

# The Bryozoan collection of the Museo Civico di Zoologia of Rome

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## ABSTRACT

The Museo Civico di Zoologia of Rome houses a collection of Bryozoa donated by Professor Carla Chimenz Gusso. The collection includes 1403 specimens preserved dried or in ethanol, 90 slides and 487 specimens on stubs (in gold). The collection also includes the types of *Retevirgula akdenizae* Chimenz, Nicoletti & Lippi Boncampi, 1997, and *Plesioleidochasma mediterraneum* Chimenz Gusso & Soule, 2003. Most of the collection material was sampled in the Mediterranean Sea, largely off the Italian coasts, between the early 1970s and 2005. Besides species endemic to the Mediterranean Sea, the collection houses representatives of some species of particular conservation interest because considered threatened. They are: *Reteporella aporosa* (Waters, 1895), *Reteporella feuerbornii* (Hass, 1948), *Reteporella grimaldii* (Jullien, 1903) and *Myriapora truncata* (Pallas, 1766).

Key words:

Bryozoa, museum collection, Rome.

## RIASSUNTO

La collezione di Briozoi del Museo Civico di Zoologia di Roma

Nel Museo Civico di Zoologia di Roma è custodita una collezione di Briozoi donata dalla professoressa Carla Chimenz Gusso. La collezione si compone di 1403 esemplari conservati sia a secco che in alcool, 90 campioni montati su vetrini e 487 campioni montati su supporto metallico in oro (stub). La collezione conserva inoltre gli esemplari tipo di *Retevirgula akdenizae* Chimenz, Nicoletti & Lippi Boncampi, 1997, e di *Plesioleidochasma mediterraneum* Chimenz Gusso & Soule, 2003. Le specie conservate provengono per lo più da zone del Mediterraneo, in particolare dalle coste italiane, e sono il risultato di raccolte effettuate dal 1970 al 2005. La collezione vanta, oltre a esemplari di specie endemiche del Mediterraneo, colonie di alcune specie di particolare interesse conservazionistico in quanto classificate come minacciate: *Reteporella aporosa* (Waters, 1895), *Reteporella feuerbornii* (Hass, 1948), *Reteporella grimaldii* (Jullien, 1903) e *Myriapora truncata* (Pallas, 1766).

Parole chiave:

Bryozoa, collezione museale, Roma.

## INTRODUCTION

Bryozoa are a phylum of almost 6000 species of aquatic organisms, mostly found in the marine environment (Bock & Gordon, 2013), with only a hundred freshwater species (Massard & Geimer, 2008; Bock & Gordon, 2013; Franjević et al., 2015).

Zooids, millimetre-sized bryozoan individuals, are sessile suspension feeders that form colonies and that are usually enclosed in an exoskeleton, a protective

structure made from either chitin or calcium carbonate.

Bryozoa have a calcareous skeleton, except for members of the freshwater class Phylactolaemata and the mostly marine class Gymnolaemata, with the latter belonging to the Order Ctenostomata, which have non-calcified colonies (Bock et al., 2018). Depending on the species, bryozoan skeletons can consist of calcite, or aragonite, or of a combination of these two minerals (Lombardi et al., 2008; Taylor et al., 2016).

Bryozoa are “bioconstructors” organisms due to their ability to form a permanent, dynamic structure (Cocito, 2004). These bioconstructions are of considerable importance because they not only create habitat heterogeneity and structural complexity, but also promote biological diversity (Cocito, 2004). Moreover, Bryozoa are among the main fouling organisms that colonize artificial substrata (Ryland, 1965; Harmelin et al., 2016).

Due to their sensitivity to climate changes, Bryozoa are considered bioindicator organisms. Their skeleton is indeed potentially vulnerable to the increase of water temperatures (Lombardi et al., 2008) and to decrease of pH due to ocean acidification (Rodolfo-Metalpa et al., 2010; Lombardi et al., 2011a; Lombardi et al., 2011b).

Despite their widespread distribution throughout the world, Bryozoans have been described as a minor phylum (Smith, 2014) and are often neglected. This is largely due to the difficulties related to their classification at the species level, which is complicated both owing to the small size of the zooids and to the lack of up-to-date and adequately illustrated identification manuals (Chimenz Gusso et al., 2014). Although the Bryozoan fauna of the Mediterranean Sea is among the best known globally (Rosso, 1996; Rosso, 2003; Ayari et al., 2008; Harmelin, 2014; Sokolover et al., 2016), new species continue to be recorded, with the number species having reached 556 (Rosso & Di Martino, 2016).

## BRYOZOAN COLLECTIONS IN ITALIAN MUSEUMS

In order to shed light on the Italian context, within which the Chimenz Gusso collection may be placed, we inquired on the presence of collections of Bryozoa in Italian Museums and Universities. One hundred and twenty-four institutions that focus on natural, biological, geological and paleontological sciences were contacted from August to October 2018.

A response to our request for information was received from 31% of the institutions, out of which only seven (18% of the responses) confirmed the presence of bryozoan collections in their institution.

The institutions that currently house the most noteworthy collections of Bryozoa are: Museo di Storia Naturale “La Specola” University of Florence; Museo di Storia Naturale “G. Doria” of Genoa; Museo di Storia Naturale of Venice. Most of these museums house both historical collections and modern collections. The Museo di Storia Naturale of Venice is the museum that contains the collection with by far the largest number of specimens and includes historical finds belonging to the Nardo, Vidocich and Brusina-Neviani collections.

The collection housed at the Museo di Scienze della Terra of Catania is highly relevant within the Italian

context. It includes many type species as well as hundreds of species (fossils included) from all over the world. It is the result of research activity spanning 30 years carried out by Professor Antonietta Rosso.

As for fossil Bryozoa, the Museo Civico of Rovereto hosts a rich collection of national and international Cenozoic specimens. We also wish to mention the collection of Ordovician marine specimens of Professor Conti at the University of Modena and Reggio Emilia as well as the small collection of fossil Bryozoa from the Island of Pianosa housed in the Museo di Storia naturale of the University of Pisa.

The following museums do not house collections of Bryozoa as such, but do contain a small number of specimens: Museo Civico di Scienze Naturali “E. Caffi” of Bergamo, Museo Geologico “G. Cortesi” of Castell’Arquato, Museo di Zoologia of the University of Padua, Museo di Storia Naturale of the University of Parma, Museo di Storia Naturale of the University of Pavia, Museo di Biologia marina “P. Parenzan” of the University of Salento; Museo di Storia Naturale dell’Accademia dei Fisiocritici of Siena and Museo Universitario of Chieti.

According to the inventory in invertebrate collections, no data were available for the Museo di Zoologia “P. Doderlein” of Palermo or the Museo di Storia Naturale of Trieste.

We wish to remember Professor Maria Illuminata Taticchi, an expert in the field of freshwater Bryozoa at the University of Perugia, who recently passed away. We were unfortunately unable to benefit from her vast expertise, nor could we find any evidence of existing collections of freshwater Bryozoa.

It is difficult to assess the state of the art of bryozoan collections in Italy with any degree of certainty since a systematic in situ investigation has not yet been conducted.

## MATERIALS AND METHODS

The collection of Bryozoa of the Museo Civico di Zoologia of Rome was donated to the museum in 2015. It consists of 1403 specimens preserved dried or in ethanol, 90 slides and 487 specimens on stubs (in gold) for scanning electron microscopy (SEM) examination.

Professor Carla Chimenz Gusso donated the specimens together with a database, a paper document in which the species, the numbers and the sampling site were recorded. In addition, she donated the volume “Briozoi” in which most of the species of Bryozoa Cheilostomatida belonging to the collection are described and accompanied by photos taken using a SEM (Chimenz Gusso et al., 2014).

Although the overall state of preservation of the Chimenz collection is good, a few problems were detected. The most frequent one was the evaporation of ethanol, caused by an improper sealing of

the jars. In these cases the specimens were placed in new sealed jars. However, the most serious problem concerned labels.

As the original labels were printed using an inkjet printer, the labels had become illegible over the years because ethanol formed an ink precipitate.

When necessary, the specimens were washed with ethanol (70% diluted) to eliminate the contamination of the ink precipitate. The new labels were then written on glossy paper with china ink. A new number was given to each sample and a red label was added to each type specimen.

Specimens were catalogued using a new alphanumeric code composed of the acronym MCZR (Museo Civico di Zoologia of Rome) and IB (Invertebrates Bryozoa) and followed by a sequential number.

## RESULTS

The collection of MCZRIB contains a total of 193 species, 189 of which of Mediterranean origin.

Other species may be added to the list once they have been investigated further, because their current identification is not certain (e.g. *Schizomavella* cfr *ochracea*). Specimens MCZRIB1267 and MCZRIB1279, referred to as *Rhynchozoon* sp.1 sensu Hayward 1974, are particularly interesting because they may represent a new species, though the material available is insufficient for their description (Chimenz Gusso et al., 2014).

All 193 species belong to the class Gymnolaemata, which includes 178 species (45 families) of the order Cheilostomatida and 15 species (8 families) of the order Ctenostomatida.

Most sampling sites are located in Italian waters, with

the remainder being located in waters belonging to France, Spain, Greece, Turkey and Tunisia. Lazio and Sicily are the Italian regions from which most of the specimens originated.

The collection includes type material: the holotype (BAK1) and four paratypes (BAK2, BAK3, BAK4, BAK5) of *Retevirgula akdenizae* Chimenz, Nicoletti & Lippi Boncampi, 1997, and the paratype of *Plesioleidochasma mediterraneum* Chimenz Gusso & Soule, 2003. The five colonies of *Retevirgula akdenizae* were collected during the "Akdeniz 92" cruise in Turkey, at the Datcha station AKD 92.02.23, at a depth of 5-7 m. in a meadow of *Posidonia oceanica* (L.) Delile. The *Plesioleidochasma mediterraneum* paratype was collected at a depth of 28 m at the Yenikas station AKD 92.02.19 (southern Turkey) in a meadow of *Posidonia oceanica* (L.) Delile. The holotype of this species was collected at the Island of Lampedusa (Sicily) at a depth of 16 m in the photophilic algae assemblage (station Cala Uccello 3) and is stored at the Allan Hancock Foundation of the University of Southern California, Los Angeles (Chimenz Gusso & Soule, 2003).

Five specimens belonging to the species *Celleporina mangnevellana* (Lamouroux, 1816) were also collected during the "Akdeniz 92" cruise.

Four Non-Indigenous Bryozoa species (NIBs) recorded in the Mediterranean Sea are present in the collection. They are: *Amathia verticillata* (delle Chiaje, 1822), *Pberusella brevituba* Soule, 1951, *Arachnoidella protecta* Harmer, 1915 and *Crisularia serrata* (Lamarck, 1816) (Ferrario et al., 2018).

*Amathia verticillata* (delle Chiaje, 1822) was collected at Civitavecchia, locality La Frasca, in August 2000 at the depth of 0.20 m (Chimenz Gusso & Rivosecchi Taramelli, 1973; Marchini et al., 2015).

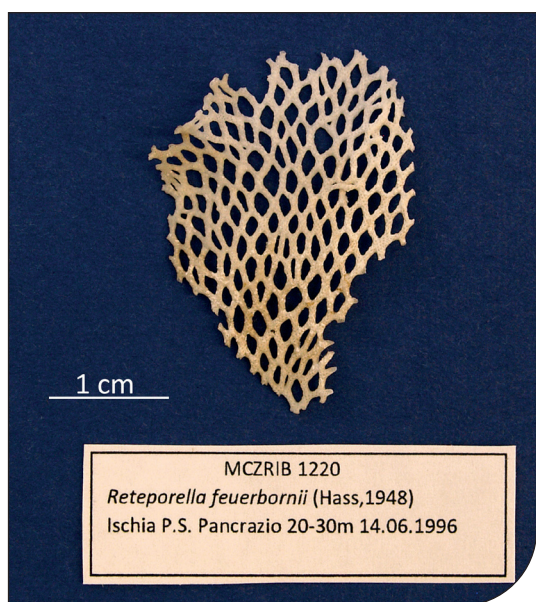


Fig. 1. *Reteporella feuerbornii* (Hass, 1948), colonies. (photo R. Paggetti).

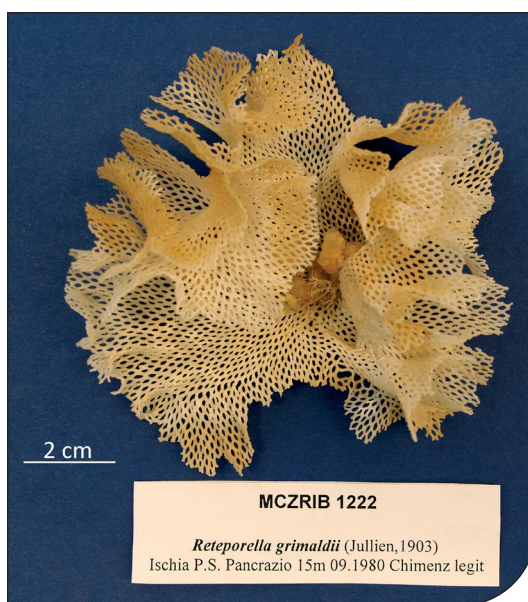


Fig. 2. *Reteporella grimaldii* (Jullien, 1903), colonies (photo R. Paggetti).



*Pherusella brevituba* Soule, 1951, was collected both at the Island of Ustica (Sicily), locality Cala Sidoti in 1996 at the depth of 15 m on *Posidonia oceanica* (L.) Delile and at Capo Falconiera in July 1996 at the depth of 10 m (Chimenz Gusso et al., 2004; Chimenz Gusso & d'Hondt, 2005).

The specimens of *Arachnoidella protecta* Harmer, 1915 were collected at the Island of Vulcano (Sicily), locality Molo di Femmina in April 1992 at the depth of 30 m (Chimenz Gusso et al., 1998); at the Island of Ustica (Sicily), locality Punta dell'Arpa at the depth of 24 m (d'Hondt & Chimenz Gusso, 2006) and at the Island of Ponza, in March 2001 at the depth of 88 m (d'Hondt & Chimenz Gusso, 2006).

*Crisularia serrata* (Lamarck, 1816) is present in the collection with six specimens, all collected at the Island of Ponza on artificial barriers, between 2002 and 2003 at a depth of 27-39 m (Chimenz Gusso et al., 2014).

Moreover, the MCZRIB collection contains four species of conservation interest that are considered endangered. They are: *Reteporella aporosa* (Waters, 1895), *Reteporella feuerbornii* (Hass, 1948) (fig. 1), *Reteporella grimaldii* (Jullien, 1903) (fig. 2) and *Myriaporora truncata* (Pallas, 1766). These vulnerable species, which are characterized by brittle colonies and usually bear erect rigid and thin branches, are recognized as threatened because they are susceptible to breakage by recreational scuba diving (de la Nuez-Hernández et al., 2014). For this reason they have been proposed for protection within the Annex IV of the "Habitat" Directive (92/43/CEE) (Chimenz Gusso et al., 2006; Rosso et al., 2010; Chimenz Gusso et al., 2014).

## CONCLUSIVE REMARKS

The Chimenz collection, thanks to the accuracy information provided, will be a reference for all those wishing to increase scientific knowledge on the biology of this phylum and for specialists who will undertake taxonomic revision works.

In addition, this collection is relevant because may contribute to increase the knowledge of the biodiversity of this group of invertebrates in the Mediterranean Sea.

None of these studies would be possible without a great effort to the conservation and long-term maintenance of museum collections, necessary actions to guarantee their availability to the future generations of researchers.

To make data access as easy as possible, the list of the species present in the Chimenz collection, with their localities and sampling date, will be available on the Museo Civico di Zoologia of Rome website, as soon as it has been updated.

The collection specimens may be consulted upon permission by the Director of the Museum, which

can be obtained by email at the following address: info@museodizooologia.it.

The hope is, as Professor Chimenz write in her volume "Briozoi", that her work may be useful to all colleagues marine biologists as a basis for other works and to all those who will end up coming across these fascinating creatures during their studies (Chimenz Gusso et al., 2014).

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