancona, 1922; Zei, 1942, 1949; Cavinato, 1952; Županović, 1961; Tortonese, 1975; Jukić & Piccinetti, 1981; Fabi & Froglia, 1983, 1984; Jukić, 1983; Onofri, 1983; Fabi & Giannetti, 1985; Zavodnik & Zavodnik, 1986; Jardas & Pallaoro, 1989; Seiwald & Patzner, 1989; Cetinić & Pallaoro, 1990b; Zavodnik & Crnković, 1992; Kovačić, 1994, 1998; Jardas *et al.*, 1996, 1998; Marconato *et al.*, 1996; Pallaoro & Jardas, 1996; Simonović *et al.*, 1996; Špan *et al.*, 1996; Caputo *et al.*, 1997; McKay & Miller, 1997; Nocita & Vanni, 1997; Orepić *et al.*, 1997; Atkinson *et al.*, 1998; Caputo, 1998; Simonović, 1999; Sorice & Caputo, 1999; Zavodnik & Kovačić, 2000; Pallaoro, 2001; Mazzoldi & Rasotto, 2002; Novosel *et al.*, 2002; Rasotto & Mazzoldi, 2002; Turk *et al.*, 2002; Lipej *et al.* 2003; Usić, 2003.
Gobius jozo var. nigra: Nardo, 1860.
Gobius jorzo: Trois, 1875.
Gobius niger jozo: Jukić & Crnković, 1974; Jukić, 1975.
Gobius jozzo: Usić, 2003.

The species was first reported in the Adriatic Sea for the Split and trogir areas (Brünnich, 1765). The species was listed for Venice, the Venice Lagoon, Triest, the Rijeka Bay, the Kvarner area, Ravenna, the Zadar Channel, the Split area, Dalmatia, the Hvar Island, the Korčula Island, the Lastovo Island, and the Boka Kotorska Bay (Naccari, 1822; Nardo, 1827, 1860; Martens, 1838; Plucàr, 1846; Perugia, 1866, 1881; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Graeffe, 1888; Langhoffer, 1904; D'Ancona, 1922; Cavinato, 1952; Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from Venice, Triest, Ravenna, Civitanova Marche, near Rovinj, the Kvarner area, the Pag Island, the Zadar Channel, the Murter Island, the Šibenik area, the Šolta Island, the Hvar Island, the Hvar Channel, the Split area, the Mljet Island, the Neretva Channel, and Dubrovnik are deposited in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj, in the of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of the Natural History Museum of Split, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of l'Istituto di Idrobiologica di Chioggia, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Marcuzzi, 1972; Tortonese, 1975; Onofri, 1983; Pallaoro & Jardas, 1996;

Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*; Usić, 2003). Specimens were collected by the small scale fishery gear at the Kornati Islands and Murter Sea, the northern and the central Dalmatia, the Split area, and the Kaštela Bay (Jardas & Pallaoro, 1989; Cetinić & Pallaoro, 1990b; Jardas *et al.*, 1996; Pallaoro, 2001), and by the bottom trawl in the northern Adriatic, the channels of the north-eastern Adriatic Sea, the central Adriatic, the channels between the mid-Dalmatian islands, the Crnogorsko primorje (Zei, 1942, 1949; Županović, 1961; Jukić & Crnković, 1974; Jukić, 1975; Jukić & Piccinetti, 1981; Jukić, 1983; Špan *et al.*, 1996). Benthic biocoenological researches recorded the species in the Rovinj area, the Raša Bay, the Lošinj Island, the Velebit Channel, the Kornati Islands, the Murter Sea, and the Mljet Island (Zavodnik, 1971; Zavodnik & Zavodnik, 1986; Zavodnik & Crnković, 1992; Jardas *et al.*, 1996; Orepić *et al.*, 1997; Novosel *et al.*, 2002) and the visual census researches recorded the species in the Slovenian coastal waters and the Rijeka Bay (Jardas *et al.,* 1998; Turk *et al.*, 2002; Lipej *et al.* 2003). The samples of *G. niger* were also collected in the Venice Lagoon, Aurisina, Ancona, and the Boka Kotorska Bay (Fabi & Froglia, 1983, 1984; Fabi & Giannetti, 1985; Seiwald & Patzner, 1989; Marconato *et al.,* 1996; Simonović *et al.,* 1996; Caputo *et al.,* 1997; McKay & Miller, 1997; Atkinson *et al.*, 1998; Caputo, 1998; Simonović, 1999; Sorice & Caputo, 1999; Mazzoldi & Rasotto, 2002; Rasotto & Mazzoldi, 2002).

***Gobius paganellus* Linnaeus, 1758**

Gobius Paganellus: Naccari, 1822; Nardo, 1827; Martens, 1838.
Gobius paganellus: Plucàr, 1846; Nardo, 1860; Perugia, 1866, 1881; Canestrini, 1872; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; Perugia, 1881; A. P. Ninni, 1882, Graeffe, 1888; Langhoffer, 1904; E. Ninni, 1912; D'Ancona, 1922; Zei, 1942, 1949; Cavinato, 1952; Mušin, 1989; Cetinić & Pallaoro, 1990a; Jardas *et al.*, 1996; Pallaoro & Jardas, 1996; Simonović *et al.,* 1996; Caputo *et al.,* 1997; Nocita & Vanni, 1997; Orepić *et al.*, 1997; Caputo, 1998; De Girolamo *et al.*, 1998; Kovačić, 1998, 2002b; Simonović, 1999; Sorice & Caputo, 1999; Zavodnik & Kovačić, 2000; Castellarin *et al.*, 2001; Turk *et al.*, 2002; Lipej *et al.* 2003; Usić, 2003.

The species was first reported in the Adriatic Sea for Venice (Naccari, 1822). The species was listed for the Venice Lagoon, Triest, Rijeka, the Ugljan Island, the Split area, and Dalmatia (Nardo, 1827; Martens, 1838; Plucàr, 1846; Nardo, 1860; Perugia, 1866, 1881; Canestrini, 1872; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Graeffe, 1888; Langhoffer, 1904; E. Ninni, 1912; D'Ancona, 1922; Cavinato, 1952; Zavodnik & Kovačić, 2000). The specimens from Chioggia, Triest, Civitanova Marche, Rovinj, the Pag Island, the Split area, the mouth of the Neretva river, and the Dubrovnik area are deposited in the collection of the Museo Zoologico di Padova, in the collection of l'Istituto di Idrobiologica di Chioggia, in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of the Natural History Museum of the Biological Institute, Dubrovnik, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Mušin, 1989; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data*; Usić, 2003). The finding by the bottom trawl in the northern Adriatic (Zei, 1942, 1949) is quite surprising, considering dept and habitat preferences of the species. Specimens were collected by the small scale fishery gear at the Kornati Islands, the Murter Sea, and the Split Channel (Cetinić & Pallaoro, 1990a; Jardas *et al.*, 1996). Benthic biocoenological researches recorded the species at the Kornati Islands, the Murter Sea, and the Mljet Island (Jardas *et al.*, 1996; Orepić *et al.*, 1997) and the visual census researches recorded the species at Triest, the Slovenian coastal waters and Kostrena (De Girolamo *et al.*, 1998; Castellarin *et al.*, 2001; Kovačić, 2002b; Turk *et al.*, 2002; Lipej *et al.* 2003). The samples of *G. paganellus* were also collected at Ancona, Buljarica and the Boka Kotorska Bay (Simonović *et al.,* 1996; Caputo *et al.,* 1997; Caputo, 1998; Simonović, 1999; Sorice & Caputo, 1999).

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

Gobius roulei: Kovačić, 1995, 2001b, 2002b; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Zavodnik & Kovačić, 2000; Turk *et al.*, 2002; Lipej *et al.*, 2003; Usić, 2003.

Single female and seven males were collected for the first time in the Adriatic Sea at four localities in the Kvarner area in 1993 and 1994 (Kovačić, 1995). The specimens are deposited in the collection of the Natural History Museum Rijeka. The additional specimens in the Kvarner area were collected by Kovačić (2001b). The species was also recorded at numerous localities in the Kvarner area (Kovačić, 1995; Zavodnik & Kovačić, 2000). The additional findings in the Adriatic Sea are from the Gulf of Triest (the northern Adriatic) (Lipej *et al.*, 2003), the Pag Island, the Kornati Islands, and the Murter Sea (the central Adriatic) (Jardas *et al.*, 1996; Pallaoro & Jardas, 1996). The specimens from the Pag Island and from the Rijeka Bay are deposited in the collection of the Institute of Oceanography and Fisheries, Split and in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj. Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*,

1996). Benthic biocoenological researches recorded the species at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996), and the visual census researches recorded the species in the Slovenian coastal waters and the Rijeka Bay (Jardas *et al.,* 1998; Kovačić, 2002b; Turk *et al.*, 2002; Lipej *et al.* 2003).

***Gobius vittatus* Vinciguerra, 1883**

Gobius vittatus: Kolombatović, 1886, 1891; Kovačić, 1994, 1998, 2002b; Pallaoro & Jardas, 1996; Jardas *et al.*, 1996; Nocita & Vanni, 1997; Jardas *et al.*, 1998; Zavodnik & Kovačić, 2000; Novosel *et al.*, 2002.

Two specimens were collected for the first time in the Adriatic Sea near Split in 1884 (Kolombatović, 1886). The additional collected specimen and details on time and locality of collecting of the first two specimens was published later (Kolombatović, 1891). The species was reported for the Rijeka Bay (Kovačić, 1994; Zavodnik & Kovačić, 2000). The specimens from the Kvarner area and Split are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data)*. Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996). Benthic biocoenological researches recorded the species at the Velebit Channel, the Kornati Islands, and the Murter Sea (Jardas *et al.*, 1996; Novosel *et al.*, 2002) and the visual census researches recorded the species in the Rijeka Bay (Jardas *et al.,* 1998; Kovačić, 2002b).

***Knipowitschia caucasica* (Kawrajsky, 1916)**

Knipowitschia caucasica: Miller, 1972c; Pallaoro & Jardas, 1996; Kovačić & Pallaoro, 2003.

Two females, collected at Zaule (near Triest), were found in the collection of the Museo Civico di Storia Naturale di Venice and identified by Miller (1972c). Additional male was collected from the Venice Lagoon by H. Bath (Miller, 1972c). Econodimis and Miller (1990) believed that Adriatic population was "a *caucasica*-like form, which differs from true *caucasica* in body proportions, and may represent a new, unnamed species". Kovačić & Pallaoro (2003) confirmed previously questioned presence of this species in the Adriatic Sea and provide data on morphology and ecology of the Adriatic specimens. The specimens from the northern and central Dalmatia, Croatia: the Pag Island, the river Karišnica, the Karin Sea, the Vrana Lake, Pirovac, the mouth of the river Jadro, in the Morinj Bay, the Prokljan Lake, the spring and the mouth of the river Pantan in the Kaštela Bay, and the river Cetina are deposited in the collection of the Natural History Museum Rijeka (Kovačić & Pallaoro, 2003). The specimens from the Prokljan Lake are deposited in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996).

***Knipowitschia panizzae* (Verga, 1841)**

Gobius Panizzae: Verga, 1841; Trois, 1875; Giglioli, 1880; E. Ninni, 1912.
Gobius panizzae: Nardo, 1860; A. P. Ninni, 1882.
Gobius Panizzai: E. Ninni, 1938.
Pomatoschistus panizzai: Bini, 1969.
Knipowitschia panizzai: Tortonese, 1975; Gandolfi & Tongiorgi, 1976; Nocita & Vanni, 1997.
Knipowitschia panizzae: Gandolfi, 1972; Miller, 1972c; Marconato *et al.,* 1996; Pallaoro & Jardas, 1996; McKay & Miller, 1997; Lugli & Torricelli, 1999; Marzano & Gandolfi, 2000, 2001.

The species was described by Verga (1841) on the specimens collected at the Lago di Comacchio. The species was listed for Laguna di Venice, the Sile river, the Piave river, the Livenza river, the Po river, the rivers of Veneto, Porto Tolle, Lago di Comacchio, the river Fortore, and Laguna di Lesina (Nardo, 1860; Trois, 1875; Giglioli, 1880; A. P. Ninni, 1882; E. Ninni, 1912, 1938; Bini, 1969; Gandolfi, 1972; Miller, 1972c; Gandolfi & Tongiorgi, 1976), without positive identification. The findings at the Lago di Garda and the Krk Island were considered as erroneous (Miller, 1972c). The samples of this species were also collected in the Po delta and the Venice Lagoon, without positive identification (Gandolfi, 1972; Marconato *et al.,* 1996; McKay & Miller, 1997; Lugli & Torricelli, 1999; Marzano & Gandolfi, 2001). The specimens from the mouth of the river Po, Caorle (Veneto), the Venice Lagoon**,** Triest, Civitanova Marche, and the Vrana Lake are deposited in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of the Institute of Oceanography and Fisheries, Split, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Tortonese, 1975; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997). All these specimens should be reexamined considering morphological similarities between *K. panizzae* and *K. caucasica* (Kovačić & Pallaoro, 2003).

***Lebetus guilleti* (Le Danois, 1913)**

Lebetus guilleti: Herler & Kovačić, 2002.

Eight females and five males were collected for the first time in the Adriatic Sea at Selce and Klenovica (the Kvarner area) in 1999 and 2001 (Herler & Kovačić, 2002). The specimens are deposited in the collection of the Naturhistorisches Museum Wien and in the collec-

tion of the Natural History Museum Rijeka. The additional finding is documented photographically at the western coast of Istria, near Rovinj in May 2002 (Herler & Kovačić, 2002).

***Lesueurigobius friesii* (Malm, 1874)**

Gobius friesii-macrolepis: Šoljan, 1948; Županović & Grubišić, 1958; Županović, 1961.
Lesueurigobius friesii: Jukić & Crnković, 1974; Jukić, 1975; Jardas *et al.*, 1981, 1996, 1998; Froglia & Gramitto, 1982; Jukić, 1983; Zavodnik & Zavodnik, 1986; Županović & Jardas, 1989; Jardas, 1996b; Pallaoro & Jardas, 1996; Kovačić, 1998; Zavodnik & Kovačić, 2000; Usić, 2003.

The first positive record of this species in the Adriatic Sea was based on specimens collected at the Krk Island by the bottom trawl in 1940 (Šoljan, 1948). The specimens collected near Rovinj, at the Raša Bay, the Kvarner area, the Šolta Channel, NW from the Islet of Jabuka, the Brač Island and at Budva are deposited in the collection of the Center for Marine Research of the Ruđer Bošković Institute Rovinj, in the collection of the Natural History Museum Rijeka, and in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996; Kovačić, 1998, *unpubl. data*; Usić, 2003). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996) and by the bottom trawl in the Kvarner area, the Rijeka Bay, south of Rogoznica, at the Jabuka Pit, the Palagruža Island, the central Adriatic, the channels between the mid-Dalmatian islands and at Crnogorsko primorje (Županović & Grubišić, 1958; Županović, 1961; Jukić & Crnković, 1974; Jukić, 1975, 1983; Jardas *et al.*, 1981, 1998; Froglia & Gramitto, 1982; Županović & Jardas, 1989; Zavodnik & Kovačić, 2000). Benthic biocoenological researches recorded the species at the Raša Bay, and in the Murter Sea (Zavodnik & Zavodnik, 1986; Jardas, 1996b).

***Lesueurigobius suerii* (Risso, 1810)**

Gobius Lunieus: Chiereghini, 1818.
Gobius lunie: Nardo, 1827.
Gobius lunie: Nardo, 1860.
Gobius *Lesueuri*: Kolombatović, 1881.
Gobius lesueuri: Kolombatović, 1882, 1891; Županović, 1961; Crnković, 1970; Zavodnik, 1971; Jukić & Crnković, 1974.
Gobius Lesueurii: Vinciguerra, 1883; Langhoffer, 1904.
Gobius lesueurii: A. P. Ninni, 1882; E. Ninni, 1912.
Lesueurigobius suerii: Zavodnik & Crnković, 1992; Jardas *et al.*, 1996, 1998; Usić, 2003; Ahnelt & Dorda, 2004.
Lesueurigobius sueri: Tortonese, 1975; Nocita & Vanni, 1997; Sorice & Caputo, 1999.

The species was recorded for the first time in the Adriatic Sea for the Venice Lagoon (Chiereghini, 1818, cited in Ninni, 1938). The species was listed under various synonyms for the Venice Lagoon, the Zadar Channel, the Split area, and the Boka Kotorska Bay (Nardo, 1827, 1860; Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Langhoffer, 1904; E. Ninni, 1912). The specimens collected near Rovinj, from Dalmatia, the Sv. Andrija Island, and Bari are deposited in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj, in the collection of the Naturhistorisches Museum Wien, in the collection of the Museo Civico di Storia Naturale di Genova, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Tortonese, 1975; Nocita & Vanni, 1997; Usić, 2003; Ahnelt & Dorda, 2004; Zavodnik, *pers. comm.*). Specimens were collected by the small scale fishery gear at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996) and by the bottom trawl in the channels of the north-eastern Adriatic Sea, near Rogoznica, the channels between the mid-Dalmatian islands, and Crnogorsko primorje (Županović, 1961; Crnković, 1970; Jukić & Crnković, 1974). Benthic biocoenological researches recorded the species at Rovinj and in the Kvarner area (Zavodnik, 1971; Jardas *et al.*, 1998; Zavodnik & Crnković, 1992). The samples of this species were also collected at Ancona (Sorice & Caputo, 1999).

***Millerigobius macrocephalus* (Kolombatović, 1891)**

Gobius macrocephalus: Kolombatović, 1891.
Millerigobius macrocephalus: Bath, 1973; Turk *et al.*, 2002; Lipej *et al.* 2003.

The species was described by Kolombatović (1891) on single specimen collected at the Brač Island (the central Adriatic) in 1887. Bath (1973) redescribed the species on four males collected at Medulin and the Limski Channel in Istria, in July 1972. The neotypes are deposited in the collection of the Senckenberg Naturmuseum, Frankfurt. The additional specimens in the Adriatic Sea were collected at the Šolta Island, the central Adriatic (Kovačić, *unpubl. data)*. They are deposited in the collection of the Natural History Museum Rijeka. Visual census research recorded the species in the Slovenian coastal waters (Turk *et al.*, 2002; Lipej *et al.* 2003).

***Odondebuenia balearica* (Pellegrin & Fage, 1907)**

Gobius liechtensteini: Kolombatović, 1891 *(part.).*
Odondebuenia balearica: Miller & Tortonese, 1968;

Ahnelt *et al.*, 1994; Jardas *et al.*, 1996; Pallaoro & Jardas, 1996.

Single specimen collected at Split and four specimens collected at the Korčula Island (the central Adriatic) were found and identified by Miller & Tortonese (1968) in the collection of the Museo Zoologico, Università di Firenze and in the collection of the Naturhistorisches Museum Wien. The additional specimens in the Adriatic Sea were collected at Rovinj (the Istrian peninsula); Urinj, Bakar, Oštro, Klenovica, the Krk Island, the Ćutin Island (the Kvarner area); Split, Stobreč, the Šolta Island, the Hvar Island, Mala Duba, the Biševo Island, and the Palagruža Island (the central Adriatic); Mljet (the southern Adriatic) (Ahnelt *et al.*, 1994; Pallaoro & Jardas, 1996; Kovačić, *unpubl. data)*. They are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split and in the collection of the Naturhistorisches Museum Wien. The species was recorded in benthic biocoenological research at the Kornati Islands (the central Adriatic) (Jardas *et al.*, 1996).

***Pomatoschistus bathi* Miller, 1982**

Pomatoschistus bathi: Miller, 1982; Ahnelt *et al.*, 1994; Pallaoro & Jardas, 1996; Lipej *et al.*, 2003.

Single male and twelve females from the private collection of H. Bath were identified by Miller (1982). The specimens were collected in the Bay of Kotor (the southern Adriatic) on May 10 1969. The additional Adriatic specimens were collected at the Krk Island, the Ćutin Island, the Lošinj Island (the Kvarner area); Seline (the Velebit Channel); the mouth of the river Zrmanja, the Prokljan Lake, the Murter Island, the Morinje Cove, the Brač Island, Blace (the central Adriatic); the Mljet Island (the southern Adriatic) (Ahnelt *et al.*, 1994; Pallaoro & Jardas, 1996; Kovačić, *unpubl. data)*. They are deposited in the collection of the Natural History Museum Rijeka and in the collection of the Institute of Oceanography and Fisheries, Split. Visual census researches recorded the species in the Slovenian coastal waters (the northern Adriatic) (Lipej *et al.*, 2003).

***Pomatoschistus canestrinii* (Ninni, 1883)**

Gobius quagga: Kolombatović, 1881.
Gobius Canestrinii: A. P. Ninni, 1883.
Gobius Canestrini: Kolombatović, 1888; E. Ninni, 1938.
Gobius canestrini: Kolombatović, 1891; Cavinato, 1952.
Pomatoschistus canestrini: Bini, 1969; Tortonese, 1975; Mrakovčić *et al.*, 1994; Lugli & Torricelli, 1999.
Pomatoschistus canestrinii: Gandolfi *et al.*, 1982; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; McKay & Miller, 1997.

The species was described by A. P. Ninni (1883) on the specimens collected by Kolombatović at the Jadro river. The species was mentioned from the type locality earlier, as a form of *Gobius quagga,* also by Kolombatović (1881). The additional collected specimens were studied for the Split area by Kolombatović (1888, 1891). The species was listed for the Venice Lagoon, Piave river and Livenza river (E. Ninni, 1938; Cavinato, 1952; Bini, 1969). The specimens from the Venice Lagoon, Triest, the Zrmanja river and its tributary Dobarnica, the Krka river, the Jadro river, the Žrnovnica river, the Cetina river, the Baćina Lakes, and the Neretva river are deposited in the collection of the Natural History Museum Rijeka, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of the Institute of Oceanography and Fisheries, Split, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Tortonese, 1975; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, *unpubl. data)*. The samples of this species were also collected at the mouth of the Tagliamento river, the mouth of the Stella river, the mouth of the Livenza river, the mouth of the Dese river, the Laguna del Basson, the Venice Lagoon, the mouth of river Po, and in the Zrmanja river (Gandolfi *et al.*, 1982; Mrakovčić *et al.*, 1994; McKay & Miller, 1997; Lugli & Torricelli, 1999).

***Pomatoschistus knerii* (Steindachner, 1861)**

Gobius Knerii: Steindachner, 1861; Langhoffer, 1904.
Gobius Kneri: Giglioli, 1880.
Gobius knerii: Kolombatović 1893.
Gobius steindachnerii: Kolombatović 1900.
Pomatoschistus knerii: Jardas *et al.,* 1996, 1998; Kovačić, 1998, 2003; Zavodnik & Kovačić, 2000.

The species was described by Steindachner (1861) on the specimens collected at the Hvar Island. The additional specimens were reported at Venice, Zaola (near Triest), the Kornati Islands, and at Seget (near Split) (Giglioli, 1880; Kolombatović 1893, 1900; A. P. Ninni, 1882; Langhoffer, 1904). The specimens from the Kvarner area and the Žakan Island are deposited in the collection of the Natural History Museum Rijeka (Jardas *et al.,* 1998; Kovačić, 1998, 2003, *unpubl. data*; Zavodnik & Kovačić, 2000). Specimens were collected by the small scale fishery gear at the Kornati Islands and in the Murter Sea (Jardas *et al.*, 1996).

***Pomatoschistus marmoratus* (Risso, 1810)**

Gobius ferrugineus: Kolombatović, 1891.
Gobius marmoratus: Ninni, 1938; Cavinato, 1952.
Pomatoschistus marmoratus: Bini, 1969; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Caputo, 1998; Kovačić, 1998; Lugli & Torricelli, 1999; Mazzoldi & Rasotto, 2001; Mazzoldi *et al.*, 2002; Turk *et al.*, 2002; Lipej *et al.* 2003; Usić, 2003.

The species was first reported in the Adriatic Sea for the Split area under the synonym *Gobius ferrugineus* (Kolombatović, 1891). The species was listed for Venice (E. Ninni, 1938; Cavinato, 1952; Bini, 1969). The specimens from Chioggia, the Venice Lagoon, the Triest area, the Kvarner area, the Pag Island, the Zrmanja river, the Karin Sea, the Zadar area, the Žakan Island, the Biograd area, the Šibenik area, the Trogir area, the mouth of the river Žrnovnica, Omiš, the Ombla river, and Bari are deposited in the collection of the Museo Zoologico di Padova, in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data)*. Visual census researches recorded the species in the Slovenian coastal waters (Turk *et al.*, 2002; Lipej *et al.* 2003). The samples of this species were also collected in the Po delta, in the Venice Lagoon, and at Ancona (Caputo, 1998; Lugli & Torricelli, 1999; Mazzoldi & Rasotto, 2001; Mazzoldi *et al.*, 2002; Usić, 2003).

***Pomatoschistus minutus* (Pallas, 1770)**

Gobius minutus: Plucàr, 1846; Perugia, 1866, 1881; Trois, 1875; Giglioli, 1880; Kolombatović, 1881; Graeffe, 1888; E. Ninni, 1938; Cavinato, 1952; Marcuzzi, 1972; Gamulin-Brida *et al.*, 1980.
Gobius minutus elongatus: Županović, 1961.
Pomatoschistus minutus: Nocita & Vanni, 1997; Caputo, 1998; Sorice & Caputo, 1999; Stefanni *et al.*, 2003; Usić, 2003.

The species was recorded for the first time in the Adriatic Sea for the Triest area (Plucàr, 1846). The species was listed for Venice, Triest, and the Split area (Perugia, 1866, 1881; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; Graeffe, 1888; E. Ninni, 1938; Cavinato, 1952). The specimens from the Venice Lagoon, the Triest area, the Kvarner area, the mouth of the river Zrmanja and the mouth of the river Neretva are deposited in the collection of Museo di Storia Naturale dell' Università di Firenze, in the collection of l'Istituto di Idrobiologica di Chioggia, and in the collection of the Natural History Museum Rijeka (Marcuzzi, 1972; Nocita & Vanni, 1997; Kovačić, *unpubl. data*; Usić, 2003). Specimens were collected by the bottom trawl between the mid-Dalmatian islands (Županović, 1961), without a positive identification. Benthic biocoenological research recorded the species at the Krk Island (Gamulin-Brida *et al.*, 1980), without positive identification. The samples of this species were recently collected at Venice and Ancona (Caputo, 1998; Sorice & Caputo, 1999; Stefanni *et al.*, 2003).

***Pomatoschistus norvegicus adriaticus* (Miller, 1972)**

Pomatoschistus norvegicus: Stefanni, 2000.

Four females and a single male were collected for the first time in the Adriatic Sea of the littoral of Venice in March 1998 (Stefanni, 2000).

***Pomatoschistus pictus* (Malm, 1865)**

Gobius affinis: Kolombatović, 1891.
Pomatoschistus pictus adriaticus: Miller, 1972a; Zander & Jelinek, 1976.

The species was recorded for the first time in the Adriatic Sea for the Venice Lagoon (E. Ninni, 1938). Miller (1972a) discovered that syntypes of *Gobius affinis* Kolombatović, 1891 from the Split area in the collection of the Naturhistorischen Museum, Wien belong indeed to *Pomatoschistus pictus*. Miller (1972a) described the subspecies of this species, *Pomatoschistus pictus adriaticus* on specimens from the Split area and on the specimens from the private collection of H. Bath collected at Triest. The samples of *P. pictus* were also collected at Rovinj (Zander & Jelinek, 1976).

***Pomatoschistus quagga* (Heckel, 1840)**

Gobius quagga: Giglioli, 1880; Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Damiani, 1896; Langhoffer, 1904.
Pomatoschistus quagga: Tortonese, 1975; Jardas *et al.*, 1996, 1998; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; De Girolamo *et al.*, 1998; Zavodnik & Kovačić, 2000; Kovačić, 2003.

The species was recorded for the first time in the Adriatic Sea in the Split area (Giglioli, 1880). The species was listed for Venice, the Rijeka Bay, the Kvarner area, the Zadar Channel, the Split area, the Hvar Island, and the Boka Kotorska Bay (Kolombatović, 1881, 1882, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Damiani, 1896; Langhoffer, 1904; Zavodnik & Kovačić, 2000). The specimens from the Kvarner area, the Žakan Island, the central Adriatic, Split and the Boka Kotorska Bay are deposited in the collection of the Natural History Mu-

seum Rijeka, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of the Institute of Oceanography and Fisheries, Split and in the collection of Museo di Storia Naturale dell' Università di Firenze (Tortonese, 1975; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 2003, *unpubl. data)*. Specimens were collected by the small scale fishery gear at the Kornati Islands and in the Murter Sea (Jardas *et al.*, 1996). Visual census researches recorded the species at Triest and the Rijeka Bay (De Girolamo *et al.*, 1998; Jardas *et al.,* 1998), without positive identification.

***Pseudaphya ferreri* (De Buen & Fage, 1908)**

Gobius pusillus: Kolombatović, 1891.
Pseudaphya ferreri: Miller, 1973b; Kovačić, 2003.

Four males and eight females, collected by Kolombatović as *Gobius pusillus* at Split (the central Adriatic), were found and identified by Miller (1973b) in the collection of the Naturhistorisches Museum Wien. The additional specimens collected at Oštro, Kačjak, and Sv. Marak (the Kvarner area) are deposited in the collection of the Natural History Museum Rijeka (Kovačić, 2003, *unpubl. data)*.

***Speleogobius trigloides* Zander & Jelinek, 1976**

Speleogobius trigloides: Zander & Jelinek, 1976; Fesser, 1980; Kovačić, 1997, 2002b.

The holotype was collected at the Banjole cave, near Rovinj, the Istrian Peninsula, in June 1975. It is deposited in the collection of the Zoologisches Institut und Zoologisches Museum der Universität Hamburg. The additional findings were reported from Hvar Island, the central Adriatic, in 1974 and 1975, and Prvić Island in 1977 and 1978 by Fesser (1980). Three females and two males from the Prvić Island (the Kvarner area) are deposited in the collection of the Naturhistorisches Museum Wien. The specimens collected from Žurkovo, the Goli Island, the Prvić Island, Bakar, the Krk Island (the Kvarner area) in the period from 1997 to 2001 are deposited in the collection of the Natural History Museum Rijeka (Kovačić, 1997, 2002b, *unpubl. data*; Zavodnik & Kovačić, 2000).

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

Thorogobius ephippiatus: Miller, 1969; Shultz, 1975; Kovačić, 1994, 1997, 1998; Ahnelt & Kovačić, 1997; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000; Arko Pijevac *et al.,* 2001; Novosel *et al.*, 2002.

The underwater photograph of this species was taken at the Prvić Island (the Kvarner area) and published in Riedl (1966) without identification. However, Miller (1969) first identified this species in the Adriatic Sea based on underwater photograph in Riedl (1966) taken at the Prvić Island and sight-record in the Dubrovnik area on August 15 1968. The species was recorded at Banjole near Rovinj in 1962 and collected at the Hvar Island in 1969 and 1970 (Shultz, 1975). The specimens from the Kvarner area are deposited in the collection of the Natural History Museum Rijeka (Kovačić, 1998, *unpubl. data)*. The species was also observed at numerous localities in the Kvarner area (Kovačić, 1994, 1997, *unpubl. data*; Ahnelt & Kovačić, 1997; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000). Benthic biocoenological research recorded the species in the Kvarner area and in the Velebit Channel (Arko Pijevac *et al.,* 2001; Novosel *et al.*, 2002).

***Thorogobius macrolepis* (Kolombatović, 1891)**

Gobius macrolepis: Kolombatović, 1891.
Thorogobius macrolepis: Miller, 1969; Pallaoro & Jardas, 1996; Ahnelt & Kovačić, 1997; Kovačić, 1998; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000; Arko Pijevac *et al.,* 2001; Novosel *et al.*, 2002.

The species was described on specimens collected in the Split area by Kolombatović (1891). Two syntypes are deposited in the collection of the Naturhistorisches Museum Wien (Miller, 1969; Ahnelt & Kovačić, 1997). Specimens from the Kvarner area are deposited in the collection of the Natural History Museum Rijeka and in the collection of the Institute of Oceanography and Fisheries, Split (Pallaoro & Jardas, 1996; Ahnelt & Kovačić, 1997; Kovačić, 1998, *unpubl. data)*. The species was also observed at numerous localities in the Kvarner area (Ahnelt & Kovačić, 1997; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000). Benthic biocoenological researches recorded the species in the Kvarner area and in the Velebit Channel (Arko Pijevac *et al.,* 2001; Novosel *et al.*, 2002). The record of Novosel *et al.* (2002) was without positive identification of the species. The specimens recorded in Kovačić (1994) belong to another gobiid species, *Gobius roulei.*

***Vanneaugobius dollfusi* (Brownell, 1978)**

Vanneaugobius pruvoti: Jardas, 1996a.
Vanneaugobius dollfusi: Pallaoro & Kovačić, 2000; Ahnelt & Dorda, 2004.

Single male collected near Split in 1931 and single female collected in the Drvenik Channel (the central Adriatic), in 1948, both deposited in the collection of the Institute of Oceanography and Fisheries, Split were identified by Pallaoro & Kovačić (2000). Authors also reported a single female collected near the Mljet Island

and a single juvenile collected by D. Zavodnik near the Palagruža Island in 1998; both deposited in the collection of the Natural History Museum Rijeka. Additional specimens from the Island Palagruža, and locality between the Vis Island and the Biševo Island were found in the collection of the Naturhistorisches Museum Wien and identified by Ahnelt & Dorda (2004).

***Zebrus zebrus* (Risso, 1826)**

Gobius zebrus: Trois, 1875; Kolombatović, 1881, 1891; A. P. Ninni, 1882; E. Ninni, 1912.
Gobius Zebrus: Perugia, 1881.
Zebrus zebrus: Tortonese, 1975; Miller, 1977; Patzner *et al.*, 1991; Kovačić, 1994; 1997, 1998, 2002b; Jardas *et al.,* 1996, 1998; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Zavodnik & Kovačić, 2000; Castellarin *et al.*, 2001; Turk *et al.*, 2002; Lipej *et al.* 2003.

The species was first reported for the Adriatic Sea by Trois (1875), without any notice on collection locality. The first recorded localities in the Adriatic Sea were Zaole and Servola near Triest (Perugia, 1881) and the Split area (Kolombatović, 1881). Additional specimens were collected at Venice by A. P. Ninni (1882) and in the Split area by Kolombatović (1891). The species was noted as common at Venice (E. Ninni, 1912). Specimens from Venice, Triest, Medulin, the Kvarner area, the mouth of the river Zrmanja, Pirovac, the Šolta Island, the Kaštela Bay and Mala Duba are deposited in the collection of Museo Civico di Storia Naturale di Venezia, in the collection of the Natural History Museum Rijeka, in the collection of the Museo Civico di Storia Naturale di Genova, in the collection of the Institute of Oceanography and Fisheries, Split, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Tortonese, 1975; Miller, 1977; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998, *unpubl. data)*. The species was also noted at numerous localities in the Kvarner area (Kovačić, 1994, 1997; Jardas *et al.,* 1998; Zavodnik & Kovačić, 2000). Benthic biocoenological research recorded the species at the Kornati Islands and the Murter Sea (Jardas *et al.*, 1996). Visual census researches recorded the species at Triest, the Slovenian coastal waters, and at Kostrena (Patzner *et al.*, 1991; Castellarin *et al.*, 2001; Kovačić, 2002b; Turk *et al.*, 2002; Lipej *et al.* 2003).

***Zosterisessor ophiocephalus* (Pallas, 1811)**

Gobius venetiarum: Nardo, 1860, Trois, 1875.
Gobius lota: Canestrini, 1872; Graeffe, 1888.
Gobius ophiocephalus: Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Langhoffer, 1904; Cavinato, 1952; Marcuzzi, 1972; E. Ninni, 1912, 1938; Usić, 2003.
Zosterisessor ophiocephalus: Tortonese, 1975; Balestra *et al.*, 1989; Mušin, 1989; Kraljević & Pallaoro, 1991; Lahnsteiner *et al.*, 1992; Zavodnik & Crnković, 1992; Giulianini *et al.*, 1994; Caputo *et al.,* 1996, 1997; Jardas *et al.*, 1996; Marconato *et al.,* 1996; Ota *et al.*, 1996; Ota & Lahnsteiner, 1996; Pallaoro & Jardas, 1996; McKay & Miller, 1997; Orepić *et al.*, 1997; Caputo, 1998; Kovačić, 1998; Ota *et al.*, 1999; Scaggiante *et al.*, 1999; Sorice & Caputo, 1999; Marchesan *et al.*, 2000; Mazzoldi *et al.*, 2000; Torricelli *et al.*, 2000; Pallaoro, 2001; Franco *et al.*, 2002; Malavasi *et al.*, 2002, 2003; Usić, 2003; Dulčić, 2004.
Zosterissessor ophiocephalus: Nocita & Vanni, 1997.

The species was recorded for the first time in the Adriatic Sea at Venice (Nardo, 1860). The species was listed under various synonyms for the Venice Lagoon, Triest, the Krk Island, the Ugljan Island, the Murter Island, the Split area, the Šolta Island, the Brač Island, the Hvar Island, the Vis Island, the Mljet Island, the Lastovo Island, the Korčula Island, and the Boka Kotorska Bay (Canestrini, 1872; Trois, 1875; Giglioli, 1880; Kolombatović, 1881, 1891; A. P. Ninni, 1882; Vinciguerra, 1883; Graeffe, 1888; Langhoffer, 1904; E. Ninni, 1912, 1938; Cavinato, 1952). The specimens from Chioggia, the Venice Lagoon, Triest, Rovinj, the Pag Island, the Šibenik area, Dalmatia, the Split area, the Šolta Island, the Dubrovnik area, the mouth of the river Neretva, and Bari are deposited in the collection of the Museo Zoologico di Padova, in the collection of the Center for Marine Research of the Ruđer Bošković Institute in Rovinj, in the collection of the Natural History Museum Rijeka, in the collection of the Institute of Oceanography and Fisheries, Split, in the collection of the Natural History Museum of the Biological Institute, Dubrovnik, in the collection of l'Istituto di Idrobiologica di Chioggia, and in the collection of Museo di Storia Naturale dell' Università di Firenze (Marcuzzi, 1972; Tortonese, 1975; Mušin, 1989; Pallaoro & Jardas, 1996; Nocita & Vanni, 1997; Kovačić, 1998; Usić, 2003). Specimens were collected by the small scale fishery gear at the Kornati Islands, the Murter Sea, and the Split area (Kraljević & Pallaoro, 1991; Jardas *et al.*, 1996; Pallaoro, 2001). Benthic biocoenological researches recorded the species at the Lošinj Island, the Kornati Islands, the Murter Sea, and the Mljet Island (Zavodnik & Crnković, 1992; Jardas *et al.*, 1996; Orepić *et al.*, 1997). Visual census research recorded the species in the Slovenian coastal waters (Turk *et al.*, 2002). The samples of this species were also collected in the Venice Lagoon, near Grado, near Triest, at Ancona, and in the Karin Sea (Balestra *et al.*, 1989; Lahnsteiner *et al.,* 1992; Giulianini *et al.*, 1994; Caputo *et al.,* 1996, 1997; Marconato *et al.,* 1996; Ota *et al.,* 1996; Ota & Lahnsteiner, 1996; McKay & Miller, 1997; Caputo, 1998; Ota *et al.*, 1999; Scaggiante *et al.*, 1999;

Sorice & Caputo, 1999; Marchesan *et al.*, 2000; Mazzoldi *et al.*, 2000; Torricelli *et al.*, 2000; Franco *et al.*, 2002; Malavasi *et al.*, 2002, 2003; Dulčić, 2004).

SPECIES EXCLUDED FROM THE CHECKLIST

The following species listed for the Adriatic Sea in the last published checklist by Jardas (1996a), should be exluded from the checklist for the Adriatic Sea:

Gobius luteus Kolombatović, 1891

Kolombatović (1891) described the variant of *G. auratus* as *G. auratus v. lutea*. Miller & El-Tawil (1974) raised this variant to species level as *G. luteus*. Heymer & Zander (1992) described new species, *Gobius xanthocephalus,* from western Mediterranean. Authors agreed with Miller (1973a) that *G. auratus v. ruginosa* was *G. fallax* and concluded that the variant *lutea* was not a separate species, but the typical form of *G. auratus* (Heymer & Zander, 1992). Consequently, *G. luteus* is a junior synonym of *G. auratus*, and not a valid species.

Gobius strictus Fage, 1907

Single female collected at the Korčula Island (the central Adriatic) was found and identified by Miller (1967) as *Gobius schmidti* in the collection of the Museo Civico di Storia Naturale di Genova. Miller (1973a) listed *Gobius schmidti* by Miller (1967) as a junior synonym of *Gobius strictus* Fage, 1907. The later suggestion of Miller (1986) that specimens of this species could be juveniles of *G. cruentatus* was confirmed by Kovačić (2004). Therefore, *G. strictus* is a junior synonym of *G. cruentatus*, and not the valid species.

Gobiusculus flavescens (Fabricius, 1779)

Nardo (1860) listed *Gobius ruthensparii* (error for *ruuthensparri*) for the Venice area. Perugia (1866) listed *Gobius ruthensparri* for the Triest area without any data for positive identification. *Gobius ruthensparii* was cited by rote for the Adriatic Sea (Canestrini, 1872; Trois, 1875; Giglioli, 1880; Stossich, 1880; Perugia, 1881; Faber, 1883; Carus, 1893) with these or different spelling errors. A. P. Ninni, (1882) excluded this species from his catalogues of gobies of the Adriatic Sea. Damiani (1896) suspected that *G. Ruthensparri* (error for *ruuthensparri)* was doubtful citation by Nardo, since the species is known from the northern Atlantic. E. Ninni (1912) and Šoljan (1948, 1965) excluded this synonym from their lists of the Adriatic fishes. E. Ninni (1938) was convinced in wrong identification of *G. ruthensparii* by Nardo. The species was listed for the first time under the valid synonym *Gobiusculus flavescens* (Fabricius, 1779) by Bini (1969). This was again a citation based only on the list published by Nardo (1860). However, a new era of citations of this species for the Adriatic Sea began with Bini (1969), following the valid name (Tortonese, 1975; Ševčić, 1977; Jardas, 1985, 1996a; Kovačić, 1994). Miller (1986) listed this species just for the eastern Atlantic. According to presented data, there is no evidence for the presence of *G. flavescens* in the Adriatic Sea.

Pomatoschistus microps (Krøyer, 1838)

E. Ninni (1938) and Cavinato (1952) recorded this species for the Venice area. All subsequent notices of this species for the Adriatic Sea (Šoljan, 1948, 1965; Bini, 1969; Vuković i Ivanović, 1971; Tortonese, 1975; Ševčić, 1977; Jardas, 1985, 1996a; Kovačić, 1994) were based on the original data by E. Ninni (1938) and Cavinato (1952). Miller (1972c, 1973a) suggested that descriptions by E. Ninni (1938) and Cavinato (1952) refered to *Knipowitschia* species. Miller (1986) and Ahnelt (1991) listed this species just for the eastern Atlantic and the northwestern coast of Mediterranan. Specimens collected by the bottom trawl between the mid-Dalmatian islands were undoubtedly wrongly identified as *Gobius microps laticeps* (Županović, 1961). According to presented data, the specimens identified as *P. microps* in the Venice area, belong to *Knipowitschia* species.

Pomatoschistus tortonesei (Miller, 1968)

The species was mentioned for the first time for the Adriatic Sea by Ševčić (1977), based on personal communication from Miller on specimens from the Boka Kotorska Bay. All later citations of this species for the Adriatic Sea (Jardas, 1985, 1996a; Kovačić, 1994) were based on data by Ševčić (1977). Miller (1982) described *Pomatoschistus bathi*, and redecribed *P. tortonesei.* The specimens from the Boka Kotorska Bay were identified as *P. bathi*. All specimens of *P. tortonesei* studied for redescription of the species (Miller, 1982) were not collected in the Adriatic Sea. Miller (1986) listed *P. tortonesei* just for the central Mediterranean. According to the above data, the specimens identified in the first place as *P. tortonesei* from the Boka Kotorska Bay (Ševčić, 1977), belong to *P. bathi*.

Vanneaugobius pruvoti (Fage, 1907)

Single male collected near Split in 1931 and single female collected in the Drvenik Channel (the central Adriatic) in 1948 deposited in the collection of the Institute of Oceanography and Fisheries, Split were reidentified as *Vanneaugobius dollfusi* Brownell, 1978 by Pallaoro & Kovačić (2000).

DISCUSSION

The sources of data for this checklist of the Adriatic Sea gobies were ichthyological lists containg original collection data, papers on taxonomy and zoogeography of gobies, fisheries papers, benthic biocoenological papers, papers on fish visual census and papers on various researches that used samples of Adriatic gobies. Studies on taxonomy and zoogeography of gobies were by the far most important contributions to the checklist among all these sources of data. Eight species were added to the last published list (Jardas, 1996a): *Didogobius spletchnai, Gammogobius steinitzi, Gobius ater, Gobius couchi, Gobius kolombatovici, Lebetus guiletti, Pomatoschistus norvegicus,* and *Vanneaugobius dollfusi* (Kovačić, 1999, 2001a; Kovačić & Miller, 2000; Pallaoro & Kovačić, 2000; Stefanni, 2000; Ahnelt, 2001; Herler & Patzner, 2002; Herler & Kovačić, 2002). All these species, except of *Gobius ater*, were included in new fish records for the Adriatic Sea by Lipej & Dulčić (2004).

Six species were excluded from the checklist of the Adriatic gobies, based on evidence referred in the present review. Some other errors were also found in the previous checklists. The doubtful status of *K. caucasica* in the Adriatic Sea, questioned by Econodimis & Miller (1990), and resolved by Kovačić & Pallaoro (2003), was overlooked by checklists published in the meantime. Absence of evidence on the presence of *B. affinis* (Miller, 1972a) was also ignored by later reviews, until true specimens of *B. affinis* were found for the first time in the Adriatic Sea thirty years later (Kovačić, 2002b). The confusion on *Vanneaugobius* was the briefest one, it lasted for only five years (Jardas, 1996a; Pallaoro & Kovačić, 2001). The presented checklist contains 46 gobiid species recorded in the Adriatic Sea up to the present date. Four Adriatic gobies could still be considered Adriatic endemic species: *Gobius kolombatovici, Knipowitschia panizzae, Pomatoschistus canestrinii* and *Speleogobius trigloides*. Today 59 species of Gobiidae are known to occur in the Mediterranean *sensu stricto* if we exlude *Gobius strictus* and *Gobius luteus* (Heymer & Zander, 1992; Kovačić, 2004) from 61 species listed for the Mediterranean (Quignard & Tomasini, 2000; Ahnelt & Dorda, 2004). The thirteen gobies recorded in the Mediterranean, and not found in the Adriatic Sea, are the Atlantic species (7 species), the Red Sea invaders (3 species), and the Mediterranean endemic species (3 species).

Three valid gobiid genera, twelve valid gobiid species and two valid subspecies were described on the Adriatic specimens (Verga 1841; Steindachner, 1861; Steindachner, 1863; Steindachner, 1870; A. P. Ninni, 1883; Kolombatović, 1891; Miller, 1969, 1971, 1972a, 1972b; Bath, 1973; Zander & Jelinek, 1976; Miller, 1992; Kovačić & Miller, 2000). The most fruitfull periods for Adriatic gobiology were from 1860 to 1900 with eight newly described species and ten first findings for the Adriatic Sea, and from 1968 to 2002 with three newly described species and fifteen first findings for the Adriatic Sea. The largest contributions were provided by Kolombatović (four species description and three first findings for the Adriatic Sea), Steindachner (three species description and one first finding for the Adriatic Sea), Miller (two species description and five first findings for the Adriatic Sea), and Kovačić (one species description and six first findings for the Adriatic Sea). The locations of eight gobiid types (holotype, syntypes or neotypes) from the Adriatic Sea are known from published sources (Tortonese, 1963; Miller, 1969, 1972b, 1973a, 1992; Bath, 1973; Zander & Jelinek, 1976; Kovačić & Miller, 2000). Adriatic types of the three species are deposited in the collection of the Naturhistorisches Museum Wien, and types of the one species in each of the following collections: the collection of the Museo Civico di Storia Naturale di Genova, the collection of the Senckenberg Naturmuseum, Frankfurt, the collection of the Zoologisches Institut and Zoologisches Museum der Universität Hamburg, the collection of the Zoologische Staatssammlung, München, and the collection of the Natural History Museum Rijeka. The richest collections in Adriatic gobiid species are the collection of the Natural History Museum Rijeka (39 Adriatic species), the collection of the Institute of Oceanography and Fisheries, Split (28 Adriatic species), the collection of Museo di Storia Naturale dell' Università di Firenze (20 Adriatic species), and the collection of the Naturhistorisches Museum Wien (13 Adriatic species).

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Tab. 1: List of gobiid species recorded in the Adriatic Sea up to the present date.
Tab. 1: Seznam glavačev, do danes ugotovljenih v Jadranskem morju.

No.	Species
1	*Aphia minuta mediterranea* De Buen, 1931
2	*Buenia affinis* Iljin, 1930
3	*Chromogobius quadrivittatus* (Steindachner, 1863)
4	*Chromogobius zebratus zebratus* (Kolombatović,1891)
5	*Corcyrogobius liechtensteini* (Kolombatović, 1891)
6	*Crystallogobius linearis* (Von Düben, 1845)
7	*Deltentosteus colonianus* (Risso, 1826)
8	*Deltentosteus quadrimaculatus* (Valenciennes, 1837)
9	*Didogobius schlieweni* Miller, 1992
10	*Didogobius spletchnai* Ahnelt & Patzner, 1995
11	*Gammogobius steinitzi* Bath, 1971
12	*Gobius ater* Bellotti, 1888
13	*Gobius auratus* Risso, 1810
14	*Gobius bucchichi* Steindachner, 1870
15	*Gobius cobitis* Pallas, 1811
16	*Gobius couchi* Miller & El-Tawil, 1974
17	*Gobius cruentatus* Gmelin, 1789
18	*Gobius fallax* Sarato, 1889
19	*Gobius geniporus* Valenciennes, 1837
20	*Gobius kolombatovici* Kovačić & Miller, 2000
21	*Gobius niger* Linnaeus, 1758
22	*Gobius paganellus* Linnaeus, 1758
23	*Gobius roulei* De Buen, 1928
24	*Gobius vittatus* Vinciguerra, 1883
25	*Knipowitschia caucasica* (Kawrajsky, 1916)
26	*Knipowitschia panizzae* (Verga, 1841)
27	*Lebetus guilleti* (Le Danois, 1913)
28	*Lesueurigobius friesii* (Malm, 1874)
29	*Lesueurigobius suerii* (Risso, 1810)
30	*Millerigobius macrocephalus* (Kolombatović, 1891)
31	*Odondebuenia balearica* (Pellegrin & Fage, 1907)
32	*Pomatoschistus bathi* Miller, 1982
33	*Pomatoschistus canestrinii* (Ninni, 1883)
34	*Pomatoschistus knerii* (Steindachner, 1861)
35	*Pomatoschistus marmoratus* (Risso, 1810)
36	*Pomatoschistus minutus* (Pallas, 1770)
37	*Pomatoschistus norvegicus* (Collett, 1903)
38	*Pomatoschistus pictus adriaticus* Miller, 1972
39	*Pomatoschistus quagga* (Heckel, 1840)
40	*Pseudaphya ferreri* (De Buen & Fage, 1908)
41	*Speleogobius trigloides* (Zander & Jelinek, 1976)
42	*Thorogobius ephippiatus* (Lowe, 1839)
43	*Thorogobius macrolepis* (Kolombatović, 1891)
44	*Vanneaugobius dollfusi* (Brownell, 1978)
45	*Zebrus zebrus* (Risso, 1826)
46	*Zosterisessor ophiocephalus* (Pallas, 1811)

SEZNAM VRST IZ DRUŽINE GOBIIDAE V JADRANSKEM MORJU

Marcelo KOVAČIĆ
Prirodoslovni muzej Rijeka, HR-51000 Rijeka, Lorenzov prolaz 1, Hrvaška
E-mail: Marcelo.Kovacic@public.srce.hr

POVZETEK

Avtor predstavlja popoln seznam 46 vrst jadranskih glavačev. Zbrani in na novo pregledani so bili vsi obstoječi podatki o pojavljanju teh vrst v Jadranskem morju. Seznam je bil napravljen na osnovi znanstvene literature in neobjavljenih podatkov iz ihtiološke zbirke, ki jo hranijo v Prirodoslovnem muzeju na Reki. Zaradi dokazov, navedenih in pojasnjenih v tem pregledu, je bilo s prejšnjih seznamov jadranskih glavačev, na katerih je bilo odkritih tudi več drugih napak, črtanih šest vrst. Sicer pa velja, da v Jadranskem morju še vedno ni bilo odkritih trinajst vrst, doslej zabeleženih v Sredozemskem morju. Na osnovi primerkov, ujetih v Jadranskem morju, so doslej opisali tri veljavne rodove, dvanajst veljavnih vrst in dve veljavni podvrsti glavačev. Jadranska gobiologija je bila najuspešnejša v obdobju med letoma 1860 in 1900 z osmimi prvič objavljenimi vrstami in desetimi prvič najdenimi vrstami v Jadranskem morju in med letoma 1968 in 2002 s tremi prvič objavljenimi in petnajstimi prvič najdenimi vrstami jadranskih glavačev.

Ključne besede: seznam, Gobiidae, Jadransko morje

REFERENCES

Ahnelt, H. (1984): Zur Kenntnis von *Gobius bucchichi* Steindachner, 1870 und *Gobius fallax* Sarato, 1889 (Pisces, Gobiidae). Ann. Nathist. Mus. Wien B, 86, 1–5.

Ahnelt, H. (1990): *Chromogobius quadrivittatus, Chromogobius zebratus* und *Zebrus zebrus* (Pisces, Gobiidae): Erstnachweise für Korsika (Frankreich) und Sardinien (Italien). Ann. Nathist. Mus. Wien B, 91, 27–41.

Ahnelt, H. (1991): Some rare fishes from the western Mediterranean Sea. Ann. Nathist. Mus. Wien, 92, 49–58.

Ahnelt, H. (2001): Two Mediterranean gobiid fishes with an unusual cephalic lateral line canal system. Cybium, 25(3), 261–267.

Ahnelt, H. & B. Elvira (1991): Eine Kollektion von Meeres- und Süsswasserfischen der Österreichischen Adria-Tiefsee-Expedition 1894. Ann. Nathist. Mus. Wien B, 92, 1–13.

Ahnelt, H. & M. Kovačić (1997): A northern Adriatic population of *Thorogobius macrolepis* (Teleostei: Gobiidae). Cybium, 21(2), 149–162.

Ahnelt, H. & J. Dorda (2004): Gobioid fishes from the north eastern Atlantic and the Mediterranean: new records and rarely found species. Ann. Nathist. Mus. Wien B, 105, 5–19.

Ahnelt, H., P. J. Miller & R. A. Patzner (1994): Systematic and distribution of two rare Mediterranean gobies, *Corcyrogobius liechtensteini* (Kolombatović, 1891) and *Odondebuenia balearica* (Pellegrin & Fage, 1907) (Teleostei: Gobiidae). Cybium, 18(2), 169–176.

Arko Pijevac, M., Č. Benac, M. Kovačić & M. Kirinčić (2001): A submarine cave at the Island of Krk (North Adriatic Sea). Nat. Croat., 10, 163–184.

Atkinson, R. J. A., C. Froglia, F. Arneri & B. Antolini (1998): Observations on the burrows and burrowing behaviour of *Brachynotus gemmellari* and on the burrows of several other species occurring on Squilla grounds off Ancona, Central Adriatic. Scient. Mar., 62(1–2), 91–100.

Balestra, M., E. A. Ferrero, P. G. Gulianini, R. Marzari, D. Ota & R. Patzner (1989): Preliminary identification of yolk proteins as molecular makres of ovarian maturation in *Zosterisessor ophiocephalus* (Pisces: Gobiidae). EAS Special Publication, 10, 19–20.

Bath, H. (1973): Wiederbeschreibung der Grundelart *Gobius macrocephalus* Kolombatović aus dem Mittelmeer und Aufstellung einer neuen Gattung *Millerigobius*. Senckenb. Biol., 54, 303–310.

Brünnich, M. T. (1768): Ichthyologia Massiliensis, sistens piscium descriptions eourumque aoud incolas nomina, accedunt spolia maris Adriatici. Copenhagen & Leipzig: Rothii, Viduam et Proft.

Bellotti, C. (1879): Note ittiologiche. Atti Soc. Ital. Sci. nat., 22, 33–38.

Bini, G. (1969): Atlante dei Pesci delle Coste Italiane. Vol. 7. Mondo sommerso ed., Milano.

Brusina, S. (1891): Dva popisa dalmatinskih riba od M. Botteri-a s dodacima Hacckel-a, Bellotti-a, Stalio-a i dr. i s uvodom od S. Brusine. Glasnik Hrv. Naravosl. Društva, 6, 110–151.

Canestrini, G. (1872): Pesci. Fauna d'Italia. Parte Terza. Francesco Vallardi Editore, Milano.

Caputo, V. (1998): Nucleolar organizer (NOR) location and cytotaxonomic implications in six species of gobiid fishes (Perciformes, Gobiidae). Ital. J. Zool., 65, 93–99.

Caputo, V., R. Vitturi, G. Odeirna, J. Cano, E. Olmo & M. S. Colomba (1996): Characterization of mitotic chromosomes in the gobiid fish *Zosterissesor ophiocephalus* (Pallas, 1811) (Perciformes, Gobiidae). Biol. Zent. bl., 115, 328–336.

Caputo, V., F. Marchegiani, M. Sorice & E. Olmo (1997): Heterochromatin heterogenity and chromosome variability in four species of gobiid fishes (Perciformes: Go-

biidae). Cytogenet. Cell Genet., 79, 266–271.
Caputo, V., M. L. Caniglia & N. Machella (1999): The chromosomal complement of *Aphia minuta*, a paedomorphic goby. J. Fish Biol., 55, 455–485.
Caputo, V., M. La Mesa, G. Candi & P. N. Cerioni (2003): The reproductive biology of the crystal goby with a comparison to that of the transparent goby. J. Fish Biol., 62, 375–385.
Carrara, F. (1846): La Dalmazia descritta. Fratelli Batava Ed., Zara.
Carus, J. V. (1893): Prodromus faunae Mediterraneae. II. E. Schweitzerbart, Stuttgart.
Castellarin, C, G. Visintin & R. Odorico (2001): L'ittiofauna della Riserva naturale marina di Miramare (Golfo di Trieste, alto Adriatico). Annales Ser. Hist. Nat., 11(2), 207–216.
Cavinato, G. (1952): Revisione del *Gobius* della Laguna Veneta. Arch. Oceanogr. Limnol., 7, 1–56.
Cetinić, P. & A. Pallaoro (1990a): Analiza lovina kogola i ocjena njegove štetnosti. Mor. rib., 42(4), 113–125.
Cetinić, P. & A. Pallaoro (1990b): Analiza lovina strašina i ocjena njegove štetnosti. Mor. rib., 42(2), 49–55.
Crnković, D. (1970): Prilog biološkoj i ekonomskoj problematici koćarenja u kanalskom području sjeveroistočnog Jadrana. Thalassia Jugosl., 6, 5–90.
Crnković, D. (2001): Problemi ribarstva i okoliša Kvarnerskog područja. Prirodoslovna biblioteka 2. Prirodoslovni muzej Rijeka, Rijeka.
D'Ancona, U. (1922): Notizie sulla pesca nel Golfo di Fiume. Mem. R. Comit. Talassia Ital., 94, 3–28.
Damiani, G. (1896): I *Gobius* italici a proposito di un raro *Gobius* del Mediterraneo *(Gobius colonianus* Risso). Riv. Ital. Sci. Nat., Siena, 16, 58–62, 77.
De Girolamo, M., S. Stefanni, M. Mazzoldi & R. Odorico (1998): Effeti della totale proibizione della pesca sul popolamento ittico del Parco di Miramare (Ts): analisi preliminare. Boll. Mus. Civ. Stor. Nat. Venezia, 49, 311–315.
Dulčić, J. (2004): Incidence of the spinal deformities in natural populations of grass – goby, *Zosterissesor ophiocephalus* from Karin Sea, Eastern Middle Adriatic. Cybium, 28, 7–11.
Economidis, P. S. & P. J. Miller (1990): Systematics of freshwater gobies from Greece. J. Zool. Lond., 221, 125–170.
Faber, G. L. (1883): The fisheries of the Adriatic and the fish thereof. B. Quaritch, London.
Fabi, G. & C. Froglia (1983): Food and feeding of *Gobius niger* L. in the Central Adriatic Sea (Osteichthyes: Gobiidae). Rapp. Comm. int. Mer Médit., 28(5), 99–102.
Fabi, G. & C. Froglia (1984): A note on the biology and fishery of the black goby *(Gobius niger)* in the Adriatic Sea. FAO Fish. Rep., 290, 167–170.
Fabi, G. & G. Gianetti (1985): Growth parameters of the black goby *(Gobius niger* L.) in the Adriatic Sea, based on otoliths reading. Rapp. Comm. int. Mer Médit., 29, 87–90.
Fesser, R. (1980): Zusätzliche Beschreibung von *Speleogobius trigloides* Zander & Jelinek (1976) (Gobiidae, Perciformes), sowie neue Fundorte und –Freilandbeobachtungen. Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien, 118/119, 123–126.
Franco, A., S. Malvasi, F. Pranovi, P. Franzoi & P. Torricelli (2002): Preliminary data on gonadal development and fecundity in the Grass goby, *Zosterissesor ophiocephalus* (Pallas, 1811) from the Venice (northern Italy). Acta Adriat., 43(2), 43–48.
Froglia, C. & M. E. Gramitto (1982): Alcuni aspetti biologici e gestionali della pesca a strascico sui "Fondi a Scampi" dell' Adriatico centrale. Atti. Conv. Unità. Oper. Affer. sottopr., Risorse Biol. Inquinam. Marino, Roma, p. 295–309.
Froglia, C. & M. E. Gramitto (1989): La pesca del rosetto (*Aphya minuta*) nel Medio Adriatico. Biol. Mar. Medit., 5(3), 503–512.
Gamulin-Brida, H., Z. Pavletić, D. Crnković, A. Požar-Domac, M. Legac & Ž. Žutić-Maloseja (1980): Prilog poznavanju bentosa infralitorala u području jugozapadne obale otoka Krk. Acta Adriat., 21(2), 355–367.
Gandolfi, G. (1972): Oservazioni sul comportamento riproduttivo di *Knipowitschia panizzae* (Osteichthyes, Gobiidae). Boll. Zool., 45, 215.
Gandolfi, G. & P. Tongiorgi (1976): La presenza di *Knipowitschia panizzae* (Verga) in aque lagunari ed esturiali Tirreniche (Osteichthyes, Gobiidae). Atti. Soc. Tosc. Sc. Nat. Mem., 83, 1–9.
Gandolfi, G., P. Torricelli & A. Cau (1982): Osservazioni sulla biologia del ghiozzeto cenerino, *Pomatoschistus canestrinii* (Ninni) (Osteichthyes, Gobiidae). Nova Thalassia, 5, 97–123.
Giglioli, E. H. (1880): Elenco del Mammiferi, degli Uccelli e dei Retili ittiofagi appartanenti alla Fauna italica, e Catalogo degli Anfibi e Pesci italiani. Catalogo Sezione italiana, Esposizione internazionale della Pesca, Berlino, 1880. Stamperia Reale, Firenze.
Giulianini, P. G., A. Marcotullio & E. A. Ferrero (1994): Light microscopical and ultrastructural cytology of the ovaries in the sea-grass goby *Zosterissesor ophiocephalus* (Osteichthyes, Gobiidae). Boll. Zool., 61, 135–144.
Graeffe, E. (1888): Uebersicht der Seetiere des Golfes von Triest. IV. Pisces (Fische). Arbeiten des Zoolog. Institutes zu Wien u. Zool. Stat. Triest., 7, 445–470.
Gridelli, E. (1931): Note d'ittologia adriatica. Atti Mus. Civ. Stor. Nat. Trieste, 11(1), 368–377.
Griffini, A. (1903): Ittiologia Italiana. Ulrico Hoepli, Milano.
Guidetti, P. (2000): Differences Among Fish Assemblages Associated with Nearshore *Posidonia oceanica* Seagrass Beds, Rocky-algal Reefs and Unvegetated Sand Habitats in the Adriatic Sea. Estuar. Coast. Shelf Sci., 50, 515–529.
Guidetti, P. & S. Bussotti (2000): Nearshore fish assemblages associated with shallow rocky habitats along the

southern Croatian coast (Eastern Adriatic Sea). Vie Milieu, 50, 171–176.

Herler, J. & M. Kovačić (2002): *Lebetus guiletti* (Teleostei: Gobiidae) in the northern Adriatic Sea: First record and details in the species' morphology. Annales Ser. Hist. Nat., 12(2), 177–188.

Herler, J. & R. A. Patzner (2002): New records of *Didogobius splechtnai* (Gobiidae) from the Tyrrhenian and Northern Adriatic Sea. Cybium, 26(2), 153–155.

Herler, J., R. A. Patzner & C. Sturmbauer (2005): A preliminary revision of the *Gobius auratus* species complex with redescription of *Gobius auratus* Risso, 1810. J. Nat. Hist., 39, 1043–1075.

Heymer, A. & C. D. Zander (1992): Feeding habits of *Gobius auratus* and other benthic small-sized fish from the French Mediterranean coast under regard of some alternating parameters. Zool. Anz., 228, 220–228.

Jaklin, A. & M. Arko-Pijevac (1997): Benthic biocoenosis of the Sv. Marko Islet (Rijeka Bay). Period. Biol., 99(2), 219–228.

Jardas, I. (1985): Pregled riba (*sensu lato*) Jadranskog mora (Cyclostomata, Selachii, Osteichthyes) s obzirom na taksonomiju i utvrđeni broj. Biosistematika, 11(1), 45–74.

Jardas, I. (1996a): Jadranska ihtiofauna. Školska knjiga, Zagreb, 535 pp.

Jardas, I. (1996b): Sastav pridnenih ihtionaselja Murterskog mora. Simpozij Nacionalni park Kornati. Priopćenja. Ekološke monografije, 7, 343–351.

Jardas, I. & A. Pallaoro (1989): Neki pokazatelji opadanja biološkog bogatstva priobalnog područja Jadrana (1960–1988). Pogledi, 19, 159–176.

Jardas, I., S. Jukić, I. Kačić, S. Regner & S. Gorenka (1981): Ribarstveno-biološka istraživanja šireg područja Malostonskog zaljeva. Savjetovanje Malostonski zaljev – prirodna podloga i društveno valoriziranje. JAZU, Dubrovnik, 12–14. studenog, 1981, p. 175–202.

Jardas, I., A. Pallaoro & D. Zavodnik (1996): Ihtiofauna područja Kornata i Murterskog mora. Simpozij Nacionalni park Kornati. Priopćenja. Ekološke monografije, 7, 353–377.

Jardas I., A. Pallaoro &. M. Kovačić (1998): Recent ichthyofauna of Rijeka Bay. In: Arko-Pijevac, M., M. Kovačić & D. Crnković (eds): Zbornik radova Prirodoslovna istraživanja riječkog područja, p. 671–685.

Jukić, S. (1975): Kočarska područja u srednjem Jadranu. Acta Adriat., 17, 1–87.

Jukić, S. (1983): Kočarska naselja Crnogorskog primorja i dozvoljeni nivo iskorištavanja. Studia Marina, 13–14, 155–165.

Jukić, S. & D. Crnković (1974): Stanje naselja pridnenih jestivih vrsta u Jadranu. Acta Adriat., 16, 137–156.

Jukić, S. & C. Piccinetti (1981): Quantitative and qualitative characteristics of demersal resources in the Adriatic Sea with some populaion dynamics estimates. FAO Fish. Rep., 253, 73–91.

Kolombatović, J. (1881): Pesci delle acque di Spalato e catalogo degli anfibi e dei rettili dei contorni di Spalato. Estratto dai programma dell' i. r. Scuola reale Superiore, p. 1–29.

Kolombatović, J. (1882): Mammiferi, anfibi e rettili, e pesci rari e nouvi per l'Adriatico catturati nelle acque di Spalato. Godišnje izvješće C. K. Velike realke u Splitu za školsku godinu 1881/82, p. 27–35.

Kolombatović, J. (1886): Imenik kralješnjaka Dalmacije. II. dio: Dvoživci, gmazovi i ribe. Godišnje izvješće C. K. Velike realke u Splitu za školsku godinu 1885/86, p. 2–32.

Kolombatović, J. (1888): Catalogus vertebratorum dalmaticorum. Godišnje izvješće C. K. Velike realke u Splitu za školsku godinu 1887/88, p. 2–32.

Kolombatović, J. (1891): Glamoči (Gobii) Spljetskog Pomorskog Okružja. Godišnje
izvješće C.K. Velike realke u Splitu za školsku godinu 1890–91, p. 1–29.

Kolombatović, J. (1900): Druge zoologičke vijesti iz Dalmacije. Program C.K. Velike realke u Splitu za školsku godinu 1899–900, p. 1–34.

Kovačić, M. (1994): Contribution to the knowledge of gobies, Gobiidae (Pisces, Perciformes) in the Rijeka Bay, Adriatic Sea. Period. Biol., 96(4), 463–465.

Kovačić, M. (1995): *Gobius roulei* De Buen, 1928 (Pisces, Teleostei, Gobiidae), a Fish new to the Adriatic Fauna. Nat. Croat., 4(4), 173–184.

Kovačić, M. (1997): Cryptobenthic gobies and clingfishes in the Kvarner area, Adriatic Sea. Nat. Croat., 6(4), 423–435.

Kovačić, M. (1998): Ichthyological collection (Cyclostomata, Selachii, Osteichthyes) of the Natural History Museum Rijeka. In: Arko-Pijevac, M., M. Kovačić & D. Crnković (eds): Prirodoslovna istraživanja riječkog područja. Zbornik radova, p. 685–698.

Kovačić, M. (1999): *Gammogobius steinitzi* Bath, 1971, a fish new to the Adriatic Sea. Nat. Croat., 8(1), 1–7.

Kovačić, M. (2001a): The Kvarner population of *Gobius couchi* (Teleostei, Gobiidae), a fish new to the Adriatic fauna. Nat. Croat., 10(1), 1–10.

Kovačić, M. (2001b): The biology of Roule's goby in the Kvarner area, northern Adriatic Sea. J. Fish Biol., 59(4), 795–809.

Kovačić, M. (2002a): A northern Adriatic population of *Buenia affinis* (Gobiidae). Cybium, 26, 197–201.

Kovačić, M. (2002b): A visual census of the coastal fish assemblage at Kostrena (the Kvarner area, Croatia). Annales Ser. Hist. Nat., 12(1), 1–8.

Kovačić, M. (2003): Hyperbenthic gobies in the Kvarner area, Adriatic Sea. J. Fish Biol., 63(4), 1051–1055.

Kovačić, M. (2004): Unusual morphological and ecological characteristics of hyperbenthic juveniles of *Gobius cruentatus*. J. Fish Biol., 65, 545–558.

Kovačić, M. & P. J. Miller (2000): A new species of *Gobius* (Teleostei: Gobiidae) from the northern Adriatic Sea. Cybium, 24, 231–239.

Kovačić, M. & A. Pallaoro (2003): Is *Knipowitschia cau-*

casica-like form from the Adriatic Sea a new Goby species? Evidence from a morphological approach in the Eastern Adriatic Sea. Cybium, 27, 81–164.

Kraljević, M. & A. Pallaoro (1991): Ihtiocenoze plitkih uvala nacionalnog parka "Kornati". Morsko ribarstvo, 43(3), 81–90.

La Mesa, M. (1999): Age and growth of *Aphia minuta* (Pisces, Gobiidae) from central Adriatic Sea. Sci. Mar., 63, 147–155.

La Mesa, M. (2001): Age and growth of *Crystallogobius linearis* (von Düben, 1845) (Teleostei: Gobiidae) from the Adriatic Sea. Sci. Mar., 65, 375–381.

Lahnsteiner, F., M. Seiwald, R. A. Patzner & E. A. Ferrero (1992): The seminal vesicles of the male grass goby, *Zosterisessor ophiocephalus* (Teleostei, Gobiidae). Zoomorphology, 111, 239–248.

Langhoffer, A. (1904): Popis riba koje su dospjele Narodnom zoološkom muzeju u Zagrebu do konca 1900. Glasnik Hrvat. Nar. dr. Zagreb, 16, 148–169.

Lipej, L. & J. Dulčić (2004): The current status of Adriatic fish biodiversity. In: Griffiths, H. I., B. Kryštufek & J. M. Reed (eds.): Balkan Biodiversity. Pattern and process in the European Hotspot. Kluwer, Dordrecht, p. 291–306.

Lipej, L., M. Orlando Bonaca & M. Šiško (2003): Coastal fish diversity in three marine protected areas and one unprotected area in the Gulf of Triest (Northern Adriatic). P.S.Z.N.I.: Mar. Ecol., 24(4), 1–15.

Lugli, M. & P. Torricelli (1999): Prespawning sound production in Mediterranean sand gobies. J. Fish Biol., 54, 691–694.

Malavasi, S., J. Coppola, F. Pranovi, A. Granzotto, A. Franco & P. Torricelli (2002): Habitat riproduttivo di Zosterisessor ophiocephalus Pall. (Pisces, Gobiidae) in Laguna di Venezia e osservazioni sulle caratteristiche dei riproduttori. Lavori Soc. Ven. Sci. nat., 27, 47–56.

Malavasi, S., P. Torricelli, M. Lugli, F. Pranovi & P. Mainardi (2003): Male courtship sounds in a teleost with alternative reproductive tactics, the grass goby, *Zosterisessor ophiocephalus.* Env. Biol. Fish., 66, 231–236.

Marchesan, M., D. Ota & E. A. Ferrero (2000): The role of mechanical stimulation during breeding in the grass goby *Zosterisessor ophiocephalus* (Teleostei: Gobiidae). Ital. J. Zool., 67, 25–30.

Marconato, A., M. B. Rasotto & C. Mazzoldi (1996): On the mechanism of sperm release in three gobiid fishes (Teleostei: Gobiidae). Env. Biol. Fish., 46, 321–327.

Marcuzzi, G. (1972): Le collezioni dell'exIstituto di Biologia Marina di Rovigno conservate presso la Stazione Idrobiologica di Chioggia. Mem. Acad. Patavina Sci. Lett. Art., 84(2), 169–219.

Martens, G. (1838): Reise nach Venedig. Erste Anhang. Fauna Veneta. Ulm, Stettin'schen Buchhandlung, p. 373–538.

Marzano, F. N. & G. Gandolfi (2000): A first decsription of an additional phosphoglucomutase locus in *Knipowitschia panizzae* (Teleostei, Gobiidae) from Italian lagoons. Ital. J. Zool., 67, 277–279.

Marzano, F. N. & G. Gandolfi (2001): Active canibalism among adults of *Knipowitschia panizzae* (Pisces Gobiidae) induced by starvation and reproduction. Ethol. Ecol. Evol., 13, 385–391.

Mazzoldi, C. & M. B. Rasotto (2001): Extended breeding season in the marbled goby, *Pomatoschistus marmoratus* (Teleostei: Gobiidae), in the Venetian Lagoon. Env. Biol. Fish., 61, 175–183.

Mazzoldi, C. & M. B. Rasotto (2002): Alternative male mating tactics in *Gobius niger*. J. Fish Biol., 61, 157–172.

Mazzoldi, C., M. Scaggiante, E. Ambrosin & M. B. Rasotto (2000): Mating system and alternative male mating tactics in the grass goby *Zosterissesor ophiocephalus* (Teleostei: Gobiidae). Mar. Biol., 137, 1041–1048.

Mazzoldi, C., C. Polttronieri & M. B. Rasotto (2002): Egg size variability and mating system in the marbled goby *Pomatoschistus marmoratus* (Pisces: Gobiidae). Mar. Eco. Prog. Ser., 233, 231–239.

McKay, S. I. & P. J. Miller (1997): The affinities of European sand gobies (Teleostei: Gobiidae). J. Nat. Hist., 31, 1457–1482.

Miller, P. J. (1967): The systematic status of the European gobiid fish *Cabotichtys schmidti* (De Buen) and *Gobius assoi* De Buen with new record from the Adriatic Sea. Ann. Mus. Civ. Stor. Nat. Genova, 77, 227–236.

Miller, P. J. (1969): Systematics and biology of the leopard spotted goby, *Gobius ephippiatus* (Teleostei: Gobiidae), with description of a new genus and notes on the identity of *Gobius macrolepis* Kolombatović. J. Mar. Biol. Ass. U. K., 49, 831–855.

Miller, P. J. (1971): A revision of the Mediterranean gobiid genus *Chromogobius* (Teleostei – Perciformes). J. Zool. Lond., 164, 305–334.

Miller, P. J. (1972a): The identity of *Gobius affinis* Kolombatović, with notes on the systematics and biology of *Pomatoschistus pictus* (Malm) (Pisces: Gobiidae). Ann. Mus. Civ. Stor. Nat. Genova, 79, 53–88.

Miller, P. J. (1972b): Generic status and redescription of the Mediterranean fish *Gobius liechtensteini* Kolombatović, 1891 (Teleostei: Gobioidea), and its affinities with certain American and Indo-Pacific gobies. J. Nat. Hist., 6, 395–407.

Miller, P. J. (1972c): Gobiid fishes of the Caspian genus *Knipowitschia* from the Adriatic Sea. J. Mar. Biol. Ass. U. K., 52, 145–160.

Miller, P. J. (1973a): Gobiidae. In: Hureau, J. C. & Th. Monod (eds): Check-List of the Fishes of the North-Eastern Atlantic and of the Mediterranean (CLOFNAM). Vol. 1. UNESCO, Paris, 525 pp.

Miller, P. J., (1973b): The species of *Pseudaphya* (Teleostei: Gobiidae) and the evolution of aphyiine gobies. J. Fish Biol., 5, 353–365.

Miller, P. J. (1977): Gobies from Rhodes and the systematic features of *Zebrus zebrus* (Teleostei: Gobiidae). Zool. J. Linn. Soc., 60, 339–362.

Miller, P. J. (1982): A new *Pomatoschistus* from the Mediterranean, and redescription of *P. tortonesei* Miller, 1968. Senckenb. Biol., 62(1), 5–19.
Miller, P. J. (1986): Gobiidae. 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. 3. UNESCO, Paris.
Miller, P. J. (1992): A new species of *Didogobius* (Teleostei: Gobiidae) from the Adriatic Sea. J. Nat. Hist., 26, 1413–1419.
Miller, P. J. & E. Tortonese (1968): Distribution and systematics of the gobiid fish *Odondebuenia balearica* (Pellegrin Fage). Ann. Mus. Civ. Stor. Nat., 77, 342–359.
Miller, P. J. & M. Y. El-Tawil (1974): A multidisciplinary approach to a new species of *Gobius* (Teleostei: Gobiidae) from southern Cornwall. J. Zool. Lond., 174, 539–574.
Mrakovčić, M., D. Schneider & M. Kerovec (1994): Freshwater gobies of Croatia. Period. Biol., 96, 441–443.
Mušin, D. (1989): Ihtiološka zbirka Prirodoslovnog muzeja Biološkog zavoda Dubrovnik. Zbornik Matice srpske za prirodne nauke, 76, 137–168.
Naccari, F. L. (1822): Ittiologia Adriatica, ossia Catalogo dei pesci del golfo e laguna di Venezia. Giornale di Fisica-chimica, storia naturale, medicina ed arti, dei professori Pietro Configliahci e Gaspare Brugnatelli. Decade II, tomo V. Pavia, p. 327–340.
Nardo, G. D. (1827): Prodromus observationum et disquisitionum Adriaticae ichthyologiae. Diarii Physices, Chemiae et Hist. Nat., 10, 6–23.
Nardo, G. D. (1860): Prospetti sistematici degli animali delle provincie Venete e del mare Adriatico e distinzione delle specie in gruppi relativi alla loro geografia fisica ed all' interese economico-statistico che presentano. Atti del R. Istituto Veneto di scienze lettere ed arti, Tomo IV, Serie III: 969–980, 1035–1076 et Tomo V, Serie III: 599–611, 785–819, 885–910.
Ninni, A. P. (1882): Catalogo dei ghiozzi (Gobiina) osservati nell' Adriatico e nelle acque dolci del Veneto. Atti Soc. natur. Modena, 3(1), 221–226.
Ninni, A. P. (1883): Nuova specie di *Gobius*. Atti Soc. venet.-trent. Sci. Nat. Padova, 8, 276–279.
Ninni, E. (1912): Catalogo del pesci del mare Adriatico. C. Bertotti, Venezia.
Ninni, E. (1938): I *Gobius* dei mai e delle acque interne d'Italia. Mem. Comm. Talassogr. Ital., 242, 1–169.
Nocita, A. & S. Vanni (1997): Cataloghi del Museo di Storia Naturale dell' Università di Firenze – sezione di Zoologia "La Specola". XVII. Actinopterygii Perciformes: Eleotridae e Gobiidae. Atti. Soc. tosc. Sci. nat. B, 104, 61–69.
Novosel, M., T. Bakran-Petricioli, A. Požar-Domac, P. Kružić & I. Radić (2002): The benthos of the northern part of the Velebit Channel (Adriatic Sea, Croatia). Nat. Croat., 11(4), 387–409.
Onofri, I. (1983): Ribe (Pisces) Prirodoslovnog muzeja u Splitu. Zb. Mat. srp. za prir. nauke, 64, 23–50.
Orepić, N., J. Vidmar, E. Zahtila & D. Zavodnik (1997): A marine benthos survey in the lakes of the National park Mljet (Adriatic Sea). Period. Biol., 99, 229–245.
Ota, D. & F. Lahnsteiner (1996): Retinal vascularization in the gras goby, *Zosterisessor ophiocephalus:* a scanning electron-microscopic study of vascular corrosion casts. Env. Biol. Fish., 45, 319–324.
Ota, D., M. Francese & E. A. Ferrero (1996): Feeding in the grass goby (*Zosterissesor ophiocephalus*, Teleostei, Gobiidae) under different light intensities: a behavioural and morphological study. Boll. Zool. Suppl., 61, p. 36.
Ota, D., M. Francese & E. A. Ferrero (1999): Vision in the grass goby, *Zosterissesor ophiocephalus* (Teleostei: Gobiidae): a morphological and behavioural study. Ital. J. Zool., 66, 125–139.
Pallaoro, A. (2001): Promjene kao posljedice ribolova i zagađenja. Hrvatska vodoprivreda, 104, 54–59.
Pallaoro, A. & I. Jardas (1996): Ichthyological collection of the Institute of Oceanography and Fisheries in Split (Croatia). Nat. Croat., 5(3), 177–219.
Pallaoro, A. & M. Kovačić (2000): *Vanneaugobius dollfusi* Brownell, 1978 a rare fish new to the Adriatic Sea. J. Fish Biol., 57, 255–257.
Patzner, R. A., M. Seiwald, S. Angerer, E. A. Ferrero & P. G. Giulianini (1991): Genital System and Reproductive Cycle of the Male Grass Goby, *Zosterisessor ophiocephalus* (Teleostei, Gobiidae) in the Northern Adriatic Sea. Zool. Anz., 226(5/6), 205–219.
Perugia, A. (1866): Catalogo dei Pesci dell' Adriatico nei cenni intitolati: Civico Museo Ferdinando Massimiliano in Triest. Continuazione dei cenni storici pubblicati nell' anno 1863, p. 1–21.
Perugia, A. (1881): Elenco sistematico degli animali del Mare Adriatico. Ulrico Hoepli Editore, Milano.
Plucàr, E. (1846): Der Fischplatz zu Triest oder Aufzählung und populäre Beschreibung der demselben aus den adriatischen Golfe zugeführten Fische und andere essbaren Meerprodukte nebst Andeutung ihrer Zubereitung als Speise. Ernst Börner, Triest.
Quignard, J. P. & J. A. Tomasini (2000): Mediterranean fish biodiversity. Biol. Mar. Med., 7, 1–66.
Rasotto, M. B. & C. Mazzoldi (2002): Male traits associated with alternative reproductive tactics in *Gobius niger*. J. Fish Biol., 61, 173–184.
Scaggiante, M., C. Mazzoldi, C. W. Peterson & M. B. Rasotto (1999): Sperm competition and mode of fertilization in the grass goby *Zosterissesor ophiocephalus* (Teleostei: Gobiidae). J. Exp. Zool., 283, 81–90.
Seiwald, M. & R. A. Patzner (1989): Histological, fine-structural and histochemical differences in the testicular glands of gobiid and blewnniid fishes. J. Fish Biol., 35, 631–640.
Shultz, G. (1975): Beobachtungen über Vorkommen und Lebensweise von *Thorogobius ephippiatus* (Lowe, 1839) (Pisces) in der Nord- und Mitteladria. Ann. Nathist. Mus. Wien, 79, 183–192.

Simonović, P. (1999): Phylogenetic relationship of Ponto-caspian gobies and their relationship to the Atlantic-Mediterranean Gobiinae. J. Fish Biol., 54, 533–555.
Simonović, P., V. P. Nikolić & K. E. Skora (1996): Vertebral number in in Ponto-Caspian gobies: phylogenetic relevance. J. Fish Biol., 49, 1027–1029.
Sorice, M. & V. Caputo (1999): Genetic variation in seven goby species (Perciformes: Gobiidae) assessed by electrophoresis and taxonomic inference. Mar. Biol., 134, 327–333.
Stefanni, S. (2000): First record of the Norway goby in the Adriatic Sea. J. Fish Biol., 57, 828–830.
Stefanni, S., E. S. Gysels, F. A. M. Volckaert & P. J. Miller (2003): Allozyme variation and genetic divergence in the sand goby, *Pomatoschistus minutus* (Teleostei: Gobiidae). J. Mar. Biol. Ass. U. K., 83, 1143–1149.
Steindachner, F. (1861): Beiträge zur Kenntniss der *Gobioiden.* Sber. Akad. Wiss. Wien, 61, 283–292.
Steindachner, F. (1863): Über eine neue *Gobius*-Art aus dem adriatischen Meere. Arch. Zool. Anat. Fisiol., 2, 341–342.
Steindachner, F. (1870): Ichthyologische Notizien (X.). Sber. Akad. Wiss. Wien, 61, 622–642.
Steindachner, F. (1883): Beiträge zur Kenntniss der Fische der Adria. Anz. Akad. Wiss. Wien, 20, 212–214.
Steindachner, F. & J. Kolombatović (1884): Beiträge zur Kenntniss der Fische der Adria. Sber. Akad. Wiss. Wien, 88, 1193–1202.
Stossich, A. (1869): Elenco sistematico degli animali del Mare Adriatico riuniti nella separate divisione della fauna adriatica del Museo. Atti Mus. Stor. nat. Trieste, 5, 9–34.
Stossich, M. (1880): Prospetto della fauna del Mare Adriatico. Boll. Soc. adr. Sci. nat. Trieste, 5, 18–71.
Sucker, L. (1895): Die Fishe, nebst den essenbaren Wirbellosen Thieren der Adria und ihre Zubereitung. Verlag von F. H. Schimpff, Triest, p. 1–179.
Šoljan, T. (1948): Ribe Jadrana. Flora i fauna Jadrana 1. Institut za oceanografiju i ribarstvo. Nakladni zavod Hrvatske, Zagreb.
Šoljan, T. (1965): Ribe Jadrana (Pisces mari Adriatici). Treće, prerađeno i dopunjeno izdanje. Zavod za izdavanje udžbenika SR Srbije, Beograd.
Špan, A., B. Antolić, A. Šimunović, I. Grubelić & S. Jukić (1996): Ecological study of gas fields in the northern Adriatic. 12. Ecological features of benthic community. Acta Adriat., 37(1/2), 161–194.
Ševčić, Z. (1977): Lista glavoča iz voda Jugoslavije. Biosistematika, 3(1), 99–110.
Torricelli, P., S. Malvasi, N. Novarini, F. Pranovi & D. Mainardi (2000): Elongation of fin rays in parental males of *Zosterisesor ophiocephalus* (Pisces, Gobiidae). Env. Biol. Fish., 58, 105–108.
Tortonese, E. (1963): Catalogo dei tipi di pesci del Museo Civico di Storia Naturale di Genova (parte III). Ann. Mus. Civ. Stor. Nat. Giacomo Doria, 73, 333–350.
Tortonese, E. (1975): Osteichthyes (Pesci ossei), Parte seconda. Fauna d'Italia. Vol. 11. Edizioni Calderini, Bologna, 636 pp.
Trois, E. F. (1875): Prospetto sistematico dei Pesci dell' Adriatico e Catalogo della Collezione Ittiologica del R. Istituto Veneto. Atti R. Istituto Veneto, 1, 3–55.
Turk, R., M. Orlando Bonaca, T. Makovec, A. Vukovič & L. Lipej (2002): A topographical survey of habitat types in the area characterized by seagrass meadow of *Posidonia oceanica* in the southern part of the Gulf of Triest (northern Adriatic). Annales Ser. Hist. Nat., 12(2), 191–202.
Ungaro, N., N. Casavola, G. Marano & E. Rizzi (1994): "Bianchetto" and "rossetto" fry fisheries in the Manfredonia Gulf: effort and catch composition. Oebalia, 20, 99–106.
Usić, U. (2003.): La biodiversità nell'alto Adriatico: Un confronto tra presente e passato attraverso le collezioni museali. Tesi di Laurea. Facolta di Scienze dell' Università di Padova, Padova.
Verga, D. (1841): Descrizione di un *Gobius* frequente nelle lagune di Comacchio. Atti 3ª Riunione Scienziati Italiani, p. 379.
Vinciguerra, D. (1883): Resultati ittiologici della crociere del "Violante". Ann. Mus. Civ. Stor. Nat. Genova, 18, 465–590.
Vuković, T. & B. Ivanović (1971): Slatkovodne ribe Jugoslavije. Zemaljski muzej BiH, Sarajevo.
Zander, C. D. & H. Jelinek (1976): Zur demersen Fischfauna im Bereich der Grotte von Banjole (Rovinj/YU) mit Beschreibung von *Speleogobius trigloides* n. gen. n. sp. (Gobiidae, Perciformes), Mitt. Hamb. Zool. Mus. Inst., 73, 265–280.
Zavodnik, D. (1971): Contribution to the dynamics of benthic communities in the region of Rovinj (Northern Adriatic). Thalassia Jugosl., 7(2), 447–514.
Zavodnik, D. & N. Zavodnik (1986): Biološka valorizacija zaljeva Raša. III. Bentos. Pomorski zbornik, 24, 535–554.
Zavodnik, D. & D. Crnković (1992): Prilozi morskoj flori I fauni lošinjske otočne skupine VIII. Ribe *(Pisces, sensu stricto).* Otočki ljetopis Cres–Lošinj, 8, 265–272.
Zavodnik, D. & M. Kovačić (2000): Index of marine fauna in the Rijeka Bay (Adriatic Sea, Croatia). Nat. Croat., 9(4), 297–379.
Zei, M. (1942): Biologische Ergebnisse einiger Forschungsreisen in der Adria. Arch. Oceanogr. Limnol., Venezia, 2(2–3), 171–197.
Zei, M. (1949): Raziskovanje s travlom na ribolovnom področju vzhodnega Jadrana. Razprave JAZU, 4, 89–119.
Županović, Š. (1961): Kvantitativno-kvalitativna analiza ribljih naselja kanala srednjeg Jadrana. Acta Adriat., 9(3), 1–151.
Županović, Š. & F. Grubišić (1958): Ribolovna efikasnost vuče u eksperimentima sa strugarima. Acta Adriat., 8(12), 1–27.
Županović, Š. & I. Jardas (1989): Fauna i flora Jadrana, Jabučka kotlina, 2. Institut za oceanografiju i ribarstvo – Split, Fauna et flora Adriatica vol. IV. Split, Logos.