2nd
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BOOK OF ABSTRACTS

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Giriş

İklim değişikliklerinin ekosistemler üzerindeki etkileri her geçen gün daha belirgin hale gelmektedir. Özellikle deniz ve sucul ekosistemlerdeki türler, bu değişimlerden büyük ölçüde zarar görmekte; bazı türlerin yok olma riski artarken, yeni cinslerin ortaya çıkması da bu sürecin kaçınılmaz bir sonucu olarak karşımıza çıkmaktadır. Bu bağlamda, bilimsel çalışmaların önemi giderek artmakta ve akademisyenler, bilgi paylaşımı ve çözüm önerileri geliştirmek adına uluslararası düzeyde bir araya gelmektedirler.

Bodrum Belediyesi'nin ev sahipliğinde, Bodrum Deniz Müzesi ve Burdur Mehmet Akif Ersoy Üniversitesi Bucak Sağlık Yüksekokulu iş birliği ile yapılan 2. Uluslararası Malakoloji Sempozyumu, bu önemli bilimsel paylaşıma ev sahipliği yaparak, TAGEM Müdürü Dr. Mustafa Altuğ Atalay ve alanında uzman 8 değerli bilim insanının katıldığı bir panel ile başlamıştır. Panelde, özellikle salyangoz ve midye yetiştiriciliğinde karşılaşılan sorunlar ve bu sorunlara yönelik çözüm önerileri derinlemesine tartışılmış; bu doğrultuda önemli adımlar atılmıştır.

Sempozyumun gerçekleştirilmesinde destek sağlayan Türkiye Bilimsel ve Teknolojik Araştırma Kurumuna (TÜBİTAK), Muğla Büyükşehir Belediyesi, Bucak Belediyesine, Burdur Belediyesine, NNC Haber Ajansına, Dinç Pansiyona, GAYA Sosiale, Bodrum Cruse Porta, Magna Manastır Otele, Flora Otele, Delfi Otele, Tarihi Sakallı Restoranta, Sami Beach Otele, Mucho Butik Otele ve Artemis Otele teşekkür ederiz.

Sempozyum süresince, 13 farklı ülkeden gelen araştırmacıların katkılarıyla toplam 37 çalışma sunulmuş ve ülkemizdeki 11 üniversite, 12 farklı kamu kurumu ve özel işletmeden araştırmacı ve bilim insanları sempozyuma katılım sağlamıştır. Sempozyumla eş zamanlı olarak, deniz canlılarından ilham alınarak ortaya çıkarılan 15 eserin sergisi de Bodrum Deniz Müzesi'nde 1-4 Ekim 2024 tarihleri arasında ziyarete sunuldu. Bu sempozyum, malakoloji alanında hem ulusal hem de uluslararası iş birliğini pekiştiren bir platform olma özelliği taşımaktadır.

Symposium Programme (1st Day)			
01 October 2024, Tuesday			
		Title	**Chairman**
09:00 – 10:00	**Registiration**		
10:00 – 11:00	• Selen Cambazoğlu *(Director of Bodrum Maritime Museum, Bodrum)* • Dr. M. Zeki Yıldırım *(Burdur Mehmet Akif Ersoy Universityi Bucak School of Healh)* • Prof. Dr. Hüseyin Dalgar *(Burdur Mehmet Akif Ersoy University Rector)* • Dr. Mustafa Altuğ Atalay *(Ministry of Agriculture and Forestry, TAGEM General Director)*	Opening Ceremony / Talks	
11:00 – 11:30	**Dr. Erőss Zoltán Peter**	**Mollusca fauna of Türkiye and the future**	Dr. Burçin Aşkım Gümüş
11:30 – 12:00	Prof.Dr. Ali Demirsoy	Bio-geological perspective on global warming	
12:05-12:25	***EXHIBITION OPENING***		
12:30 – 13:50	***Launch***		
13:50 – 16:00	***Panel*** **Moderators:** • Dr. Mustafa Emre Gürlek • Hakan Budunoğlu **Panelists:** • Hakan Budunoğlu, Architect, Land Snail Breeder • Selçuk Uztürk, Breeder, Chairman of the Board of Directors of Martaş T.A.Ş. • Merve Şahin, Land snail breeder Trabzon • Burçhan Öndoğan, Grower, Kandıra- Kocaeli • Murat Yüce Aquaculture Engineer, Mussel Grower • Yılmaz Akın Aquaculture Engineer, Menetrel G.S.T. LTD. Processing Factory Manager • Jean-Luc Servia FDG Lojistic Manager • Dr Gülden Yazar, Senior Aquaculture Engineer	Snail and Mussel Farming Panel (Industry Status, Challenges and Expectations, Proposed Solutions)	Dr. Mehmet Zeki Yıldırım
16:00 – 17:30	***Bodrum Maritime Museum Visit***		

Symposium Programme (2nd Day)			
02 October 2024, Wednesday			
		Title	**Chairman**
09:00 - 09:30	**Dr. Daniel Molloy Online**	**An Examination of the Morphological Characters of *Dreissena caputlacus* Schütt 1993**	Dr. Bahadır Önsoy
09:30 - 10:00	**Dr. Vladimir Laptikhovsky**	**Cephalopod stock assessment approaches and management measures**	
10:00 - 10.15	Banu Bitlis	Polyplacophora, Gastropoda and Scaphopoda species associated with *Posidonia oceanica* in the Northern Aegean coasts of Türkiye	
10:15 - 10:30	Serap Koşal Şahin Nilay Dökümcü	The Gastropod Fauna of Riva Stream (Istanbul)	
10:30-10:45	Aydin Örstan	Land snails of Izmir and its environs from 1839 to 2024	
10:45 - 11:00	*Coffee break*		
11:00 - 11:30	**Dr. Thomas Wilke Online**	**The Mollusk Biodiversity Crisis in The Caspian Sea - Facts and Fiction**	Dr. Serap Koşal ŞAHİN
11:30 - 11:45	Ümit Kebapçı	Disjunct distributions among the land snails of Türkiye	
11:45 - 12:00	Serkan Çamalan Burçin Aşkım Gümüş Şaban Kabak	Freshwater Molluscs of Eğriova Pond (Ankara, Türkiye)	
12:00 - 13:30	*Launch*		
13:30 - 14:00	**Frank P. Wesselingh Hulya Alçiçek Cihat Alçiçek Sergei Lazarev Thomas Neubauer Online**	**A new view on the timing of Anatolian lacustrine molluscan evolution**	Dr. Yeşim Büyükmeriç
14:00 - 14:30	**Dr. Maxim V. Vinarski**	**A conceptual history of malacology (from folkbiology to our days)**	
14:30 - 14:45	Nil Pembe Özer Merve Kaplan	The Situation and Importance of the Catching and Export of Striped Venus (*Chamelea gallina* L., 1753) in Türkiye	
14:45 - 15:00	Gülden Yazar Ayşegül Kubilay	Effect Of Feeding Helix Aspersa Maxima (Muller 1774) With Dietary Black Cumin (Nigella Sativa L.,1758) Additive Feeds On	

14:45 - 15:00	Gülden Yazar Ayşegül Kubilay	Effect Of Feeding Helix Aspersa Maxima (Muller 1774) With Dietary Black Cumin (Nigella Sativa L.,1758) Additive Feeds On Total Mesophilic Aerobic Bacterial Load İn Muscle And Intestine	
15:00 - 15:15	*Coffee break*		
15:15 - 15:45	**Dr. Ivaylo Kanev Dedov**	**Results of the survey of Bulgarian zoologists in Vietnam (2018, 2023) with an emphasis on gastropods**	Dr. Aydın Örstan
15:45 - 16:00	Özgen Yılmaz Hasan Cerim Tahir Özcan Bahadır Önsoy İsmail Reis	Preliminary Results of the Study on Limpets of Gökova Bay, Southern Aegean Sea	
16:00 - 16:15	Şebnem Erkebay Cem Erkebay Arzu Morkoyunlu Gönül Konakay	The Impact of Certain Shellfish and Mollusks in the Marine Environment on Maritime Transport and Antifouling Applications	
16:15 - 16:30	Tülay Polat Üzümcü Ayfer Özmen Arzu Morkoyunlu	A Study on the Demand and Consumption of Malacological Species in Seafood Restaurants	
16:30 - 16:45	Mehmet Zeki Yildirim Cafer Bulut Vedat Yegen İbrahim Özdal Gülsen Tatli	Lake Egirdir Gastropoda species and spatial distribution	
16:45 - 17:00	Serap Koşal Şahin	Mollusc Fauna Of Kepir Glacial Lake (Munzur Glaciers, Türkiye) And Surrounding Streams	

Symposium Programme (3rd Day)			
03 October 2024, Thursday			
		Title	**Chairman**
09:00 – 09:25	Dr. Yeşim Büyükmeriç	Type Specimens of Fossil Gastropods and Bivalves from Türkiye and Their Paleogeographic and Stratigraphic Significance	Dr. Ümit Kebapçı
09:25 – 09:45	**Dr. Vladimir Laptikhovsky**	**Climate-induced changes in the life history of the common cuttlefish in the English Channel**	
09:45 - 10:00	Mustafa Emre Gürlek	New Localities of Ecrobia maritima (Milaschewitsch, 1916) (Gastropoda: Hydrobiidae) from the Mediterranean Coast of Turkey	
10:00 – 10: 15	Ömür Alyakut Ayfer Özmen	Utilisation of Mollusca Species in Sustainable Gastronomy: The Squid Case	
10:15 - 10:30	Vedat Yegen M. Zeki Yildirim İbrahim Özdal Selman Şapçioğlu Gülsen Tatli	Beysehir Lake Gastropoda Species and Spatial Distribution	
10:30 - 10:45	*Coffee break*		
10:45 – 11.00	Mehmet Zeki Yıldırım	Lymnaeidae of Turkey: Species Diversity and Distribution	Dr. Mustafa Emre Gürlek
11:00 - 11:15	Hatice Darga	Analysis of Children's Books on Freshwater and Sea Creatures	
11:15 - 11:30	Arzu Morkoyunlu Şebnem Erkebay Cem Erkebay	Relationship between dreisenna polymorpha (pallas) and diatom distributed in Big Akgöl Lake (TÜRKIYE)	
11:30– 11:45	Nurten Terkeş	The Effects of Edible Snails on Human Health	
11:45 - 12:00	Alp Salman Bahadır Önsoy	Cephalopod reproductive biology	
12:00 – 12:15	Murat Yüce	Black Mussel; The Birth of a New Industry	
12:15 – 13:30	*Launch*		
13:30- 13:45	**Dr. Mary Seddon Online**	European Mollusca	Dr. Nurten Terkeş
13:45– 14:00	Oğuz Olgaç Erişti Meryem Taşkaya **Online**	Preliminary Studies and Use of Technology in Aquaculture Projects	

14:00 – 14:15	Muhammed Mustafa Sezginer **Online**	The role of gastropods in human and animal health	
14:15 – 14:30	Deniz Mercan Deniz Anıl Odabaşı Naime Arslan **Online**	Distribution pattern of two new gastropods (Pseudorientalia kanari and Theodoxus gloeri) in Balıkdamı Wetland (Eskişehir) area	
14:30 - 14:45	Gülsüm Batmaz Erişmiş Pınar Arslan Yüce Aysel Çağlan Günal **Online**	Importance of Hemolymph Fluid in Aquatic Mussels	
14:45- 15:00	İhsan Ekin **Online**	Endemic Freshwater Microsnail (Prosobranchia: Hydrobiidae) Fauna of the Southeast Anatolia Region: Distribution, Description, and Conservation Status	
15:00- 15:15	Hülya Şereflişan Ahmet Alkaya **Online**	The Importance of Molluscan Based Artificial Reefs in The Blue Economy	
15:15- 15:30	Emile Yedahoun Arzu Morkoyunlu **Online**	Some Freshwater Gastropods of Benin (West Africa)	
15:30 – 15:45	Asmaul Husnah Asrum Arzu Morkoyunlu **Online**	Shellfish Industry in Indonesiag	
15:45 – 16:00	Mitat Kandemir	Reflections Of Aquaculture On Art And Design	
16:00 – 17:00	*Closing session*		

Symposium Programme (4th Day)		
04 October 2024, Friday		
10:00 – 17:00	All participants	Bodrum city tour

THE SHELLFISH INDUSTRY IN INDONESIA

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Indonesia as an archipelagic country with more than 17,504 islands, has vast marine areas covering approximately 65% of its total surface area. With a coastline stretching 81,000 km, Indonesia is one of the countries with significant fishery potential, totaling 26,606,000 hectares. Indonesia's marine resources include various types of fish, shellfish, and other marine biota. The shellfish industry in Indonesia falls into the developing group. Among the commercially important shellfish in Indonesia, Crassostrea sp., Anadara spp., Meretrix spp., Amusium sp., along with the green mussel (Perna viridis L.) have significant development potential. In Indonesia, shellfish culture has not developed to the desired extent due to drawbacks in terms of hygiene and sanitation. No sanitary control is applied to bivalve mollusks caught from the wild. Although the vast majority of fishing areas are free from pollution, it is thought that some quality control tools should be developed to stimulate demand. In terms of local people's food preferences, seafood does not have a large share in Indonesian daily life. Only a few regions of the country, such as South Sulawesi, Maluku, and Irian Jaya, prefer seafood as a priority, while other regions prefer vegetable consumption. For this reason, there is a low market demand for shellfish. However, the low incentives for investment in shellfish culture also hinder the development of the sector. In recent years, the Indonesian Government has been developing policies to promote coastal aquaculture and various shellfish. In particular, there are studies on the marine farming development project. Studies are being carried out to promote the nutritional value of shellfish and the different flavors of these products. In the Indonesian shellfish sector, the introduction and adoption of technologies from countries with experience in this field will support the development of the young industry.

Keywords: Indonesia, Mollusca, Potential, Shellfish

FRESHWATER GASTROPODS OF BENIN (WEST AFRICA)

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Benin is a West African country with a surface area of over 130,000 ha, consisting of rivers, lakes, lagoons and streams, the economy of which is mainly dependent on fishing and agriculture. Benin's neighbors are Togo to the west, Burkina Faso to the northwest, the Republic of Niger (Niger River) to the north and Nigeria to the east. Benin has a coastline of about 125 km along the Atlantic Ocean in the south. Along with a long coastline, it also has freshwater resources. The most important of these are the Oueme River, the Mono River, Lake Nokoue and Lake Aheme. There are four water basins in the country: the Niger Basin, the Volta Basin, the Oueme Basin and the Mono Basin. These water basins have different ecological dynamics and contain a wide variety of species. Based on collections made by Henry Hubert in the 1910s, the freshwater gastropods of Benin were first studied by Germain in 1917. Towards the end of the 20th century, various malacological studies on freshwater and brackish water taxa in Benin have gained momentum. In this study, information will be given about some species of Africanogyrus coretus, Biomphalaria camerunensis, Bulinus forskalii, Bulinus globosus, Bulinus senegalensis, Gyraulus costulatus, Segmentorbis kanisaensis, Cleopatra bulimoides, Pachymelania. aurita, Potadoma freethi, Hydrobia lineata, Radix natalensis, Neritina rubricata distributed in Benin. Research on freshwater gastropods is still ongoing in Benin.

EFFECT OF FEEDING HELIX ASPERSA MAXIMA (MULLER 1774) WITH DIETARY BLACK CUMIN (NIGELLA SATIVA L.,1758) ADDITIVE FEEDS ON TOTAL MESOPHILIC AEROBIC BACTERIAL LOAD IN MUSCLE AND INTESTINE

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In this study, it was aimed to determine the aerobic bacterial load in the muscle and intestine after 30 days of feeding with different rates (0.5%, 1% and 2%) of Helix aspersa maxima dietary black cumin (Nigella sativa L., 1758). A total of 600 H. aspersa maxima individuals were used in this experiment. A total of 50 H. aspersa maxima individuals were used in each group. 0% (control), 0.5%, 1% and 2% dietary black cumin (N. sativa) was ground into powder and mixed into the feed. Mixed black cumin ratios were fed to 3 different groups in 3 replicates for 30 days. H. aspersa maxima (Muller 1774), which feeding during the trial, was dissected after anesthesia for 10 minutes at -20°C under laboratory conditions. 10 individual H. aspersa maxima from each group were examined. The organs were separated from each other by the shell, and muscle and intestine samples were taken for examination. The dilution process was carried out with a dilution range of 10-7. Total mesophilic aerobic bacteria count was made by pour plate method. Bacteriological counting was performed after the petri dishes were incubated for 24-48 hours at 25°C. At the end of the incubation, all colonies growing in the Tryptic Soy Agar (TSA) medium were counted as "Total Bacteria", and the result was given as log cfu/g by making a standard calculation in petri dishes where between 30-300 colonies were counted. As a result of microbiological examination of muscle and intestine samples of H. aspersa maxima (Muller 1774), which was fed with rations prepared by adding black cumin to the feed in different proportions, 3.178±756.1a log/g was found in the foot muscle of the snails in the control group. In the 0.5% trial group of black cumin, 1.621±12.64ab log/g was found in the foot muscle and 1.773±29.36 log/g in the intestine. In the 1% trial group, 0.17±0.51b log/g was found in the foot muscle and 1.717±49.44 log/g in the intestine. While there was no bacterial load in the foot muscle in the black cumin 2% trial group, it was found to be-0.11±0.40 log/g in the intestinal flora. As a result, it has been determined that black cumin added to the feed reduces the bacterial load in the muscles and intestines.

Keywords: Helix aspersa maxima, Nigella sativa, bacterial load

* This study was produced from Gülden YAZAR's doctoral thesis, which was accepted at Isparta University of Applied Sciences, Graduate Education Institute in February 2024.

THE MOLLUSK BIODIVERSITY CRISIS IN THE CASPIAN SEA - FACTS AND FICTION

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Many scientists agree that we are currently facing the "6th mass extinction event". This is particularly evident in the Pontocaspian region – the brackish-waters of the Caspian, Black and Aral Sea basins. Many Pontocaspian species are in sharp decline or even threatened with extinction (the "Pontocaspian biodiversity crisis"). Mollusks are particularly affected due to their benthic lifestyle and high degree of endemism. However, due to possible collection and taxonomic biases, it has been difficult to evaluate the extent of the crisis. There are indications that the number of endemic mollusk species in the Pontocaspian area is inflated (taxonomic crisis). There is also a lack of reliable pre-Anthropocene baseline data. For example, since most endemic gastropod species have been described from "fresh looking" shells, it remains unclear which species existed before the "Anthropocene". Moreover, fieldwork in the Pontocaspian region entered a crisis after the breakdown of the former Soviet Union (sampling bias). Therefore, realistic estimates of current extinction rates are difficult to obtain, and it is not clear whether 80% or more of the endemic mollusk species in the Pontocaspian region have actually been lost in the last 30 years, as claimed by some authors. In the current presentation, we therefore address the differential contributions of the taxonomic and the collection biases to the loss of endemic Caspian Sea mollusk species to understand the extent of the current biodiversity crisis. Specifically, we used state-of-the art "museomics" approaches such as sequencing historical DNA, applying proteomics and 3D morphological analyses of museum specimens to understand species boundaries. We also investigated 14C data from "fresh looking" shells collected in the Caspian Sea during the past 150 years to assess which species were still alive in the early "Anthropocene". In addition, we used statistical approached to investigate whether the lack of records of endemic species in recent decades is related to the sharp decline in sampling and loss of taxonomic expertise. Our preliminary data indicate that there is a strong taxonomic bias in the Caspian Sea. The number of endemic species is greatly inflated and some "recent" species have already gone extinct before the onset of the "Anthropocene". In addition, there is a collection bias that partly explains the lack of records in recent decades. However, we also provide clear evidence for an ongoing biodiversity crisis. This crisis may be exacerbated by the expected massive lake-level decline in the Caspian Sea by the end of this century. In summary, both taxonomic and biodiversity crises in the Caspian Sea are facts. However, the very high extinction rates of Pontocaspian mollusks reported by some authors seem to be (still) fiction.

EFFECTS OF EDIBLE SNAILS ON HUMAN HEALTH

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Edible snails have been recognised as an important food source in many cultures around the world. These organisms attract attention in terms of human health, especially due to their high protein, low fat content and structures enriched with various biologically active compounds. In this study, the effects of edible snails on human health were investigated. In this study, studies on the health effects of edible snails were compiled using the existing literature review and various academic databases. These studies were collected by using keywords ('edible snails,' 'nutritional benefits,' 'bioactive compounds in snails,' 'snail-derived medical products') in academic databases such as Google Scholar, PubMed, ScienceDirect. As a result of the literature review, it was determined that snails are remarkable for their high protein and low fat content, as well as being rich in various vitamins (B12, E) and minerals (iron, magnesium). In addition, biologically active compounds found in snails have been found to have anti-inflammatory, antioxidant and immune-enhancing effects. However, some studies have drawn attention to the risk of snails carrying parasites and emphasised that this situation can be minimised with appropriate preparation and cooking methods. Snails stand out as a food source with high nutritional value and potential to provide many health benefits. Especially being a low-calorie protein source makes them attractive for diet and health-conscious consumers. However, it should not be forgotten that snail consumption carries some health risks. Therefore, it is important to pay attention to hygienic preparation and cooking processes in the consumption of snails. In conclusion, edible snails can be considered as a valuable food source in terms of health when consumed properly.

Keywords: Edible snails, Human, Health

PRELIMINARY RESULTS OF THE STUDY ON LIMPETS OF GÖKOVA BAY, SOUTHERN AEGEAN SEA

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The current study was carried out to determine the Patella species and their biological and morphometric characteristics dwelling in the tidal zone of Gökova Bay, Southwestern Türkiye. The three sampling points across the Bay are Akyaka (highly populated), Çınar (moderately populated), and Turnalı (weakly populated). The sampling of limpet individuals was done monthly, and executed using a 20 cm x 20 cm metal frame and three repeats of random sampling in the supra-, eu- and sublittoral zones. Shell length, posterior shell length, shell width, shell height, total weight, shell weight, and meat weight were the recorded parameters regarding the species. Additionally, length-length, length-weight relationships, and Fulton's condition factor for each species were calculated separately. Since the project under which the studies mentioned above were conducted is still in progress, only a portion of the results from the first six months (October'24 – March'24) has been presented. According to the results, there are three limpet species inhabiting the rocky habitats of Gökova Bay: Patella rustica, P. ulyssiponensis, and P. caerulea. A total of 393 limpet individuals were sampled, 194 of which are P. caerulea, 172 are P. rustica, and 27 are P. ulyssiponensis. The maximum shell length values for P. rustica, P. ulyssiponensis, P. caerulea are 13.46, 17.97 and 12.11, and the b values are 2.7998, 2.3266 and 2.9701, respectively. The number of individuals, as an indicator of their presence in different zones from the lowest to the highest, is determined as supralittoral, eulittoral and sublittoral, respectively. The present study addresses a knowledge gap regarding the population characteristics of species of the genus Patella through a comprehensive assessment of the population structure and characteristics of Patella species in the southwestern Aegean coast and their allometric relationships. The project, of which this study is a part, was supported by Hitit University Scientific Research Projects Coordinatorship (project no. ALACA19001.23.001).

Keywords: Patellidae, Gökova Bay, sublittoral zone, Fulton's condition factor, morphometry.

THE IMPACT OF CERTAIN SHELLFISH AND MOLLUSKS IN THE MARINE ENVIRONMENT ON MARITIME TRANSPORT AND ANTIFOULING APPLICATIONS

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Fouling organisms are shellfish and mollusks that adhere to various surfaces, especially metal structures, to sustain their lives. The most common types include hard-shelled macro and micro-organisms, sea snails, mussels, oysters, algae, tube worms, and similar species. Due to their nature, they continue their life by attaching themselves to hard surfaces. These organisms typically feed by filtering water. Since they cannot change their location, the presence of water currents is vital for their survival, as the current brings them their food. In this context, the hard underwater surfaces of ships, which are constantly in motion, provide an ideal environment for these fouling organisms.

In this study, we focused on fouling organisms such as sea snails, mussels, and oysters.

One of the most discussed and debated topics today is environmental problems. The rapidly changing living conditions and increasing population have altered and increased consumption habits. Meeting these growing consumption needs is made possible through logistical activities. Among these activities, maritime transportation is the most preferred due to the large volume of goods transported and its cost-effectiveness. To further enhance the economic aspect, the carrying capacities of ships are being increased day by day.

This is where the concepts of malacology and logistics intersect. Mussels, oysters, sea snails, and similar organisms, which need to attach to a surface to survive, can use the surfaces of ships that are in contact with seawater. This situation increases the friction between the ship's surface and the seawater, leading to higher fuel consumption. The increase in fuel consumption contributes to the rise in the carbon footprint associated with maritime transport. Additionally, different species of marine organisms transported from various parts of the world's oceans can disrupt the natural structure of the new environments they are introduced to or cause irreversible ecological damage.

So, what measures are being taken against this? How do these measures impact natural life and the environment? In this study, we conducted a comparative analysis using a review method to evaluate this highly debated issue, along with proposed solutions and their effects over time. The evaluation from past to present is expected to contribute to future studies.

POLYPLACOPHORA, GASTROPODA AND SCAPHOPODA SPECIES ASSOCIATED WITH POSIDONIA OCEANICA IN THE NORTHERN AEGEAN COASTS OF TÜRKİYE

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The objective of the present study was determining Mollusc species distributed in Posidonia oceanica in the northern Aegean coasts of Türkiye. In line with this purpose, zoobenthic material was sampled from ten stations at depths 5 and 10 m between the dates 20.07.2016 and 28.07.2016. The samplings were collected by quadrate sampler (20X20 cm) with scuba diving and three replicates were taken each sampling. As a result of the faunistic evaluation, a total of 140 species belonging to the classes of Poyplacophora, Gastropoda and Scaphopoda were identified. The species which have the most dominance value was Bittium reticulatum (Da Costa, 1778) (57.6%) and Caecum subannulatum de Folin, 1870 (4.12%). According to frequency index values, Bittium reticulatum (Da Costa, 1778) (85.4%) and Pusillina philippi (Aradas & Maggiore, 1844) (50%) were distributed as constant species on Posidonia oceanica meadows in northern Aegean coasts of Türkiye, while 13 species were represented in less than 49% of the samples.

Keywords: Gastropoda, Posidonia oceanica, Aegean coasts

A CONCEPTUAL HISTORY OF MALACOLOGY (FROM FOLK BIOLOGY TO OUR DAYS)

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In this communication, I present my own, rather subjective, view on the history of the study of mollusks. The history of this field of zoology may be viewed as a series of transitions, which drastically changes both scientific attitude and research practices of naturalists interested in mollusks. The main important transition, which divided it into two large stages, was the so-called conchology-to-malacology shift. It took place around 1800 and was marked by creation of the modern concept of Mollusca. The previous one, was inherited from the Ancient Greek science and culminated in Linnaeus's Systema Naturae (the mid-18th century). Two great zoologists of that epoch, Lamarck and Cuvier were involved in debates around the meaning of the term Mollusca, and Cuvier's contribution has played the decisive role in the solving of this problem.

The history of such concepts, as 'mollusk', 'shell', 'soft body' and some others is briefly reviewed.

Other key events in the history of malacology (conchology) were:

1. Creation of natural history as a separate scientific discipline (Aristotle and other Ancient Greek authors).

2. The birth of the natural history in the modern science (the Early Modern Europe, 16th-17th centuries).

3. Darwinian revolution (the mid 19th century), which led to continual (and rather slow) shift in scientific paradigm, from the static Aristotelian worldview to dynamic Darwinian one.

4. The conceptual revolution in zoological taxonomy of the mid-20th century. Such disciplines as cladistics, phenetic systematics, DNA systematics have originated in that time. The current situation in malacology is determined mainly by the influence of these innovations.

THE SITUATION AND IMPORTANCE OF THE CATCHING AND EXPORT OF STRIPED VENUS (CHAMELEA GALLINA L., 1753) IN TÜRKİYE

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After the depletion of striped venus stocks in Italy, Türkiye has become the top exporter. However, there has been a significant variability in fishing quantities in recent years. The production amount, which was 28 thousand tons in 2022, decreased by 51% to 13 thousand tons in 2023. Its proportion within non-fish seafood also dropped from 60% to 41.3%. A significant portion of the exports are done as frozen and canned products. The majority of fishing is done for species like the sea snail from the western Black Sea region. According to regulations, fishing zones are generally changed every two years. In 2023, striped venus was registered by the Seafood Registration Committee. This study evaluated the current situation regarding fishing of this striped venus, which is subject to most fishing activities apart from fish.

RELATIONSHIP BETWEEN DREISSENA POLYMORPHA (PALLAS) AND DIATOM DISTRIBUTED IN BÜYÜK AKGÖL LAKE (TÜRKİYE)

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Büyük Akgöl Lake, located within the borders of Sakarya Province, is a shallow lake with a drainage area of 47 km2, surface area of 3.6 km2, and a maximum depth of 6 m. at the coordinates of 41°01′ N, 30° 33′ E. The lake is surrounded by reeds and reed beds, and there are aquatic plants on the water surface. In this study, diatom species on Dreisenna polymorpha (Pallas) in the limnofauna of Büyük Akgöl Lake were determined. The research was carried out at 4 research stations between May 2019 and November 2019. As a result of the study, 4 taxa belonging to the Bacillariales order of the Bacillariophyceae class, 2 taxa belonging to the Cocconeidales order, 14 taxa belonging to the Cymbellales order , 1 taxa belonging to the Fragilariales order, 2 taxa belonging to the Licmophorales order, 9 taxa belonging to the Naviculales order, 1 taxa belonging to the Surirellales order, and 4 taxa belonging to the Tabellariales order were identified. The Cymbellales order constitutes the richest group in terms of number of taxa. Similar values were determined on the basis of stations. A relationship was also determined in terms of the survival of diatoms distributed in the lake and the formation of the feeding regime of Dreisenna Polymorpha.

Keywords: Dreisenna Polymorpha (Pallas), Diatom, Büyük Akgöl, Sakarya

AN EXAMINATION OF THE MORPHOLOGICAL CHARACTERS OF DREISSENA CAPUTLACUS SCHÜTT 1993

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In 1993 the German malacologist Hartwig Schütt described a new species of freshwater dreissenid mussel, Dreissena caputlacus, from type locality Lake Gölbaşı near Adıyaman, Türkiye. Since then, this species has been reported from other freshwater bodies in Türkiye indicating a wide distribution. In the interest of assisting field workers to recognize this species, we present an English translation (see below) of the morphological characters that were listed by Schütt in the description (Beschreibung) section of his German language paper. In addition, we comment on the apparent variability of some of these characters (e.g., shell shape and coloration) based on morphological comparisons with mussels identified as D. caputlacus by sequencing. The following is the translation of Schütt's description: species is large, approximately triangular and flat; the umbo is pointed, slightly rotated and forms an angle of about 60° between the ventral margin and the dorsal margin; the ventral margin is concave behind the umbo, but soon becomes straight to slightly convex; the dorsal margin is long and almost straight until it merges in a uniform arc into the evenly rounded posterior margin; the keel is already sharp at the umbo, runs initially curved, but soon becomes almost straight and remains distinct and straight to the posterior end; the ventral surface area is very narrow and occupies less than 1/4 of the area of the very broad, wing-like extended dorsal surface; the byssal sinus is deeply impressed especially on the left valve; the coloration [of the dorsal surface] consists of a pattern of zig-zag bands, which is repeated in the same way until the posterior margin, but becoming larger and larger; the septum is long and narrow, relatively large overall; the wing-like widening [of the dorsal surface] extends inside the valves considerably beyond the hinge line. Dimensions of the type valve in mm: length = 30.8; height = 20.4; width = 8.4.

THE IMPORTANCE OF MOLLUSCAN BASED ARTIFICIAL REEFS IN THE BLUE ECONOMY

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Artificial reefs are structures placed on the seafloor with the aim of enhancing the productivity of marine ecosystems and improving underwater habitats. These structures mimic the morphological and ecological features of natural reefs, altering physical and biological conditions within marine ecosystems and thereby supporting overall ecosystem health. They are designed to provide new substrates for autotrophic organisms, increasing the availability of nutrients. It is believed that artificial reefs play a significant role in meeting the habitat needs of benthic organisms and enhancing the productivity of marine ecosystems. Mollusks, particularly oysters and mussels, play a critical role in artificial reefs. Bivalve mollusks not only provide physical structure but also deliver a range of ecosystem services. These species improve water quality, protect coastlines from erosion, and support sustainable fisheries. For instance, mussels and oysters filter water by removing colloidal particles and nutrients, thereby significantly enhancing water quality and supporting ecosystem health. Mollusks also contribute to the biodiversity of artificial reefs by serving as habitat and breeding grounds, thus enriching marine ecosystems. The proper design and management of artificial reefs are crucial for maximizing the ecosystem services provided by these structures. In this context, the effective use of artificial reefs holds significant potential for the conservation of marine ecosystems and the sustainable management of marine resources. Understanding the effectiveness of artificial reefs and the role of mollusks within these structures necessitates ongoing, updated scientific research. Research on the design, implementation, and monitoring of artificial reefs is essential for optimizing the sustainability and biodiversity of marine ecosystems.

DISTRIBUTION PATTERN OF TWO NEW GASTROPODS (PSEUDORIENTALIA KANARI AND THEODOXUS GLOERI) IN BALIKDAMI WETLAND (ESKİŞEHİR) AREA

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The Balıkdamı Wetland, an impoundment of the upper course of the Sakarya River located near Sivrihisar (Eskişehir), is one of the most important wetlands in Türkiye. The Balıkdamı Wetland has 1,470 hectares of surface area and the International Bird Area consist of eastern and western regions. Wetland area also comprises the mouth of the torrential Göksu Stream, which is partly hyporheic. In recent years, gastropod fauna of wetland has investigated and two new gastropod species, subterranean nerite Theodoxus gloeri and small hydrobiid Pseudorientalia kanari, have been described from the area. Göksu Stream, where the new gastropod species were recorded, flows through the protected area of Balıkdamı Wetland. The objective of the present study is examination of the distribution pattern of two new gastropod species in the Balıkdamı Wetland. Both species were found in only Göksu Stream, which is a tributary of the Sakarya River in northwestern Türkiye. For this purpose, Göksu Stream and wetland stations were sampled once every two years (generally during autumn). Some environmental parameters were also measured (water temperature, pH and dissolved oxygen). Subterranean nerite Theodoxus gloeri was found only in the mouth of Göksu Stream. Although this species was described from the stream by Odabaşı and Arslan (2015) with the highest population density, our study was showed that the existence and dominance of the species was decreased gradually, and only a few specimens were detected in the area in 2023 year. The small hydrobiid Pseudorientalia kanari was found at two stations of Göksu Stream with low density. The type locality is a spring with several outflows in the area. The fast-flowing water is crystalline and the bottom covered with cobble – pebble substrate with patches of filamentous algae. The only species found with Pseudorientalia kanari is Theodoxus sp. Although, the Gastropoda fauna of the marshland and reeds was dominated by widely distributed other gastropod species (M. buccinoida, Th. fluviatilis, P. natolica), both two species have the most limited distribution in the Göksu Stream. Wetlands are under pressure with the intensification of human activities and environmental changes. Plans to irrigate the entire area along the upper reaches of the Sakarya River by DSI (State Water Works- especially pumping stations on the Sakarya River and from the Göksu springs where new species live in) may negatively affect rare, endangered, endemic or relict species.

LAND SNAILS OF İZMİR AND ITS ENVIRONS FROM 1839 TO 2024

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The city of Izmir in western Türkiye is the type locality of at least 5 land snail species and thus occupies a significant place in malacological history. Izmir has grown tremendously since the 1960s and continues to do so. Development and limestone mining are especially threatening the limestone hills around the city where the snail diversity is the highest. To assess the state of the snail fauna, I have been doing surveys in and around the city and also on the Karaburun Peninsula to the west. The present species total is more than 40. Among the relatively common species are Thiessea matrella (Westerlund, 1898) and Zonites smyrnensis (Roth, 1839) whose type localities are Izmir. Zonites chloroticus chloroticus (Pfeiffer, 1852) is also present and the ranges of the two Zonites species almost overlap. Additionally, several other species Roth reported from Izmir in 1839 may still be found on the limestone hills. One of the rarest species is Vitrea storchi described by Pintér in 1978 from the island of Chios across from the Karaburun Peninsula. The species has not been collected on the island since then. Shells referrable to that species have been found at a location on the Karaburun Peninsula. The distribution patterns of other species, including an undescribed Vitrea, collected during the surveys will also be discussed.

A NEW VIEW ON THE TIMING OF ANATOLIAN LACUSTRINE MOLLUSCAN EVOLUTION

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Southwestern Anatolia comprises several basins that abound in Neogene and Quaternary fossiliferous lacustrine successions. In the past, the exact stratigraphic ages of these successions were poorly constrained (Alçiçek et al., 2015). Furthermore, the composition and nature of the faunas were also poorly documented and understood. The poor stratigraphic and taxonomic constraints have hampered our understanding of the evolution of the SW Anatolian region as an aquatic biodiversity hotspot.

Especially the Denizli Basin has a remarkable, more than one kilometer thick succession with rich faunas including endemic hydrobiid snails and Pontocaspian cardiids that may help us to understand the biogeographic evolution of aquatic biota in the Anatolian-Aegean realm. So far, age estimates for these faunas range from the Late Miocene to the Pleistocene (Wesselingh et al., 2008 – Geobios 214; Alçiçek et al., 2015 – Palaeo3 437; Alçiçek et al., 2019 - Palaeobiodiversity & Palaeoenvironments 99; Rausch et al., 2019 – Geobios 57).

Here we summarize ongoing faunal studies from the Denizli and adjacent Baklan Basin. We distinguish five phases with different successive mollusk faunas. We provide new radiometric age estimates that show all successions to be of a Quaternary age. A major turnover event is identified in the Early Pleistocene, when a mixed Anatolian fauna with Paratethyan elements was completely replaced by a Pontocaspian-type of fauna. A new transitional fauna between the classical Denizli cardiid faunas dominated by Didacna species and the faunas from the adjacent Baklan Basin that only contain Monodacna documents the shift towards more modern type of Anatolian faunas. Our findings show that the biogeographic evolution of the region has been more dynamic than previously assumed and that both regional isolation and interchange with Paratethyan and Pontocaspian areas have been important in shaping the Anatolian biota of today.

IMPORTANCE OF HEMOLYMPH FLUID IN AQUATIC MUSSELS

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In mussels, one of the aquatic invertebrates, as in all other invertebrates, the organism's immunity is provided by the cells, hemocytes and factors in the hemolymph against harmful microorganisms. Hemolymph, the blood tissue analogue of vertebrates, is an important biological fluid in mussels with both its biochemistry and cells. For this reason, the hemolymph parameter has become one of the more popular analysis methods in aquatic toxicology studies. Hemocyte cells located in the hemolymph fluid have an important role, especially in immunological reactions. They enable the organisms to activate their immune system against pathogens, pollutants and abiotic conditions. The use of hemolymph fluid in both field and laboratory studies is important in terms of being a rapid technique. In mussel samples collected from the field, it reflects the biotic and abiotic conditions of the aquatic ecosystem where it was collected at the time of collection. In laboratory studies, it has the advantage of comparing experimental groups according to control groups in experiments carried out under controlled conditions. Therefore, it is important to determine the hemolymph parameters of mussels and to describe the morphological features of hemocytes.

Keywords: mussels, hemolymph, hemocytes

A STUDY ON THE DEMAND AND CONSUMPTION OF MALACOLOGICAL SPECIES IN SEAFOOD RESTAURANTS

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Malacology is the branch of invertebrate zoology that deals with mollusks. Many creatures, mostly crustaceans are examples of this group. The menus of seafood restaurants include malacological species such as scallops, octopus, and calamari, and are particularly preferred by foreign tourists. This research aims to provide information on seafood restaurant menus and consumer demands and consumption. The literature review did not find any study conducted on this topic in Türkiye and it was observed that the studies conducted focused on fish restaurants and fish consumption. In this context, semi-structured interviews were conducted with managers/owners of seafood restaurants operating in the Kocaeli and Bodrum and the results obtained through descriptive analysis were interpreted. The research universe consists of companies providing malacological seafood services in Kocaeli and Bodrum six restaurants were selected through purposive sampling. As a result of the research, expert opinions were obtained regarding the demand and consumption of malacological species in restaurants, a conceptual infrastructure of seafood was created and sectoral opinions were presented.

Keywords: Malacology, Seafood Restaurants, Menu, Kocaeli, Bodrum.

ANALYSIS OF CHILDREN'S BOOKS ON FRESHWATER AND SEA CREATURES

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Children's books offer important developmental support to children. Illustrated children's books play an important role in the formation of permanent and effective learning in children by supporting information about environments, situations and assets that are difficult or impossible to access with visual elements. The aim of this study is to examine the topics of aquatic creatures in preschool and primary school books. The study was conducted in 2024 with the survey method. The sample consists of illustrated children's books in a public library and two public kindergartens in Burdur province. The data were collected with a form developed by the researcher. A total of 5300 books were scanned. Among the scanned books, books on freshwater and marine organisms were examined according to the criteria list. The necessary information was recorded manually and using a computer. The data were analyzed by content analysis method. According to the findings, a total of 25 books dealt with aquatic creatures. The analyzed books are for children between the ages of 3-6 and 7-12. Seventeen of the books were published in Türkiye and eight in other countries. The books were published between 2012 and 2023. The main characters and side characters of the books analyzed are mostly aquatic creatures. In a small number of books, child characters were also included. Some of the characters in the book are fish, crab, octopus, snail, starfish, oyster, whale. The books deal with the environment, values education, the way of life of living things, and daily life relations. The messages given by the books are related to raising awareness about the environment, the living spaces of other living things, the way of life of these living things, their needs, cooperation, communication within the framework of the subject they deal with. The findings show that different living things are covered in children's books. However, it is important for sustainable life that these publications increase, environmental awareness increases, and that children respect nature and the living space of other living things in nature.

THE GASTROPOD FAUNA OF RIVA STREAM (ISTANBUL)

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Gastropods were collected seasonally at Riva Stream beginning from March 2018 to January 2019. In this study 6162 individuals of Gastropods were identified (1species belong to Prosobranchia (Bithynia sp.) 3 species belong to Pulmonata (Planorbis planorbis (Linnaeus, 1758), Physella acuta (Draparnaud, 1805) and Gyraulus albus (O. F. Müller, 1774). Also some physico-chemical parameters values (depth, width, flow rate, water temperature, dissolved oxygen, pH, electrical conductivity, salinity, TP, O-PO4, NH4-N, NO2-N, NO3-N, AKM) were calculated. Canonical Correspondence Analysis were determined to understand the relation of various physicochemical and biologic data by using the Past Statistics Program (version 4.02).

Keywords: Gastropods, biodiversity, aquatic ecology, freshwater.

LYMNAEIDAE OF TÜRKİYE: SPECIES DIVERSITY AND DISTRIBUTION

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Lymnaeidae, second largest family in Hygrophila, is among the most broadly studied taxa worldwide as members of this group is commonly encountered in various ecosystems. Regional distribution and ecology of the recorded species are described, and future research directions are briefly discussed.

Accordingly, Six genera with nine species occur in Türkiye: Ampullaceana (2 species), Galba (1 species), Lymnaea (1 species), Peregriana (1 species), Radix (1 species), Stagnicola (3 species).

Two of the Stagnicola species are endemic to Türkiye, both to Mediterranea Region, one in the Lakes Region and other in the Kayseri area.

FRESHWATER MOLLUSCS OF EĞRIOVA POND (ANKARA, TÜRKİYE)

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Eğriova Pond in the Beypazarı district of Ankara is an artificial pond created by the Special Administration of the Ankara Provincial Governor's Office and the Beypazarı Forestry Directorate. It was created to meet the needs of the local population for sports activities, picnics, rest and recreation areas. The area of the pond is 18.76 ha and its depth is 6 m. In this study, sediment samples were collected from five different stations on the shore of the pond to investigate the malacofauna of Eğriova Pond. The field studies were conducted in winter (2024) and spring (2024). In total 5 stations were evaluated by means of ecological characteristics (temperature, pH, electrical conductivity, total suspended solids, oxygen, secchi disc depth). NISP (number of identified specimens), and conchological measurements are recorded. The species are photographed by DinoLight camera. As a result of the research, a total of 9 species are identified. Radix auricularia (Linnaeus, 1758), Peregriana labiata (Rossmässler, 1835), Ampullaceana balthica (Linnaeus, 1758), Galba truncatula (O. F. Müller, 1774), Planorbarius corneus (Linnaeus, 1758), and Gyraulus albus (O. F. Müller, 1774) from the class Gastropoda; Corbicula fluminea (O. F. Müller, 1774), Euglesa pseudosphaerium (Ehrmann, 1933), Sphaerium corneum (Linnaeus, 1758) from the class Bivalvia. Among these species, R. auricularia, G. truncatula, P. corneus, C. fluminea, E. pseudosphaerium and S. corneum were recorded for the first time for Ankara. According to the 2024 IUCN Red List data, E. pseudosphaerium is recorded as "Vulnerable (VU)" category in Europe and its population is declining. The species identified in this study are euryoecious and support their presence in Eğriova Pond which is mesotrophic. The presented study will be an important data source for future malacofauna, biomonitoring and conservation studies.

THE USE OF MOLLUSCA SPECIES IN SUSTAINABLE GASTRONOMY: A CASE STUDY OF CALAMARI

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The increasing global population, coupled with environmental concerns and limited resources, has intensified the search for alternative protein sources. Seafood, with its low carbon footprint and high nutritional value, plays a crucial role in sustainable food systems. Specifically, mollusks such as calamari are emerging as significant alternatives due to their low environmental impact and high nutritional benefits. In this context, the question of "How will future nutrition evolve and how will sustainable food be provided?" has generated interest and defined the focus of this study. This conceptual study aims to evaluate the significance and utilization of calamari as a food source within the context of sustainable gastronomy, particularly among Mollusca species. Another objective is to explore how calamari might contribute to food safety and nutrition in the future. Such studies could help promote mollusks like calamari within the gastronomy world and enhance their adoption as part of sustainable food practices.

Keywords: Seafood, Mollusca species, calamari, sustainable food, gastronomy.

DISJUNCT DISTRIBUTIONS AMONG THE LAND SNAILS OF TÜRKİYE

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Disjunct distributions is among the most problematic subjects of biogeography as the perceived patterns can be resulted from vicariance, dispersal, extinction and introductions, or mixture of these. Türkiye is situated at the eastern corner of the Mediterranean area, which too is under focus of many biogeographers especially due to its refugial status during the Quaternary. What makes Türkiye further exceptional are the bridge forming geographical position, altitudinal and climatic variations, and disjunct or intricate distribution patterns in many faunal groups, as in the case of land snails. Land snails, many which are habitat specialists and slow dispersers, are sensitive to major changes in their environments even though some may thrive in small areas isolated from the remaining distributions of their conspecifics and/or relatives. Therefore, the clarification of a disjunct distributional pattern possess conservational importance along with the biogeographical aspect. Accordingly, disjunct distributions of some remarkable taxa from Türkiye are presented here with a brief discussion about the possible reasons behind on each.

ENDEMIC FRESHWATER MICRO-SNAILS (CAENOGASTROPODA: HYDROBIIDAE) OF SOUTHEAST ANATOLIA: TAXONOMY, DISTRIBUTION, AND CONSERVATION STATUS

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The purpose of this study is to provide a comprehensive overview of the endemic freshwater microsnail species in the Southeast Anatolia and highlight their distribution and conservation status. The Southeast Anatolia is one of the most extensively studied areas for freshwater snails. Pseudamnicola bilgini, P. intranodosa, Belgrandiella edessana, Radomaniola caputlacus, and Sheitanok amidicus are endemic hydrobiid species to Southeast Anatolia. S. amidicus is endemic to Diyarbakır, Adıyaman, Mardin, Batman, and Şırnak, while P. bilgini is endemic to Mardin, Diyarbakır, Şanlıurfa, Adıyaman, Siirt, Şırnak, and Batman. R. caputlacus is restricted to Adıyaman, while B. edessana and P. intranodosa are endemic to Şanlıurfa. Additionally, P. intranodosa, R. caputlacus, and B. edessana have only been identified at their type localities. The most widespread species endemic to Southeast Anatolia is P. bilgini. These microsnails exhibit shell sizes ranging from 1 to 2 mm on average. Their shells typically consist of 4 to 5 whorls. By emphasizing the unique nature of these species and their inclusion in the IUCN Red List, this research aims to raise awareness about the importance of protecting and preserving these rare and threatened snails. Furthermore, this study intends to contribute to the existing knowledge of the region's biodiversity and facilitate informed conservation strategies for safeguarding these endemic species from extinction.

Keywords: Freshwater snails, Endemic species, Southeast Anatolia, Conservation.

NEW LOCALITY RECORDS OF ECROBIA MARITIMA (MILASCHEWITSCH, 1916) (GASTROPODA: HYDROBIIDAE) FROM THE MEDITERRANEAN COASTS OF TÜRKİYE

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Ecrobia maritima (Milaschewitsch, 1916) genellikle denize yakın acısu bölgelerinde yaşar. Ukrayna, Bulgaristan ve Karadeniz kıyıları, oradanda Yunanistan ve Ege kıyılarına kadar dağılım gösterir. Bu çalışmada ise, Türkiye'de daha önce İzmir Karaburun'dan kaydı verilen türün Adana ve Muğla illerinden yeni lokalite kayıtları verilmiştir. Örnekler Adana'da Seyhan Nehri'nin denize döküldüğü noktadan, Muğla'da ise Dalyan İztuzu mevkiinden 2013 ve 2014 yıllarında toplanmıştır. Türün detaylı morfolojik teşhisleri yapılmış kuşlarla yada diğer taşınma yollarıyla taşınımları tartışılmıştır.

RESULTS OF THE SURVEY OF BULGARIAN ZOOLOGISTS IN VIETNAM (2018, 2023) WITH AN EMPHASIS ON GASTROPODS

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In 2018 and 2023, two scientific expeditions of Bulgarian zoologists were conducted in North and South Vietnam. The fauna of various habitats was studied and a large amount of zoological material was collected. The presentation covers some interesting species as well as published and forthcoming scientific papers, with a special emphasis on the land snails. The scientific contributions are summarized, as well as the future plans for research in Southeast Asia are discussed.

BEYSEHİR LAKE GASTROPODA SPECIES AND SPATIAL DISTRIBUTION

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This study was carried out to determine the Gastropoda species and spatial distribution of Beyşehir Lake. Sampling activities were carried out seasonally in 16 stations (7 coastal, 9 limnetic zone) in 2023. In samplings, 4 replicate were used in areas of 250 cm2 in the coastal zone, one replicate was used in the limnetic zone with a 15 cm x 15 cm sized Ekman grab. The samples were fixed in 70% alcohol under field conditions and then species identification and counting (individuals) were carried out in the laboratory. Species abundance (individuals/m2) was calculated according to the sampling method. As a result of the studies, 1234 specimens were obtained from 15 taxa belonging to the Gastropoda. It was determined that 72.3% (892 individuals) of these specimens were alive and 27.7% (342 individuals) were death. When the number of individuals and abundances of the species were analyzed, it was determined that the species with the highest number of individuals was Radix labiata (351 individuals). This species was followed by Planorbis carinatus (156 individuals). The species with the lowest number of individuals were Lymnaea stagnalis and Oxyloma elegans (5 individuals). Live individuals of Borysthenia naticina, Falsipyrgula beysehirana, Kirelia carinata could not be obtained. The live individuals obtained from the stations in the coastal zone constituted 96.6% (862 individuals), while the samples obtained from the limnetic zone constituted 3.4% (30 individuals). When the sampling stations were analyzed in terms of the number of individuals, the highest number was obtained from Gedikli Coastal Station (312 individuals). This station was followed by Gölkaşı Coastal station (246 individuals). The stations with the lowest number was Yeşildağ Limnetic and Depth-2 (1 individual). No live individuals were obtained from Fele, Budak and Gedikli stations in the limnetic zone. When the sampling stations were analyzed in terms of individual abundance, it was determined that Gölkaşı Limnetic station (444.44 individuals/m2) had the highest density. This station was followed by Karadiken Limnetic station (400 individuals/m2). The station with the lowest abundance was Fele Kıyı (9.67 individuals/m2). According to the data we obtained from our study, it was determined that live individuals intensively preferred the coastal zone. It is estimated that the death individuals obtained came from the coastal zone to the limnetic zone with water movements.

Keywords: Gastropoda, Distribution, Lake Beyşehir

MOLLUSC FAUNA OF KEPIR GLACIAL LAKE (MUNZUR GLACIERS, TÜRKİYE) AND SURROUNDING STREAMS

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This research was carried out August 2023 in the Kepir plateau in the Munzur Glacier mountains and the Mercan stream in its surroundings. A total of Bithynia sp. in Kepir Glacial Lake, 1 belonging to Prosobanchia (Bithynia pseudemmerica), 3 belonging to Pulmonata (Physella acuta, Galba truncatula, Radix labiata) and 1 belonging to Bivalvia (Pisidium casertanum) in Mercan Creek. 6 taxa were identified. In addition, water temperature, dissolved oxygen and pH values of each station were measured. Species and parameters in the region have been recorded for the first time. This research was supported by Istanbul University Scientific Research Project Project No. 39540.

GASTROPOD SPECIES AND SPATIAL DISTRIBUTION IN LAKE EĞİRDİR

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This study was conducted to determine the gastropod species and their spatial distribution in Lake Eğirdir. Sampling efforts were carried out seasonally at 16 stations (8 coastal and 8 limnetic regions) throughout 2023. In the coastal areas, a quadrat sampling method with four repetitions was applied using 250 cm² plots, while in the limnetic regions, a single repetition was performed using an Ekman dredge measuring 15 cm x 15 cm. The collected samples were fixed in 70% alcohol under field conditions, followed by species identification and counting (individuals) in the laboratory.

As a result of the study, 22 taxa from the class Gastropoda were identified in the lake, including Acroloxus egirdirensis, Bulinus truncatus, Theodoxus heldreichi heldreichi, Valvata kebapcii, Borysthenia naticina, Viviparus contectus, Bithynia pseudemmericia, Falsipyrgula pfeiferi, Graecoanatolica lacustristurca, Lymnaea stagnalis, Radix auricularia, Radix labiata, Stagnicola palustris, Physa fontinalis, Physella acuta, Ancylus fluviatilis, Planorbarius corneus, Bathyomphalus contortus, Gyraulus albus, Planorbis planorbis, Planorbis carinatus, and Hippeutis complanatus.

Among the identified species, Viviparus contectus was found to have the widest distribution. Additionally, Acroloxus egirdirensis and Bulinus truncatus were observed to be distributed in the Kayaağzı and Gelendost regions.

Based on the data obtained from our study, it was determined that live individuals predominantly prefer coastal areas up to a depth of 1 meter, while they avoid the limnetic region. The shells found in the limnetic region are thought to have been transported from the coastal areas by water movement. Due to the declining water levels in the lake, habitat loss in coastal areas is expected to have negative impacts on these species.

Keywords: Lake Eğirdir, Gastropoda, Spatial distribution.

TYPE SPECIES OF FOSSIL GASTROPODS AND BIVALVES FROM TÜRKİYE AND THEIR PALEOBIOGEOGRAPHIC AND BIOSTRATIGRAPHIC SIGNIFICANCE

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The aim of this study is to document only Cenozoic fossil taxa from the perspectives of biostratigraphy and paleobiogeography; therefore, extant taxa are excluded from this discussion. Gastropods and bivalves exhibit a wide range of environmental adaptations, from freshwater to brackish and marine conditions. Thus, this work provides not only a systematic list of type species from Türkiye but also discusses their paleoenvironmental and paleoecological characteristics from a general perspective. For systematic classification, the latest taxonomic revisions and updated nomenclature from online databases such as WoRMS* and MolluscaBase**, along with previous works, have been compiled. Among the gastropods, 1 subfamily (Pseudoamnicolinae Radoman, 1977), 8 genera (Sengoeria Harzhauser et al., 2016; Falsipyrgula Radoman, 1973; Graceanatolica Radoman, 1973; Koskinakra Kadolsky, 2016; Erentoezia Landau et al., 2013; Janssenia Landau et al., 2013; Europhos Landau et al., 2013; and Nisosyrnola Landau et al., 2013), 1 subgenus (Bessadrobia Schütt, 1992), 106 species, and 15 subspecies are presented. Among the bivalves, 2 subgenera [Cleidochandrella Freneix and Lefevre, 1967, and the former Pseudocardita Oppenheim, 1919 (now revised as Didacna)], 36 species, and 8 subspecies are systematically listed. Some of these taxa have been revised in subsequent studies and proposed as synonyms for other species. The history of paleontological studies on mollusks in our country dates back to at least the 1800s. Therefore, we can divide the historical compilation of mollusks into two periods: the pre-Republican era and the Republican era. In the pre-Republican period, until the early 1900s, British, German, and French researchers who came to the regions within the borders of what was then the Ottoman Empire primarily conducted geological and paleontological research, collecting numerous fossil specimens. Among these works, Oppenheim's (1919) study, which frequently describes many new species and subspecies, stands out as one of the most notable. During his fieldwork, Oppenheim (1919) collected mollusk specimens from numerous localities, including Western Anatolia, Thrace, the northwestern Black Sea region, and southern and central Anatolia. These researchers took the fossils they collected back to their home countries to form collections and later donated them to relevant museums. Although this tradition continued during the Republican era, Turkish researchers sent abroad for education under the directive of Mustafa Kemal Atatürk, and later their students, collected new fossil specimens from the early stages of the new Republic to the present. They shared these partially through joint studies and publications with their colleagues from abroad, but they also began to form their own collections. The awareness of collecting and Natural History Museum culture among Turks only began to develop during the Republican era and is still relatively new. Scientific efforts and initiatives to raise public awareness on this issue continue to this day.

Keywords: Cenozoic, Gastropoda, Bivalvia, Type taxons, Stratigraphy, Paleobiogeography.

THE MALACOLOGICAL SITUATION OF TURKIYE: PAST AND FUTURE

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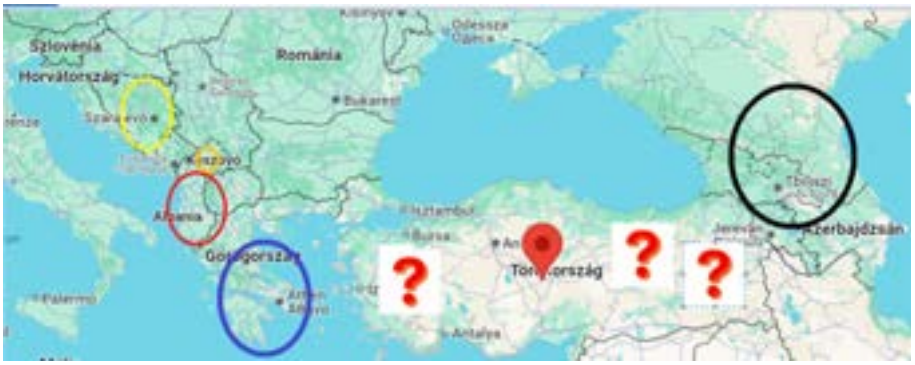
In the past few decades, the malacological exploration of Turkiye has developed at a rapid pace. The summary works of Burcin A. Gümüs, Ü.Kebabci and M.E. Gurlek, Serap K.Sahin, Nilay Dokumcu, Mehmet Z. Yildirim indicate rapid development. Unfortunately, the research and success of terrestrial and aquatic species, and the insufficient variation of methods, were left behind. This is reflected in the low number of discovered species.

If we compare the number of subterranean species in Türkiye: 11 (where the size of the limestone areas is huge: 313342 km²), either the limestone area of Georgia: 12476 km² or Bosnia 14827 km², or the 51 known subterranean species of Georgia in the Caucasus or the number of subterranean species known so far in various countries of the Balkans. Bosnai has around 100 subterranean species.



My colleague, Dr. Jozef Grego PhD, and I are offering our knowledge to Turkish youth, PhD students, for an international collaboration to better understand the Turkish Subterranean Mollusca fauna.

CEPHALOPOD STOCK ASSESSMENT APPROACHES AND MANAGEMENT MEASURES

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Literature analysis of methodologies used for assessment of stocks of squid, cuttlefish and octopus in the different areas of the World revealed a wide range of approaches. They encompass direct surveys of the stock, surveys of recruitment combined with depletion models, production models and combination of the different models. Some of methodologies are used in fisheries management (limitations set on catch, number of vessels or /and number of crew) some are at the stage of experiment. The most promising ways to solve the problem are production models adjusted for interannual environmental variability (so changing carrying capacity) for data-limited stocks, and either a combination of a recruitment survey combined with a depletion model or a two-stage model for data rich stocks.

CLIMATE-INDUCED CHANGES IN THE LIFE HISTORY OF THE COMMON CUTTLEFISH IN THE ENGLISH CHANNEL

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The population of common cuttlefish Sepia officinalis in the English Channel recently developed two life cycles: annual (spawning 1 y.o.) and biennial (spawning 2 y.o.) instead of the biennial strategy known before, associated with increasing environmental temperatures in recent decades because of climate changes. Both groups differ in the size of mature animals (110–196 mm mantle length vs. 140–262 mm) and the number of chambers in the cuttlebone (60–97 in annual vs. 93–152 in biennial). The annual group represented some 15%–20% of the population, and the proportion of early spawners increased during the reproductive period, from 3%–5% in February/March to 50%–70% in June/July. Among spawning cuttlefish males predominated as ~2:1. Such environmentally driven changes in historical ecology as exemplified by the cuttlefish might be a critical link in the adaptation of the cephalopod life cycles to changing ecosystems.

FROM RED LIST ASSESSMENTS TO CONSERVATION ACTION: EUROPE

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Between 1996 and 2024, the IUCN SSC Mollusc Specialist Group has assisted with the assessment of nearly 10,000 species of Mollusc on the IUCN Global or Regional Red Lists (latest version 2024.1). This spans marine (18.6%), Freshwater (41.5%) and Terrestrial (38.5%) ecosystems. Over 3000 of these were a comprehensive assessment of all Non-marine Molluscs.

The most severe threats to Molluscs remain 1) habitat loss through urban expansion, 2) pollution from sewage, 3) pollution as result of agricultural activities, 4) mining and quarrying and 5) exploitation of water sources. However upcoming threats in Europe that have become more dominant in the last 5 years include "increased frequency and intensity of fires" and include "increased frequency and intensity of drought events", and "impact from named invasive non-native species" such that these three threats are becoming common threats at a global level, rather than more localised threats.

The Red List documentation allows for the identification of actions required to mitigate and reduce the threats to Molluscs on a world-wide basis and this data could be used to streamline conservation actions into country-level plans.

At Conference of the Parties in 2022, nations agreed to a new action plan for the decade 2020-2030: the Kunming-Montreal Global Biodiversity Framework (KMGBF). This plan is designed to halt and reverse biodiversity loss by 2030, to stop extinctions and recover species populations, and restore ecosystems by the end of the decade. This provides an opportunity for malacologists to champion the integration of more molluscs.

To improve conservation action, we need to:

1) Develop multispecies conservation plans eg. European freshwater bivalves with policy actions at regional levels, conservation and monitoring actions at catchment levels.

2) Identify species and sites for CBD Target 1: reduce biodiversity loss - freshwater bivalves in Europe, terrestrial species on the continent and islands.

3) Undertake Action plans for threatened species CBD Target 4: eg Desertas Land Snail project.

4) Where threatened species occur in an existing Key Biodiversity Area get them added to the local management plan (Western and Eastern Mediterranean Freshwater Molluscs.

5) Suggest new methods for monitoring threatened species (eg E-DNA)

6) CBD Target 2: 30% restoration of degraded areas by 2030: ensure any actions are not damaging to existing fauna and will benefit threatened molluscs where present.

BLACK MUSSELS: THE BIRTH OF A NEW INDUSTRY (TÜRKİYE)

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Mytilus galloprovincialis L.1819, a bivalve aquatic product that has both ecological and economic importance for aquatic systems, is a very valuable food due to its rich content of protein, fat, carbohydrate (glycogen) and various vitamins. The water quality, physical, chemical and microbiological optimum conditions must be present in the cultivation of these creatures that feed by filtering seawater. Therefore, the environment and conditions in which they are cultivated are very important in terms of food safety. In recent years, farms have been established and operated in production areas determined by the Ministry of Agriculture and Forestry for the safe consumption of black mussels (Mytilus galloprovincialis) in Türkiye. In this study, information will be provided about the establishment stages of a mussel farm in Türkiye, cultivation techniques, harvesting processes, equipment and systems used for this work.

Keywords: Mytilus galloprovincialis, farming systems, aquaculture, Türkiye

CEPHALOPOD REPRODUCTIVE BIOLOGY

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Cephalopoda is a class of phylum Mollusca that has about 800 species defined by now and distributed all oceans except the seas have low salinity such as Black Sea and Baltic Sea and none in fresh waters. They can be found from surface waters to 5000 m depths with pelagic and bethic lifestyles. They can migrate vertically and also thousands of kilometers horizontally. Their sizes also vary from 1 cm in total length in Idiosepius spp. and 15 m in giant squid Architeuthis spp. Bearing these variations gives cephalopods many different reproductive features and we can see an animal's reproductive physiology, strategy and even behaviours by inspecting its morphological characters. There are just two subclasses (except fossil ones) of Cephalopoda: Nautiloidea and Coleoidea. All cephalopods distributed in the Mediterranean Sea belong to the subclass Coleoidea. All cephalopods are separate sexes, and there is no hermaphroditism seen. In their relatively short life time, they have just one reproductive season and after the reproduction ends they die which is so called semelparity. They don't have larval stage and juveniles grow fast. A semelparous animal dies after reproduction such as in Salmonidae and Anguillidae fish families and also in Coleoid cephalopods. Only iteroparous cephalopods belong to the subclass Nautiloidea. General female anatomy contains an ovary in which the oocytes are produced and grow, an oviduct or two oviducts depending on the species to contain ripe eggs ready for spawning, and in some species a pair of nidamental glands to excrete secretions for protecting spawned eggs. Whereas the males have testis to produce sperms, spermatophoric organ complex to produce spermatophores in which the sperms are stored, and a needham's sac to store spermatophores. A spermatophore has sperm reservoir, cement body, head and tail. The male brings a bunch of spermatophores with his specialized arm called hectocotylus in some taxa, and puts them onto the females tissue, mantle or just puts a spermatophore inside the female's mantle as seen in octopods. On the samples collected for reproduction study, some measurements must be taken such as mantle length and body weight of the animal. Then the maturity stage is defined by following a maturity scale after disection. After removing reproductive organs, their weights must be taken. All oocyets (or from subsamples) are needed to be counted and measured, and for males all spermatophores to be counted and measured. After then, the data is collected to make some calculations like gonadosomatic index, potential fecundity etc. There are three types of ovulation described for cephalopods which are Asynchronous if the ovary contains oocytes from all size groups at the same time in a mature female, Group-synchronous if there are some gaps between the size groups, and Synchronous if there is just one group of oocyte found in the ovary. Potential fecundity of the animal means all oocyte stock the females have but not means all oocytes will be spawned. After collecting some spent animals, there are still some unspawned eggs left inside the ovary but potential fecundity can give us an opportunity to compare the reproductive strategy of the animal studied. According to Koppeler (2012) reproductive strategies represent a set of behavioral, morphological, and physiological adaptations that facilitate access to potential mates, improve the chances of mating and fertilization, and enhance infant survival. There are some reproductive strategies reflecting the life styles of the animals could be described for Cephalopoda in the light of collected data from samples mentioned above; for example, in benthic lifestyle, the animals tend to have lower fecundities with larger oocytes and benthic juveniles because of the stability of benthic environments. On the other hand, benthopelagic lifestyle requires higher fecundities, smaller oocytes with planktonic paralarvae. In holopelagic lifestyle females must protect their fertilized eggs onto their bodies as in pelagic octopods Tremoctopus violaceus and Argonauta argo, even show ovoviviparity as in Ocythoe tuberculata in such unstable, unsecure pelagic environments. Studies on reproductive biology of cephalopods are very important because they are different than fish, and so it requires different approaches to protect populations and make better managements on their fisheries.

REFLECTIONS OF AQUACULTURE ON ART AND DESIGN

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Water is the source of life for all living things. It is the most basic substance for living things to sustain their lives. 4/3 of the world is covered with water. Most of the water in the earth is found in the oceans and only 2.5% of it consists of fresh water. All living things on earth benefit from water. An important part of developed societies and trade routes were established where there is water. There are many values that this substance, which is of great importance for life, adds to the earth. Cleaning and nutrition are at the forefront of these.

While the waters have been the centre of life for some living things, they have also been the areas where many living things feed. These living things it hosts are called aquaculture. The benefits of aquatic products to nature are quite high. In addition, it also offers nutrition to humans and other living things.

People have drawn all kinds of creatures that make their lives easier and used them at different times and places. Looking at the art history of societies, traces of aquatic creatures are found. It is possible to reach these coincidences through literature and art. People have used decorative products, clothes, objects and models to beautify the environment they live in. These can be defined by different branches of art. It is possible to see aquatic products in these arts.

Aquatic products develop within architecture and handicrafts and exhibit a rich profile including ceramics, wood, stone, textile, glass, metal, book decoration arts, etc. These products have contributed to the ornamentation and design style by being used in various branches of art.

In this context, it is aimed to investigate the purposes of use, techniques used and material properties of water products used in handicrafts. In line with this goal, a qualitative and observation-based method will be used. This study is important for the transfer of aquatic products to future generations through art.

PRELIMINARY STUDIES AND USE OF TECHNOLOGY IN AQUACULTURE PROJECTS: AN OVERVIEW WITH A FOCUS ON MUSSEL FARMING

Oğuz Olgaç ERİŞTİ, Meryem TAŞKAYA

Aquaculture is an essential and rapidly growing field for sustainable food production and the conservation of marine ecosystems. This research presents an integrated approach to preliminary studies and the use of technology in aquaculture projects. Specifically, we summarize the effectiveness of oceanographic, hydrographic, topographic, and meteorological studies conducted using remote sensing technologies, as well as optical and seismic technologies, to optimize planning and operational efficiency in mussel farming and related industries.

Public authorities often require datasets with low horizontal and vertical resolution for the planning of aquaculture systems. However, such datasets fall short in providing optimal data for systems that interact directly with the environment, making it difficult to guarantee reliable returns on investment. Instead, they primarily offer data to support environmental protection and ensure the product is grown at a sustainable, rather than maximum, yield. To achieve safer economic investments and efficient operations, it is necessary to allocate about 3-4% of the total project cost to preliminary feasibility studies.

Gence Teknoloji contributes to the sector with advanced oceanographic, meteorological, hydrographic, and topographic analyses, using both cutting-edge inspection equipment and proprietary methods. Raw data are delivered to users through graphs and meaningful three- dimensional maps, enabling digital navigation across temporal and spatial resolutions. Horizontal and vertical resolutions are converted into visualized oceanographic data maps, enhancing decision-making processes.

Presenting unstructured data–such as millions of unsorted values or thousands of pages of textual reports–does not effectively support users' decision-making. Therefore, Gence Teknoloji applies modern presentation and reporting techniques to deliver its findings in a user-friendly format.

1. Oceanographic Analysis

Oceanographic research includes the measurement of wave height, shape, direction, and speed; the direction and speed of ocean currents; horizontal and vertical temperature distribution; organic and inorganic material distribution; turbidity; and chemical parameters. It also involves the study of functional organic molecules like chlorophyll a, b, and c. While many of these parameters can be obtained through remote sensing methodologies, fieldwork remains the backbone of any feasibility study. Remote sensing data are calibrated with field data to enhance their reliability, and regression or convolution analyses from various data sources further extend the spatial datasets.

2. Topographic Analysis

Topographic analyses involve the three-dimensional measurement of the seafloor topography and sediment analysis at depths of at least 10 meters. Visual inspections using underwater drones are conducted to detect topographic formations and benthic or pelagic organisms. These surveys also play a crucial role in the preservation of underwater cultural heritage.

3. The Role of Autonomous Screw Anchors in Mussel Farming

Among aquaculture systems, mussel farming requires the most anchoring, with screw anchors recognized for their stability and low operational costs. However, deploying these anchors at depths exceeding 50 meters presents challenges. The "Autonomous Screw Anchor Project," developed by Gence Teknoloji and supported by TÜBİTAK and approved by Yıldız Technical Technopark, addresses these challenges by enabling remote operation. This innovative technology ensures precise anchor placement at appropriate angles for various seabed conditions, streamlining both installation and maintenance efforts.

4. Technological Evolution in Mussel Farming Equipment

The first mussel farming machines in Türkiye were adapted from models originating in New Zealand, Italy, and Spain. These early designs were reverse-engineered without accounting for local conditions, resulting in operational inefficiencies. Recent advancements have focused on addressing issues such as component failures by redesigning hydraulic systems and enhancing power capacities. For instance, hydraulic cranes used in mussel farming now incorporate gears that act as fuses to prevent motor failure under heavy loads, ensuring smooth operations with minimal downtime.

5. Mussel Boats and Operational Optimization

Mussel boats are designed to meet modern safety standards while providing operational platforms for harvesting and seeding. The design process considers factors such as friction coefficient, balance, and operational range to optimize fuel consumption and operational efficiency. These factors are essential to ensure the boats are adapted to local geographical and meteorological conditions.

6. Elastic Rope Systems

Elastic rope systems are designed to safeguard aquaculture systems and their biomass from the negative effects of meteorological and oceanographic dynamics. These systems minimize infrastructure stress by absorbing the impact of surface water movements, preventing stock losses caused by cage ruptures, rope breaks, or net tears. Additionally, they stabilize production lines during storms, preventing the detachment of mussel stocks from the system.

Conclusion

From autonomous systems to advanced mechanical designs, the integration of innovative technologies plays a crucial role in the sustainable development of aquaculture. By addressing both environmental challenges and operational inefficiencies, these technologies provide comprehensive solutions for future aquaculture projects. This overview emphasizes the importance of a multidisciplinary approach that combines oceanographic, hydrographic, topographic, and meteorological studies with engineering expertise to achieve sustainability and operational excellence in aquaculture.