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Special Section: The new Checklist of the Italian Fauna

The new Checklist of the Italian Fauna: Hydrozoa (Cnidaria)

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SUMMARY

The hydrozoan fauna of the Mediterranean Sea is considered as the best-known fauna of this class in the world, and the last monograph covers 457 species representing about 12% of the 3,702 currently valid species reported in the last world assessment of hydrozoan diversity. In this paper the checklist of the hydrozoan marine species is reported for the nine Italian marine biogeographical units, updating the one previously published in the series 'Checklist delle Specie della Fauna d'Italia' in 1995 that reported 319 hydrozoans on 463 cnidarian taxa. This note describes the state of the art of the Italian Hydrozoa checklist data set until June 2024. In detail, the updated checklist includes 340 hydrozoan species (128 Anthoathecata; 121 Leptothecata; 53 Siphonophorae; 6 Limnomedusae; 3 Actinulida; 14 Narcomedusae; 15 Trachymedusae), representing 74% of Mediterranean hydrozoan species. In detail in the current Italian Hydrozoa checklist, 40 species were added (increase of 12%) compared to the previous checklist with 14 strictly endemic species (4% of the total) for the Italian waters, 55 (16%) subendemic ones, and 20 (6%) are alien species. On the other hand, 19 species reported in the previous checklist were removed because considered dubious, synonyms of older ones or without detailed distributions for our territory. In addition, 69 species (20%) expanded their biogeographic distribution. The checklist data set will be dynamically updated with new records, and it will be freely available from Lifewatch Italy at https://www.lifewatchitaly.eu/en/initiatives/checklist-fauna-italia-en/checklist. This note describes the state of the art of the Hydrozoan checklist data set until June 2024.

INTRODUCTION

The 'Checklist delle Specie della Fauna d'Italia' was a project (Minelli et al. 1993-1995) representing one of the first attempts to carry out an almost complete list of the animal species known for terrestrial and marine habitat of the Italian country. In 2020 the project for an updated 'New Checklist of the Italian Fauna' started (Bologna et al. 2022) and the goal of the present data paper is to provide information on the updated checklist of the species of the class Hydrozoa, with the description of the state of the art of the data set as it currently stands in June 2024. The database will be continuously updated on the online platform of LifeWatch Italy (www.lifewatchitaly.eu/en/initiatives/checklist-fauna-italia-en/checklist) allowing a dynamically updated knowledge on the occurrence of the Italian fauna (Bologna et al. 2022).

The class Hydrozoa (Fig. 1) comprises ca. 3,702 prevalently marine species currently regarded as valid, ascribed to two heterogenous subclasses (Hydroidolina and Trachylinae) (WoRMS Register of Marine Species, 2025), although the status of many nominal species is currently unclear, and a considerable number of names also represent synonyms. There is currently no broad consensus for the higher classification of the Hydrozoa, and several systems and alternative names are in use (Daly et al. 2007, Schuchert 2023). Hydroids have three basic life-cycle stages: a tiny free-swimming ciliated planula, which settles and metamorphoses into a sessile (attached), usually colonial polyp stage (hydroid), which in its turn, will produce medusae (sexually adult condition) by budding. It is often the case, however, that either the hydroid or the medusa stage can be absent from the life cycle of species or even of entire groups. When the medusa is absent, the sexual adult stage is the polyp. Colonies of hydroids are complex and often polymorphic, typically 5-500 mm or more high, branched and grow vegetatively by increasing the number of hydranths (the main body of the hydroid). Members of some species can retract their polyps within the 'hydrotheca', a protective extension of the perisarc, but others lack such a structure.

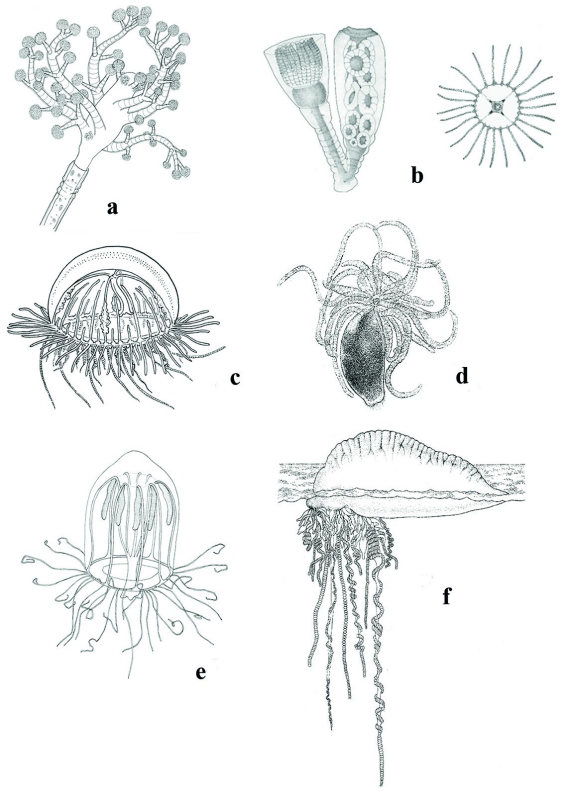

Figure 1. Representative specimens of the marine Hydrozoa from Italy. a, Anthoathecata: *Cladocoryne floccosa* Rotch, 1871 – hydranth. b, Leptothecata: *Obelia dichotoma* (Linnaeus, 1758) – polyp with gonotheca and medusa. c, Limnomedusae: *Olindias muelleri* Haeckel, 1879 – medusa. d, Actinulida: *Halammohydra schulzei* Remane, 1927 general view. e, Trachymedusae: *Aglantha digitale* (O. F. Müller, 1776) – medusa. f, Siphonophorae: *Physalia physalis* (Linnaeus, 1758) colony. a, b, Cristina Di Camillo; c, redrawn and modified after Kramp 1959; d, modified after Swedmark & Tessier 1966; e, modified after Gravili et al. (2015); f, modified after Pagès & Gili 1992.

Siphonophores (one of the three orders of the subclass Hydroidolina) are mainly characterized by nectophores and are very efficient carnivores, which can reach very high abundance under favorable environmental conditions. The complex life cycles of the Hydrozoa caused many taxonomic disagreements. For an extended period, polyps and medusae have been considered as different

entities and two separate classification systems have been created for them. The reconstruction of their life cycles is, therefore, a necessary pre-requisite for a unified classification (Boero et al. 1997).

The first modern list of Mediterranean Hydrozoa (besides Siphonophorae) was provided by Picard (1958) including 191 species. Subsequently, Boero and Bouillon (1993) compiled a list of 346 species, updated to 379 by Boero et al. (1997). Nowadays, the most updated available list with 457 species of Mediterranean Hydrozoa, including Siphonophorae, is by Bouillon et al. (2004). Schuchert (2004, 2006, 2007, 2008a, 2008b, 2009, 2010) reviewed several European Hydrozoa taxa. Furthermore, diagnostic characters and character states in the class Hydrozoa are described by Bouillon et al. (2006) with diagnoses and keys for all supraspecific taxa. Moreover, WORMS (World Register of Marine Species) (https://www.marinespecies.org/aphia.php?p=taxdetails&id=1337) provides a recently revised list of Word Hydrozoa, reporting taxonomic notes and documented distribution.

The Hydrozoa fauna of the Italian waters is the most representative of the whole basin, due to the central position of the Italian Peninsula in the Mediterranean Sea (see Bouillon et al. 2004). In the past, Italy has been the centre of marine biodiversity studies, with the continuous work of many visitors to the Zoological Station Anton Dohrn of Naples (Du Plessis 1880, 1881, Vannucci 1966, Brinckmann-Voss 1970). Messina was also a favoured place for hydrozoan studies (Gegenbaur 1857, Metschnikoff 1886). The Gulf of Trieste was an important centre of hydrozoan research with Meneghini, Heller, Graeffe, Neppi and Stiasny, Schneider, and others. In 2008 the SIBM (Società Italiana di Biologia Marina), as part of the overall agreement with the Ministry of the Environment, Land and Sea Protection, has been commissioned to revise and complete the list of Italian marine species (https://www.sibm.it/public/book-files/SIBM-Biologia-Marina-Mediterranea-15-Suppl-1---2008-ITAENG--Num-.pdf) and to publish the first volume with the section dedicated to Hydrozoa (Gravili et al. 2008), that served as the backbone for the development of the present project of the new Italian checklist.

The present updated checklist (including 340 species of Hydrozoa) follows the previous one (Avian et al. 1995) that reported 319 species (out of 463 cnidarian taxa) and summarizes the current state of knowledge of distribution of each species in the Italian marine waters. In this paper, summary statistics of the new checklist are presented and compared with the previous edition (Avian et al. 1995). Additionally, a description of the database is also provided with brief information about data set description, data set information, management details, geographic information, literature records, and taxonomic information.

Data set description

The checklist includes information in 62 fields, of which 25 have been used for the marine Hydrozoa (thus, excluding those concerning the presence/absence in terrestrial/freshwater areas and in the Italian Administrative Regions: Table 1, Supplementary Table S1). The first 14 fields provide the taxa from Phylum to Family and Subfamily, followed by Genus and Genus authorship, Subgenus and Subgenus authorship, Species and Species authorship, and eventually, when available, Subspecies, followed by Scientific name and Scientific name authorship.

The binomen of the species is mentioned as in WoRMS (World Register of Marine Species) (Horton et al. 2021), with the relative AphiaID code.

The following columns report the known occurrence of Hydrozoa in each of the nine areas (Fig. 2; Supplementary Table S1) used in the checklist of the marine flora and fauna published by the SIBM (Relini 2008, 2010) and largely based on the biogeographic sectors identified by Bianchi (2004), including records from the Italian Economic Exclusive Zone.

Table 1. Description of the data set with specific information relative to definitions and storage type for each of the 62 columns of the total data set. The variables (25) used for the Hydrozoa are reported in bold.

Variable (column)	Description	Storage type
Phylum	Phylum name, Cnidaria for all records	String
Class	Class name, Hydrozoa for all records	String
Order	Order name	String
Family	Family name, according to WoRMS	String
Subfamily	Subfamily name	String
Genus	Valid genus name, according to WoRMS	String
Genus authorship	Genus author	String
Subgenus	Subgenus name	String
Subgenus authorship	Subgenus author	String
Specific epithet	Valid species name, according to WoRMS	String
Specific epithet authorship	Species author	String
Infraspecific epithet	Valid subspecies name, according to WoRMS	String
Scientific name	Scientific name	String
Scientific name authorship	Scientific name author	String
WORMS (AphiaID)	Species AphiaID as reported in WoRMS	String
Endemisms	Species known as endemic, subendemic, not endemic, questionable	String
Establishment means	Species known as native (indigenous), alien, introduced, uncertain	String
Ligurian Sea	Marine Area number 1 according to SIBM: Ligurian Sea North of Piombino and Capo Corso	Binary
Northern_Tyrrhenian_Sea	Marine area number 2 according to SIBM: Coasts of Sardegna (and Corsica), with North Tyrrhenian Sea from Piombino to Gaeta	Binary
Southern_Tyrrhenian_Sea	Marine area number 3 according to SIBM: Coasts of Campania, Tyrrhenian coasts of Basilica, Calabria and Sicilia	Binary
Messina_Strait	Marine area number 4 according to SIBM: Messina Strait between Sicilia and Calabria	Binary
Eastern_Mediterranean_Basin	Marine area number 5 according to SIBM: South-Eastern coasts of Sicilia, Pelagie Islands, Maltese archipelago	Binary
Ionian_Sea	Marine area number 6 according to SIBM: Eastern coast of Sicilia (without Messina Strait), Ionian coasts of Calabria and Basilicata and Southern part of Puglia up to Otranto	Binary
Southern_Adriatic_Sea	Marine area number 7 according to SIBM: Lower Adriatic Sea, Coasts of Puglia between Otranto and Manfredonia	Binary
Middle_Adriatic_Sea	Marine area number 8 according to SIBM: Mid Adriatic Sea, coasts between Manfredonia (Puglia) and Conero (Marche)	Binary
Northern_Adriatic_Sea	Marine area number 9 according to SIBM: High Adriatic Sea, coasts from Conero (Marche) to Istria (Friuli - Venezia Giulia)	Binary
Continental_Italy	Occurrence of the taxon in the continental Italy (grouping: Friuli Venezia Giulia, Veneto, Trentino-Alto Adige, Lombardia, Valle d'Aosta, Piemonte, Liguria, Emilia-Romagna)	Binary
Peninsular_Italy	Occurrence of the taxon in the peninsular Italy (grouping: Toscana, Marche, Umbria, Lazio, Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria)	Binary
Insular_Italy	Occurrence of the taxon in the insular Italy (grouping: Sicilia e Sardegna)	Binary
Valle_d'Aosta	Occurrence of the taxon in Valle d'Aosta	Binary
Piemonte	Occurrence of the taxon in Piemonte	Binary
Lombardia	Occurrence of the taxon in Lombardia	Binary
Trentino_Alto_Adige	Occurrence of the taxon in Trentino Alto Adige	Binary
Veneto	Occurrence of the taxon in Veneto	Binary
Friuli_Venezia_Giulia	Occurrence of the taxon in Friuli Venezia Giulia	Binary
Liguria	Occurrence of the taxon in Liguria	Binary
Emilia_Romagna	Occurrence of the taxon in Emilia Romagna	Binary
Toscana	Occurrence of the taxon in Toscana	Binary
Marche	Occurrence of the taxon in Marche	Binary
Umbria	Occurrence of the taxon in Umbria	Binary
Lazio	Occurrence of the taxon in Lazio	Binary
Abruzzo	Occurrence of the taxon in Abruzzo	Binary
Molise	Occurrence of the taxon in Molise	Binary
Campania	Occurrence of the taxon in Campania	Binary
Puglia	Occurrence of the taxon in Puglia	Binary
Basilicata	Occurrence of the taxon in Basilicata	Binary
Calabria	Occurrence of the taxon in Calabria	Binary

Sicilia	Occurrence of the taxon in Sicilia	Binary
Sardegna	Occurrence of the taxon in Sardegna	Binary
San_Marino	Occurrence of the taxon in San Marino	Binary
Città_del_Vaticano	Occurrence of the taxon in Città del Vaticano	Binary
Canton_Ticino	Occurrence of the taxon in Canton Ticino	Binary
Corsica	Occurrence of the taxon in Corsica	Binary
Malta	Occurrence of the taxon in Malta	Binary
birds Italy	Birds in Italy	String
birds Continental Italy	Birds in Continental Italy	String
birds Peninsular Italy	Birds Peninsular Italy	String
birds Sicily	Birds in Sicily	String
birds Sardinia	Birds in Sardinia	String
Taxon Remarks	Nomenclatorial changes from the previous checklist of Avian et al. (1995)	String
Occurrence Remarks	Occurrence remarks	String
Citation	Literature reference for new distribution records	String

Figure 2. Geographical setting for the new 'Checklist of the Italian fauna'. Marine sectors, with the Economic Exclusive Zone in blue: 1, Ligurian Sea; 2, northern Tyrrhenian, including the sea around Corsica and Sardinia; 3, southern Tyrrhenian, including the sea around northern and southern Sicily and Pantelleria Isles; 4, Messina Strait; 5, southern Mediterranean, including the sea around south-eastern-most Sicily and Pelagie Islands, and the continental shelf around Malta (light blue); 6, Ionian Sea; 7, southern Adriatic; 8, mid-Adriatic; 9, northern Adriatic. Terrestrial and inland water sectors: N - Continental Italy; S - Peninsular Italy; Si - Sicily; Sa - Sardinia.

Three final columns report Taxon and Occurrence remarks, and the relevant literature references, respectively, with particularly concerning taxonomic changes or new entries with respect to previous editions of the checklist, suggested changes to the taxonomy in WoRMS, and new geographic records with respect to the previous edition of the checklist.

The new checklist of Italian marine Hydrozoa is given in the Supplementary file (Supplementary Table S1).

Data set information

Object name: Checklist of the Italian Fauna: Hydrozoa (Cnidaria).

Characters encoding: Unicode (UTF-8).

Data set citation: Gravili C. Hydrozoa. In: Bologna M.A., Zapparoli M., Oliverio M., Minelli A., Bonato L., Cianferoni F., Stoch F. (eds.), Checklist of the Italian fauna. Version 1.0. Last update: 2024-06-30.

Format name: xml, Extensible Markup Language, for the online version at LifeWatch Italy.

Format version: 1.0.

Distribution: https://dataportal.lifewatchitaly.eu/view/urn%3Auuid%3Ac1f2ab37-61e4-48e9-b3a9-15bdbf002f9d.

Date of creation: June 30th, 2024.

Date of last revision: June 30th, 2024.

Language: English.

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Metadata language: English.

Metadata managers: Marco Bologna, Lucio Bonato, Fabio Cianferoni, Alessandro Minelli, Marco Oliverio, Fabio Stoch, Marzio Zapparoli & LifeWatch Italy.

Management details

Project title: The new Checklist of the Italian Fauna: Hydrozoa (Cnidaria)

Database manager: Cinzia Gravili, Marco Bologna, Lucio Bonato, Fabio Cianferoni, Alessandro Minelli, Marco Oliverio, Fabio Stoch, Marzio Zapparoli & LifeWatch Italy

Temporal coverage: Anything published by June 2024.

Record basis: Published records in the scientific and grey literature.

Funding grants: No funding was specifically available for the project on Hydrozoa; funding for the update of the Checklist of the Italian fauna was obtained from LifeWatch Italy.

Geographic information

General description: The data set includes records from the national marine areas, including the two major islands Sardinia and Sicily, together with archipelagos and minor islands politically under the Italian legislation.

Geographic units: The geographical units for marine and coastal waters refer to the nine biogeographical sectors identified by the SIBM (Relini 2008, 2010), and largely based on the biogeographic sectors identified by Bianchi (2004), including records from the Italian Economic Exclusive Zone.

Bounding box: All sea waters falling under Italian administrative boundaries were included.

Sampling design: no additional sampling to collect records of Hydrozoa, but we used only published data.

Habitat type: The aquatic habitats refer to any marine habitat where Hydrozoa can be found was considered.

Biogeographic region: Within the Mediterranean Province of the Atlantic-Mediterranean Region, the dataset covers nine of the thirteen Mediterranean biogeographical Sectors (Bianchi et al. 2012).

Countries: Marine Economic Exclusive Zone of Italy (but including also the Tyrrhenian coasts of Corsica and the continental shelf of the Maltese archipelago).

Quality control for geographic data: I checked that the georeferenced records and the published localities in the papers indeed matched the geographical units used for the checklist at the level of marine regions for marine records.

Literature records

General description: Only published records are included in the data set. A search through the literature was performed by 30th June 2024.

Literature search methods: We searched through Web of Science, Scopus, and Google Scholar for keywords (‘hydrozoan’ or ‘Hydrozoa’) and (‘Italy’ or ‘Italian’).

Literature list: The papers or books published after the previous checklist by Avian et al. (1995) that reported information about Mediterranean hydrozoan are 282.

Quality control for literature data: We checked all the available scientific articles and grey literature published by June 2024. The dynamic nature of the online data set at Lifewatch Italy will allow including potentially overlooked records. The lagoon waters have been extensively studied by Morri (1980, 1981, 1982, 1984), while there is little information on Hydrozoa of the Italian fresh waters and, consequently, on the *Hydra* species present in Italy without detailed distributions for our territory (they are not included in this paper). Furthermore, the literature saturated with papers by non-specialists about the jellyfish stage of the species *Craspedacusta sowerbyi* Lankester, 1880 (this species is not included in this paper), perhaps because it was considered something exceptional, but the number of reports

demonstrates how the species is very common in all continents (Kramp 1961).

Taxonomic information

General description: Only records identified at the species level were included.

Taxonomic coverage: Class Hydrozoa.

Taxonomic rank: The data set includes species and mentions higher taxa for each species, including Phylum, Class, Order, Family, and Genus.

Taxon specialist: Cinzia Gravili.

Nomenclature: The adopted nomenclature followed the species names in WoRMS (or from the original descriptions for species newly described). Species authorships follow the rules of art. 51.3 of the 4th edition of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature1999) for the use of parentheses.

Taxonomic remarks: Any taxonomic change that occurred since the publication of the previous checklist (Avian et al. 1995) is mentioned, according to the nomenclature reported in WoRMS and considering the recent scientific literature. Species that were included in the previous checklist and currently considered not valid by WoRMS are excluded from the data set.

Quality control for taxonomic data: Taxonomic data were checked and updated to include revision of names, synonyms, delimitation of genera and higher taxa, all conducted through a comparison according to WoRMS and with the original descriptions for all species described after year 1995.

RESULTS

Summary statistics

This updated checklist includes 340 Hydrozoan species (128 Anthoathecata; 121 Leptothecata; 53 Siphonophorae; 6 Limnomedusae; 3 Actinulida; 14 Narcomedusae; 15 Trachymedusae), belonging to 187 genera and 82 families (Table 2), representing 74% of Mediterranean hydrozoan species. In detail in the current Italian Hydrozoan checklist, 40 species were added (increase of 12%) and 4 families (5%) compared to the previous checklist with 14 strictly endemic species (4%) for the Italian waters, 55 (16%) subendemic ones, and 20 (6%) are alien species. On the other hand, 19 species reported in the previous checklist were removed because considered dubious, synonyms of older ones or without detailed distributions for our territory. In addition, 69 species (20%) expanded their biogeographic distribution. In particular, 40 species are added in this updated checklist: *Bougainvillia britannica* (Forbes, 1841), *Velkovrhia enigmatica* Matjasic & Sket, 1971, *Eudendrium mouloyensis* Marques, Peña Cantero & Vervoort, 2000, *Myrionema amboinense* Pictet, 1893, *Merona cornucopiae* (Norman, 1864), *Rhizogeton nudus* Broch, 1910, *Amphinema bouilloni* Schuchert, 2007, *Proboscidactyla ornata* (McCrady, 1859), *Trichydra pudica* Wright, 1857, *Corymorpha annulata* (Kramp, 1928), *Zanclea giancarloi* Boero, Bouillon & Gravili, 2000, *Aglaophenia pluma* (Linnaeus, 1758), *Aglaophenia tubulifera* (Hincks, 1861), *Cuspidella humilis* Hincks, 1866, *Halecium delicatulum* Coughtrey, 1876, *Lovenella gracilis* Clarke, 1882, *Monotheca posidoniae* Picard, 1952, *Amphisbetia operculata* (Linnaeus, 1758), *Diphasia margareta* (Hassall, 1841), *Sertularella ellisii* (Deshayes & Milne Edwards, 1836), *Campanularia volubilis* (Linnaeus, 1758), *Clytia brevithecata* (Thornely, 1900), *Gastroblasta raffaelei* Lang, 1886, *Hartlaubella gelatinosa* (Pallas, 1766), *Laomedea flexuosa* Alder, 1857, *Laomedea neglecta* Alder, 1856, *Solmaris corona* (Keferstein & Ehlers, 1861), *Haliscera bigelowi* Kramp, 1947, *Aglantha digitale* (O. F. Müller, 1776), *Aglantha elata* (Haeckel, 1879), *Arctapodema australis* (Vanhöffen, 1912), *Pantachogon militare* (Maas, 1893), *Athorybia rosacea* (Forsskål, 1775), *Cordagalma ordinatum* Pugh, 2003,

Table 2. Summary of the hydrozoan diversity (species, genera and families) as derived from the present checklist (in bold: 2024), with a summary of the species and families' numbers reported in the previous checklist (1995).

Subclass/Order/Suborder	species (1995)	families (1995)	species (2024)	genera (2024)	families (2024)
Hydroidolina/Siphonophorae/Cystonectae	2	2	2	2	2
Hydroidolina/Siphonophorae/Physonectae	9	4	12	8	5
Hydroidolina/Siphonophorae/Calycophorae	34	5	39	17	6
Hydroidolina/Anthoathecata	128	31	128	76	33
Hydroidolina/Leptothecata	110	24	121	60	25
Trachylinae/Limnomedusae	6	3	6	6	3
Trachylinae/Narcomedusae	15	3	14	5	3
Trachylinae/Trachymedusae	12	4	15	11	3
Trachylinae/Actinulida	3	2	3	2	2
Total	319	78	**340**	**187**	**82**

Forskalia asymmetrica Pugh, 2003, *Desmophyes villafrancae* (Carré, 1969), *Lensia hotspur* Totton, 1941, *Chelophyes contorta* (Lens & van Riemsdijk, 1908), *Kephyes ovata* (Keferstein & Ehlers, 1860), *Sphaeronectes bougisi* Carré, 1968.

Twenty non-indigenous species were recorded along the Italian coast: *Calyptospadix cerulea* Clarke, 1882, *Eudendrium carneum* Clarke, 1882, *Eudendrium merulum* Watson, 1985, *Cordylophora caspia* (Pallas, 1771), *Octotiara russelli* Kramp, 1953, *Trichydra pudica* Wright, 1857, *Moerisia inkermanica* Paltschikowa-Ostroumowa, 1925, *Corymorpha annulata* (Kramp, 1928), *Coryne eximia* Allman, 1859, *Cirrholovenia tetranema* Kramp, 1959, *Eirene viridula* (Péron & Lesueur, 1810), *Filellum serratum* (Clarke, 1879), *Eucheilota paradoxica* Mayer, 1900, *Clytia brevithecata* (Thornely, 1900), *Clytia linearis* (Thornely, 1900), *Clytia mccradyi* (Brooks, 1888), *Gonionemus vertens* A. Agassiz, 1862, *Scolionema suvaense* (Agassiz & Mayer, 1899), *Amphogona pusilla* Hartlaub, 1909, *Arctapodema australis* (Vanhöffen, 1912).

Twenty species were unaccepted and synonymized with accepted species: *Bougainvillia maniculata* Haeckel, 1864 and *B. ramosa* (van Beneden, 1844) with *B. muscus* (Allman, 1863); *Garveia franciscana* (Torrey, 1902) with *Calyptospadix cerulea* Clarke, 1882; *Lizzia fulgurans* (A. Agassiz, 1865) and *Podocoryne minuta* (Mayer, 1900) with *L. blondina* Forbes, 1848; *Eudendrium cunninghami* Kirkpatrick, 1910 with *E. carneum* Clarke, 1882; *Eudendrium fragile* Motz-Kossowska, 1905 with *E. album* Nutting, 1898; *Eudendrium motzkossowskae* Picard, 1952 with *E. simplex* Pieper, 1884; *Hydractinia ornata* Bonnevie, 1899 with *Schuchertinia allmanii* (Bonnevie, 1898); *Podocoryne hartlaubi* Neppi & Stiasny, 1911 with *Podocoryna areolata* (Alder, 1862); *Octotiara violacea* Kramp, 1959 with *O. russelli* Kramp, 1953; *Eugotoea petalina* Margulis, 1989 with *Rhabdoon singulare* Keferstein & Ehlers, 1861; *Orchistoma agariciforme* Keller, 1884 with *O. pileus* (Lesson, 1843); *Helgicirrha schulzei* Hartlaub, 1909 with *H. cari* (Haeckel, 1864); *Sertularella picta* (Meyen, 1834) with *S. gaudichaudi* (Lamouroux, 1824); *Clytia pentata* (Mayer, 1900) with *C. folleata* (McCrady, 1859); *Orthopyxis asymmetrica* Stechow, 1919 with *Campanularia breviscyphia* Sars, 1857; *Olindias phosphorica sensu* Delle Chiaje, 1841 with *O. muelleri* Haeckel, 1879; *Cunina lativentris* Gegenbaur, 1857 with *C. globosa* Eschscholtz, 1829; *Solmaris vanhoeffeni* Neppi & Stiasny, 1911 with *S. flavescens* (Kölliker, 1853)

Twenty-one new and superseded combinations: *Clavopsella michaeli* (Berrill, 1948) with *Pachycordyle michaeli* (Berrill, 1948); *Cordylophora pusilla* Motz-Kossowska, 1905 with *Pachycordyle pusilla* (Motz-Kossowska, 1905); *Hydractomma pruvoti* (Motz-Kossowska, 1905) with *Podocoryna pruvoti* (Motz-Kossowska, 1905); *Podocoryne minima* (Trinci, 1903) with *Podocorynoides*

minima (Trinci, 1903); *Sarsia eximia* (Allman, 1859) with *Coryne eximia* Allman, 1859; *Hydractinia fucicola* (M. Sars, 1857) with *Stylactis fucicola* (M. Sars, 1857); *Sarsia prolifera* Forbes, 1848 with *Codonium proliferum* (Forbes, 1848); *Sarsia gemmifera* Forbes, 1848 with *Stauridiosarsia gemmifera* (Forbes, 1848); *Sarsia producta* (Wright, 1858) with *Stauridiosarsia producta* (Wright, 1858); *Dipurena ophiogaster* (Haeckel, 1879) with *Stauridiosarsia ophiogaster* (Haeckel, 1879); *Dipurena reesi* Vannucci, 1956 with *Stauridiosarsia reesi* (Vannucci, 1956); *Vannuccia forbesii* (Mayer, 1894) with *Corymorpha forbesii* (Mayer, 1894); *Halocordyle disticha* (Goldfuss, 1820) with *Pennaria disticha* Goldfuss, 1820; *Tubularia crocea* Agassiz, 1862 with *Ectopleura crocea* (Agassiz, 1862); *Tubularia larynx* Ellis & Solander, 1786 with *Ectopleura larynx* (Ellis & Solander, 1786); *Plumularia obliqua* (Thompson, 1844) with *Monotheca obliqua* (Johnston, 1847); *Thecocarpus distans* (Allman, 1877) with *Lytocarpia distans* (Allman, 1877); *Thecocarpus myriophyllum* (Linnaeus, 1758) with *Lytocarpia myriophyllum* (Linnaeus, 1758); *Ophiodissa mirabilis* (Hincks, 1868) with *Hydrodendron mirabile* (Hincks, 1866); *Sertularia distans* Lamouroux, 1816 with *Amphisbetia distans* (Lamouroux, 1816); *Sertularia perpusilla* Stechow, 1919 with *Tridentata perpusilla* (Stechow, 1919).

Two species are reverted to the original combination: *Stylactaria inermis* (Allman, 1872) with *Stylactis inermis* Allman, 1872; *Dipurena halterata* (Forbes, 1846) with *Slabberia halterata* Forbes, 1846.

The species *Zygocanna* sp. is assigned to *Z. vagans* Babnik, 1948.

Sixteen uncertain species (*species inquirendae*): *Cytaeis pusilla* Gegenbaur, 1857; *Protiara tetranema* (Péron & Lesueur, 1810); *Coryne caespes* Allman, 1871; *Sarsia ocellata* Busch, 1851; *Dicodonium adriaticum* Graeffe, 1884; *Cuspidella humilis* Hincks, 1866; *Lafoeina tenuis* Sars, 1874; *Laodicea neptuna* Mayer, 1900; *Laodicea ocellata* Babnik, 1948; *Hydranthea aloysii* (Zoja, 1893); *Orchistomella graeffei* (Neppi & Stiasny, 1911); *Cunina polygonia* (Haeckel, 1879); *Cunina vitrea* Gegenbaur, 1857; *Pegantha mollicina* (Forsskål, 1775); *Pegantha zonaria* (Haeckel, 1879); *Sphaeronectes bougisi* Carré, 1968.

Misidentifications: The species *Turritopsis dohrnii* (Weismann, 1883) has often been misidentified as *T. nutricula* McCrady, 1857.

Hydra species present in Italy without detailed distributions for the Italian territory and *Craspedacusta sowerbyi* Lankester, 1880 with papers by non-specialists about the jellyfish stage of the species are not included in this paper (see the paragraph Literature records).

Concerning the geographic distribution of the species (Fig. 3a, Table 3), the marine biogeographical unit 1 (Ligurian Sea) showed the highest number of taxa (273), followed by the unit 3 (South Tyrrhenian Sea) (248) and the unit 8 (mid-Adriatic) (183), no marine areas is without known records of hydrozoans.

Table 3. Patterns of richness in the biogeographic marine sectors (see Figure 2). a, Species richness: total number of species for each sector. b, Endemic species richness: number of sub- and endemic species present in each sector. c, Alien species richness: number of species non-indigenous for the Italian fauna, present in each sector.

Marine sector	total species	endemic species	alien species
1	273	50	14
2	106	20	5
3	248	40	10
4	65	10	0
5	63	8	2
6	162	29	5
7	88	10	2
8	183	25	9
9	178	34	4
entire Italy	**340**	**69**	**20**

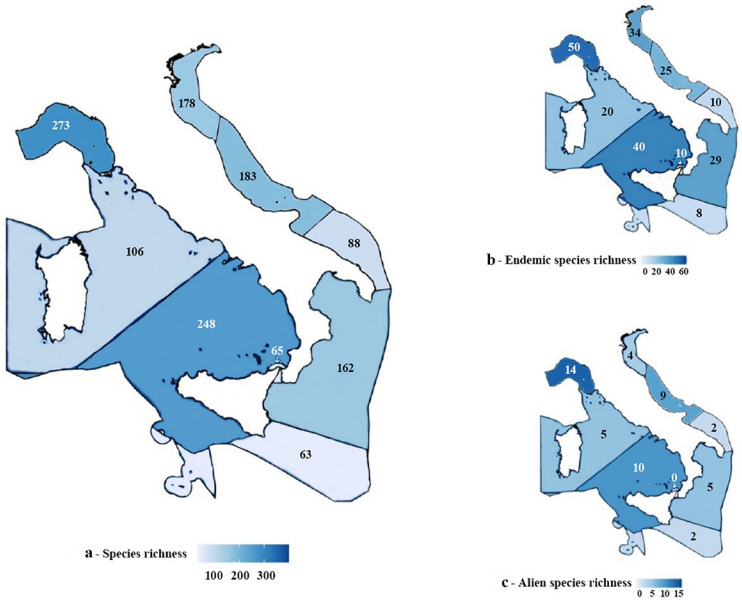

Figure 3. Patterns of richness in the biogeographic marine sectors (see Figure 2). a, Species richness: total number of species for each sector. b, Endemic species richness: number of sub- and endemic species present in each sector. c, Alien species richness: number of species non-indigenous for the Italian fauna, present in each sector.

As expected, the lowest hydrozoan diversity was scored in the Ionian Sea, and particularly in Sector 5 (southern Mediterranean, including the sea around south-eastern-most Sicily and Pelagie Islands, and the continental shelf around Malta: 63 species) (Fig. 3a). Sectors 1 and 3 have the highest number of scored endemics, 50 spp. (72% of the total endemic species) and 40 spp. (58%), respectively; Sector 5 has the lowest, 8 spp. (12%) (Fig. 3b, Table 3). Interestingly, the highest number of alien species is recorded from the Ligurian Sea (Sector 1: 14 species, 4% of the total species), with high numbers also from Sector 3 (southern Tyrrhenian, including the sea around northern and southern Sicily and Pelagie Islands: 10 spp., 3%) and Sector 8 (9 species, 3%) (Fig. 3c, Table 3).

On the other hand, it was recorded a particularly significant example of missing hydrozoan taxon regarding the species *Tricyclusa singularis* (Schulze, 1876) of boreal affinity that is absent since a very long time. This species, since its original description from Trieste, the unique Mediterranean record, has never been recorded again from the Mediterranean Sea. Its disappearance represents a case of Mediterranean extinction of a species, but also of the whole family Tricyclusidae that comprises only this monotypic genus (Boero & Bonsdorff 2007).

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