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RESEARCH ARTICLE

The Catalog of Aquatic Mollusca (Bivalvia and Gastropoda) in the Limnology Museum of Çanakkale Onsekiz Mart University (COMULM)

Songül Biçer[1], Deniz Anıl Odabaşı[2], Buğra Öztürk[3]

[1]Çanakkale Onsekiz Mart University, Department of Marine and Inland Water Sciences, School of Graduate Studies, Çanakkale, Türkiye
[2]Çanakkale Onsekiz Mart University, Department of Marine and Inland Water Sciences, Faculty of Marine Science and Technology, Çanakkale, Türkiye
[3]Çanakkale Onsekiz Mart University, Department of Aquaculture, School of Graduate Studies, Çanakkale, Türkiye

ORCID: S.B. 0000-0002-8531-8135; D.A.O. 0000-0003-0738-2606; B.Ö. 0000-0002-2213-0207

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Correspondence: Deniz Anıl Odabaşı
aodabasi@comu.edu.tr

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Abstract

Objective: Natural History Museums are important organizations that increase the awareness of the public on biodiversity, nature, and its conservation. Museums or collections like these, enable the recognition of organisms that are now extinct or that cannot always be seen in nature. Thus, the establishment of such collections can be very useful for the formation of nature consciousness. In this study, the aquatic Mollusca Catalog of the Limnology Museum of Çanakkale Onsekiz Mart University (COMULM) is presented.

Materials and Methods: The specimens of the collection were identified according to the identification references under a stereomicroscope and fixed with 80 % alcohol or remained dry in glass vials or plastic tubes. All the materials were labeled and transferred to the multi-drawer archive cabinet in the Marine and Inland Water Laboratory, Faculty of Marine Science and Technology. This catalog, which contains 53 taxa, includes local endemics and common taxa as well as invasive-exotic taxa mainly from Türkiye. The list of the Mollusca catalog was presented by following the current taxonomic nomenclature.

Results: According to the results, nine of the Mollusca belong to Bivalvia and the 44 of which are Gastropoda. In total, 2301 specimens were counted in the catalog, and the species with the highest specimen number (419 individuals) is *Physella acuta*. Considering the geographical distributions of the Mollusca species in this catalog, the eleven species of freshwater gastropods in the catalog are endemic to Türkiye, whereas three of the freshwater gastropods are endemic to the Middle East, Balkans, and some of the Greek Islands in the Aegean Sea. On the other hand, some gastropod species are not naturally found in our aquatic systems, which were collected from ornamental purpose aquariums.

Conclusion: In this context, the Mollusca museum of the COMULM is capable of contributing to Turkey's faunistic studies by enabling taxonomic comparisons and investigations to the scientists.

Keywords: Collection, Museum, Mollusca, Türkiye, Limnology

Introduction

As Türkiye has three of the 34 bio-geographical regions considered as biodiversity hotspots, namely the Euro-Siberian, the Mediterranean, and Irano-Turanian, it is home to a wide variety of organisms in terrestrial, marine, and inland water ecosystems (Mittermeier, *et al*., 2005; Şekercioğlu, *et al*., 2011; Küçük & Ertürk, 2013). The main threat of the unique biological diversity might be listed as habitat loss, pollution, invasive species, and climate change; therefore, they are being destroyed faster than we can document them or understand their significance (McNeely, *et al*., 1990). As the level of consciousness of the societies increases, the knowledge, conservation, and maintenance of biological diversity have become important to society. Natural History Museums are one of the institutes that raise the awareness of the public on nature, biodiversity, and its conservation and provide a rich source of data for various fields including biology, biogeography, paleontology (Lister, *et al*., 2011), and

education (Mujtaba, *et al*., 2018). However, the importance of such collections in Türkiye seems to have been better understood in recent years. There are several examples of the scientific and visual-scientific museum set by the departments of universities in recent years such as Ege University (Salman & İzmirli, 2020; Tezcan, *et al*., 2020), İstanbul University (Meriç, *et al*., 2007; Kaya & Özuluğ, 2017; Kaya, *et al*., 2018; Özuluğ & Saç, 2019), Çanakkale Onsekiz Mart University (Baycan & Tosunoğlu, 2017), and Recep Tayyip Erdogan University (Kaya, *et al*., 2021). On the other hand, some visual museums established by the governmental institutions i.e. the Ministry of Culture and Tourism and The Institute of Mineral Research and Exploration of Türkiye are pioneers.

The aim of the study is to present the catalog of the Mollusca under the Limnology Museum of Çanakkale Onsekiz Mart University (COMULM). In this context, authors declare opening the Mollusca catalog at the Faculty of Marine Science and Technology, Çanakkale Onsekiz Mart University (ÇOMU) to the scientists and graduate students.

Material and Method

Mollusca specimens in the COMULM catalog were put into glass vials or plastic tubes depending on the material's dimension and preserved by ethyl alcohol at the grade of 80%. Only shell specimens are cataloged as dry. A labelling system was developed for materials belong to the museum catalog starting a code consisting of the capital letters of the housing institute, the name of the museum, and the taxonomic order (Classis) of the material that is COMULM-B or G. Following the code, a number was assigned according to its registration rank. The code is produced to be used in research articles to meet the requirements of International Code of Zoological Nomenclature. There is some additional information following the material code that is individual number (*ind*), fixative (*acl*) referring alcohol or dry preservation (*dry*). In a case the material was belong to a juvenile specimen, "*juv*" the statement was placed between individual number and fixative. Further information on the material, e.g. the person who donates or collects the specimen and on the sampling location including coordinates (if present), was kept confidential in this study.

This museum catalog is kept in the multi-drawer archive cabinet in the Laboratory of Marine and Inland Water Biology of the Faculty of Marine Science and Technology, Çanakkale Onsekiz Mart University, Türkiye (Fig. 1). Materials of the museum catalog have been checked bi-annually for changing fixatives.

Figure 1. The Mollusca Catalog of COMULM in the multi-drawer archive cabinet.

The publication of Bank & Neubert (2017) was followed in the taxonomic nomenclature of the Mollusca catalog. The specimens of the catalog were identified using Schütt (1964), Radoman (1983), Öztürk, *et al*. (2008), Glöer (2019) for Gastropoda, Araujo & Korniushin (1998), Beran & Horsak (1998), and Zettler & Glöer (2006) for Bivalvia.

Result and Discussion

There are a total of 53 taxa, 9 of which are Bivalvia and 44 of which are Gastropoda, in the Mollusca catalog of COMULM. A total of 2301 specimens belonging to taxa in the collection were counted. The highest individual number (419 ind.) belongs to *Phsella acuta*, which has invader character (Dillon, Wethington, Rhett & Smith, 2005) and a very common and abundant species in the region where the material is obtained (Odabaşı, *et al*., 2019a; Bal, *et al*., 2021). Besides, there are several endemic species in the collection which were deposited as holotype or paratype materials including *Theodoxus gloerii* Odabaşı & Arslan, 2015, *Bythinella kazdaghensis* Odabaşı & Georgiev, 2014, *Bythinella gokceadaensis* D. A. Odabaşı, 2019, *Grossuana kayrae* D. A. Odabaşı, 2019, *Pseudamnicola cirikorum* D. A. Odabaşı, 2019, *Pseudamnicola radeae* D. A. Odabaşı, 2019, *Pseudamnicola thalesi* D. A. Odabaşı & Akay 2020, *Bithynia kayrae* Odabaşı & Odabaşı, 2017, *Bithynia timmi* D.A. Odabaşı & Arslan, 2015, *Pseudobithynia yildirimi*

Odabaşı, Kebapçı & Akbulut, 2013, and *Valvata kebapcii* Odabaşı, Glöer & Yıldırım, 2015.

The majority of taxa obtained from the scientific studies carried out in the streams of Northern Aegean Basin (e.g. Odabaşı, *et al*., 2013; Odabaşı & Georgiev, 2014; Odabaşı, *et al*., 2015; Odabaşı & Arslan, 2015a; Odabaşı & Arslan, 2015b; Odabaşı & Odabaşı, 2017; Odabaşı, *et al*., 2019a; Odabaşı, *et al*., 2019b; Odabaşı, *et al*., 2020; Bal, *et al*., 2021), whereas several materials are transferred from the domestic or foreign museums (e.g. *Bithynia tentaculata* (Linnaeus, 1758), *Bythinella charpentieri* (J. R. Roth, 1855), *Theodoxus anatolicus* (Récluz, 1841), *Melanopsis costata* (Olivier, 1804) etc.) or collected from ornamental purpose aquariums (e.g. *Melanoides tuberculate* (O. F. Müller, 1774), *Anentome Helena* (von dem Busch, 1847), *Planorbella duryi* (Wetherby, 1879)).

In conclusion, it is thought that the museum catalog of COMULM will be very useful in terms of providing comparison material for future scientific studies. In addition, it will also be used as educational material for undergraduate students.

List of the Mollusca Taxa

Phylum Mollusca Cuvier, 1795
Classis Bivalvia Linnaeus, 1758
Subclassis Heterodonta Neumayr, 1884
Ordo Cardiida Ferrusac, 1822
Superfamilia Tellinoidea Blainville, 1814
Familia Semelidae Stoliczka, 1870

Abra alba (W. Wood, 1802)
COMULM-B107, 1 ind, dry. COMULM-B133, 2 ind, dry.

Ordo Myida Stoliczka, 1870
Superfamilia Stoliczka, 1870
Familia Dreissenidae Gray, 1840

Dreissena polymorpha (Pallas, 1771)
COMULM-B1, 24 ind, alc. COMULM-B105, 7 ind, alc. Additional Materials: COMULM-B117, B121, B122, B125, B126, B127, 40 ind, dry.

Ordo Sphaeriida Lemer, Bieler & Giribet, 2019
Superfamilia Sphaerioidea Deshayes, 1855
Familia Sphaeriidae Deshayes, 1855
Subfamilia Sphaeriinae Deshayes, 1855

Musculium lacustre (O. F. Müller, 1774)
COMULM-B66, 1 ind, alc. COMULM-B102, 3 ind, alc.

Pisidium casertanum (Poli, 1791)
COMULM-B20, 8 ind, alc. COMULM-B31, 10 ind, alc. COMULM-B34, 18 ind, alc. COMULM-B38, 5 ind, alc. Additional Materials: COMULM-B75, B78, B82, B118, 55 ind, alc, 03.08.2018.

Pisidium subtruncatum (Malm, 1855)
COMULM-B35, 1 ind, alc. COMULM-B36, 7 ind, alc. COMULM-B53, 11 ind, alc. COMULM-B65, 3 ind, alc. Additional Materials: COMULM-B69, B72, B76, B80, B94, B110, 22 ind, alc.

Pisidium annandalei Prashad, 1925
COMULM-B17, 4 ind, alc. COMULM-B103, 3 ind, alc. COMULM-B104, 5 ind, alc. COMULM-B108, 12 ind, alc.

Pisidium nitidum Jenyns, 1832
COMULM-B3, 4 ind, alc. COMULM-B70, 3 ind, alc. COMULM-B79, 9 ind, alc. COMULM-B112, 6 ind, alc.

Spaherium sp.
COMULM-B86, 1 ind, alc. COMULM-B90, 2 ind, dry.

Familia Mytilidae Rafinesque, 1815
Subfamilia Brachidontinae F. Nordsieck, 1969

Mytilaster marioni (Locard, 1889)
COMULM-B2, 2 ind, alc. COMULM-B106, 2 ind, alc.

Phylum Mollusca Cuvier, 1795
Classis Gastropoda Cuvier, 1795
Subclassis Neritimorpha Koken, 1896
Ordo Cycloneritida Frýda, 1998
Superfamilia Neritoidea Rafinesque, 1815
Familia Neritidae Rafinesque, 1815
Subfamilia Neritininae Poey, 1852

Theodoxus anatolicus (Récluz, 1841)
COMULM-G248, 4 ind, alc.

Theodoxus gloerii Odabaşı & Arslan, 2015
COMULM-G52, 1 ind, dry. COMULM-G53, 16 ind, dry. COMULM-G225, 10 ind, dry. COMULM-G229, 3 ind, dry.

Theodoxus sp.
COMULM-G5, 14 ind, alc. COMULM-G27, 7 ind, alc. COMULM-G156, 5 ind, alc. COMULM-G232, 12 ind, alc.

Subclassis Caenogastropoda Cox, 1960
Ordo Cerithiimorpha Golikov & Starobogatov, 1975
Superfamilia Cerithioidea J. Fleming, 1822
Familia Cerithiidae J. Fleming, 1822
Subfamilia Bittiinae Cossmann, 1906

Bittium reticulatum (da Costa, 1778)
COMULM-G58, 2 ind, dry.

Familia Thiaridae Gill, 1871 (1823)
Subfamilia Thiarinae Gill, 1871 (1823)

Melanoides tuberculata (O.F. Müller, 1774)
COMULM-G2, 36 ind, dry.

Familia Melanopsidae H. Adams & A. Adams, 1854

Melanopsis buccinoidea (Olivier, 1801)
COMULM-G1, 34 ind, alc. COMULM-G10, 7 ind, alc. COMULM-G26, 42 ind, alc. COMULM-G40, 9 ind, alc. Additional Materials: COMULM-G42, G45, G46, G47, G54, G88, G101, G111, G113, G119, G121, G128, G137, G140, 140 ind, dry.

Melanopsis costata costata (Olivier, 1804)
COMULM-G8, 4 ind, dry. COMULM-G203, 2 ind, dry.

Ordo Littorinimorpha Golikov & Starobogatov, 1975
Superfamilia Rissooidea Gray, 1847
Familia Rissoidae Gray, 1847

Rissoa splendida Eichwald, 1830
COMULM-G61, 2 ind, dry. COMULM-G94, 1 ind, dry.

Superfamilia Truncatelloidea Gray, 1840
Familia Bythinellidae Locard, 1893

Bythinella kazdaghensis Odabaşı & Georgiev, 2014
COMULM-G135, 22 ind, alc.

Bythinella gokceadaensis D. A. Odabaşı, 2019
COMULM-G80, 1 ind, alc. COMULM-G81, 10 ind, alc. COMULM-G109, 20 ind, alc. COMULM-G112, 15 ind, alc. Additional Materials: COMULM-G114, G123, G124, G125, G129, 50 ind, alc.

Bythinella charpentieri (Roth, 1855)
COMULM-G132, 5 ind, alc.

Familia Hydrobiidae Stimpson, 1865
Subfamilia Belgrandiinae de Stefani, 1877

Grossuana kayrae D. A. Odabaşı, 2019
COMULM-G79, 1 ind, alc. COMULM-G177, 13 ind, alc.

Grossuana sp.
COMULM-G35, 1 ind, alc.

Subfamilia Hydrobiinae Stimpson, 1865

Ecrobia ventrosa (Montagu, 1803)
COMULM-G108, 10 ind, alc. COMULM-G28, 38 ind, alc. COMULM-G36, 15 ind, alc. Additional Materials: COMULM-G59, G235, G242, 55 ind, dry.

Subfamilia Pseudamnicolinae Radoman, 1977

Pseudamnicola cirikorum D. A. Odabaşı, 2019
COMULM-G77, 1 ind, alc. COMULM-G, 1 ind, alc.

Pseudamnicola radeae D. A. Odabaşı, 2019
COMULM-G78, 1 ind, alc. COMULM-G103, 34 ind, alc. COMULM-G103, 16 ind, alc.

Pseudamnicola thalesi D. A. Odabaşı & Akay 2020
COMULM-G102, 3 ind, alc.

Pseudamnicola sp.
COMULM-G160, 1 ind, dry. COMULM-G255, 5 ind, dry.

Familia Truncatellidae Gray, 1840
Familia Bithyniidae Gray, 1857

Bithynia kayrae Odabaşı & Odabaşı, 2017
COMULM-G161, 16 ind, alc. COMULM-G204, 15 ind, alc.

Bithynia tentaculata (Linnaeus, 1758)
COMULM-G259, 2 ind, dry. COMULM-G270, 1 ind, dry. COMULM-G273, 4 ind, dry. COMULM-G134, 1 ind, dry. COMULM-G253, 6 ind, alc. COMULM-G143, 3 ind, dry. COMULM-G166, 1 ind, alc.

Bithynia timmi D.A. Odabaşı & Arslan, 2015
COMULM-G258, 7 ind, alc. COMULM-G267, 5 ind, alc.

Bithynia sp.
COMULM-G38, 3 ind, alc.

Pseudobithynia yildirimi Odabaşı, Kebapçı & Akbulut, 2013
COMULM-G30, 11 ind, alc. COMULM-G33, 6 ind, alc. COMULM-G84, 8 ind, alc.

Subfamilia Truncatellinae Gray, 1840

Truncatella subcylindrica (Linnaeus, 1767)
COMULM-G29, 1 ind, dry.

Familia Tateidae Thiele, 1925

Potamopyrgus antipodarum (Gray, 1843)
COMULM-G228, 25 ind, alc.

Ordo Neogastropoda Wenz, 1938
Superfamilia Buccinoidea Rafinesque, 1815
Familia Nassariidae Iredale, 1916
Subfamilia Anentominae E. E. Strong, Galindo & Kantor, 2017

Anentome helena (von dem Busch, 1847)
COMULM-G3, 12 ind, dry.

Subfamilia Nassariinae Iredale, 1916

Tritia neritea (Linnaeus, 1758)
COMULM-G44, 1 ind, dry. COMULM-G55, 2 ind, dry.

Subclassis Vetigastropoda Salvini-Plawen, 1980
Ordo Trochida
Superfamilia Trochoidea Rafinesque, 1815
Familia Trochidae Rafinesque, 1815
Subfamilia Cantharidinae Gray, 1857

Steromphala adansonii (Payraudeau, 1826)
COMULM-G56, 5 ind, dry. COMULM-G211, 3 ind, dry.

Subclassis Heterobranchia Gray, 1840
Ordo Allogastropoda Haszprunar, 1985
Superfamilia Valvatoidea Gray, 1840
Familia Valvatidae Gray, 1840

Valvata (*Tropidina*) *kebapcii* Odabaşı, Glöer & Yıldırım, 2015
COMULM-G25, 12 ind, alc. COMULM-G41, 5 ind, alc. COMULM-G50, 10 ind, alc. COMULM-G78, 13 ind, alc. Additional Materials: COMULM-G95, G148, G151, G155, G165, G167, G175, G176, G179, G181, G186, G189, G192, G198, G207, G208, G209, G217, G241, 60 ind, dry.

Valvata (*Tropidina*) *macrostoma* Mörch, 1864
COMULM-G264, 1 ind, dry.

Valvata (*Cincinna*) *piscinalis* (O.F. Müller, 1774)
COMULM-G249, 1 ind, alc. COMULM-G271, 8 ind, alc.

Borysthenia naticina (Menke, 1845)
COMULM-G170, 1 ind, alc. COMULM-G266, 1 ind, alc. COMULM-G268, 5 ind, alc. COMULM-G269, 2 ind, dry.

Infraclassis Euthyneura
Subterclass Tectipleura
Superorder Hygrophila Férussac, 1822
Superfamilia Lymnaeoidea Rafinesque, 1815
Familia Lymnaeidae Rafinesque, 1815
Subfamilia Amphipepleinae Pini, 1877

Radix auricularia (Linnaeus, 1758)
COMULM-G19, 16 ind, alc. COMULM-G73, 4 ind, alc.

Radix labiata (Rossmässler, 1835)
COMULM-G11, 6 ind, alc. COMULM-G20, 8 ind, alc. COMULM-G39, 11 ind, alc. COMULM-G48, 4 ind, alc. COMULM-G272, 1 ind, dry. Additional Materials: COMULM-G52, G62, G64, G68, G70, G71, G74, G82, G85, G90, G99, G105, G115, G118, G120, G126, G130, G133, G136, G147, G158, G163, G169, G173, G174, G191, G199, G213, G219, 270 ind, dry.

Subfamilia Lymnaeinae Rafinesque, 1815

Galba (*Galba*) *truncatula* (O. F. Müller, 1774)
COMULM-G18, 6 ind, alc. COMULM-G23, 8 ind, alc. COMULM-G32, 11 ind, alc. COMULM-G57, 4 ind, alc. Additional Materials: COMULM-G69, G215, G243, G262, 7 ind, dry.

Lymnaea stagnalis (Linnaeus, 1758)
COMULM-G22, 4 ind (juv.), alc.

Stagnicola palustris (O.F. Müller, 1774)
COMULM-G9, 1 ind (juv.), dry.

Familia Physidae Fitzinger, 1833
Subfamilia Physinae Fitzinger, 1833
Physella acuta (Draparnaud, 1805)
COMULM-G12, 11 ind, alc. COMULM-G15, 28 ind, alc. COMULM-G17, 32 ind, alc. COMULM-G43, 18 ind, alc. Additional Materials: COMULM-G53, G63, G65, G66, G67, G72, G75, G79, G83, G89, G92, G94, G96, 330 ind, dry.

Familia Planorbidae Rafinesque, 1815
Subfamilia Ancylinae Rafinesque, 1815
Tribus Ancylini Rafinesque, 1815

Ancylus fluviatilis O.F. Müller, 1774
COMULM-G13, 2 ind, alc. COMULM-G14, 3 ind, alc. COMULM-G138, 12 ind, alc. COMULM-G149, 1 ind, dry. COMULM-G206, 4 ind, alc.

Tribus Helisomatini F.C. Baker, 1928

Planorbella duryi (Wetherby, 1879)
COMULM-G4, 25 ind, dry.

Tribus Planorbini Rafinesque, 1815

Gyraulus (*Armiger*) *crista* (Linnaeus, 1758)
COMULM-G159, 1 ind, alc. COMULM-G202, 1 ind, alc. COMULM-G238, 1 ind, alc.

Gyraulus piscinarum (Bourguignat, 1852)
COMULM-G21, 8 ind, alc. COMULM-G24, 15 ind, alc. COMULM-G31, 5 ind, alc. COMULM-G77, 22 ind, alc. Additional Materials: COMULM-G86, G93, G97, G100, G102, G107, G110, G116, G117, G122, G127, G131, G146, G152, G162, G164, G168, G171, G172, G182, G188, G197, G200, G212, G218, G220, G234, G240, G256, 65 ind, dry.

Planorbis intermixtus Mousson, 1874
COMULM-G6, 8 ind, alc. COMULM-G7, 5 ind, alc. COMULM-G49, 3 ind, alc. COMULM-G51, 12 ind, alc. Additional Materials: COMULM- G150, G153, G180, G190, G196, G202, G210, G254, 30 ind, dry.

Tribus Segmentinini F.C. Baker, 1945

Hippeutis complanatus (Linnaeus, 1758)
COMULM-G239, 5 ind, alc.

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