



Biodiversity in the Black Sea - ecological Study from the Perspective of Romanian philately

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Authors' contributions

This work was carried out in collaboration between authors. Author BVC designed the study, performed the literature searches, and wrote the first draft of the manuscript. Authors ALP and CM managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

As the concern for the management of protected areas is relatively new in Romania, and the information related to this topic is relatively scarce, especially those on marine ecosystems, we considered necessary this study on the management of marine protected areas with specific biodiversity illustrated by philately. Marine protected areas, in particular, delimited as areas where the main purpose is the protection of nature and cultural values, are important for all segments of society. Through this paper, we aimed to review several aspects, ecological and philatelic alike, regarding the specific biodiversity of the Black Sea ecosystem. Following the analyzes performed

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on account of the data from the consulted specialized literature (in the form of postage stamps, FDCs, occasional envelopes, and maximum postcards, but also other philatelic effects), as well as as a result of other observations (with catalogs and sites with philatelic content), we concluded that the biodiversity of the Black Sea, as well as the marine ecosystem itself, are relatively well represented in Romanian philately. The four philatelic issues illustrate crustaceans, mollusks, corals, and anemones, but also other species, all being to the liking of the general public in terms of information and promotion.

Keywords: Biodiversity; black Sea; marine ecosystem; philatelic issues; ecological study.

1. INTRODUCTION

The Black Sea is an intracontinental sea, located between Southeast Europe and Asia Minor (40°55' and 46°32' lat. N, and 27°27' and 41°42' long. E), bordering Russia, Ukraine, Romania, Bulgaria, Turkey, and Georgia. Through the Kerch Strait, it can be reached in the Sea of Azov, through the Bosphorus into the Marmara Sea, and through the Dardanelles Strait into the Aegean Sea and the Mediterranean [1-2]. This is a remnant of the Sarmatian Sea and has several unique aspects in the world, which is why it is also called *Unicum Hydrobiologicum*.

With an area of 413,000 km² and depths that vary up to a maximum of 2245 m, the Black Sea is unique. Its uniqueness refers, among other things, to the existence of life only up to 180-200 m depth, on the so-called continental shelf, which is the most extensive along the Romanian coast. The salinity of the water is 15-22 g‰ at offshore, compared to 24-34 g‰, in other seas and oceans. In the area of the Romanian coast, the salinity decreases even more, usually being 7-12 g‰ [2-4].

The circular arrangement of water sources and the existence of a single external connection - through the Bosphorus Strait with the Marmara Sea and through the Dardanelles Strait with the Mediterranean Sea, along with relatively moderate water heating, determine the almost total lack of vertical sea currents and the existence of only horizontal currents. In this sense, the Black Sea is divided into the surface area and the deep area, and from a biocenotic point of view, we find three areas: coastal, pelagic, and abyssal. The water temperature varies on the surface: in summer it reaches 29°C, in winter it reaches 0°C. Light enters the sea at a depth of 150-200 m. Below this depth, there is no oxygen, due to a layer of sulfur-reducing bacteria, which produce CO₂ and hydrogen sulfide [1],[3]. In winter or during variations in the weather, 5-10 m high waves can

form. The fauna is mainly represented by worms, mollusks, crustaceans, fish and dolphins, in the aquatic environment and birds consuming fish, in the aerial one in the vicinity and above the pontic basin.

The state company specialized in publishing and selling Romanian postage stamps, under the current name of Romfilatelia, has put into circulation a series of shows dedicated to the flora and fauna of protected areas. Among them, the shows dedicated to biodiversity in the Black Sea had a significant impact on collectors and of course the general public. Next, an attempt will be made to detail the issues in question.

2. MATERIALS AND METHODS

The documentation for this study was based on the authors' concerns for ecology and management of protected areas [5-6], as well as their interest in marine ecosystems and their status [7-8]. Having at hand a series of extremely relevant studies at the national level, in terms of protected area management and biodiversity conservation [9-11], the authors decided to extrapolate these approaches to the space of the Black Sea ecosystem.

The philatelic itinerary regarding the biodiversity in the Black Sea is based on four philatelic issues. Published in 1966, 2001, 2002, and 2007, all philatelic issues have various aspects related to biodiversity. If the 1966 and 2007 issues show wildlife species (crustaceans, mollusks, and vertebrates), the other two issues, from 2001 and 2002, come with flora species (corals and sea anemones). In addition to the issue pieces (postage stamps, FDCs, and maximum postcards), other philatelic effects were identified, including circulations and different occasional envelopes. The rich philatelic material was indexed and analyzed with the help of the specialized catalogs [12-14] and the sites with philatelic content.

3. RESULTS AND DISCUSSION

3.1 Crustaceans and Mollusks, 1966

The first philatelic issue that refers to the biodiversity of the Black Sea is the one entitled "Crustaceans and mollusks", consisting of eight stamps see Fig. 1 [15-16], published on 15.10.1966. The technical data of the issue are indexed and presented in Table 1 [12,14].

As can be seen in Fig. 1, the issue "Crustaceans and mollusks" (LP #639, RO #2723..2730)

represent a Noble Crayfish (*Astacus astacus*) with a face value of 5 bani (2,500,000 copies), Netted Dogwhelk (*Nassa reticulata*) - 10 bani (2,500,000 copies), Marbled Rock Crab (*Pachygrapsus marmoratus*) - 20 bani (2,500,000 copies), Land Snail (*Campylaea trizona rossin*) - 40 bani (2,000,000 copies), Land Snail (*Helix leucorum mull*) - 55 bani (2,000,000 copies), Mediterranean Mussel (*Mytilus galloprovincialis*) - 1,35 lei (1,500,000 copies), Great Pond Snail (*Lymnaea stagnalis*) - 1,75 lei (1,000 .000 copies) and Swan Mussel (*Anadionta cygnaca*) - 3.25 lei (200,000 copies).



Fig. 1. The philatelic issue "Crustaceans and mollusks", 15.10.1966, Bucharest

Table 1. Technical characteristics of the philatelic issue "Crustaceans and mollusks", 15.10.1966, Bucharest

Technical details	Values
Release date	15.10.1966
Number of postage stamps	8
Stamp / Block / Mini sheet	49 × 34 mm / - / -
Pagination	block of four stamps with different nominal values (2 × 9,000 lei and 2 × 16,500 lei)
Printing system	Coated paper, lacy paper 13¼
Circulation	200,000 complete series
Designer	Aida Tasgian Constantinescu
FDC (first day cover)	3 FDCs
Indexing (catalog codes)	LP #639, CMR #2639..46, Yv #2240..47, Mi #2544..51, G #3412..19, S #1879..86

The postage stamps presented above were also included in combinations of three pieces, to complete the envelopes with the mention of the first day of the issue. Thus, no less than 3 FDCs were formed, which we decided to reproduce in Fig. 2 [17-19]. What is worth mentioning about FDCs is that they were made in a limited number, according to the sources of documentation we had at our disposal. As for the maximum postcards, very few were identified. One of the maxims captures Noble Crayfish (*Astacus astacus*) in all its splendor see Fig. 3a [20]. Three other maxims capture Land Snail (*Helix leuorum*) moving on a burdock leaf see Fig. 3b-d [21-23], while the last of the maxims presents a picture of the aquatic environment, which illustrates the level the Marbled Rock Crab reef (*Pachygrapsus marmoratus*) and a seahorse see Fig. 3e [24].

In addition to the pieces presented, several occasional envelopes and circulations were identified. These are reproduced in the Appendix section. For example, the occasional envelope reproduced in Fig. 12a [25] is stamped with the stamp illustrating Noble Crayfish (*Astacus astacus*), also bearing the special stamp of the Philatelic Exhibition of Pioneers and Schoolchildren, 28.05.-18.06.1987, Tulcea. In Fig. 12b [26] and Fig. 12c-e [27-28] there is a francature based only on the postage stamp with Netted Dogwhelk (*Nassa reticulata*), the

envelopes bearing the insignia of the Philatelic Exhibition "Litoral 68", 15.07.-15.09.1968, held in several locations, respectively Mamaia, Constanța, Eforie Nord and Mangalia.

Similar, in Fig. 12f-i [29-32] are reproduced some occasional envelopes bearing the stamp with Marbled Rock Crab (*Pachygrapsus marmoratus*), along with the specific insignia of the philatelic exhibition "Litoral 67", held between 16.07.-28.08.1967 in Constanța, Eforie Nord and Mangalia. In addition, in Fig. 13a-d are illustrated some circulated pieces, all based on a postage formed by the postage stamps of the considered philatelic issue [33-36].

3.2 Corals and Sea Anemones (I), 2001

The second philatelic issue dedicated to biodiversity in the Black Sea is entitled "Corals and sea anemones" (I). With nominal values between 2,500 and 37,500 lei, the four stamps of the issue delight our eyes (see Fig. 4a-d) [37]. Postage stamps representing Finger Coral (*Porites porites*) with a face value of 2,500 lei, Giant Caribbean Sea Anemone (*Condylactis gigantea*) - 8,300 lei, Snake-locks Sea Anemone (*Anemonia telia*) - 13,500 lei and Purple Sea Fan (*Gorgonia ventalina*) - 37,500 lei were paginated and organized as blocks of 4 each (see Fig. 4e) [37-38].



(a) Noble Crayfish (*Astacus astacus*), Rossi (*Capylaea trizona rossin*) and Melcul de mâl (*Lymnaea steagnalis*)



(b) Crabul marmorat (*Pachygrapsus marmoratus*), Melcul de apă (*Helix leuorum mull*) and Midia (*Mztilus galloprovincialis*)



(c) Nassa (*Nassa reticulata*) and Scoica de lac (*Anadionta cygnaca*)

Fig. 2. FDCs of the "Crustaceans and mollusks" issue, 15.10.1966, Bucharest

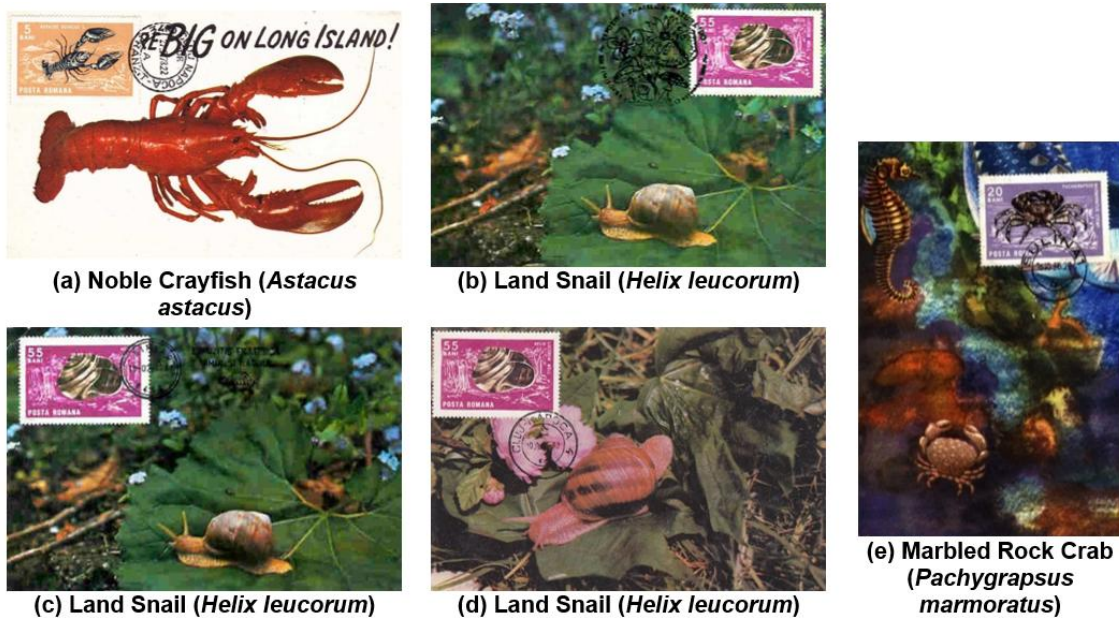


Fig. 3. Maximum postcards of the "Crustaceans and mollusks" issue

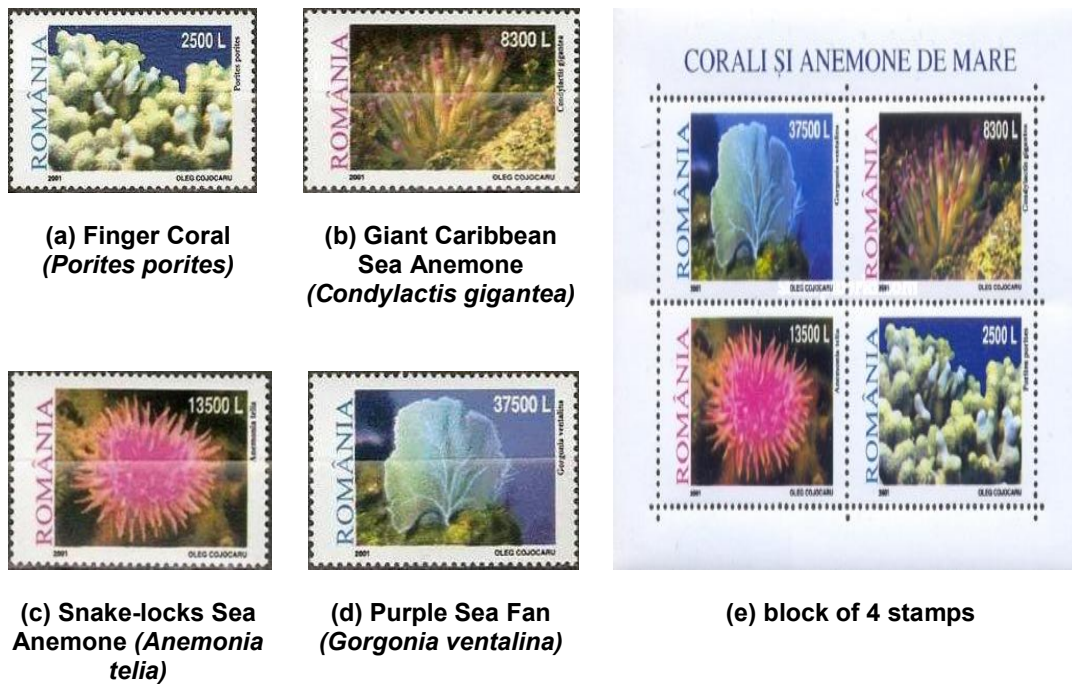


Fig. 4. Stamps and 4-stamp block related to the philatelic issue "corals and sea anemones (I)", 27.09.2001, bucharest

The technical details related to the issue in question are summarized in Table 2 [13,37]. As can be seen, there are major differences between this issue and the one before it in terms of the number of pieces, circulation, and size.

As expected, postage stamps are also found in two FDCs that also have a representative image for marine biodiversity in the background (see Fig. 5) [39-41]. Furthermore, as it can be easily seen, even the

special stamp of the show makes direct reference to corals.

3.3 Corals and Sea Anemones (II), 2002

The third philatelic issue in the series, as a sequel to the one in 2001, is entitled "Corals and sea anemones (II)". It appeared on 30.01.2002, in Bucharest, is also made up of four postage stamps with values between 9,000 lei and 16,500 lei. The stamps in question, respectively Red Coral (*Corallium rubrum*) and Elkhorn Coral (*Acropora palmata*) have a face value of 9,000 lei, while Plumose Anemone (*Metridium senile*) and Beadlet Anemone (*Actinia equina*) have a face value of 16,500 lei (see Fig. 6a-d) [42]. Even in the case of this philatelic issue, the block consisting of four postage stamps was identified (see Fig. 6e) [43].

The technical details related to the issue in question are summarized in Table 3 [13],[42]. As can be seen, there are no major differences

between this issue and the one before it in terms of the number of pieces, circulation, and size.

The two FDCs related to the philatelic issue "Corals and sea anemones (II)" are reproduced in Fig. 7 [44-47]. In addition to these, the four official maximum postcards were reproduced, as can be seen in Fig. 8 [48-49]. The maximum postcards illustrate practically the same image as the postage stamps that are part of the francature.

3.4 Fauna from the Black Sea, 2007

In the highly suggestive philatelic issue entitled "Fauna from the Black Sea", appeared on 09.02.2007, four postage stamps are illustrating the Short-snouted Seahorse (*Hippocampus hippocampus*) - 70 Romanian bani, the Common Dolphin (*Delphinus delphis*) – 1.50 lei, the Loggerhead (*Caretta caretta*) – 3,10 lei, and the Tub Gurnard (*Trigla lucerne*) – 7.70 lei, as shown in Fig. 9a-d [50-52].

Table 2. Technical characteristics of the philatelic issue "Corals and sea anemones (I)", 27.09.2001, Bucharest

Technical details	Values
Release date	27.09.2001
Number of postage stamps	4
Stamp / Block / Mini sheet	42×27 mm / - / 104×77 mm
Pagination	block of four stamps with different nominal values (2,500, 8,300, 13,500 and 37,500 lei)
Printing system	6-color chrome paper, 13¼ lace
Circulation	100,000 complete series
Designer	Oleg COJOCARU
FDC (first day cover)	2 FDCs, 1000 seturi
Indexing (catalog codes)	LP #1570, Mi #5608..11, S #4483..86



(a) Finger Coral (*Porites porites*) and Purple Sea Fan (*Gorgonia ventalina*)



(b) Giant Caribbean Sea Anemone (*Condylactis gigantea*) and Snake-locks Sea Anemone (*Anemonia telia*)

Fig. 5. FDCs of the "Corals and sea anemones (I)" issue, 27.09.2001, Bucharest



(a) Elkhorn Coral (*Acropora palmata*)



(b) Red Coral (*Corallium rubrum*)



(c) Plumose Anemone (*Metridium senile*)



(d) Beadlet Anemone (*Actinia equina*)



(e) block of 4 stamps

Fig. 6. The postage stamp set and block for the "Corals and sea anemones (II)" issue, 30.01.2002, Bucharest

Table 3. Technical characteristics of the philatelic issue "corals and sea anemones (II)", 30.01.2002, bucharest

Technical details	Values
Release date	30.01.2002
Number of postage stamps	4
Stamp / Block / Mini sheet	42 × 27 mm / - / 106 × 76 mm
Pagination	block of four stamps with different nominal values (2 × 9,000 lei and 2 × 16,500 lei)
Printing system	6-color chrome paper, 13¼ lace
Circulation	finished sheets 4 pieces, 160,000 series
Designer	Oleg COJOCARU and Mihail GOLOGAN
FDC (first day cover)	2 FDCs, 1000 sets
Indexing (catalog codes)	LP #1577, Mi #5634..37, S #4484..87,G #6260..63



(a) Elkhorn Coral (*Acropora palmata*) and Plumose Anemone (*Metridium senile*)

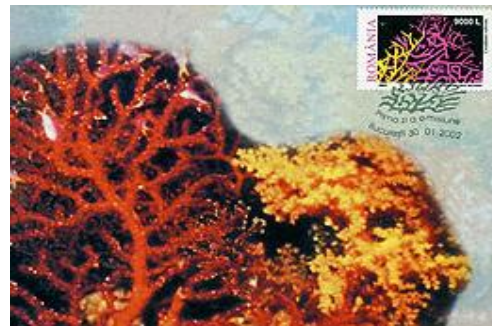


(b) Red Coral (*Corallium rubrum*) and Beadlet Anemone (*Actinia equina*)

Fig. 7. FDCs of the "Corals and sea anemones (II)" issue, 30.01.2002, Bucharest



(a) Elkhorn Coral (*Acropora palmata*)



(b) Red Coral (*Corallium rubrum*)



(c) Plumose Anemone (*Metridium senile*)



(d) Beadlet Anemone (*Actinia equina*)

Fig. 8. Maximum postcards of the "Corals and sea anemones (II)" issue, 30.01.2002, Bucharest

In addition to the technical characteristics indexed in Table 4 [13,50], we also present the set of four postage stamps organized as a block (see Fig. 9e) [53-57], as well as the FDCs (see Fig. 10) [58], respectively the set of maximum postcards (see Fig. 11) [59-60].

The Short-snouted Seahorse (*Hippocampus hippocampus*) is illustrated on the stamp with a

face value of 70 bani [50-52]. This fish that looks like a chess piece, measuring 10-12 cm, lives among the seagrass bushes and algae, at a short distance from the shore. Interestingly, the chicks grow in a bag located under the male's abdomen, from where, after 2-3 weeks, they spread in the seawater. The seahorse can change its body color to adapt to the environment and protect itself from enemies.



(a) Short-snouted Seahorse (*Hippocampus hippocampus*)



(b) Short-beaked Common Dolphin (*Delphinus delphis*)



(c) Loggerhead (*Caretta caretta*)



(d) Tub Gurnard (*Trigla lucerna*)



(e) Souvenir Sheet – „Fauna from the Black Sea”

Fig. 9. The postage stamp set and block for the "Fauna from the Black Sea" issue, 09.02.2007, Bucharest

Table 4. Technical characteristics of the philatelic issue "Corals and sea anemones (II)", 30.01.2002, Bucharest

Technical details	Values
Release date	09.02.2007
Number of postage stamps	4
Stamp / Block / Mini sheet	48 × 33 mm / - / 190 × 120 mm
Pagination	block of 4 stamps in 5 colors, with four different values (1.50 lei, 0.70 lei, 3.10 lei and 7.70 lei)
Printing system	offset lithography
Circulation	57,750 stamps and 15,000 blocks
Designer	Radu OLTEAN
FDC (first day cover)	2 FDCs, 450 sets
Indexing (catalog codes)	LP #1755, Yv #5183..86, Mi #6163..66



(a) Short-snouted Seahorse (*Hippocampus hippocampus*) & Tub Gurnard (*Trigla lucerna*)

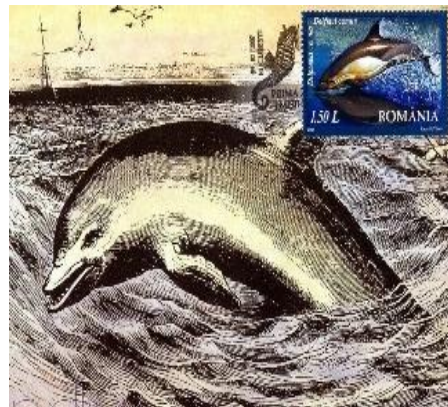


(b) Short-beaked Common Dolphin (*Delphinus delphis*) & Loggerhead (*Caretta caretta*)

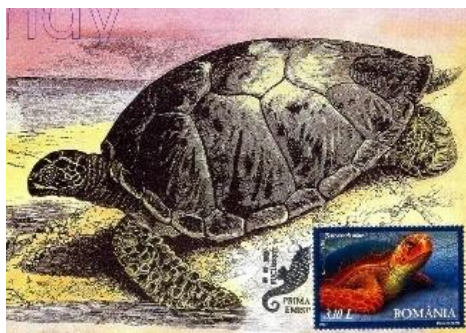
Fig. 10. FDCs of the "Fauna from the Black Sea" issue, 09.02.2007, Bucharest



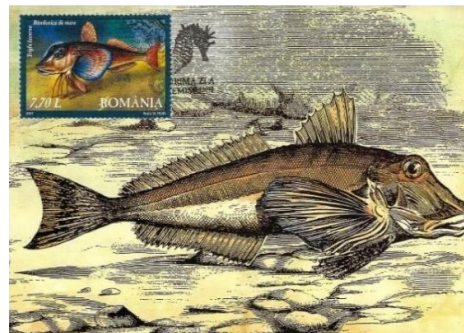
(a) Short-snouted Seahorse (*Hypocampus hippocampus*)



(b) Short-beaked Common Dolphin (*Delphinus delphis*)



(c) Loggerhead (*Caretta caretta*)



(d) Tub Gurnard (*Trigla lucerna*)

Fig. 11. Maximum postcards of the "Fauna from the Black Sea", 09.02.2007, Bucharest

The Short-beaked Common Dolphin (*Delphinus delphis*) is illustrated on the stamp with a face value of 1.50 lei. It has a gray-black back with greenish reflections. The sides of the body are

gray and the abdomen whitish. The snout is suitable for elongation, the mandible protrudes beyond the jaw, and the forehead is slightly flattened in the front. It feeds on crustaceans,

cephalopod mollusks, but also on the herds of sardines, anchovies, flying fish (in the Mediterranean) [50]-[52]. It is 1.5-1.8 m long and weighs up to 55 kg (in exceptional cases, it reaches 100 kg). The maximum lifespan of individuals of the species is 22 years (males) and 20 years (females). It lives along the coast at a relatively shallow depth.

The Sea turtle or Loggerhead (*Caretta caretta*) is illustrated on the stamp with a face value of 3.10 lei. This species, less common in our country, is generally large in size so that adults can reach even 1.2 m and weigh up to 200 kg [50]-[52]. As a rule, the sea turtle lives in the Atlantic Ocean, the Mediterranean Sea, rarely penetrating the Black Sea, from where it can accidentally reach the Romanian beaches. It has a large head, strong jaws, and the forelimbs are like a paddle, with two claws. Omnivorous, it feeds on other marine animals.

The Sea swallow or Tub Gurnard (*Trigla lucerna*) is illustrated on the stamp with a face value of 7.70 lei. The sea swallow is a rare marine fish, measuring around 65 cm and weighing almost 3 kg [50]-[52]. It has a brightly colored body, covered with small scales. The pectoral fins, which suggest the shape of the swallow's wings, extend like bent claws, with the help of which the fish can crawl on the seabed. Due to its vivid colors, the sea swallow is one of the most beautiful species of fish in the Black Sea.

For the last three issues, no other philatelic effects were identified, such as special covers, occasional envelopes or various circulations. However, this does not mean that the philatelic issues themselves did not circulate or were not to the liking of the general public.

4. CONCLUSION

Biodiversity in the Black Sea, as it was observed in the four philatelic issues that have appeared so far (March 2021), is a topic far too present in Romanian thematic philately. There are few philatelic materials identified and analyzed (mainly circulated pieces), although more than 50 years have passed since the first issue. In the same context, it should be mentioned that the most impressive appearances were the occasional envelopes made on the occasion of various profile events, mainly philatelic exhibitions in seaside resorts. They had the merit of promoting both the specifics of the resorts themselves, and of facilitating public access to

lesser-known species of flora and fauna, such as those that hide in the Black Sea ecosystem.

DISCLAIMER

The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX



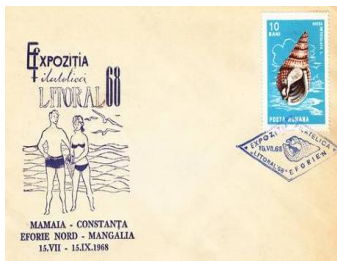
(a) Noble Crayfish (*Astacus astacus*)



(b) Netted Dogwhelk (*Nassa reticulata*)



(c) Netted Dogwhelk (*Nassa reticulata*)



(d) Netted Dogwhelk (*Nassa reticulata*)



(e) Netted Dogwhelk (*Nassa reticulata*)



(f) Marbled Rock Crab (*Pachygrapsus marmoratus*)



(g) Marbled Rock Crab (*Pachygrapsus marmoratus*)



(h) Marbled Rock Crab (*Pachygrapsus marmoratus*)



(i) Marbled Rock Crab (*Pachygrapsus marmoratus*)

Fig. 12. Different occasional covers for the philatelic issue "Crustaceans and mollusks", 15.10.1966, Bucharest (Romania)



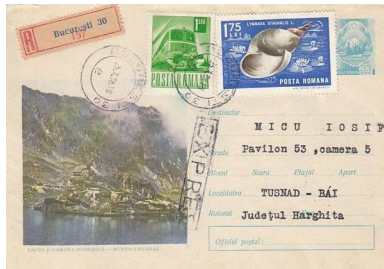
(a) Marbled Rock Crab (*Pachygrapsus marmoratus*)



(b) Marbled Rock Crab (*Pachygrapsus marmoratus*)



(c) Mediterranean Mussel (*Mytilus galloprovincialis*)



(d) Great Pond Snail (*Lymnaea stagnalis*)

Fig. 13. Different circulations for the philatelic issue "Crustaceans and mollusks", 15.10.1966, Bucharest (Romania)

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