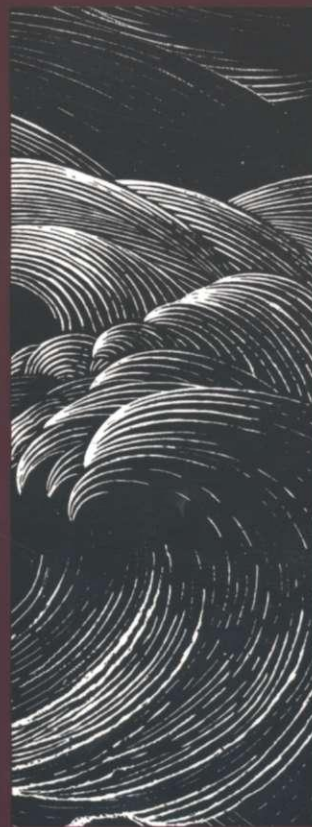


BLACK SEA BIOLOGICAL DIVERSITY

UKRAINE



BLACK SEA ENVIRONMENTAL SERIES VOL: 7

Ukrainian National Report

BLACK SEA ENVIRONMENTAL SERIES

The Black Sea Environmental Series consists of thematic regional studies undertaken as part of a programme for improved management of the Black Sea environment. The Black Sea Environmental Programme (BSEP) was initiated in June 1993 at the urgent request of the governments of Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine. The BSEP, funded by the Global Environment Facility and a number of collateral donors, is managed by the United Nations Development Programme (through UNOPS) in close cooperation with the World Bank and the United Nations Environment Programme, and donors. It closely coordinates the work of governmental and international experts, specialist UN Agencies, and national and international NGOs. The BSEP sets out to provide a sustainable basis for managing the Black Sea through capacity building, environmental assessment, the development and harmonization of policy and legislation, and by facilitating appropriate environmental investments. It was instrumental in assisting the Black Sea governments to develop the Black Sea Strategic Action Plan, signed by the six Ministers of the Environment on 31 October, 1996. The Action Plan sets out a pragmatic strategy for rehabilitating and protecting the Black Sea in the coming decades. The Black Sea Environmental Series is brought to a wider audience in order to provide a baseline of peer-reviewed quantitative information on the Black Sea which can be employed by managers, researchers and teachers. The studies also serve as case histories for the eventual application of concepts agreed at the 1992 Rio de Janeiro "Earth Summit" and which are embodied in "Agenda 21". Widely considered as the most damaged sea on our planet, the Black Sea should serve as an example to future generations of mankind's ability to understand, save and protect an internationally shared resource.

GEF Black Sea Environmental Programme

Black Sea Biological Diversity Ukraine

Compiled by

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Prepared in

Odessa Branch, Institute of Biology of Southern Seas
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Ukraine

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The findings, interpretations and conclusions expressed in this publication are entirely those of the authors and should not be attributed in any manner to the Global Environment Facility, its affiliated organisations or the countries that they represent.

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Introduction

The main objective of this study is to give a general, systematic overview of the biodiversity of the Ukrainian waters of the Black Sea and Azov Sea which will then serve as a scientific basis for the preparation of national and regional strategies for the conservation, sustenance and utilisation of the biological resources of the sea and coastal water bodies. The main tasks are:

- to determine the main categories of biotopes (habitats), their boundaries and other main determining parameters of the environment;
- to describe the structure and species composition of the main living forms: i.e. plankton, nekton, benthos;
- to describe the characteristics of key species: background, dominants and edifiers of communities, endemics, relicts, invasive and introduced species;
- to describe the characteristics of rare, endangered and protected species; to determine the biodiversity features of the biotopes in the Ukrainian part of the Azov Sea;
- to describe the characteristics of the main biocoenoses of the selected biotopes of the Black Sea;
- to assess the contemporary changes in the ecosystem of the Black Sea according to the criterion of biodiversity;
- to describe the characteristics of the protected territories and the representative flora and fauna of the coastal zone of the Black and Azov Seas;
- to detail activities implemented conducted for the conservation of biodiversity and recommendations for its further protection and amelioration.

Executive Summary

The length of the Ukrainian Black Sea coastline is 1,628 km. Ukrainian territorial waters extend 12 nautical miles off the coast and cover an area of approximately 24,850 km². The area of the rest of the shelf up to the 200m isobath is equivalent to 55,750 km² or 57% of the total Black Sea shelf.

There are 14 main limans and estuaries with a total area of 1,952 km². The water salinity ranges from 0.3 to 296.0 ppt. There are eight gulfs with a total area of 1,770 km² and a salinity of 3.0-18.5 ppt. The main rivers are the Danube, Dnestr, southern Bug, Ingulets and Dnepr.

The main rivers entering the Ukrainian Black Sea are the Danube, Dnestr and Dnepr. They have a combined drainage area of 1,400,000 km², accounting for two thirds of the whole catchment basin. The annual river runoff of these rivers is about 243.8 km³.

The low water levels of the Crimean rivers, which have an average annual river runoff of 0.88 km³, means that they do not have a significant impact on the shelf ecosystems.

The Ukrainian coast of the Black Sea and the Azov Sea is rich in different kinds of wetlands, such as marine, brackish-water and freshwater. Fourteen of them have varying degrees of protection. Some of the wetlands are large (Eastern Sivash - 165,000 ha. Karkinitsky and Dzharylgach Bays - 87,000 ha, Tendrovsky Bay - 38,000 ha): others are smaller (Krivaya Bay and Krivoi Peninsula - 1,400 ha, the coast from Chernomorsk to Cape Uret in Crimea - 9,600 ha). There are a total of 19 marine wetlands in Ukraine, of which 11 are in the Black Sea and eight in the Azov Sea. They have a total combined area of 635,000 ha.

The area of the main Ukrainian northwestern shelf north from Cape Tarkhankut to Zmeiny Island is 48,600 km² and the water volume 1,150 km³ at an average depth of 23.7m. The sediment is made up of clay, sand and shells.

Among the many islands of the Black Sea only three are of any size. These are the islands of Berezan (Schmidt), Zmeiny and Kefken.

Zmeiny island is the only one to be located far offshore at a distance of 35 km from the mainland. It has an area of almost 18 hectares and a coastline of 1,970m.

A total of 4,289 plant and animals species have been recorded in the Ukrainian Black Sea. They include: bacteria (25 genera), fungi (175 species), phytoplankton (471 species), zooplankton (1,061 species), microphytobenthos (346 species), macrophytobenthos (258 species), higher aquatic plants (159 species), meiobenthos (497 species), macrozoobenthos (875 species), fish (154 species), marine mammals (4 species), and marine and freshwater parasites (264 species) in 84 bird species and four species of marine mammals.

The main benthic biocoenoses are: the bivalve *Modiolus phaseolinus* (55-225m on silty sediments, 31-85 taxa, 1.7-230.0 g.m⁻²); the polychaeta *Terebellides stroemi* (50-100m on silty sediments, 27 taxa, 0.2-17.6 g.m⁻²); the polychaeta *Melinna palmata* (12-35m on silty and silty-sandy sediments, 47 species, 30 g.m⁻², on average); the bivalve *Gouldia minima* (20-50m on silty- sandy sediments, 106 species, 7.5-12.0 g.m⁻²); the

bivalve *Venus gallina* (7-30m, on sandy sediments, 140 species, 8-1,010 g.m-2); the mussel *Mytilus galloprovincialis* (0-55m, on silt, sand and all types of hard substrates, 105 species, 1-65,300 g.m-2), the soft-shelled clam *Mya arenaria* (1-26m, on sandy and silty-sandy sediments, 76 species, 38-2.400 g.m-2); the bivalve *Lentidium mediterraneum* (0-20m, on sandy sediments in shallow-water low salinity areas, 40 species, 47.4-114.0 g.m-2); the red alga *Phyllophora* (10-60m, 118 species of invertebrates and 47 species of fish, average biomass 1,360.7 g.m-2); the sea-grass *Zostera* (0.2-12 on sandy and silty-sandy sediments, 70 species, 850-4,260 g.m-2); the brown alga *Cystoseira* (0-15m, on rocky substrates, species, 470-3,960 g.m-2).

Since the 1950s the volumes of nutrients and organic substances introduced into the northwestern shelf of the Black Sea by the Danube, Dnestr and Dnepr rivers have increased about tenfold. The northwestern shelf has now become the largest hypertrophic area in the whole Mediterranean Basin, which stretches from the Straits of Gibraltar to the Azov Sea. The chain of biological consequences of this excess nutrient run-off can be summarized as follows:

Phytoplankton Blooms

The immediate consequence is an outburst of phytoplankton, especially dinoflagellates, euglenoids, and different species of picoplankton. The most vivid examples of such phytoplankton blooms occur on the northwestern shelf. In the 1950s the share of peridinians in the total phytoplankton biomass was 18.8%, but in the 1980s it reached 54.4%. Red tides caused by blooms of peridinians have become common phenomena on the northwestern shelf.

Blooms of One-celled Animals and Jellyfish

Another consequence of phytoplankton enrichment has been the increase in the number of some herbivore and detritivore zooplankton species. The most typical forms are the flagellate *Noctiluca scintillans*, the infusorian *Mesodinium rubrum*, the jellyfish *Amelia aurita*, some rotatorians, the cladoceran *Pleopis polyphemoides* and the copepod *Acartia clausi*.

The Decline in Populations of Large Planktonic Crustaceans

The populations of relatively large pelagic crustaceans, including carnivores, mixotrophes and even herbivores, began to decline; e.g. populations of the neustonic Pontellidae, *Centropages kroyeri*, the zoea and megalopa of crab etc. This effect could be explained by the concentration of toxicants in the surface microlayer. The decrease in crab populations can be assumed to be due to hypoxic conditions on the shelf.

Decreasing Water Transparency and the Reduction in Benthic Macrophyte Communities

A decline in water transparency causes a weakening of the photosynthesis of bottom algae due to low light penetration and a reduction of the shelf macrophytocoenosis, except for

those very shallow forms close to the edge of the sea. This change has been typified by the degradation of Zernov's Phyllophora field. The red *Phyllophora* has practically disappeared and the northwestern shelf has, as a result, lost an important habitat for marine invertebrates and fish and a rich source of oxygen.

Hypoxia and Mass Mortalities of Bottom Animals

Sedimentation on the shelf of large amounts of dead phytoplankton is a result of cultural eutrophication. The decomposition of this organic material causes hypoxia and even anoxia in the near-bottom layers of water. The formation of large hypoxic areas is a new phenomenon in the Black Sea ecosystem, first recorded in August - September 1973 on the northwestern shelf. In more recent years, cases of mass mortality of benthic organisms from hypoxia have become commonplace; the scales depending on the meteorological, hydrological, hydrochemical and biological peculiarities of each summer season. The biological losses due to hypoxia on the northwestern shelf are estimated at 100-200 t of organisms per square kilometre of bottom area. The total biological losses over 18 years (1973-1990) are estimated at 60 million t, including 5 million t of fish, both young and adult, comprising both commercial and non-commercial species.

Decreases in the Invertebrate Standing Stock

As a result of hypoxia, silting and other factors, the standing stock of Black Sea organisms has decreased markedly. In the early 1960s, the total mussel biomass on the northwestern shelf was about 10 million t. In the 1980s, the mussel biomass had fallen to a little over 3 million t, with juveniles predominating. The oyster *Ostrea edulis* is very sensitive to silting and has now almost completely disappeared from the northwestern shelf where, in the late 1950s, there were once more than 50 million individuals. The populations of crabs, hermit crabs, ghost shrimps (*Callinassa*), and bottom fish such as turbot, which were also very common on the northwestern shelf until the 1960s, have also practically disappeared.

Increases in the Populations of Fish Inhabiting the Shallow Sub-littoral Zone

Over the last 5-7 years, there has been a noticeable increase in the population of small shore fish like the silverside, *Altherina mochon pontica*, the sand lance *Gymnammodites cicerellus*, the transparent goby *Aphia minuta*, the blenny *Blennius tentacularis* and other species immune to predation by *Mnemiopsis leidyi*. In the 1980s a new inhabitant of the shallows became acclimatised to the Black Sea, the grey mullet *Mugil so-iuy*, which originates in the Amur river estuary and the brackish water areas of the .

The main direct human impact on the biodiversity of the Black Sea is the accidental introduction of species from elsewhere in the ballast and bilge waters of sea-going ships and the international introduction of exotic commercial invertebrates and fish. The largest changes to the Black Sea biocoenoses took place as a result of the penetration and autoacclimatisation of new species such as the gastropod *Rapana thomasina* (first recorded in 1947), the bivalve molluscs *Mya arenaria* and *Scapharca inaequalis* (1966 and 1982 respectively), and the comb jelly *Mnemiopsis leidyi* (1982).

The following commercial marine organisms are common to the Ukrainian Black Sea and marine wetlands: the red algae *Phyllophora* (five species, *Ph. nervosa*, *Ph. brodiaei*, *Ph. pseudoceranoides*, *Ph. membranifolia*, and *Ph. traii*), the sea grasses *Zostera* (two species, *Z. marina* and *Z. nana*), molluscs (*Mytilus galloprovincialis* and *Rapana thomasiana*), crustaceans (*Artemia salina*, the amphipod *Pseudogammarus maeoticus*, the crayfishes, *Astacus astacus*, *Pontastacus leptodactylis*, *P. pipachypus*, *P. cubanicus*, *P. eichwaldi*, the shrimps *Palaemon adspersus*, *P. elegans*, and *Crangon crangon*), the insects (*Chironomus plumosus* and *Ch. salinarius*) and fish. In 1960-1970 there were 26 species of commercial fish; in 1980-1995 only six (*Sprattus sprattus phalericus*, *Alosa kesleri pontica*, *Engraulis encrasicolus ponticus*, *Merlangius merlangus euxinus*, *Trachurus mediterraneusponticus*, and *Mugilso-iuy*).

There are four reserves in the Ukrainian coastal zone: the Dunaiskie Plavni Nature Reserve (14,851 ha, 78 Red Data Book species), the Chernomorsky Natural Biosphere Reserve (87,348 ha, 126 Red Data Book species), the Mys Martyan Reserve (240 ha) and the Karadag Nature Reserve (2,856 ha).

Proposals have been made for activities on the protection of biodiversity on local, national and regional levels.

Physical-Geographical and Socio-Economic Profile of the Ukrainian Black Sea

The length of the Ukrainian Black Sea coast is 1,628 km (Shuisky, 1989), which is approximately 37% of sea's entire coastline. Ukraine's territorial waters extend 12 nautical miles offshore and cover a total area of 24,850 km². The area of the remainder of the shelf up to the 200 m isobath is equivalent to 55,750 km² or 57% of the whole shelf (Zaitsev, 1992). Ukraine also has 1,207 km of coastline on the Azov Sea (Shuisky, 1989). The main geographical features of Ukraine, such as gulfs and bays, rivers, estuaries, islands, reserves, cities and wetlands, are shown on the general map (Fig. 1).

The main rivers entering the northwestern Black Sea are the Danube, Dnepr and Dnepr, which have a total drainage area of 1,400,000 km², making up two thirds of the whole catchment basin, and an annual runoff of about 243.8 km³. The Crimean rivers, such as the Alma, Kacha and Balbek, have a total mean annual river runoff of only 0.88 km³ and do not have a significant influence on the shelf ecosystems.

The population of coastal cities of Ukraine makes up 36% of the total population of the whole Black Sea coast.

The most common types of coasts are shown in Fig. 2. The northwestern Black Sea coast is characterised by a diversity of marine water bodies such as deltas, estuaries, limans, lagoons and wetlands (Fig. 1) and a commensurate variety of marine, brackish and freshwater plant and animal species which are influenced by a wide range of environmental conditions (Table 1, 2).

The Ukrainian northwestern shelf north of Cape Tarkhankut covers an area of 48,600 km², with a total water volume of 1,150 km³ at a depth of 23.7 m. The sediment is made up of clay, sand and shells. The central part of the shelf is occupied by Zernov's Phyllophora field of red algae, primarily *Phyllophora nervosa*. The shallow water is covered by seaweed, such as *Zostera marina*.

Table 1. Some Characteristics of Ukrainian Limans and Estuaries

Water Bodies	Area, km ²	Depth, m		Temperature, C °		Salinity, ‰		Bottom
		Ave.	Max.	Winter	Summer	Min.	Max.	
Sasyk, liman	200	1,5	3,9	0	26	1,2	2,5	muddy
Shagany, liman	74	1,3	2,2	0	27	17	35	muddy
Alibey, liman	72	1,4	2,5	0	27	16	39	muddy
Burnas, liman	23	1,0	2,1	0	27	16	38	muddy
Shabolat, liman	30	1,0	2,2	0	26	8	24	muddy
Dnestrovsky, estuary	360	1,3	2,7	0	25	0,3	16	sandy
Sukhoy, liman	30	5,0	12	0	25	5	17	sandy muddy
Hadjibeysky, liman	70	5,0	13,5	0	26	1,5	4	muddy
Kuyalnik, liman	58	3,0	7,0	-1,0	27	50,0	296	muddy
Dofinovsky, liman	7	0,8	1,8	0	27	5	27	muddy
Adzhalyk, liman	8	1,5	7	0	26	8	13	sandy muddy
Tiligulsky, liman	160	4,5	21	0	25	0,4	14	sandy muddy
Berezansky, liman	60	3,3	15	0	25	3	13	muddy
Dneprovsko-Bugsky, estuary	800	65	12	0	25	1,3	14	muddy sandy

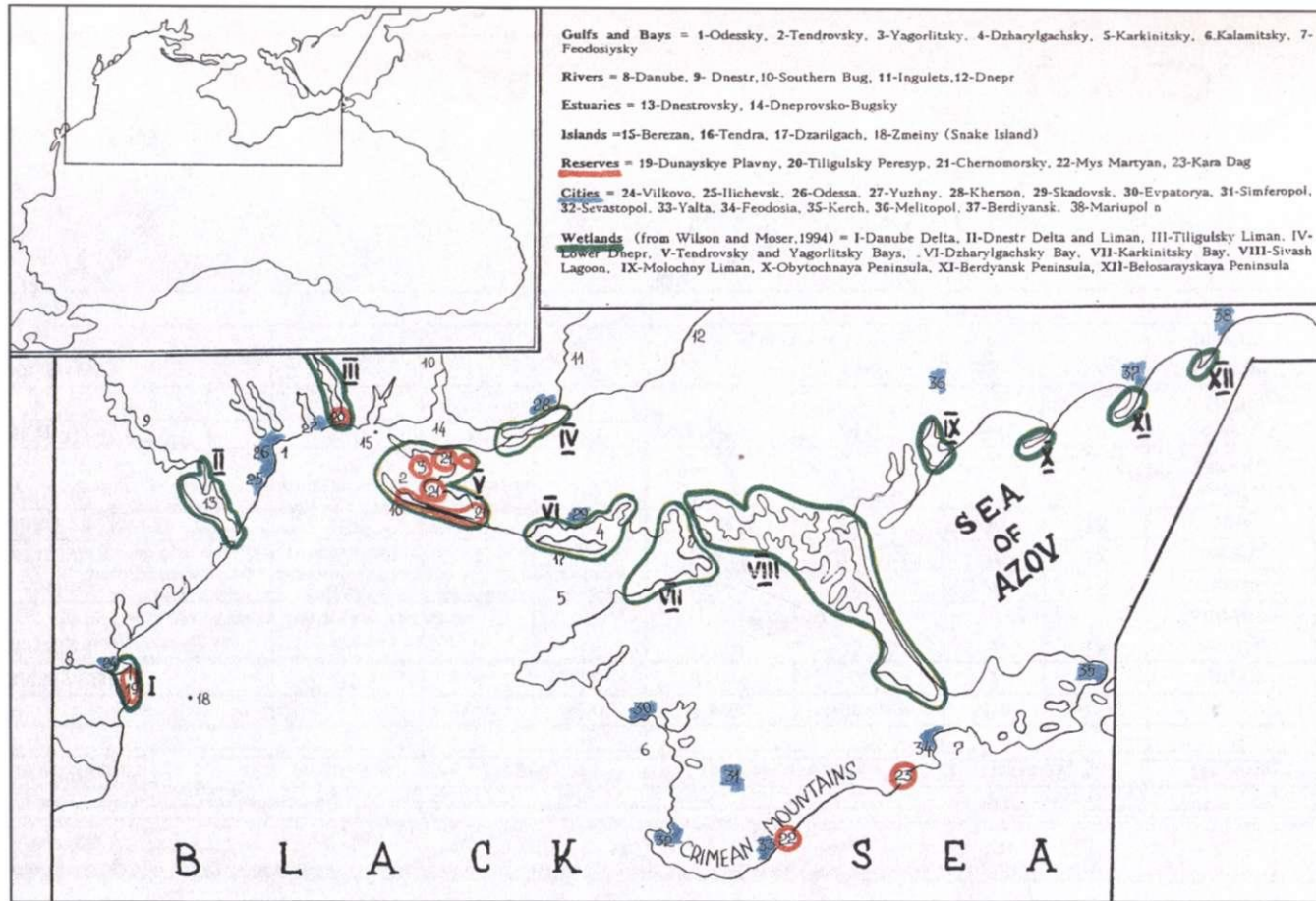


Fig. 1 General map of the Ukrainian sectors of the Black Sea and the Sea of Azov.

Table 2. Some Characteristics of the Largest Gulfs Along the Ukrainian Coast of the Black Sea

Water Bodies	Area, km ²	Depth, m		Temperature, C °		Salinity, ‰		Bottom
		Ave.	Max.	Winter	Summer	Min.	Max.	
Zhebriyansky	95	4	12	0 +4	26	3	14	muddy
Odessky	40	5	14	0 +4	25-26	3	18	sandy muddy
Yagorlitsky	400	2	5	0 +3	26-27	26	18	sandy
Tendrovsky	320	2	10	0 +5	26-27	20	18	sandy
Dzharilgatsky	160	2	10	0 +5	26-27	26	18	sandy
Karkinitzky	15	12	36	1 +4,5	24-26	27	18,5	sandy muddy
Kalamitsky	530	10	30	0,7 +5	24-25	27	18	sandy muddy
Feodosiysky	210	10	29	4 6	24-26	26	18	sandy muddy

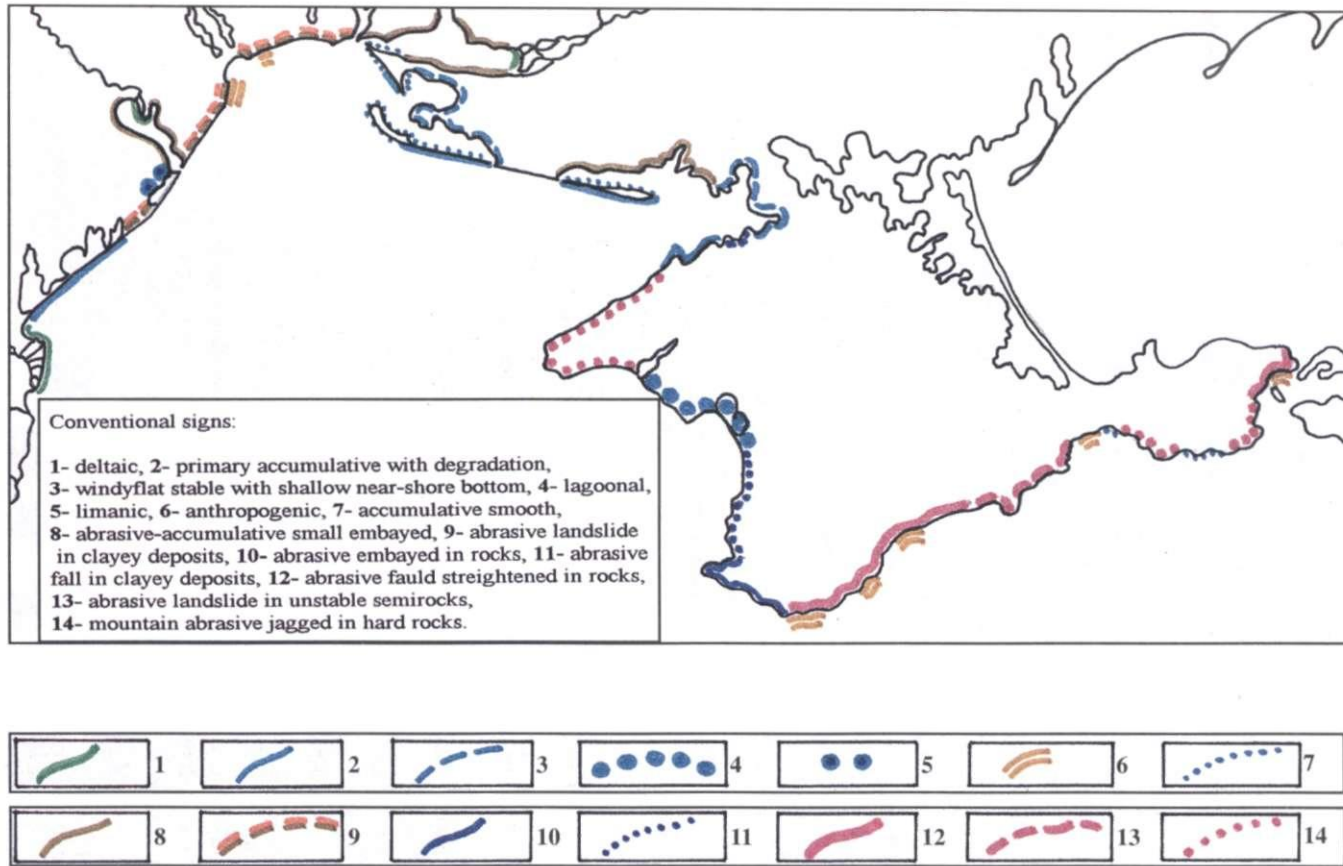


Fig. 2 Sea coast types of the Ukrainian sector of the Black Sea (Yu. D. Shuisky, 1990)

I. Habitats on the Northwestern and Crimean Shelves of the Black Sea

The Ukrainian Black Sea possesses a unique diversity of biotopes and environmental conditions and a particularly rich variety of plants and animals in the pelagic and benthic zones.

In terms of salinity the marine pelagic zone can be divided into three main categories (Table 3). River water proper is observed only in the river mouths of the Dnepr, South Bug, Dnestr and Danube. In the sea it usually reaches a salinity of 6-8 ppt. This water mass is widespread in the northwest of the sea, not only in the Dneprovsko-Bugsk) and Dnestrovsky limans but also several miles out to sea. A strip of river water borders the Danube delta south of Zhebriansky Bay. During stormy weather, the river water mixes with the underlying marine waters and salinity levels rise. After the storm abates, the continuing river runoff restores the upper water layers to their former state. Freshwater organisms enter the northwestern Black Sea with the river water.

In the northwestern Black Sea the hydrological characteristics of the surface water mass vary considerably, with temperatures ranging from 26 to 10 C°, salinity from 10 to 18.5 ppt, transparency from 3-4 m to 18-20 m, and colour from blue-green to yellow-green. But there is less variety in the waters off the southern Crimean coast, where the salinity is 17-18 ppt, the transparency 14-22 m, and the colour changes from blue-green to blue. In winter the water temperature drops to less than 7-8 C°. The surface water is the main biotope for the Mediterranean immigrants which make up most of the Black Sea flora and fauna.

Bottom water fills the lowest part of the shelf zone from the pycnocline to the seabed. The salinity in the centre of this water mass is equal to 19.5 ppt, the temperature ranges from - 0.20 C° in the winter to 13.5 C° in the autumn. The lowest water levels are mainly inhabited by boreal-atlantic (Celtic) relicts which have remained in the Black Sea from the last glacial period, although it is not clear how they survived the freshened New Euxinian period. Today they are mostly thermophobic, although some are eurythermic. These include invertebrates such as *Calanus helgolandicus*, *Pseudocalanus elongatus*, fish such as the Black Sea sprat, *Sprattus sprattus phalerictis*, the whiting, *Merlangius merlangus euxinus* and the flounder *Platichthys flesus luscus*.

The Ukrainian Black Sea coast also has a variety of shore and beach types (Fig. 2) and, as a result, a wide range of environmental conditions in the supralittoral, pseudolittoral and upper sublittoral zones.

Sandy beaches of different granulometric composition ranging from fine to coarse granules, both together with clay and detritus on delta shores or without clay and detritus along the marine shores of the Tendra or Dzarylgach islands, predominate along the northwestern coast. The beaches along the rocky Crimean coast are composed of pebbles or gravel and, less frequently, of sand deposited by wave action. All of these geological features have an impact on the formation of marginal benthic communities (Fig. 3, 4).

Table 3. Characteristics of water masses of the northwestern Black Sea according to the season of the year (Bolshakov, 1970)

Season	Water mass	Layer, m	Temperature, C°	Salinity, ppt	Transparency, m
Spring	River	0-5	6-10	0-6	0.3-0.5
	Surface	0-10	6-10	12-18	3-17
	Bottom	10-bottom	3-7	17-19.5	-
Summer	River	0-5	22-26	0-6	0.1-0.2
	Surface	0-15	22-26	12-18	3-10
	Bottom	15-bottom	6-12	18-19	-
Autumn	River	0-5	8-10	0-6	0.1-0.3
	Surface	0-bottom	10-16	14-18	3-18
	Bottom	none	none	none	none
Winter	River	0-5	-0.2...2.0	0-6	?
	Surface	none	none	none	none
	Bottom	0-bottom	-1.6...3.0	14-19	?

In parts of the upper sublittoral zone there are small areas of sediments with specific properties and inhabitants: for example, the coarse grained "amphioxus" sand, which is inhabited by the famous sand lance and organisms harvested as food, can be found near the shores of Karkinitzky Bay, Cape Foros and in a few other places in the Black Sea.

At depths of more than 10 m the seabed is composed mainly of silty sands, shells and silt in different proportions. In some places there are banks or elevations on the shelf bottom. The largest are: Odesskaya and Shaganskaya along the northwestern coast and Bakalskaya in the north west of the Crimean peninsula. Biocoenoses of mussels and, less frequently, oysters develop and fish malacophages accumulate on the banks.

Populations of Pontic or Ponto-Caspian relicts are mainly concentrated in shallow water regions where all the water levels, from the surface to the seabed, are dominated by river water. In the previous geological epoch these organisms inhabited the mildly saline New Euxinian basin, which occupied the area now covered by the Black Sea. Today they have found shelter in the Dnestrovsky and Dneprovsko-Bugsky limans, in the freshened estuarine regions and in the Azov and Caspian seas.

Invertebrate brackish-water relicts include polychaetes of the genus *Hypaniu*, molluscs of genera *Monodacna*, and *Adacna* united into one *Hypanis* genus, the amphipod *Pontogammarus maeoticus*, the mysids *Hemimysis scarraia*, *Paramysis intermedia* and cumaceans of the genera *Pierocuina* and *Pseidocuma*. Relict fish species include the sturgeons Acipenseridae, the anadromous shad of the genus *Alosci* and the Black Sea kilka *Clupeonella caltriventris caltriventris*. Pontic relicts occur in the sea and far from the coast

(sturgeons and shad, for example, winter at great depths). However, their main biotopes, especially at the early stages of ontogenesis, are located in areas dominated by river water.

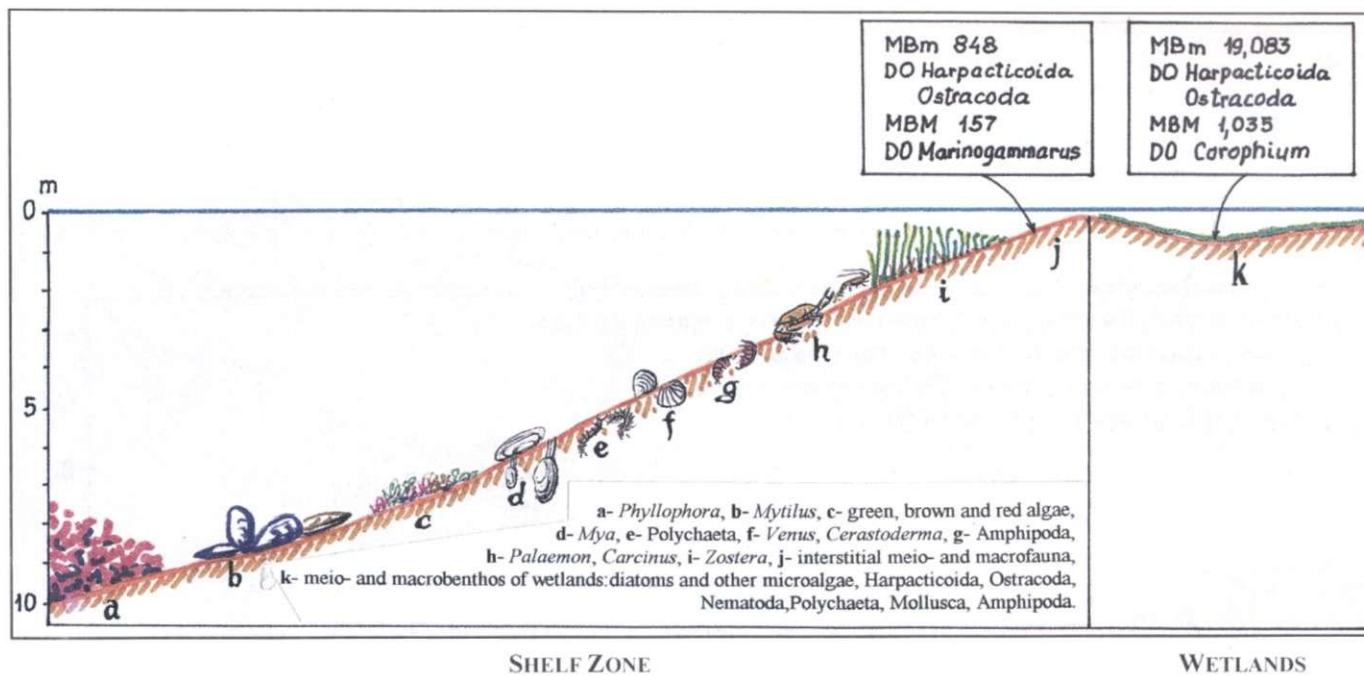
The remaining benthic regions are inhabited by many communities of marine organisms. Some of the biocoenoses of the Ukrainian shelf are the largest of their kind in the Black Sea according to area, biological diversity and abundance of population and biomass. For example, the *Phyllophora* biocoenosis in the centre of the northwestern shelf recently occupied an area exceeding 10,000 km². The mussel biocoenosis occupies a similar area. In the 1960s the total biomass of this mollusc accounted for 97.5% of the entire mussel stock from the mouth of the Danube to the Coruch river estuary in Georgia (Ivanov, 1963). At the time almost 56% of the total biomass of the Black Sea forage macrozoobenthos was situated on the northwestern shelf (Zakutsky, Vinogradov, 1967). Most of the Black Sea stock of the eelgrass *Zostera* was produced at the apex of Karkinitsky Bay and in Dzharylgachsky Bay (Vozhinskaya et al. 1971).

The south Crimean coast has a subtropical climate. Almost 70% of the territorial plants species here have ranges more or less equivalent to the Mediterranean floristic region (Molchanov, Yuschenko, 1987). In winter the temperature of the sea water is about 7-8 C°, which permits the development of thermophilic species. The macrophytes include the red algae *Laurencia papilosa* and *Gigartina acicularis* (Zinova, 1967). Thermophilic fish, which are common in the Mediterranean but rare in the Black Sea, are represented by species as the blue damselfish *Chromis chromis* (*Pomacentridae*), the bogue *Boops boops*, the puntazzo *Puntazzo puntazzo* (*Sparidae*) and the lettered perch *Serranus scriba* (*Serranidae*).

In addition to the river deltas and their marshes there are also many coastal water bodies along the Ukrainian Black Sea coast, such as limans, lagoons and lakes, which have a wide range of environmental conditions for aquatic organisms (Fig. 5). They differ in size (from 800 km² for the Dneprovsko-Bugsky liman to small lagoons less than one hectare in size), in maximum depth (from 27 m for Donuzlav lake to half a metre in the microlagoons), in salinity (from fresh water to ultrahaline lakes and limans), in degree of isolation from the sea (from the open Dnestrovsky and Dnepro-Bugsky limans to completely closed lagoons and lakes with a water level lower than the sea), in the chemical composition of the water and in types of sediment.

It is very difficult to give a precise figure for the total number of water bodies as many of them are so shallow that they dry up in the summer. Only some of the marine water bodies have names designating them on geographical maps and published data on their morphometric characteristics. Others are only named on detailed maps; while most lack names altogether or are described as "a group" of lakes, such as the Kinbumsky, Tendrovsky and Kerchensky lakes. There are approximately 1,000 small lakes and lagoons along the Ukrainian Black Sea coast, mostly in the northwest. There are at least 400 lakes in the Kinburn peninsula (Andriash, 1990).

Pontic relicts prevail in the fresh and brackish coastal water bodies. Only a few halophilic species survive in the ultrahaline water bodies in large numbers and biomass. They include the diatom alga *Dunaliella salina*, the insect *Chironomus salinarius* and the crustacean *Artemia salina*.



- MBm - mean biomass of meiobenthos (mg.m^{-2})
- MBM – mean biomass of macrobenthos (mg.m^{-2}),
- DO - dominant organisms

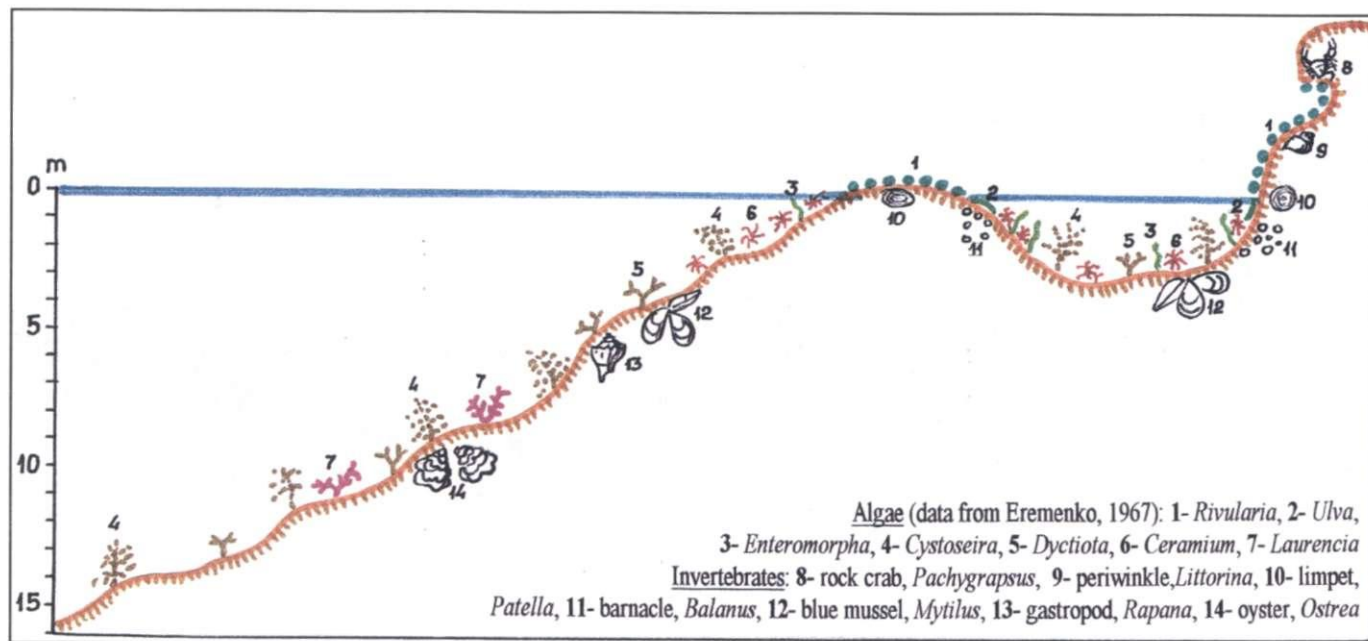


Fig. 4 Transect of a rocky shore in the northwestern Black Sea (Cape Tarkhancut area).

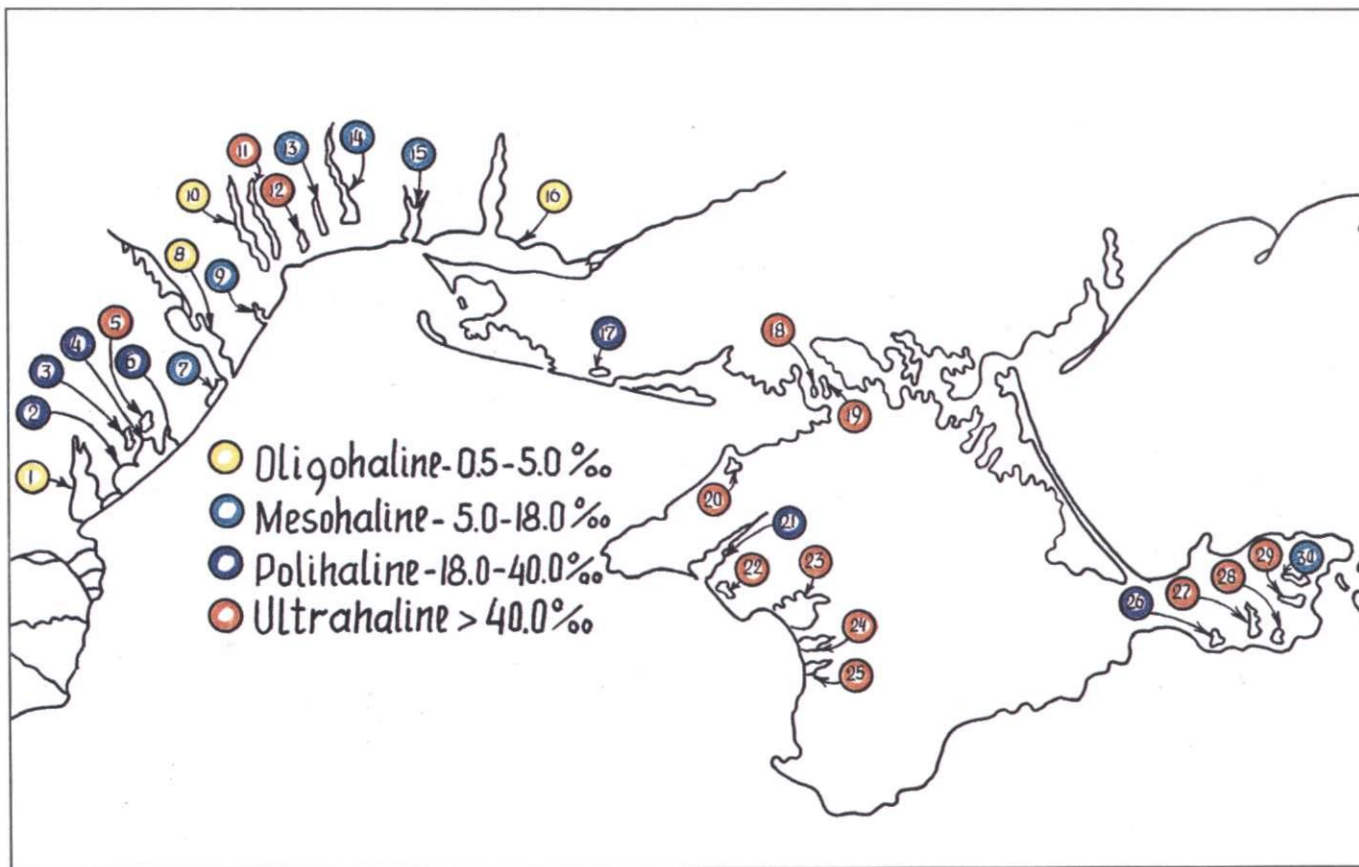


Fig. 5 The salinity of main water bodies of the Ukrainian Black Sea coast. (Names and characteristics are given in Table 3).

Water bodies with an intermediate salinity of up to 40-50 ppt often have a high biological diversity, with large numbers and biomass. For example, the microlagoons of the Tendra lakes (Tendrovsky Bar) exceed adjacent areas of the upper sublittoral of Tendrovsky Bay in biomass and abundance (Fig. 3).

This is the main reason that the fry of so many fish species, including mullet, gobies and turbot, are attracted to shallow water lagoons to feed. The same water bodies in marine wetlands serve as the primary food resource for a large number of waterfowl and aquatic birds.

Table 4. Coastal water bodies of the Ukrainian Black Sea coast

Name	Liman, lake (l, o)	Area km ²	Maximum depth, m	Salinity Ppt
Sasyk (Kunduk)	1	205	3.9	2-3
Shaganyl	1	74	2.0	14-35
Karachaus	1	15	2.0	20-40
Alibey	1	72	2.5	15-36
Khadzhider	1	9.8	12	20-140
Burn as	1	23	1.6	10-30
Budaksky (Shabolat)	1	30	2.2	12-15
Dnestrovsky	1	360	2.7	1-14
Sukhoi	1	10	15.0	14-17
Khadzhibeisky	1	70	14.0	1-3
Kuyalnitsky	1	60	3.0	120-250
Dophinovsky (B.Adzhalyksky)	1	7	2.5	10-40
Grigorievsky(M.Adzhalyksky)	1	8	15.0	10-15
Tiligulsky	1	160	21.0	2-12
Berezansky	1	60	14.0	0.3-15
Dneprovsko-Bugsky	1	800	12.0	1-14
Ustrichnoie	0	3.5	3.0	16-25
Staroie (Tusly)	0	12.5	0.8	250-350
Krasnoie	0	24.5	1.0	120-300
Bakalskoie	0	7.1	0.9	40-110
Donuzlav	0	48	27.0	10-40
Oiburskoie	0	5	13	50-170
Sasyk	0	71	12	90-160
Sakskoie)	0	9.7	1.5	40-150
Kizyl Yar	0	6.9	0.5	40-250
Kachik	0	4.5	0.8	20-40

Uzunlarskoie	0	21.2	0.3	150-260
Opukskoie (Koyaskoie)	0	18.7	0.5	40-180
Tobechikskoie	0	18.7	0.5	40-180
Kamish Burunskoie	0	3.6	1.0	8-11

The northwestern and Crimean shelves of the Black Sea, together with their numerous coastal water bodies, contain a very high biodiversity of marine, brackish, freshwater and coastal territorial plant and animal species. However, in the last 20-30 years, conditions on both the northwestern and Crimean shelves and in the Black Sea region as a whole, have changed significantly as a result of anthropogenic factors. The change has been most marked in the shallow waters of the northwestern Black Sea.

II. Marine Islands

Among the many islands of the Black Sea only three are of any size. These are the islands of Berezan (Schmidt), Zmeiny and Kefken.

Zmeiny island is the only one to be located far offshore at a distance of 35 km from the mainland. It has an area of almost 18 hectares and a coastline of 1,970m. The island is quadrangular in shape with a peninsula in the northeast corner (Fig. 6). It is 440 m in length from north to south and 414 m in breadth and from west to east. At its longest, along a north-eastern-west axis running through the peninsula, the island is 662 m (Kohler, 1827). Its shores vary in height from 10 m to 22 m. The highest elevation is in the centre of the island at about 40 m.

The island is surrounded by a fringe of underwater rocks and has a lighthouse. The first scientific data on Zmeiny island has been found in the proceedings of the St. Petersburg Academy of Sciences, provided by N. Kohler (1827) and A. Nordmann (1844), a well-known naturalist and professor at Richilieu Lycee in Odessa.

During the 20th century there were some publications by Romanian scientists about the island (Borza, 1927; Calinescu, 1931; Bacesascu, 1961). In 1959 G. A. Solyanik (1959) a former researcher at the Odessa Biological Station (now Odessa Branch of IBSS) published the results of research carried out in August-November 1956.

The following marine organisms have been recorded near to the shore of the island: brown algae *Cystoseria barbata* (Calinescu, 1931; Solyanik, 1959), *Phyllophora brodiaei* (Solyanik, 1959) and other microphytes.

The fauna included the rock crab *Eriphia verrucosa* and the marble crab *Pachygrapsus marmoratus* (Calinescu, 1931; Solyanik, 1959), which are both in the Red Data Book of Ukraine.

Today these species are completely absent from the northwestern coast of the Black Sea. There are also references to mussels, actineans and fish of the Serranus genus. Biologists in the area have also reported finding the oyster *Ostrea edulis*. According to A.

Nordmann (1844) the monk seal was observed close to the island in 1841. An article by N. E. Solyanik (1959) also noted that fishermen from Vilkovo reported seeing the monk seal.

Today *Monachus monachus* is one of the species registered in the International Red Data Book. Since the 1950s there have been no hydrological surveys on or around the island.

Scientific expeditions organised by the Odessa Branch of the IBSS (1970-1991) and samples from stations located 400-500 m from the island recorded a great diversity of benthos, plankton and fish species characteristic of the northwestern Black Sea.

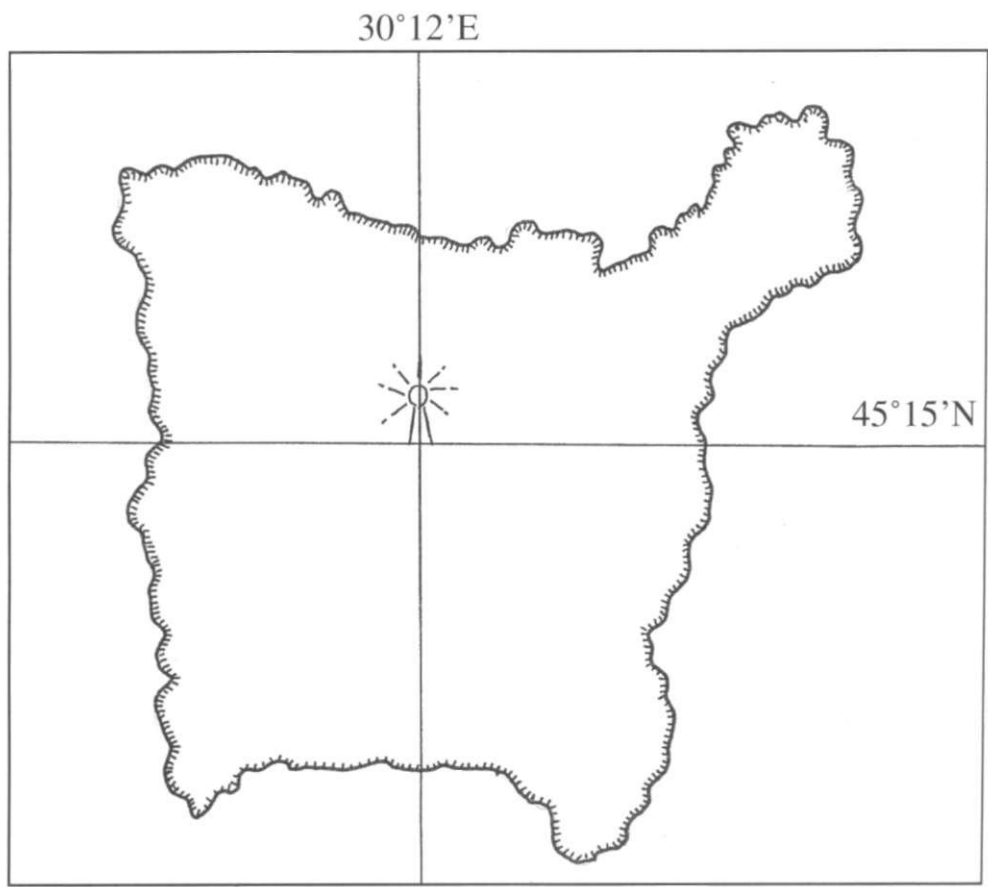


Fig. 6 Zmeiny Island with lighthouse.

Bacteria

I. Northwestern Black Sea

Saprophyte bacteria are the most numerous microorganisms in the water column and bottom sediments of marine water bodies. They are responsible for the primary breakdown of organic matter. In recent years increasing eutrophication of the sea water has resulted in a decrease both in the ratio of the total amount of microorganisms and the volume of saprophyte. In the 1960s the ratio was 100,000 for the bacterioplankton of the northwestern Black Sea. Today the figure is approximately 100 for both the bacterioplankton and the bacteriobenthos.

Studies of the composition of saprophyte bacteria in the Black Sea have shown that the greatest biodiversity is in deep water areas and the least in northwestern Black Sea (Lebedeva, 1979). In the 1960s, 560 strains of bacteria were registered in the northwestern Black Sea, of which non spore bearing rods made up 43%, cocci 39% and spore bearing 18% (Tsyban, 1970). A list of the genera identified is given in Annex I, Table 6. According to A. Tsyban (1970) only 60% of the cultures collected were of true marine bacteria. The rest, such as cocci and spore bearing rods, entered the sea in runoff from the mainland.

In the 1970s significant changes were recorded in the qualitative composition of the saprophyte bacterioplankton (Nizhegorodova, Teplinskaya, 1984; Teplinskaya et al., 1984) which became even more pronounced in the 1990s (Teplinskaya, 1994). It was observed that the eutrophication of the sea had led to an increase in the number and frequency of cocci and spore bearing rods which were resistant to unfavourable environmental conditions (Table 7).

Towards the end of the 1970s the qualitative diversity of saprophyte bacterioplankton in northwestern Black Sea was four times higher than in the 1960s (Table 6). This was probably related to the increasing eutrophication of the entire northwestern Black Sea after 1973 when the rise in the volume of organic runoff from the mainland, as well as river runoff, created favourable conditions for the development of bacteria, creating a polyfermentative system transforming different organic compounds of allochthonic origin.

Bacteria of the genus *Bacillus* were constantly present in the near surface layers of the northwestern Black Sea. This is a result of the high resistance of spore bearing forms to significant changes in environmental conditions in the interface of water and atmosphere. If the spore forms are not truly marine, then it is possible to measure the scale of the microbial runoff from the mainland which concentrates in the near surface layer. Natural bacterial communities develop in the near bottom layers where the volume of contaminants is insignificant.

In the 1970s the saprophyte bacterioplankton of the northwestern Black Sea had a high level of biochemical activity. About 21.4% of the isolated cultures were antagonistic to *Escherichia coli* isolated from water in this area (Nizhegorodova & Teplinskaya, 1984). This is a very important factor in the self-purification of the marine environment. Bacterial antagonists were represented by spore bearing (31.7%), non spore bearing rods (45%) and cocci (23.3%). The greatest number of antagonistic cultures were those of the *Bacillus* genus, followed by *Micrococcus*, *Photobacterium* and *Pseudomonas*. The degree both of antagonistic activity and the range of action was higher in cultures isolated from near estuarine and coastal areas where there are conditions suppressing or, in some cases inhibiting, the growth of bacterioplankton entering the sea with the runoff of bacterial coli groups.

Table 5. Long term changes in bacterial community quantities (order of magnitude) of the northwestern Black Sea in the water body (WB) and in bottom sediments (BS) during the summer period

Time period	WB, cells.mg ⁻¹		BS, cells.ml ⁻¹	
	General Quantity	Quantity of Saprophytes	General Quantity	Quantity of Saprophytes
Early 1960s	10 ¹	10	~	9
Late 1970s	10 ¹	10 ¹ -10	10 ¹	10 ¹
Late 1980s	10 ¹	10 ¹	10 ¹ -10 ²	10 ¹
Early 1990s	10 ¹	10 ¹	10 ² -10 ³	10 ¹

Table 6. Qualitative Diversity of Bacterioneuston (I) and Bacterioplankton (II) in Off-shore (S) and Coastal (C) Areas in the North-western Black Sea

Genera	Till 1975		1977-1975		Contemporary Period	
	S	C	S	C	S	C
Micrococcus Cohn, 1872	S	C	S	S	S	C
Bacillus Cohn, 1872	S	S	S	S	S	C
Sporolactobacillus Kitahoga, 1969	C	C	M	M	S	C
Lactobacillus Beijerinck, 1901			S	S	S	
Pseudomonas Migula, 1894	S	C	S	S	S	
Xantomonas Doerson, 1939	C	C	S	S		
Chromobacterium Bergonzini, 1881	S	S	S	S		
Flavobacterium Bergey, 1923			S	S	S	C
Acetobacter Beijerinck, 1898			S	S	S	C
Alcaligenes Castellani et Chalmas, 1919			S	S		
Sarcina Goodsir, 1842	S	S	S	S		
Bacterium Elhenbery, 1957	S	S				
Listeria Pizic, 1940	C	C	S	S	S	C
Planococcus Migula, 1894	C	C	S	S	S	C
Corynebacterium Lehmann et Neumann, 1896	C	C	S	S		
Arthrobacter Conn et Dimmick, 1947	C	C	S	S		
Neisseria Trevisan 1885			S	S	S	C
Streptococcus Rosenbach, 1884			S	S		
Cellulomonas Bergey et al 1973			S	S		
Kurthia Trevisan 1885			S	S	S	C
Microbacterium Oria-Jensen 1919			S	S		
Vibrio Pacini, 1854			S	S		
Aeromonas Kluyver et van Niel, 1936			S	S	S	C
Photobacterium Beijerinck, 1889			S	S		
Lucibacterium Hendrie, 1970			S	S		

Note: To 1975 S - 1963-1964 Tsyban, 1970

C - 1973-1975 Teplinskaya et al. 1984

During studies conducted in 1980 to 1986 N. Kovaleva (1988) established that *Micrococcus* and *Bacillus* genera dominated throughout the year in the coastal waters of Odessa Bay, while *Flavobacterium* and *Pseudomonas* were frequent.

During the early 1990s, after a long period of continuous anthropogenic loads on the ecosystem, more profound irreversible changes began to take place in the bacterial community (Teplinskaya, 1994).

The number of genera decreased (Table 6). Differences in the structure of bacterioplankton in the coastal, estuarine and open waters of the northwestern Black Sea disappeared and genera uniting spore bearing rods became predominant (Table 7).

Table 7. Long term dynamics of the morphological composition of saprophyte bacterioplankton of the northwestern Black Sea

Period of observation	References	Morphological groups, %		
		Cocci	non spore bearing rods	Spore bearing rods
1963 -1964	Tsyban, 1970	39	43	18
1973 - 1980	Teplinskaya, et al, 1984	13	59	28
1990 -1994	Teplinskaya, 1994	17	42	41

An analysis of saprophyte bacterioplankton identified 254 stations of spore bearing and non spore bearing rods and cocci (Nizhegorodova, Teplinskaya, 1984). The morphological composition of the bacteria was determined by close proximity to the river runoff and the granulometric composition of sediments.

At a distance from the mouth, the proportion of spore bearing rods and cocci diminished and the amount of non spore bearing rods increased.

Spore bearing rods predominated in grey silt. In silty fine grained sand the ratio of spore bearing and non spore bearing rods was the same; while the morphological composition of saprophyte bacteria in the upper layer of the sediment was closely linked with surface runoff.

The most common mass saprophyte bacteria were representatives of the *Bacillus*, *Micrococcus* and *Pseudomonas* genera, with a frequency varying between 12% and 19%. In the near estuarine areas *Bacillus* and *Micrococcus* were most common.

During the 1970s *Pseudomonas* was present in 30-40% of relatively clean areas such as Tendra Island and Cape Tarkhankut.

II. The Ukrainian Sector of the Azov Sea

Variations in the total number of bacterioplankton in the Azov Sea is closely tied to changes in the hydrological regime (Tolokonnikova, 1991). Before 1983 the index was tens of millions of cells per 1 ml of water, although it subsequently fell to 1,100,000 cells.ml⁻¹. The amount of saprophyte bacteria decreased to one third of its previous level. After 1983 it averaged 2,000 cells.ml⁻¹.

There were also qualitative changes. In the last decade rod shaped forms (55%) have become dominant. In 1963-1968 they made up only 31% of the total. The amount of bacteria in bottom sediments changes according to salinity and in an inverse relationship to the volume of bacterioplankton. In 1983-1986 the total volume of the bacteriobenthos was 1.2-2.3.10⁹.cells.g⁻¹. Levels of saprophyte bacteria peaked during high salinization (2.10⁹.cells.g⁻¹ in the Azov Sea).

III. Areas Influenced by River Runoff

Changes in the structure of bacterial communities in areas influenced by river runoff can be analysed using the bacterioplankton of the Danube delta as an example. An analysis of multiyear data has produced the following conclusions: The total volume of bacterioplankton in the estuarine part of the Danube and Kiliya delta is influenced by the runoff from tributaries and winter-spring floods. Multiyear investigations have shown that the amount of bacteria in the waters of the Danube waters varied from 2 to 63,000,000 cells.ml⁻¹. Biomass indices change according to the season (2 - 8 mg.l⁻¹ in plankton, 0.1 - 16 mg.g⁻¹ in benthos. The calculated bacterial expenditures were 6 - 38 kg.s⁻¹. The monthly bacterial runoff was 14 - 103,000 and reached a maximum during floods.

Heterotrophic bacteria account for a significant proportion of the bacterial communities in the Danube (tens of thousands cells.ml⁻¹). About 980 cultures of heterotrophic forms were isolated from the water and 460 from the sediments. The highest species diversity was observed near the towns of Izmail and Vilkovo and where the Danube enters the sea, including: *Bacterium*, *Chromobacterium*, *Micrococcus*, *Bacillus*, *Pseudomonas*, *Mycobacterium*, *Sarcina* and *Neisseria*.

Microflora oxidizing oil products were represented by two classes, three orders, six genera and 26 species. Forty two per cent of them belonged to the *Pseudomonas* genus, followed by *Bacterium*, and *Micrococcus*. Fifty five strains were isolated.

The following bacterial antagonists producing antibiotic substances were isolated in the waters of the Danube: *Saccharomyces cerevisiae* and *Candida albicans*, together with marine species such as *Pseudomonas turcosa* and *Bacterium salivarius*. Some species of bacteria were widespread (e.g. *B. agile*, *B. nitrijicans*, *Sarcina flava* and *Micrococcus albus*); others were rare (e.g. *Planococcus casei* et al.).

Isolated cultures of heterotrophic bacteria demonstrated antagonistic properties to 33 test microbes. In the sediments of the river bed there were more bacterial antagonists to *Staph. aureus*, less to *B. mycoides* and *C. albicans* and least of all to *Escherichia coli*.

Eighty six per cent of the plankton bacteria in the Danube produced biologically active substances and vitamins (80% in the marine part, 70% in the sea water). On average there were 65% heterotrophs.

Actinomycetes were present in large quantities. They are typical soil microorganisms and probably entered the Danube through terrigenous runoff. Their numbers varied from 72,000 cells.m⁻³ in the high-water period to 50,000 cells.m⁻³ during floods. During the 1950s there were virtually no actinomycetes or protoactinomycetes. However, within a decade 27 were recorded in the plankton.

The bacterioplankton of the Dnestr and Dnestrovsky limans is quantitatively similar to bacterioplankton the Danube; although the numbers of saprophyte bacteria are even higher. During January-March 1994 there were (0.45-10.0).10³ cells.ml⁻¹, which corresponds with the data of N. Potapova (1992) for the same period in 1970-1987. Levels peaked during the summer at (18-24).10⁶ cells.ml⁻¹.

An analysis of the recent changes in the bacterioplankton of the Dneprovsko-Bugsky liman has shown 3-5 fold increase in numbers compared the early 1980s, from (1-11).10⁶ cells.ml⁻¹ (Rossova, 1989) to (31-37).10⁶ cells.ml⁻¹ in 1992. The volume of saprophyte bacteria in the bottom sediments varies at (86.5-110.0).10³ cells.g⁻¹. Levels peak in the summer (Fig. 7).

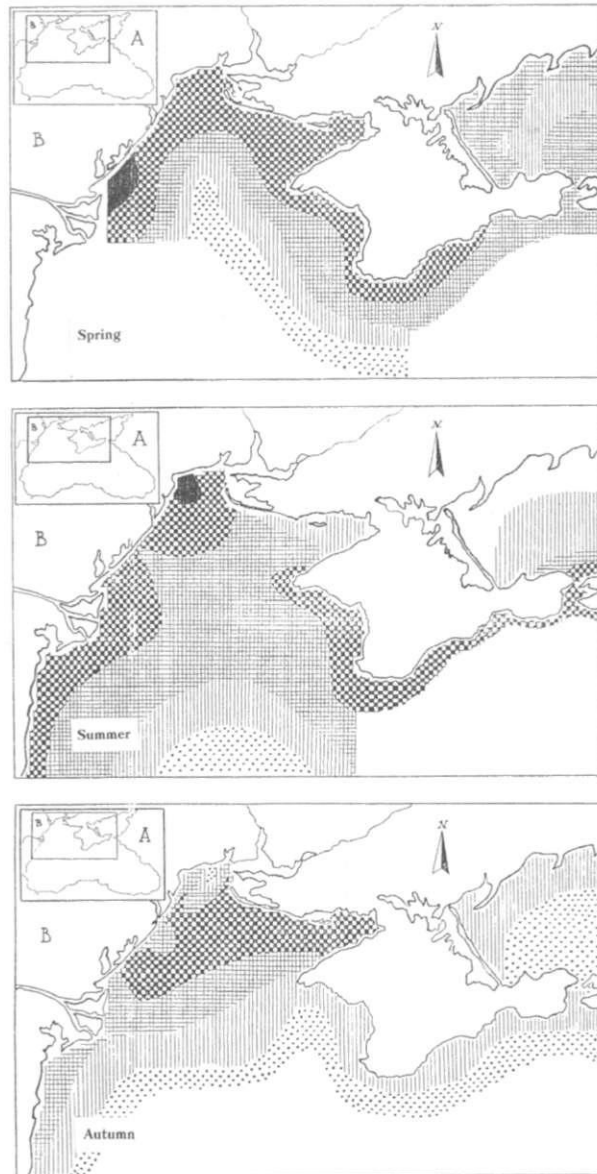
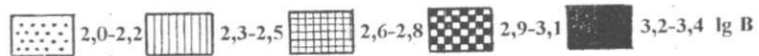


Fig. 7 Average statistical distribution of bacterioplankton biomass ($B, \text{mg}\cdot\text{m}^{-3}$) during the period 1973-1993.

Conventional signs:



3

Phytoplankton and Fungi

The large rivers, such as the Dnestr, Dnepr and Danube, which enter the northwestern Black Sea provide it with a constant supply of freshwater species of phytoplankton. A total of 501 taxa of algae have been recorded in the Ukrainian part of the Danube, comprising: blue-green (Cyanobacteria), Euglenoidea, Dinophyta, Chrysophyta, Diatoms, and green algae. Green algae predominate (up to 35%), followed by diatom algae (up to 30%), blue-green algae (15%) and, in some areas, euglenae (13%). The other algae play an insignificant role.

The leading complex of phytoplankton is comprised of typical plankton algae from the Centrophyceae class, Volvococophyceae and, especially, Chlorococophyceae such as *Dictyosphaerium pulhellum*, *Hyaloraphidium contortum*, *Ankistrodesmus acticularis*, *Coelastrum microporum*, *Crucigenia irregularis*, *Lagerheimia genevensis*, *Micractinium pusillum* and *Oocystis borgei*.

The most widespread of the other green algae are the Volvococophyceae, including the numerous *Chlamydomonas globosa* and *C. reinhardii*. Other species from this class include *Eudorina elegans*, *Pandorina morum* and *Phacus lenticarus*. Blue-green algae are widely represented by species of the genus *Oscillatoria* (*O. geminata*, *O. limosa*, *O. planctonica*, *O. tenuis* and *O. ucrainica*), the genus *Anabaena* together with *Aphanizomenon* and *Microcystis*. Rare phytoplankton species in the Danube include *Mallomonas allorgei*, *M. elliptica*, *M. longiseta*, *Dactylococopsis raphidioides* and *pannonica* from the chrysophyta and the diatoms *Stephanodiscus subsalsus* and *S. subtilis*.

Many brackish water and marine species of algae can be found in the arms of the Danube Kiliya delta, including diatoms as *Chaetoceros*, *Coscinodiscus*, *Nitzschia* and *Cyclotella caspia*. The presence of sea water influences the phytoplankton composition not only in the Kiliya delta but also in the river bed where freshwater species account for 87% of the total compared with 60% in the estuary. Phytoplankton numbers in the Danube vary from 250 to 12,700 cells.Γ', while the biomass ranges from 0.2 to 9.2 g.m''' (data for the 1970s).

Near Danube Limans

The number of species of algae in the phytoplankton of the near Danube limans was limited at approximately 100 species, mostly blue-green, diatoms and green algae. More rare were the chlorophyta, euglena and dinophyta. The dominant species included: *Anabaena flos-aquae*, *Aphanizomenon flos-aquae*, *Anabaena scheremetievi*, *Nitzschia acicularis*, *Melosira italica*, *Gyrosigma acuminatum*, *Melosira granulata* and *Nitzschia sigmoidea*. Their numbers ranged from 5 to 438,000 cells.l⁻¹ and their biomass varied from 0.012 to 0.377 g.m⁻³.

The lower Dnestr and Dnestrovsky Limans

A total of 265 species and 3,335 taxa have been recorded in the lower Dnestr and Dnestrovsky limans. Diatoms accounted for the largest number of species at 95. followed by green algae (83), blue-green algae (33), dinophyta (29), euglenophyta (19). chrysophyta (4) and xanthophyta (2). The leading species were: *Cyclotella meneghiniana*, *Melosira granulata*, *M. italica*, *Stephanodiscus hantzschii*, *S. subtilis*, *Surirella globosa*, *Actinastrum hantzschii*, *Dictiosphaerium pulchellum* and *Scenedesmus quadricauda*. Large numbers of marine dinophytes species were recorded in the liman, while euglena predominated in the lower Dnestr near the village of Mayaki. In winter *Synura uvella* was the most widespread of the Chrysophyta with numbers ranging from 64 to 8,250,000 cells.l⁻¹ and its biomass from 70.8 to 4,350 mg.m⁻³.

Phytoplankton Species Diversity in the Northwestern Black Sea

Detailed studies of the species diversity of phytoplankton in the northwestern Black Sea goes back over one hundred years (Sredinsky, 1873; Merezkhovskiy, 1902-1903; Lebedev, 1916; Aksentyev, 1926; Konoplev, 1938; Proshkina-Lavrenko, 1955, 1963; Ivanov, 1962, 1963, 1965, 1967, 1982). The characteristic feature of phytoplankton in this area of the Black Sea is that it includes both marine and freshwater species. The latter enter the sea in the river runoff from the Danube, Dnepr and Dnestr. Of the 372 species of algae recorded in the area in 1954-1960 almost 52% were freshwater and freshwater brackish species (Ivanov, 1967). The largest number of freshwater species (46) were recorded in the estuarine areas. In shallow water areas 31% of the plankton was composed of benthos and overgrowths resulting from vertical mixing of water masses. The composition of open sea plankton was similar to that of the sea as a whole, albeit poorer in terms of the number of marine species.

There was a difference between the composition of the phytoplankton in the near Danube and near Dnestrovsko-Bugsky areas. In the latter there was a large number of blue-green and other freshwater systematic groups introduced into the sea with the river runoff. In areas influenced by Danube water the composition of freshwater species was more limited because the high turbidity of Danube waters hinders the development of phytoplankton. The species diversity of the Dnestr area is similar, but poorer.

Diatoms account for the largest greatest number of species of phytoplankton in the northwestern Black Sea (Table 8), particularly *Chaetoceros* (33 species). Mass species include *Ch. socialis*, *Ch. curvisetus* and *Ch. affinis*. There was only a small number of *Nitzschia* (17), although there were significant quantities of *N. seriata*. There were also some *Synedra* species (15).

Table 8. Species diversity of phytoplankton (number of species) of the northwestern Black Sea in 1954-1960* and 1973-1994

Systematic groups	1954-1960	1973-1994
Bacillariophyta	180	116
Pyrrophyta	76	104
Chlorophyta	62	52
Cyanophyta	24	30
Chrysophyta	17	20
Euglenophyta	12	2
Xanthophyta	1	2
Total	372	326

*According to A.Ivanov (1967)

The genera *Coscinodiscus* and *Melosira* accounted for the same number of species and subspecies (13) although they differed in composition. In the spring there were mass developments of *Melosira granulata* and *M. italica* in the freshwater areas of the sea.

Other genera were represented by only 1-4 species although they nevertheless accounted for a significant proportion of the total phytoplankton. Spring phytoplankton mass species included *Skeletonema costatum*, *Thalassiosira parva* + *Th. subsalina* and *Detonula confervaceae*. Summer phytoplankton included *Rhizosolenia calcar-avis* and *Cyclotella caspia*; while species such as *Thalassionema nitzschioides* maintained almost constant populations throughout all the seasons.

In 1954-1960 the pyrrophyta ranked second after the diatoms in terms of the number of species. The genera *Peridinium* (29) accounted for the largest number of species, including *P. knipowitschii*, *P. steini* and *P. mimiticulum*. The most widespread were *Prorocentrum cordata* (*Exuviaella cordata*), *Pr. micans*, *Pr. compressa*, *Ceratium Jurat.* *C. fittis* and *C. tripos*.

Freshwater blue-green and green algae developed in large quantities in near estuarine areas, mostly in the near Dneprovsko-Bugsky region. They included *Ankistrodesmus acicularis* var. *mirabilis*, *Dictiosphaerium pulchaellum* and *Scenedesmus quadricauda*. The freshwater *Microcystis aeruginosa* and *Aphanizomenon flos-aquae*

bloomed almost annually in the summer and autumn. Coccolithophorida and silicoflagellata are present in large numbers in the Black Sea but are rarely encountered in the northwest of the sea. During studies covering 21 years (1973-1994) up to 326 species of phytoplankton algae belonging to seven orders were recorded in the northwestern Black Sea and in the shallow waters of the Sukhoi and Grigorievsky limans, which had been converted into ports.

In recent years there has been a decrease in the species composition of the diatoms, which currently account for 36% of the total phytoplankton; in 1954-1960 they accounted for 48%. But the appearance of new species of *Chaetoceros* (*Ch. coronatus* and *Ch. karianus*) has meant that there has been no reduction in the number of species. Mass species include: *Ch. socialis*, *Ch. compressus* and *Ch. insignis*. However, the number and frequency of the former mass species of *Ch. curvisetus* have declined.

The species composition of the genera following *Chaetoceros*, such as *Nitzschia*, *Synedra* and *Coscinodiscus*, has also decreased. These include species such as *Nitzschia seriata* and *Cylindrotheca closterium* (*Nitzschia closterium*) and the freshwater *Melosira granulata*, which appear in large numbers in the spring near the Danube's zone of influence. There has recently been a decline in the numbers and frequency of the mass species *Thalassionema nitzschioides* and *Rhizosolenia calcar - avis*, which can be ascribed to benthos and fouling. Nevertheless, new species have occurred. For example. *Skeletonema subsalsum* has developed in large numbers in the zone of influence of the river runoff. It should be noted that there are transition forms from *Sc. subsalsum* to *Sc. costatum*, which often causes difficulties in identification.

Species of *Skeletonema costatum*, *Nitzschia seriata*, *Cylindrotheca closterium*, *Cerataulina pelagica* and *C. bergonii* have been recorded. The development of other diatoms is seasonal. Freshwater species of *Stephanodiscus hantzschii* and *Melosira granulata* were encountered in spring and early summer, while marine *Leptocylindrus danicus*, *Rhizosolenia calcar - avis*, and *Ditylum brightwellii* were observed in the autumn. In the last 40 years the species diversity of *Pyrrophyta* algae has increased from 20.4% to 34% (1954-1969). New representatives of *Cryptophyta*, the heterotroph *Hillea fusiformis* and *Cryptomonas acuta*, were encountered in the area in large numbers, although, as this group is difficult to identify, it is possible that there may be more species.

The genus *Peridinium* accounts for the largest number of peridininian species for (27 species, including the new species *P. breve* and *P. brevipes*). Others which were previously limited in numbers have become mass species, such as *Heterocapsa triquetra* (*Peridinium triquetrum*) and *Scirpsie/la trochoidea* (*Peridinium trochoideum*).

There has been an increase in the species diversity of genera of *Gymnodinium* (15 compared with 5 in 1954-1960), *Gyrodinium* (6 compared with 3) and *Glenodinium* (10 compared with 6). Species such as *Glenodinium najadeum*, *Gl. lenticula*, *Gyrodinium adriaticum* and *G. cornutum* were often encountered en masse. The species diversity of the *Goniaulax* genus has increased and *G. polyedra* has recently become a mass species. However, peridininian species new to the northwestern Black Sea, such as *Protoceratium reticulatum* and *Cladopyxix setigera*, were encountered only rarely.

Pyrrophyta algae, whose diversity increases during the warmer months, are represented by *Prorocentrum cordata*, *Scropsiella trochoidea*, and recently by *Heterocapsa triquetra*. But there has been a decline in the species diversity of green algae entering the sea with river runoff. Many species of the genera *Peridialstrum* and *Oocystis* have not been recorded in the sea. New marine species include *Poropila dubia*. Green algae of the genera *Ankistrodesmus* and *Scenedesmus* were able to spread in large numbers over most of the northwestern shelf. There has been an increase in the species diversity of freshwater blue-green algae, including new small cellular species of the genera *Gleocapsa* and *Merismopedia*. Unlike green algae, the distribution of blue-green algae has been limited to estuarine areas. No significant changes in *Chlorophyta* have been recorded. However, recently the presence of *Coccolithus huxleyi* has resulted in water blooming; while in April 1993 blooming was caused by *Dinobryon sp.* *Euglena* algae were represented by two species, *Eutreptia viridis* and *E. lancvii*, whose presence is an indication of the water quality as they flourish in water with high levels of decaying organic matter.

There was a change in the ecological structure of phytoplankton, with an increase in marine, brackish-marine and brackish water species to constitute 65% of all species. Changes in species diversity were noted in the phytoplankton near the Crimean peninsula (Georgieva, Senichkina, personal communication). In the 1970s mass species such as *Cyclotella caspia*, *Thalassionema nitzschioides* and *Exuviaella compressa* were extremely rare. However, new *Distephanus* and *Pyrrophyta* species have appeared. They include *Achrodina sulcata*, *Pronoctiluca acuta*, *Pr. pelagica*, *Hillea fusiformis*, *Peridinium palatimim*, a uracsere *Pterosperma cristatum*, *Meringosphaera mediterrane* and *Planktoniella sol*.

Along the Crimean coast from Karadag to Sevastopol (1938-1992) the total phytoplankton numbers were 3.106 - 3.109 cells.m⁻³ and the biomass - 5-1,829 mg.m⁻³.

The progressive eutrophication of the marine environment has led a decrease in the numbers of species of diatoms sensitive to rising concentrations of contaminants and an increase in peridinians, not only autotrophs but also heterotrophs and myxotrophs.

Fig. 8 gives the average phytoplankton biomass over the period 1973-1993 in the oxygen 0-100 m layer. The figures are based on studies by IBSS (Georgieva, Senichkina, personal communication, Kovalev et al., 1993) and its Odessa Branch (Nesterova, personal communication, Volovik et al., 1993).

Fungi

Research on marine mycology near the Ukrainian coast was conducted by N. Ya. Artemchuk from 1962 to 1972 and L. M. Bagriy-Shakhmatova (Zelezinskaya) from 1966. At present marine mycology is being studied at the Institute of Botany, National Academy of Sciences of Ukraine, by L. M. Bagriy-Shakhmatova and at the Odessa Branch of the Institute of Biology of the Southern Seas by A. A. Andrienko and N. I. Kopytina.

175 representatives of marine mycobiota have been recorded along the Ukrainian coast, including 159 species belonging to the higher fungi, such as classes of Ascomycetes, Basidiomycetes and Deuteromycetes, and 16 species of lower fungi such as

Chytriodiomycetes, Oomycetes and Zygomycetes. Only 69 species are obligate marine. Most of the lower, and some of the higher, genera of fungi (*Penicillium*, *Aspergillus* etc.) were first described as representatives of terrestrial biotopes and freshwater habitats. Almost all of the lower fungi (except the order Peronosporales) are parasites of marine plants and hydrobionts (Artemchuk, 1981). For example, there was an epizooty of the plankton *Penilia avirostris* caused by the *Hyphochytrium peniliae* (Artemchuk, Zelezinskaya, 1969; Zelezinskaya, 1969, 1972), which infected eggs of two species of Black Sea barnacles with the fungi *Saprolegnia monoica Pringsheim* (Rzhepishevsky, Artemchuk, 1970).

Table 6 illustrates the distribution of marine mycobiota according to data from the following authors: Zelezinskaya, 1965, 1976, 1979; Artemchuk, Zelezinskaya, 1969; Rzhepishevsky, Artemchuk, 1970; Artemchuk, 1973, 1974, 1979, 1981; Bagriy-Shakhmatova, 1983, 1985, 1985b, 1988, 1989, 1991; Andrienko, Kopytina, 1992-1994.

A total of 87 species of higher marine fungi (15 species of ascomycetes and 72 deuteromycetes) and 14 species of lower marine fungi have been recorded along the Crimean peninsula. Only one species of lower fungi and 57 species of higher fungi (33 ascomycetes, 22 deuteromycetes and 2 basidiomycetes) have been recorded in the northwestern Black Sea.

Research has shown that there are 49 species of higher marine fungi in the Grigorievsky liman, 29 in the Sukhoi, 3 in the Khadzhibei, 1 in the Berezansky and 3 in the Tendrovsky Bay. Of these species three from the class Ascomycetes (*Dryosphaera navigans*, Koch et E. B. G. Jones, 1988; *Halosaphiea hamata Johnson*, Jones, Moss, 1988; and *Leptosphaeria avicenniae*, J. et E. Kohlm, 1965) and five species from the class Deuteromycetes (*Cirrenalia fusca*, Schmidt, 1969; *C. pseudomacrocephala*, Kohlm, 1979; *Graphium sp.* and *Vesicularia maritima*, binder, 1944; and *Zalerion varium*, Anastasiou, 1963) were recorded in the Black Sea for the first time.

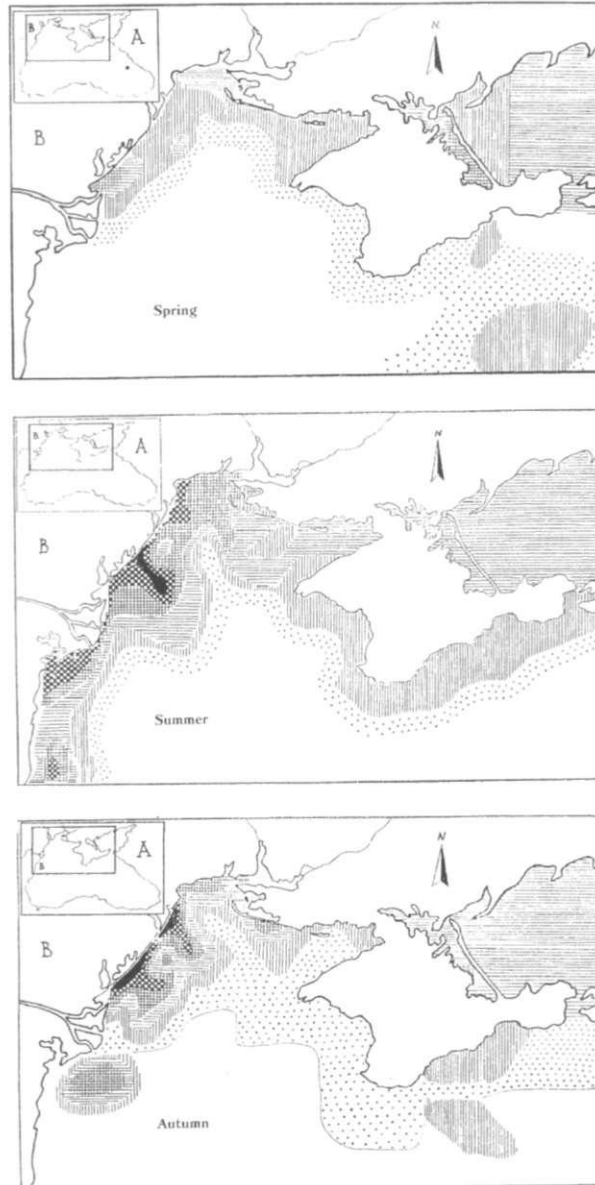
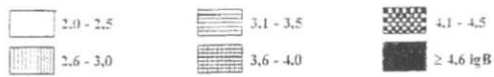


Fig. 8 Average statistical distribution of phytoplankton biomass (B, mg.m⁻³) during the period 1973-1993.

Conventional signs:



Zooplankton

General Characteristics

There are 1,070 species of zooplankton in the brackish water and freshwater coastal waterbodies of Ukraine, including Rotifera, Copepoda and Cladocera. There are 233 species of marine pelagic invertebrates in coastal and open water waters (Annex I, Table 3). Although the total number of freshwater zooplankton species exceeds the number of marine species, the latter has a greater diversity in large taxonomic groups. From 25% to 52% of the species composition is made up of Rotifera, Cladocera and Copepoda. The highest levels of biodiversity of marine zooplankton in Ukraine waters is in the northwestern Black Sea (Table 9). Horizontal distribution. River run off has a significant impact on the horizontal distribution of zooplankton. The outflow of nutrients in rivers is due to the development of phytoplankton in estuarine areas of the sea which in turn explains the formation of regular accumulations of zooplankton in the Danube-Dnepr interfluvium (DDI). In freshwater ecosystems the zooplankton biomass rarely reached 1 g.m⁻³. But in estuarine areas the biomass exceeded 175 g.m⁻³, primarily because of the development of *Noctiluca miliaris* = *N. scintillans* (Zaitsev et al., 1987).

The biomass of the zooplankton of open waters, including *N. miliaris* and *Pleurobrachia rhodopsis* in the main oxygen layer of 0-100 m, has been estimated at 0.4 g.m⁻³ (Kovalev et al., 1993). Biomass levels peak in autumn, a phenomenon which has been attributed to the large pelagic invertebrates *Calanus ponticus*, *Pleurobrachia rhodopsis* and *Sagitta setosa* which increase in numbers as the result of the development of the epipelagic biocoenosis. In the winter the decline in temperatures and river runoff in the northwestern Black Sea means that there is a greater decrease in the development of zooplankton than in open waters.

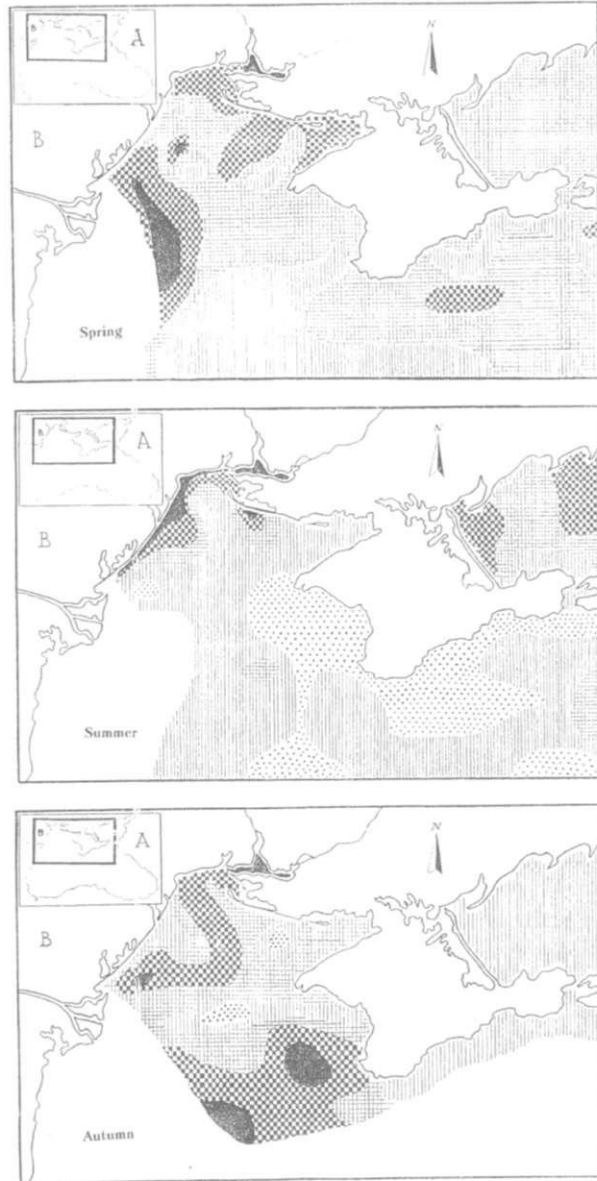


Fig. 9 Average statistical distribution of mesozooplankton biomass (B , $\text{mg}\cdot\text{m}^{-3}$) during the period 1973-1993.

Conventional signs:



Table 9. Distribution of the species composition of the marine mesozooplankton by main taxonomic groups in Ukrainian sea waters

Species	Till 1975 (NWBS)	Contemporary state		
		NWBS	SAL	CA
PROTOZOA	25	24	5	15
Flagellata	1	1	1	1
Sarcodina	-	-	-	1
Infusoria	24	23	4	13
COELENTERATA	14	11	6	6
Hydrozoa	11	8	3	4
Scyphozoa	2	2	2	2
Nematoda	1	1	1	-
CTENOPHORA	1	2	2	2
Nemertini	1	-	-	-
NEMATHELMINTHES	42	44	8	1
Rotatoria	42	44	8	1
ANNELIDA	12	11	4	13
Polychaeta, larvae	12	11	4	13
TENTACULATA	3	3	-	2
Bryozoa, larvae	2	2	-	1
Phoronidea	1	1	-	1
ARTROPODA	93	59	20	29
CRUSTACEA	76	42	15	20
Cladocera	17	17	5	5
Calanoida	15	12	7	7
Monstrilloida	2	-	-	2
Cyclopoida	6	5	2	1
Harpacticoida	32	4	-	2
Ostracoda	1	1	1	-
Cirripedia	3	3	1	3
MALACOSTRACA	17	17	4	9
Decapoda	9	9	-	9
Mysidacea	3	3	1	-
Cumacea	1	1	1	-
Isopoda	3	3	1	-
Amphipoda	1	1	1	-
MOLLUSCA	4	4	2	6
Gastropoda, larvae	2	2	-	5

Bivalvia, larvae	2	2	2	1
CHORDATA	2	2	1	2
Ascidiacea	1	1	-	1
Appendicularia	1	1	1	1
CHAETOGNATHA	2	1	1	1
ACRANIA	1	-	-	-

Table 10. Biological diversity of zooplankton in Black Sea coastal and open sea waters

Habitats	Number of species			
	Copepoda	Cladocera	Rotifera	Varia
Lake type				
DD	92	65	200	?
DL	32	27	170	?
S	23	31	63	?
Estuary type				
TE	38	7	16	?
DE	31	50	114	19
BTK	24	12	16	14
DBE	75	84	104	6
Marine type				
NWBS	23	17	44	77
CS	12	5	1	59

Habitats: DD - Danube Delta; DL - Danube Lakes (Kagul, Yalpug, Kugurlui, Kartal, Safyan, Kotlabukh, Kitay); S - Sasyk water body; TE - Tuzlov limans (Burnas, Alibey, Shagany); DE - Dnestrovsky liman; BTK - Berezansky, Tiligulsky and Khadzhibeisky limans; DBE - Dneprovsko-Bugsky liman; NWBS - northwestern Black Sea shelf; CS - Crimean zone.

During the warmer weather the highest biodiversity and quantitative zooplankton indices were observed in coastal waters in the transformation zones of river waters. Here the abundance and biomass of invertebrates is 10 fold greater than in open waters, due to the development of protozoa, rotifers and benthic invertebrate larvae. The latter account for 20% to 43% of the total zooplankton. Larvae of more than 30 species of invertebrates have been discovered in the plankton of the northwestern Black Sea alone. The most

numerous are larvae of *Balanus improvisus* (up to 106 ind.m⁻³), *Mya arenaria* (up to 38.103 ind.m⁻³), *Mytilus galloprovincialis* (up to 10.103 ind.m⁻³) and *Nereis succinea* (up to 3.103 ind. m⁻³). Larvae mostly develop in the 8-22 C° temperature range. The average distribution of meroplankton in the surface 0-10 m layer (the zone of maximum accumulation) is almost the same and is determined by the distribution of parent forms (Fig. 10, Fig. 11) (Alexandrov, Polischuk, 1994). Near the Crimean coast the maximum concentrations of benthic larvae are an order higher than in the northwestern Black Sea (Murina, Kazankova, 1987).

The characteristics of zooplankton in different habitats in the coastal and open waters of the Black Sea basin are shown in Table 11.

Table 11. Numbers (N, 103 ind.nr⁻³) and biomass (B, g.nr⁻³) of mass species of zooplankton in the main habitats of Black Sea coastal and open sea waters.

Habitats	Mass species	Maximum value	
		N	B
DD	<i>Acanthocyclops robustus</i>	120	1.80
	<i>Brachionus calyciflorus</i>	80	0.75
	<i>Bosmina longirostris</i>	70	0.70
	<i>Brachionus angularis</i>	40	0.10
	<i>Keratella quadrata</i>	34	0.10
	<i>Alona costata</i>	6	0.22
	<i>Simocephalus vetulus</i>	5	0.40
DL	<i>Brachionus angularis</i>	4900	0.60
	<i>B. calyciflorus</i>	1200	1.50
S	<i>Daphnia magna</i>	180	12.40
	<i>Diaphanosoma dubia</i>	140	6.50
TE	<i>Acartia clausi</i>	120	2.50
DE	<i>Diaphanosoma brachyurum</i>	300	5.40
	<i>Brachionus calyciflorus</i>	130	0.90
	<i>Asplanchna priodonta</i>	52	1.00
BTH	<i>Calanipeda aquae-dulcis</i>	200	5.00
	<i>Moina brachyata</i>	40	2.00
	<i>Acartia clausi</i>	30	0.20
	<i>Heterocope caspia</i>	8	3.00
DBE	<i>Brachionus calyciflorus</i>	650	5.30
	<i>Acartia clausi</i>	200	1.50
	<i>Cercopagis pengoi</i>	140	2.50

	Podonevadne trigona	38	0.60
MN	Noctiluca scintillans(=miliaris)	52	2.48
	Favella ehrenbergi	13	0.06
	Acartia clausi	3	0.06
EP	Noctiluca scintillans	2620	227.00
	Synchaeta baltica	620	1.42
	Bivalvia, larvae	50	0.15
	Polychaeta, larvae	15	0.09
	Balanus, larvae	12	0.07
	Acartia clausi	5	0.07
	Mnemiopsis sp	0.07	310.00
BP	Pseudocalanus elongatus	8.9	0.13
	Noctiluca scintillans	6.7	0.69
	Sagitta setosa	0.6	0.04
	Calanus ponticus (=C.helgolandicus)	0.5	0.03
	Pleurobrachia rhodopis (=P.pileus)	0.2	1.44

Habitats: DD - Danube Delta; DL - Danube Lakes (Kagul, Yalpug, Kugurlui, Kartal, Safyan, Kotlabukh, Kitay); S - Sasyk water body; TE - Tuzlov estuaries (Burnas, Alibey, Shagany); DE - Dnestrovsky estuary; BTK - Berezansky, Tiligulsky and Khadzhibeisky estuaries; DBE - Dneprovsko-Bugsky estuary; MN- marine neustone; EP - epipelagic zone; BP - bathypelagic zone.

Vertical Distribution

The lower boundary of zooplankton distribution corresponds to the upper boundary of the hydrogen sulphide layer. The highest zooplankton concentrations are in either the surface 10 m layer or in the thermocline layer (from 20 to 40 m), depending on the season. High levels have also been observed at depths of 120-150 m on the coastal margin of the circular current up to 60 m in the centre of the western part of the sea. The lower boundary coincides with the isooxygen of 0.4-0.5 ml O₂. The highest concentrations consist of characteristic representatives of bathypelagic organisms: such as *Pleurobrachia rhodopis*, *Calanus ponticus*, *Pseudocalanus elongatus* and *Sagitta setosa* (Table 11). These species are normally distributed in layers. The upper layer consists of the comb-jelly *P. rhodopis*. The central layer is made up of *C. ponticus* and the lowest layer of *S. setosa* and females of *P. elongatus* up to 0.2 g.m⁻³ (Kovalev et al., 1993).

Individual members of the epiplankton community, such as *Noctiluca scintillans*, *Synchaeta baltica*, *Acartia clausi*, larvae of benthic invertebrates and the introduced comb-jelly *Mnemiopsis sp.*, live above the thermocline (Table 11).

The daily vertical migrations made by bathyplankton specimens into the upper near surface layer and the homogenic structure of the populations of copepod species above and under the thermocline have led numerous authors (Vodyanitsky, 1954; Kovalev et al.,

1993) to come to the conclusion that the division into epiplankton and bathyplankton is conditional and that it would be more accurate to refer to a single community, an entity of pelagic organisms in all of the inhabited layers of the Black Sea.

However, it is in the Black Sea that the neuston biocoenosis was first discovered and described in the near surface microlayer of 0-5 cm. Neuston organisms are characterized by specific morpho-physiological adaptations (Zaitsev, 1970). Typical specimens of planktonic invertebrates in the Black Sea neuston include copepods from the *Pontellidae* family, such as *Pontella mediterranea* *Anomalocera patersoni* and *Labidocera brunescens*. The neuston of the near surface biotope is the first to be influenced by anthropogenic activities whose consequences are transmitted via the land or atmosphere. This explains the disappearance of the narrow neritic species *R. runescens* and the sharp decline in numbers and the movement of the range of *P. mediterranea* and *A. patersoni* into open areas of the sea. Today the neuston community is represented by epiplanktonic species of *N. scintillans* (+*miliaris*), *A. clausi* and *F. ehrenbergi* (Table 11), as well as the early stages of fish and benthic invertebrates.

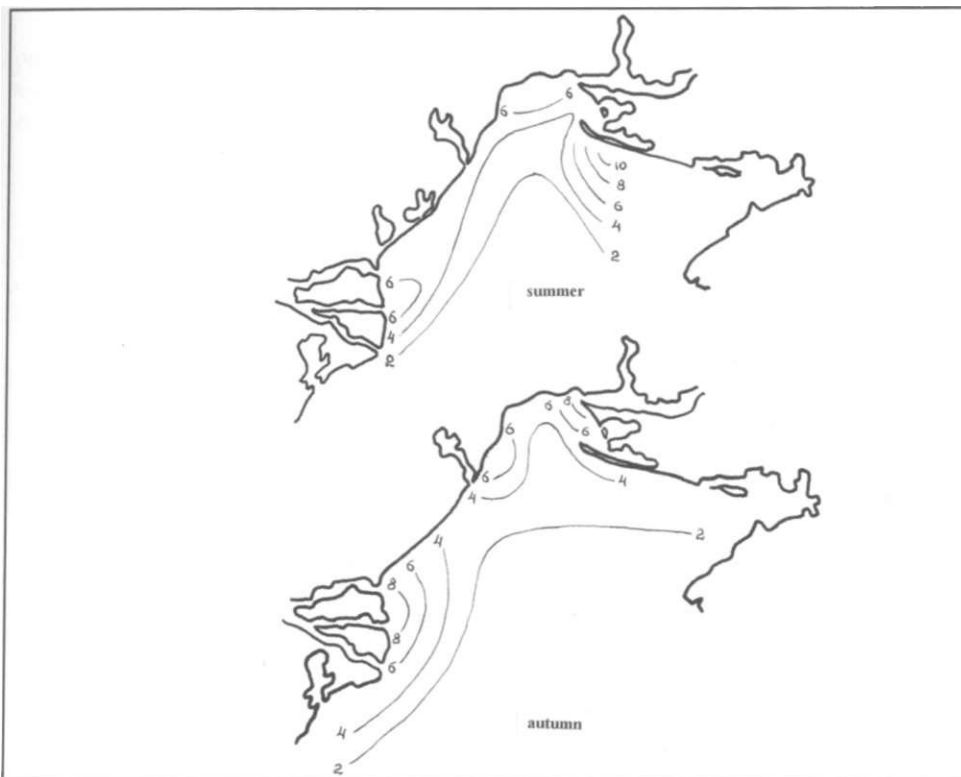


Fig. 10 Spatial distribution (number, 10^3 ind.m^{-3}) of the bivalvia larvae in northwestern part of the Black Sea (0-10 m. layer).

The most significant changes in the structure (Annex I, Table 3) and quantitative development of zooplankton have been observed as a result of eutrophication. In addition to a sharp decline in the abundance of a number of species (*Penilia avirostris*, *Evadne nordmani*, *E. spinifera* and *Centropages ponticus*) there has been a sharp increase in zooplankton specimens such as *N. scintillans*, *A. clausi* and *Pl. polyphemoides*.

In summer 1986, at a distance of 25-30 miles from the mouth of the Danube, extremely high concentrations of *N. scintillans*, ranging from 10 to 559 mg.m⁻³, were registered over an area of 100 km² (Zaitsev et al. 1988).

Eutrophication and the decline in standing stocks of plankton feeding fish produced a sudden increase in the numbers of the jellyfish *Aurelia aurita* throughout the Black Sea basin, especially in the northwestern Black Sea. *A. aurita* populations peaked at the beginning of the 1980s when the average biomass reached 47 g.m⁻³ and standing stocks in the northwestern Black Sea reached 82.106 tons wet weight. In 1990 the average biomass of jellyfish declined eight fold (Zaitsev, Polischuk, 1984).

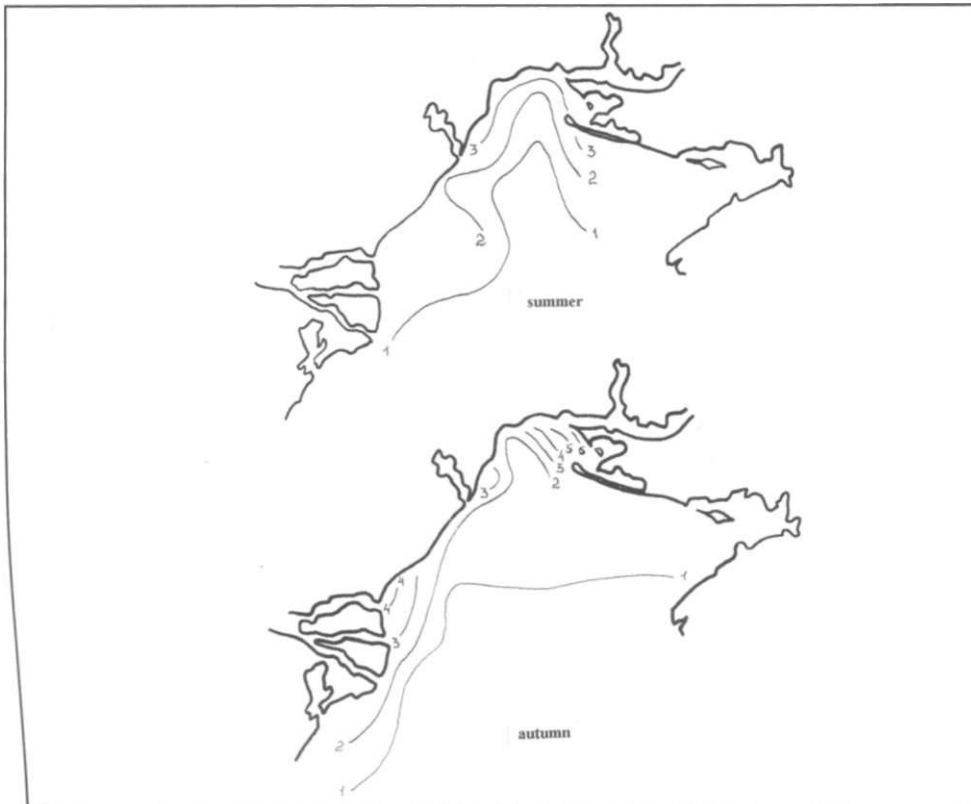


Fig. 11 Spatial distribution (number, 10⁴ ind.m⁻³) of the polychaeta larvae in northwestern part of the Black Sea (0-10m. layer).

In 1987 in the open waters opposite the Crimean peninsula single specimens of a species of comb-jelly new to the Black Sea, the introduced *Mnemiopsis sp.* (Zaitsev et al., 1988), were discovered. By 1990 it had become a mass species (Vinogradov et al., 1990) and currently has a significant impact on the state of the pelagic ecosystem of the Black Sea and Azov Sea. Characteristics of the contemporary state of the main pelagic predators.

Pleurobrachia rhodopis

The comb-jelly *Pleurobrachia rhodopis* forms part of the bathyplankton complex and, for most of the year, stays in the lower layers of the oxygen zone. However, it reproduces in the upper layer, which is rich in forage zooplankton, and to which specimens sometimes migrate. This is a constant process and is accompanied by severe grazing of copepods. In the northwestern shallow waters, as in all of the coastal zone, *Pleurobrachia rhodopis* is encountered only during strong stable winds when the water masses of the cold intermediate layer reach the coast.

The maximum concentrations of *Pleurobrachia rhodopis* are found in the main productive zone (Table 10). However, in this zone accumulations of forage zooplankton and predators are divided vertically, mixing only at night during the migration of the comb-jelly to the surface.

Mnemiopsis sp.

The highest concentrations of the comb-jelly *Mnemiopsis sp.* are found in the shallow coastal zone. Populations reach their highest levels in the northwestern Black Sea (Fig. 12). Unlike *Pleurobrachia rhodopis*, in 1992-93 populations of *Mnemiopsis sp.* fell in the spring-summer period and peaked in autumn-early winter. In zones inhabited by both species, *Mnemiopsis sp.* populations were always vertically separated from those of *Pleurobrachia*, as a result of the two grazing on different complexes of zooplankton.

Sagitta setosa

The biomass of *S. setosa* is 1-2 orders lower than that of the comb-jelly. Its distribution is similar to that of *P. rhodopis* with concentrations reaching their highest levels in the main productive zone. However, unlike *Pleurobrachia rhodopis*, *Chaetognatha* make regular migrations from the lower layers of the oxycline to the surface in the evening, returning to the lower levels during the day. They also have different seasonal cycles. *Pleurobrachia rhodopis* reaches its highest biomass from May to September, while *Chaetognatha* biomasses peak in the winter and early spring.

The introduction of *Mnemiopsis sp.* produced a division of the pelagic community into two subsystems separated spatially, in depth and in their periods of maximum development: namely the coastal subsystem of *Mnemiopsis sp.* which is functionally tied to

epiplankton forage organisms; and the main Black Sea current zone of *Pleurobrachia rhodopsis*, the main consumer of bathyplankton. Chaetognaths form a link between the two subsystems and, where there is coexistence, facilitating the transfer of secondary production from surface layers to deeper water and vice versa.

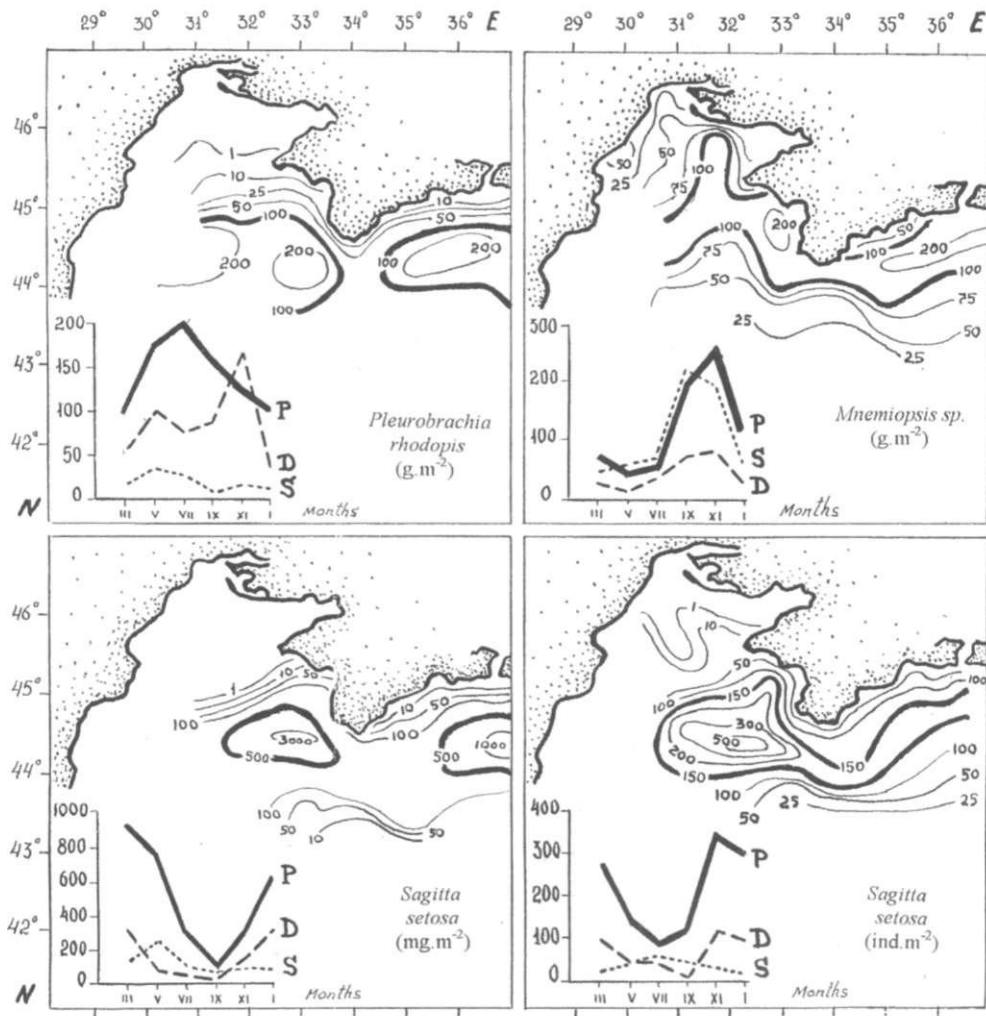


Fig. 12 Average spatial and temporal distribution of *Pleurobrachia*, *Mnemiopsis* and *Sagitta* in Ukrainian Black Sea area in 1992-1993.

D - divergence zone, P - zone of high productivity, S - shelf zone.

Phytobenthos

I. Microphytobenthos

At present there is considerable data on the microalgal population of hard (artificial and natural) and soft substrates of the Black Sea and the adjacent limans (Pogrebnyak 1965, Kuvaeva 1963, Kucherova 1957, 1970, 1975, Proshkina-Lavrenko 1955, 1963, Bodeanu 1979, Guslyakov 1978, 1981, 1991, Gerasimyuk 1992, Guslyakov et al. 1992). However, systematic investigations of the microphytobenthos are still relatively rare and have been limited to certain areas of the Black Sea shelf. There has been no theoretical justification of the production processes at the level of benthic microscopic algae; nor have objective methods been formulated for determining the processes.

Nevertheless, preliminary data show that the production of microalgae in the sea may significantly exceed the production of macrophytobenthos. The solution of this problem would contribute to an integrated assessment of the structural-functional organization of the coastal Black Sea ecosystem and ways of regulating it.

A total of 136 species of microalgae have been recorded in Ukrainian Black Sea coastal waters. Pennata form the basis of the benthic Black Sea microflora, particularly two orders - with and without a raphe (Annex I, Table 4).

The distribution of diatom algae on soft substrates in the northwestern Black Sea resembles a mosaic (Fig. 13). The highest levels were recorded during an autumn expedition in 1992 in Odessa and Tendrovsky bays ($19,110 \cdot 10^6$ cells \cdot m⁻² and $1,415.7 \cdot 10^6$ cells \cdot m⁻², correspondingly). The lowest levels were recorded near the Danube estuary ($11.5-52.2 \cdot 10^6$ cells \cdot m⁻²), opposite the Dnestrovsky liman ($8.6-37.6 \cdot 10^6$ cells \cdot m⁻²), on the cross section of Yuzhniy port and Dnepro-Bugsky liman ($63.7-95.7 \cdot 10^6$ cells \cdot m⁻²) and in the southern part of Tendrovsky Bay ($65.5-95.7 \cdot 10^6$ cells \cdot m⁻²). There were also localized areas with very low levels near the Danube estuary. There was even greater diversity in the biomass figures. The largest area with the greatest biomass is near Tendrovsky Bay ($2.8-5.5$ g \cdot m⁻²), in the northern part of the Dnepro-Bugsky liman (4.28 g \cdot m⁻²) and near the Odessa coast (2 g \cdot m⁻²).

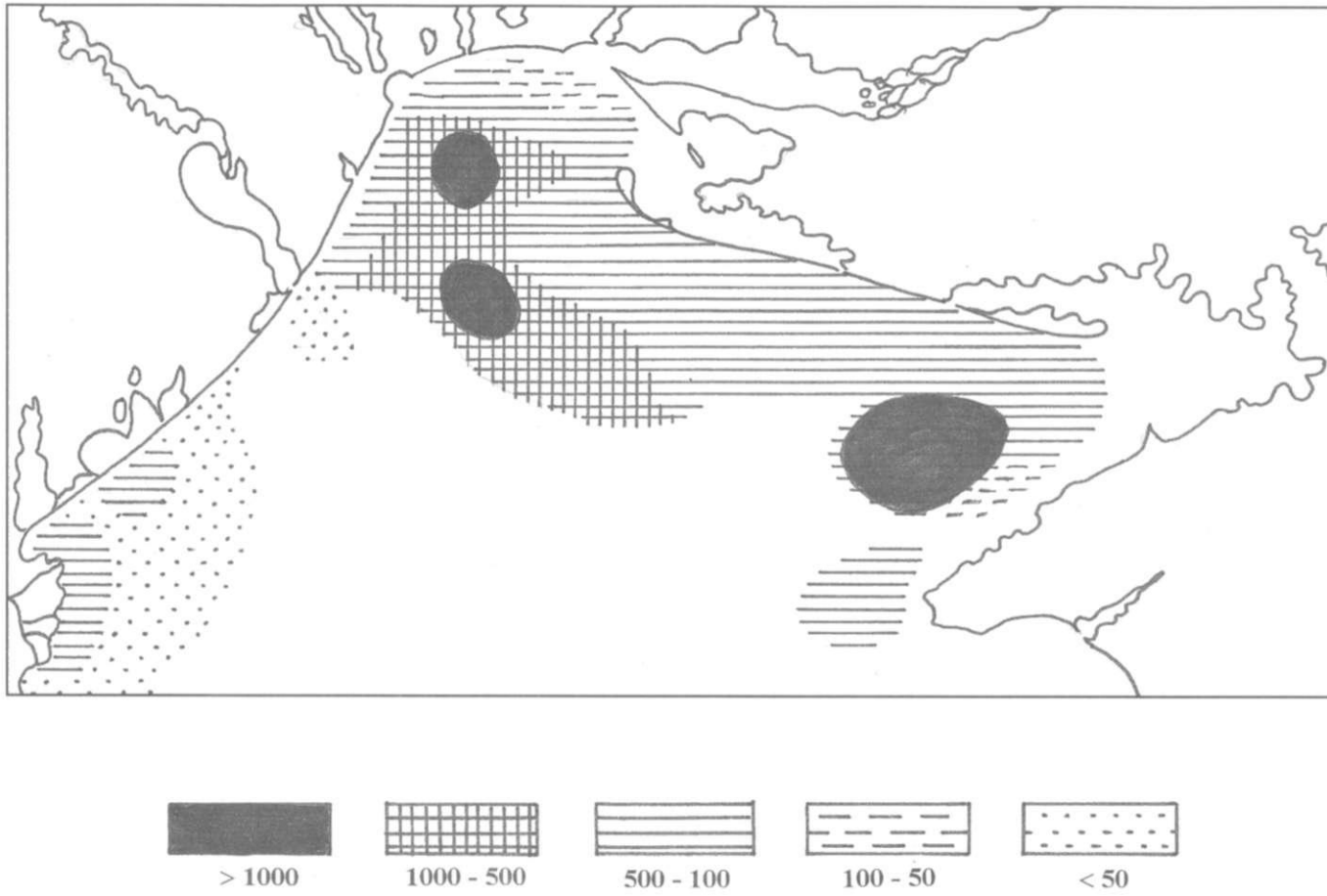


Fig. 13 Numbers (10^6 cells. m^{-2}) of benthic diatoms on the northwestern shelf of the Black sea.

Low biomass values have been recorded near the Danube estuary (0.03-0.29 g . m⁻³) between the Dnestrovsky and Sukhoi limans (0.11-0.52 g . m⁻³), near Yuzhniy port (0.33-0.79 g . m⁻³) in the western part of Tendrovsky Bay (0.33-0.4 g . m⁻³) and seaward opposite the Odessa coast (0.72-0.57 g . m⁻³).

In the Danube, and in some areas of the Dnestr, the microphytobenthos biomass is composed of pelagic species. High mortality levels have meant that in these areas both the species biodiversity and biomass of benthic forms remain low.

As of 1994, 98 taxa of phytobenthos algae had been recorded in the Ukrainian part of the Danube, two thirds of them diatoms, including: *Diatoma vulgare*, *Melosira varians*, *Cymbella ventricosa*, *C. tumida*, *C. parva*, *Gomphonema parvulum* and *Nitzschia intermedia*. The filamentous green algae with large biomasses in the bays of the delta include *Cladophora glomerata* and *Oedogonium sp.* Blue-green algae on the bottom include large biomasses of *Phormidium ambiguum*, *Lyngbya major* and *Oscillatoria geminata*. The biomass of the phytobenthos varies from 0.025 to 0.154 g.m⁻³.

The phytobenthos of the near Danube limans comprises 80 species. Diatoms predominate, being supplemented in the summer by blue-green and chlorophyta depositing from plankton. The maximum indices are 857,000 cells. 10 cm⁻³ and 0.50 mg. 10 cm⁻³.

The phytobenthos of the lower Dnestr and Dnestrovsky limans is made up of blue-green, dinophyta, cryptophyta, euglenophyta, chrysophyta, xanthophyta diatoms and green algae. There are 219 taxa and 207 species. Diatoms and green algae dominate the benthic algocoenoses, including: *Melosira italica*, *Melosira varians*, *Stephanodiscus astraea*, *S. hantzschii*, *Navicula cryptocephala*, *N. viridula*, *N. cuspidata*, *N. hungarica*, *N. gastrum*, *N. tuscula*, *N. anglica*, *Pinnularia braunii*, *P. major*, *Cymbella cuspidata*, *C. gracilis*, *C. lanceolata*, *C. lata*, *C. tumida*, *C. turgida*, *Scenedesmus acuminatum*, *S. quadricauda*, *S. apiculatum* and *S. opolinensis*. (Annex I, Table I). In 1986 the average biomass was 0.2 g.m⁻³, rising to 0.9 g.m⁻³ in 1987.

In terms of density and biomass, diatom numbers on the sandy beaches of the Tiligulsky liman peak at 0.9 10⁶ cells.g⁻¹ of sand or 0.9 mg.g⁻¹ of sand. In the summer the figures for both abundance and biomass begin to decline and fall still further in autumn and winter. In May on Dzharylagach island the "blooming" of the sand can usually be observed on wide areas of sandy beaches in the hygro and epipsammon zones. Studies of the microphytes of the limestone near Sevastopol showed that the biomass peaked at 1,885.6 g.m⁻² in the spring.

II. Macrophytobenthos

Anthropogenic Dynamics of Black Sea Phytocoenoses

The Black Sea flora of higher algae (Chlorophyta, Phaetophyta and Rhodophyta) is of Atlantic origin representing an impoverished flora of the Mediterranean Sea. Fluctuating temperatures and salinity over a period of several centuries have produced a slow

transformation of the flora and vegetation of the Black Sea. In the 19th and 20th centuries the Black Sea flora lost some of its tropical and subtropical species. But arctic boreal species, which had disappeared from the Mediterranean, remained in the Black Sea in deep water or in the coastal zone as seasonal winter forms.

In addition to these slow naturally occurring changes there have also been a series of rapid transformations, particularly in this century, caused by anthropogenic factors, many of which can be observed during a single generation of observations. The first information to appear in the literature on anthropogenic changes in Black Sea bottom vegetation was published in 1930 (N. Morozova-Vodyanitskaya, 1930). Other algologists subsequently studied the subject in some depth (Pogrebnyak, 1965; Kalugina-Gutnik, 1975; Eremenko, 1977; Kaminer, 1987 et al.).

The most significant anthropogenic changes in the bottom fauna were noted in the 1960s in coastal waters. The marginal phytocoenoses, which serve as indices of the state of the ecosystem as a whole, were the first to give an indication of the critical situation.

In the Sevastopol and Novorossiisk bays the original biocoenoses have been squeezed out by meso and polysaprobic biocoenoses. The biomass and standing crop of *Cystoseira* have declined, while the biomasses of *Enteromorpha*, *Viva* and *Cladophora* have increased. In the 1970s-1980s the pollution of coastal waters began to have an impact on the flora of offshore waters near Karadag.

Over the last 30 years the eutrophication of coastal waters has significantly altered the structure of marine vegetation. According to A. Kalugina-Gutnik (1985), the standing crop of *Cystoseira* along the Crimean and Caucasian shores dropped by an average of 60%. The *Viva* biomass increased threefold in polluted bays and the area covered by the *Viva* phytocoenoses grew more than tenfold. While the frequency and dispersal range of a number of oligosaprobic species decreased.

Changes in the vegetation in the sublittoral zone at depths of 40-60 m were observed much later, in the mid 1960s. Zernov's Phyllophora Field (ZPF) which once covered an area of 1,100 km² and which in 1964 had a standing crop of 4,100,000 t (Kalugina, Lachko, 1968) has now almost disappeared. K. Kaminer calculated that in 1984 only 420,000 t of the phyllophora remained. The process of degradation is continuing. According to data compiled by A. Kalugina-Gutnik, of the 36 species of algae in ZPF only nine remain (1989). Populations of oligosaprobic species (species of *Lithothamnion*, *Sphacelaria saxatilis* etc) have disappeared completely.

However, *Phyllophora brodiaei* and *Polysiphonia elongata*, which were previously restricted to a limited range, have become widespread, occupying the ecological niche vacated by mass mortalities in populations of *P. nervosa*. Where *P. brodiaei* has disappeared it has not been replaced by other species and the areas, such as the western part of ZPF, remain bare and lifeless. As a rule, the original perennial phytocoenoses have been replaced by populations with short lifespans. The phyllophora field beyond the Bakalsky Bar of Karkinitsky Bay displays similar characteristics. The main reason for the degradation is the eutrophication of the water masses, a process which has accelerated in recent years (Zaitsev, 1983).

These anthropogenic changes are most dramatic in the northwestern Black Sea. Long before the first signs of the degradation of the phyllophora became evident, it was possible to study the structural changes in the marginal phytocoenoses under anthropogenic pressure from disturbances in the sediment (anti-landslide construction) and eutrophication (Eremenko, 1974 etc).

Anthropogenic activities have had a marked impact on the structure and dynamics of the phytobenthos of the Dnestr-Dnepr interfluvium. The species composition of the simplified phytocoenosis in the interfluvium is four times poorer than in the Black Sea (Annex I, Table 5). Even though the water is of marine origin a brackish-marine group of macrophytes predominate, while boreal and arctic-boreal groups rank first in terms of biomass and the number of species. The percentage of polysaprobionts in the phytobenthos is half the figure for the Black Sea as a whole. Over a period of 25-30 years 14 species of macrophytes have disappeared from the interfluvium, including red and brown algae such as: *Cystoseira barbata*, *f. hoppi*, *Stilophora rhizoides*, *Dilophus fasciola*, *Chondrea dasyphylla*, *C. tenuissima*, *Melobesia farinosa* and *Leuthoria difformis*; while another 16 species have become rare.

The disappearance of *Cystoseira* has changed the coastal vegetation and its phytocoenosis has been gradually replaced by that of *Ceramium*. In contrast to the Crimean and Caucasian shores, the dominant phytocoenoses are those of *Ceramium elegans*, *C. rubrum*, *Enteromorpha intestinalis*, *E. prolifera*, *Cladophora vagavunda* and *Polysiphonia denudata*.

But the impoverishment of biodiversity has recently stabilised. The list of species which have disappeared or become rare is not rising. Indeed, during the 1990s species which had once been considered rare became more common, including species of red and brown algae such as: *Polysiphonia sanguinea*, *Pylaiella littoralis* and *Punctuaria latifolia*. This change has been attributed to long multiyear variations in the floristic composition and to a process of self-regulation in the ecosystem.

One of the most significant features of anthropogenic regression today is the substitution of oligosaprobiont and P-mesosaprobiont species by a-mesosaprobiont and polysaprobiont species with a shorter life cycle and a high growth rate.

An analysis of the changes in marginal phytocoenoses in the interfluvium has shown that, in addition to a decline in the total number of species, over a period of 20 years the proportion of oligosaprobionts has fallen to 11%, while the proportion of polysaprobionts has increased from 20 to 35% (Annex I, Table 6). These changes demonstrate the increasing eutrophication of the northwestern Black Sea. It is significant that there are no oligosaprobionts among the dominants and subdominants of the phytocoenoses. Mesosaprobionts and polysaprobionts each account for 50% of the dominant species.

Since the 1960s there has been an increase in the distribution and biomass of such polysaprobionts as *Urospora penicilliformis* and *Enteromorpha prolifera*. Regressive anthropogenic succession occurs in coastal areas and in the limans, particularly Grigorievsky and Sukhoi.

A full list of the macrophytobenthos species found in the Ukrainian Black Sea is given in Annex I, Table 7.

III. Higher Aquatic Plants

Modern studies of hydrobionts have been conducted according to organismic, population and phytostromatic (chorological) factors. In addition, the structures of growth have been measured using remote control methods and estimates made of the areas and standing stocks.

A total of 159 species of hydromacrophytes and hygromacrophytes have been recorded in the floristically-rich Danube estuary. The flora of the area is diverse. The estuary is the only part of the former Soviet Union where the northern Balkan ash *Fraxinus pallisae* can be found. Recently, reed and water chestnut species have been recorded by Ukrainian botanists. Since 1976 large quantities of free floating aquatic plants from the Asolaceae family have been discovered.

Higher aquatic plants are represented by numerous groups composed of biocoenoses of different types, which makes their structure easier to explain at a chorological level, when combinations of, rather than individual, phytocoenoses are studied. Eight groups of mesocombinations have been identified.

The first group of mesocombinations occupies the conuses of outflows and alluvial deposits of delta areas. These habitats have a shallow depth (0.5-1 m) and a good water exchange. Mineralization of the water does not exceed 0.2-0.3 ppt. Associations of *Sparganium erectum* and certain species of cat's tails (*Typhia angustifolia*, *T. grossheimii* Pobed and *T. laxmanii*) are linked with a layer of water chestnuts (*Trapa natans*). Associations of *Scirpus lacustris* on silted sand with shells are characteristic of parts of the Dnestrovsky and Dneprovsky limans.

The second group of mesocombinations is composed of the vegetation of newly formed bays with a moderate water exchange. In freshwater bays with moderate sedimentation, mineralization of the water does not exceed 1 ppt, and associations of water chestnuts *T. natans* predominate. *Nymphoides peltata*, the water lily *Nymphaea alba* and *Ceratophyllum demersum* are encountered only in Potapovsky and Tsiganka on the Danube. A holophyte mesocombination can be found in brackish water areas (4-5 ppt salinity) with the water milfoil *Myriophyllum spicatum*, the pondweed *Potamogeton pectinatus* and *Schoenoplectus triquetus*. Such areas are devoid of vegetation with floating leaves, which is typical of mesocombinations on the grey silts specific to the Kiliya delta of the Danube.

The third group of mesocombinations is linked to vegetation in long existing bays with a poor water exchange and intensive autochthonic siltation (e.g. Anankin, Delukov Chepirkin, Rybachiy). The isolation of the vegetation means that it is less subject to other influences and itself serves as an ambient factor. Plant cover is represented by a combination of the water lily, narrow leafed and dark green cat's tails and, rarely, the water chestnut. This type of mesocombination is characteristic of the flood plains of all three estuarine areas.

The fourth group of mesocombinations is characteristic of isolated bays with a hyperaccumulation of autochthonic organic matter. *Stratiotes aloides* and the dark green hornwort *Ceratophyllum* dominate in this type of habitats. As a rule, there are fewer water lily coenoses in large water bodies.

The fifth group includes vegetation of the most elevated parts of the remains of autochthonic plant material. The densest are the swamp communities of reeds, reeds with water plants and narrow leafed cat's tail. These are not only characteristic of the reed islands of all three estuarine areas, but also of the freshwater upper parts of the Tiligulsky and Berezansky limans.

The sixth group of mesocombinations is linked to the vegetation of freshened shallow waters with significant wave action. These include communities of *Najas*, *Potamogeton nodosus* in the marine part of the Lebyazhye shallows, and Zhelezny Bay.

The seventh group includes brackish water parts of the coast, overgrown by eelgrass *Zostera marina*, *Zannichellia*, *Potamogeton pectinatus* and *Ruppia spiralis*. Such mesocombinations are characteristic of the greater part of Tiligulsky and Berezansky limans.

This eighth group of mesocombinations occupies newly formed bays with alluvial deposits and moderate water exchange, such as can be found in the front margin of the Dnepr delta, where the dominant communities are *Nymphoides peltata* (41.2%), the water lily (24.2%) and *Ceratophyllum demersum* (13%).

The total area of the plant cover of the Danube delta, not including the reed groups, is 155 ha. The dry plant mass totals 1,163 tons. Water plants are comparatively sparse in the Dnestr liman. However, they produce about 70,000 tons of organic matter. In the Dnepro-Bugsky liman overhanging growths account for more than 4,000 ha, while the standing crop totals 24,800 tons of dry plant mass.

IV. Meiobenthos

A special study of the meiobenthos of the Ukrainian shelf of the Black Sea was launched at the end of the 1960s (Kiseleva, 1965). Different groups in the meiobenthos have been studied, but biodiversity investigations only conducted for some of them.

The first monograph on the biodiversity and ecology of contemporary foraminifers was published by V. Yanko in 1987. The numerous works which appeared prior to the 1960s cannot be used for comparative analysis because dyes were not used for the identification of foraminifer species living today. But relatively complete lists are available for foraminifers in the northwestern Black Sea and the Azov Sea today (Vorobyova, Yanko, 1986, 1990). Biodiversity is related to factors such as salinity, the type of sediments and the amount of organic matter. There are 36 different species on the northwestern shelf, and 18 in the Azov Sea. The maximum density of foraminifers may reach 4,000,000 - 5,000,000 ind.m⁻². *Ammonia tepida* is a mass species.

The first studies of the Black Sea nematode fauna were conducted by I. Philip'yev (1918-1921, 1921) in the area around Sevastopol and the southern Crimean coast. These studies were supplemented by research by T. Platonova's (1968). The species composition of the nematodes living on the western Crimean coast was first described by M. Kiseleva (1965). Further detailed investigations of the northwestern (Karkinit'sky Bay), southwestern (Cape Nukull, Donuzlav - Cape Tarkhankut), southern (Yaltinsky Bay near Alushta) and eastern (Cape Meganom, Karadag Reserve) Crimean coasts and Sivash lagoon were conducted by N. Sergeeva (1972, 1973, 1974, 1976, 1979, 1981, 1984). The first studies of the northwest were conducted by A. Paramonov (1926). In the 1980s there were comprehensive studies of the species composition of the Danube-Dnester interfluvium, the Pridneprovsko-Bug'sky area, Odessa, Egorlitsky and Tendrovsky bays in the Sukhoi and Grigorievsky limans and the Azov Sea (Kulakova, Vorobyova, 1987; Kulakova, 1989; Vorobyova, Zaitsev, Kulakova, 1992, Philip'yev, 1922, Vorobyova, Kulakova, 1990).

The only nematodes included in the faunistic list of free-living nematodes are those which have not been identified as a species. Many in this group require additional study and description. The nematode fauna of the Black Sea comprises 250 species.

Most of the free living nematodes are euribionts, inhabiting diverse biotopes across the entire Black Sea shelf. Average densities are: 22,000-49,000 specimens.m⁻² in the sand biotope; 80,000-20,000 specimens.m⁻² in silty sand biotopes; and 100,000-120,000 specimens.m⁻² in silty biotopes. The highest nematode densities (2,000,000-3,000,000 specimens.m⁻²) have been recorded in the Crimea, in Donuzlav, Balaklava Bay, and in the northwestern part of Odessa Bay. The dominant or mass species are: *Sabatieria abyssalis*, *S. pulchra*, *Terschellingia longicaudata*, *Sphaerolaimus dispar*, *Axonolaimus setosus* and *Mesotheristus setosus*.

Representatives of the Gastrotricha class are widespread in the alluvial deposits of Black Sea beaches, where they mostly inhabit fine grained sands. Gastrotrichs are encountered in the interstitial zone throughout most of the year. Their numbers vary widely, reaching a maximum of 395.100 specimens.cm⁻² (Vorobyova, Zaitsev, Kulakova, 1992).

The suborder Harpacticoida is one of the most numerous and faunistically diverse groups of the Black Sea meiobenthos. Its members inhabit all of the bottom biotopes and are often encountered in plankton in shallow waters. The faunistic composition and population dynamics of Harpacticoids have been most completely described for the Crimean shores (Kosyakina, 1936; Griga, 1961-1964, 1969). The identification of the faunistic composition of Harpacticoids communities in growths and sediments began in 1976. More than 100 species have been recorded, of which six are new to the Black Sea (Kolesnikova, 1979, 1981, 1983, 1991). In 1990 Vorobyova and Kulakova published a list of Harpacticoid species in the Azov Sea. There have also been multiyear studies of the species diversity and population dynamics of Harpacticoids in the pseudo- and supralittoral zones of sandy beaches in Odessa (Vorobyova, 1984; Vorobyova, Zaitsev, Kulakova, 1992). In 1974 Monchenko published a survey of the Harpacticoids of the southern shore of the Dnestrovo-Bug'sky interfluvium, the Dnestrovsky liman and mouth of the Danube.

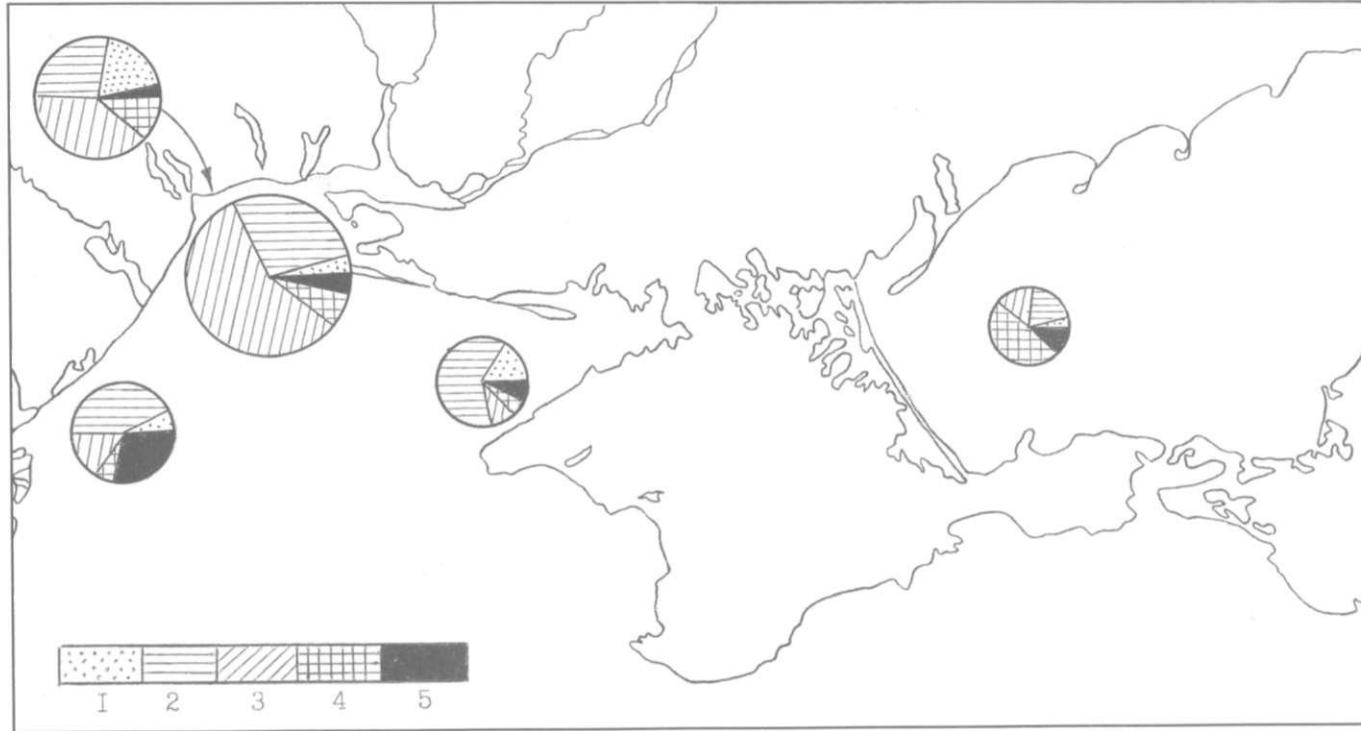


Fig. 14 Taxonomic groups of meiobenthos in the shelf zone of the Black Sea and the Sea of Azov.

1. Foraminifera, 2. Nematoda, 3. Harpacticoida, 4. Other groups, 5. Pseudomeiobenthos

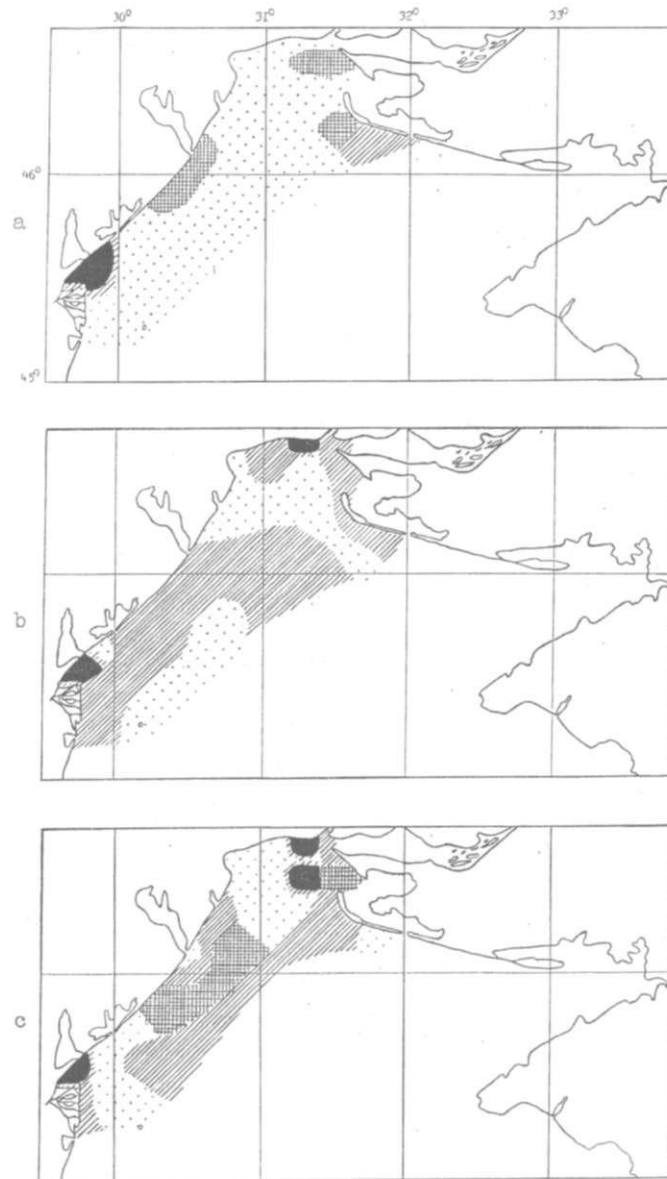
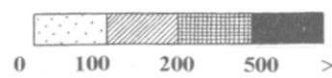


Fig. 15 Numbers (ind.m^{-3}) of meiobenthos in spring a - summer b - and autumn c - seasons.



The species diversity of ostracods on the northwestern shelf of the Black Sea was studied by Shornikov (1964, 1966, 1967). But in the last 20 years surveys of ostracods have been restricted to the biotope of sandy beach deposits (in the pseudosupralittoral) where seven species have been identified (Vorobyova, Zaitsev, Kulakova, 1992) The main aggregations are characteristic of coarse grained sands. They are encountered throughout the year with numbers peaking in May to October at around 36,000 ind.m⁻².

The first data on the akarofauna of the Ukrainian shores were published by Makkaveeva (1961, 1965), who investigated marine ticks of the Crimean coast and in adjacent macrophyte growths near Sevastopol. Ten species of Halacarida were identified. Studies of the akarofauna of the northwestern Black Sea and the Odessa Bay began in the 1970s. In 1979 Vorobyova and Yaroshenko identified 17 species of marine ticks while in 1988 Vorobyova and Kulakova identified 12 soil ticks in the interstitial area of sandy beaches. Halacarids make up from 0.2 to 1.2% of the meiobenthos, although the figure can be even higher in the upper sublittoral (0-1.5 m) in some areas of the northwestern Black Sea.

Studies of species diversity and the qualitative indices of meiobenthos, which in bottom biocoenoses are highly sensitive to changes in the environment, may help in evaluating the processes which have taken place in the past ten years and forecasting the consequences.

The first stage in the study of the meiobenthos of the northwestern Black Sea is the analysis of the distribution of different meiobenthos representatives according to environmental factors (temperature, salinity, depth, sediment type). Table 13 shows significant variations in population densities at various depths during different seasons. The maximum values were observed during the summer in silty sediments.

The species composition of the meiobenthos varies with different levels of eutrophication (Fig. 14). The spatial distribution of the quantitative indices of the meiobenthos is heterogeneous and may vary from 10 to 5,000,000 specimens m⁻². The highest values are observed during the mass development of foraminifers, particularly near "blooming" zones of phytoplankton in the near surface sea layers and the subsequent sedimentation of the algae at the bottom (Fig. 15).

Nematodes and foraminifers currently dominate the northwestern Black Sea. In the coastal area influenced by the Dnepr runoff and around Odessa Bay they account for 87.5-100% of the total. There have been significant changes in recent years. Of the permanent representatives, apart from nematodes, only harpacticoids and foraminifers can be found in large numbers under favourable conditions. Ostracods, halacarids, turbellarians, gastrotrichs, kinorhynchans are rare. Hypoxia and the resultant mass mortalities cause not only significant changes in the percentages of eumeiobenthos specimens, but reduce the proportion of the pseudomeiobenthos in the total number and biomass of organisms. Thus, in the Odessa area the moiety of the temporary component is less than 1.9% in the summer and 1% in the autumn. The meiofauna is only represented by three groups. Nematodes account for 65.7-84.2% of the total, rising to 100% in some areas. The heavy silting and low oxygen levels mean that most mollusc larvae which fall to the bottom perish (Vorobyova, 1990).

Thus, the species composition (Annex I, Table 8) and the qualitative indices of the meiobenthos are formed under the influence of natural environmental factors and undergo marked changes influenced by eutrophication and other anthropogenic factors.

Table 13. Average numbers (N, ind.m⁻² and biomass B, mg.m⁻²) of the meiobenthos at different depths

Group		<10m	10-15m	15-20m	<25m
SPRING					
Foraminifera	N	75025	104020	127343	177720
	B	39,0	54,0	66,2	92,4
Nematoda	N	163350	200425	296093	310688
	B	62,0	76,1	112,5	118,0
Harpacticoida	N	35450	20700	124062	83541
	B	354,5	207,0	1240,6	835,4
Other groups	N	1200	5135	3437	520
	B	46,9	163,9	131,8	20,8
Eumeiobenthos	N	275025	330280	550935	572469
	B	502,4	501,0	1551,1	1066,6
Pseudomeiobenthos	N	3000	3000	2187	3625
	B	155,0	69,5	138,1	49,4
Meiobenthos	N	278025	333280	553122	576094
	B	657,4	570,5	1689,2	1116,0
SUMMER					
Foraminifera	N	8125	22200	20580	5530
	B	4,2	11,5	10,7	2,9
Nematoda	N	960833	279000	706275	187544
	B	365,1	106,0	268,4	71,2
Harpacticoida	N	599500	215000	420750	35862
	B	5995,0	2150,0	4207,5	358,6
Other groups	N	4555	21950	9250	7106
	B	42,6	599,3	286,7	180,1
Eumeiobenthos	N	1573013	538150	1156855	236042
	B	6006,9	2866,8	4773,3	615,7
Pseudomeiobenthos	N	26250	23250	16925	3193
	B	972,0	681,7	885,4	172,2
Meiobenthos	N	1599263	561400	1173780	239235
	B	6978,9	3548,5	5658,7	787,9
AUTUMN					
Foraminifera	N	1850	416	6750	3750

	B	0.9	0.2	3.5	1.9
Nematoda	N	199850	137916	185770	507714
	B	75,9	52,4	70.5	192,9
Harpacticoida	N	31725	205000	72500	70142
	B	317,2	2050.0	725,0	701,4
Other groups	N	0	0	0	0
	B	0	0	0	0
Eumeiobenthos	N	265150	343332	265020	581606
	B	394,0	2102,6	799,0	896,2
Pseudomeiobenthos	N	9550	4583	4200	6642
	B	257,5	169,5	159,2	108,4
Meiobenthos	N	274700	347915	269220	588248
	B	615,5	2272,1	958,2	1004,6

V. Macrozoobenthos

The biological diversity of marine water bodies depends on many interrelated factors, such as salinity, type of sediment, oxygen regime and temperature.

The average salinity of the Black Sea is 18 ppt compared with 37 ppt in the Mediterranean. The species diversity of free living, multicellular organisms is 3.1 fold lower at 1,707 compared with 5,281 in the Mediterranean (Mordukhai-Boltovskoi, 1972). The average salinity of the Azov Sea is still lower (11 ppt) which explains an even lower diversity of species, a total of 350. This difference in salinity is because there is an upper limit of mesohaline waters between the Black Sea and Azov Sea averaging 15 ppt, which is very important for fauna. The Azov Sea is within the limits of the brackish water zone and differs from genuine marine waters in its impoverished fauna and its domination by species ready for osmoregulation.

Until the early 1970s the species composition and quantitative distribution of the macrozoobenthos can be characterized as seasonally stable with comparatively small annual fluctuations in density and biomass. But abrupt changes were observed in the macrobenthos, particularly in the freshened areas of northwestern Black Sea, in the early 1970s. The first mass mortality of benthic fauna was registered in the Dnestrovsky-Danube interfluvium (DDI) in September 1973 (Salsky, 1977).

About 875 macrozoobenthos taxa have been identified on the Ukrainian Azov Sea-Black Sea shelf. In the last 20 years, 243 taxa have been recorded in the northwestern Black Sea and 312 near the Crimean coast. The fauna of the coastal areas is poor with 101 species being recorded in marine waters and 402 in freshwater areas (Tables 14, 16 and Annex I, Table 9). The macrobenthos of the Azov Sea includes 136 taxa (36 worms, 60 crustaceans, 23 molluscs and 17 others) (Vorobyov, 1949). The species composition of the

macrozoobenthos of the Azov Sea was 4.1 times poorer than that of the Ukrainian Black Sea shelf.

Eutrophication is the most important of the complex of anthropogenic factors affecting the marine biota, causing periodical mortalities of benthic fauna due to a lack of oxygen (hypoxia).

Table 14. Temporal changes in the species diversity of the macrozoobenthos on the Ukrainian Black Sea shelf

Main systematic groups	Till 1975	Contemporary state			
		NWBS	Crimea	Coastal water bodies salt fresh	
Worms	205	59	103	22	57
Crustaceans	202	91	89	50	68
Molluscs	186	69	89	21	72
Insecta	204	5	1	5	200
Others	78	19	29	J	5
Total	875	243	312	101	402

In the past two decades shelf the areas subject to hypoxia have spread from the near estuarine waters toward the centre of the sea. In some years the hypoxic areas have covered 66% of the northwestern Black Sea at depths of 10-40 m (Zaitsev et al, 1985). The time period for mass mortalities varies from one to three months.

The qualitative composition of the fauna is impoverished in the hypoxic zone as the result of the mortalities of species most sensitive to oxygen deficiency, such as crustaceans and other motile forms of epifauna.

Another result of eutrophication is a decline in water transparency, which has led to a degradation of macrophytes and a decrease in the numbers of corresponding phytoplankton hydrobionts. Some of the autochthonic benthic species were unable to adapt to changing environmental conditions and their range and their frequency has diminished significantly. At the same time the disturbed conditions have enabled opportunistic species such as *Nereis succinea* and *Spio filicornis* to flourish.

The species composition of the macrozoobenthos in the coastal zone of the sea changed more than the macrobenthos in deep water areas. Significant changes have occurred at the biocoenosis level. In the 1980s almost all the biocoenoses of the polychaete *Melinna palmata* disappeared, even though in the 1970s it had been widespread as the *Melinna clay* biocoenosis on the northwestern shelf (Losovskaya, Rytikova, 1987). *Melinna*'s low productivity and lack of a pelagic stage of development meant that it was

replaced by the *Mya arenaria* biocoenosis. At present this biocoenosis occupies large areas of the coast from Tendrovsky Bay in the east to the Danube delta in the west (Vorobyova, Sinegub, 1989). In 1983 a new biocoenosis of the polychaete *N. succinea* (Zolotarev, 1987) formed in the northwestern Black Sea. The oligochaetes biocoenosis was first recorded near the coast of Odessa in August 1994. *Nereis* and Oligochaetae biocoenoses are temporary. During the interim recovery period of the macrozoobenthos that follows mass mortalities, the areas previously occupied by *Nereis* and Oligochaetae biocoenoses are filled by mussel or clam biocoenoses.

There are currently 14 main biocoenoses on the Ukrainian Black Sea shelf. In the 1950s there were 12 benthic biocoenoses in the Azov Sea (Vorobyov, 1949). But hypereutrophication has transformed the structure of benthic biocoenoses. In 1992 there were only four biocoenoses in the Azov Sea, all of them new, namely: *Abra* - *Cerastoderma*, *Mya* - *Cerastoderma*, Mytilidae - *Balanus* and *Cerastoderma* - *Mytilaster* (Alyomov, 1994).

However, there are "oases of biodiversity," where the composition of the fauna has remained virtually unchanged since the 19th century. One of these "oases" is the coastal zone (up to 20 m) of Zmeiny island which accounts for almost 0.01% of the area of the Dnestrovsky-Danube interfluvium. Up to 72 taxa can be found here, compared with 71 in all of the rest of Dnestrovsky-Danube interfluvium (Table 15).

Table 15. Macrozoobenthos species numbers in the Dnestrovsky-Danube (DD)area of the Black Sea 1957-1984.

Main systematic groups	Number of species				Index	
	DD M Zmeiny island	without Zmeiny island	Zmeiny island	Total	Common to both	of community of species
Worms		19	21	25	15	60.0
Crustaceans		24	21	36	9	25.0
Molluscs		23	22	31	14	45.2
Others		5	8	8	5	62.5
Total		71	72	100	43	43.0

The Zmeiny Island area is characterized by favourable environmental conditions. None of the mass mortalities observed elsewhere were observed here. The fauna of these areas differs to such an extent that the coefficient of community is equal to only 43%. Similar cases on the Ukrainian shelf of the Black Sea - Azov Sea basin include: Egorlitsky Bay (96 macrobenthos taxa), the Karadag coastal zone of (69) and Kerch Strait (111) (Table 16).

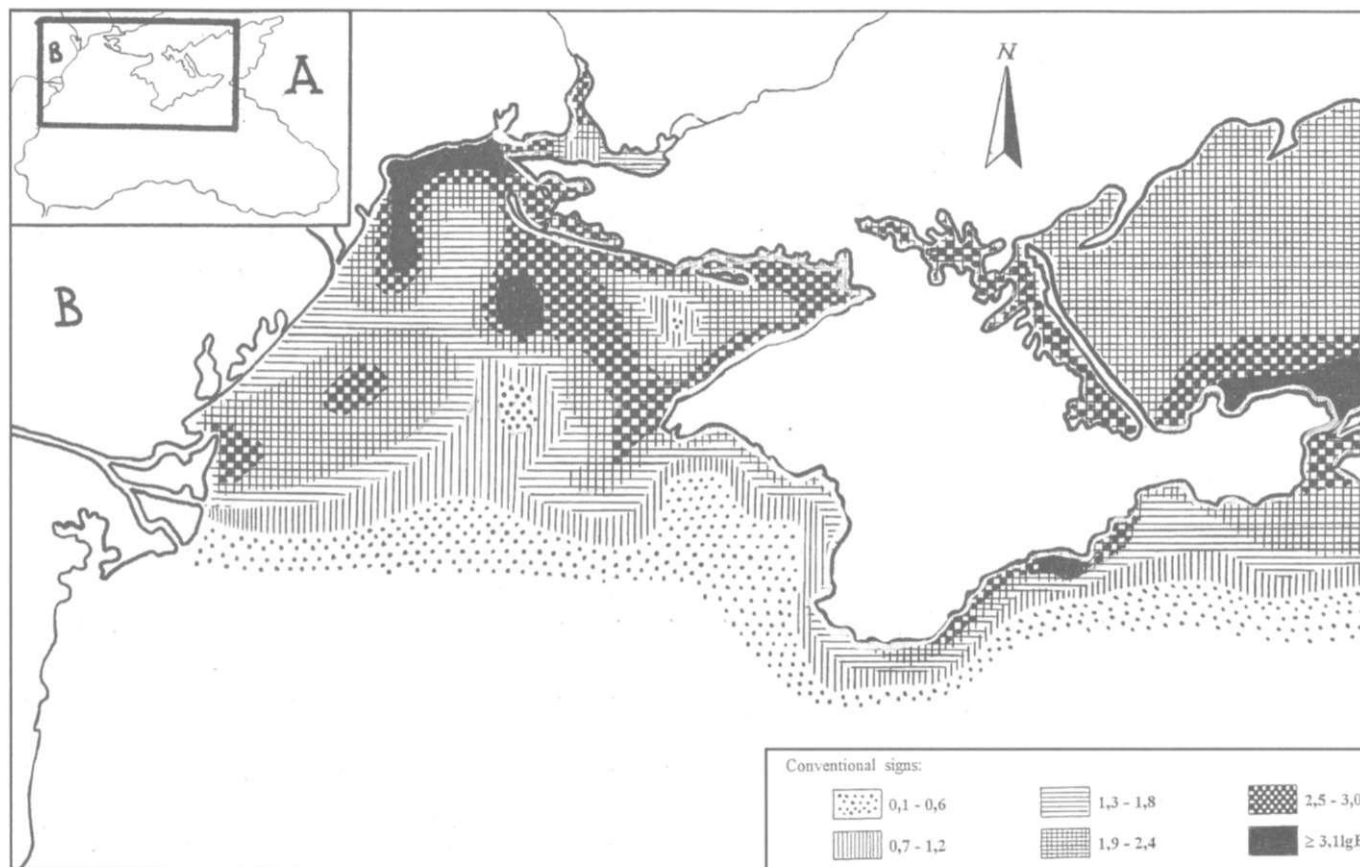


Fig. 16 Average annual distribution of macrozoobenthic biomass ($B, g \cdot m^{-3}$) for the period 1984-1994.

Table 16. Macrozoobenthos diversity in different Ukrainian marine areas

Main systematic groups	Area and time of study		
	Egorlitsky Bay, 1988	Karadag, 1976-1978	Kerch Strait, 1989
Worms	29	25	39
Crustaceans	33	38	29
Molluscs	26	17	32
Others	8	9	11
Total	96	89	111

Egorlitsky Bay is shallow with a maximum depth of 6 metres and characterized by diverse biotopes and the mass development of macrophytes and higher aquatic plants and fungi. The Karadag region, one of the cleanest areas in the sea, is situated in the eastern part of the Crimea far from industrial centres and sources of freshening. High salinity (17.7-18.3 ppt), stable hydrological conditions, numerous cliffs and rocks, and macrophyte fouling promoted the development of copious fauna, some of which (e.g. polychaetes) are only encountered here.

A feature of the Kerch strait is that there are two parallel currents from the Azov Sea to the Black Sea and back. As a result no mortalities are evident in the bay, while the diversity of biotopes, the presence of macrophytes and the high aeration of the water have led to the development of a rich fauna. Fig. 16 gives the quantitative distribution of macrozoobenthos in the Ukrainian waters of the Black Sea and Azov Sea.

Table 17. Specific composition of the main taxonomic groups of the marine macrozoobenthos

Species	Till 1975	Contemporary State Areas			
		NWBS	Crimea	Water Bodies	
				Marine	Brackish
Porifera	22	3	7	-	-
Coelenterata	29	8	8	2	-
VERMES	205	59	104	22	57
Turbellaria	26	1	2	1	4

Nemertini	13	3	2	1	-
Polychaeta	114	54	99	15	5
Oligochaeta	37	1	1	5	33
Hirudinea	15	-	-	-	15
Bryozoa	13	1	2	1	5
Phoronidea	2	1	2	-	-
CRUSTACEA	202	91	89	50	68
Phyllopoda	1	-	-	1	-
Cirripedia	5	1	2	1	-
Decapoda	37	17	30	5	7
Mysidacea	20	6	2	5	9
Cumacea	22	12	9	6	12
Anisopoda	2	2	2	-	-
Isopoda	18	10	9	3	3
Amphipoda	93	42	32	29	37
Pantopoda	4	1	3	-	-
MOLLUSCA	186	69	89	21	72
Loricata	2	1	2	-	-
Gastropoda	116	32	43	12	55
Bivalvia	68	36	44	9	17
Echinodermata	5	2	4	-	-
Tunicata	7	4	6	-	-
INSECTA	204	5	1	5	200
Odonata	15	-	-	-	15
Ephemeroptera	9	-	-	-	9
Hemiptera-Heteroptera	19	-	-	-	19
Coleoptera	63	-	-	2	63
Megaloptera	1	-	-	-	1
Trichoptera	20	-	-	-	20
Lepidoptera	5	-	-	5	-
Culicidae	3	-	-	-	3
Chironomidae	61	5	1	3	57
Heleidae	5	-	-	-	5
Stratiomyidae	2	-	-	-	2
Ephidridae	1	-	-	-	1
T o t a l	875	243	312	101	402

* Northwestern Black Sea

Ichthyofauna

I. General Characteristics of the Ichthyofauna of the Ukrainian Black Sea

The species composition of the fish and fishery resources of the Ukrainian Black Sea shelf is determined by the regional characteristics of the ecosystem and by common seasonal and long-term processes occurring in the Azov Sea-Black Sea basin due to natural causes and anthropogenic influences. The ichthyofauna of the Ukrainian Black Sea shelf currently consists of 154 species and subspecies of fish (Annex I, Table 10). A few species of fish, which are occasionally found in this part of the sea (e.g. *Euthynnus alleteratus*, *Xiphias gladius*, et al.), have not been included in the list.

The Ukrainian Black Sea shelf can be divided into two large areas, namely: the northwestern Black Sea from Cape Tarkhankut to the Danube; and the waters washing the coast of Crimea from Cape Tarkhankut to the Kerch Strait. The qualitative differences in the ichthyofauna of the two areas are determined primarily by differences in water salinity and average annual temperatures.

A significant freshening of waters in the northwestern Black Sea caused by river runoff from the Danube, Dnestr, South Bug, Dnepr and smaller rivers explains the appearance of freshwater and anadromous fish in limans and near estuarine areas and on the shelf. These fish breed in fresh water and include completely freshwater fish, mostly Cyprinidae and Cobitidae, which move down the rivers or enter the sea from irrigation canals. Semianadromous fish can be combined into one group; i.e. those which feed in fresh waters limited by the 10-12 ppt isohaline. The more common freshwater anadromous and semianadromous carps found on the shelf include: the *Vimba vimba n. carinata*, the royal fish *Chalcalburnus chalcoides danubica*, the bream *Abramis brama*, the common carp *Cyprinus carpio*, the sabrefish *Pelecus cultratus*, the roach *Rutilus rutilus hechkeli*, the catfish *Silurus glanis*, the pike *Esox lucius*, and the pike-perch *Lucioperca lucioperca*. During high water in the Dnepr some freshwater fish sometimes enter Odessa Bay.

Recently the grass carp *Ctenopharyngodon idella* and the silver carp *Hypophthalmichthys molitrix* have been often found in areas of Karkinitsky Bay and Dzharylachsky Bay adjacent to outfalls from irrigation systems. In some situations about 10 species of freshwater fish can be found in the sea. Commercial fish such as the anadromous members of the sturgeon Acipenseridae family and the herring Clupeidae family play an important role in this part of the sea.

Brackish species account for a large number of the fish species in the limans and freshwater areas of the northwestern Black Sea. These include: the Black Sea kilca *Clupeonella cultriventris cultriventris*, *Percarina demidoffi* and a large group of gobies (Gobiidae). There is also a group of temperate marine species consisting of eight species of Boreal-Atlantic relicts, the remnants of glacial fauna, namely: the piked dogfish *Squalus acanthias*, the thornback ray *Raja clavata*, the sprat *Sprattus sprattus phalericus*, the flounder *Platichthys flesus luscus*, the Black Sea whiting *Merlangius merlangus euxinus*, the three-spined stickleback *Gasterosteus aculeatus*, the salmon *Salmo trutta labrax*, and the eel *Anguilla anguilla*.

The largest mass group of fish species in Ukrainian coastal waters is composed of marine thermophilic fish, including euryhaline forms entering fresh waters such as pipefish (Syngnathidae) and mullet (Mugilidae). Most of these fish are Mediterranean immigrants. Some of them have developed into a special Black Sea subspecies differing in some morphological characteristics and dimensions from the Mediterranean species. Most of these marine thermophilic species can be found near the Crimean coast, but some migrate into the northwestern Black Sea during spring-summer-autumn. The families with the largest number of species are: mullets (Mugilidae), porgies (Sparidae), wrasses (Labridae), blennies (Blennidae) and gobies (Gobiidae). The composition of the ichthyofauna in the near Danube, near Dnestr and near Dnepr regions of the northwestern Black Sea differs significantly.

The mullet *Mugil so-iuy*, which was introduced from far eastern waters, is one of the species that has recently become acclimatised to Ukrainian coastal waters. It has often been found in limans and in the sea and may be of commercial importance.

One specimen of *Chromogolius quadrivittatus* (described by V. I. Pinchuk) was discovered near Odessa. Since it was encountered with several specimens of *Benthophiloides brauneri* it is assumed that is part of the ichthyofauna of this area. The species composition of fish in Karkinitsky Bay is also area specific. In summer the temperature of the water reaches 23-26 C° and the salinity 18-19 ppt. As a result some fish which are not normally found in northern waters, such as species from the Sparidae, Labridae, Centranchidae and Gobiesocidae families, enter Karkinitsky Bay. The most commonly encountered species are the blue damsel fish *Chromis chromis*, the sea bich *Arnoglossus kessleri*, and the sting ray *Dasyatis pastinata*. Sturgeons feed in Karkinitsky Bay. The construction of irrigation systems has also led to the introduction of freshwater fish. Fish which inhabit the rocky bottom of the southern and southeastern coasts of the Crimea can be found near the rocky coast of Cape Tarkhankut.

The main *Phyllophora* field of Zernov, which is located in the central zone of the northwestern Black Sea, also has distinct ichthyofaunic characteristics.. Although the area

of the sea bottom covered by *Phyllophora* has declined significantly over the last 30 years, the species composition of the fish in the field has changed little. Species can be found which are normally closely associated with overgrowths of aquatic plants and the typical inhabitants of the sandy, muddy-sandy and sandy-shelf sediments which prevail throughout the northwestern Black Sea. The most common species include the dragonets Callionymidae and the two-spotted clingfish *Diplecogaster bimaculata euxinica*. Some of the inhabitants acquire a typical reddish-brown colouring to their fins and body.

The species most characteristic of the northwestern Black Sea are gobies, herrings and sturgeons. Other common species include: the silverside *Atherina boyeri*, the red mullet *Mullus barbatus ponticus*, the greater weever *Trachinus draco*, the common stargazer *Uranoscopus scaber*, the flounder *P. flesus luscus*, the piked dogfish *S. acanthias*, the anchovy *Engraulis encrasicolus ponticus*, the sprat *S. sprattus phalericus*, and the Black Sea horse mackerel *Trachurus mediterraneus ponticus*.

Seasonal changes in water temperatures have a significant impact on the qualitative composition and dispersal of fish in northwestern Black Sea. In the autumn the majority of fish species migrate from the coastal zone and return in the spring. The northwestern Black Sea plays an important role in the spawning and feeding of fish species migrating into this area.

Fish migrating from the Sea of Marmara are also very important. In the 1960s these included commercially important species such as the bonito *Sarda sarda*, the mackerel *Scomber scombrus*, and the blue fish *Pomatomus saltator*.

The qualitative and quantitative composition of the northwestern Black Sea has undergone considerable changes in the last ten years. There has been a decline in the standing stocks of large long-living commercial fish, such as sturgeons, the turbot *Psetta maeotica*, large herrings and large gobies. Short cycle species now appear more frequently in commercial catches. The annual mass mortalities of hydrobionts as a result of excessive eutrophication has had a negative impact on the ichthyofauna of the Ukrainian shelf. There are many thermophilic fish in the coastal waters of the Crimea, which is why its marine ichthyofauna is more diverse than that of the northwestern Black Sea. The presence of cliffs and rocks creates favourable conditions for fish families such as pipefishes, wrasses, porgies, blennies, gobies, dragonets (Callionymidae), and clingfishes (Gobiesocidae).

In terms of ichthyofaunical species composition, the waters near the Crimean coast can be divided into three main areas, namely: from Cape Tarkhankut to Sevastopol; from Sevastopol to Koktebel; and from Koktebel to Kerch. The first and third regions include high numbers of species which are characteristic of low salinity. The largest number of marine species of fish of marine origin occur in the region from Sevastopol to Koktebel.

It should be emphasized that the species composition has become impoverished in some regions of the Ukrainian Black Sea shelf. For example, the seahorse *Hippocampus ramulosus*, the straight-nosed pipefish *Nerophis ophidion* and the dotted dragonet *Callionymus risso* have almost disappeared from the region adjacent to Odessa. In spite of the decline in standing stock, the most important species in terms of the volume of the commercial fish catch are: the anchovy *E. encrasicolus ponticus*, the Black Sea sprat, the horse mackerel *T. mediterraneus ponticus*, the silverside *A. boyeri*, the whiting *M.*

merlangus euxinus, the piked dogfish 5. *acanthias*, the Black Sea shad *Alosa kessleri pontica*, mullets (Mugilidae), gobies (Gobiidae), and the Black Sea turbot *P. maeotica*.

II. Ichthyofauna of the Black Sea and Azov Sea Estuaries

Fish from six ecological groups can be found, either temporarily or permanently, in the estuaries of the Black Sea and Azov Sea. Fish species vary according to salinity and other ecological conditions.

Brackish water fish can be found in low salinity areas of the Black Sea and Azov Sea and in the estuaries of large, medium-sized and small rivers in their basins (e.g. the Danube, Dnestr, Dnepr, South Bug and Molochny). Semianadromous fish which feed in B-mesohaline waters (up to 5.0-8.0 ppt) but move to fresh water to breed, can be found in the freshened parts of estuaries and the lower reaches of rivers.

Marine fish can be found in the Black Sea and in some Black Sea coastal limans (and Sivash lagoons) in two categories of brackish waters (a-mesohaline 5.01-18 ppt and polyhaline 18.01-30 ppt) and two categories of salt water (euhaline, 30.01-40.00 ppt, and ultrahaline, more than 40 ppt).

Anadromous fish continuously live and feed in the Black Sea and Azov Sea in brackish waters with a high salinity (a-mesohaline and polyhaline), but migrate to the fresh waters of the Danube, Dnestr, Dnepr, South Bug, Don and Kuban rivers to breed. Most of the anadromous fish of Ukraine make anadromous migrations to feed and migrate from marine water to fresh water to breed. The only exception is the eel *Anguilla anguilla*, which makes catadromous breeding migrations. In its adult form it makes breeding migrations from fresh water and Ukrainian waters to the Sargasso Sea across the breadth of the Atlantic Ocean, using one of two routes: from the rivers of the Vistula basin (West Bug) through the Baltic Sea; and from rivers of the basins of the Danube, Dnestr, South Bug, Dnepr and Don (Siversky Donets) through the Black Sea.

Bony fish, which can be found in the open Black Sea (such as the pike dogfish *Squalus acanthias*, the thornback ray *Raja clavata* and the common stingray, *Dasyatis pastinaca*), are not found in the estuarine areas of Ukrainian rivers and estuaries. The only bony fish which can be found in these waters are the subclass Actinopterygii, which are represented by a small, but ancient and very valuable, gourmet group of ganoid fish, the order of sturgeon-like fish.

The Acipenseridae sturgeon family comprises six species, including five anadromous species (the great sturgeon *Huso huso*, the spiny sturgeon *Acipenser nudiiventris*, the Russian sturgeon *A. guldenstadti colchicus*, the Atlantic sturgeon *A. sturio*, and the starred sturgeon *A. stellatus*) and one freshwater species, the sterlet *A. ruthenm*. All six species are classed as disappearing, rare or endangered.

The Clupeidae herring family has five representatives: the Black Sea shad *Alosa kessleri pontica*, the anadromous form; the marine Black Sea shad, the brackish form; the Caspian shad *A. caspia nordmanni*, a semianadromous species; the sprat *Sprattus sprattus*

phalericus, a marine species; and the Black Sea kilka *Clupeonella cultriventris cultriventris*, which is adapted to different salinities.

The Salmonidae family is represented by the anadromous Black Sea salmon *Salmo trutta labrax*; the Umbridae family by the freshwater European mudminnow *Umbra krameri*; and the Esocidae family by the freshwater pike *Esox lucius*.

A total of 34 species from the Cyprinidae family can be found in the Ukrainian Black Sea, of which the Black Sea roach *Rutilus frisii*, the long-whiskered gudgeon *Gobio uranoscopus*, and the barbel *Barbus barbus boristhenicus* are classed as endangered. The following species should also be included in the Ukrainian Red Data Book: the Agam chub *Leuciscus agamicus*, the chub *E cephalus*, the dominub *E boristhenicus*, the undermouth *Chondrostoma nasus*, the Dnestr long-whiskered gudgeon *Gobio kessleri*, the barbel *Barbus barbus*, the vimba *Vimba vimba*, and the sabrefish *Pelecus cultratus*. There are also three acclimatised species, namely: the grass carp *Ctenopharyngodon idella*, the silver carp *Hypophthalmichthys molitrix* and the stone moroco *Pseudorasbora parva*.

The Siluridae family is represented by the catfish *Siluris glanus*, a semianadromous, freshwater form. The Anguillidae family is represented by the catadromous European eel *Anguilla anguilla*. The Gasterosteidae family has two representatives: the brackish southern nine-spined stickleback *Pungitius platygaster platygaster*, and the three-spined stickleback *Gasterosteus aculeatus*, which inhabit waters of different salinity. There is one representative of the Centarchidae family, the freshwater common sunfish *Lepomis gibbosus*, which was introduced from North America.

There are seven representatives of the Percidae family, including the pike-perch *Lucioperca lucioperca* and the Volga zander *Lucioperca volgensis*, which have semianadromous and freshwater forms, the sea zander *Stizostedion marinus*, the percarina *Percarina demidoffi*, the river perch *Perca fluviatilis*, the ruffe *Acerina shraetser*, and the Don ruffe *Acerina acerina*. The sea zander is under threat of extinction, while the ruffe and the Don ruffe are included in the Ukrainian Red Book Data Book. The Pleuronectidae family is represented by only species, *Platichthys flesus luscus*, which can be found in water of varying salinity.

III. Marine Mammals

The mammals of the Black Sea are represented by the monk seal *Monachus monachus* and three species of dolphins, the bottlenosed dolphin *Tursiops truncatus ponticus*, the common dolphin *Delphinus delphis ponticus* and the harbour porpoise *Phocaena phocaena relicta*.

The high mobility and long migrations of dolphins means that it is difficult to make accurate estimates of their numbers in specific national waters in the Black Sea. The following data is for the whole of the Black Sea.

In the 1950's there were almost one million dolphins in the Black Sea. According to L. Zenkevich (1963), they consumed almost 5 x 10⁵ tonnes of fish annually. In the mid-1960s the dolphin population had fallen to 3 x 10⁵ animals. In 1966 the capture of

dolphins was prohibited in the USSR, Romania and Bulgaria. The Turkish catch of dolphins ceased in 1983.

In 1983 and 1984 a combined ship and air survey estimated the Black Sea dolphin population at 60,000-100,000 animals (Vinogradov, Simonov, 1989). In 1987 a four-ship survey by Turkish scientists counted 51,226 animals in a 60 km zone along the southern coast of the Black Sea (Celikkale et al., 1989). The main species (59.1%) was the common dolphin, followed by bottlenosed dolphins (32.5%), and harbour porpoises (8.41%). An extrapolation to the entire Black Sea would suggest a total Black Sea dolphin population of 454,440.

Such a discrepancy in the estimates of dolphin numbers can be explained by the different methods used (the Turkish survey did not include aerial observations), and by the different concentrations of dolphins in the southern and northern waters of the Black Sea. Dolphins are much more abundant in the southern zone than in the northern and central Black Sea. For example, at the end of September 1991, a cruise by the research vessel "Professor Vodyanitsky" from Yalta in the Crimea to Varna in Bulgaria (about 600 km) only encountered 3-4 dolphins. However, it is clear that the 1987 estimate of a then current dolphin population of 500,000 individuals was a considerable exaggeration (Zaitsev, 1993).

IV. Parasites

The main freshwater biotopes investigated for the presence of parasitofauna are shown in Table 18. The greatest biodiversity of parasites was observed in the lower reaches and the delta of the Dnepr and the estuarine part of the Danube (Table 19). The dominant hydrobiont parasite species were trematodes (Table 20). The parasites and commensals of the most common Black Sea invertebrates are shown in Table 21.

The extent of research on the parasitofauna of marine hydrobionts of different taxonomic groups and fish-eating birds varies significantly and is closely related to their economic value (fish, commercial species of molluscs, some bird species and marine mammals) or the role of these organisms in the life cycles of the above-mentioned animals.

The most extensive data is on the parasites of 84 species of marine birds (Reshetnikova, 1955; Radulescu, 1970; Gaevskaya et al., 1975) for the helminthofauna of 45 species of fish-eating birds and 4 species of marine mammals. Trematodes, monogenea, cestoda and nematodes are the most frequent parasites of marine fish.

The parasitofauna of marine invertebrates has been less studied, except for molluscs (*Mytilus galloprovincialis* and *Ostrea edulis*) used in mariculture, for which more than 15 species of parasites, commensals and shell-borers (Kholodkovskaya, 1989, Gaevskaya et al., 1990) have been identified, including pathogenic species for molluscs, such as: *Steinhausia mytilovum*, *Protoeces maculatus* and *Cliona vastifica* (Table 21). The helminthofauna of other species of bivalves and gastropods (*Hydrobia*, *Rissoa*, *Mytilaster*, *Abra*) includes 10 species of larval trematodes (Dolgikh, 1970) ascribed to six families and

two orders, namely: *Bucephalidae* (1), *Diplostomatidae* (1), *Acanthocolpidae* (1), *Fellodistomatidae* (3), *Halporidae* (1), and *Hemiroidae* (4 species).

The diversity of the parasitofauna of molluscs in different regions of the sea is determined by hydrobiological, hydrochemical and hydrological conditions, and is most diverse in coastal areas, shallow water lagoons and salt limans.

From the 1980s onwards anthropogenic factors have had a significant impact on changes in the parasitofauna of molluscs.

Table 18. The main habitats of the freshwater parasites of the Ukrainian Black Sea

Area	Biotope	Boundaries
Lower reaches and delta of Dnepr	Wetlands freshwater	Coastal
	River	River bed zones
Dneprovsko-Bugsky liman	Wetlands freshwater	Eastern part, left bank of the central part
	Littoral freshwater	Coastal zone of the right bank, eastern and central parts
	Littoral brackish water	Coastal zones of the Bug-sky liman and western part of the Dneprovsky liman
Liman of the northwestern part of the Black Sea	Wetlands freshwater	Upper reaches and coastal zones of the limans of Kagul, Yalpug, Katlabukh, Safyan, Kugurliy
	Wetlands brackish water	Upper reaches and coastal zones of Berezansky and Bugsky limans
Estuarine part of the Danube	Wetlands main	Coastal and wetland zones
	River	River bed zones of the lower reaches of the delta.

	Littoral brackish water	Littoral and kuts of the front edge of the delta
Dnestrovsky estuarine area	Wetlands	Wetland zones of the lower Dneestr reaches and coastal zones of the upper part of the Dneprovsky liman
	River	The river bed zones of the lower reaches of the Dneestr
	Littoral	Coastal zones of the lower reaches and limans

Table 19. Total number of freshwater parasites

Area	Number of registered species	Degree of confidence	Number of proposed species
The lower reaches and delta of Dnepr	239	High	about 300
Dneprovsko-Bugsky liman	178	Medium	@ 250
Limans of the northwestern Black Sea	158	Medium	@250
The estuarine part of the Danube (Kiliya delta)	248	High	@350
The Dnestrovsky estuarine area	68	Medium	@250
Total	about 250	Medium	(a) 300

Table 20. The dominant species of hydrobiont parasites in the freshwater area.

Dominant species	Area			
	1	2	3	4
<i>Sphaerostomum bramae</i>	+		+	
<i>Plagioporus scrjabini</i>	+		+	
<i>Apophallus muhlingi</i>	+		+	
<i>Sanguinicola inermis</i>	+		+	
<i>Rhipidicotyle illense</i>	+			
<i>Bucephalus polymorphus</i>	+			+
<i>Crowcrocaecum skrjabini</i>	+			+
<i>Aspidogaster limacoides</i>	+			+
<i>Dactylogyrus simplicimalleata</i>	+			
<i>D. similis</i>	+			
<i>Posthodiplostomum cuticola</i>	+	+	+	+
<i>Ligula intestinalis</i>	+	+	+	
<i>Asymphyrodora imitans</i>		+	+	+
<i>Pleurogenoides medians</i>			+	
<i>Echinoparhyphium echinatoide</i>		+	+	
<i>Maritrema subdolum</i>			+	
<i>Polymorphus magnus</i>		+	+	
<i>Dactylogyrus extensus</i>		+	+	
<i>Myxobolus ellipsoides</i>		+	+	
<i>Caryophyllaeus laticeps</i>		-	-	
<i>Paradiplozoon homoion</i>		+	+	
<i>Diplozoon paradoxum</i>		+	+	+
<i>Acanthocephalus anguillae</i>		+	+	
<i>Phyllodistomum elongatum</i>		+		+
<i>Ergasilus sieboldi</i>		+		

1. Lower reaches and delta of Danube

2. Near Danube limans

3. Estuarine part of the Danube

4. Dnestrovsky estuarine area.

Table 21. List of parasites, commensals and shell-boring organisms of Black Sea mussels and oysters

Species	Molluscs	Area		
		1	2	3
Mastigophora		1	2	3
<i>Hexamita nelsoni</i>	<i>Mytilus galloprovincialis</i>		+	
Sporozoea				
<i>Nematopsis legeri</i>	<i>M. galloprovincialis</i> , <i>Ostrea edulis</i>		(+)	+
Microsporidia				
<i>Steinhausia mytilovum</i>	<i>M. galloprovincialis</i>		+	+
Peritricha				
<i>Ancistrum mytili</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>	+	+	+
<i>Peniculistoma mytili</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>	+	+	+
<i>Gargarius gargarius</i>	<i>M. galloprovincialis</i>		+	
<i>Raabella helensis</i>	<i>M. galloprovincialis</i>		+	
Porifera				
<i>Cilona vastifica*</i>	<i>M. galloprovincialis</i>			+
Plathelminthes				
<i>Urastoma cyprinae</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>	+	+	+
<i>Proctoeces maculatus</i>	<i>M. galloprovincialis</i>		+	+
<i>Parvatrema duboisi</i>	<i>M. galloprovincialis</i>		+	+
Annelides				
<i>Polydora ciliata*</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>		+	+
Mollusca				
<i>Gastrochaena dubia*</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>			+
<i>Petricola lithophaga*</i>	<i>M. galloprovincialis</i> <i>O. edulis</i>			+

1. open waters of the northwestern Black Sea at depths exceeding 10 m

2. coastal waters of the northwestern Black Sea, limans, bays

3. coastal waters of the Crimea

* shell-borers

(*) Cape Tarkhankut

V. Main Benthic Biocoenoses

Bottom communities are classified according to biotope (Zernov, 1913; Zenkevich, 1963; Bacescu et al., 1991; Marinov, 1990) or species-dominants or edificators (Konstantinov, 1979; Kiseleva, 1981). It is the latter criterion which has been used below, as it is believed that the description of communities more fully illustrates the adaptation of species and their populations to changing environmental conditions.

The quantitative development of dominant species may indicate a zone in the biotope with a characteristic community. The main location of the community is where the dominant species has a maximum density index compared with other areas. The index is

calculated according to the formula \sqrt{bp} , where b is the biomass in g.m^{-2} and p is the frequency in percent.

Today there is no consensus of opinion as to the number of bottom communities either on the Ukrainian shelf or in the Black Sea as a whole. This may be explained by the spatial heterogeneity of the distribution of different communities and a considerable diversity of environmental conditions.

The differences in environmental conditions in the benthos on the northwestern and Crimean shelves (from Cape Tarkhankut to Kerch Strait) result in the biocoenoses having significantly different species compositions and quantitative characteristics. The main reasons for this are the diverse thermohalinity, amplitudes of temperature and variations in salinity. Fig. 17 gives a detailed description of the communities on the northwestern shelf and Fig. 17a a description of communities on the Crimean shelf. The communities have been named after their dominant species.

The *Modiolus phaseolinus* Biocoenosis

Modiolus phaseolinus is a bivalve mollusc living at depths of 55-125 m on silty sediments called phaseolina sediments. In terms of depth it is the lowest biocoenosis on the Black Sea northwestern shelf

The community comprises 31 taxa. Its density (D) varies from 24-2,170 ind.m^{-2} of phaseolina and its biomass (B) from 3-230 g.m^{-2} . The mass species of the biocoenosis are: *Amphiura stepanovi* ($D = 8-210 \text{ ind.m}^{-2}$, $B = 0.1-0.8 \text{ g.m}^{-2}$), *Mytilus galloprovincialis* ($D = 4-290 \text{ ind.m}^{-2}$, $B = 32.4-122.0 \text{ g.m}^{-2}$), and *Prionospio cirrifera* ($D = 4-50 \text{ ind.m}^{-2}$, $B = 0.01-0.04 \text{ g.m}^{-2}$).

The biocoenosis of the Crimean shelf comprises 85 taxa ($D = 80-3,320 \text{ ind.m}^{-2}$, $B = 1.7-147.5 \text{ g.m}^{-2}$). The mass species are: *Amphiura stepanovi* ($D = 20-120 \text{ ind.m}^{-2}$, $B = 0.3-2.0 \text{ g.m}^{-2}$) and *Terebellides stroemi* ($D = 40-200 \text{ ind.m}^{-2}$, $B=0.7-2.7 \text{ g.m}^{-2}$).

Particularly in its upper levels, the phaseolina biocoenosis serves as a feeding ground for large adult species of some benthic fish, including the great sturgeon, turbot and whiting (Vinogradov, 1959; Zaitsev, personal observations underwater in 1985).

The Polychaeta *Terebellides stroemi* Biocoenosis

The Polychaeta *Terebellides stroemi* biocoenosis has been observed at depths of 50-100 m on exclusively silty sediments near the shelf west and southeast of Crimea. Sergeeva reported 27 taxa. The density of the *Terebellides stroemi* biocoenosis varied from 36-384 ind.m⁻² and its biomass from 0.2-17.6 g.m⁻²). The mass species were: *Nephtys hombergii* (D = 8-100 ind.m⁻², B = 0.1-1.7 g.m⁻²), *Aricidea claudiae* (D = 4-76 ind.m⁻², B = 0.002-0.03 g.m⁻²), *Oligochaeta sp.* (D = 4-8 ind.m⁻², B = 0.002-0.008 g.m⁻²), *Iphinoe maeotica* (D = 4-20 ind.m⁻², B = 0.004-0.024 g.m⁻²) and *Amphiura stepanovi* (D = 4-40 ind.m⁻², B = 0.03-0.43 g.m⁻²). The mass species sometimes also include the bivalve mollusc *Abra nitida milachewichi*.

The Polychaeta *Melinna palmata* Biocoenosis

The Polychaeta *Melinna palmata* biocoenosis is composed of the polychaete *M. palmata*. This biocoenosis is widespread on the northwestern shelf. It is located at a depth of 12-35 m on silty and silty-sandy sediments. The average density and biomass of the macrozoobenthos is 290 ind.m⁻² and 30 g.m⁻² respectively. The dominant species, *M. palmata*, accounts for 19-27% of the total biomass of the community (Zambriborsch et al., 1973). The biocoenosis includes 47 animal species. The mass species are: *N. hombergii*, *Nereis diversicolor*, *Ampelisca diadema* and *Abra nitida milachewichi*.

Sturgeons winter in the melinna sediment zone to the south of Odessa bank, the so-called "starred sturgeon hole", where they feed on the melinna (Vinogradov, 1959). Since the 1980s there has been an increase in the area covered by the biocoenoses in Karkinitsky Bay (Zolotarev, Povchun, 1986; Zolotarev et al., 1991).

The mollusc *Gouldia minima* Biocoenosis

The biocoenosis of the bivalve mollusc *G. minima* occupies small areas on silty-sandy sediments of the Crimean Shelf at depths of 20-50 m. Up to 106 species have been recorded (Kiseleva, 1981). The density and biomass of *G. minima* in the biocoenosis are 90-180 ind.m⁻² and 7.5-12.0 g.m⁻² respectively. The mass species are: the bivalve mollusc *Lucinella divaricata* (D = 12-150 ind.m⁻², B = 0.03-0.60 g.m⁻²); and the gastropod *Tritia reticulata* (D = 7-14 ind.m⁻², B = 3.0-5.5 g.m⁻²) (N. Sergeeva, personal communication).

The mollusc *Venus gallina* Biocoenosis

The mollusc *Venus gallina* biocoenosis is found on sandy sediments mostly on the Crimean Shelf, and at depths of 7-30 m on the northwestern shelf in Karkinitsky Bay.

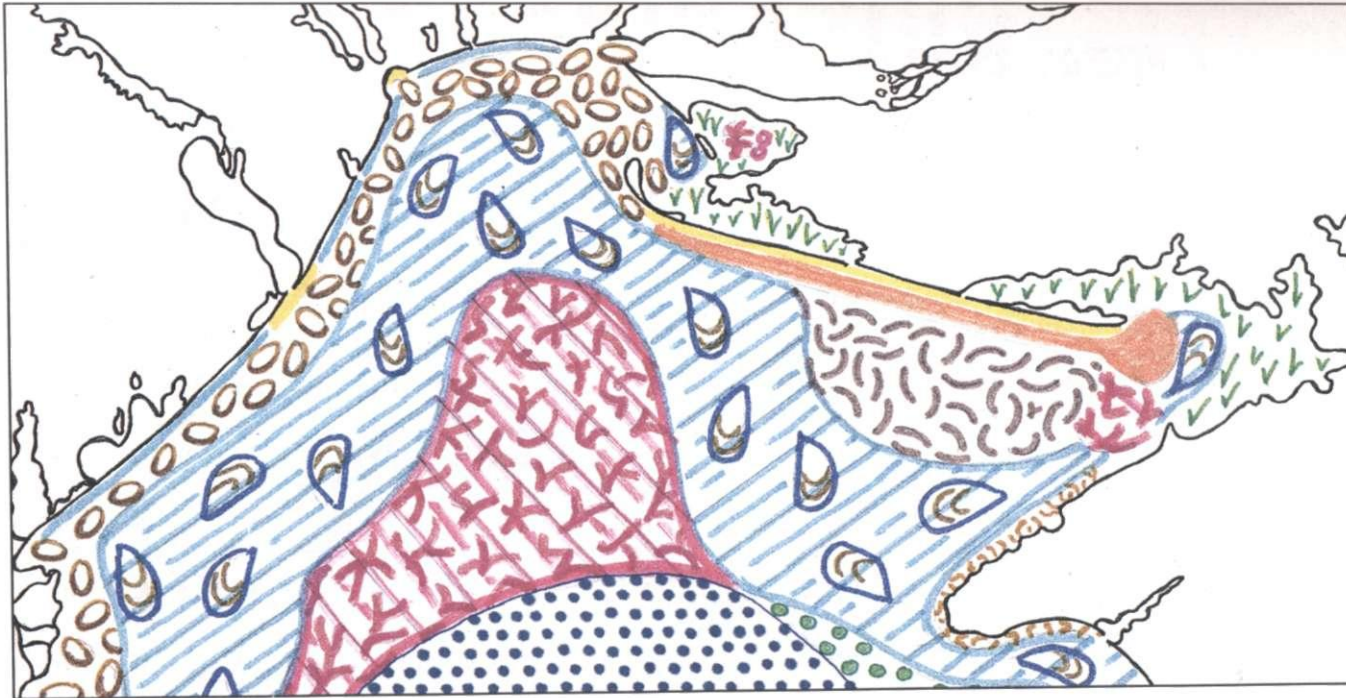
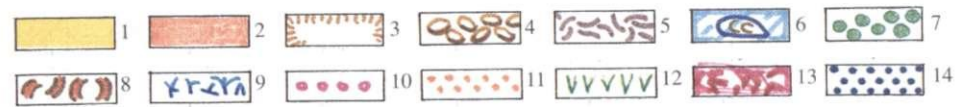


Fig. 17 Benthic biocoenoses of the Ukrainian shelf of the Black Sea (northwestern part). Conventional signs in Fig. 17a.



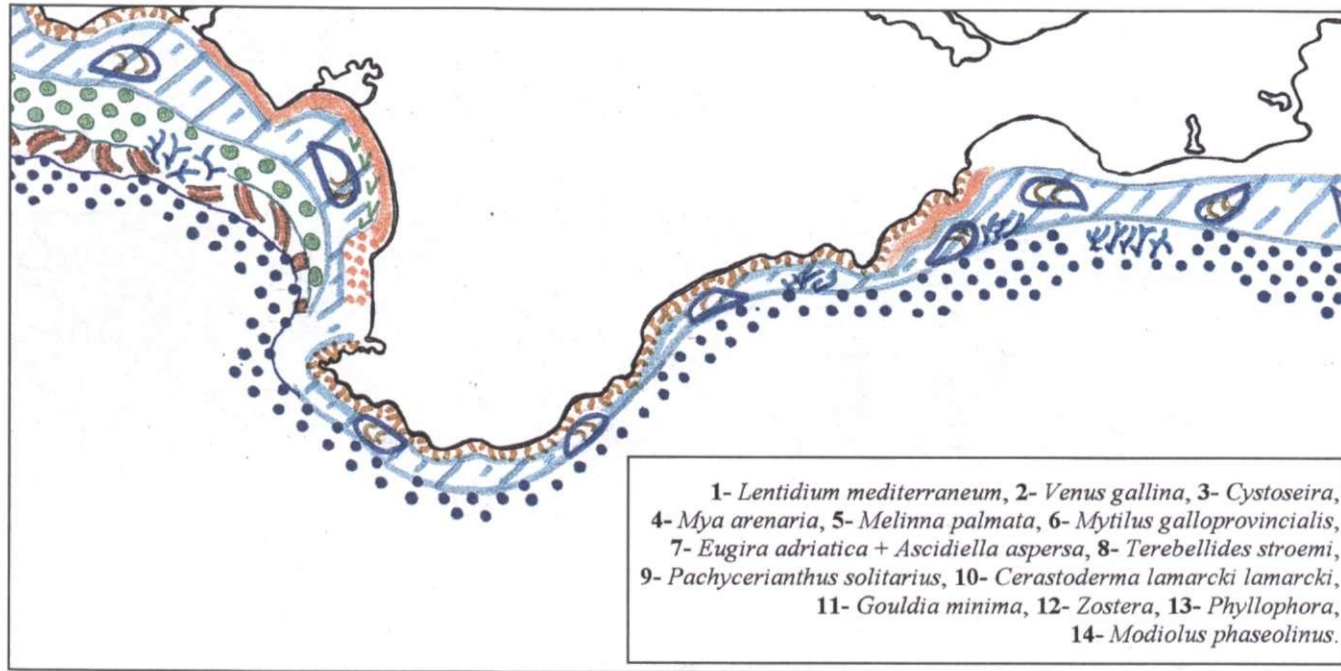
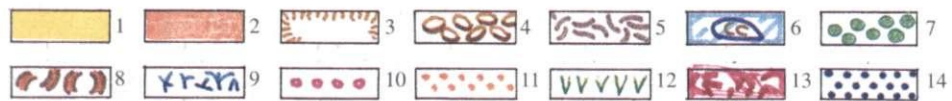


Fig. 17a Benthic biocoenoses of the Ukrainian shelf of the Black Sea. (Crimean shelf)



Crimean shelf

The density and biomass of *V. gallina* in the biocoenosis are 90-400 ind.m⁻² and 27-1010 g.m⁻² respectively. The mass species are: the bivalve molluscs *Gouldia minima* (D = 130-390 ind.m⁻², B = 6.5-24.0 g.m⁻²) and *Spisula subtruncata* (N = 8-165 ind.m⁻², B = 1.3-24.0 g.m⁻²) (N. Sergeeva). There are 140 species (Kiseleva, 1981)

The high populations of polychaetes and small molluscs provide food for fish such as the striped mullet, the gurnard and some goby species.

Northwestern shelf

The density and biomass of *V. gallina* in the biocoenosis are 10-800 ind.m⁻² and 8-1000 g.m⁻² respectively. The total number of macrozoobenthos species in the community is 5-7. The mass species are: ophiura *Amphiura stepanovi* (D = 8-210 ind.m⁻², B = 0.1-1.8 g.m⁻²), *Mytilus galloprovincialis* (D = 4-290 ind.m⁻², B = 32-122 g.m⁻²), the polychaeta *Prionospio cirrifera* (D = 4-50 ind.m⁻², B = 0.1-0.04 g.m⁻²) and the sponge *Spongia sp.* (B = 0.2-1.4 g.m⁻²).

The mussel *Mytilus galloprovincialis* Biocoenosis

The dominant species is the bivalve mollusc *M. galloprovincialis*, which is the most widespread mussel in the Black Sea macrozoobenthos and plays an important role in the functioning of the shelf ecosystem. It is distributed across wide areas at depths from the spray zone to 55 m, inhabiting natural (silts, sands, shells, rocks) and artificial substrates (concrete, metal, synthetic materials).

On the Crimean shelf its density and biomass are 50-1,500 ind.m⁻² and 115-3,100 g.m⁻² respectively (Sergeeva). On the northwestern shelf the figures are D = 10-54,000 ind.m⁻² and B = 1-18,000 g.m⁻² respectively (Sinegub). Particularly high densities have been observed on the anthropogenic substrates elevated above the bottom. On concrete shoreline reinforcements in Odessa Bay the average density and biomass of mussels were 14,200 ind.m⁻² and 18.9 kg.m⁻². (maximum D = 17,200 ind.m⁻² and B = 36.2 kg.m⁻²) (Alexandrov, 1991). Even higher indices were discovered in Karkinitsky Bay on the supports of marine stationary platforms used for extracting gas. The average density and biomass were 15,500 ind.m⁻² and 28.3 kg.m⁻² (maximum D = 30,750 ind.m⁻² and B = 65.3 kg.m⁻²) (Zolotarev et al.).

On the northwestern shelf the mass species of the biocoenosis are: the bivalve mollusc *Mya arenaria* (D = 10-2,400 ind.m⁻², B = 0.3-890 g.m⁻²), the barnacle *Balanus improvisus* (D = 10-2,000 ind.m⁻², B = 0.3-220.0 g.m⁻²), the polychaetes *Nereis succinea* (D = 10-1,600 ind.m⁻², B = 0.2-75.0 g.m⁻²), *Polydora ciliata limicola* (D = 10-1200 ind.m⁻², B = 0.1-1.0 g.m⁻²), *Prionospio cirrifera* (D = 10-5,000 ind.m⁻², B = 0.1-5.2 g.m⁻²). A total of 84 species of macrozoobenthos have been recorded.

On the Crimean shelf the mass species are: the mollusc *Modiolus adriaticus* (D = 30-130 ind.m⁻², B = 34.6-96.2 g.m⁻²) and the polychaete *Terebellides stroemi* (D = 31-142 ind.m⁻², B = 1.3-13.3 g.m⁻²). The biocoenosis consists of 105 animal species.

The mollusc biocoenosis plays an important role in providing food resources to benthic feeding fish, including turbot, flounders, gobies and sturgeons. The predatory mollusc *Rapana thomasiana* is frequently encountered, particularly on the Crimean Shelf.

The mollusc *Mya arenaria* Biocoenosis

The bivalve mollusc *Mya arenaria* biocoenosis can be found on sandy and silty-sandy sediments at depths of 1-16 m (Zambriborsch et al., 1979), sometimes at 26 m (Ivanov, 1973), mainly dispersing in fresh waters.

M. arenaria was first recorded in the Black Sea in 1966 (Beshevli, Kalyagin, 1967). It squeezed out the aboriginal biocoenosis of the bivalve mollusc *Lentidium mediterraneum*. It is now most widespread in the estuarine regions of the northwestern Black Sea.

The density and biomass of *M. arenaria* varies in the range of 600-33,600 ind.m⁻² and 240-2400 g.m⁻². The dominant species accounts for an average of 80% of the total (Kiseleva, 1988), rising to 96% in the river runoff regions such as the Danube-Dnester interfluvium (Chichkin, Medinets, 1994).

I. Sinegub identified 76 macrozoobenthos species. The main species are the polychaetes *Nereis succinea* (D = 10-2,100 ind.m⁻², B = 0.01-60.0 g.m⁻²) and the *Polydora ciliata limicola* (D = 10-1800 ind.m⁻², B = 0.01-0.67 g.m⁻²).

The *M. arenaria* biocoenosis has been observed in marine bays (e.g. in the central part of Tendrovsky Bay). According to D. Chernyakov, it is encountered at depths of 8-10 m in the biotope of silty limestone. It includes 12 macrozoobenthos. The average density and biomass are 3,000 ind.m⁻² and 38 g.m⁻² respectively.

The mollusc *Lentidium mediterraneum* Biocoenosis

The dominant species *L. mediterraneum* (= *Corbulomia maeotica*) is encountered on sandy sediments in shallow waters (from the spray zone to 20 m) mostly in the freshened areas of the northwestern shelf.

Up to 30 individuals of 1-3 mm barnacles encrust the shells of one *Lentidium*. The total volume of barnacles may exceed the volume of the mollusc by a factor of five or more, which in summer results in mass stranding of the molluscs on the shore.

The density and biomass of *L. mediterraneum* vary in the range of 5,000-145,000 ind.m⁻² and 60-90 g.m⁻² (Grinbart, 1949; Zakutsky, 1963; Kiseleva, 1981; Sinegub, 1993). The biomass of the dominant species accounts for 79-98% of the entire community (Kiseleva, 1981; Sinegub, 1993). Up to 30 macrozoobenthos species have been recorded in the biocoenosis.

In the fresh water areas of the northwestern shelf (e.g. Odessa Bay) the mass species are: the mollusc *Cerastoderma glaucum* (D = 80-90 ind.m⁻², B = 0.3-27.3 g.m⁻²), the

amphipod *Ampelisca diadema* ($D = 960-1760 \text{ ind.m}^{-2}$, $B = 2-4 \text{ g.m}^{-2}$), the polychaeta *Nereis succinea* ($D = 70-120 \text{ ind.m}^{-2}$, $B = 1-2 \text{ g.m}^{-2}$) and the cumacean *Iphinoe maeotica* ($D = 30-110 \text{ ind.m}^{-2}$, $B = 0.02-0.10 \text{ g.m}^{-2}$) grow. In the saline areas (e.g. Karkinitzky Bay) the mass species are: the gastropod mollusc *Hydrobia ventrosa* ($D = 7,000 \text{ ind.m}^{-2}$, $B = 10-20 \text{ g.m}^{-2}$), the polychaete *Nephtys hombergii* ($D = 40 \text{ ind.m}^{-2}$, $B = 3-5 \text{ g.m}^{-2}$) and the bivalve mollusc *Spisula subtruncata* ($D = 50 \text{ ind.m}^{-2}$, $B=3-5 \text{ g.m}^{-2}$). Ten macrozoobenthos species were found in freshened waters and 40 species in saline waters.

The *L. mediterraneum* biocoenosis is an important feeding ground for fish (Bacesco et al., 1957). Since the introduction of *M. arenaria* into the Black Sea the best examples of the *L. mediterraneum* biocoenosis have been in Odessa Bay (up to 5 km^2) and in near estuarine areas (Sinegub, 1993).

The alga *Phyllophora* Biocoenosis

The alga *Phyllophora* biocoenosis is mostly concentrated on silty-shelly sediments over an area of about $15,000 \text{ km}^2$ (at a depth of 20-60 m) known as Zernov's Phyllophora Field. The dominant species is the red algae *P. nervosa*. The same biocoenosis can also be found in the central part of Egorlitsky Bay, in the eastern part of Karkinitzky Bay (small phyllophora field) over an area of 150 km^2 (at a depth of 10-20 m). Accumulations of this seaweed have been observed in the coastal waters of the Tarkhankut peninsula and from Donuzlav Lake to Evpatorijsky Lake.

The total standing crops of algae are: 200,000 t in Zernov's Phyllophora Field; 180,000 t in the small phyllophora field; and 40,000 t opposite west Crimea. In addition to the dominant species there are three other species of phyllophora: *P. brodieri*, *P. pseudoceranoides* and *P. trallii* (Kalugina-Gutnik, 1979). There are 118 species of invertebrates in the phyllophora (Vinogradov, Zakutsky, 1967) and 47 species of fish (Vinogradov, 1967). The mass macrozoobenthos species in Zernov's Phyllophora Field are: the bivalve molluscs *Mytilus galloprovincialis* ($D = 380 \text{ ind.m}^{-2}$, $B = 210 \text{ g.m}^{-2}$), *Mytilaster lineatus* ($D = 6 \text{ ind.m}^{-2}$, $B = 210 \text{ g.m}^{-2}$), the gastropod *Rissoa parva* ($D = 10 \text{ ind.m}^{-2}$, $B = 0.2 \text{ g.m}^{-2}$), the barnacle *Balanus improvisus* ($D = 7 \text{ ind.m}^{-2}$, $B = 0.2 \text{ g.m}^{-2}$), the polychaeta *Nereis succinea* ($D = 52 \text{ ind.m}^{-2}$, $B = 3.1 \text{ g.m}^{-2}$) (T. Mikhailova).

In Egorlitsky Bay the mass species of the Phyllophora biocoenosis are: the bivalve mollusc *Mytilaster lineatus* ($D = 11,000 \text{ ind.m}^{-2}$, $B = 600 \text{ g.m}^{-2}$), the polychaetes *Nereis zonata* ($D = 1,400 \text{ ind.m}^{-2}$, $B = 21 \text{ g.m}^{-2}$), *Platynereis dumerilii* ($D = 1,200 \text{ ind.m}^{-2}$, $B = 11 \text{ g.m}^{-2}$) (D. Chernyakov, personal communication). The characteristic macrozoobenthos species are: *Bittium reticulatum*, *Harmothoe imbricata*, *Balanus improvisus* and *Synisoma capito*.

A commercial standing crop of *Phyllophora* is currently available only in the small phyllophora field in Karkinitzky Bay. In 1993 it totaled 182,000 t, while the recommended harvest did not exceed 9,000 t. From Donuzlav Lake to the city of Evpatoria the standing crop is estimated at 40,000 t with a permissible harvest of 4,000 t (Bryantsev, 1994).

The seagrass *Zostera* Biocoenosis

The dominant species of the *Zostera* biocoenosis are *Zostera marina* and *Z. noltii* (a total of 5 species of the genus *Zostera*). The biocoenosis can be found on silty-sandy sediments at depths of 0.2 to 12 m. It forms dense growths in bays and limans.

The distribution of *Zostera* in coastal areas has declined in recent years as the result of anthropogenic influences, especially on the northwestern shelf and in the bays of Crimea. An exception is the Kerch Strait, where hydrological-hydrochemical conditions remain favourable for the development of sea weeds. The average biomass of *Zostera* was 5,058 g.m⁻², and its density 433 ind.m⁻². In other areas of the Ukrainian shelf the *Zostera* biomass and abundance varied from 750-4,000 g.m⁻² and 260-800 ind.m⁻² respectively (Milchakova, personal communication). There are 17-40 species of algae in the *Zostera* biocoenosis, which account for from 1 to 30% of the phytocoenosis biomass. The dominant species are: *Viva rigida*, *Chaetomorpha chlorotica*, *Ectocarpus confervoides*, *Laurencia obtusa* and *Gracilaria verrucosa* (Kalugina-Gutnik, 1974; Milchanova, 1988). The total number of macrozoobenthos species varies from 24 in the kut part of Karkinitzky Bay (northwestern shelf) to 70 in Kazachey Bay near Sevastopol (CS). In the freshened area of the northwestern shelf the biocoenosis contains the crabs *Macropipus holsatus* and *Rhithropanopeus harrisi tridentata* and the prawns *Palaemon adspersus* and *P. elegans*. In the shallow water of the east of Tendrovsky Bay, which is where *Zostera* occurs in the greatest quantities, the mass species in the biocoenosis are: the molluscs *Abra ovata* (D = 1,100-10,500 ind.m⁻², B = 50-200 g.m⁻²) and *Hydrobiidae* (D = 2,850-19,100 ind.m⁻², B = 13-90 g.m⁻²). There are 36 species in the biocoenosis. The total density and biomass are 6,300-20,700 ind.m⁻² and 100-260 g.m⁻² respectively (D. Chernyakov, personal communication). The mass species of the biocoenosis on the Crimean shelf are: the gastropod molluscs *Mohrensterniaparva* (B = 4 g.m⁻²), *Bittium reticulatum* (B = 60 g.m⁻²), and the bivalve mollusc *Mytilaster lineatus* (B = 500 g.m⁻²). The fish of the Syngnathidae family are characteristic of this biocoenosis.

The alga *Cystoseira* Biocoenosis

The dominant species in the *Cystoseira* biocoenosis is the brown alga *Cystoseira barbata*, which develops on rocky substrates from the spray zone to a depth of 15 m. The *C. barbata* biocoenosis once occupied the entire rocky coast of Ukraine but today occurs only on the Crimean Shelf and possibly near Zmeiny island (Solyanik, 1959).

The mass species are: the molluscs *Mytilaster lineatus* (D = 50-6,800 ind.m⁻², B = 200-690 g.m⁻²) and *Rissoa splendida*; the amphipods *Amphithoe vaillanti* and *Caprella acantifera*; and the polychaetes *Grubea clavata*. The average density and biomass of the macrozoobenthos in the biocoenosis are 13,000-35,000 ind.m⁻² and 370-960 g.m⁻² respectively. A total of 23 species were recorded in the biocoenosis on the Crimean shelf, including representatives of the ichthyofauna of the Labridae family and the blue damselfish *Chromis chromis*. The epiphython of *Cystoseira* is described in detail by E. Makkaveeva (1979). Other common species include: the polychaetes *Nereis succinea*,

Nephtys hombergii and *Terebellides stroemi*; the molluscs *Mytilaster lineatus*, *Cerastoderma glaucum*, *Irus irus*, *Polititapes aurea*, *Donacilla cornea* and *Pilar rudis*. There are a few biocoenoses where rare species predominate, such as *Amphioxus (Branchiostoma) lanceolata*, which colonized coarse "amphioxus" sand near Cape Foros (Crimean shelf), the hydroid *Pachycerianthus solitarius*, and the ascidians *Eugyra adriatica* and *Asciadiella aspersa*. The distribution of the main benthic biocoenoses on the Ukrainian shelf is given in Fig. 17.

VI. Marine Wetlands

The Ukrainian coast of the Black Sea and the Azov Sea is rich in different kinds of wetlands, marine, brackish-water and freshwater. Some of them are large: e.g. Eastern Sivash (165,000 ha); Karkinitzky Bay and Dzharylgach Bay (87,000 ha); and Tendrovsky Bay (38,000 ha). Others are small in area: e.g. Krivaya Bay and Krivoi Peninsula (1400 ha); the seaside from Chernomorsk to Cape Uret in the Crimea (9,600 ha). There are a total of 19 marine wetlands in Ukraine (Fig. 18), of which 11 are in the Black Sea and eight in the Azov Sea. The total area of these wetlands is approximately 635,000 ha.

In addition to their ecological importance the wetlands of the Black Sea basin also provide valuable goods and services for local people. These include: flood control, the retention of pollutants and sediments, support for commercial fisheries, recreational potential and the provision of important habitats for wildlife, including many endangered species. The main geological, morphometrical and ecological characteristics are shown in Annex I, Table 11. The threatened species of plants and birds and the protected areas in the Ukrainian marine wetlands are shown in Tables 22-23-24.

Table 22. Rare plants of the Ukrainian marine wetlands

Species of plants	Category of protection	№ of wetland*
<i>Utysoyogon gryilus</i>	I	1, 2, 9, 1U
<i>Ctadium mariscus</i>	II	1,2,10
<i>Damasonium alisma</i>	I	15
<i>Elitrigia stipifolia</i>	II	15,18
<i>Epibctch is palustris</i>	III	1,7
<i>Eremogone cephalotes</i>	II	5,6
<i>Mursitea quaarifolia</i>	I	1,2
<i>Leucojum aestivum</i>		1,7
<i>Glanium flavum</i>	I	16
<i>Orchis palustris</i>	II	1,7,10
<i>Trapa natans</i>	II	1,2,5,7
<i>Salvinia natans</i>		1,2,5,7
<i>Aldrovanda vesiculosa</i>	III	1,2,5,7

* name of wetland see legend Fig. 18

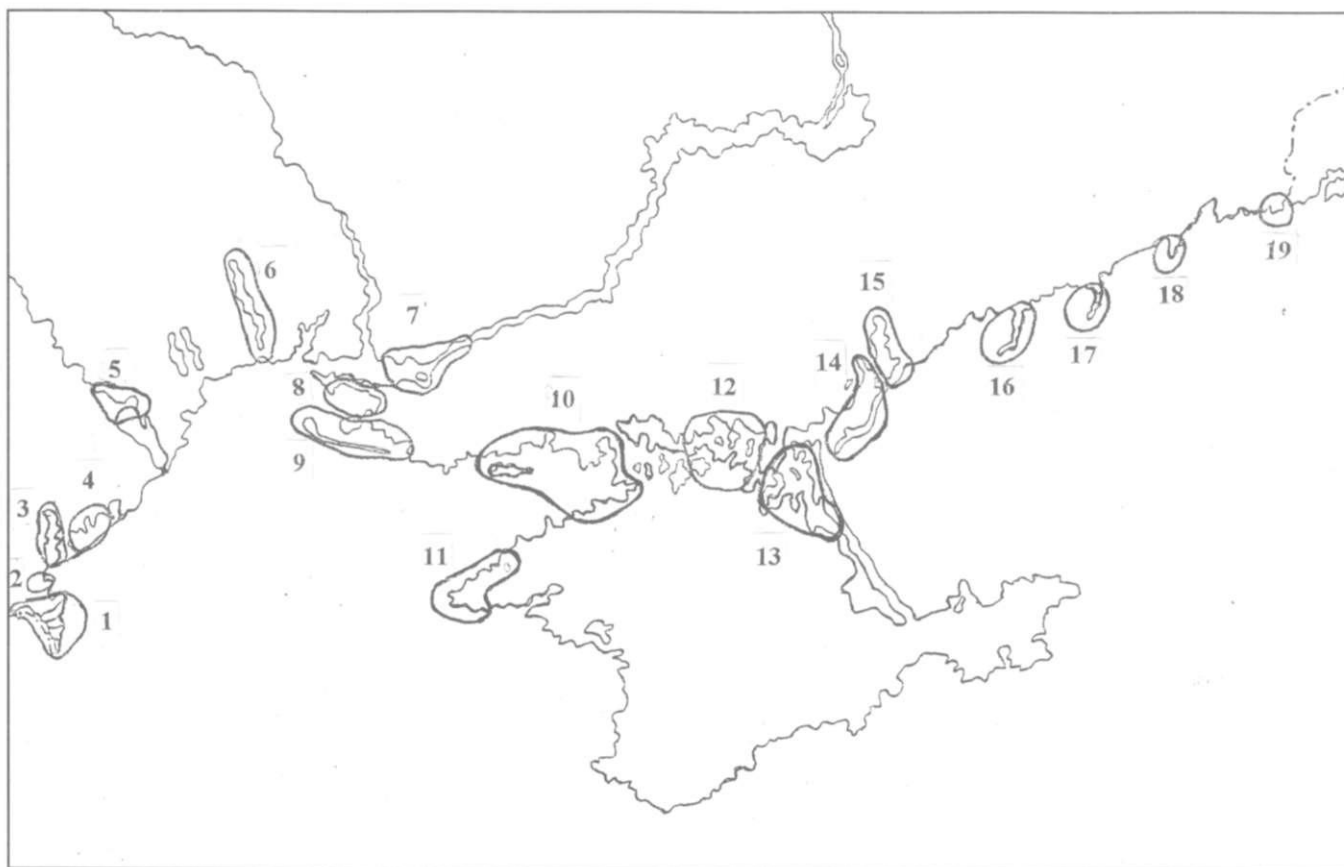


Fig. 18 Ukrainian major coastal wetland areas in the Black Sea and the Sea of Azov.

Table 23. Rare species of birds breeding in Ukrainian marine wetlands

Species of Birds	Wetlands* (pairs of breeding birds)	Wetlands* (number of individuals during seasonal accumulations)
<i>Pelecanus onocrotalus</i>	-	1(2,100); 3(2,000); 4(120); 5(500); 8(45); 9(30)
<i>Pelecanus crispus</i>	1(3)	1(25); 5 (800)
<i>Phalacrocorax aristotelis</i>	11 (350-500)	
<i>Phalacrocorax pygmeus</i>	1(700); 5 (20)	1(1 300)
<i>Platalea leucorodia</i>	1(800); 2 (350); 5 (20)	
<i>Plegadis falcinellus</i>	1(300); 5 (300-2,000); 6 (200); 13 (500)	
<i>Egretta alba</i>	2 (400); 5 (300); 7 (350-700); 10 (200-700); 13 (500); 15 (10); 16 (120); 17 (70); 18 (9-20); 19 (8-15)	6 (900); 18 (100); 19 (260)
<i>Egretta garzetta</i>	10 (500-970); 13 (500); 17 (40)	9 (76,000)
<i>Ciconia ciconia</i>	1(7)	
<i>Ciconia nigra</i>	-	1(10); 5(130); 9(10)
<i>Grus grus</i>		1(100); 8-9(300); 13 (2,000); 12 (100-300)
<i>Anthropoides virgo</i>		4 (10); 8-9(30)
<i>Otis tarda</i>		1(10); 8 (10)
<i>Branta ruficolis</i>	—	1-3-4 (2,000)
<i>Casarca ferruginea</i>	1(?)	1 (60); 8 (10)
<i>Somateria mollissima</i>	8 (700)	
<i>Aythya ferina</i>	2 (1,800); 3 (170)	3 (18,000); 6 (5,000); 7 (6,000); 8 (25,000-40,000); 9 (60,000); 10 (7,900)
<i>Aythya niroca</i>	1(130); 5(20)	1(100); 5 (50)

<i>Netta rufina</i>	2 (400)	12-13 (3,000)
<i>Tadorna tadorna</i>	6 (70); 10(70)	12-13 (12,000)
<i>Pandion haliaetus</i>	-	1(5); 5(5); 9(2-3)
<i>Haliaeetus albicilla</i>	1(?)	1(8); 3-4(14); 8-9(55)
<i>Charadrius alexandrinus</i>	4(30); 6(35)	
<i>Charadrius dubius</i>	6(15)	
<i>Himantopus himantopus</i>	1(15); 4(80-90); 5(5); 6(10); 13(600-800); 14(20); 15(250); 17(10-26)	
<i>Recurvirostra avoseta</i>	4(100); 6(100); 9(250); 13(500-600); 14(60); 15(50- 250)	4(1,300); 13(50)
<i>Haemotopus ostralegus</i>	1(5)	
<i>Numenius phaeopus</i>		1(600)
<i>Glareola pratincola</i>	3(60); 4(60); 8-9(50-60); 16-17-18-19(200);	
<i>Glareola nordmanni</i>	8-9(4-25);	
<i>Larus ichthyaetus</i>	12(115-245); 13(360)	10(300)
<i>Larus genei</i>	6(10); 9(6,800-37,450); 10(300); 12(1,000 -1,300); 13(850)	12-13(200)
<i>Larus melanocephalus</i>	6(120); 12(2,000); 13(450)	
<i>Apus melba</i>	11(10)	

* name of wetland see legend Fig. 18

Table 24. Protected areas of Ukrainian marine wetlands

N° of wetland	Existing protected territories
1	Part of wetland (9,000 ha) — in the state reserve “Dunajskije Plavni”
2	—
3	—
4	—
5	Part of the territory — in the game reserve “Urochische Dnestrovskije Plavni”; Liman — the Game Reserve of the Military Society of Fishermen and Hunters (MSFH)
6	Two Ornithological Game Reserves in the Lower (“Tiligulskaja Peresyp”, “Nizovje Tiligulskogo Limana”(“Lower Tiligulski Liman”); the hunting economy of the Society of Fishermen and Hunters (SFH) — in the Upper Liman
7	Ichthyological Game Reserve “Krasnaja Hatka”; some of SFH and MSFH
8	Greater part — in the State Biosphere Reserve “Chernomorski”
9	In the State Biosphere Reserve “Chernomorski”
10	Reserve “Lebjazije Ostrova” (“Swan’s Islands”); Kolonchakskije Islands — in the Game Reserve
11	Game Reserve
12	—
13	—
14	Fedotova Peninsula and the Upper Liman — Game Reserves
15	One hydrological protected area; three Ornithological Game Reserves — “Altashirski”, “Rodionovski”, “Stepanovskaja Kosa”(“Stepanovskaja Peninsula”)
16	Game Reserve
17	State Game Reserve
18	Game Reserve
19	Ornithological Game Reserve “Krivokoski Liman”; State Nature Memorial “Krivaja Kosa” (“Curved Peninsula”)

Current State of Biodiversity and Trends in Biological Processes

I. The Impact of Eutrophication on Marine Flora and Fauna

The state of the Black Sea ecosystem was predetermined by the geographical and geopolitical situation of its drainage basin. Of all the European semi-enclosed and coastal seas, the Black Sea and the Azov Sea are the most isolated from the ocean. Their drainage basin includes the territories of many countries, has an area of 2.2 million km² (Fig. 19), and is inhabited by at least 162 million people (Mee, 1992). The catchment areas of the Black Sea and Azov Sea are rich in land-based sources of different pollutants, which are transported into the sea by about 300 rivers, the principal among which are the Danube, Dnepr and Dniestr which flow into the northwestern Black Sea.

Until the early 1960s, the northwestern shelf was biologically the richest and most productive region of the Black Sea, including: the immense meadow of red algae "Zernov's Phyllophora field", in the central part of the northwestern shelf; extensive fields of the sea grasses *Zostera sp.* in shallow bays; large quantities of molluscs (e.g. the blue mussel *Mytilus galloprovincialis* and the oyster *Ostrea edulis*), bottom crustaceans (e.g. amphipods, mysids, shrimps - *Crangon crangon*, *Palaemon adspersus*, *P. elegans*, crabs - *Carcinus mediterraneus* and *Macropipus arquatus*) plus abundant phytoplankton and zooplankton, all of which in turn created favourable conditions for many species of both adult and young bottom and pelagic fish.

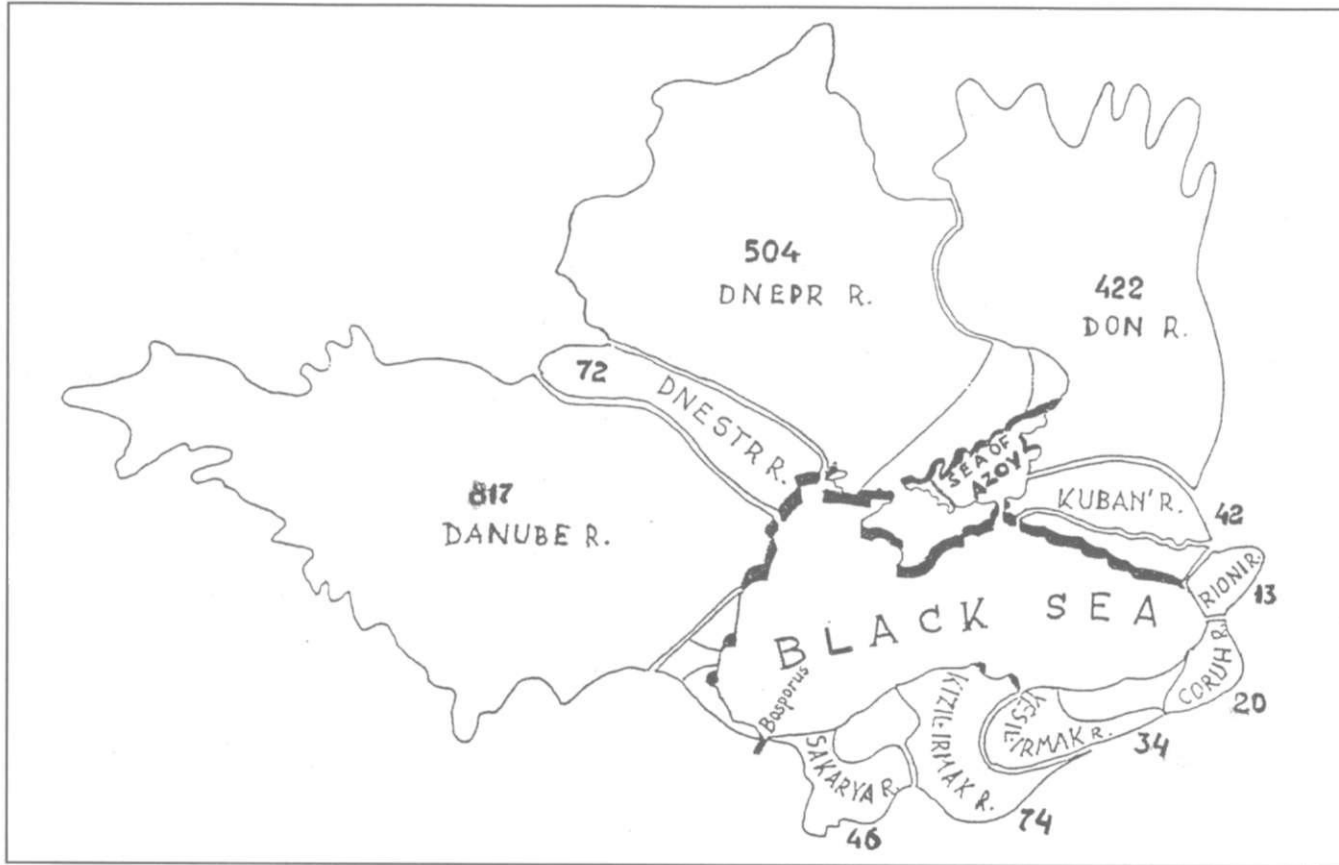


Fig. 19 Drainage basins of ten principal Black Sea rivers (areas, ths km²).

The most numerous of these fish were: flatfishes (*Psetta maeotica*, *Platichthys flesus* Inserts and *Solea lascaris*); gobies (*Neogobius melanostomus* and *Mesogobius bacrachocephalus*); the thornback *Raja clavata*; the stingray *Dasiatis pastinaca*; the whiting *Odontogadus merlangus euxinus*; and sturgeons (*Huso huso*, *Acipenser stellatus* and *A. guldenstadti colchicus*). The pelagic fish of the northwestern shelf included: the anadromous Black Sea shad *Alosa kessleri pontica*; the bonito *Sarda sarda*; the horse mackerel *Trachurus mediterraneus ponticus*; and grey mullets (*Mugil cephalus*, *Lisa urata* and *L. saliens*).

Different authors (Almazov, 1962 and 1967, Zaitsev et al., 1987) have estimated that the amounts of nutrients and organic substances introduced by the Danube, Dnestr and Dnepr rivers onto the northwestern shelf increased approximately tenfold between the 1950s and the 1980s. The northwestern shelf is the largest hypertrophic area in the entire Mediterranean Basin from the Straits of Gibraltar to the west to the Azov Sea to the east.

The chain of biological consequences of this excess nutrient run-off can be characterized as follows:

Phytoplankton Blooms

The immediate consequence is an outburst of phytoplankton, especially dinoflagellates, euglenoids, and different species of picoplankton. The most striking examples of such phytoplankton blooms occur on the northwestern shelf (Table 25).

Table 25. Average biomass of phytoplankton during the blooming period on the northwestern shelf of the Black Sea

Period	Average biomass (mg. ³)	Author
1950s	670	Ivanov, 1967
1960s	1,030	Mashtakova, 1971
1970s	18,690	Nesterova, 1987
1980s	30,000	Nesterova, Terenko, 1987

In the 1950s peridinians accounted for 18.8% of the total phytoplankton biomass (Ivanov, 1967). By the 1980s its share had risen to 54.4% (Nesterova, 1987). Red tides caused by blooms of peridinians have become common phenomena on the northwestern shelf (Nesterova, 1979).

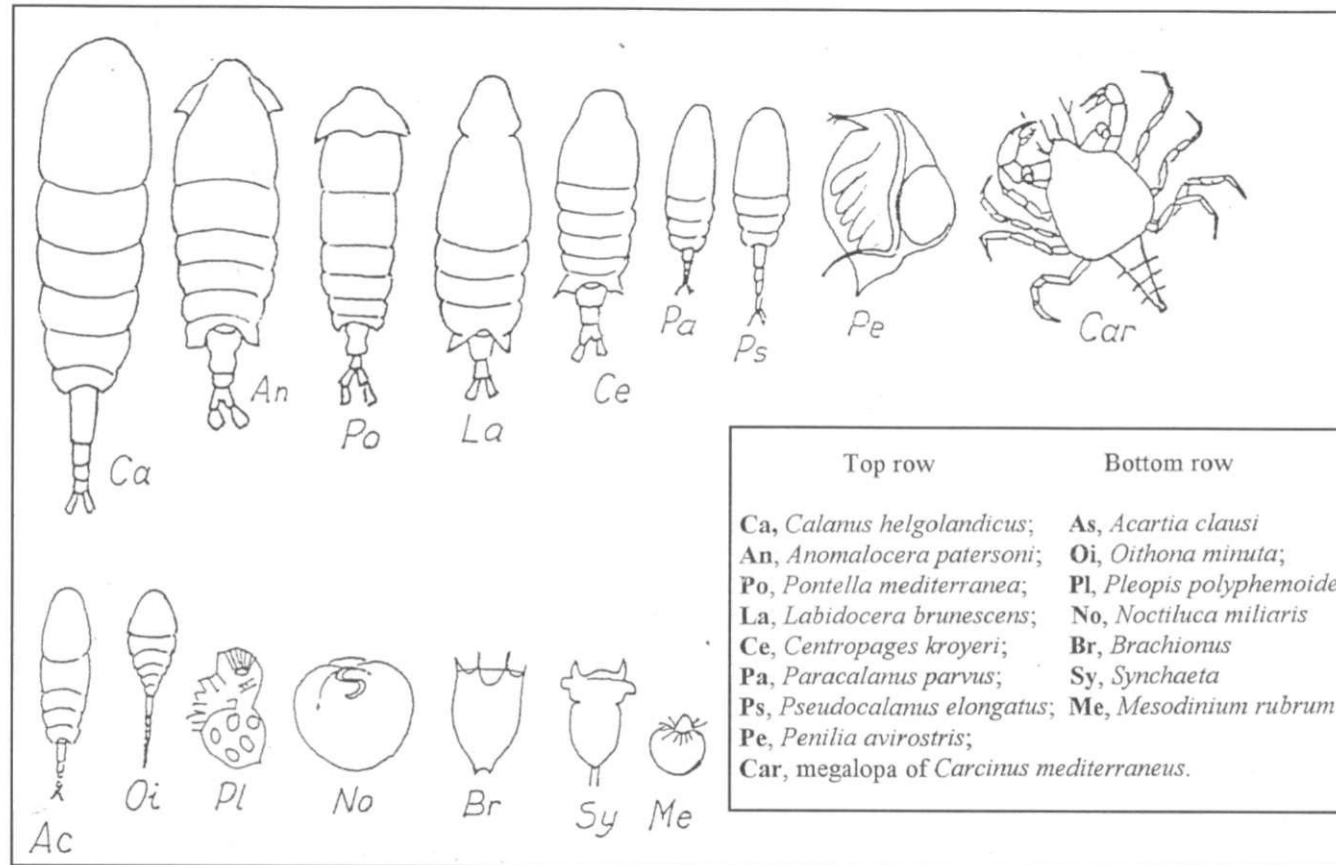


Fig. 20 Top row: the large size planktonic organisms that dominated Black Sea coastal waters until the 1960s.
Bottom row: the small size planktonic organisms that replaced the larger species and dominated coastal waters in the 1980s.

Blooms of One-celled Animals and Jellyfish

One of the consequences of phytoplankton enrichment has been an increase in the number of some herbivore and detritivore zooplankton species. The most typical are: the flagellate *Noctiluca scintillans*; the infusorian *Mesodinium rubrum*; the jellyfish *Amelia aurita*; some rotatorians; the cladoceran *Pleopsis polyphemoides*; and the copepod *Acartia clausi*.

The Decline in Populations of Large Planktonic Crustaceans

In contrast to the above, the populations of relatively large pelagic crustaceans, including carnivores, mixotrophes and even herbivores, have begun to decline: e.g. the neustonic Pontellidae, *Centropages kroyeri*, and the zoea and megalopa of crabs. This can be explained by the concentration of toxicants in the surface microlayer. The decline in crab populations is assumed to be due to hypoxic conditions on the shelf. But the reason for the decrease in the populations of the planktonic *Calanus* and *Pseudocalanus* is not yet fully clear, although the general trend has been for a decline in populations of large planktonic species and an increase in the numbers of smaller species (Fig. 20). This has affected the zooplankton which serve as food for marine fish. (Zaitsev, 1992).

Decreasing Water Transparency and the Reduction of Benthic Macrophyte Communities

Another important consequence of eutrophication, phytoplankton blooms, and a sharp increase in the number of some zooplankton species, has been the decline in water transparency in the Black Sea, and a corresponding change in the compensation depth of the water column. A decline in water transparency causes a weakening of the photosynthesis of bottom algae due to low light penetration and a reduction in the shelf macrophytocoenosis, except for those very shallow forms close to the edge of the sea. A typical example has been the degradation of Zernov's *Phyllophora* field (Fig. 21). In the late 1960s this community occupied 11,000 km² of the northwestern shelf at depths of 20 m to the north and 60 m to the south. The community was composed of three species of red algae, *Phyllophora nervosa*, *P. brodiaei* and *P. membranifolia*, and a dozen species of invertebrates which were either attached to or lived amongst the algae: e.g. sponges, hydrozoans, bryozoans, molluscs, polychaetes, barnacles, amphipods, isopods, shrimps, crabs and ascidians. More than 40 species of fishes were associated with the *Phyllophora* biocoenosis for feeding, reproduction or hibernation (Vinogradov, 1967). Many invertebrates in this community (e.g. the sponges *Mycale syrix* and *Haliclona ascidia*, the isopods *Idotea baltica basteri* and *Synisoma capita*, amphipods *Gammarus locusta*, *Caprella acantifera*, *Phthisica marina*, and the decapods *Crangon crangon* and *Macropus arquatus*) are protectively coloured against a red or reddish background making them animals almost invisible to predators and prey. The same colouring can be found in several fish species such as the clingfish *Lepadogaster lepadogaster* and *L. candollei*, the shore rockling *Gaidropsarus mediterraneus*, the wrasses *Crenilabrus quinque maculatus* and

Ctenolaprus rupestris and the gobies *M. batrachocephalus* and *N. melanostomus*. Even some pelagic fish in this community differ from specimens inhabiting other biotopes by having red or reddish fins (e.g. the Black Sea shad and mackerel). A drastic reduction of *Phyllophora* meadows began in the 1970s. By the mid 1980s the surface area of the community had declined tenfold (Zaitsev, 1992), the specifically coloured *Phyllophora* fauna had practically disappeared and the northwestern shelf had, as a result, lost an important habitat for marine invertebrates and fish as well as a rich source of oxygen.

Hypoxia and the Mass Mortality of Bottom Animals

Another important consequence of the eutrophication of the Black Sea has been THE sedimentation of large amounts of dead phytoplankton to the shelf as a result of THE increased biomass of pelagic microphytes. The decomposition of this organic material causes hypoxia and even anoxia in the near-bottom water layers. The formation of large hypoxic areas is a new phenomenon in the Black Sea ecosystem, which was first recorded in August - September 1973 on the northwestern shelf. Later hypoxia-induced mass mortalities of benthic invertebrates and fishes were recorded over a surface area of 3,500 km² between the Danube river delta and the Dnestr river estuary (Salsky, 1977, and Zaitsev, 1977). In more recent years, hypoxia-induced mass mortalities of benthic organisms have become ordinary phenomena, their scale dependent on the meteorological, hydrological, hydrochemical and biological peculiarities of each summer season (Table 26). On the northwestern shelf the biological losses caused by hypoxia are estimated at 100-200 t of organisms per square kilometre of sea bottom. Over the period 1973-1990 THE total biological losses are estimated at 60 million t, including 5 million t of young and adult fish from both commercial and non-commercial species. The most common victims OF hypoxia include molluscs, barnacles, crustaceans and bottom fishes. Some pelagic species, such as anchovy and mackerel, are sometimes affected by hypoxia, although the mechanism by which this happens is not yet fully understood.

Table 26. Surface areas (10³ km²) of hypoxic zones on the northwestern Black Sea shelf in 1973-1990.

Year	Surface area	Year	Surface area	Year	Surface area
1973	3.5	1979	15.0	1985	5.0
1974	12.0	1980	30.0	1986	8.0
1975	10.0	1981	17.0	1987	9.0
1976	3.0	1982	12.0	1988	12.0
1977	11.0	1983	35.0	1989	20.0
1978	30.0	1984	10.0	1990	40.0

The decomposition on the sea bottom of large quantities of dead animals, usually at depths of 8-10 to 40m, produces hydrogen sulphide in hypoxic areas. In fact, there are two hydrogen sulphide zones in the Black Sea (Zaitsev, 1992): one comprises the entire deep water column, the upper limits of which are around 70-80m below the surface in the centre of the sea; the other is on the northwestern shelf at depths of 8-10m to 35-40m. The former was one of the specific ecological features of the Black Sea, even prior to eutrophication. The second zone first appeared in the early 1970s as a result of the anthropogenic eutrophication of the northwestern shelf and is temporary, occurring in summer-autumn, usually for a duration of one to three weeks.

Decreases in the Invertebrate Standing Stock

The standing stock of Black Sea organisms has decreased considerably as a result of hypoxia, silting and other factors. The total biomass of Phyllophora on the northwestern shelf fell from 9 million t in the late 1960s to 0.3 million t in the mid 1980s (Zaitsev, 1992). In the early 1960s the total biomass of the blue mussel on the northwestern shelf was about 10 million t. By the 1980s the figure had been cut by two thirds and the population was dominated by juveniles. The oyster *Ostrea edulis* is very sensitive to silting, and has now almost completely disappeared from the northwestern shelf where, in the late 1950s, it numbered more than 50 million individuals (Zaitsev, Vinogradov, 1967). The populations of crabs, hermit crabs, ghost shrimps (*Callinassa*), and bottom fish such as turbot, which were very common on the northwestern shelf until the 1960s, have also virtually disappeared.

Increases in the Populations of Fish Inhabiting the Shallow Sub-littoral Zone

Since the late 1980s there has been a sizable increase in populations of small shore fish such as the silverside *Altherina mochon pontic*, the sand lance *Gymnammodites cicerellus*, the transparent goby, *Aphia minuta*, the blenny *Blennius tentacularis* and other species immune to predation by *Mnemiopsis leidyi*.

In the 1980s a species became acclimatised to the shallow waters of the Black Sea, namely the grey mullet *Mugil so-iuy*, which originated in the Amur river estuary and the brackish water areas of the Sea of Japan. During the 1970s and 1980s *Mugil so-iuy* fry were air transported to the Molochnaya river estuary in the Azov Sea and the Dnester river estuary in the Black Sea (Gorelov, Esipova, 1992). The initial attempts were unsuccessful but *Mugil so-iuy* eventually became acclimatised and has bred successfully, particularly in the Azov Sea. According to S. P. Volovik (personal communication), an estimated 90 million fry were produced in 1989 and another 50 million in 1990. Both adults and young fish are very numerous along the South Crimean coast. Adult specimens winter along the southern Black Sea coasts and can also be found near Trabzon in January-February (S. Unsal, personal communication). If *Mugil so-iuy* eggs and larvae prove to be immune to predation by *Mnemiopsis leidyi*, this very euryhaline and eurythermous mullet could become one of the abundant near-shore fish species of the Black Sea and Azov Sea.



Fig. 21 Progressive reduction of the Zernov's "Phyllophora field" on the northwestern shelf in 1950s (.....), 1960s (-.-.-), 1970s (-----) and 1980s (_____).

II. Direct Human Impact on Species Diversity

There are a number of anthropogenic influences on Black Sea biodiversity. One is the introduction of allochthonous organisms for the biological control of some local species. For example, the minnow *Gambusia affinis* was introduced in 1925 from Italy in an attempt to eradicate mosquitoes in the Kolkhida wetlands. *Gambusia affinis* can now be found in river mouths and other low salinity areas of the Black Sea.

The pump kingseed *Lepomis gibbosum* was introduced from North America into Europe as a brightly colored aquarium fish. It spread to fresh-water ponds and rivers and is now common in the Danube delta and other brackish-water areas and can also be found in the northwestern NW Black Sea. In the Danube delta and estuaries it feeds on fish eggs and larvae.

The main direct human impact on the biodiversity of the Black Sea is the accidental introduction of species from elsewhere in the ballast and bilge waters of ocean going ships, in fouling communities, and in the international introduction of exotic commercial fish and

invertebrates. Fig 22 contains a schematic diagram charting the introduction of exotic species into the Black Sea.

There have only been two successful examples of the intentional introduction of exotic species: *Mugil so-iuy* has now become a mass commercial fish, while *Crassostrea gigas* is cultured in some areas along the Caucasian and Crimean coasts.

Ecological Consequences of Changes in the Biodiversity of the Black Sea

The most recent changes in the Black Sea bottom biocoenoses which as a result of the penetration and autoacclimatisation of exotic species have been caused by the introduction of the gastropod *Rapana thomasiana*, the bivalve molluscs *Mya arenaria* and *Scapharca taequivalvis*, and the comb jelly *Mnemiopsis sp.*

Rapana thomasiana

This large predatory mollusc from the Sea of Japan was first discovered in the Black Sea in 1947 in Novorossisky Bay (Drapkin, 1953). It did not have any serious competitors and, as a result, it dispersed along the Caucasian and Crimean coasts, appearing in the Azov Sea, and reaching Romanian, Bulgarian and Turkish waters (Chukhchin, 1984; Cvetkov. Marinov, 1986).

Rapana thomasiana is very fertile and tolerant of significant freshening, the contamination of water and oxygen deficiency. The wide distribution of a new, highly adaptive predatory mollusc in the Black Sea has significantly changed the structure of many bottom biocoenoses. Populations of large bivalve molluscs, such as *Mytilus galloprovincialis*, *Ostrea edulis* and *Pecten ponticus* have fallen considerably at several sites (Chukhchin, 1984). The gastropod *Rapana thomasiana* has also had an impact on the biocoenoses of soft sediments, feeding on *Venus gallina*, *Gouldia minima*, *Pilar rudis*, and other small bivalve molluscs.

Populations of *Rapana thomasiana* are comparatively low in the northwestern Black Sea and it has had little impact on the marine ecosystem in the region. The reasons for the low *Rapana thomasiana* populations on the northwestern shelf are unknown. There are abundant food resources and the levels of water contamination are lower than in some other sites where the mollusc is very common.

Mya arenaria

This bivalve mollusc, which is a native of the north Atlantic, was first observed in the Black Sea in 1966, on the Ukrainian shelf off Odessa (Beshevli, Koljagin, 1967). Within

15 years *Mya arenaria* had become abundant in the northwestern and western Black Sea and in the Azov Sea (Cvetkov, Marinov, 1986; Ivanov, 1986). It is particularly numerous on muddy sediments in coastal zones where its biomass exceeds 1 kg.m⁻². In some areas this soft clam has become the dominant species of the new biocoenosis.

Mya arenaria populations appear to have peaked in the northwestern Black Sea in 1982, when its frequency was 71.7% at an average density of 58 ind.m⁻² (Ivanov, 1986). Its distribution was subsequently limited by the almost annual mass mortalities of benthic fauna across wide areas between the Danube and Dnester estuaries. In 1981-1992 its average density near the Dneprovsko-Bugsky liman estuary varied from 2 to 310 ind.m⁻².

On the other hand, the modern processes which have introduced silt to the bottom substrate have favoured an increase in the distribution of *Mya arenaria* populations. For instance, its distribution expanded rapidly in Karkinitzky Bay in the 1980s, when there was interdeposition of silt particles after intensive bottom trawling on the northwestern shelf (Zaitsev, 1993). As a result, new *Mya arenaria* biocoenoses have formed in Karkinitzky Bay and the species has also entered other communities where the dominant species were the bivalve molluscs *Mytilus galloprovincialis*, *Abra nitida*, and *Venus gallina*.

Scapharca inaequalvis (*Cunearca cornea*)

This bivalve mollusc, which is a member of the Indo-Pacific fauna, was first discovered in the Black Sea in 1968 on the Caucasian shelf (Zaika et al., 1992). Over the next 15 years it spread to the inshore waters of Romania (Gomoiu, 1984) and Bulgaria (Cvetkov, Marinov, 1986), near the Danube estuary, along the Caucasian coast, to the Kerch Strait (Zolotarev, 1987) and Azov Sea.

Scapharca inaequalvis reaches a length of 5.7 cm and an agglomeration of large specimens has a mass of 60-80 g. It inhabits soft muddy, sandy-muddy, shelly-sandy sediments mostly at depths of up to 30 m, becoming an element in biocoenoses and squeezing out some native molluscs. In the Kerch Strait its frequency reached 49% at an average density of 3.5 ind.m⁻² and a biomass of 67 g.m⁻² (Ivanov, 1991). In some regions its biomass exceeded 200 g.m⁻² and it became the dominant species.

In the northwestern Black Sea *Scapharca inaequalvis* is only found in muddy sediments near the Danube estuary (Zhebriyansky Bay) along with the bivalve mollusc *M. arenaria*, another autoacclimatisant. The density of the introduced clam is 0.6-5.0 ind.m⁻² at a biomass of 1.5-10 g.m⁻². Outside Zhebriyansky Bay. There have been several observations of *Scapharca inaequalvis* connected with the *M. galloprovincialis* biocoenosis (e.g. Zmeiny Island and Shaganskaya Bank). But the annual mass mortalities of bottom fauna in the region appear to have prevented the further dispersal of the new clam in the coastal region between the Danube and Dnestr estuaries. In the Azov Sea, *S. inaequalvis* has been discovered in the biocoenosis of the bivalve mollusc *Cerastoderma lamarecki*. In 1990 it had reached a mean density of up to 2.6 ind.m⁻² and a biomass of up to 26 g.m⁻².

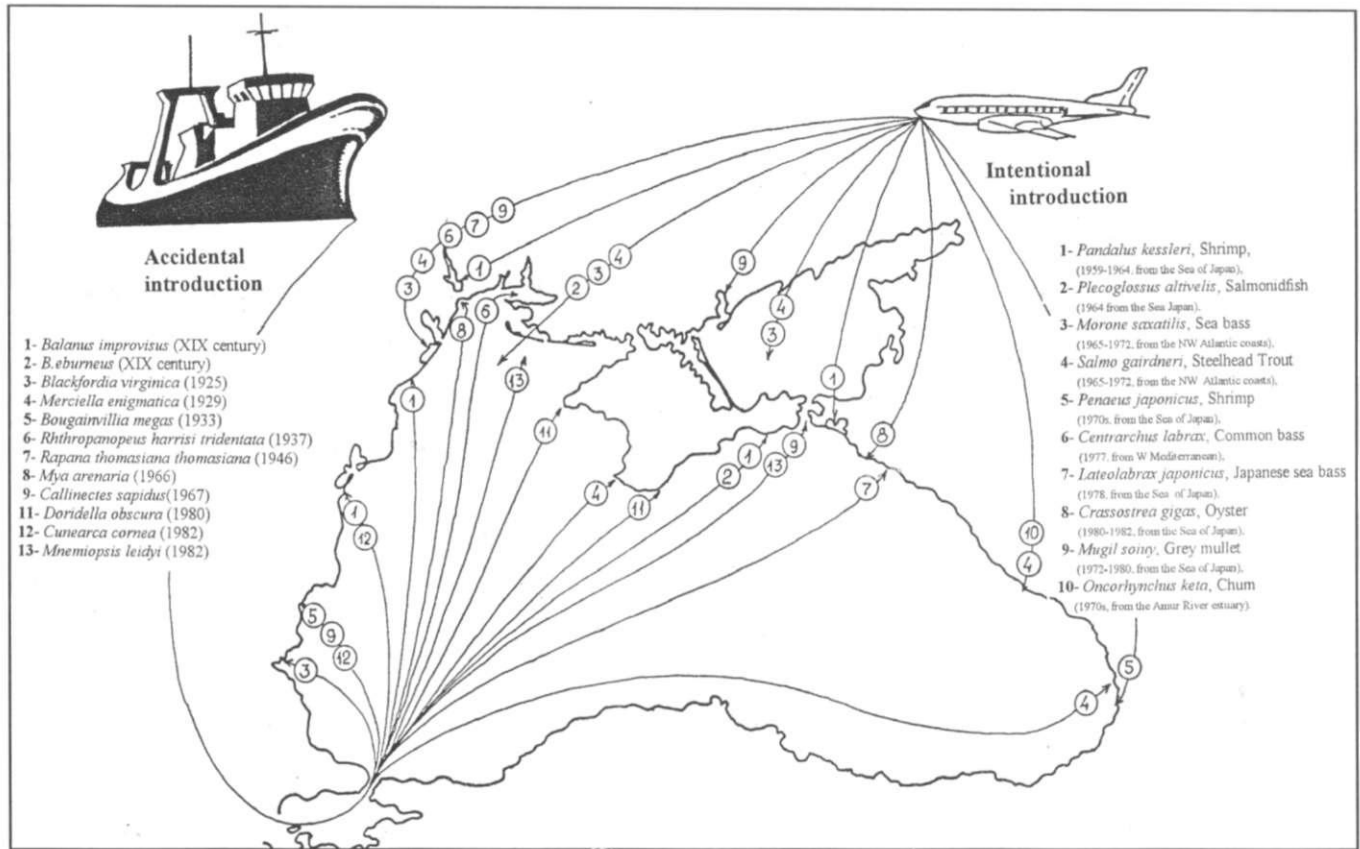


Fig. 22 Introduction of exotic species into the Black Sea.

S. inaequalvis has thus become a widespread species in the Black Sea and changed the structure of many benthic biocoenoses. Its introduction into the Black Sea and the Azov Sea has demonstrated its high adaptive capability. Most notably, it has remained alive under hypoxic conditions, when other benthic invertebrates have died. *S. inaequalvis*'s high adaptive potential will undoubtedly promote its further penetration.

Mnemiopsis sp.

The comb jelly *Mnemiopsis sp.* was introduced from the eastern seaboard of North America, probably in ballast waters. It was first encountered in the Black Sea in 1982. Within five years it had spread throughout the northwestern, central and northeastern Black Sea. In 1989 its average concentration reached 1.5 kg.m⁻³ in off-shore areas and 3 kg.m⁻³ in the near shore. Its total biomass in the Black Sea was estimated at 780,000,000 tons (Shushkina et al., 1990).

Mnemiopsis sp. actively grazes infusorians, copepods, acartia, sagitta, balanus nauplii, and the larvae of fish, bivalve and gastropod molluscs (Sergeeva et al., 1990; Tsikhon-Lukanina, Reznichenko, 1991). The intensive development of a new consumer of zooplankton produced a rapid transformation of the species and trophic structures of the pelagic communities of the Black Sea. As a result, the biomass of several copepod species declined 2-3 fold and sagitta more than 10 fold. The total biomass of mezoplankton feed for *Mnemiopsis sp.* declined five fold in comparison with 1978 (Shushkina et al., 1990). A decrease in the abundance of zooplankton may, in turn, have produced an increase in the concentrations of phytoplankton it consumes.

The results of the transformation of the pelagic communities triggered by the introduction of *Mnemiopsis sp.* are probably broader than in former investigations and may have far reaching consequences. One consequence may be changes in the structure of bottom communities as the result of the decimation of the larvae of many bottom benthic animals.

Summary

It is clear that the unintentional introduction of new species is a significant factor in recent changes in the Black Sea ecosystem. The intense development of some introduced animals was the result of their high adaptive capability. On the other hand, the impoverishment of Black Sea ecosystem's fauna composition and the low level of competitive interrelations has also played a role in the successful colonization of autoacclimatizants. Given the current state of the Black Sea ecosystem, new introduced species may soon appear, particularly euryhaline and estuarine species.

The most likely donor area for the further dispersal of marine organisms is the northwestern Pacific Ocean. This region has been the source for introduced species in other areas of the Pacific Ocean (Garlton, 1987) and in the northern Adriatic (Sacchi et al,

1987). The molluscs *Raphana thomasiana*, *Scapharca inaequivalvis* and *Crassostrea gigas* and the polychaete *Polydora limicola* all have their origin here and perhaps are the first examples of the successful "pacificization" of the benthic fauna of the Black Sea.

Phytoplankton blooms

Shallow waters, copious river runoff and the specific hydrological and hydrochemical regimes of the northwestern Black Sea, all create favourable conditions for the intense development of phytoplankton and the "blooming" of one or several species of algae.

According to A. Ivanov (1962), in the 1950s-1960s the number of species producing blooms was not large, comprising ten marine species (nine diatom and one peridinin) and eight freshwater species (three diatom, four blue-green and one green). In April to September blooms spread over 9% of the entire northwestern Black Sea.

The eutrophication of the northwestern Black Sea was accompanied by an increase in blooming and in the numbers of species of different taxa (Table 27) causing them (Nesterova, 1987).

In addition to the 14 species of diatoms which bloom at present, two peridinians, two chrysophytes and one euglena also participate. In the zone of influence of the river runoff there are three diatoms, 10 blue-green and one green species.

In 1973-1994 the blooming which began in March continued until November. The initiators of blooming in the spring were usually representatives of phytoplankton in the cold part of the year, e.g. *Skeletonema costatum* and *Chaetoceros socialis*. Their maximum numbers did not exceed those in the reported literature data (Ivanov, 1967) and new species such as *Stephanodiscus hantzschii*, *Chaetoceros karianus* and *Dinobryon sp.* appeared (Table 27). *Stephanodiscus hantzschii* recorded the lowest numbers of cells for the spring period at 20-400,000 cells.l⁻¹.

Spring blooming occurred in coastal waters between the estuaries of the Dneprovsko-Bugsky liman and the Danube (Fig. 23). Summer blooms had the highest numbers and coverage, as well as the most serious impact on marine biota, particularly blooms of the peridinin *Prorocentrum cordata* and the diatom *Cerataulina pelagica*.

In the 1950s and 1960s *Prorocentrum cordata* bloomed twice, reaching a maximum density of 3,000,000 cells.l⁻¹ (Ivanov, 1967). In September 1973, in the Dnestrovsky-Danube interfluvium, *Prorocentrum cordata* caused a "red tide", the first of its kind in the northwestern Black Sea. Rusty-red coloured spots appeared on the marine surface and the maximum abundance was 13,000,000 cells.l⁻¹ (Nesterova, 1979).

The neritic diatom alga *Cerataulina pelagica*, which was a mass phytoplankton species in the 1950-1960s, with a maximum abundance of 300,000 cell.l⁻¹ (Ivanov, 1967), first bloomed in the Dnestrovsky-Danube interfluvium in September 1975 (Nesterova, 1981).

Since then these species have bloomed in the northwestern Black Sea almost annually, with *Prorocentrum cordata* blooming in early summer, followed by blooms of *Cerataulina pelagica*.

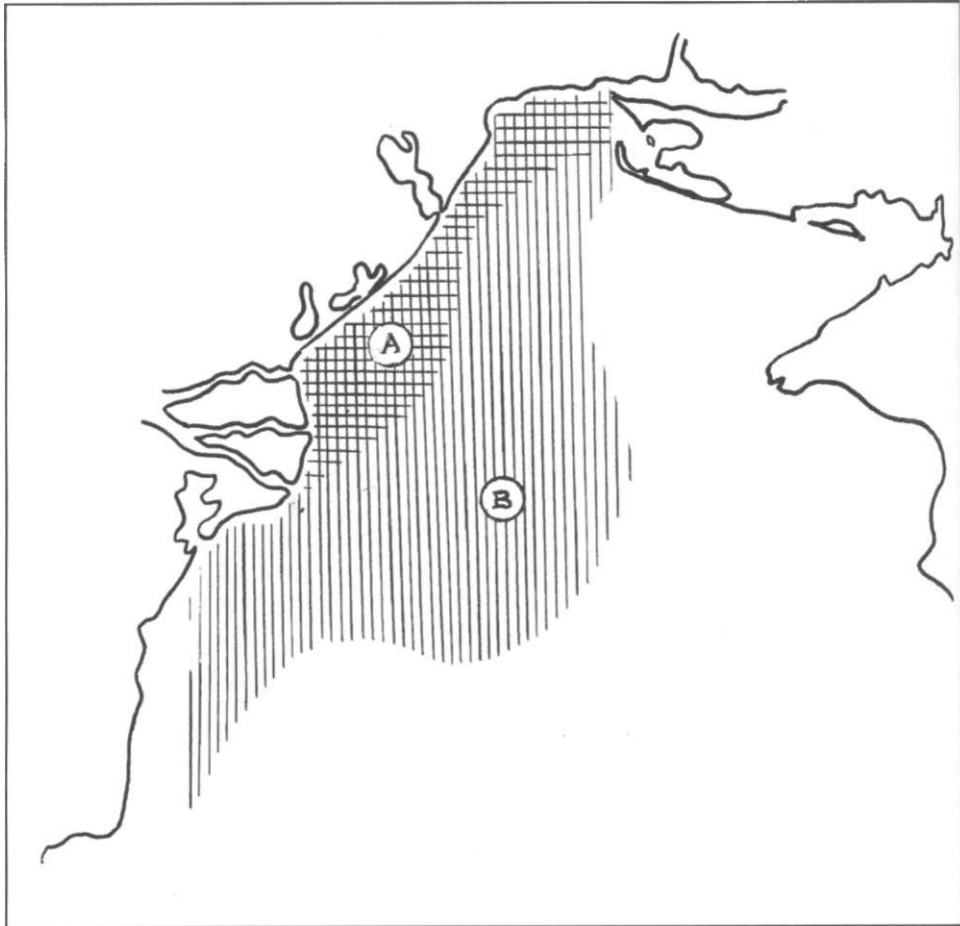


Fig. 23 Zones of blooming of phytoplankton in the Northwestern part of the Black Sea in 1973-1993: A - Spring and autumn periods, B - Summer period.

One feature of the blooms of the species mentioned above is that they extend over a significant area of the sea.

In 1973-1975 the areas covered by the blooms near the coast increased (Fig. 23). In summer 1978 the area covered by *Cerataulina pelagica* blooms shifted towards the centre of the northwestern shelf. In 1979-1980 *Prorocentrum cordata* blooms covered 57% of the northwestern shelf.

At the same time the indices of the species undergoing blooms increased: e.g. in 1973 the figure for *Prorocentrum cordata* was 1973 13,000,000 cells.l⁻¹; in 1974 139,000,000 cells.l⁻¹; and in 1979 a northwestern shelf record of 224,000,000 cells.l⁻¹. The

same increase was observed in the figures for *Cerataulina pelagica*, which rose from 16,000,000 cells.l⁻¹ in 1975 to 37,000,000 cells.l⁻¹ in 1978 (Nesterova, 1985, 1987).

There were also occasional blooms of other species (i.e. *Nitzschia tenuirostris*, *Coccolithus huxleyi*, *Chaetoceros insignis*, *Rhizosolenia fragilissima* and *Heterocapsa iriquetra*) which were not normally considered to be blooming species. The numbers of others (e.g. *Cyclotella caspia* and *Skeletonema costatum*) decreased (Table 26).

The species diversity of the minute freshwater blue-green and green algae increased and produced very frequent blooms of water in the Pridneprovsko-Bugsky liman; many of the species were blooming for the first time. The freshwater diatoms *Meloseira granulata* and *Stephanodiscus hantzschii* bloomed in the zone of influence of the waters of the Danube. There were frequent blooms of blue-green algae near the estuary of the Dnestrovsky liman (Nesterova, 1977), the first time they had been observed since the 1950-1960s (Ivanov, 1967).

Blooms of the diatoms *Nitzschia seriata*, *Cerataulina pelagica*, *Thalassiosira parva* + *Th. subsalina* and *Skeletonema costatum* occurred off the northwestern coast in October-November (Table 28). At the same time, *Oscillatoria kesseleri* bloomed in the estuary of the Dnepro-Bugsky liman. The highest figures were for a bloom of *Skeletonema costatum* (20 400,000 cells.l⁻¹).

In the last five years the intensity of the blooming has decreased and the area covered has shrunk to 8% (Table 28). In July 1989 the maximum *Prorocentrum cordata* concentrations were 12,000,000 cells.l⁻¹; and in August 1991 the highest concentration of *Cerataulina pelagica* was 5 500,000 cells.l⁻¹.

It is quite possible that observations made towards the end of the 1980s and beginning of the 1990s coincided with the end of the vegetation period of the species which caused blooming over wide expanses of the sea. In August 1991 *Cerataulina pelagica* was mostly composed of single cells or chains of small numbers of cells, which is uncharacteristic for this species.

The highest concentrations of blooming species occur in the upper 10 m. layer, except for *Heterocapsa triquetra* which achieves peak concentrations on the seabed. When blooms of different species occur simultaneously, the species predominate in different layers.

During 1992-1994 there were constant blooms in the Sukhoi and Grigorievsky limans, which have served as marine ports for the last 20 years. But the blooms did not extend to adjacent areas of the Black Sea; where there were blooms in these areas they were of other species. In summer-autumn there were blooms of the diatoms *Skeletonema costatum*, *Nitzschia seriata* and *Cerataulina pelagica* in the Sukhoi liman.

In Grigorievsky liman there were blooms of the euglenoid *Eutreptia lanovii* in February 1993 and of the diatom *Cylindrotheca closterium* in August 1994 (see Table 27). An increase in the discharges of ballast water from ships and ship-sourced contaminants in limans and the adjacent sea can result in the appearance of new species of microphyte toxic to humans and animals.

Table 27. Maximum numbers (million cells.l-1) of phytoplankton species causing blooms

Species	Northwestern Black Sea		Crimean Coast	
	Till 1973	1973 - 1994	Till 1973	1973 - 1994
Marine				
<i>Thalassiosira parva</i> + <i>Th.subsalina</i>	26.0	54.0-	-	-
<i>Skeletonema subsalsum</i>	-	1.9	-	-
<i>Sc. costatum</i>	32.0	20.4	-	20-22
<i>Cyclotella caspia</i>	5.2	1.7	>1	-
<i>Leptocylindrus danicus</i>	72.0	28.0	-	-
<i>L. minimus</i>	6.0	16.0	-	-
<i>Rhizosolenia fragilissima</i>	0.2	3.6	2	2
<i>Rh. Alata</i>	-	-	>0.6	>0.6
<i>Rh. calcar avis</i>	-	-	>0.6	>0.6
<i>Chaetoceros karianus</i>	-	3.0	-	-
<i>Ch. socialis</i>	5.4	4.6	20	-
<i>Ch. insignis</i>	-	1.7	-	-
<i>Cerataulina pelagica</i>	0.4	37.0	~4	-
<i>Cylindrotheca closterium</i>	-	16.0	-	-
<i>Nitzschia tenuirostris</i>	-	28.6	-	-
<i>N. delicatissima</i>	-	-	-	2
<i>N. seriata</i>	1.0	2.8	-	-
<i>N. pungens</i>	-	-	-	>1

<i>Asterionella japonica</i>	-	-	-	~2
<i>Prorocentrum cordata</i>	3.3	224.0	-	-
<i>Heterocapsa triquetra</i>	-	18.0	-	-
<i>Coccolithus huxleyi</i>	-	5.0	-	4.0
<i>Dinobryon sp.</i>	-	4.0	-	-
<i>Eutreptia lanovii</i>	-	1.7	-	-
Freshwater				
<i>Melosira granulata</i>	1.8	1.0	-	-
<i>Stephanodiscus hantzschii</i>	-	20.8	-	-
<i>Diatoma elongatum</i>	0.8	4.2	-	-
<i>Microcystis aeruginosa</i>	3.3	15.0	-	-
<i>M. pulvereae f. incerta</i>	-	94.8	-	-
<i>Gleocapsa minor</i>	-	2.6	-	-
<i>G. minima</i>	-	4.4	-	-
<i>Merismopedia minima</i>	-	22.0	-	-
<i>M. tenuissima</i>	4.5	8.2	-	-
<i>M. punctata</i>	-	2.8	-	-
<i>Aphanizomenon flos-aquae</i>	0.9	34.0	-	-
<i>Anabaena spiroides</i>	-	6.3	-	-
<i>Oscillatoria kisselevi</i>	-	143.0	-	-
<i>Scenedesmus obliquus</i>	-	26.0	-	-

Table 28. Dynamics of changes in the zones (percentage of the total area of the northwestern shelf) of blooms in the northwestern Black Sea in 1973-1993

Year	Area of bloom (%)		
	Spring	Summer	Autumn
1973	-	-	10.5
1974	-	10.1	
1975	15.5	18.3	13.2
1976	-	-	18.3
1977	6.0	16.7	7.6
1978	-	33.0	
1979	-	57.0	
1980	-	51.5	
1981	-	-	2.0
1982	-	8.5	6.0
1983	4.2		
1984	3.3		
1985	-	-	16.5
1986	-	26.1	
1989	-	8.0	
1991	-	12.8	
1992	-	12.1	
1993	11.7		

Small organisms fare better in media rich in minerals and organic matter as the ratio of the surface to volume is higher. Research has shown that the average volume of cells of bloom species has declined since the 1950s and 1960s.

Prior to anthropogenic eutrophication, the average volume of cells was 1,700 μm^3 . As anthropogenic eutrophication rose, the average volume decreased to 1,000 μm^3 .

As the result of blooming, especially of *Prorocentrum cordata*, sanitary-biological indices indicated a worsening of water quality in the northwestern Black Sea, the development of hypoxia in the near bottom layers and mass mortalities of benthic organisms and fish (Nesterova, 1979).

III. Commercial Species

Fisheries

Until 1985-1986 the Black Sea countries' total catch continued to increase, reaching 700,000 t. But after 1986 the catch went into sharp decline. About 77% of the total catch was composed of small pelagic fish such as the anchovy and the sprat. In the late 1980s on the northwestern shelf the anchovy catch declined at least tenfold, while in the Azov Sea anchovy fishing ceased completely after 1989 (Zaitsev, 1993).

The biodiversity of commercial fish of the Black Sea has decreased considerably during the last three decades (Table 29).

Table 29. Commercial fish of the Ukrainian Black Sea (Zaitsev, 1992)

In 1960-1970	In 1980-1990
<i>Squalus acanthias</i>	<i>Sprattus sprattus phalericus</i>
<i>Raja clavata</i>	<i>Alosa kessleri pontica</i>
<i>Dasyatis pastinaca</i>	<i>Engraulis encrasicolus</i>
<i>Acipenser stellatus ponticus</i>	<i>Odontogadus merlangus euxinus</i>
<i>Huso huso</i>	<i>Trachurus mediterraneus ponticus</i>
<i>Acipenser guldenstadti colchicus</i>	
<i>Sprattus sprattus phalericus</i>	
<i>Alosa kessleri pontica</i>	
<i>Engraulis encrasicolus ponticus</i>	
<i>Belone belone euxini</i>	
<i>Odontogadus merlangus euxinus</i>	
<i>Mugil cephalus</i>	
<i>Mugil auratus</i>	
<i>Mugil saliens</i>	
<i>Atherina mochon pontica</i>	
<i>Pomatomus saltatrix</i>	
<i>Trachurus mediterraneus ponticus</i>	
<i>Mullus barbatus ponticus</i>	
<i>Sarda sarda</i>	
<i>Scomber scombrus</i>	
<i>Gobius batrachocephalus</i>	
<i>Gobius melanostomus</i>	

<i>Gobius cephalarges</i>	
<i>Gobius fluviatilis</i>	
<i>Psetta maeotica</i>	
<i>Platichthys flesus luscus</i>	

Mytilus galloprovincialis

At the beginning of the 1960s, about 9,360,000 tons (97.5%) of the total mussel biomass of 9,600,000 tons on the Black Sea shelf from the Danube to Batumi was concentrated in the Ukrainian waters of the northwestern part of the Black Sea (Ivanov, 1963).

During active mussel harvesting in 1975-1980 the area of the mussel fields on the northwestern shelf exceeded 20,000 km² while the total stock was estimated at 6,000,000 tons (Samishev et al, 1986). But both the total stock (down by 30%) and the area covered by the mussel fields were considerably smaller than in the 1960s. The decline accelerated during the 1980s when the mollusc stock fell by a half.

An analysis of changes in the population characteristics of mussels in the northwestern shelf of the Black Sea in 1984-1994 has shown that parameters such as the average density of populations, biomass, average age and maximum life span decreased more than twofold. But more recently there has been a rejuvenation of the mussel population and the moiety of juvenile specimens has increased. The death coefficient of molluscs has more than doubled since 1984. There have also been striking changes in the mussels' absolute reproduction rate. Over the period 1984-1994 the rate has declined almost tenfold. But in recent years mussel populations have begin to stabilize, although there is no indication that the population will return to its former state.

There is considerable demand for mussel raw material for nutritional and medicinal purposes, which has prompted the growing of mussels in farms at different sites along the Ukrainian Black Sea coast. The largest farms are located in Kalamitsky Bay and Karkinitsky Bay (Scientific-Technological Centre for the Use of Natural Resources of the Shelf of the National Academy of Sciences of Ukraine - STC "Shelf, Sevastopol), and in the Kerch Strait (Scientific-Industrial Amalgamation Kerchmollusc, Kerch).

The collectors of the STC "Shelf marine farms produce a harvest of up to 2,000 tons per annum. The mussels fall off the collectors create a mussel bank at the bottom of Kalamitsky Bay. This bank has changed the local ecosystem and resulted in an increase in biodiversity, particularly the numbers of algae, invertebrates and fish.

The National Agency of Marine Investigations and Technology of Ukraine has initiated a long term government programme entitled "Mollusc", which has already made a considerable contribution to mussel aquaculture in the country. The programme's objective is to develop the best technology for the intensive farming of mussels in specific areas of the Black Sea and Azov Sea.

Rapana thomasiana

First discovered in the Black Sea in 1947 off Novorossiisk (Drapkin, 1953), *Rapana thomasiana* has been observed in large quantities off Sevastopol and Yalta since 1954.

Rapana lives on sandy and rocky bottoms at depths of 3 to 35 m in a coastal strip 1-3 km in width. Densities are low in shallow waters up to 6 m in depth, averaging two specimens. 100 m⁻². The maximum concentrations have been observed at depths of 8-10 m along the edge of a mass mussel settlement, where *Rapana* densities reach 12 ind.m⁻².

The Crimean coast is *Rapana's* main habitat in Ukraine. It is almost never found in the northwestern Black Sea or the Azov Sea. For the last 30 years no records have been kept on the abundance of *Rapana* on the Crimean coast. However, according to a personal communication by a leading research associate, Rubenstein YugNIRO (Kerch), there has been a slight increase in numbers. *Rapana* is used for food. One kilogram of boiled, frozen *Rapana* meat costs US\$ 5-10. Its large shell, which can be up to 100 mm high, is used in souvenirs.

Ostrea edulis

Until the First World War, oysters were grown for commercial purposes in different areas of the Black Sea including the northwest. One of the most famous factories was the Scholtse plant near Sevastopol. However, in 1914 severe storms destroyed the equipment used for rearing molluscs and production came to a halt.

In the 1970s there was a significant decline in the standing stock of oysters in the northwestern Black Sea, although experiments on farming them were reintroduced. In addition to the Black Sea oyster *Ostrea edulis*, attempts were made to grow the gigantic far eastern oyster *Crassostrea gigas* in Kerch, Karadag, in the salt lake Donuzlav.

The sharp decrease in the natural populations of Black Sea oysters, has resulted in *Ostrea edulis* being registered in the Red Data Book of Ukraine.

Chironomidae

The larvae of two species of *Chironomus plumosus*, which can be found in brackish water up to 10-11 ppt, and *C. salinarius*, from salty water up to 50 ppt and more, are caught in significant quantities using old-fashioned methods and sold as food for aquarium fish. Their main habitats are coastal brackish water bodies, salt lakes and limans. Larvae are caught the whole year round. The price is US\$ 1-4 per kg.

Artemia

The brackish water shrimp *Artemia salina* can be found in large numbers in southern Ukraine. The eggs used in fishing are obtained in Kuyalnitsky liman (Odessa) and in Sivash lagoon in the Crimea. *Artemia* eggs cost US\$ 50-80 per kg (dry weight).

Amphipoda

Amphipods are used as food for aquarium fish. In certain areas of the northwestern Black Sea pseudolittoral the biomass of the amphipod *Pseudogammarus maeoticus* reaches 2-3 kg.m⁻². These amphipods are sold for commercial purposes at US\$ 1-2 per kg.

Decapoda

A long time ago some of the decapoda of the northwestern Black Sea were caught for commercial purposes, including the freshwater crayfish. In Ukraine there are unique water bodies where they have been caught. Until 1955 an average of 250 tons per annum, or 12.5% of the world catch, were taken in the Dnestrovsky liman; while up to 13% was caught in the near Danube area (Brodsky, 1981).

However, in recent years changing ecological conditions have resulted in a decline in the catch of freshwater crayfish. There is no reliable data on the catch over the last few years. The Dnestrovsky and Dneprovsko-Bugsky limans in the lower reaches of the Danube contain five species of crayfish, namely: *Astacus astacus*, *Pontastacus leptodactylis*, *P. Pipachypus*, *P. cubanicus* and *P. eichwaldi*. In 1995 in Odessa the price of crayfish was US\$ 1.

The shrimps *Palaemon adspersus*, *P. elegans* and *Crangon crangon* are caught in the limans, bays and near the Black Sea coast using old-fashioned methods. In 1995 in Odessa the price of shrimps was US\$ 8 per kg (wet weight).

Marine plants

The main Black Sea commercial plants are red algal species of the genus *Phyllophora* (*P. nervosa*, *P. brodiaei*, *P. pseudoceranooides*, *P. membranifolia* and *P. trailii*) and the sea grasses *Zostera marina* and *Z. nana*.

Phyllophora

In the 1960s the total standing crop of *Phyllophora* in an area of 11,000 km² in Zernov's field in the centre of the northwestern Black Sea reached 6,400,000 tons. In 1984 it dropped to 420,000 tons and in 1990 to 100,000 tons (Kalugina-Gutnik, 1994). The hauling and processing of *Phyllophora* for agaroid is carried out by the Odessa plant established in 1927. The drastic fall in the standing crop has meant that the algae is now taken from a small *Phyllophora* field in Karkinitzky Bay.

Zostera

In the 1960s standing crops of *Zostera* in the Tendrovsky, Egorlitzky, Karkinitzky and Dzharylgachsky bays reached 1,100,000 tons. Towards the end of the 1980s the figure had fallen to 500,000 tons (Kalugina-Gutnik, 1994).

Protected Areas and Species in the Ukrainian Coastal Zone

I. Dunaiskie Plavni Reserve

The Danube Delta is the largest and the most intact wetland complex in Europe, occupying an area of about 600,000 ha, of which 150,000 ha are in Ukraine and 442,000 ha in Romania. The Danube River flows into the Black Sea through three channels, of which the Kiliysky carries two-thirds of its annual river runoff.

The Dunaiskie Plavni State Reserve (DPR) is located where the Kiliysky enters the Black Sea, on islands in the delta and in the coastal strip. It was established in April 1981, although a sanctuary regime had already been introduced in different parts of the reserve in 1967. In 1973 the Dunaiskie Branch of the Chernomorsky State Reserve was established on 3,158 ha of islands and 4,600 ha of Black Sea waters. In 1978 the total area of the Dunaiskie Reserve was 14,851 ha.

According to the Ramsar Convention, since 1975 the reserve has been included among wetlands of international significance. The biosphere significance of the Ukrainian Danube delta is primarily based on the following:

- The diversity of marine, freshwater and terrestrial biotopes, a network of canals, arms and river tributaries, swamps and lakes with reed growths, flood plains, alluvial islands and forests on elevated sites, meadows, pastures and dunes. The water area of the delta is increased by the nearby lakes to the north (Fig. 24);
- A significant diversity of aquatic and terrestrial plants and animals, with more than 1.500 species of plants and more than 5.000 species of animals;

- The high indices of bioproductivity. There are dense growths not only of common plants such as reeds, bulrushes, sedges and willows, but also rare protected species such as the water chestnut, salvinia and buckthorn.

There are regular microalgae blooms in the Danube avandelta reaching a biomass of tens and even hundreds of grams per cubic metre. Up to 50,000 specimens.m⁻² of the relict amphipod *Pontogammarus maeoticus* have been discovered in the pseudolittoral zone of the DPR. The reserve also provides exceptionally favourable feeding conditions for fish, waterfowl and aquatic birds. During one three-hour observation by Yu. Zaitsev from 12:00 to 15:00, about 80 freshwater fish (8 species) and 50 gray mullet fry *Mugil saliens* passed through a 50 cm arm of the Kiliysky channel of the Danube delta. The Danube delta is a traditional area for fisheries. The high fish productivity of the Ukrainian part of the delta is confirmed by the fact that pelicans nesting in Romanian territory fly each year to the DPR to feed.

The largest colony in Europe of another protected species of aquatic birds, the spoonbill *Platalea leucorodia*, also gathers in the reserve. During the colder months up to 100,000 migratory aquatic birds from all over Europe, including the northern swan *Cygnus cygnus* and some species of geese, winter in the DPR.

The DPR is also home to some rare trees. The Danube water chestnut *Trapa danubialis* is an endemic of the Danube, while the water chestnut *Trapa natans* has been entered in the Red Data Book of Ukraine (Fig. 25). *Salvinia natans* has also been included in the Red Data Book of Ukraine (Zaitsev, 1990).

The DPR's phytoplankton includes 800 species of marine, brackish and freshwater unicellular algae. There are 50 species of phytobenthos macrophytes. But the soft sediments and high water turbidity mean that there are almost no macrophytes in the sea. Dense growths of *Zostera marina* can only be found in very shallow water in the marine embayments of the delta.

The marine zooplankton includes large numbers and a high biomass of the infusorian *Mezodinium rubrum*, the protozoan *Noctiluca miliaris* (*N. scintillans*), rotatoria and the jellyfish *Aurelia aurita*.

The zoobenthos is comprised of about 250 species. Molluscs such as the freshwater Unionidae, Limnaeidae, *Viviparus*, the marine *Mya arenaria* and *Lentidium Mediterranean* are quite numerous, as are crustaceans, polychaetes and insect larvae. The reserve contains more than 100 species of fish, plus nine amphibian species, seven reptile species, 225 bird species and 25 species of mammals (Voloshkevich et al., 1987).

Another reason why the DPR needs protection is that it includes the avandelta and adjacent waters containing the widest brackish area of the sea, with specific fauna and flora. Characteristic species of the Danube avandelta include the Danube shad *Alosa kessleri pontica* and six species of sturgeons, four of which have been registered in the Red Data Book of Ukraine, namely: *Acipenser ruthenus*, *A. nudiventris*, *A. sturio* and *Huso huso ponticus*.

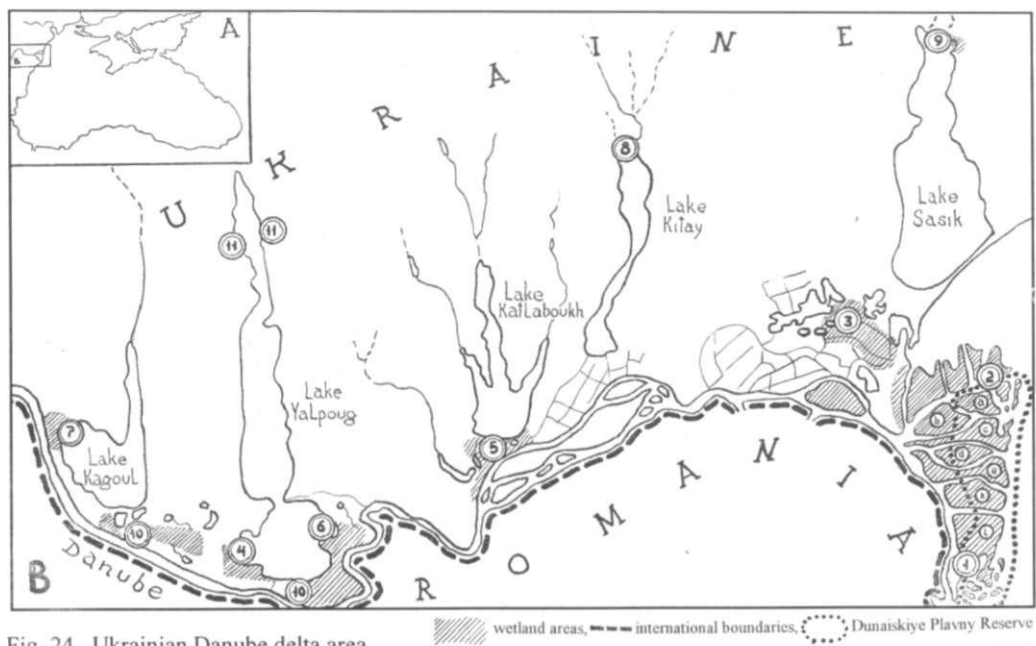


Fig. 24 Ukrainian Danube delta area.







Legend

Islands: a) Poludeny, b) Ochakovsky, c) Ankudinov, d) Peschany, e) Stambulsky, k) Kubansky, l) Kubanu

- | | |
|---|--|
| 1. Southern part of Kiliya Branch delta | 7. Lake Kagul plavny |
| 2. Northern part of Kiliya Branch delta | 8. Upper part of Kitay Lake |
| 3. Stentsovsko-Zherbrijanskye plavny | 9. Upper part of Sasik Lake with rivers deltas |
| 4. Western part of Kugurluy Lake | 10. Near Danube River forest |
| 5. Nekrasovsko-Bogatyanksyke plavny | 11. Upper parts of Yalpug Lake with steppe communities |
| 6. Eastern part of Kugurluy Lake | |



Fig. 25 Distribution of some rare plant species of Danube Plavny Reserve (B).

- B₁**
-  - *Trapa natans* L.
 -  - *Leucojum aestivum* L.
 -  - *Orchis palustris* Jacq.
 -  - *Hyppophae rhamnoides* L.
- B₂**
-  - *Salvinia natans* (L.) All.
 -  - *Nymphoides peltata* (C.G.Gmel) O.Kunz.
- reserve boundary

There are three species of Black Sea dolphins in the marine part of the reserve, namely: *Delphinus delphis ponticus*, *Phocaena phocaena relicta* and *Tursiops tritneatus ponticus* which is included in the Red Data Book of Ukraine. Another rare mammal species is the monk seal *Monachus monachus*.

Although the reserve was only established recently, it has already begun to produce positive results. The areas covered by rare species of aquatic plants have increased: the water chestnut and *salvinia* fivefold, the buckthorn three to fourfold. The number of bird species has risen from 170 in 1981 to 225 in 1987, including an increase in those recorded in the Red Data Book of Ukraine from 5 to 13. Two pairs of white-tailed eagles have nested on artificial platforms set up by researchers in the tops of trees.

In 1993 the DPR signed a cooperative agreement with the World Wildlife Fund. In 1994 the Global Environment Trust Fund allocated US\$ 1,500,000 for the implementation of a project on the "Conservation of Biodiversity in the Ukrainian Part of the Danube Delta". The aim of the project is to set up a management structure and expand the protected zones in the Ukrainian part of the Danube delta. Later the protected zone will be expanded to 34,000 hectares and plans made for a biosphere reserve on an area of 67,000 ha.

II. Chernomorsky Biosphere Reserve

The Chernomorsky Biosphere Reserve (CBR) was created in 1927 and reorganized in 1983 as a biosphere reserve confirmed by a UNESCO certificate. The CBR is situated in the northwestern coastal area of the Black Sea, near Prichernomorya, south of the Dneprovsko-Btigsy liman (Fig. 26). The total area of the reserve is 87,348 ha including a reserve core of 57,048 ha and a buffer zone (Egorlitsky Bay) of 30,300 ha. Five mainland areas are included in the reserve core: three forest steppes, namely Ivano-Rybalchansky (3,200 ha), Solenoozersky (2,300 ha) and Volyzhin Les (203 ha); and two coastal areas: Egorlitsky Kut (840 ha) and Potievsky (1,064 ha). The reserve also includes the islands of Tendrovsky Bay and Egorlitsky Bay, namely: Dolgy (470 ha), Krugly (8 ha), Konskie (27 ha), Orlov (28 ha), Babin (6 ha), Smaleny (8 ha); as well as a large part of the Tendrovsky Spit (1,289 ha). The eastern (shallow water) part of Tendrovsky Bay covering 36,628 ha was added to the reserve core in 1975. In addition, when the Chernomorsky State Reserve was transformed into a biosphere and became an ornithological sanctuary of considerable significance, Egorlitsky Bay was included as a buffer zone (see Fig. 26). The total water area of the reserve, including the one kilometre strips along Tendrovsky Spit (=Tendra Island), Dolgy and Krugly islands, is 78,100 ha. There is an area of 1,000 sq. km of wetlands adjacent to the reserve which was awarded international status under the Ramsar Convention in 1971. The CBR is subject to powerful anthropogenic pressure from the regulation and withdrawal of fresh water runoff through the Dnepro-Bugsky liman, and agricultural activity, the erosion of Nizhnedneprovsky sands, recreational development, and a general worsening of the ecological situation in the northwestern Black Sea. Irrigation has caused the greatest damage to the protected nature reserve. The main culprits are rice paddies in the Krasnoznamenskaya irrigation system.

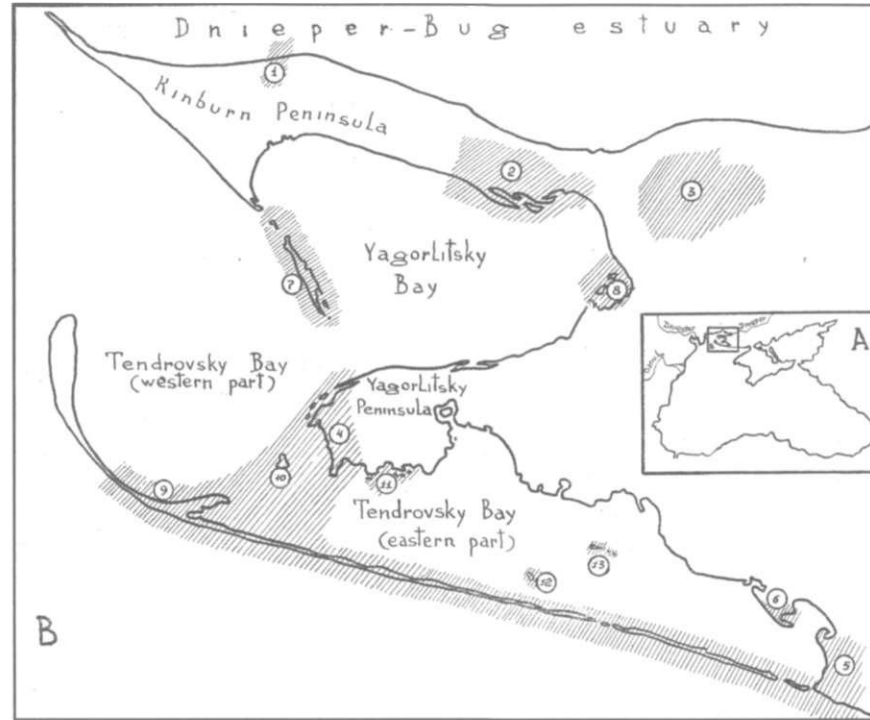


Fig. 26 Chernomorsky Biosphere Reserve (cross-hatches).

Legend

- | | | |
|-----------------------|-----------------------------|-----------------------|
| 1. Volyzhin Les | 6. Otievskaya Strelka | 10. Orlov Island |
| 2. Solenoozerny | 7. Dolgy and Krugly Islands | 11. Sibirskye Islands |
| 3. Ivano-Rybalchansky | 8. Konskye Islands | 12. Smaleny Island |
| 4. Yagorlitsky Kut | 9. Tendra Island | 13. Babin Island |
| 5. Potievsky | | |

(клиннн

The terrestrial reserve flora includes 185 species of fungi, including higher basidiomycetes (101 species), phytotrophic obligate fungal parasites (84), lichens (75) and mosses (61). The higher plant species include 728 species from four phyla, 92 families and 348 genera.

The fresh water bodies of the reserve contain 35 species of Euglenophyta (Vetrova, 1992). According to I. Pogrebnyak (1965), there are 97 species of macrophytes in the marine water bodies, including seven species of higher plants. Today Tendrovsky Bay and Egorlitsky Bay contain 57 species of macrophytes including Chlorophyta (21 species), Charophyta (5), Phaeophyta (13) and Rhodophyta (29).

The marine water macrozoobenthos comprises 187 species of invertebrates, including Porifera (10 species), Actinaria (2), Polychaeta (68), Crustacea (64), Mollusca (37) and Ascidiacea (5) (Pinchuk, Chernyakov, 1989; Pinchuk, Chernyakov, Aleksenko, 1992; Alekseev, 1992; Pinchuk, 1989; Komarova, 1986, unpublished, data of Chernyakov, Pinchuk, Rubenstein).

The fauna of the reserve consists of 4,000 species. The terrestrial invertebrates include 173 species of spiders and 25 species of terrestrial molluscs. The total number of terrestrial invertebrates (excluding insects) exceeds 800.

The ichthyofauna includes 78 species, comprising three species of Chondrichthyes and 75 species of Osteichthyes (Vinogradov, 1960; Pinchuk, 1987, unpublished data of Pinchuk and Tkachenko). There are also five species of amphibians and nine species of reptilians (Kotenko, 1977). The ornithofauna consists of 303 bird species pertaining to 20 orders, including 10 species of nesting birds.

The contemporary fauna also includes 49 species of terrestrial and three species of aquatic mammals from six orders and 14 families (Selyunina, 1992). The names of the protected species of the DPR and CBR included in the Red Data Book of Ukraine are shown in Annex I, Table 12.

The State of the Marine Ecosystem in the Chernomorsky Biosphere Reserve in the Western (deep water) part of Tendrovsky Bay

The benthic biocoenoses are dominated by short-lived forms such as *Nereis succinea* or the young of eurybiotic species of bivalve molluscs. The only organism which can tolerate a lack of oxygen is *Mya arenaria*, which is a more or less stable component of benthic populations. The composition and structure of the bottom communities illustrates the constant pressure of mass mortalities. Only in the upper part of the sublittoral zone to a depth of 2 metres can favourable ecological conditions be found.

About one quarter of the area of the eastern part of Tendrovsky Bay consists of shallow water up to a depth of one metre. The average depth is 1.5 metres, the maximum not more than 4 m. Aquatic plants flourish in these shallow water areas. The densest growths are made up of Charophyta (south and east shallow waters, silty part of the bottom of the bay), *Potamogeton pectinatus* L. (the lower part of the northern and southern slopes), *Zostera marina* L. (the bottom near the islands of Babin and Smaleny) and *Zostera noltii* (Cavol) (northeastern shallow waters). Mixed growths of macrophytes are characteristic of the coastal strip up to a depth of 0.8 - 10 m.

The dominant species in the zoobenthos are small gastropod molluscs of the Hydrobiidae family (average abundance 1.580 - 2.000 ind.m², biomass 3.3 - 4.3 g.nr, frequency 96%), the bivalve mollusc *Mytilaster lineatus* (average abundance 250 - 360 specimens.m², biomass 17.8 - 25.4 g.m², frequency 68%). The molluscs *Abra ovata* and *Polititapes aurea* dominate the silty sediments. The bottom communities of the eastern part of the Tendrovsky Bay were badly damaged by the severe winters of 1984 - 1985 and 1986 - 1987. At the time of writing they appeared to be undergoing a process of recovery. The total standing stock of the zoobenthos has increased from 10.000 t (1987) to 48.000 t (1993).

At depths greater than 3.5 m the central part of Egorlitsky Bay is dominated by communities of the red alga *Phyllophora nervosa*. The distribution of this algae is limited by silt in the west and shallow water in the north, east and south. According to unpublished data from N. Volsky, in July 1992 the standing stock of *Phyllophora* was 63.400 ± 14.400 t. The reserve's *Phyllophora* community has high average densities (16.000 ind.m⁻²) and biomass (up to 800 g.m⁻²).

There are 52 species in the zoobenthos. On the southern and northern slopes of the bay at depths of 3.5 m there are large growths of higher plants, mainly *Zostera marina* and *Potamogeton pectinatus*. Until recently this was the site of a *Chant intermedia* A. Br. association. However, in 1992 the association almost completely disappeared from the bottom community (Eremenko, Minicheva, 1992).

The *Mytilaster lineatus* biocoenosis, which includes 56 zoobenthos species, is found at a depth of up to 3.5 m on sediments lacking vegetation. The average density of the dominant species is 4.600 specimens² and its biomass 480 g.m⁻².

Significant areas of the western and eastern margins of the water body are covered by a biocoenosis of silty sediments with *Abra ovata*. The biocoenosis comprises 41 macrozoobenthos species. The average density is 2.100 ind.m⁻² and the biomass 400 g.m⁻².

In spite of seemingly favourable conditions in Egorlitsky Bay, there are signs of anthropogenic eutrophication. Eutrophicated Tendrovsky waters entering Egorlitsky Bay are involved in the central cyclonic circulation leading to an intense accumulation of suspended particles and the siltation of extensive shelly areas on the edge of the cyclone in the west of the bay. This phenomenon was responsible for mass mortalities in the Egorlitsky oyster banks at the end of the 1970s and the beginning of the 1980s. Further siltation led to a gradual accumulation of silt sliding down the slope in the central part of the water body (unpublished data, I. Rubinstein). One result of these anthropogenic factors has been the appearance of the pelophilic benthos forms that can be seen today.

Egorlitsky Bay is in the best ecological condition. Anthropogenic factors have only influenced some benthic groups and the natural structure of the bottom community has not been disturbed. But in the eastern part of Tendrovsky Bay these processes have had far reaching results and the structure of the community has been altered. However, the biological productivity of the benthos has recently increased and there appears no reason to suggest that the process will not continue. But the western part of Tendrovsky Bay is in worse condition and the changes there appear irreversible. There has been a sharp decline in the productivity of the benthic community and mass mortalities.

III. Mys Martyan Reserve

The state reserve "Mys Martyan" was created to conserve the grove of evergreen relicts of Mediterranean flora and endemics and the Black Sea coastal area in accordance with the Ukrainian Council of Ministers' Order on "The organization of new state reserves and the expansion of the Chernomorsky State Reserve" of 20 February, 1973. It is part of the Nikitsky Botanical Garden of the National Academy of Sciences of Ukraine. The total area of the Mys Martyan Reserve is 240 ha, including 120 ha of forest land and 120 ha of the Black Sea. The land and waters of the reserve are not subject to economic activity and serve only for scientific investigations conducted without disturbing the reserve regime.

The reserve preserves in a natural state an entire oak-forest ecosystem typical of the southern Crimean coast, conserving the gene fund of living organisms, facilitating the study of the natural processes and dynamics of the coastal marine complex as an example of interaction between land and sea, and acting as a reservat from which territories with economic activity beyond the reserve are enriched.

The phytobenthos of the reserve has been studied since 1973. The most characteristic benthic vegetation of the upper sublittoral of Mys Maryan is the phytocoenosis of *Cystoseira crinita* and *C. barbata*. *C. crinita* is distributed through the reserve at depths of 0 to 14 m. The maximum density of growth (1.000 - 2.000 specimens per nr of bottom) forms two belts at depths of 0-3 m and 4-6 m respectively.

Growths of *C. barbata* are found at depths of 2 to 14 m. In the eastern pan of the reserve they begin at the spray zone. It should be noted that the dispersal of *Cystoseira* is determined by the boundary of stationary substrates. The highest densities are at depths of 5-7 m.

The thallomas of *Cystoseira* are strongly encrusted with macro and microepiphytes. Many epiphytes are characteristic of a certain part of the *Cystoseira thalloma*: for example, to the branches, axial parts or the foot. Species such as *Corynophlaea*, *Eetoearpus*, *Ceramium*, *Kylinia* and *Acrochaetium* grow densely on the terminal branches of *Cystoseira*. *Laurencia coronopus* and *Sphacellaria cirrhoscr*, and, to a lesser degree, *Porphyra leueosticta* and *Chaetomorpha flourish* on the axial part of the thalloma, while *Corallina granifera* and *Apoglossum ruseifolium* grow on rocks and on the feet and thalloma of *Cystoseira*.

The species composition and amount of epiphytes varies through the year. Epiphytes reach maximum qualitative and quantitative parameters in areas protected from waves. The mass species (more than 100 g.m⁻² biomass) in this community include: *Phyllophora nervosa* (1.839 g.m⁻²), *Cladostephus verticilatus* (879 g.m⁻²), *Polysiphonia suhilifera* (681 g.m⁻²), *Corallina granifera* (486 g.m⁻²), *Ceramium pec/cillalum* (435 g.m⁻²), *Laurencia pinnatifida* (303 g.m⁻²) and *Codium vermillara* (189 g.m⁻²).

There are two widely represented associations in the tipper sublittoral belt, namely as (*C. crinita* + *C. barbata*) and (*C. barbata* + *C. crinita*). Epiphytes are characteristically attached to different parts of the thalloma. In the *C. barbata* + *C. crinita* association the epiphytes are more developed than in the *C. crinita* - *C. barbata* association.

Red algae are the dominant species in the *Cystoseira* phytocoenoses, followed by brown and green algae.

There is a greater diversity of zooplankton in the reserve (74 species) than in the recreational areas (66 species). The rare animal species include: the siphon jellyfish *Lucernaria campanula*, the polychaete *Nematonereis unicornis*, the molluscs *Acanthochilona cascictlaris*, *Tergipes lergipes* and *Area noae* and the isopod *Gnathiu haeseoi*.

Phytocoenoses of the Pseudolittoral

The algal macrophytes of the pseudolittoral belt make up an independent ecological group. The pseudolittoral belt is subject to large quantities of dissolved, precipitating pollutants, atmospheric precipitation, and shore leaching which often carry contaminants. As a rule the algae inhabiting the pseudolittoral are smaller in size than analogous species in the sublittoral.

The vegetation in the reserve's pseudolittoral is arranged like a belt, reaching a maximum width of 60 cm in rocky places and cliff overhangs. Depending on the time of the year, the coverage of the algal growth ranges from 60-100%. On pebble beaches with single large rocks the algal growth cover averages around 10%, falling to 1-3% in the winter. The phytocoenoses of the pseudolittoral are characterized by a mosaic distribution of macrophytes, poly dominancy and a succession of dominating species during the year. In the cold months the dominant species are: *Seytosityphon lomentaria* (maximum biomass of 1.486.67 g.m²), *Petalonia zoslerifolia* (maximum biomass of 997.47 g.m²) and *Ecllocarpits eonfervoides* (maximum biomass of 508.20 g.m²). During the summer the biomasses of *Ceramiam eilialitm* and *DHophus fasciola* increase from 131.33 g.m² to 927.57 g.m² and from 196.07 g.m² to 555.23 g.m² respectively. In spring the biomass of *Enteromorpha iniestinalis* can reach 341.60 g.m², rising to 678.60 g.m on pebble beaches. In the summer *L. pinnaiifida* can reach 3.78 - 56.23 g.m².

The average biomass of the pseudolittoral phytocoenoses of rocky areas is 1.714.76 g.m², of cliff overhang 2.168.63 g.m² and of pebble beaches 1.228.38 g.m².

The Mys Martyan pseudolittoral phytocoenoses contains the following rare species: *Ulotrix imp/ixa*, *Blidingia minima*, *Chaetotuorpha gracilis*, *Cladophoropsis memhranaceu*, *Ervlthroe/adia subintegra*, *ilelminthora divaricate/*, *Ceramittm tentiissitmtm*, (*. deslongchampii*, *C'. secundalum*, *Pterosiphonia pennala* and *Herposiphonia secunda*.

Up to 83 species of algae macrophytes have been discovered in the reserve's pseudolittoral belt, including 19 Chlorophyta species, Phaeophyta 16 species and Rhodophyta 48 species. (I. I. Pogrebnyak and I. I. Maslov, 1980; I. I. Maslov, 1984, 1985; I. I. Maslov, T. V. Belich, 1993, 1993b; and T. V. Belich, 1993, 1993b.)

Phytocoenoses of Marine Grasses

There are two higher aquatic plants in the coastal waters of Mys Martyan, namely the sea grasses *Zoslera marina* L. and *Zostera nolii* Погнелю. *Zostera* communities inhabit sandy sediments with shell admixtures to a depth of 8-9 m. The communities are contiguous

monodominant growths of *Z. marina* and *Z. noli*. There is an insignificant intermingling of the thalloma of one species into the other algal cover only near the contact zones.

The vegetative thallomas of *Z. marina* attain peak biomass and densities in the second half of summer. In August *Z. marina* biomass and density averaged 742.2 g.m⁻² (47.4% of which were submerged organs) and 316.67 specimens.m⁻² respectively. The average length of the thalloma was 32.3 cm with a 4.1 mm leaf width. In September the thallomas grew to an average of 37.03 cm with a leafwidth of 4.28 mm.

Z. noli achieves peak biomass and density at the beginning of autumn, reaching an average of 380.21 g.m⁻² (36.7% of which were submerged organs) and 825 specimens.m⁻² respectively. The length of the thallomas was 31.97 cm with a leaf width of 1.94 mm.

The different timing of peak values for *Z. noli* and *Z. marina* may be the result of adaptive factors when the two species reside together in mixed oligodominant biocoenoses.

In *Zostera* coenoses there are 677 species of algal macrophytes (18 species of Chlorophyta, 12 of Phaeophyta and 37 of Rhodophyta). The number of species in *Z. marina* communities varies from 17-38, while in *Z. noli* communities the number varies between 14-35. The algal biomass of *Z. marina* phytocoenoses varies from 2.04 g.m⁻² to 56.21 g.m⁻² (0.33-7.55% of the biomass of all vegetation) and of *Z. noli* from 1.67 g.m⁻² to 75.92 g.m⁻² (0.6 - 3 1.63%). Both parameters have two peaks: in June and in September. The dominant species by peak biomass levels during the season are: *Chonclria tenuissima* (43.75 g.m⁻²), *Eciocarpus confervoides* (35.42 g.m⁻²), *Cladophora albida* (32.08 g.m⁻²), *Polysiphonia subulifera* (12.6 g.m⁻²), *Cladostephus verticillatus* (8.33 g.m⁻²), *Ceramium pedicellatum* (6.08 g.m⁻²) and *Kylina vigratula* (5.83 g.m⁻²).

Almost all algae in the biocoenoses develop like epiphytes on the leaves and roots of *Zostera*. *Pseudovella nadsonii*, *Pringsheimiella soutata*, *Goniotrichum elegans*, *Ralfsia verrucosa* and *Melohesia lejolisii* have been observed on rhizomes and roots.

A comparison of the flora of the algal and *Zostera* communities of the sublittoral belt shows that many species of algae prefer sea grass thallomas as a substrate and are almost never found beyond the limits of algal growths.

Nature conservation measures in the Crimea have resulted in the creation of a system of protected marine water areas, consisting of 26 reserve marine complexes along the coast of the peninsula. Most marine reservats are classed as nature heritage of local significance. They occupy more than 30,000 ha. Many are used for recreational and commercial purposes. There are few state reserves. Given the conditions prevailing along the southern Crimean coast, which is under constant anthropogenic influence, the most effective method of protecting the gene fund of bottom vegetation is the complete protection of separate unique marine areas.

IV. The Karadag State Reserve

The Karadag State Reserve (KSR) is located on the southeastern coast of the Crimean peninsula between the cities of Feodosyia and Sudak, which was formally declared a state

reserve in 1979. Today it covers an area of 2,855.7 ha, including 2,046.1 ha of land and 809.1 ha of the Black Sea.

The reserve was established to protect the mountainous mass of volcanic origin rock, which rises to a height of 577 m. Karadag is a mineralogical nature museum (more than 100 minerals have been discovered) in which steppe, forest-steppe, coastal and marine biogeocoenoses are closely grouped together in a small area.

The reserve contains about 1,035 species of plants, including 200 rare and endemic species, 35 species of mammals, 177 species of birds and 107 species of marine fish. Karadag also contains 169 species of macrophyte algae, of which 42 are green, 41 brown and 86 red (Kalugina-Gutnik, 1984). The zooplankton consists of 108 species, the most numerous of which are copepods (35 species), decapods (13 species) and tintinnids (27 species) (Murina, Zagorodnaya, 1989). The benthos is dominated by *Cystoseira*, *Venus*, *Mytilus*, *Terehellia* and *Phaseolina* biocoenoses (Makkaveeva, 1989). Marine mammals include three species of dolphins: *Delphinis delphis ponticus*, *Tursiops truncatus ponticus* and *Phocaena phocaena relic/a*.

Public Awareness in Environmental Protection and the Mass Media

The oldest non-governmental environmental protection organization in Ukraine is the Society of Hunters and Fishermen (USHF) founded in 1920 and the Society for Conservation of Nature (USCN) created in 1946. Regional organizations for the former have been established in Vinnitsa, Dnepropetrovsk, Zhitomir, Zakarpatia, Kirovograd, Nikolaev and Odessa oblasts, and for the latter in Vinnitsa, Volyn, Dnepropetrovsk, Zhitomir, Zakarpatia, Kirovograd, Kherson, Khmelnytsky oblasts and the Crimea.

The objective of the USHF is to unite all those involved in sport and game hunting and fishing and to regulate these activities according to common rules. The USHF once had branches in almost every institute of learning and factory, but today it faces severe difficulties in finding sponsors to finance nature protection activities.

However, in the past ten years a number of other ecological associations have appeared which have targeted ecologically hazardous industrial facilities. They include the "Zeleni Svit" (Green World) association and the "Green Party".

Regional "Zeleni Svit" organizations have been set up in the following cities: Vinnitsa, Lutsk, Dnepropetrovsk, Nikopol, Krivoi Rog, Uzhgorod, Ivano-Frankovsk, Kiev, Nikolaev, Rovno, Sumy, Ternopol, Kharkov, Cherkassy and Chernovtsy. There are branches of the Green Party in Nikopol, Svetlovodsk, Odessa, Ternopol and Cherkassy.

There are also local ecological unions which seek to raise public awareness of ecologically vulnerable natural complexes. These include "Citizens for the Cleanliness of the Environment" (Pavlograd, Dnepropetrovsk oblast), Ecofund "Pridneprovie" (Dnepropetrovsk), the regional association "Vozrozhdenia" (Krivoi Rog), the Ecofund of Crimea "For the Survival of the Peoples of Crimea", the "Lion Society" (Lvov), the "Fund

for Natural History and Ecology" (Odessa Zoo), the "Puzanov Fund for the Protection and Salvage of Wild Life" (Odessa), the "Public Committee for the Control of Environmental Protection", Zdolbunov (Rovno oblast), the Ecocentre "Ozon" (Kharkov) and the Dzharylgach Society (Skadovsk, Kherson oblast).

The first ecological journal "Ridna Priroda", which is published by the USHF and the Society for Conservation of Nature, was founded in 1971. The journal includes official reports and articles on environmental protection issues in Ukraine and conservation work by public organizations and state agencies and establishments.

Since 1990 there has been a steady increase in the number of readers of the popular scientific journal "Usie Zhivoe", which is published by the Odessa Zoo and the Fund for Natural History and Ecology.

A number of newspapers have also been printed on nature conservation topics. These include "Dnipro-Slavutich" (Dnepropetrovsk), "Ecologia i zdorovie" (Dnepropetrovsk), "Zeleni Svit" (Kiev), "Dzherela" (Sumy), "Nash Kray" (Donetsk) and "Krinitza" (Alchevsk, Lugansk oblast).

Recommendations

It is recommended that the following measures be carried out.

Local Level

- To regulate the population density of the water chestnut in the Danube delta by harvesting the nuts for economic uses.
- To restore the traditional system of burning out reeds in parts of the Danube islands.
- To organise the cleaning and dredging of silted canals and overgrown tributaries on the sea coast of the Danube delta.
- To cease planting monocultures of pine on the Kinburn peninsula and to form park type sparse forests by roguing out existing pine stands.
- To convert the rice growing areas adjacent to protected territories (Kiliya district. Odessa region. Skadovsk district. Kherson region and Crimea) to closed water use technology.
- To minimize the use of pesticides and other toxic substances on farm lands close to protected territories and aquatic areas.
- To encourage the use of mariculture to grow mussels on the shelf of the sea because of the damage caused to benthic biocoenoses by hypoxia.
- To formulate and implement a new technology to control the quality of coastal waters using hydrobiological amelioration based on the construction of "artificial reefs".
- To restore the biological diversity and recreational conditions of urbanized areas of coastal waters by managing the productive properties of aquatic ecosystems.

National Level

The protection and restoration of biological diversity necessitates an increase in the network of protected territories and water areas. In addition to existing reserves, the following areas on the Ukrainian Black Sea and Azov Sea coasts should be granted protected zone status:

- The Tuzlov group of limans (Shagany, Alibei and Burnas) including the creation of game reserves in the upper part of Alibei and near Trikhatki village.
- Zhebriyanovskye Plavni and Lake Sasyk should be included in the Biosphere Reserve "Dunaiskie Plavni".
- Lower Dneestr (the area between rivers of Dneestr and Turunchuk, the northern part of Dneestr Liman) should become a national park.
- Tiligulsky Liman should become a regional landscape park.
- Yagorlitsky Bay and Tendrovsky Bay. The area of the Yagorlitsky Kut should be increased from 840 to 5.550 ha. a reserve regime established in the western part of Tendrovskaya Bar. including Yagorlitsky Bay as a part of the reserve core.
- Karkinitsky and Dzhary Igachsky Bays should become a marine reserve.
- The seaside from Chernomorsk to Cape Uret (Crimea) should become a national park.
- Central Sivash and Eastern Sivash should become a national park "Azovo-Sivashsky".
- Utlyuksky Liman should become a game reserve.
- Obitochny Bay and Obitochaya Bar and Berdyansk) Bay and Berdyanskaya Bar should become protected areas.
- Belosaraysky Bay and Belosaray skaya Bar should become a game reserve.
- Krivoi Bay and Krivaya Bar should become a game reserve.

Given the exceptional significance of the Black Sea and the Azov Sea wetlands (Yagorlitsky, Tendrovsky, Dzhary Igashcky. Karkinitsky bays and the Sivash lagoon complex areas) for the protection of biodiversity and Red Data Book species, special studies need to be conducted. This research can be carried out by the Odessa Branch of the IT3SS. Chernomorsky Reserve. Kinburn Peninsula Regional Landscape Park and Azov Black Sea Ornithological Station. Melitopol. The research should include the following:

- An inventory of species of marine plants and animals in the wetlands and marine coastal shallow waters of the northwestern Black Sea and the Azov Sea:
- An evaluation of the current state of the benthic and pelagic biocoenoses under different habitat conditions:
- An evaluation of the current populations of mass and rare species of invertebrates and algae:
- Research into the peculiarities of morphological differentiation and genetic structure of populations of different mass and rare species;
- The identification of areas where natural resources are in a critical state and marine areas vital to of the sea for conservation of biodiversity;
- An examination of the functioning of marginal biocoenoses in the Black Sea and the Azov Sea and their significance in the trophic relations offish and birds.

Regular biological and ecological monitoring of coastal waters should be considered the main source of information on the state of. and changes in. the marine environment. The complete network of stations for observations and measurements should include the following:

- Danube avandelta:

- Tsarigradskoie headwater of the Dnestr liman;
- Bolshoi Fontan Cape;
- the apex of the Kinburn Bar in the Dneprovsko-Bugsky liman;
- Tendrovskaya Bar, western end;
- Dzharylgach Island, eastern end;
- Cape Tarkhankut;
- Cape Khersones;
- Cape Martyan;
- Cape Karagach near Karadag;
- Kerch Strait;
- Eastern Sivash;
- Biryuchy Island, western end;
- Berdyanskaya Bar, apex.

A necessary requirement when conducting any kind of economic activity is to carry out compensatory measures for conservation of nature. The Cabinet of Ministers Decree No. 867 of 21 October 1993 on decreasing pollution in the northwestern Black Sea near Odessa foresees the establishment of one fish rearing plant for *Mugil so-iny* and another for sturgeons in the Danube delta. There are also plans to utilise microbiological cleaning technology to remove oil pollution etc. from the marine environment.

Regional Level

Recommendations include:

- Giving the Dunaiskie Plavni State Reserve the status of a biosphere and include it in the UNESCO List of Biosphere Reserves. A proposal to change the status of the reserve was approved at the International Conference on Biosphere Reserves in Seville, 20-25 March, 1995.
- Representatives of Ukraine and Romania should prepare a proposal to create a common Transboundary Biosphere Reserve in the Danube delta on the basis of the Dunaiskie Plavni Reserve in Ukraine and the Danube Delta Biosphere Reserve in Romania. Specialists from Ukraine and Romania also put forward a proposal to this effect in Seville.
- It has been suggested that a branch of the Dunaiskie Plavni Reserve should be established on Zmeiny Island (Ukraine) in order to protect migrating birds from eastern Europe and rare Black Sea plant and animal species (including the monk seal).
- Official lists of rare and protected species of flora and fauna should be compiled by specialists from the littoral states for inclusion in a Black Sea Red Data Book in order to improve international cooperation in protecting and enriching the biodiversity of the Black Sea and Azov Sea.

Annex I - Data Tables for Individual Species Referred to in the Main Text

No	Name of the Tables	Chapter
1	List of Phytoplankton Species	1
2	List of Fungi Species	3
j*	List of Zooplankton Species	4
4	List of Microphytobenthos Species	5
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Table 1. List of Phytoplankton Species

Species	Marine		Fresh Water		Estuaries	
	A	B	A	B	A	B
BACILLARIOPHYTA						
<i>Melosira granulata</i> (Ehr.) Ralfs, 1861	-	-	M	M	-	-
<i>M. granulata</i> var. <i>angustissima</i> O.Mull.) Ilust., 192~1966	-	-	+	s	-	-
<i>M. granulata</i> var. <i>curvata</i> (Grun) Ilust.	-	-	+	-	-	-
<i>M. italica</i> (Ehr.) Kutz., 1844	-	-	M	s	-	-
-var. <i>іспуціша</i> (iriin) (> Mull. 1904	-	-	+	-	-	-
<i>M. Juergensii</i> Ag., 1824	+	S	-	-	-	-
<i>M. moniliformis</i> (O. Mull.) Ag., 1824	+	s	-	-	-	-
-var. <i>subglobosa</i> Grun, 1878	+	s	-	-	-	-
<i>M. nummuloides</i> (Dilhv) Ag., 1824	+	-	-	-	-	-
<i>M. sulcata</i> Ehr. Kutz., 1844	+	s	-	-	-	-
<i>Sl. varians</i> Ag., 181'	-	-	+	-	-	-
<i>Podosira hormoides</i> (Mont.) Kutz. 1844	+	-	-	-	-	-
<i>I. hyalodiscus scoticus</i> (Kutz.) Grun., 1880	.	s	-	-	-	-
<i>I. amhic/uus</i> Grun. 18~9	+	-	-	-	-	-
<i>Skeletonema costatum</i> (Grev.) Cl., 18~8	M	M	-	-	M	-
<i>Sc. subsalsum</i> I.A. Cl.) Bethge. 1928	-	M	-	-	-	-
<i>Thalassiosira aculeata</i> Pr.-Lavr. 1956	-	s	-	-	-	-
<i>Th. coronijera</i> Pr.-Lavr., 1955	+	-	-	-	-	-
<i>Eh. decipiens</i> (Grun.) Jorg 1905	+	s	-	-	s	-
<i>111 excentrica</i> tElir i (1445-1944	+	s	-	-	-	-

<i>-var. fasciculata</i> <i>Illust. 192'-193'</i>	+	-	-	-	-	-
<i>Th. ornata</i> <i>Pr.-Lavr.</i>	+	-	-	-	-	-
<i>Th. parva</i> <i>Pr.-Lavr. 1955</i>	M	M	-	-	s	-
<i>Th. subsalina</i> <i>Pr.-Lavr. 1955</i>	M	M	-	-	s	-
<i>Cyclotella Kutziana</i> (<i>Thwait</i>)	-	-	+	-	-	-
<i>C. meneghiniana</i> <i>Ktz 1844</i>	-	-	+	s	-	-
<i>C. casp/a</i> <i>Gran. 18-H</i>	M	M	-	-	M	-
<i>Stephanodiscits astrea</i> (<i>Ehr.</i>) <i>Grun. 1880</i>	-	-	+	s	-	-
<i>-var. iiiiiuttulus</i> (<i>Kutz</i>) <i>Grun. 1880-1885</i>	-	-	+	-	-	-
<i>St. hantzschii</i> <i>Grun. 1880</i>	-	-	+		s	-
<i>Coscinoiliscus apiculatus</i> <i>Ehr. 1844</i>	+	-	-	-	-	-
<i>C. gigas</i> <i>Ehr. 1841</i>	+	s	-	-	-	-
(<i>.granti</i> <i>.lough. 1905</i>)	+	s	-	-	s	-
<i>-var. aralensis</i> (<i>Ostf.</i>) <i>Illust. 192'-193'</i>	+	-	-	-	-	-
<i>C. Janischii</i> <i>AS. 1H'4-193'</i>	+	s	-	-	-	-
(<i>Joncsianus</i> (<i>Grev</i>) (1st/ 1915)	+	s	-	-	-	-
<i>-var. coiiinutatus</i> (<i>Grun.</i>) <i>Illust. 192'-193'</i>	+	-	-	-	-	-
<i>C. lacustris</i> <i>Grun. 1880</i>	+	s	-	-	-	-
<i>C. l meatus</i> <i>Ehr. 1838</i>	+	s	-	-	-	-
<i>C. perforatus</i> <i>Ehr. 1844</i>	+	s	-	-	-	-
<i>-var. cellulosus</i> <i>Grun ISS4</i>	+	-	-	-	-	-
<i>-var. pavillardii</i> (<i>Eortii</i>) <i>Illust. 192'-193'</i>	+	s	-	-	-	-
<i>C. radiants</i> <i>Ehr. 1839</i>	+	s	-	-	-	-
<i>Actinophychus undulatits</i> (<i>Rail.</i>) <i>Ra/fs.1861</i>	+	-	-	-	-	-
<i>Asteromphalus robustus</i> <i>Castr.</i>	+	-	-	-	-	-
<i>Actinocyclus Ehrenbergii</i> <i>Ralfs . 1861</i>	+	-	-	-	-	-

<i>-var. crassus</i> C/Γ.Sin.; <i>llust.</i> , 192'-193'		-	-	-	-	-
<i>-var. tend</i> Ins (Breb.) Must., 192'-193'	+	-	-	-	-	-
<i>Detonula cinfervacea</i> (CI.) Gran, 1900	+	s	-	-	-	-
<i>Leptocylindrus minimus</i> Gran ., 1915	+	s	-	-	M	-
<i>/.. danicus</i> CI., 1889	M	M	-	-	s	-
<i>Rhizosolenia fragilissima</i> Bergon 1903	+	M	-	-	s	-
<i>Rh. alata</i> Rhightw., 1858	+	s	o	-	-	-
<i>Rh. calcar avis</i> M.Schultze 1858	M	M	-	-	s	-
<i>Bacteriastrum hyalinum</i> Laud, 1864	-	I.S	-	-	-	-
<i>Chaetoceros ahnormis</i> Pr.-Lavr. 1953	-	s	-	-	-	-
<i>Ch. affinis</i> Laud., 1864	+	M	-	-	s	-
<i>C/i. affinis f. schuttii</i> (CI.) Pr.-Lavr. 1894	+	s	-	-	-	-
<i>Ch. affinis f. willei</i> (Gran.) <i>llust.</i> , 192'-193'	+	s	-	-	-	-
<i>Ch. anastomosans</i> Grun ., 1880-1885	+	-	-	-	-	-
<i>Ch. borgei</i> Lemm., 1903-1904	+	s	-	-	-	-
<i>Ch. ceratosporum</i> Ostf, 1910	f	-	-	-	-	-
<i>Ch. compressus</i> Laud., 189~	-	M	-	-	-	-
<i>Ch. coronatus</i> Gran, 189~	-	s	-	-	-	-
<i>Ch. curvisetus</i> CI., 1889	M	M	-	-	s	-
<i>Ch. danicus</i> CI., 1889	+	s	-	-	s	-
<i>Ch. densus</i> CI., 1901	+	s	-	-	s	-
<i>Ch. dubius</i> Pr.-Lavr., 1955	-	s	-	-	s	-
<i>Ch. Julax</i> Pr.-Lavr, 1955	+	-	-	-	-	-
<i>Ch. gracilis</i> Schutt., 1905	+	-	-	-	-	-
<i>Ch. heterovalvatus</i> Schutt. 1953	+	s	-	-	-	-
<i>Ch. holsaticus</i> Schutt., 1895	+	s	-	-	-	-

<i>Ch. insignis</i> Pr.-Lavr., 1955	+	M	-	-	M	-
<i>Ch. karianus</i> Grim., 1880	-	M	-	-	S	-
<i>Ch. lacinosus</i> Schutt, 1895	+	S	-	-	-	-
<i>Ch. lamleri</i> Ralfs, 1864		-	-	-	-	-
<i>Ch. lorenzianus</i> Grun., 1863	+	S	-	-	S	-
-var. <i>solitarius</i> Pr.-Lavr., 1956	+	S	-	-	-	-
-var. <i>suhsalinus</i> Pr.-Lavr., 1956	+	S	-	-	-	-
<i>Ch. muelleri</i> Leiluii . 1898	+	S	-	-	S	-
<i>Ch. paulsenii</i> Ostf, 1901	+	S	-	-	-	-
<i>Ch. peruvianus</i> Brightw., 1856	+	S	-	-	S	-
<i>Ch. rigidus</i> Ostf., 1901	+	M	-	-	S	-
<i>Ch. scabrosus</i> Pr.-Lavr., 1956	+	S	-	-	-	-
<i>Ch. seiracanthus</i> Gran., 189'	+	S	-	-	-	-
(<i>h. septentrionalis</i> Ostf. 1895	+	S	-	-	-	-
<i>Ch. similis</i> Cl., 1896	+	M	-	-	S	-
<i>Ch. similis</i> /' <i>solitarius</i> Pr.-Lavr., 1955	+	M	-	-	S	-
<i>Ch. simplex</i> Ostf, 1901	+	S	-	-	S	-
-var. <i>calcintrans</i> Pauls . 1905	+	S	-	-	-	-
<i>Ch. socialis</i> Laud.. 1864	M	M	-	-	M	-
<i>Ch. socialis</i> f. <i>radians</i> (Schutt.) Pr.-Lavr., 1953	M	M	-	-	M	-
<i>Ch. subtilis</i> Cl., 1896	+	S	-	-	-	-
-var. <i>abnormis</i> f. <i>simplex</i> Pr.-Lavr., 1961	+	S	-	-	-	-
<i>Ch. subsecundus</i> (Grun.) illust., 192'-193'	+	S	-	-	-	-
<i>Ch. teres</i> Cl., 1896	+	S	-	-	-	-
<i>Ch. wighamii</i> Brightw., 1856	+	S	-	-	-	-
<i>Ditylum brightwellii</i> (West.) Grun., 1880-1885	+	M	-	-	M	-

<i>Biddulphia mobiliensis</i> Bail, 1845	+	s	-	-	-	-
<i>Cerataulina pelagica</i> / <i>Cerataulina bergonii</i> (Cl.) Perag., 1892	M	M	-	-	M	-
<i>Ilcmiaulus hauckii</i> Grun 188(1- 1885	+	-	-	-	-	-
<i>Diatoma vulgare</i> Bory 1828	-	-	M	M	-	-
<i>1) elongation</i> (Lyngh.) Ag. 1824	-	-	E.M	\	-	-
<i>Fragilaria crotonensis</i> Kill	-	-	+	s	-	-
<i>/s. capucina</i> Th'sni.	-	-	+	-	-	-
<i>F. construens</i> Ehr. I Grun, 1862	-	-	+	-	-	-
<i>Synedra actinastroides</i> Lemm	-	s	-	-	-	-
<i>S. acus</i> Kutz	-	-	+	-	-	-
<i>S. bacillus</i> Greg , 185'	-	-	+	-	-	-
<i>S. berlinensis</i> Lemm	-	-	-	s	-	-
<i>S. erysallina</i> (Ag.) Kulz. 1844	+	-	-	-	-	-
<i>S. curvata</i> Pr.-Lavr. 1951	+	s	-	-	-	-
<i>S. fulgens</i> (Grew) Th'Sin.	+	-	-	-	-	-
<i>S. Gaillonii</i> (Bory) Ehr. 1830	-	s	-	-	-	-
<i>S. tabulata</i> (Ag.) Kutz. 1844	+	s	-	-	-	-
<i>S. ulna</i> (Mtsch.) Ehr, 1838	-	-	+	s	-	-
-var. <i>aecipialis</i> (Kutz.) Ilust	-	-	+	-	-	-
-var. <i>biceps</i> (Kutz.) Schonf	-	-	+	-	-	-
-var. <i>danica</i> (Kutz.) Grun	-	-	+	-	-	-
<i>S. undulata</i> Bailly. 1853	-	-	+	-	-	-
<i>S. vaucheriae</i> Kutz (<i>S. minutissima</i>	-	-	+	-	-	-
<i>Thalassionema nilzschoides</i> Grun., 1880-1885	M	S-0	-	-	M	-
<i>Asterionella formosa</i> Lass.	-	-	+	s	-	-
-t <i>xracillima</i> (Lantzsch.) lleih.	-	-	+	-	-	-

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<i>Rhabdonema adriaticum</i> Kulz., 1844		S	-	-	-	-
<i>Striatella delicatula</i> (Kutz) Grun. 186'	+	S	-	-	-	-
<i>S. unipunctata</i> Lyngb. 1832	+	s	-	-	-	-
<i>Grammatophora marina</i> (Lyngb.) Kutz , 1844	+	s	-	-	-	-
<i>G. oceanica</i> (Ehr.) Grun., 1881	+	-	-	-	-	-
<i>G. serpentina</i> (Ralfs) Ehr., 1844	+	s	-	-	-	-
<i>Licmophora gracilis</i> (Ehr.) Grun.. 186'	+	-	-	-	-	-
<i>L. Ehrenbergii</i> (Kulz) Grun.. 186'	+	s	-	-	s	-
<i>Cocconeis scutellum</i> Ehr., 1838	+	s	-	-	s	-
-var. <i>parva</i> Grun.. 188(1 1885	+	-	-	-	-	-
-var. <i>minutissima</i> Grun, 1880-1885	+	-	-	-	-	-
<i>C. pediculus</i> Ehr., 1838	-	-	+	-	-	-
<i>Achnanthes hrevipes</i> Ag., 1824	+	s	-	-	s	-
-var. <i>intermedia</i> (Kulz.) Cl., 1895		-	-	-	-	-
-var. <i>parvula</i> (Kulz.) Cl.. 1895	+	-	-	-	-	-
<i>.l. longipes</i> Ag., 1832	+	s	-	-	-	-
<i>Rhoicosphaenia curvata</i> (Kulz) Grun.. 186'	-	-	+	s	-	-
<i>Xavicula cryptocephala</i> Kutz.	+	-	-	s	-	-
<i>X. Ivra</i> Ehr.. 1844	+	-	-	-	-	-
<i>N. menisculum</i> Scliuii. 186'	+	-	-	-	-	-
<i>X. palpebralis</i> Breb , 1853-1856	+	-	-	-	-	-
<i>X. pennala</i> var. <i>pontica</i> Mer.. 1902	+	-	-	-	-	-
<i>Gyrosigma ascuminatum</i> (Kulz) Rabenh.	-	-	+	M	-	-
<i>G. distortum</i> (IV. Sm.)						
-var. <i>Parkeri</i> llarr.	-	-	+	-	-	-
<i>G. Kutzingii</i> (Grun.) Cl.	-	-	+	-	-	-

<i>Pleurosigina angulatum</i> (Oueck.) IV.Sin.. 1853-1856	1	-	-	-	-	-
<i>P. elongatum</i> IT. Sm.. 1852	+	S	-	-	-	-
<i>P. formosum</i> IT. Sin. .1*52.	+	-	-	-	-	-
<i>P. rigulum</i> IT Sin.. 1853-1856	+	-	-	-	-	-
<i>Amphiprora alula</i> Kulz.. 1844	+	s	-	-	-	-
<i>.I. paludosa</i> IT. Sin.. 1853-1856	-	s	-	-	-	-
<i>. Imphora bigibba</i> Grun. 18~ 1	-	s	-	-	-	-
<i>A. granulata</i> var. <i>cuslala</i> Pr.-Lavr, 1963	-	s	-	-	-	-
<i>A. Inalina</i> Kulz.. 1844	+	s	-	-	-	-
<i>A. injle.xa llirebl</i> III. Smith. 18'3	-	s	-	-	-	-
<i>A. prolans</i> Greg.. 185'	-	s	-	-	-	-
-var. <i>aculeata</i> Perag. 189'-191)8	-	s	+	-	-	-
<i>(ymhella cvmhi/ornus</i> Agarclh. 1930.	-	s	-	-	-	-
<i>Ilantzschia amphio.xys</i> IT.hr.1 Grun.	-	-	+	-	-	-
<i>liacillaria paratlo.xa</i> Gmelin, 1 ~88	-	-	-	s	-	-
<i>Nitzschia acicularis</i> IT. Sin. 1853-1856	-	-	+	-	-	-
<i>N. apiculata</i> (Greg.) 1880	-	-	+	-	-	-
<i>N. delicatissimu</i> Cl.. 189~	+		-	-	s	-
<i>N. holsatica</i> llust. 1924	-	-	+	-	-	-
<i>N. hitngarica</i> Grun..1862	-	-	+	-	-	-
<i>X. intermedia</i> Hantzsch.	-	s	-	-	-	-
<i>N. longissima</i> llirebl Ral/sl86l	-	-	.	s	s	-
<i>N. palea</i> <small>IK12.1</small> IT. Sm.	-	-	+	-	-	-
<i>X. punctata</i> (IT.Sm.I Grun. 1880	+	-	-	-	-	-
<i>N pungens</i> var. <i>atlantica</i> Cl.. (1882)	+	s	-	-	-	-
<i>X reversa</i> IT. Sm. /853	+	-	-	-	-	-

<i>Jl, seriata</i> Cl. 1853	+	M	-	-	M	-
<i>X. sigma</i> (Ktz.) IV. Sm. 1853-1856	-	-	+	-	-	-
<i>X. sigmoidea</i> (Ehr.) IV. Sm. 1853-1856	-	-	+	-	s	-
<i>X. tenuirostris</i> Mez. 1902	+	s	-	-	-	-
<i>X. trvblionella</i> llantzsch.	-	-	+	-	-	-
-var. <i>levidensis</i> (IV.Sm.) Crruii.	-	-	+	-	-	-
<i>X. vemicularis</i> (Kutz.) Grun	-	-	+	-	-	-
<i>Cylindrotheca closterium</i> (Ehr.) Retain. Lewin (1853) (<i>Xilzschia closterium</i>)	+	fl	-	-	M	-
<i>Campylodiseus echeneis</i> Ehr., 1840	-	-	+	-	-	-
<i>C.lliurettii</i> lireb., 1854	+	-	-	-	-	-
-var. <i>lineolatum</i> Pr.-Lavr., 1955	+	-	-	-	-	-
<i>Gomphonema olivaceum</i> (Lyngb.) Kt., 1833-1836	-	-	+	-	-	-
-var. <i>minutissimum</i> Grun.	-	-	+	-	-	-
<i>Enithemia sore.x</i> Kutz	f	-	-	-	-	-
<i>Cymatopleura solea</i> (Breb.) IV. Sm.	+	-	-	-	-	-
<i>Surirella gemma</i> Ehr., 1839	+	-	-	-	-	-
<i>S. ovalis</i> breb, 1844	+	-	-	-	-	-
<i>S. ovata</i> Kutz. 1839	+	-	-	-	-	-
PYRROPHYTA						
Cryptomonadineae						
<i>Cryptomonas acuta</i> Butch.	-	s	-	-	-	-
<i>Ililleafusiforme</i> Schill 1925	-	M	-	-	s	-
<i>Dinoplageolatae</i>						
<i>Prorocentrum balticum</i> (Lohm.) Hasle, 1908	+	s	-	-	-	-
<i>Pr. compressa</i> (Ostf.) 1889	+	M	-	-	s	-

<i>Pr. cordata (Ostf) 1901</i>	M	M	-	-	M	-
Exuviaella cordata						
<i>Pr. marina Gien. 1881</i>	-	s	-	-	-	-
<i>Pr. maximum Schill.</i>	+	-	-	-	-	-
<i>Pr. micans Ehr. 1833</i>	+	M	-	-	M	-
<i>Pr. obtusion Ostf. 1908</i>	-	s	-	-	-	-
<i>Pr. perforatus Gran. 1915</i>	-	s	-	-	-	-
<i>Pr. sailed Ium Sch. 19011</i>	-	s	-	-	-	-
<i>Pr. vaginula (Stan.) Schutt 1883</i>	-	s	-	-	-	-
<i>Phalacroma rotundaluin (Clap.) et l.achm.) Ko/, et Michener 1859</i>	+	s	-	-	M	-
<i>Dynophysis acuminata Clap et Eaclim. 1859</i>	-	s	-	-	-	-
<i>l). acuta Ehr. 1839</i>						
<i>l). baltica (Paulsen) Ko/, et Skogsberg 1900</i>	+	s	-	-	-	-
<i>IX eaudata Kent. 1881</i>	+	s	-	-	s	-
<i>l), norvegica Clap, el l.achm.1859</i>	+	-	-	-	-	-
<i>IX fori i i Pav/I. 1916</i>	+	-	-	-	-	-
<i>IX levanderi H'olos.,1928</i>	+	-	-	-	-	-
<i>IX ovum Schutt 1895</i>	+	s	-	-	-	-
<i>D. sacculus Stein 1883</i>	+	s	-	-	s	-
<i>IX sphaerica Stein 1883</i>	+	s	-	-		-
<i>Oxyrrlus marina Duj 1841</i>	+	s	-	-	-	-
<i>Gymnodinium agile Ko/, et Sw. 1921</i>	-	s	-	-	-	-
<i>G. agiliforme Schill 1928</i>	-	s	-	-	-	-
<i>G. fuscum (Ehr.) Stein 1834</i>	-	s	-	-	-	-
<i>G. /urns Schill. 1895</i>	+	s	-	-	-	-
<i>G najadeum Schill 1928</i>	+	M	-	-	s	-

<i>G. neapolitanum</i> Schill. 1928	+	S	-	-	-	-
<i>G. minor</i> Lebour 191'	-	s	-	-	-	-
<i>G. rhwmhoides</i> Schutt 1895	-	s	-	-	-	-
<i>G. simplex</i> (L. Ohm.) Kof. et Sw. 191)8	-	s	-	-	-	-
<i>G. splendens</i> Lebour 1925	+	M	-	-	s	-
<i>G. sulcatum</i> Kof. et Sw.	+	-	-	-	-	-
<i>G. wulfii</i> Schill. 1916	-	s	-	-	-	-
<i>Gyrodinium adriaticum</i> Schill	-	M	-	-	S	-
<i>G. britannia</i> Kof. u Swazy 1921	-	s	-	-	-	-
<i>G. cornulum</i> (Pouchet) Kof. u Sw. 1921	-	M	-	-	s	-
<i>G. fusil</i> or me Kof. et Swezy 1910	+	s	-	-	s	-
<i>G. lachn nni</i> i Menu i Ko/ el Suez\ 19III	+	s	-	-	-	-
<i>G. nasulum</i> (Il'ulff) Schill.	+	-	-	-	-	-
<i>G. spirale</i> (Bergh.) Kof. el Swezy 1881	-	s	-	-	s	-
<i>Polvkrikos sehwarzi</i> Bulschli 18'3	-	s	-	-	-	-
<i>I'aulsenella chaeloceralis</i> I Paulsen) Challon 1911	+	-	-	-	-	-
<i>Ellobiopsis chatloni</i> Caullery. 1910	+	-	-	-	-	-
<i>Pyrophacus horologycuin</i> Stein 1883	+	s	-	-	s	-
<i>Glenodinium apicalalum</i> Lachm. 1901	+	-	-	-	-	-
<i>G. behningi</i> (Lind.l Kissel. 192'	+	-	-	-	-	-
<i>G. caspicum</i> (Ostf.) Schill.. 1901	+	s	-	-	-	-
<i>G. danicum</i> Pauls 190'	-	s	-	-	-	-
<i>G. foliaceum</i> Stein 1883	-	s	-	-	-	-
<i>G. leniicula</i> i Bergh i Schill I W	+	M	-	-	S	-
<i>G. paululum</i> Lind. 192S	+	s	-	-	-	-
<i>G. pilida</i> (Ostf) Schill. 1908	+	s	-	-	-	-

<i>G. oculatum</i> Stein 1883	-	s	-	-	-	-
<i>G. penardii</i> Lemm. 1900	-	M	-	-	-	-
<i>G. penardiforme</i> (Lind.) Schill. 1918	-	M	-	-	-	-
<i>G. pidvisculns</i> (Ehr.) Stein 1830	-	s	-	-	-	-
<i>Cocholodinium citron</i> Kof. et Swezy, 1921	-	s	-	-	-	-
<i>Pronoctiluca acuta</i> (Lohm.) Schill, 1912	-	s	-	-	-	-
<i>Pr pelagica</i> Lab.-Don, 1888-1889	-	s	-	-	-	-
<i>Imphidinium aculuu</i> Lohm.	-	s	-	-	-	-
<i>A. acutissimum</i> Schill. 1928	-	s	-	-	-	-
<i>A. crassum</i> Lohm. 1908	+	s	-	-	-	-
<i>A. longum</i> Lohm. 1908	-	s	-	-	-	-
<i>A. operculatum</i> Clap, et Laschm. 1859-61	-	s	-	-	-	-
<i>A. phaeocysticola</i> Lebour 1925	-	s	-	-	-	-
<i>Peridinium achromaticum</i> Levander 1902	+	s	-	-	-	-
<i>P. aciculiferum</i> Lemm. 1900	+	-	-	-	-	-
<i>P. bipes</i> Stein 1883	-	s	-	-	-	-
<i>P. breve</i> Pauls 190-	-	s	-	-	-	-
<i>P. brevipes</i> Pauls 1908	-	s	-	-	-	-
<i>P. bulla</i> Slew, 1910	+	-	-	-	-	-
<i>P. claudicans</i> O.Pauls. 190'	+	s	-	-	-	-
<i>P. conicum</i> (Gran.) Ostf. et Schmidt. 1901	+	s	-	-	-	-
<i>P. conicum</i> f. <i>concava</i> Metz 1933	+	-	-	-	-	-
<i>P. crassipes</i> Kof. 190'	+	s	-	-	-	-
<i>P. ci actum</i> (OF.Mull) Ehr. 1"3	+	s	-	-	-	-
<i>P. depression</i> Bail. 1855	+	s	-	-	-	-
<i>P. diabolus</i> C'J. 1900	+	-	-	-	-	-

<i>P. divergens</i> Ehr. 1840	t	s	-	-	-	-
<i>P. excentricum</i> Pauls 1917	+	-	-	-	-	-
<i>P. globulus</i> Stein 1883	+	s	-	-	s	-
-var. <i>quarnerense</i> Schroder 1901	+	s	-	-	-	-
-var. <i>ovatuin</i> (Pouch.) Schill. 1853	+	-	-	-	-	-
<i>P. grand</i> Ostf 1906	+	s	-	-	s	-
<i>P. grand f.mile</i> (Pavil) Schill. 1916	-	s	-	-	-	-
<i>P.inconspicuum</i> Lemm 1899	+	s	-	-	-	-
<i>P. knipowitschii</i> Csat. 192"	+	s	-	-	-	-
<i>P. latum</i> Pauls. 1904	+	-	-	-	-	-
-var. <i>halophyla</i> (l.indent.) 192~	i	-	-	-	-	-
-var. <i>concavilaterale</i> Kisselew 1935	+	-	-	-	-	-
<i>P. longispinum</i> Ko/. 1883	+	s - o	-	-	-	-
<i>P. minilum</i> Ko/. 190"	+	-	-	-	-	-
<i>P. minusculum</i> Pavil. 1904	+	s - o	-	-	s	-
<i>P. oceanicum</i> l'an-1 lo/fcn 189"	+	-	-	-	-	-
<i>P. orhiculare</i> Pauls 190"	+	-	-	-	-	-
<i>P. pedunculatum</i> Schutt 1895	+	s	-	-	-	-
<i>P. pellucidum</i> (liergh.) Schutt. 1881	+	s	-	-	-	-
<i>P. pentagonum</i> (iron. 1902	+	s	-	-	-	-
<i>P. solidicorne</i> Mangin 1926	-	s	-	-	-	-
<i>P. spiniferum</i> Schill. 1911	+	s	-	-	-	-
<i>P. sphaericum</i> Okamum 1912	+	s	-	-	-	-
<i>P. steinii</i> ./org. 1899	+	s	-	-	s	-
<i>l leterocapsa triquetra</i> (Ehr.) Lebour 1840	+	M	-	-	M	-
<i>P. triquetrum</i>						

<i>Scripsiella trochoidea</i> (Stein) 1883	+	M	-	-	s	-
P.trochoideum						
<i>Goniaidax cochlea</i> Meunier 191(1)	-	S	-	-	-	-
(<i>j. diacantha</i> (Meunier) Schill	-	s	-	-	-	-
<i>G. diegensis</i> Kof. 1911	+	s	-	-	-	-
<i>G. digitate</i> (L'ouchel.) Ko/ 1883	-	s	-	-	-	-
<i>G. minima</i> Matz 1933	-	s-o	-	-	s	-
<i>G. orientalis</i> hind. 1924	-	s	-	-	-	-
<i>G. polyedra</i> Stein. 1883	+	M	-	-	s	-
<i>G. polygramina</i> Stein. 1883	+	s-o	-	-	-	-
<i>G. scrippsae</i> Kof. 1911	+	s	-	-	s	-
<i>G. spinifera</i> (Clap, et Lachm.) Diesing 1838-1861	-	s	-	-	-	-
<i>G. triacantha</i> Jorg. 1899	-	s	-	-	-	-
<i>Protoceratium reticulation</i> (Clap, et Lachm.) liitschti 1839	-	s	-	-	-	-
<i>Ceratium furca</i> (Ehr.) Clap et Lachm. 1833	+	+	-	-	s	-
<i>C. fuisus</i> (Ehr.) Ditj. 1834	+	s-o	-	-	s	-
<i>C. tripos</i> (O.K.Mull.) Sitzsch. Γ ⁶	+	s-o	-	-	s	-
<i>Goniodoma polyedricum</i> (Pouch.) Jorg. 1883	-	+	-	-	-	-
(<i>ladopy.xi.x setifera</i> Lohm.	-	+	-	-	-	-
<i>Massartia vorlicello</i> (Stein.) Schill. 1878	-	+	-	-	-	-
CHLOROPHYTA						
<i>Golenkia radiata</i> Chod.	-	-	-	s	-	-
<i>Schroediria setigera</i> Smith.	-	-	+	s	-	-
<i>Pediastrum horyanum</i> (Titrp) Menegh. (1840)	-	-	+	s	-	-
-var. <i>longicorne</i> Racib. 1889	-	-	+	s	-	-

<i>P. duplex</i> Meyeu 1829	-	-	t	s	-	-
<i>P. telras</i> (Ehr.) Rolfs 1H44	-	-	+	-	-	-
-var. <i>tetraodon</i> (Corda)	-	-	+	-	-	-
<i>Telraedron caudatum</i> (Corda) Hans 1888	-	-	+	s	-	-
<i>T. incus</i> (led.) G.M. Smith	-	-	+	s	-	-
<i>T. schmidlei</i> (Schroed.) Lemm Rahh. 1S6S	-	-	+	-	-	-
<i>Lagerheimia ciliata</i> (Lagerh.) Chodat. 1895	-	-	+	s	-	-
<i>L. cptaclriseta</i> (Lemm.) G.M. Smith 192()	-	-	+	-	-	-
<i>Oocystis Borgei</i> Snow 1903	-	-	+	s	-	-
<i>O. crassa</i> Wittrock 1880	-	-	+	s	-	-
<i>O. elliptica</i> West. 1892	-	-	+	s	-	-
<i>O. Sovae-Semliae</i> Wide 189'	-	-	+	-	-	-
<i>O. parva</i> W. et W 1898	-	-	+	-	-	-
<i>O. solitaria</i> Willi: 18'9	-	-	+	s	-	-
<i>O. submarina</i> Lagerh. 1886	-	-	+	-	-	-
<i>Ankistrodesmus acicularis</i> (Al. Braun) Korschik 1953	-	-	+	s	-	s
<i>A. acicularis</i> var. <i>mirabilis</i> (W. et W.) Korseh.	-	-	+	s	-	-
<i>A. angustus</i> Bern.	-	-	+	s	-	-
<i>A. arcuatus</i> Korseh. 1953	-	-	+	\	-	s-o
<i>A. Bibrajanus</i> (Reinsch.) Korschik	-	-	+	s	-	-
<i>A. convolutus</i> Corda 1839	-	-	+	M	-	s-o
<i>A. Braunii</i> (Naeg.J Brunn 1915	-	-	+	-	-	-
<i>A. falcatus</i> (Corda Rolfs) 1848	-	-	+	s	-	-
<i>A. longissimus</i> (Lemm.) Wide	-	-	+	s	-	-
-var <i>acicularis</i> (Chad.) Brunnth.	-	-	+	s	-	-
<i>A. spirale</i> (Turner) Lemm. 1908	-	-	+	s	-	-

<i>Kirchneriella cuntorla (Schmidle) Hold</i>	-	-	+	S	-	-
<i>K. lunaris (Kirchn.) Moeb.1894</i>	-	-	+	s	-	s
<i>Dictyosphaerium ehrenbergianum Xag. 1849</i>	-	-	+	s	-	-
<i>IX pilehellu in Wood 18'4</i>	-	-	+	s-o	-	-
<i>Coelastrum postoranni Xag1855</i>	-	-	+	s	-	s
<i>G. sphaericum Xag. 1849</i>	-	-	+	s	-	-
<i>Crucigenia apiculata (Lemm.) Selmdle</i>	-	-	+	s	-	-
<i>(. irregularis Wide</i>	-	-	+	-	-	-
<i>C. rectangularis (A.Br.) 1891</i>	-	-	l	s	-	-
<i>C. (elrapedia (Kirchn.) W.1902</i>	-	-	+	s	-	-
<i>Tetrastrum glohrum (Roll) Ahlstr. et Tiff.</i>	-	-	+	-	-	-
<i>T. midisetium (Schmidle)</i>	-	-	+	-	-	-
<i>T. straurogentjorme (L.Schoed.) Lemm.</i>	-	-	+	-	-	-
<i>T. lunaris Korschik</i>	-	-	+	s-o	-	-
<i>T. Wisconsinensis G.S.Smith.</i>	-	-	+	-	-	-
<i>Aclinastrum hantzschii Lagerh. 1882</i>	-	-	+	M	-	s
<i>Scenedesmus acicularis (Lagerh.) Chodal. 1902</i>	-	-	+	M	-	-
<i>-var. hiserialis Reinh. 1953</i>	-	-	+	s	-	-
<i>S. aculiformis Schrod 189~</i>	-	-	+	-	-	-
<i>S. arcuatus Lemm. 1899</i>	-	-		s	-	-
<i>-var. platydiscay G.M.Smith</i>	-	-	-	s	-	-
<i>S. bjugatus (Turp.) Lagerh. 1893</i>	-	-	+	s	-	-
<i>-var. bijugatus (Turp.) Lagerh. 1893</i>	-	-	+	s	-	-
<i>S. obliquus (Turp.) Kutz. 1938</i>	-	-	+	s	-	-
<i>-var. alternans Chrystjuk. 1953</i>	-	-	+	s	-	-
<i>-var. obliquus Kutz.. 1833</i>	-	-	-	s	-	-

<i>S. opoliensis</i> Lemm						
-var. <i>alalus</i>	-	-	+	s	-	-
-var. <i>asymmetica</i>	-	-	+	s	-	-
-var. <i>carinatus</i> Lemm	-	-	+	-	-	-
<i>S. quadricauda</i> (Turp.) Hrehsl /835	-	-	+	M	-	s
-var. <i>abudans</i> Kirchn.	-	-	+	s	-	-
-var. <i>armatus</i> (Chad.) Deditss	-	-	+	-	-	-
-var. <i>eualternans</i> Pr.-Lavr	-	-	+	-	-	-
-var. <i>setosusus</i> Kirchn.	-	-	+	-	-	-
<i>S. tetrademiformis</i> (Wolosz.) Chad.	-	-	+	s	-	-
<i>Mieractinium pusdlum</i> /•/•. 1858	-	-	+	s	-	-
<i>M. quadriselum</i> (Lemm.) CM. Smith 1918	-	-	+	s	-	-
<i>Parailoxia mullisela</i> Swir.	-	-	+	-	-	-
I <i>festella holhvoides</i> (II. 1 1 est.) de Wild. 189'	-	-	+	s	-	-
<i>Dunaliella salina</i> Tend.	-	-	-	s	-	-
<i>Poropila dubia</i> Schill /925	-	-	-	s	-	-
CYANOPHYCEAE						
<i>Synechococcus elongatus</i> Sag.	-	-	+	-	-	-
<i>Synechocystis salina</i> l'isl. 1924	-	-	-	s	-	-
<i>Dactyloeoocopsis irregularis</i> (i. M. Smith 1922	-	-	+	-	-	-
<i>Microcystis aeruginosa</i> Kutz., 1845	-	-	M	M	-	-
<i>M. aeruginosa</i> f. <i>aeruginosa</i> Kutz. 1845	-	-	M	M	-	-
<i>M. ichihvohlahe</i> Kutz 1845	-	-	-	s	-	-
<i>M. pulverea</i> (Wood) Elenk. 1938	-	-	+	M	-	-
<i>M. pulverea</i> f. <i>holsatica</i> (Lemm.) Elenk. /938			-	M	-	-

<i>N. pulvereaf. incerla</i> (Lemm.) Elenk 1938	-	-	+	M	-	-
<i>Aphanothece stagnina</i> (Spreng.) Al. Braun 1865	-	-	-	s	-	-
<i>Gleocapsa limnetica</i> (Lemm.) Hollerh. 1938	-	-	-	M	-	s
<i>G. minima</i> (Keissl.) Hollerh. 1938	-	-	+	M	-	s
<i>G. minor</i> f. <i>minor</i> (Kutz.) Hollerh., ampl 1938	-	-	-	M	-	s
<i>G. miuuita</i> (Kutz.) Hollerh. 1938	-	-	-	M	-	s
<i>G.lurgidaf. lurgicla</i> (Kutz) Hollerh. 1938	-	-	-	s	-	-
<i>Merismopectia elegans</i> Al. Braun 1848	-	-	-	M	-	-
<i>XL glauca</i> (Ehr.) Xag. 1849	-	-	+	M	-	-
<i>l. glauca</i> / <i>l. mciterranea</i> (Xag.) Collins	-	-	+	M	-	-
<i>M. minima</i> G. Beck 1897	-	-	+	M	-	s
<i>M. punctata</i> Meyen 1839	-	-	+	fm	-	-
<i>M. tenuissima</i> Lemm. 1898	-	-	1	M	-	-
<i>Coelosphaerium kutzingianum</i> Xag. 1849	-	-	+	-	-	-
<i>Gomphosphaeria aponino</i> Kutz 1846	-	-	-	s	-	-
<i>Anabaena flos-aquae</i> (Lyngb.) Breb. 1835	-	-	+	-	-	-
<i>A. Kisselevii</i> Pr.-Lavr.	-	-	+	-	-	-
<i>. l kisseleviana</i> Elenk.	-	-	+	-	-	-
<i>A knipowitschii</i> Ussatsch.192	-	-	+	-	-	-
<i>A Scheremetievi</i> Elenk.	-	-	+	-	-	-
<i>A. spiroicles</i> K/eb. 1895	-	-	+	s	-	-
<i>A. spiroides</i> f. <i>contractu</i> (Kleb.) Elenk. 1938	-	-	+	s	-	-
<i>Aphanizomenon flos-aquae</i> (L.) Ralfs	-	-	M	M	-	-
<i>Xodularia spumigena</i> Meri 1822	-	-	-	s	-	-
<i>Oscillatoria kisselevi</i> Anissim	-	-	+	M	-	M
<i>O. nigro-viridis</i> Thwait	-	-		-	-	-

<i>O. planktonica</i> Wolosz	-	-	+	M		M
<i>O. tenuis</i> Ag. IS 13	-	-	+	s	-	
<i>Spirulina laxissinia</i> G.S. 184~	-	-	+	s	-	s
<i>S. meneghiniana</i> Zanard 1847	-	-	+	s	-	
<i>S. tenuissima</i> Kutz. 1836	-	-	+	s	-	
<i>Lyngbya conervoides</i> Ag.	-	-	+	-	-	-
CHRYSOPHYTA						
Chryomonadinae						
<i>Dinobryon peltitoidum</i> Lev.	+	-	-	-	-	
<i>Mallomonas lilloensis</i> Conr.	+	-	-	-		
<i>Phaeocystis globosa</i> Lagerh.	+	-	-	-		
<i>Prymnesium parvum</i> 'i' arter	-	S	-	-		
<i>Cocclithoplax</i> idae						
<i>Icanthoica uclinhos</i> Schill 1925	+	s	-	-		
<i>A. iptatospina</i> Lohm. 1963	-	s	-	-	-	
<i>Syracosphaera mediterranea</i> Lohm	-	s	-			
<i>Pontosphaera haeckelti</i> Lohm.	+	-	-	-		
<i>P. huaxlevi</i> Lohm. 1925	+	M	-	-	s	
<i>P. nigra</i> Schill. 1926	+	s	-			
<i>Caliptriosphaera oblonga</i> Lohm., 1902	+	s	-	-		
<i>Rhabdosphaera hispida</i> Lohm. 1912	+	s	-	-		
<i>Rlongistylis</i> Schill. 1925	+	s	-	-		
<i>R. stylifer</i> Lohm. 1902	+	s	-	-		
<i>R. tuhulosa</i> Schill. 1925	+	s	-	-		
<i>Lohmannosphaera subclausi</i> Gran et Braarud	+	-	-	-	-	-

<i>Coccolithus pelagians</i> Lohm. 1912	-	S	-	-	-	-
<i>Coccolithophora fragilis</i> Lohm.	+	-	-	-	-	-
Ebriaceae						
<i>Ebria tripartita</i> (Schum.) Lemml86~	-	s	-	-	s	-
<i>Hermesium acricum</i> Lachm.	+	s	-	-	-	-
Silicoflagellatae						
<i>Dictioclathra</i> Ehr. 1839	+	s	-	-	-	-
<i>Distephanos speculum</i> Ehr. Hack. 188'	+	s	-	-	-	-
-var. <i>octonarius</i> Del., 1932	+	s	-	-	-	-
-var. <i>speculum</i> (Ehr.) Hack. 18,8'	+	s	-	-	-	-
Euglenophyta						
<i>Euglena charkoviensis</i> Swir. 1913	-	-	+	-	-	-
<i>E. granulata</i> (Klebs.) Schmitz 1883	-	-	+	-	-	-
<i>E. pisciformis</i> Klebs 1883	-	-	+	-	-	-
<i>E. proxima</i> Dang. 1901	-	-	+	-	-	-
<i>Eutreptia lanovii</i> Sleser 1904	+	M	-	-	M	-
<i>E. viridis</i> Hertv. /852	+	s	-	-	M	-
<i>Thalassiosira</i> (Ehr.) Stein 1831	-	-	+	-	-	-
<i>Trachelomonas fluviatilis</i> 1909	-	-	+	-	-	-
<i>Strombomonas longa</i> (Swir.) Popova 1955	-	-	+	-	-	-
Volvocaceae						
<i>Pteromonas torta</i> Korschik	-	-	+	-	-	-
<i>Gonium pectorale</i> Mull.	-	-	+	-	-	-
<i>Pandorina monni</i> Borv	-	-	+	-	-	-
<i>Eudorina elegans</i> Ehrenb. 1832	-	-	+	-	-	-
<i>Chloromonas cuneata</i> Schill.	-	-	+	-	-	-

<i>(hlainydoublepharis knollii Schill</i>		-	-	-	-	-
Pterospermales						
<i>Pterosperma crislatum Schill., 1925</i>	-	S	-	-	s	-
<i>P. Jorgensii Schill., 1925</i>	-	S	-	-	-	-
<u>\anthophyta</u>						
<i>Meringosphaera mcditerraneo Lohm., 191~</i>	+	s	-	-	s	-
<i>M. mem Schill., 1925</i>	-	s	-	-	-	-

Legend

A - A.I.Ivanov. 1962.1964.1965

B - D.A.Nesterova. 1973-1994

M - mass species

S - sparse

I - introduced

E - endemic

O - often

S(-) - sparse-often

Table 2. List of Fungi Species

Species	Till 1975	Contemporary State Areas				Biblio.
		NWBS	Crimea	Water Bodies		
				Marine	Brackish	
Kl. CHYTRIDIOMYCETES						
<i>Hyphochytrium pendicle</i> Artemch. et Zelezin., 1969	+	-	+	-	-	5.6.16
Kl. OOMYCETES						
<i>Leptolegnia pontica</i> Artemchuk, 1965	+	-	-	-	-	5.2(1)
<i>Thraustochytrium gloiosum</i> Kohav- aslji et Ookuho	+	-	+	-	-	1.2.5
<i>Hyphochytrium surgenense</i> Iken	+	-	+	-	-	1.2.5
<i>Schizochytrium aggregation</i> Goldstein	+	-	+	-	-	1.2.5
<i>Lagenidiopsis arctica</i> Artemchuk, 19~3	+	-	-	-	-	1.5
Kl. ZYGOMYCETES						
<i>Hyphoglossum globosum</i> Fischer	+	-	+	-	-	1.3.5
<i>M. circinelloides</i> van Tieghem, 1875	+	-	+	-	-	1.3.5
<i>M. racemosus</i> Freese	+	-	+	-	-	1.3.5
<i>M. albo-ater</i> Xauniov, 1915	+	-	+	-	-	1.3.5
<i>Actinomyces elegans</i> (Eidan) Benjamin et Hesseltine	+	-	+	-	-	1.3.5
<i>Absidia spinosa</i> Lendner	+	-	+	-	-	1.3.5
<i>Rhizopus nigricans</i> Ehrenberg	+		+	-	-	1.3.5

<i>Rh.cohnii</i> (Colm) Berlese et Toni	+	-	+	-	-	1.3.5
<i>Syncephalastrum racemosus</i> Colic.	+	-	+	-	-	1.3.5
<i>Mortierella</i> spp.	+	-		-	-	1.3.5
Kl. ASCOMYCETES						
<i>Amylocarpus encephaloides</i> Currey, 1857-1859	-	S\	-	-	-	13.17
<i>Arenariomyces trifurcatus</i> Ilohnk ex E.B.C.Jones. 1953	-	M	+	Adzh. Sukh	-	7.8.11.12.17
<i>Chaetomium glohosum</i> Kunze	+	-	+	-	-	1.3.5
<i>Ch.indicum</i> Corda	+	-	+	-	-	1.3.5
<i>Ch.olivaceum</i> Cooke et Ellis	i	-	1	-	-	1.3.5
<i>Ch.minutum</i> Krzem.a Badura	+	-	+	-	-	1.3.5
<i>Ch.heteropilium</i> Artemch.. 1973	+	-	+	-	-	1.3.5
<i>Chaetomium</i> spp.	+	-	+	-	-	1.3.5
<i>(eriosporopsis ealvprata</i> Kohlm.. 1960	-	S	+	Adzh	-	7.8.13.14
<i>(.halima kinder. 1944</i>	-	M	+	Adzh. Sukh	-	7.8.10.13
<i>Ceircumveslita</i> (Kohlm/ Kohlm.J1953). 19"2	-	Sv	-	Adzh	-	7.13
<i>C.tubulifera</i> (Kohl) Kirk in Kohlm.. 195"	-	t	+	Adzh. Sukh	-	7.8.13.14
<i>Crinigera maritima</i> Schmidt. 1969	-	+	-	-	-	15
<i>Carhosphaerella leptosphaerioides</i> Schmidt. 1969	-	+	-	Adzh. Sukh	-	8.9
<i>Corollospora maritima</i> Werdermann, 1922	-	M	-	Adzh. Sukh	-	7.8.1 1.13.17
<i>Clacera Under in Barhoorn & hinder. 1944</i>	-	+	-	Adzh. Sukh	-	8.9
<i>Cpulchaella</i> Kohlm..Schmidt et Scur 196"	-	+	-	-	-	10.13
<i>Drxosphaera navigans</i> Koch.et E.B.G.Jones, 1988	-	+	-	Adzh	-	8
<i>Emericellopsis maritima</i> Beljak, emend.Arlenchuk. 19~3	+	S\	+	-	-	1.5
<i>Elalosphaeria appendictlata</i> kinder in Barghoorn unci kinder.	-			Adzh. Sukh	-	S.13. 17.18
<i>Halosaphiea hamata</i> Johnson, Jones Moss, 1988		+	-	Adzh	-	X
<i>Halosphaeriopsis mediosetigera</i> Crihh et T. W.Johnson, 1958	-	+	+	Adzh	-	7.8.13.18

<i>Illicina elaterifera</i> Kohlm., 1961	-	+	-	Adzh. Sukh		8.9
<i>Liultra</i> sp.	-	Sv	-	-	-	13.14
<i>Lulworthia</i> sp.	-	+	+	Adzh. Sukh	-	7.8.10.13
<i>Leptosphaeria olhopunculata</i> (l'eslendorpi Saccardo. ISS3	-	+	-	Adzh	K had	8.13.17
<i>L. a\ icenniae</i> .1 et I; Kohlm. /1965	-	S	-	Adzh	-	8
<i>l.neomaritima</i> Gessner u Kohlm.. 19~6	-	+	-	Adzh	K had	S. 13
<i>l.oraemaris</i> Under and liarghoorn and lander. 1944	-	+	-	Adzh. Sukh	-	8.13.18
<i>Microhelvia</i> Under! Kohlm.. 19~1	-	Sv	-	-	-	13.18
<i>Nais inomala</i> Kohlm.. 1962	-	+	+	Adzh	-	7.8.13.18
<i>l'leospora pelagica</i> Johnson. 1956	-	s	-	Adzh. Sukh	-	8
<i>P.pelvetia</i> Sutherland. 1915	-	s	-	Adzh. Sukh	-	8.13
<i>l'leospora</i> sp.	-	+	-	Adzh. Sukh	-	8.13
<i>Reinispora galerita</i> Tuhaki. 196S	-	S\	-	-	-	15
<i>R.maritima hinder</i> . 1944	-	+	-	Adzh	-	8.13
<i>R.ipiadrireremis</i> (llohk) Kohlm., 195' <19~2)	-	+	-	Adzh. Sukh	-	8.13
<i>R.stellata</i> Kohlm.. 1961)	-	s	-	Adzh	-	15
<i>R.pilleata</i> Kohl. 1963	-	Sv	-	-	-	15
KI.DEUTERMYCETES						
<i>. Ispergillus glaucus</i> l.n.e.x hi:	+	-	+	-	-	1.3.5
<i>Asperg. herhariorum</i> (think) Thorn	+	-	+	-	-	1.3.5
<i>. Isperg./innigatits</i> Ireseniits	+	-	+	-	-	1.3.5
<i>Isperg iilluceits</i> Thom et Citreh. emend. Fennel el Harelip	+	-	+	-	-	1.3.5
<i>. Isperg. ochraceits</i> It'dhehn	+	-	+	-	-	1.4.5
<i>. Is/erg.niger</i> ran Tieghem	+	-	-	-	-	15
<i>. Is/K'rg.caih/ichis</i> Link ex Fi:	+	-	+	-	-	1.3.5

<i>Asperg. flavus</i> kink ex 1-i:	+		+	-	-	13.5
<i>Asperg. oryzae</i> (Ahlhurg) Colin.	+	-	1	-	-	13.5
<i>Asperg. wentii</i> Wehmer	+	-	+	-	-	13.5
<i>Asperg. versicolor</i> i \ itillj Tiraboski	+	-	-	-	-	1.5
<i>Asperg. sordidus</i> Bainier el Sartory	+	-	+	-	-	13.5
<i>Asperg. ustus</i> (Bainier) Thorn el Church	+	-	+	-	-	13.5
<i>Asperg. flavipes</i> Bainier el Sartory	f	-	+	-	-	14.5
<i>Aureobasidium pullulans</i> (de Bary) Arnaucl	+	-	-	-	-	1.5
<i>Alternaria tenuis</i> Sees ex Fries	+	-	1	-	-	13.5
<i>Al. tenuissima</i> (Th'w) Wiltsh	+	-	-	-	-	1.5
<i>Al. maritima</i> Suth.. 1916	+	+	-	Adzh. Sukh		1.3.5. 8.13
<i>Bolrvlis cinerea</i> Persoon ex Fries	+	-	+	-	-	13.5
<i>B. pilulifera</i> Saccardo	+	-	f	-	-	13.5
<i>Cephalosporium charlicola</i> Lindau	+	-	-	-	-	1.5
<i>C. acremonium</i> C'orda	+	-	-	-	-	1.5
<i>C. rosetini</i> Oudemans	+	-		-	-	13.5
<i>Catrum</i> (Corda) Pidopl	+	-	+	-	-	13.5
<i>C. coremioides</i> Bailie	+	-	-	-	-	1.5
<i>C. irrenalia fusca</i> Schmidt, 1969	-	+	+	-	-	7.8
<i>C. macrocephala</i> (Kohlm.) Meyers el Moore. 1960 Tendr	-	M	+	Adzh. Sukh	-	7.8.20
<i>C. pseudomacrocephala</i> Kohlm.. 19"9	-	+	-	Adzh	-	8
<i>Cliocladium penicilloides</i> ('orda	+	-	f	-	-	13.5
<i>C. liocladium zaleskii</i> Pidopl.	+	-	+	-	-	13.5
<i>C. liocladium</i> sp. 1	+	-	+	-	-	13.5
<i>Cladosporium algarum</i> Cooke et Masee. 1916	+	+	-	Adzh. Sukh	-	1.5.8.13
<i>Cl. herbarum</i> (persoon) link ex Tries		-	-	-		1.5

<i>(lavariopsis biilhosa (Anastasiou) XakagiriA Tuhaki. 1985</i>	-	+	+	Adzh	-	7
<i>Cremeria cvimiulis Vlevers. Moore. 1960</i>	-		-	Ad/li	-	8
<i>Curvularia paleseens Boetlipi 1933</i>	+	-	f	-	-	1.3.5
<i>Dendryptiella salina iSuth) high, el Xicot. 1964 8,13</i>	+	+	+	Adzh. Sukh	-	1.3.5.
<i>Pen arenaria Xicol, 1958 Sukh</i>	-	+	-	Adzh	-	8.20
<i>Diplodia oraemaris hinder. 1944</i>	-	+	-	Adzh. Sukh	Her	8.18
<i>D.thalassis Artemch. 1980</i>	+	-	-	-	-	1.5
<i>Diplodia sp. 1 (I.C.Ilygher.Johnson. Sparrow. 196/ Tendr</i>	+	-	-	-	-	1.5
<i>Epicocciini maritiinum Sut/i.. /9/6</i>	-	Sv	-	-	-	19
<i>Fusidium eleganllillni Pidopl.</i>	+	-	-	-	-	1.5
<i>Fusarium gihhosum App.et VV. emend llilai</i>	i	-	+	-	-	1.3.5
<i>h'.samhucinum Fuckel</i>	+	-	+	-	-	1.3.5
<i>F.culmorum (Smith) Sad</i>	+	-	-	-	-	1.5
<i>h.iupiaeductumlRadek et Rahh) pr.p) Lagerheim</i>	i	-	-	-	-	1.3.5
<i>F oxysporum Schlecht. emend Snyder. et flans</i>	+	-	+	-	-	1.3.5
<i>h monili/orne Sheldon</i>	i	-	-	-	-	1.5
<i>F.solani(Mart)App.et Hi.var argillaceumlfnBilai</i>	+	-	+	-	-	1.3.5
<i>Geotrichum candidum Link ex Persoon</i>	+	-	-	-	-	1.5
<i>Graphiium sp.</i>	-	+	-	Adzh. Sukh	-	8
<i>I lehninlhosporiium hondarzewii Pidopl.</i>	+	-	-	-	-	1.5
<i>II. halodes Drechsler.1923</i>	-	+	-	-	Khad	20
<i>llumicola alopallonella Mever i Moore Am.. 1960</i>	-	+	+	Adzh	-	7.8
<i>Macrosporium lamiuariiuiin Suth.. 1916</i>	+	-	+	-	-	1.3.5
<i>Monodietys pelagiea(Johiison) Jones. 1963</i>	-		+	Adzh. Sukli	-	8.13.15
<i>Mycodone uhnariac Potehnja</i>	+	-	+	-	-	1.3.5
<i>Monosporium acuminatum Bonorden</i>	+	-	+	-	-	1.3.5

<i>M. minutissim</i> Rivolta	+	-	+	-	-	13.5
<i>Oospora lactis</i> f/r/s. iSaccardo	+	-	-	-	-	15
<i>Papularia rosea</i> Greben el Kusnets	+	-	+	-	-	13
<i>P. sphaerosperma</i> (Persoon) von Iloiner	+	-	+	-	-	13
<i>Illohnal algicola</i> Artemch., 198(1	+	-	+	-	-	15
<i>Papitlaspora halima</i> Anastasiou, 1 963	-	i	+	Adzh. Sukh	-	8.15
<i>Penicillium albidum</i> Sopp.	+	-	+	-	-	13.5
<i>Pen. cyclopium</i> IVesling	+	-	+	-	-	13
<i>Pen. chermesinum</i> Biourge	+	-	-	-	-	13.5
<i>Pen. charlesii</i> Smih	+	-	+	-	-	13
<i>Pen. citrinum</i> Thorn	i	-	+	-	-	13.5
<i>Pen. corvophyllum</i> Dierckx	+	-	+	-	-	13.5
<i>Pen. commune</i> Thorn.	+	-	+	-	-	13.5
<i>Pen. deumhens</i> Thorn.	i	-	-	-	-	13.5
<i>Pen. expansion!</i> I. inkjThom.	+	-	-	-	-	13.5
<i>Pen. frequentans</i> Wesling	+	-	+	-	-	13.5
<i>Pen. uniculosum</i> Thorn.	+	-	+	-	-	13.5
<i>Pendanoso-coerideum</i> Thorn	+	-	+	-	-	13.5
<i>Pen. puherulin</i> Bainier	+	-	f	-	-	13
<i>Pen. raciborskii</i> Zaleski	+	-	+	-	-	13.5
<i>Pen. restriction</i> Gilaman el Abbot	+	-	+	-	-	13
<i>Pen. rugidosum</i> Thorn	+	-	+	-	-	13
<i>Pen. steski</i> Zaleski	+	-	+	-	-	13.5
<i>Pen. stoloni/erui</i> Thorn	+	-	+	-	-	13.5
<i>Pen. variahile</i> Sipp.	+	-	i	-	-	13.5
<i>Pen. viridicalum</i> Westling	+	-	i	-	-	15.3

<i>Pen.restriction (Шаман el Abbot</i>	+	-	+	-	-	1.3.5
<i>Pen. waksmanii Zaleski</i>	+	-	+	-	-	1.3.5
<i>Periconia falina Marshal</i>	+	-	-	-	-	1.5
<i>P.proli/icu Anaslasiioi. 1963</i>	-	+	+	Adzh. Sukh	-	7.8.19
<i>Phoina capitulum Pawar.Malhur el 1 hirumalachar</i>	+	-	-	-	-	1.5
<i>P.herharum U'eslend</i>	+	-	-	-	-	1.3
<i>P.gerberum U'eslend</i>	+	-	-	-	-	1.5
<i>I.humicola Ciliuin el Abbott</i>	+	-	-	-	-	1.5
<i>P.multipara Pawar.Malhur el 1 hirumalachar</i>	+	-	-	-	-	1.5
<i>Seopulariopsiss brevicaulis tSaeelHa'nier</i>	+	-	+	-	-	1.3
<i>Sepedonium ehrysospermum IHulliardlh'ries</i>	+	-	-	-	-	1.5
<i>Sepedonium sp. 1</i>	+	-	-	-	-	1.5
<i>Spicaria divarciatalThomidilman et Caiman el Abbott</i>	+	-	-	-	-	1.3.5
<i>S violaeera Abbott</i>	+	-	-	-	-	1.3.5
<i>Stachvolrxs alternans lionorden</i>	+	-	-	-	-	1.5
<i>Stemphvliuin iiaritiinun Johnson</i>	+	-	-	-	-	1.3.5
<i>Trichoderma album Preu.ss</i>	+	-	+	-	-	1.3.5
<i>Tr.koningii Oudemans</i>	+	-	+	-	-	1.3.5
<i>Tr.viride Persoon ex Pries</i>	+	-	+	-	-	1.3.5
<i>I rilirachium album Under</i>	+	-	+	-	-	1.3.5
<i>Trichocladiuin aehrasporum Meyers.Moore. I)" 1</i>	-	+	+	Adzh. Sukh. Tendr	-	7.8.15
<i>Tr/ehosporium /uhum Komyschko</i>	+	-	+	-	-	1.3.5
<i>I nigricans SaccJ.lignicola .Sit//.</i>	+	-	+	-	-	1.3.5
<i>I richolhecium roseum kink ex Pries</i>	+	-	+	-	-	1.3.5
<i>Torula convulala liar:</i>	+	-	-	-	-	1.5
<i>1 erticil/ium album!Preussl Pidopl</i>	+	-	-	-	-	1.5

<i>V. eelhtlosae</i> I aszewska	+	-	-	-	-	1.5
<i>V. albo-atrwn</i> Retake et Bertold	+	-	+	-	-	1.3.5
<i>V. lateritium</i> Berkeley	+	-	+	-	-	1.3.5
<i>Pesticlaria marina</i> Schmidt, 19~9	-	+	-	Adzh	-	7.2(1)
<i>Zalerion maritima</i> Under, 1944	-	+	-	Adzh. Sukh. Yauor	-	7.20
<i>V. variant. Inasiasitm.</i> 1963	-	M	+	Adzh. Sukh	-	7.8
KI. BASIDIOMYCETES						
<i>Digitatiapora marina</i> Doguel. 1962	-	s	-	Adzh. Sukh	-	8.13.14
<i>Ma vibrissa</i> Moore et Meyers. 1959	-	M	-	Adzh	-	8.19

Legend

M - mass species

S - rare species

S\ - disappearing species

Adzh - Adzhalyk (Grigorievsky) liman

Her - Berezansky liman

Khad - Khadzhibaisky liman

Sukh - Sukhoi liman

Tendr - Tendro\ sky bay

Yagor - Yagorlitsky bay

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Table 3. List of Zooplankton Species

Species	III 1975 (NWBS)	Contemporary State				
		Marine waters			Brackish waters	
		NWBS	SAL	CA	DD	DE
PROTOZOA						
Flagellata						
<i>Xoelilucct miliaris</i> Suriray. IS 16	NI-BM 3.7X	MII 2	+ M	EB		
Sarcoclina						
<i>Streblus perlucidall</i> leron-Allen el Earlaml. 19/3}	-	-	-	V.		
Infuzoria						
<i>Coxliella helix</i> (Clap, el Laeh.l. Brandt, 190'	NEB 3.6X	S 2	-	EB		
<i>V.helix</i> var. <i>eoehleala</i> Brand/. 191Γ	NEB 3.6	S	-	-		
<i>C.anmdata</i> (l)aday). Brandt. 1SS5	NEB 3.6X	S 2	-	EB		
<i>C.undulatospiralis</i> (Dolgo- polskaja, 194(1/	-	ES 2	-	-		
(' <i>decipiens</i> (Jorg., 1924)	-	ES 2	+	-		
<i>h'avella ehrenhergi</i> (Clap, et Laeh.l.Kofa.Camp. IS5S	\ 1 H 3.6S	+ 2	+	EB		
<i>Helicostomella sitbidata</i> (Ehrenherg),Jorgetisen, 1924	NEB 3.6X	S	-	EB		
<i>Metacylis mereschkowskii</i> Kof.aX'amp.. 1881	NEB 3.6X	. 2	-	1 B		
<i>Mjorgensenii</i> (Cleve.1902). Kof.a.Camp.. 1924.192"	NEB 3.6	-	-	-		
<i>M mediterraiiea</i> var. <i>neapo-</i> hiana Mereschk, 1981	-	1 s 2	-	-		
<i>Stenosemella nivalis</i> (Meunier. 1910). Kof. a. Camp	EB 3.6	S	-	EB		
<i>S.ventricosa</i> (Clap, el Laeh.. 1858). Jorgensen	EB 3.6.8	S	-	-		

<i>Tintinnopsis tallica</i> Unmeet, 1896	NE 3.6.S	S 2	-	EB		
<i>T.beroidea</i> Stein em i.ntz.. Sr.. em Jorgensen. ISS4	NE 3.6.8	s	-	-		
<i>T.campanulafEhrenberg</i>), Daday, 1840	NEB 3.6.8	S 2	+	EB		
<i>T.compressa</i> Daday, 188'	NE 3.6		-	-		
<i>T.cylindrica</i> Daday. 1886	NE 3.6.8	+	-	EB		
<i>T.luhianeoi</i> Daday. 1886	NEB 3.6.8	S 2	-	EB		
<i>T.meunieri</i> Kofoidet Campbell. 1929	NE 3.6.8	S	-	-		
<i>T.tubulosa</i> Lavander. Kofoid et Campbell. 1900	NEB 3.6.8	S	+	EB		
<i>T.rossoliiu</i> <u>lorozovskaei</u> . 190S	NE 3.6	-	-	-		
<i>T.kojoidi</i> llada, /932	NE 3.6	s	-	-		
<i>T.urnula</i> Meunier, 1910	NE 3.6	-	-	-		
<i>T.mintiadl'ailes</i> , 1925)	-	ES 2	-	-		
<i>T.karajacensis</i> (Brandt. 1908)	IB s	S 2	-	EB		
<i>T.davidoYi</i> Daday. ISSO	IB 8	-	-	EB		
<i>'i sithacnta</i> Jorgensen, 1899	E 8	-	-			
<i>Tinlimidiuin mucicola</i> ('let Lacli.. 1858	E 8	S 2	-	-		
1 'orticella sp. Unite, 1 '58	-	ES 2	-	-		
<i>Zoolliamnius</i> sp. Ehrenberg, 1838	-	ES 2	-	-		
COELENTERATA						
Hydrozoa						
<i>Black/oi-dia</i> Virginia! <u>la</u> er. 1910	E 3.8	S	-	-		
<i>('ampanularia johnstoni</i> (. II- der), 1856	E 3.8	: 2	-	-		
<i>('oryinorpba nutans</i> M.Sars. 1835	E 3	S	-	-		
<i>Corvne tubulosa</i> M.Sars. 1835	i: 3.8	• 2	+	E		

<i>Cordylophora caspia</i> Pallas, 1~0	E 8	S 2	-	-		
(<i>ladonema radiatum</i> Ditjardin, 1843	E 3.8	-	-	-		
<i>Eleutheria dichotoma</i> Ouatre- /ages, 1842	E 3.8	-	-	-		
<i>I hill-actinia carnea</i> (M.Sars). 1846	1 3.8	S	i	i:		
<i>Moerisia maeotica</i> (Ostroumov, 1896)	E 3.8	-	-	E		
<i>Ohelia longissima</i> (Pallas, 1~66)	E 3.8	+ 2	+	-		
<i>Rathkea octopnctata</i> (M. SarsJ, 1835	E 3.8	S	-	i:		
Nematoda						
<i>Nematoda sp. Rudolphi</i> , 18(18	E 8	S 2	+	-		
Scyphozoa						
<i>Aurelia aurita</i> (Lamarck. 1 58)	Ei 3.8	M 2	+	EB		
<i>Rhizostoma pulmo</i> (Macri, 1 "Si	EB 3.8	+ 2		EB		
CTENOPHORA						
<i>Mnemiopsis mccradyi</i> Mayer. 1900	-	EM 10	+	EI		
<i>Pleurobrachia rhodopis</i> ('hun. 1880	EBM 3.8	+ 2	+	B		
NEMERTINI						
Nemertini						
<i>Xemertini sp.larvae (pilidium)</i>	E 3.8		-			
NEMATHELMINTHES						
Rotatoria						

<i>Asplanchna prioclonla</i> (iosse. IS50	i: 3.x	S 2	+	-	-	-
<i>A.p.priodonta</i> Gosse	-	-	-	-	+	+
<i>A.p.tridentata</i> Grander et l'arezuk	-	-	-	-	+	-
<i>A.p.hehetica</i> Imhof	-	-	-	-	+	+
<i>A.sieboldi</i> (Leydig)	-	-	-	-	+	+
<i>A.girodi</i> de Guerne	-	-	-	-	+	+
<i>A.herricki</i> de Guerne	-	-	-	-	+	-
<i>A.Jienriella</i> l.angliaus	-	-	-	-	+	-
<i>A.brig/itvelli</i> Gosse	-	-	-	-	+	+
<i>Asp</i>	-	-	-	-	+	-
<i>Asplaneluiopus</i> mullicept (iSchrank)	-	-	-	-	+	+
<i>Asplanchnoptts</i> syrinx (L.hrenberg)	-	-	-	-	+	+
<i>Aseoinorphella</i> volvoeieola (Plate)	-	-	-	-	-	+
<i>Aseoinorpha</i> minima llojsten	-	-	-	-	+	+
<i>A.saltans</i> Hartsch	-	-	-	-	+	-
<i>. i.agilis</i> Zacharias	-	-	-	-	+	-
<i>A.ecauidis</i> Perty	-	-	-	-	+	-
<i>Alherlia</i> nitidis Bonsjold	-	-	-	-	+	-
<i>. tdntrusor</i> Gosse	-	-	-	-		-
<i>Aspelta</i> mollis Kudeseu	-	-	-	-	+	-
<i>Anuraeopsis</i> Jissa (Gosse)	-	-	-	-	+	+
<i>. tdinela</i> oculata Milne	-	-	-	-	+	-
<i>. t.vaga</i> Davis	-	-	-	-	+	-
<i>A.vaga</i> minor Bryce	-	-	-	-	+	-
<i>A.vaga</i> major Bryce	-	-	-	-	+	-

<i>B. delonyata</i> Roewalel	-	-	-	-	+	-
<i>A. barbata</i> Janson	-	-	-	-	+	-
<i>Alrochus tenaciileilns</i> Il'ierzejski	-	-	-	-	+	-
<i>Beauchampia crucigera</i> (Dutroehet)	-	-	-	-	+	-
<i>Bipalpus hudsoni</i> Imhof	-	-	-	-	+	
<i>brachionus pliceitilis</i> (O. F.Midler, 1 ~86)	K 3.8	+	-	-	+	+
<i>Hp rotundiformis</i> Tschugunoff	-	-	-	-	+	-
<i>B. epiaelrielentalus</i> Hermann. I~83	E 3.8	M 2	+	-	+	+
<i>B. q. quadridentatus</i> Hermann	-	-	-	-	+	+
<i>B. q. melheni</i> Barrels et Daday	-	-	-	-	i	+
<i>B. e\ brexispinus</i> F.hrenherg	-	-	-	-	+	+
<i>B. c\ ancylognatus</i> Schmarda	-	-	-	-	+	+
<i>B. q. cluniohriculeiris</i> Skorikov	-	-	-	-	+	+
<i>B. q. rhenanus</i> hauler horn	-	-	-	-	+	y
<i>B. q. hyphalmyros</i> Tschugunoff	-	-	-	-	+	-
<i>B. q. divergens</i> Tschugunoff	-	-	-	-	+	-
<i>B. q. enlzi</i> (Franco)	-	-	-	-	+	-
<i>B. q. zernovi</i> I oronkov	-	-	-	-	+	-
<i>B. q. hyphalmyros</i> I'schugunox. 1921	-	ES 2	-	-	-	-
<i>B. calyciflorus</i> Vall..]-66	1 3.X	M 2	+	-	+	-
<i>Be. calyciflorus</i> Valias	-	-	-	-	+	+
<i>B. c. var. ampiceros</i> Fhrenherg. 1838	E X	S 2	-	+	-	-
<i>B. c. elorcas</i> Gosse	-	-	-	-	+	+
<i>Il c. elorcas spinosus</i> Il'erzejski	-	-	-	-	+	+
<i>B. c. anuraeiformis</i> Brehm	-	-	-	-	+	.

<i>B.c.amphiceros forficula Rudescu</i>	-	-	-	-	+	+
<i>B. c. spinosus Wierzejski</i>	-	-	-	-	+	+
<i>B.angularis Gosse, 1851</i>	E3	+	-	+	-	-
<i>B. a. angularis (iosse</i>	-	-	-	-	+	+
<i>B.a.aestivus Skorikov</i>	-	-	-	-	+	-
<i>B.a.bidens Plate</i>	-	-	-	-	+	+
<i>B.asplunclmoides ('hurii, 194'</i>	1-3	S	-	-	-	-
<i>B. urceolaris O. F. Midler, 1~3</i>	K8	s	+	-	-	-
<i>B urceus (Linnaeus)</i>	-	-	-	-	+	-
<i>Bu. urceus Linnaeus. 1~5S</i>	-	ES 2	-	-	+	+
<i>B u.sericus Rousselet</i>	-	-	-	-	+	+
<i>B.leydigii Conn</i>	-	-	-	-	+	+
<i>B.l.quadratus Pousse lei</i>	-		-	-	+	+
<i>B l roUldiIS BollSSelel</i>	-	-	-	-	+	+
<i>B.l.lridenlalus Zernov</i>	-	-	-	-	+	+
<i>B.I.I triparlilus Leissling</i>	-	-	-	-	+	+
<i>B.heunini Leissling</i>	-	-	-	-	+	+
<i>B.rubens l'hrenherg</i>	-	-	-	-	+	+
<i>B.bidenlala Anderson</i>	-	-	-	-	+	
<i>B.nilsoni Ahlsrom</i>	-	-	-	-	+	+
<i>B.faleatus Zacharias</i>	-	-	-	-	+	-
<i>B. hudapestmensis Daday</i>	-	-	-	-	+	+
<i>B.b.punctatus Pempe!</i>	-	-	-	-	+	-
<i>B. b. lineatus Skorikov</i>	-	-	-	-	+	+
<i>B.forficula Wierzejski</i>	-	-	-	-	+	-

<i>B.J. woronkowi</i> Eadeew	-	-	-	-	-	-
<i>B.f.minor</i> \ 'oronkow	-	-	-	-	+	-
<i>B.f.inegalis</i> Rodewald	-	-	-	-	+	-
<i>B.J.reducla</i> Grese	-	-	-	-	+	-
<i>B.f.semireducta</i> Rodewald	-	-	-	-	+	-
<i>B.f.divergens</i> I adeew	-	-	-	-	+	-
<i>B.diversicornis</i> I(Daday)	-	-	-	-	+	+
<i>B. d. diversicornis</i> (Daday)	-	-	-	-	+	+
<i>B.d.homoceros</i> (I I ierzejskn	-	-	-	-	+	+
<i>Bryceela tenella</i> Bryce	-	-	-	-	+	-
(<i>ephalodella niegaloeplialu</i> (ilascotl	-	-	-	-	+	-
(<i>.m.compressa</i> Dormer	-	-	-	-	+	-
(<i>.eva</i> Gosse	-	-	-	-	+	-
(<i>Jorjicala</i> Ehrenberg	-	-	-	-	+	-
<i>G.limosa</i> Wuljerl	-	-	-	-	+	-
<i>C.temdsela</i> Burn	-	-	-	-	+	-
(<i>.lenuior</i> Gosse	-	-	-	-	+	-
<i>C pachyodon</i> Wulfert	-	-	-	-	+	-
<i>C'.slerea</i> Gosse	-	-	-	-	+	-
<i>C.s.minor</i> Donner	-	-	-	-	+	-
(<i>.armata</i> Rudescu	-	-	-	-	+	-
(<i>.catellina</i> Mueller	-	-	-	-	+	-
(<i>.c.volvocicola</i> Zawadowski	-	-	-	-	+	-
(<i>.c.major</i> Zawadowski	-	-	-	-	+	-
<i>C'. c. botezati</i> Rodewald	-	-	-	-	+	-

<i>C.fluviatilis</i> Zawadowski	-	-	-	-	-	-
<i>C.gusideaci</i> Rodewald	-	-	-	-	+	-
<i>C. gracilis</i> Ehrenberg	-	-	-	-	-	-
<i>C.globata</i> Gosse	-	-	-	-	+	-
<i>C.gibboides</i> Wuljerl	-	-	-	-	+	-
<i>C.panarista</i> Myers	-	-	-	-	+	-
<i>C.remand</i> Wiszniewski	-	-	-	-	+	-
<i>C.exigua</i> Gosse	-	-	-	-	+	-
<i>C.ventripes</i> Dixon-Nuttall	-	-	-	-	+	-
<i>G.auriculata</i> Mueller	-	-	-	-	+	-
<i>Gdelieata</i> Wuljerl	-	-	-	-	+	-
<i>C.hoodi</i> Gosse	-	-	-	-	+	-
<i>(.derbvi</i> Dixon-Xultall el h'reemann	-	-	-	-	+	-
<i>C. tinea conspicua</i> Donner	-	-	-	-	+	-
<i>C. oxydaelyla</i> Wulfer	-	-	-	-	-	-
<i>C'.gihha</i> (Ehrenberg)	-	-	-	-	+	+
<i>Colurella adriatica</i> Ehrb., IHII	E 3.8	-	-	-	+	+
<i>(.monodactylos</i> Althaus, 195~	E 3	-	-	-	-	-
<i>C.colurus</i> (Ehrbg.,1830)	E 8	-	-	-	+	-
<i>C. obttsa</i> Gosse	-	-	-	-	+	-
<i>C.o.clausa</i> Hatter	-	-	-	-	+	-
<i>C.o.aperta</i> Hatter	-	-	-	-	+	-
<i>C.sinistra</i> Carlin	-	-	-	-	+	-
<i>CJtindenburgi</i> Sid necke	-	-	-	-	+	-
<i>C.dicentra</i> Gosse	-	-	-	-	+	-

<i>C.colitrus compressa</i> Lucks	-	-	-	-	+	-
(<i>.uncinate/</i> (Mueller)	-	-	-	-	+	-
(<i>.i.bicuspidata</i> /Ehrenberg)	-	-	-	-	+	-
(<i>.u.dejlexu</i> (Ehrenberg)	-	-	-	-	+	-
<i>Cpaludosa</i> Carlin	-	-	-	-	+	-
<i>C.tesselata</i> Glascott	-	-	-	-	+	-
(<i>.gastracantha</i> Elauer	-	-	-	-	+	-
(<i>onochilus hipocrepis</i> (Schrnk)	-	-	-	-	+	+
(<i>. unicornis</i> Rousselet	-	-	-	-	+	-
(<i>onochih)ides deltaicus</i> Rudescu	-	-	-	-	+	-
(<i>.coenobasis</i> Skorikow	-	-	-	-	+	-
(<i>.nutans</i> (Seligo)	-	-	-	-	+	-
(<i>.dossuarius</i> Hudson	-	-	-	-	+	-
(<i>'ollothecu edeniata</i> l(<i>'ollins</i>)	-	-	-	-	+	-
(<i>'pelagica</i> Rousselet	-	-	-	-	+	-
(<i>. balatonica</i> I arga	-	-	-	-	+	-
<i>C.I i heru</i> Zacharias	-	-	-	-	+	-
(<i>.mutabilis</i> Hudson	-	-	-	-	+	-
(<i>.u/rochoides</i> Wierzejski	-	-	-	-	+	-
<i>C.calva</i> Hudson	-	-	-	-	+	-
<i>C.hoodi</i> Hudson	-	-	-	-	+	-
(<i>.trilohata</i> (oilins	-	-	-	-	+	-
(<i>.algicolu</i> Hudson	-	-	-	-	+	-
(<i>. biljingeri</i> Berlins	-	-	-	-	+	-
<i>C.ambigua</i> Hudson	-	-	-	-	+	-

<i>(.rotiilcila Seheslyen el 1 arga</i>	-	-	-	-	+	-
<i>C'campanulata Dobie</i>	-	-	-	-	+	-
<i>C. cyclops ('ubill</i>	-	-	-	-	+	-
<i>(.omaki Ehrenberg</i>	-	-	-	-	+	-
<i>C. omaki cornula Dobie</i>	-	-	-	-	+	-
<i>C.omata natans Tschugunoff</i>	-	-	-	-	+	-
<i>(.heptabrachiata Schoch</i>	-	-	-	-	+	-
<i>(.heptabrachiata diadema I'elr</i>	-	-	-	-	+	-
<i>('hroinogasier oralis iHergendall</i>	-	-	-	-	+	-
<i>Cupelopagis vorax I.eydig</i>	-	-	-	-	+	-
<i>Diple.propatida Gosse</i>	-	-	-	-	+	-
<i>Diplois daviesiae Gosse</i>	-	-	-	-	+	-
<i>Dieranophorus gaudis I Ehrenberg)</i>	-	-	-	-	+	-
<i>I). uiicinalus Milne</i>	-	-	-	-	+	-
<i>I > u minor KovtiU link</i>	-	-	-	-	+	-
<i>D.hauerianus hauerianus II iszniewski</i>	-	-	-	-	+	-
<i>D. h. bruchygnathiis IT iszniewski</i>	-	-	-	-	+	-
<i>D he rentes Wiszniewski</i>	-	-	-	-	+	-
<i>D.leptodon Wiszniewski</i>	-	-	-	-	+	-
<i>D.luetkeni liergendal</i>	-	-	-	-	i	-
<i>IXforcipalus (Inciter)</i>	-	-	-	-	+	-
<i>D.rostralus Dixon-Xuital el Freeman</i>	-	-	-	-	+	-
<i>D.caudaius (Ehrenberg)</i>	-	-	-	-	+	-
<i>D.arlamus lepsii Rodewald</i>	-	-	-	-	+	-
<i>D.rosa Gosse</i>	-	-	-	-	+	-

<i>D.proclestes Honing el Myers</i>	-	-	-	-	+	-
<i>Dissotroeho mocrosyla (Ehrenberg)</i>	-	-	-	-	+	-
<i>D.oeulealo aculeata I Ehrenberg)</i>	-	-	-	-	+	-
<i>Dnlophaga delagei de Heauchainp</i>	-	-	-	-	+	-
<i>Enccnlruin marinuni (Du/ardin. IS-fh</i>	E 3	S	-	-	+	-
<i>E.muslella (Mueller)</i>	-	-	-	-	+	-
<i>E plication Eyferth</i>	-	-	-	-	+	-
<i>Ehuetiae Iteming el Myers</i>	-	-	-	-	+	-
<i>E.grande Western</i>	-	-	-	-	+	-
<i>E.putorius Wulfert</i>	-	-	-	-	+	-
<i>Ejelis Mueller</i>	-	-	-	-	+	-
<i>E.sutor Wiszniewski</i>	-	-	-	-	+	-
<i>E.martes Wuljerl</i>	-	-	-	-	+	-
<i>E.rousseleti Eie-I'eilersen</i>	-	-	-	-		-
<i>E.saundersiae saundersiae IHudson)</i>	-	-	-	-	+	-
<i>E Intra Wuljerl</i>	-	-	-	-	.	-
<i>Enteroplea lacuslris Ehrenberg</i>	-	-	-	-	+	-
<i>Eosphoro ehrenbergi Weber et Mantel</i>	-	-	-	-	+	-
<i>E.najas Ehrenberg</i>	-	-	-	-	+	-
<i>E.thoa Honing el myers</i>	-	-	-	-	+	-
<i>E.thoa ihoides Wuljerl</i>	-	-	-	-	+	-
<i>Epiphanes senta (Mueller)</i>	-	-	-	-	+	-
<i>E. brachionus (Ehrenberg)</i>	-	-	-	-	+	+
<i>E.b.spinosus (Rousselet)</i>	-	-	-	-	+	-
<i>E clavulula (Ehrenberg)</i>	-	-	-	-	+	+

<i>E.macroura</i> (Barrois et Daday)	-	-	-	-	+	-
<i>Erignadia clastopis</i> Hudson et Gosse	-	-	-	-	+	-
<i>Euchlanis dilatata</i> Ehrenberg, 1832	E 3.8	S	-	-	+	-
<i>E.d.datata</i> Ehrenberg	-	-	-	-	+	+
<i>E. d. macrura</i> Ehrenberg	-	-	-	-	+	-
<i>E.d.lucksiana</i> I latter	-	-	-	-	+	-
<i>E.d.unisetata</i> I.e.</i>	-	-	-	-	+	-
<i>E.deflexa</i> Gosse	-	-	-	-	+	+
<i>E.Irii/tetra</i> Ehrenberg	-	-	-	-	+	-
<i>Et.hyalina</i> I.eydidig	-	-	-	-	+	-
<i>E.lvra</i> Hudson	-	-	-	-	+	-
<i>E.parva</i> Rousselet	-	-	-	-	+	-
<i>E.ineisa</i> (uuiin)	-	-	-	-	+	-
<i>E.pyriforitus</i> Gosse	-	-	-	-	+	-
<i>E.alata</i> I'oronkow	-	-	-	-	+	-
<i>E.oropha</i> Gosse	-	-	-	-	+	-
<i>E.inenela</i> Myers	-	-	-	-	+	-
<i>E.calpidia</i> (Myers)	-	-	-	-	+	-
<i>E.eontorta</i> (Wulfert)	-	-	-	-	+	-
<i>E.phryne</i> Myers	-	-	-	-	+	-
<i>Eudaclylola eudactylota</i> Gosse	-	-	-	-	+	-
<i>Embata coiiiiueiisalis</i> Western	-	-	-	-	+	-
<i>E.parasitica</i> (liglioli)	-	-	-	-	+	-
<i>Filinia longiseta</i> (Ehrenberg. IS34)	E 3	S 2	+	-	+	+
<i>E. I. longiseta</i> (Ehrenberg)	-	-	-	-	+	+

<i>F. brachiata (Pousselet)</i>	-	-	-	-	-	+ •
<i>F. major Colditz</i>	-	-	-	-	+	-
<i>F. passa (Mueller)</i>	-	-	-	-	+	-
<i>F. terminalis (Plate, 1886)</i>	E 3	S	-	-	+	+
<i>F. ringens (Linne)</i>	-	-	-	-	+	-
<i>F. asecta Fadeew</i>	-	-	-	-	+	-
<i>F. cornuta IWeisse</i>	-	-	-	-	+	-
<i>Fe. eornuta IWeisse</i>	-	-	-	-	+	-
<i>F. c. m. onoarthra Sokolowa</i>	-	-	-	-	+	-
<i>Floscularia milicerta (Ehrenberg)</i>	-	-	-	-	+	-
<i>F. jants (Hudson)</i>	-	-	-	-	+	-
<i>κ coin/era (Hudson)</i>	-	-	-	-		-
<i>Gasropus styliger Imhoj</i>	-	-	-	-	+	-
<i>Habrolrocha eollaris Ehrenberg</i>	-	-	-	-	+	-
<i>Il. gracilis Montet</i>	-	-	-	-	+	-
<i>Il. g. gracilis Montet</i>	-	-	-	-	+	-
<i>H. g. quadridens Schulte</i>	-	-	-	-	+	-
<i>I. lata Bryce</i>	-	-	-	-	+	-
<i>U. tripits Murray</i>	-	-	-	-	+	-
<i>H. bidens Gosse</i>	-	-	-	-	+	-
<i>H. rosa Donner</i>	-	-	-	-	+	-
<i>H. constricta Dujardin</i>	-	-	-	-	+	-
<i>H. augusticollis (Murray)</i>	-	-	-	-	+	-
<i>H. crenata (Murray)</i>	-	-	-	-	+	-
<i>Ik. c. crenata (Murray)</i>	-	-	-	-	+	-

<i>H.c.sphagnophila</i> Pawlowski	-	-	-	-	-	-
<i>Il elegans</i> (Milne)	-	-	-	-	+	-
<i>Il.spicule</i> /Bryce	-	-	-	-	+	-
<i>Iurringia eupe>elei</i> Gosse	-	-	-	-	+	-
<i>I lexarlhrei jennica</i> (I.evaneler)	-	-	-	-	+	-
<i>Il. oxyurus</i> (Zernov)	-	-	-	-	+	-
<i>H.mollis</i> (Bartos)	-	-	-	-		+
<i>I l.mira</i> (Hudson)	-	-	-	-	+	-
<i>Ilura aurita</i> Ehrenberg	-	-	-	-	+	-
<i>I.aurita intermedia</i> Wuljerl	-	-	-	-	+	-
<i>I.viridis</i> Stenroos	-	-	-	-	+	-
<i>I.myersi</i> Wulfert	-	-	-	-	+	-
<i>Keratella cruciformis</i> (Thompson, 1H92)	E 3	S	-	-	-	-
<i>K.cochlearis</i> (Gosse. ES51)	E 3.8	+ 2	Y	-	+	+
<i>K.cochlearis cochlearis</i> (Gosse)	-	-	-	-	+	+
<i>K electa</i> (Gosse)	-	-	-	-	.	+
<i>K c. t.punctata</i> (Lauterhorn)	-	-	-	-	+	-
<i>κ c. I. major</i> (Lauterhorn)	-	-	-	-	+	-
<i>k.c.macracantlia</i> 1 Lauterhorn)	-	-	-	-	+	-
<i>K.c.m.micracantha</i> (Lauterhorn)	-	-	-	-	I	-
<i>k.c.iii.liiherculata</i> (Lauterhorn)	-	-	-	-	+	-
<i>κ. c. leptacantha</i> (Lauterhorn)	-	-	-	-	+	-
<i>k.c.hispilei</i> (Lauterhorn)	-	-	-	-	t	-
<i>K.c.robusta</i> (Lauterhorn)	-	-	-	-	+	-
<i>k. irregularis</i> (Lauterhorn)	-	-	-	-	+	-

<i>K.i.irregularis</i> (Lauterhorn i)	-	-	-	-	+	-
<i>K.i.connectens</i> (Lauterhorn)	-	-	-	-	+	-
<i>K.i.angulifera</i> (Lauterhorn)	-	-	-	-	+	-
<i>K.q.quadrata</i> (Midler. 1~S'l	E 3.8	+ 2	+	-	+	+
<i>K.q.quadrata</i> (Midler. 1~86)	i: 8	S 2	-	-	+	+
<i>K.q.frenzeli</i> (Eckstein, 1895)	-	ES 2	-	-	+	
<i>K.q.reticulata</i> (Carlin, 1943)	-	ES 2	-	-	+	f
<i>K.q.plalei f.laegersk/oehl</i>	-	-	-	-	+	-
<i>K.q.divergens</i> l'oigt	-	-	-	-	+	-
<i>K.q.disperse!</i> ('arlin	-	-	-	-	+	-
<i>K.tropica</i> (Apstein)	-	-	-	-	+	+
<i>K.I.ospina l'adeev</i>	-	-	-	-	+	-
<i>K t.tropica</i> (Apstein. 190')	-	ES 2	-	-	+	+
<i>K.I.rediicla hadeev. 192'</i>	-	ES 2	-	-		+
<i>K.seiridata ciirvicornis Ky/ov</i>	-	-	-	-	+	-
<i>K.ticinensis</i> (('allerio)	-	-	-	-	+	-
<i>K.volga</i> (Ehrenberg)	-	-	-	-	+	+
<i>K.v.valga</i> (Ehrenberg)	-	-	-	-	+	+
<i>K.v.monospina Klausener</i>	-	-	-	-	+	+
<i>K.v.heterospina l Klausener</i>	-	-	-	-	+	+
<i>K.v.hrehuui Klausener</i>	-	-	-	-	+	-
<i>K.lestudo</i> Ehrenberg	-	-	-	-	+	+
<i>K.hiemalis</i> ('arlin	-	-	-	-		-
<i>Kellicotlia longispina</i> (Kellicott. 18'9)	1 3.8	S	-	-	+	-
<i>l.ocinularia flosculosa</i> (Mueller)	-	-	-	-	+	-

<i>Limnias ceratophylli</i> Schrank	-	-	-	-	+	-
<i>L.milicerta</i> Weisse	-	-	-	-	+	-
<i>Lindia tondosa</i> Dujardin	-	-	-	-	+	-
<i>L.truncata</i> Jennings	-	-	-	-	+	-
<i>Iecane obtusa</i> (Murray)	-	-	-	-	+	-
<i>LJigona</i> (Dunlop)	-	-	-	-	+	-
<i>I.J! ex i lis</i> Gosse	-	-	-	-	+	+
<i>I.arcula llarring</i>	-	-	-	-	+	-
<i>/. ungulala</i> (Gosse)	-	-	-	-	+	+
<i>L.affinis l.cylinder</i>	-	-	-	-	+	-
<i>I. tenuiseta llarring</i>	-	-	-	-	+	-
<i>I.subtilis llarring</i>	-	-	-	-	+	-
<i>L.grandis</i> Murray)Murray, 1913)		-	-	-	+	-
<i>I.liornemanni</i> Ehrenberg	-	-	-	-	+	-
<i>L.Hyphema llarring el Myers</i>	-	-	-	-	+	-
<i>I. nana</i> Murray	-	-	-	-	+	-
<i>I.magna iSlenroos)</i>	-	-	-	-	+	-
<i>E. ludwigii</i> (Eckstein)	-	-	-	-	+	-
<i>L.ohioensis</i> (I lerriek)	-	-	-	-	+	-
<i>h.inermis</i> Brvce	-	-	-	-	+	-
<i>l.puinila</i> Rousselet	-	-	-	-	+	-
<i>L.gissensis</i> Eckstein	-	-	-	-		-
<i>h.kluchor</i> Tarnogradsky	-	-	-	-	+	-
<i>L.agilis</i> bryce	-	-	-	-	+	-
<i>L.elasma llarring el Myers</i>	-	-	-	-	+	-

<i>L. quadridentata</i> (Ehrenberg)	-	-	-	-	+	f
<i>L. pygmaea</i> (Murray)	-	-	-	-	+	-
<i>L. hamata</i> (Stokes)	-	-	-	-	+	-
<i>L. closterocerca</i> (Schmarda)	-	-	-	-	+	+
<i>L. copeus</i> (Murray)	-	-	-	-	+	-
<i>L. psalmodi</i> (Murray)	-	-	-	-	+	-
<i>L. crenata</i> (Murray)	-	-	-	-	+	-
<i>L. bulla</i> Gosse	-	-	-	-	+	+
<i>L. slenroosi</i> (Murray)	-	-	-	-	+	+
<i>L. galeata</i> (Murray)	-	-	-	-	+	-
<i>L. comma</i> (Murray)	-	-	-	-	+	+
<i>L. lunaris</i> (Ehrenberg)	-	-	-	-	+	-
<i>L. lialera</i> (Murray)	-	-	-	-	+	-
<i>L. lainellata</i> (Murray)	-	-	-	-	+	-
<i>L. hifurca</i> (Murray)	-	-	-	-	+	-
<i>L. furcata</i> (Murray)	-	-	-	-	+	-
<i>L. plesia</i> (Murray)	-	-	-	-	+	-
<i>L. curvicornis</i> (Murray)	-	-	-	-	+	-
<i>L. hastata</i> (Murray)	-	-	-	-	+	-
<i>L. verecunda</i> (Murray)	-	-	-	-	+	-
<i>L. undulata</i> (Murray)	-	-	-	-	+	-
<i>L. copeus</i> (Murray)	-	-	-	-	+	-
<i>L. pygmaea</i> (Murray)	-	-	-	-	+	-
<i>L. luna</i> (Murray)	-	-	-	-	y	+
<i>L. balatonica</i> (Murray)	-	-	-	-	+	-

<i>L.l.presumpta</i> Ahlstrom	-	-	-	-	+	-
<i>Lepadella parasita</i> Hatter	-	-	-	-	+	-
<i>L.astscicola</i> Hotter	-	-	-	-	+	-
<i>L.lata</i> Wieszniowski	-	-	-	-	+	-
<i>L.l.sinuata</i> Wieszniowski	-	-	-	-	+	-
<i>L.raja</i> Wieszniowski	-	-	-	-	+	-
<i>h. branchico/a</i> flatter	-	-	-	-	+	-
<i>L. borealis</i> Ilarring	-	-	-	-	+	-
<i>Lquadricarinata</i> (Stenroos)	-	-	-	-	+	-
<i>l.q.oeloeariitalo</i> Wnl/erl	-	-	-	-	+	-
<i>L. ovalis</i> (Mueller)	-	-	-	-	+	+
<i>E.elliptica</i> Wuljerl	-	-	-	-	+	-
<i>L.patella</i> (Mueller)	-	-	-	-	+	+
<i>L.p.patella</i> (Mueller)	-	-	-	-	+	-
<i>L.p.similis</i> (Lucks)	-	-	-	-	+	-
<i>k.p.marine</i> Rodewald	-	-	-	-	+	-
<i>h. cryphaea</i> Ilarring	-	-	-	-	+	-
<i>I..dactyliscta</i> (Stenroos)	-	-	-	-	+	-
<i>L.minuta</i> Montet	-	-	-	-	+	-
<i>L.costata</i> Wuljerl	-	-	-	-	+	-
<i>L.rhomboides</i> (Gosse)	-	-	-	-	+	-
<i>L. amptilropis</i> Ilarring	-	-	-	-	+	-
<i>/..triptera</i> Ehrenberg	-	-	-	-	+	-
<i>[..acuminata</i> (Ehrenberg)	-	-	-	-	+	+
<i>L.nympha</i> Donner	-	-	-	-	+	-

<i>h.ehrenhergi</i> Perty	-	-	-	-	+	-
<i>L.haueri</i> Rodewald	-	-	-	-	+	-
<i>L.quinquecostata</i> (Lucks)	-	-	-	-	+	-
<i>Lophocharis lepadelloides</i> Rodewald	-	-	-	-	+	-
<i>L.salpina</i> (Ehrenberg)	-	-	-	-	+	-
<i>L.oxysternon</i> (Gosse)	-	-	-	-	+	-
<i>Maerochaetus collinsii</i> Gosse	-	-	-	-	+	-
<i>M.subquadrattis</i> Perty	-	-	-	-	+	-
<i>Metadiaschiza trigona</i> Rousselet	-	-	-	-	+	-
<i>Monommata aegttalis</i> Ehrenberg	-	-	-	-	+	-
<i>M.dentala</i> Wulfert	-	-	-	-	+	-
<i>M.appendleulata</i> Stenroos	-	-	-	-	+	-
<i>M.granchs</i> Tessin	-	-	-	-	+	-
<i>Mdongisela</i> Mueller	-	-	-	-	+	-
<i>Mastia</i> Myers	-	-	-	-	+	-
<i>Microeodides chlaena</i> (Gosse)	-	-	-	-	-	-
<i>Mlcrocodon clavus</i> Ehrenberg	-	-	-	-	+	-
<i>Mniobia incrassata</i> (Muray)	-	-	-	-	+	-
<i>M. scarlatina</i> (Ehrenberg)	-	-	-	-	+	-
<i>M.granulosa</i> Bartos <i>m. magna</i> (Plate)	-	-	-	-	+	-
<i>M. russeola</i> (Zelinka)	-	-	-	-	+	-
<i>M. tetraodon</i> (Ehrenberg)	-	-	-	-	+	-
<i>M. inhiotiea</i> (Zelinka)	-	-	-	-	+	-
<i>Maerotraehela mullispinosa</i> Thompson	-	-	-	-	+	-
<i>M. hifringeri</i> Bryce	-	-	-	-	+	-

<i>M.plicata plicata</i> (Bryce)	-	-	-	-	+	-
<i>M.p.hiruulinella</i> (Murray)	-	-	-	-	+	-
<i>M.nana nana</i> (Bryce)	-	-	-	-	+	-
<i>M.ehrenbergii</i> (Janson)	-	-	-	-	+	-
,\Icpidricornifera \Blue	-	-	-	-	+	-
<i>M.papillosa</i> Thompson	-	-	-	-	+	-
\I. mullispinosa Thompson	-	-	-	-	+	-
\I m. mullispinosa Thompson	-	-	-	-	+	-
<i>M.m.brevispinosa</i> (Murray}	-	-	-	-	+	-
<i>Mzickendrahti</i> (Richlers)	-	-	-	-	+	-
<i>M.z.digitata</i> Bartos	-	-	-	-	+	-
<i>Mytilina miitica</i> (Perty)	-	-	-	-	+	-
<i>M.bicarinata</i> (Perty)	-	-	-	-	+	-
<i>Mmueronata</i> (Mueller)	-	-	-	-	+	-
<i>Mm iiiucronala</i> (Mueller)	-	-	-	-	+	+
<i>Mm spongera</i> (Ehrenberg)	-	-	-	-	+	+
\I. ventral is (Ehrenberg)	-	-	-	-	+	-
<i>M v. ventralis</i> Ehrenberg)	-	-	-	-	+	-
<i>Mv.redueta</i> (Ehrenberg)	-	-	-	-	+	-
<i>M. v. brevispiitii</i> (Ehrenberg)	-	-	-	-	+	-
\I macracantha (Gosse)	-	-	-	-	+	-
<i>Mvitlens</i> Eevaiuler)	-	-	-	-	+	-
<i>M.crassipes</i> (Lucks)	-	-	-	-	+	-
<i>M.trigone!</i> (Gosse)	-	-	-	-	+	-
<i>Solhilea se/uamu/lei</i> (Mueller)	-	-	-	-	+	-

<i>N.squamulla squamulla</i> (Mueller)	-	-	-	-	+	+
<i>X s.frigida</i> Jaschnov	-	-	-	-	+	-
<i>Sotholca acuminata</i> (Ehrenberg. 1832)	K 3	S 2	-	-		
<i>X.a.acuminata</i> (Ehrenberg)	-	-	-	-	+	+
<i>X.a.e.extensa</i> Oloffson.1918	-	ES 2	-	-	+	-
<i>A.striata</i> (OF.Midler. 1 '86)	E 3.8	E	-	-	+	-
<i>X. c/netura</i> Skorikow	-	-	-	-	+	-
<i>X.lahis</i> Gosse	-	-	-	-	+	-
<i>X.foliaeae</i> I Ehrenberg)	-	-	-	-	+	-
<i>Xotommata diasema</i> Myers	-	-	-	-	+	-
<i>X. copeus</i> Ehrenberg	-	-	-	-	+	-
<i>A pachyura</i> (Gosse)	-	-	-	-	+	-
<i>\ brachy out</i> Ehrenberg	-	-	-	-		-
<i>N.cerberus</i> Gosse	-	-	-	-	+	-
<i>X.glyphura</i> Wuljerl	-	-	-	-	+	-
<i>X.pseudocerberus</i> de Hcatichamp	-	-	-	-	+	-
<i>X.silpha</i> (Iossc	-	-	-	-	+	-
<i>X. tripus</i> Ehrenberg	-	-	-	-	+	-
<i>X. eollaris</i> (Ehrenberg)	-	-	-	-	+	-
<i>X.saccigera</i> Ehrenberg	-	-	-	-	+	-
<i>X.aurita</i> (Mueller)	-	-	-	-	+	-
<i>X.cyrtopus</i> Gosse	-	-	-	-	+	-
<i>X.doneta llarring et</i> Myers	-	-	-	-	.	-
<i>Farad.hudsoni</i> (Glascott)	-	-	-	-	+	
<i>Philodina cilrina</i> Ehrenberg	-	-	-	-	+	-

<i>Ph. megalotrocha</i> Ehrenberg	-	-	-	-	+	-
<i>Ph. acuticornis</i> Murray	-	-	-	-	+	-
<i>Ph. a. oc/i as a</i> Milne	-	-	-	-	+	-
<i>Ph. eryihrophthahna</i> Ehrenberg	-	-	-	-	+	-
<i>Ph. eristata</i> Donner	-	-	-	-	+	-
<i>Ph. brevipes</i> Murray	-	-	-	-	+	-
<i>I'h. vorax</i> (Janson)	-	-	-	-	+	-
<i>Ph. striata</i> Rodewald	-	-	-	-	+	-
<i>Ph. tridentctta</i> Rodewald	-	-	-	-	+	-
<i>Ph. plena</i> Bryce	-	-	-	-	+	-
<i>Ph. roseola</i> Ehrbr., 1832	E 8	-	-	-	+	+
<i>I'leiiiretra hrycei</i> (Weber)	-	-	-	-	+	-
<i>P. costata</i> (Bartos)	-	-	-	-	+	-
<i>Pleurotrocha petromyzon</i> Ehrenberg	-	-	-	-	+	-
<i>P. constricta</i> Ehrenberg	-	-	-	-	+	-
<i>Plalyias polyacanthus</i> (Ehrenberg)	-	-	-	-	4	-
<i>P. patulits</i> (Mueller)	-	-	-	-	+	+
<i>P.p. palulus</i> (Mueller)	-	-	-	-	+	+
<i>P.p. halatonicus</i> l'arga	-	-	-	-	+	-
<i>P.p. leopoldi</i> (Oye)	-	-	-	-	+	-
<i>P. quadricornis quadricornis</i> (Ehrenberg)	-	-	-	-	+	+
<i>P. cphrevispinus</i> (Daday)	-	-	-	-		+
<i>Ploesoma truncation</i> (Levander)	-	-	-	-	+	+
<i>P. tenticulare</i> Harrick	-	-	-	-	+	-
<i>P. lynceus</i> Ehrenberg	-	-	-	-	+	-

<i>Ploesoma triacanthum</i> (Bergendal)	-	-	-	-	+	-
<i>Polvarthra remata</i> Skorikov, 1896	1 3	S	-	-		
<i>P.vulgaris</i> Carlin, /943	E 3.8	s	-	-	+	+
<i>P. dolichoptera</i> Idelson	-	-	-	-	+	+
<i>/'.minor \ oigi</i>	-	-	-	-	+	-
<i>P major</i> Burckhardt	-	-	-	-	+	+
<i>P. euryptera</i> Wierzejski	-	-	-	-	+	1
<i>l'.longiremis</i> Carlin	-	-	-	-	+	-
<i>P.proloba</i> Wulfert	-	-	-	-	+	-
<i>P.pseudoproloha A/hurtova</i>	-	-	-	-	+	-
<i>P.sp</i>	-	-	-	-	+	-
<i>Postclausa minor</i> Rousselet	-	-	-	-	+	-
<i>P.hyptopus</i> (Ehrenberg)	-	-	-	-	+	-
<i>Pompholyx eomplanata</i> Crosse	-	-	-	-	+	-
<i>/'.sulcata</i> Hudson	-	-	-	-	+	+
<i>Proales reinhardti</i> (Ehrb.. 1834)	E 3.8	s	-	-		
<i>P doliaris</i> Rousselet	-	-	-	-	+	-
<i>P. wernecki</i> (Ehrenberg)	-	-	-	-	+	-
<i>P.halophila</i> Remane	-	-	-	-	t	-
<i>P dafnicola</i> (Thompson)	-	-	-	-	+	-
<i>P. paras i to</i> (Ehrenberg)	-	-	-	-	+	-
<i>P.uroglenae de</i> Beauchamp	-	-	-	-	+	-
<i>P.minima</i> Montet	-	-	-	-	+	-
<i>P.brevipes llarring et</i> Myers	-	-	-	-	+	-
<i>l'.similis de</i> Beauchamp	-	-	-	-	+	-

<i>P.fallaciosa</i> Wulfert	-	-	-	-	+	-
<i>P.cleciapiens</i> (Ehrenberg)	-	-	-	-	+	-
<i>P.sordida</i> Gosse	-	-	-	-	+	-
<i>P.theodora</i> (Gosse)	-	-	-	-	+	-
<i>P.mieropus</i> (Gosse)	-	-	-	-	+	+
<i>Pseudoharringia similis</i> Fadeew	-	-	-	-	+	-
<i>Ptygura spongicola</i> Berlins	-	-	-	-	+	-
<i>P.milieerta</i> Ehrenberg	-	-	-	-	+	-
<i>P.milicerta mucicola</i> Ke/licott	-	-	-	-	+	-
<i>P.velata</i> Gosse	-	-	-	-	+	-
<i>P.pilula</i> C'ubitt	-	-	-	-	+	-
<i>P.crystallina</i> Ehrenberg	-	-	-	-		-
<i>P.longipes</i> Wills	-	-	-	-	+	-
<i>P.Jongicornis socialis</i> Weber	-	-	-	-	+	-
<i>Rhinoglena frontalis</i> Ehrenberg	-	-	-	-	+	-
<i>Resticula gelida</i> Haining el Myers	-	-	-	-	+	-
<i>R.melandocus</i> Gosse	-	-	-	-	+	-
<i>Rotaria neptunia</i> Ehrenberg	-	-	-	-	+	+
<i>Rlriscalca</i> (Weber)	-	-	-	-	+	-
<i>R.tridens</i> Montet	-	-	-	-	+	-
<i>R.elongata</i> Weber	-	-	-	-	+	-
<i>R.gracilicauda</i> (Bory de St. Vincent)	-	-	-	-	+	-
<i>R.c/tr/na</i> Ehrenberg	-	-	-	-	+	-
<i>R.macroceros</i> Gosse	-	-	-	-	+	-
<i>R.macrura</i> Ehrenberg	-	-	-	-	+	-

<i>R. rotatoria</i> Pallas	-	-	-	-	+	+
<i>R. sordida</i> Western	-	-	-	-	+	-
<i>R. magna-calcarata</i> Parsons	-	-	-	-	+	-
<i>R. socialis</i> Kellicott	-	-	-	-	+	-
<i>R. neptunoida</i> Plarring	-	-	-	-	+	-
<i>R. tardigrada</i> Phrbg., 1832	1- 8	-	-	-		-
<i>Scandium longieaudum</i> (Mueller/	-	-	-	-	+	-
<i>Sinantherina socialis</i> Linne	-	-	-	-	+	-
<i>Scptatinella rostrum</i> Schmarda	-	-	-	-	+	-
<i>S. tridentata mutica</i> Ehrenberg	-	-	-	-	+	-
<i>S. lerdigi</i> 'acharias	-	-	-	-	+	-
<i>S. hi/urea</i> Bolton	-	-	-	-	+	-
<i>Stephanoceros Jimbrialus</i> Goldfuss	-	-	-	-	+	-
<i>Synchaeta pectinata</i> Ehrenberg, 1832	E 3.8	S 2	-	-		
<i>S. striata</i> Wierzejski, 1893	E 3	S 2	-	-	+	+
<i>S. rora.x</i> Rousselet, 1902	E 3.8	S 2	-	-	+	-
<i>S. littoralis</i> Rousselet, 1902	E 3.8	S 2	-	-	+	-
<i>S. baltica</i> Ehrenberg, 1834	E 8	M 2	+	-	+	-
<i>S. monopus</i> Plate, 1889	-	+E 2	-	-	+	-
<i>S. grimpei</i> Remane, 1929	-	liS 2	-	-	-	-
<i>S. oblonga</i> Ehrenberg, 1831	-	ES 2	-	-	+	+
<i>S. cecilia</i> Rousselet, 1902	-	ES 2	-	-	+	-
<i>S. triophthalma</i> Lauterhorn, 1894	E 8	S 2	-	-		
<i>S. longipes</i> Gosse	-	-	-	-	+	-
<i>S. curvata</i> Lie-Pettersen	-	-	-	-	+	-

<i>S.ceciliafusipes</i> Buchhoh	-	-	-	-	+	-
<i>S.grandis</i> Zacharias	-	-	-	-	+	-
<i>S.kitina</i> Rousselet	-	-	-	-	+	-
<i>S.tremula</i> Mueller	-	-	-	-	+	+
<i>S.tavina</i> Hood	-	-	-	-	+	-
<i>S.gyrina</i> Hood	-	-	-	-	+	-
<i>S.rasehni</i> Rudesett	-	-	-	-	+	-
<i>S.sp. Ehrenberg, 1832</i>	-	-	-	E	+	-
<i>S.neapolitana</i> Rousselet. 1902	i: 8	S	-	-	+	-
<i>Taphrocampa selenura</i> Gosse	-	-	-	-	+	-
<i>T.ctnoidosa</i> Gosse		-	-	-	i	-
<i>Taphrocampa selenura</i> Gosse	-	-	-	-	i	-
<i>T.anmdosa</i> Gosse	-	-	-	-	i	-
<i>Trichocerca capuchin tiller., et V.ach., 1893)</i>	E 8	s	-	-	-	-
<i>T.marina</i> (Daday, 1890)	E 8	s	-	-	-	-
<i>T.raltus</i> (O.T.Midler..I"6)	E 8	s	-	-	+	+
<i>T.elongata</i> Gosse	-	-	-	-	+	-
<i>T.lophoessa</i> (Gosse)	-	-	-	-	+	-
<i>T.gracilis</i> (Tessin)	-	-	-	-	1	-
<i>T.bicristata</i> (Gosse)	-	-	-	-	+	-
<i>T.cylindrica</i> (Imhof)	-	-	-	-	+	+
<i>T.jenningsi</i> (Woigt)	-	-	-	-		-
<i>T.iiigris</i> (Mueller)	-	-	-	-		-
<i>T.leniiior</i> (Gosse)	-	-	-	-	+	+
<i>T.fusififormis</i> (T.cylinder)	-	-	-	-	+	-

<i>T. terms (Gosse)</i>	-	-	-	-	+	-
<i>T. similis (Wierzejski)</i>	-	-	-	-	+	-
<i>T. birostris (Minkiewicz)</i>	-	-	-	-	+	-
<i>T. scipio (Hudson et Gosse)</i>	-	-	-	-	+	-
<i>T. longiseta (Schrank)</i>	-	-	-	-	+	-
<i>T. sejunctipes (Gosse)</i>	-	-	-	-	+	-
<i>T. rattus (Mueller)</i>	-	-	-	-	+	-
<i>T. r. earinata (Ehrenberg)</i>	-	-	-	-	+	+
<i>T. r. minor E'adeew</i>	-	-	-	-	+	-
<i>T. Jnervis (hinder)</i>	-	-	-	-	(-
<i>T. sty/ata (Gosse)</i>	-	-	-	-	+	-
<i>T. pusdla (Jennings)</i>	-	-	-	-	+	-
<i>T. parvula ('arlin</i>	-	-	-	-	+	-
<i>Edixon-nuttidli (Jennings)</i>	-	-	-	-	+	+
<i>T. brachyura (Gosse)</i>	-	-	-	-	+	-
<i>T. rousselet! 1 oigt</i>	-	-	-	-	+	-
<i>T. sulcata (Jennings)</i>	-	-	-	-	+	-
<i>T. cavia (Gosse)</i>	-	-	-	-	+	-
<i>T. uncinata 1 'oigt</i>	-	-	-	-	+	-
<i>T. intermedia (Stenroos)</i>	-	-	-	-	+	-
<i>T. porcellus (Gosse)</i>	-	-	-	-	+	-
<i>T. inermis (Under)</i>	-	-	-	-	+	-
<i>T. taurocephala (llauer)</i>	-	-	-	-	+	-
<i>T. weberi Jennings</i>	-	-	-	-	+	-
<i>T. vernalis (Hauer)</i>	-	-	-	-	+	-

<i>Tesludinella patina</i> (Hermann, 1833)	E 8	-	-	-		
<i>T.p.patina</i> (Hermann)	-	-	-	-	+	+
<i>T.p.intermedia</i> (Anderson)	-	-	-	-	+	-
<i>T.parva</i> Terret:	-	-	-	-	+	-
<i>T.mucronala</i> (Gosse)	-	-	-	-	+	-
<i>T.truncata</i> Gosse	-	-	-	-	+	-
<i>T.elliptica</i> Ehrenberg	-	-	-	-	+	-
<i>T.sphagnicola</i> Rude sen	-	-	-	-	+	-
<i>T.clypeata</i> ((lh.Mulh.l~S6/	E 8	-	-	-	+	-
<i>Tetramastix opoliensis</i> Zacharias	-	-	-	-		-
<i>To brevispina</i> Ahlstrom	-	-	-	-	+	-
<i>Trichoma truncata</i> (Whiteieztte)	-	-	-	-	+	-
!/. <i>t.truncata</i> (Whitelegge)	-	-	-	-	+	-
<i>T.t.aspinosa</i> (Rodewald)	-	-	-	-	+	-
<i>T.t.longispina</i> (Rodewald/	-	-	-	-	+	-
<i>T.pocillum</i> (Mueller)	-	-	-	-	+	-
<i>T.p.pocillum</i> (Mueller)	-	-	-	-	+	+
<i>T.p.hergi</i> (Meissner)	-	-	-	-	+	-
<i>T.similis</i> (Stenroos)	-	-	-	-	+	-
<i>T.lelractis</i> (Ehrenberg)	-	-	-	-	+	-
<i>T.t.lelractis</i> (Ehrenberg/	-	-	-	-	+	-
!/. <i>t.paupera</i> (Ehrenberg)	-	-	-	-	+	-
<i>T.curta</i> (Skoricov)	-	-	-	-	+	-
<i>Triple plicata</i> Levunder	-	-	-	-	+	-
<i>T.p.razelmi</i> Rodewald	-	-	-	-	+	

<i>Trochosphaera solstitialis</i> Thorpe	-	-	-	-	+	-
<i>Wierzejskiella sabulosa</i> Wieszniewski	-	-	-	-	+	-
<i>Wolga spinifera</i> l'Western!	-	-	-	-	+	-
ANNELIDA						
Polychaeta, larvae						
<i>Aonides oxycephala</i> (Sors, 1872)	-	-	-	E	-	-
<i>Capitella capitata</i> (Fabricius, 1~80)	1 X	s	-	E	-	-
<i>Glycera tridaetylu</i> Schmarda, 1861	1 3	s	-		-	-
<i>Harmothoe imbricata</i> (Linne. 1761)	1 X	M	+	E	-	-
<i>Lagis</i> (<i>Peetnaria</i>) <i>koreni</i> Malmgren, 1865	1 8	s	-	E	-	-
<i>Magelona rosea</i> Moore, 1901	1 3	s	-		-	-
<i>Mierospio meznikowianus</i> (Cktparede, 1869)	1 8	s	-		-	-
<i>Neanthes</i> (<i>Xereis</i>) <i>succinea</i> keuckart. 1841	1 X	M	+	E	-	-
<i>Nereis succinea</i> keuckart ('Itiaje, 1821)	-	-	-	E	-	-
<i>Nerinides Iridenlala</i> Southern, 1914	-	-	-	E	-	-
<i>Nephtys hombergii</i> Aud. M. Edw.	-	+	-	-	-	-
<i>Polydora ciliata</i> (Johnston, 1838)	E X	M	+	E	-	-
<i>Polygorditts neapolitanus</i> var. <i>ponticus</i> Zalenky, 1882	E 3	-	-	-	-	-
<i>Spio filicornis</i> (Muller, 1776)	E 8	+	M 2	E	-	-
<i>Prtonospio mahngreni</i> Claperede, 1868	-	-	-	E	-	-
<i>P. cirrifera</i> 1171	-	+	-	-	-	-
<i>Pholoe synopthahnica</i> Cktparede, 1868	1 X	M	-	E	-	-
<i>Phyllodoce tuberculata</i> Bobretzky, 1868	E 8	s	-	-	-	-
<i>Ph. mucosa</i> Oersted	-	+	-	-	-	-

<i>Pygospio elegans</i> Clap.	-	+	-	-	-	-
<i>Scolelepis fuliganosa</i> (Claparede. 1868)	-	-	-	E	-	-
<i>1'igtorniella zaikai</i>	-	-	-	B	-	-
Olygochaeta						
Aeolosomatidae						
<i>Caetogaler diastrophits</i> (Gruithuisen)	-	-	-	-	+	-
<i>t'haetogaster setosus</i> Svetlov, 1925	-	-	-	-	+	-
<i>llomoehaeta naidina</i> Bretscher. 1896	-	-	-	-	+	-
<i>Sots pseudobtusa</i> Piquet. 1906	-	-	-	-	+	-
<i>X.eliuguis</i> Mueller. 1"3	-	-	-	-	+	-
<i>N.pardalis</i> Piquet. 1906	-	-	-	-	+	-
<i>Pristina Phreuherg.</i> 1828	-	-	-	-		-
<i>P.papillosa</i> Cernosvilov. 1935	-	-	-	-	+	-
TEINTACULATA						
Bryozoa						
<i>Bryozoa sp..larvae</i> (cyphonautes)	NE 3	Sx	-	-	-	-
<i>Lepralia pallasiana</i> (Moll . 1803)	NE 7	Sx	-	E	-	-
<i>Иtembranipora</i> sp.	-	+	-	-	-	-
Phoroniclea						
<i>Phoronis euxinicola</i> (S.- Long. 190)	E 3	S	-	E	-	-
ARTROPODA						
Crustacea						
Cladocera						

<i>Acroperus harpae</i> (Baird)	-	-	-	-	+	+
<i>Alona affinis</i> Leydig	-	-	-	-	+	+
<i>A. quadrangularis</i> (Mueller)	-	-	-	-	+	+
<i>A. rectangula</i> Sars	-	-	-	-	+	+
<i>A. r. reetangula</i> Sars	-	-	-	-	+	-
<i>A. r. pulchra</i> Hellich	-	-	-	-	+	-
<i>A. r. caucasica</i> Schiklejew	-	-	-	-	+	-
<i>A. r. riehardi</i> Stingelin	-	-	-	-	+	-
<i>A. I. intermedia</i> Sars	-	-	-	-	+	-
<i>A. weltneri</i> Keilhaek	-	-	-	-	+	-
<i>A. eostata</i> Sars	-	-	-	-	+	-
<i>A. guttata</i> Sars	-	-	-	-	+	+
<i>A. g. tubereulata</i> kutz.	-	-	-	-	+	-
<i>A. davidi</i> Richard	-	-	-	-	+	-
<i>Alonella nana</i> (Baird)	-	-	-	-	+	+
<i>A. exigua</i> (Lilljeborg)	-	-	-	-	+	-
<i>A. excisa</i> (Fischer)	-	-	-	-	+	-
<i>A. rostrata</i> (koeh)	-	-	-	-	+	-
<i>Alonopsis elongata</i> (Sars)	-	-	-	-	+	-
<i>A. ambigua</i> lilljeborg	-	-	-	-	+	-
<i>Anchistropus emarginatus</i> Sars	-	-	-	-	+	-
<i>Bosmina longirostris</i> (O.F. Midler. 1'85)	F. 3	S 2	-	-	+	+
<i>B. l. similis</i> (Lilljeborg)	-	-	-	-	+	+
<i>B. l. pellucida</i> Stingelin	-	-	-	-	+	+
<i>B. l. cornuta</i> (Lilljeborg)	-	-	-	-	+	-

<i>B. l. curvirostris</i> Fisher	-	-	-	-	+	-
<i>B. l. brevicornis</i> Hellich	-	-	-	-	+	-
<i>B.l.typica</i> (Mueller)	-	-	-	-	.	-
<i>B.coregoni</i> Baird, 185~	E 3	S	-	-	+	+
<i>B. c. longicornis</i> Schoedler	-	-	-	-	+	-
<i>Be.humilis</i> Lilljeborg	-	-	-	-	+	-
<i>B.longispina</i> Leydig	-	-	-	-	+	-
<i>Bunops serrieaudata</i> (Daday)	-	-	-	-	+	-
(<i>amplacercus rectiroslris</i> Schoedler	-	-	-	-	+	+
<i>C.r. hiserralus</i> Schoedler	-	-	-	-	+	-
<i>C. lilljehorgi</i> Schoedler	-	-	-	-	+	+
<i>Ceriodaphnia affinis</i> Lilljeborg	-	-	-	-	I	-
<i>C'.pidchella</i> Sars	-	-	-	-	i	+
(<i>.quadrangula</i> (Mueller)	-	-	-	-	+	-
<i>C.q.hainata</i> Sars	-	-	-	-	+	-
(<i>.reticulata</i> (Jurine)	-	-	-	-	+	+
<i>C.r.typiea</i> (Jurine)	-	-	-	-	+	-
<i>C.r.kurzii</i> Stingelin	-	-	-	-	+	-
<i>C.megalops</i> Sars	-	-	-	-	+	-
<i>C'. laticaudata</i> Mueller	-	-	-	-	+	-
(<i>rotunda</i> Sars	-	-	-	-	+	-
(<i>setosa</i> Motile	-	-	-	-	+	-
(<i>ercopagis pengoi</i> (Ostromov, 1891)	E 3	s	-	-	+	-
<i>C.tenera</i> Sars						+
<i>Comigerius inaeoticus inaeoticus</i> (Pengo. IS-9)	R 3	S 2	-	-	+	+

<i>Chydorus sphaericus</i> (O.F. Midler, 1~S5)	E 3	S	+	-	-	-
<i>Ch.latus</i> Sars	-	-	-	-	+	-
<i>Covalis</i> Kur:	-	-	-	-	+	-
<i>C.piger</i> Sars	-	-	-	-	+	-
<i>C.gibbus</i> Lilljeborg	-	-	-	-	+	-
<i>Cglohosus baird</i>	-	-	-	-	+	+
<i>Daplmia pules</i> (De (leer)	-	-	-	-	+	+
<i>!)/>.middendoijiana</i> Fischer	-	-	-	-	+	-
<i>D.p.tenehrosa</i> Sars	-	-	-		+	-
<i>D.p.ohtusa</i> Kutz.					+	-
<i>Daplmia longispina</i> (O.F.Midler, 1~85)	E 3	S 2	-	-	+	+
<i>D. l. longispina</i> (Mueller)	-	-	-	-	+	-
<i>D.l.littoralis</i> Sars	-	-	-	-	+	-
<i>D.gateala</i> Sars	-	-	-	-	+	-
<i>D) hyalina</i> (Leydigl	-	-	-	-	+	+
<i>D.h lacustris</i> Sars	-	-	-	-	+	-
<i>D.cueulata</i> Sars, IH62	E 3	S	-	-	+	+
<i>D.c.cucullata</i> (Sars)	-	-	-	-	+	-
<i>D.c.apicata</i> Kutz.	-	-	-	-	+	-
<i>D.c.berolinensis</i> Schoedler	-	-	-	-	+	-
<i>D. c. kahlbergensis</i> Schoedler	-	-	-	-	+	-
<i>D.c. incerta</i> Richard	-	-	-	-	+	-
<i>D.cristata</i> Sars	-	-	-	-	-	-
<i>D.atkinsoni</i> Baird	-	-	-	-	+	-
<i>D. magna</i> Straits	-	-	-	-	+	-

<i>D.carinata</i> King	-	-	-	-	4	+
<i>Dcurvirostris</i> Eyhmann	-	-	-	-	+	-
<i>D similis</i> Claus	-	-	-	-	+	-
<i>Diaphanosoma brachiurum</i> (Lievin, 1848)	E 3	S	-	-	+	+
<i>l). b. leuchtenhergianum</i> Fischer	-	-	-	-	+	-
<i>D.ihthia</i> Manutilova	-	-	-	-	+	-
<i>Disparalona rostrata</i> (Koch)					+	+
<i>Dunhevedia crassa</i> king					+	+
<i>Evadne spinijero</i> Oh .Midler, 186~	EM 3.8	s	-	E	+	-
<i>E.nordmanni</i> Loven, 1836	1-M 3.8	Sx	+	-	-	-
<i>Ewycercus lomellalits</i> (<u>luellen</u>)	-	-	-	-	+	+
<i>Graptoleberis testudinaria</i> (Fischer)	-	-	-	-	+	+
<i>llyocryplus soriliclus</i> I Lievin)	-	-	-	-	+	+
<i>Lagilis</i> Kurz	-	-	-	-	+	+
<i>l.acutifrons</i> Sars	-	-	-	-	+	-
<i>Kurzia latissima</i> Kurz	-	-	-	-	+	-
<i>Lathonuru ••ectirostris</i> (Mueller)	-	-	-	-	+	-
<i>Latonopsis hospitus</i> Naidenow	-	-	-	-	+	-
<i>Leptodora kindtii</i> (Focke, 1844)	E 3	s	-	-	-	-
<i>Leydigia leviligu</i> I I eydig)	-	-	-	-		+
<i>L.acanthocercoides</i> (Fisher)	-	-	-	-	+	+
<i>Macrothrix rosea</i> (Jurine)	-	-	-	-	+	+
<i>Mdaticornis</i> (Jurine)	-	-	-	-	+	+
<i>Mhirsutieorius</i> Xorinan el Brady	-	-	-	-	+	-
<i>M.daday</i> Behning	-	-	-	-	+	-

<i>M.spinosa</i> King	-	-	-	-	+	-
<i>M.s.schauinslandi</i> Sars	-	-	-	-	+	-
<i>Moina recirostris</i> L. eudig. 1860)	-	ES 2	-	-	+	+
<i>Moina r.lilljeborgii</i> Schoedler	-	-	-	-	+	-
<i>M.macrocopa</i> (Straus)	-	-	-	-	+	-
<i>M.micrura</i> Hellich	-	-	-	-	+	+
<i>Mmicrophthalma</i> Sars	-	-	-	-	+	-
<i>M.brachiata</i> (Jurine)	-	-	-	-	+	-
<i>Monospilus tlispar</i> Sars	-	-	-	-	+	+
<i>Oxyurella lenuieaudis</i> (Sars)	-	-	-	-	+	+
<i>Penilia avirostris</i> Dana, 1849	EM 3.8	Sx 2	-	EI	+	+
<i>Pleopis polypltenwides</i> (L.euckart, 1859)	EM 3.8	M 2	+M	E	+	+
<i>P.lergestina</i> (Clans. 18")	E 3.8	Sx	-	E	+	-
<i>Podon intermedins</i> Lilljeborg, 1853	E 3.8	-	-	-	-	-
<i>Pdeuckarli</i> G.O.Sars,1862	E 3.8	S 2	+	-	-	-
<i>Pleuroxus aduneus</i> (Jurine)	-	-	-	-	+	+
<i>P. truncatus</i> (Mueller)	-	-	-	-	+	+
<i>P. uneinalus</i> Baird	-	-	-	-	+	-
<i>P.trigonellus</i> (Mueller)	-	-	-	-	+	-
<i>P.sstriatus</i> Schoedler	-	-	-	-	+	
<i>P laevis</i> Sars	-	-	-	-	+	+
<i>Podonevadne trigone!</i> (L.). Sars, 189~	E 3	+	+	Ik	+	+
<i>Polyphemus pcdieulus</i> (Linne)	-	-	-	-	+	+
<i>Rhyncholalona fale at a</i> (Sars)	-	-	-	-	+	-
<i>Scapholeheris mneronala</i> 1 Mueller)	-	-	-	-	+	+

<i>S. m. cornuta</i> (Schoedler)	-	-	-	-	-	+
<i>S.m.)'route laevi</i> (Mueller)	-	-	-	-	+	-
<i>S. microcephala</i> Lilljeborg	-	-	-	-	+	-
<i>S.kingi</i> Sars	-	-	-	-	+	-
<i>S.aurita</i> (Fischer)	-	-	-	-	+	-
<i>Sida cristallina</i> (Mueller)	-	-	-	-	+	+
<i>Simocephalus vetulus</i> (Mueller)	-	-	-	-	+	+
<i>S.v.spinosulus</i> Stingelin	-	-	-	-	+	-
<i>S. elizabethae</i> (King)	-	-	-	-	+	-
<i>S. serrulatus</i> (Koch)	-	-	-	-	+	+
<i>S. s. rotundifrons</i> Brehin	-	-	-	-	+	-
<i>S.s.produetifrons</i> Stingelin	-	-	-	-	+	-
<i>S.expinosus</i> (Koch)	-	-	-	-	+	-
<i>S.e.congener</i> Schoedler	-	-	-	-	+	-
<i>Wlassiczia pannonica</i> Daday	-	-	-	-	+	-
Copepoda						
Calanoida						
<i>Acartia clausi</i> (iieshrecht, ISS9)	NEBM 3.7	M 2	M	EB	+	+
<i>A hi/ilosa</i> Ciieshrechl	-	-	-	-	+	-
<i>Acanthodiptomus denlicornis</i> (Wierzejski)	-	-	-	-	+	+
<i>Anomalocerapalersoni</i> Templeton, 183'	E 3.8.9	-	-	-	-	-
<i>Arctodiptomus wierzeisky</i> (Richard)	-	-	-	-	+	-
<i>A saltans</i> (Daday)	-	-	-	-	+	-
<i>Ahacillifer</i> (Koelhel)	-	-	-	-	+	-
<i>Aacutilobatus</i> Sars	-	-	-	-	+	-

<i>A.dudichi valachicus Banarescu, Serban</i>	-	-	-	-	+	-
<i>A.dentifer Smirnov</i>	-	-	-	-	+	-
<i>A.kerkyrensis (Pesta)</i>	-	-	-	-		-
<i>Calanipedu aptae dulcisfknczagin. IS-3)</i>	I:R 3	S 2	-	ER	+	+
<i>Calanus euxinus (helgolandicus. ponticus) kuruwaev</i>	I-BM 3.8	+	+	EB	-	-
<i>Centropages ponticus Karaw., 1895</i>	NEM 3.7.8	Sx 2	+	E	-	-
<i>Diaptomus gracilis Sars. IS62</i>	E 3	S 2	-	-	+	+
<i>D.salinus Daday. 1885</i>	E 3	S 2	-	-	-	-
<i>1). castor Jurine</i>	-	-	-	-	+	-
<i>D.incrassalus Sars</i>	-	-	-	-	+	-
<i>Eudiuptoinus gracilis (Sars)</i>	-	-	-	-	+	+
<i>E.gractloides Lilljeborg</i>	-	-	-	-	+	+
<i>Ecoeruleus IFischer)</i>	-	-	-	-	+	-
<i>F. e. vulgaris tSchuneil)</i>	-	-	-	-	+	-
<i>F. vulgaris (Schmeil)</i>	-	-	-	-	+	-
<i>E. intermedins (Steuer)</i>	-	-	-	-	+	-
<i>Eurytemora velox Lilljeborg, 1853</i>	E 3	S 2	-	-	+	+
<i>F.ajjinis (Poppe. 1880)</i>	E 3	+2	+	-	+	
<i>Eurytemora lacustris Poppe</i>	-	-	-	-	+	-
<i>E. hirundoides Xordquist</i>	-	-	-	-	+	-
<i>E.grimmi Sars</i>	-	-	-	-	+	-
<i>1 lemidiaptomus umhlyodon tMarenzeller)</i>	-	-	-	-	+	-
<i>1 leterocope casino Sars. 189~</i>	ER 3	+	+	-	+	i
<i>labidoeera brunescens Czernjavsky. 1868</i>	NE 3.8.9	-	-	-	-	-
<i>Lovenula alluaudi (de Guerne et Richard)</i>	-	-	-	-	+	

<i>Mixodiaptomus kupehvieseri</i> (Brel'ni)	-	-	-	-	.	-
<i>Paradiaptomits</i> sp.	-	-	-	-	+	-
<i>Paracalanus parvus</i> (Clans. 1863)	I'M 3.7.8	- 2	+	E	+	+
<i>Paracartia latisetosa</i> (Erie., 18~3)	E 3.8	-	-	-	-	-
<i>Pontella mediterranea</i> Clans. 1863	NE 3.8.9	Sx	-	E	-	-
<i>Pseudocalanus elongatus</i> (Boeck, 18~2j)	EBM 3.8	+ 2	+	EB	+	+
Cyclopoida						
<i>Aeanlhoecyclops vernalis</i> (Fischer. 1853)	-	ES 2	-	-	+	+
<i>A.robustus</i> Sars	-	-	-	-	+	+
<i>A.gigas</i> ((laus)	-	-	-	-	+	-
<i>A.viridis</i> (Jurine)	-	-	-	-	+	+
<i>A.oligolriehus</i> Monehenko	-	-	-	-	+	-
<i>Cyelops vieinus</i> (I Ijan., 18~5)	E 3	S 2	-	-	+	+
<i>Csi re nuns h'isch.</i> , 1851	1 3	S 2	-	-	+	+
(.s.slreinius lFischer)	-	-	-	-	+	+
(.furfifer C 'laus	-	-	-	-	+	-
(iisignis ('laus	-	-	-	-	+	-
<i>Cyclopina gracilis</i> Claus, 1863	E 3.8	S 2	+	-	-	-
<i>Diacyclops hieuspidatus</i> (Claus)					+	+
<i>D.b.bicuspidatus</i> (Claus)	-	-	-	-	+	-
<i>D. b. odessana</i> (Schmankevitch)	-	-	-	-	+	-
<i>D.nanus</i> (Sars)	-	-	-	-	+	-
<i>D.bisetosus</i> (Rehber)	-	-	-	-	i	-
<i>D.languidus</i> (Sars)	-	-	-	-	+	-
<i>D. languidooides</i> (Lilljeborg)	-	-	-	-	+	-

<i>I).cohabitans Monchenko</i>	-	-	-	-	+	-
<i>IXcrassicaucalis (Sars)</i>	-	-	-	-	+	-
<i>Eucyclops serrulatus (Fischer)</i>	-	-	-	-	+	+
<i>E.s.proximus Lilljeborg</i>	-	-	-	-	+	-
<i>E. macruroides I Lilljeborg</i>	-	-	-	-	+	-
<i>E.m.denticulatus (Graeter)</i>	-	-	-	-	+	-
<i>/•'. macrurus (Sars)</i>	-	-	-	-	+	-
<i>I. speratus I Lilljeborg</i>	-	-	-	-	+	-
<i>h.uryte loirgicauca Philippi. 1843</i>	F. 3	-	-	-	-	-
<i>Ectocyclopsphaleratus (Koch.)</i>	-	-	-	-	+	-
<i>I lalieyclops magnieeps (Lilljeborg)</i>	-	-	-	-	+	+
<i>ILneglectus Kiejer</i>	-	-	-	-	+	-
<i>ILir neglectus Kiejer</i>	-	-	-	-	+	-
<i>Macrocyclus albidus (Jurine)</i>	-	-	-	-	+	-
<i>MJuscus (Jurine)</i>	-	-	-	-	+	+
<i>\ I distinctus I Richard</i>	-	-	-	-	+	-
<i>Microcyclus bicolor Sars</i>	-	-	-	-	+	-
<i>XL varicans (Sars)</i>	-	-	-	-	+	+
<i>Mv.ruhellus /Lilljeborg</i>	-	-	-	-	+	-
<i>M.gracilis (Lilljehoi-g)</i>	-	-	-	-	+	-
<i>Xietacyclus minimis (laus</i>	-	-	-	-	+	+
<i>\l.planus Kiurney</i>	-	-	-	-	+	-
<i>Xlesocyclops leuckarli l('laus</i>	-	-	-	-	+	+
<i>Oithona minula /Kricz.. IS~3)</i>	NI-M 3.7.8	. 2	-	-	+	+
<i>1) -.omits < lot is IS63</i>	IBM 3.8	+ 2	+	EB	+	+

<i>Thermocyclops crassus</i> (Fischer)	-	-	-	-	+	+
<i>T.oithonoides</i> (Sars)	-	-	-	-	+	+
<i>T.d\bowskii</i> (kande)	-	-	-	-	+	-
<i>Tropocyclops prasinatus</i> (Jurine)	-	-	-	-	+	-
<i>Paracyclops fimbriatus</i> (Fischer)	-	-	-	-	+	+
<i>P.f.chiltoni</i> (Thomson)	-	-	-	-	+	-
<i>P.poppei</i> (Renberg)	-	-	-	-	+	-
<i>P.affinis</i> (Sars)	-	-	-	-	+	-
Monstrilloida						
<i>Cymhasoma longispinosus</i> (Bourne, 1890)	-	-	-	E	-	-
<i>Monstrilla grandis</i> Giesbr., 1892	E 3.8	-	-	E	-	-
<i>Mhelgolandica</i> Claus, 1863	E 3.8	-	-	-	-	-
Harpacticoida						
<i>Ameira parvulla</i> (Claus, 1866)	E 8	-	-	-	+	-
<i>Amphiseus similis</i> (Claus, 1866)	E 8	-	-	-	-	-
<i>Asellopsis sarmatica</i> Jacubi- siak, 1938	E 8	-	-	-	+	-
<i>Atthevella erassa</i> (Sars)	-	-	-	-	+	-
<i>A.trispinosa</i> (Brady)	-	-	-	-	+	-
<i>Bryocamplus minutus</i> (Claus)	-	-	-	-	+	-
<i>B.pygmaeus</i> (Sars)	-	-	-	-	+	-
<i>B.zschokkei</i> (Schmeil)	-	-	-	-	+	-
<i>(anthocamptus staphylinus)</i> Jurine, 1820	E 3.8	-	-	-	+	-
<i>Canuella perplexa</i> T. et A.Scott, 1893	E 3.8	S	-	-	+	-
<i>Cfurcigera</i> Sars	-	-	-	-	+	-
<i>Cletocamptus retrogressus</i> Schmankevisch, 18-5	E 3.8	-	-	-	-	-

<i>(.confluens iSchuneil. 1894)</i>	[- 8	-	-	-	+	-
<i>(lelocles lenuipes Scott</i>	-	-	-	-	+	-
<i>Dactylopodia tisboides (Claus. 1863)</i>	i: 8	-	-	-	-	-
<i>Diarthrodes minutus (Claus)</i>	-	-	-	-	+	-
<i>Ectinosoma abrau (Kriczagin. 18")</i>	E 8	-	-	-	+	+
<i>E.melauipeus Bocck. 1864</i>		-	-	-	+	-
<i>h'.curticorne Boa κ</i>	-	-	-	-	+	-
<i>Elaphoidella gracilis (Sarsi</i>	-	-	-	-	+	-
<i>I'.bidens-coronata (Sars)</i>	-	-	-	-	+	-
<i>E.elaphoides (Chappuis)</i>	-	-	-	-	+	-
<i>Epectophanes richardi Mrazek</i>	-	-	-	-	+	-
<i>Erhydrosoma longifurcaluii Sars</i>	-	-	-	-	t	-
<i>Enhydrosoma gariensis Curacy. 1930</i>	E 5	-	-	-	+	-
<i>E.caeri Raibaut. 1965</i>	E 5	-	-	-	+	-
<i>I larpacticus gracilis Claus. 1863</i>	E 3.8	-	-	-	+	-
<i>ll.lilloralis Sars. 1910</i>	E 3	-	-	-	-	-
<i>lluniremis kroyer. 1842</i>	E 3.8	-	-	-	+	-
<i>H.Jlexus Brady et Robertson</i>	-	-	-	-	+	-
<i>I larpacticella inopinala Sars</i>	-	-	-	-	+	-
<i>llorsiella hrevicornis tDouue. 1904)</i>	E 8	-	-	-	+	-
<i>Harpacticoida sp.sp.G.O. Sars. 1862</i>	E 3	S 2	-	-	-	-
<i>l.aopbonle setosa Boeek. 1864</i>	E 8	-	-	-	-	-
<i>Limnocletodos helming/ Borutzky</i>	-	-	-	-	+	-
<i>Longipediapontica Kriczagin, 18"</i>	-	-	-	E	-	-
<i>Mesochra pygmaea i(laus. 1863)</i>	и 8	-	-	-	-	-

<i>M.aestuarii</i> Gurney, 1921	1, is	-	-	-	+	-
<i>M.lilljeborgi</i> Bocck. 1853	E 8	-	-	-	-	-
<i>M.xeiopoda</i> Monard	-	-	-	-	-	-
<i>M.armoricanu</i> Monord	-	-	-	-	+	-
<i>Microartridion</i> Idterale (Poppe. 1881)	E 3.8	-	-	-	-	-
<i>M.fed lax</i> Perkins. 1956	E 5	-	-	-	+	-
<i>Metis ignea</i> Plüilippi. 1843	E 8	-	-	-	-	-
<i>M.i.lialmyricola</i> Marcus et Par	-	-	-	-	+	-
<i>Sannopus palustris</i> Brady	-	-	-	-	+	-
<i>Xitocra elongata</i> Marcus. 1968	E 4	S	-	-	-	-
<i>X.lacusIris</i> (Schiiiankeviscli. 18'5)	E 3	-	-	-	-	-
<i>X.liihernica</i> (Brady. 1880/	E 8	s	-	-	1	1
<i>X.h.incerta</i> (Richard)	-	-	-	-	+	-
<i>X.typica</i> Boeck	-	-	-	-	+	-
<i>X.lacusIris</i> (Schmankewitsch)	-	-	-	-	+	-
<i>X.l.sinoe</i> Marcus et Por	-	-	-	-	t	-
<i>Xitocrella kossivigi</i> (Xoodll	-	-	-	-	.	-
<i>Onychocamptus inohaiiiitied</i> Blanchard el Richard.	E 3	-	-	-	+	-
<i>Phyllognathopus paludosus</i> (Mrazek)	-	-	-	-	+	-
<i>P viguieri</i> (Maü/ko:)	-	-	-	-	+	-
<i>Schtzopera neglecta</i> .leal	-	-	-	-	+	-
<i>S.grimalschii</i> Jakuhisiak	-	-	-	-	r	-
<i>S.jugurtha</i> (Blanchard el Richard)	-	-	-	-	y	-
<i>S.coinpacta</i> hint	-	-	-	-	+	-
<i>S.borutzkyi</i> Montschenko	-	-	-	-	4	-

<i>S.kunzi</i> . [post.196'	i: i	-	-		-	-
<i>S. varnensis</i> . [post.. 1967	i: i	-	-	-	-	-
<i>Sailc/lic/iim longicauda</i> (P'lilippi. 1840)	E S	-	-	-	-	-
<i>Stenhelta palustris</i> (Brady)	-	-	-	-	+	-
<i>S.tethynensis</i> Monard	-	-	-	-	+	-
<i>Tishe lustriana</i> Marcus					+	-
<i>Tisbefurcata</i> (Baird.183') E 3.8 8 2					+	-
<i>T.sp. Lang.</i>	-	-	-	E	-	-
<i>Viguiarella paludosa</i> (Mrazek)	-	-	-	-	+	-
Ostracoda						
<i>Ostracoda sp.sp. I.atrcillc. 1816</i>	E 3	S 2	+	-	-	-
<i>Balanus eburneus</i> Gournetts Gould. 1841	E 8	S	-	E	-	-
<i>B.improvisus</i> Darwin	NE 3.S	M 2	*	E	-	-
<i>I'eiruca spengleri</i> Darwin. 1854	E	S	-	E	-	-
<i>(impcdia Nauplii</i>	i	+	-	-	+	-
Malacostraca						
Decapoda						
<i>Athanas niteseens</i> Leach. 1814	E 8	S	-	E	-	-
<i>Galianassa peslai</i> De-Man. 1929	IS	s	-	E	-	-
<i>(raineon crangon ll.inne. 1 '58)</i>	E 8	s	-	E	-	-
<i>Diogenes piigdalor</i> Hons. 1828	E 8	s	-	E	-	-
<i>llippolyle sp. Leach. 1814</i>	E 8	s	-	E	-	-
<i>I'luinnus hirtellus tlinnaeus. 1 '58)</i>	i; 8	s	-	f	-	-
<i>I'isidia lougimana</i> (Risso, 1815)	E 8	s	-	E	-	-
<i>Xanllio poressa lOlivi, 1 ~92)</i>	E 8	s	-	E	-	-

<i>L'pogebiapusilia (Petagna, 1 92)</i>	I 8	S 2		E			-
Mysidacea							
<i>Gastrosaccits sanctus (\an Beneden, 1861)</i>	E 3.8	S	-	-	-	-	-
<i>Mesopodopsis slabheri t 1 an Beneden. 1861)</i>	E 3.8	s	+	-	-	-	-
<i>Paramisis kroyeri ('zerniavsky, 1882</i>	E 3.8	s	-	-	-	-	-
Cumacea							
<i>Iphinoe maeotica (Sowinskyi, 1893)</i>	ER3.8	s	+	-	-	-	-
Isopoda							
<i>Idolea baltica basleri Audouin. 182~</i>	E 8	S 2	+	-	-	-	-
<i>I.ostroumovi Sowinskyi, 1895</i>	NE 3.9	S	-	-	-	-	-
<i>Synisoma capita (Railike. 183~)</i>	E 8	S 2	-	-	-	-	-
Amphipoda							
<i>Amphipoda sp.</i>	EB 3	S	+	-	-	-	-
MOLLUSCA							
Gastropoda (larvae)							
<i>Bit Hum reticulation (Costa. I~99)</i>	E	s	-	E	-	-	-
<i>llaminoea navicula (Costa. 1"8)</i>	-	-	-	E	-	-	-
<i>himopontia capitala (Midler, 1"3)</i>	-	-	-	i:	-	-	-
<i>Rissoa splendida Eichwald. 1830</i>	l.	s	-	E	-	-	-
<i>Tergipes tergipes (Forskal, 1 7~5)</i>	-	-	-	E	-	-	-
Bivalvia (larvae)							
<i>Borneo Candidas 1..</i>	-	+	-	-	-	-	-
<i>Bivalvia sp.sp.</i>	NE 3	M 2	+	-	-	-	-
<i>('ardium sp.</i>	-	+	-	-	-	-	-

<i>Ipogebiapusilla (Pelagna, 192)</i>	E 8	S 2	-	E	-	-
Mysidacea						
<i>Gastrosaccus sanctus (van beneden. 1861)</i>	E 3.8	S	-	-	-	-
<i>Me.sopodopsis slabheri (van beneden. 1861)</i>	E 3.8	S	+	-	-	-
<i>Paramisis kroveri Czerniavskv. 1882</i>	E 3.8	s	-	-	-	-
Cumacea						
<i>Iphinoe maeotica (Sowinskyi. 1893)</i>	ER 3.8	s	+	-	-	-
Isopoda						
<i>Idolea baltica hasten Audotiiin. 182'</i>	1 8	S 2	+	-	-	-
<i>I.ostroumovi Sowinskyi. 1895</i>	NE 3.9	s	-	-	-	-
<i>Synisonia eapilo (Ratlike. 183')</i>	E 8	S2	-	-	-	-
Amphipoda						
<i>Amphipoda sp.</i>	EB 3	S	+	-	-	-
MOLUSCA						
Gastropoda (larvae)						
<i>Bittium reticulatum K'osta. 1799)</i>	E	S	-	E	-	-
<i>Haminoea navicula (Costa. 1778)</i>	-	-	-	E	-	-
<i>himopoiuia capitata (Mullet: 1"3)</i>	-	-	-	E	-	-
<i>Rissoa splendida Eiehwald. 1830</i>	E	s	-	E	-	-
<i>Tergipes tergipes (Forskal. 1"5)</i>	-	-	-	E	-	-
ISALVIA (larvae)						
<i>Borneo candidus L.</i>	-	+	-	-	-	-
<i>Bivalvia sp.sp.</i>	NE 3	M 2	+	-	-	-
<i>(ardium sp.</i>	-	+	-	-	-	-

<i>/Ireissena polymorph</i>	-	+	-	-	-	-
<i>Modiolus adrialicus (Lam.)</i>	-	+	-	-	-	-
<i>Mya arenaria (L.)</i>	-	+	-	-	-	-
<i>Mytilus galloprovincialis Lamarck. 1819</i>	NE 3.8	M	+	E		
<i>Mytilaster lineatus (Ginelin)</i>	-	+	-	-	-	-
<i>Ostrea edulis (L.)</i>	-	+	-	-	-	-
<i>Teredo navalis L.</i>	-	+	-	-	-	-
<i>I nio sp.</i>	-	-	-	-	-	-
CHORDATA						
Appendicularia						
Ascidia (larvae)						
<i>. tseidiacea Lamarck. 1916</i>	E 3	Sx	-	E	-	-
<i>Oikopleura dioica Lob., IS-2</i>	NEM 3.7.8	M 2	+	E	-	-
CHAETOGNATHA						
<i>Sagitta selosa Midler. 184</i>	♂	+2	+ EB		-	
<i>Spadella cephaloptera (IT. Btsch, 1851)</i>		-	-	-	-	-
ACRANIA						
<i>AmphioMis lanceolalus (Pallas. 1 (!)</i>	E 3	-	-	-	-	-

Note: * - Parchuk G. V. (unpublished)

Legend

NWBS - Northwestern part of the Black Sea
SAL - Sukhoi and Adzhalyk (Grigorievsky) limans
CA - Crimea sea area
Dl) - Danube delta
DE - Dneestr estuary
D) - dominant
M - mass
S - sparse

S\ - disappearing

I - introduced species, immigrants
R - relict
N - neuston
E - epiplankton
B - bathyplankton
+ - present
- - absent
I-I I - bibliography

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Table 4. List of Microphytobenthos Species

Species	Sea		Estuaries	
	NWBS	Crimea	Fresh water	Sea
<i>Achnanthes brevipes</i> Agardh, 1824	M	\\1	-	M
<i>A. delicatula</i> iKuizi Grunow, 1880	S	-	M	O-M
<i>A. dispar</i> C/eve. 1891	s	s	-	-
<i>A. hungarica</i> Grunow, 18'4	s	-	S-O	-
<i>A. lanceolate!</i> (Breh.) Grunow. ISSO	s	-	M	s
<i>A. longipes</i> Agardh. 1832	M	M	-	MI
<i>A. lyreita</i> Pr.-Lavrenko. 1961	s	-	-	-
<i>A. manifera</i> Brim. 1893-1896	s	s	-	-
<i>A. pinnata</i> Hustedt, 1922	s	s	-	s
<i>A. pseudogroonleindlca</i> Ilendey. 1964	R.S	-	-	-
<i>A. strand</i> Hustedt. 1932	IS	-	-	-
<i>A. Irion/usa</i> l'an Lamlinglain. 196"	IS	IS	-	s
<i>Actinoeyeliis ehrenbergii</i> Rolfs. 1861	0	M	-	s
<i>Actinoptyclins itndilalns</i> (Bail.) Rolfs. 1861	s	s	-	-
<i>Amphora acuta</i> Gregoiy, 185~	s	s	-	-
<i>A. acutiuscula</i> Kutzing, 1844	s-0	-	-	0
<i>A. angularis</i> Gregoiy. 1855	s	s	-	-
<i>A. aspera</i> Petit, 18"	s	s	-	-
<i>A. higibba</i> Grunow, 18~1	s	s	-	-
<i>A. caroliniana</i> Giffen, 1980	S(-)	s-0	-	s

<i>A. chadjibeiensis</i> Gusljakow, 1992	S	-	s	s
<i>A. cqffaeformis</i> (Ag.) Kutzing, 1844	M	s-o	-	s-o
<i>A. commutata</i> Grunow, 1880-1885	S	s	-	S(-)
<i>A. costata</i> IV. Smith, 1853-1856	s	s	-	-
<i>A. castellata</i> Giffen, 1963	s	-	-	s-o
<i>A. a asset</i> Gregory, 185~	s-o	0	-	-
<i>A. cuneata</i> Clew, 1876	LS	LS	-	-
<i>A. delicatissimu</i> Krasske. 1930	s	s	-	s
<i>Amphora c/uhia</i> Gregory. 185'	s	s	-	-
<i>A. exigua</i> Gregory. 185"	s-o	s-o	-	s
<i>A. eunotia</i> Cleve, 18~3	0	0	-	-
<i>A. genkalii</i> Gusljakow, 198"	R.S	-	-	-
<i>A. graejjii</i> (Grun.) Cleve. 1894-1895	s	s	-	-
<i>A. hyalina</i> var <i>hyalina</i> Kutzing. 1844	s-o	O-M	-	s-o
-var. <i>delieatula</i> I'r. kavrenko. 1963	s-o	0	-	s
<i>A. ineonspieua</i> I'r.-l.avrenko. 1963				
<i>A. karajevae</i> Gusljakow, 198"	s	s	-	-
<i>A. laevis</i> Gregory. 185"	s	s-o	-	s
<i>A. libyea</i> Ehrenberg, 1854	s	s	-	s
<i>A. lineolata</i> Ehrenberg. 1834	s	s	-	s
<i>A. lydiae</i> Gusljakow, 19S~	s	-	-	s
<i>A. macilenla</i> Gregory, 185"	s	s	-	-
-var. <i>maejica</i> I'r - kavrenko. /963	s	s	-	s
<i>A. makarovae</i> Gusljakow, 198"	s	s	-	s
<i>A. obtusa</i> Gregory 1856-185"	s	0	-	s

<i>A. ocellata</i> Dokin 1861	S	s	-	s
<i>A. ostrearia</i> Brebisson, 1849	S-O	s-o	-	s
-var. <i>vitrea</i> Cleve. 1868	s-o	s-o	-	s
<i>A. oralis</i> Kutzing. 1844	s	s	s-o	s
. <i>i parvula</i> Pr. Lavrenko, 1963	-	s	-	-
<i>A. pediculus</i> iKulzj Grunow. 18~5	o	-	S-O	s
<i>A. pogrebn/akovii</i> Gusljakow. 1992	s	-	S	s
<i>A. pontica</i> Gusljakow. 1992	s	-	-	s
<i>A. proschkiniana</i> Gusljakow. 1992	s	-	-	s
<i>A. proteus</i> Gregory. 185~	o	0	-	s
<i>A. robusta</i> Gregory. 185~	s	s	-	s
<i>A. suhacutiseula</i> Sehoeman. 19'2	LS	-	-	LS
<i>A. suhangularis</i> Hustedt. 1955	LS	-	-	LS
<i>A. sublaevis</i> Hustedt, 1955	LS	-	-	LS
<i>A. tenuissima</i> Hustedt, 1955	LS	-	-	LS
<i>A. terroris</i> l.trenherg. 1853	s	s	-	s
<i>A. topashevskii</i> Gusljakow, 1992	s	-	-	s
<i>A. llunnensis</i> I Mover) . 1. ('leve- latter. /932	s	-	s-o	s
<i>A. truncata</i> (Greg.) Cleve, 1894-1895	s	s	-	-
<i>Anaulus minimis</i> Grunow. 1880-1885	s	-	-	-
<i>Anorlltoneis e.xcentrica</i> (lonkin) Grunow. 186"	LS	LS	-	LS
<i>A. Itummii</i> Hustedt. 1955	LS	-	-	-
<i>Ardissonia huculus</i> (Greg.) Grunow. 1880	s	s	-	-
<i>A. crystalina</i> l.lg.) Grunow. 1880	s-o	s-o	-	-
<i>Asterionella formosa</i> 11 assail 1850	s	-	s-o	S-O

<i>Aulacosiragranulata</i> (Ehr.) Simonsen. 19~9	S-O	-	-	-
<i>Auliscus sculptus</i> (W. Sm.) Ralfs. 1H61	S	s	-	-
<i>Aurricula insecta</i> (Grim.) Cleve. 1894-/895	S	s	-	-
<i>A.intermedia</i> (Lewis) Cleve. 1894-1895	S	s	-	-
<i>Hacillaria paradoxa</i> (dentin, 1 "88	S-O	s-o	-	-
<i>H. socialis</i> (Greg.) Grunow, 1891-1894	s	-	-	s
<i>liacleiiastrum liyalinm</i> Lauder. 1864	o	o	-	-
<i>Berkeleya inicans</i> (Lyngb.) Grunow. 1868	o	M	-	-
<i>H. rutilans</i> (Trenlep.) Grunow. 188(1	m	O-M	-	-
<i>H (Xavicula) seopulorum</i> Hreh. et Kutz) Cox. 1982	o	M	-	-
<i>Biddulphiia aurita</i> (Lyngb.) Rrebisson et Godey, 1839	-	s	-	-
-var. <i>obtusa</i> (Kutz.) Hustedt. 192"-193'	-	s	-	-
<i>li. rostrata</i> Hustedt. 192"-193"	-	s	-	-
-var. <i>alala</i> I'r.-Lav- renko. 1961	s	-	-	-
<i>li subaequa</i> (Kutz.) Ralfs. 1861	s	-	-	-
<i>Rrehissonia hoeekii</i> tEhr) Grunow. 1860	s	s	-	s
<i>Caloneis amphishaena</i> (Horyi) Cleve. 1894	s-o	s	s	s-o
<i>C densestriata</i> (Pr.-Lavr.) Gusljakow, 1992	s	s	-	-
<i>C formosa</i> (Greg.) Cleve var. <i>densestriata</i> I'r.-lavrenko	-	s	-	-
<i>C oregonia</i> (Ehr.) Petriek. 1966	s	-	-	-
<i>C liber</i> (W. Sm.) Cleve. 1894-1895	s-o	o	-	-
<i>C probabilis</i> (A. Sm.) Cleve. 1894	s	s	-	-
<i>C subsalina</i> (lonk.) Ilendcy. 1951	o	s	-	s-o
(<i>ampilodiscus daemelianus</i> Grunow, 18~4	s	s	-	-
<i>C decorus</i> Hrehisson. 1854	s	s	-	-

<i>(. echeneis Ehrenberg, 1840</i>	S	s	-	s
<i>C. eximius Gregory, 185"</i>	-	LS	-	-
<i>C. impressus Grunow, IH"</i>	-	LS	-	-
<i>C. ralfsii W. Smith, 1853-1856</i>	-	S	-	-
<i>C. thuretii Brebisson, 1854</i>	S-O	o	-	-
<i>-var. lineolatus Pr.- Lavrenko, 1955</i>	s	S	-	s
<i>Chaetoceros simplex Ostenfeld, 1901</i>	s-o	s	-	s
<i>C. subsecundus (Grun.) Hustedt. 192"-193'</i>	S-O	s-o	-	s
<i>Climaconeis (Amphora) injlexa (Breb.et Kutz.) Cox. 1982</i>	s-o	s	-	s
<i>C. scopulorioicles (Ilust.) Cox, 1982</i>	s	-	-	-
<i>Climacosphenia moniligera Ehrenberg, 1841</i>	LS	-	-	-
<i>Coeconeis costata Gregory, 1855</i>	o-s	o-s	-	o-s
<i>Cdirupta Gregoiy, 185'</i>	LS	-	-	-
<i>-var. Jlexella (Jan et Rahh.) Gronow. 1880-1885</i>	LS	-	-	-
<i>C. disculus (Schum.) Cleve. 1895</i>	s	s	-	-
<i>C. distans Gregory, 185"</i>	s	s	-	s
<i>C. engelhrechtii Chohnoky 1955</i>	LS	-	-	-
<i>C. kujalnizkensis Gusljakow el Gerasimuk, 1992</i>	M	-	-	s
<i>C. maxima (Grun.) Peragallo. 189'</i>	s	s	-	-
<i>C. molesla Kutzing, 1844</i>	s	M-O	-	-
<i>-var. crucijera Grunow. 18~4</i>	-	s	-	-
<i>C. nolata Pelit, 18"</i>	s	M-O	-	-
<i>C. cptarnerensis Grunow, 18~4</i>	s	s	-	-
<i>(. pediculus Ehrenberg, 1838</i>	M-O	s	-	M
<i>C. pellucida Grunow: 1862</i>	-	s	-	-

<i>C. placentula</i> Ehrenberg, 1838	O	s	-	O
-var. <i>englypla</i> Grunow, 1884	M	o-s	-	O-S
-var. <i>lineal</i> (Ehr.) Cleve, 1894-1895	s	-	-	O
-var. <i>intermedia</i> (Ilerih. el Perag.) Cleve 1894-1895	s	s	-	s
<i>C. plaeenuloides</i> Gusljakow, 1992	s	-	-	s
<i>C. pseudodebesii</i> Pr.-Lavrenko, 1963	-	s	-	-
<i>C. pseudoniorginato</i> Gregory, 185"	s	s	-	-
<i>C. quarnerensis</i> Grunow, 18~4	-	s	-	-
<i>C. seullellum</i> Ehrenberg, 1838	M	M	-	M
<i>C. stauroneiformis</i> (Ill.) Okuo, 1952	s-o	s-o	-	-
<i>Coscinodiscus grand</i> Cough, 1905	s	s	-	s
<i>C. janischii</i> A.Schmidt, 18'4-193~	s	s	-	s
<i>C. jonesianus</i> (Grew) Osten/eld, 1915	s	s	-	-
<i>C. nitidis</i> Gregoiy, 185~	-	s	-	-
(<i>. radialus</i> Ehrenberg, 1839	R.S-O	R.S-O	-	s
<i>Cvelotella easpia</i> Grunow, 18'5	s-o	-	-	s-o
<i>C. kutzingiana</i> Thwaites, 1848	s-o	s	-	s-o
<i>C. meneghiniana</i> Kutzing, 1844	s-o	S-O	-	s
<i>C. operculata</i> (Ag.l Kutzing, 1833	s	-	s	O
(<i>. striata</i> Grunow, 1880	s	-	O	s
<i>Cymatopleura elliptica</i> (Breb.J IV. Smith, 1851	s	-	O	s
<i>C. librile</i> (Ehr.) Pantoczek, 1902	s	-	O	s
<i>Cymbella angusta</i> (Greg.) Gusljakow, 1992	s-o	s	-	s
-var. <i>kujalnitzkensis</i> Gusljakow et Gerasimuk, /992	O	-	-	s-o
<i>C. areas</i> (Greg.) Gusljakow, 1992	O	o-s		

<i>C. fistula</i> (Temp.) Kircher, 18~8	S-O	-	s-o	s
<i>C. cymbelloides</i> (Greg.) Gusljakow, 1992	s	s	s	s
<i>C. cymbiformis</i> Agardh, 1830	-	-	s	-
<i>C. helvetica</i> Kutzing, 1844	s	-	s	-
<i>C. lanceolata</i> (Ehr.) Van Heurek, 1880-1885	-	-	S-O	-
<i>C. odessana</i> Gusljakow, 1992	s-o	s	-	s
<i>C. prostrata</i> (Ehr.) Brun, 1880	-	-	s-o	-
<i>C. pusilla</i> Grunow, 18~s	-	s	-	-
<i>C. tumida</i> (Breb.) Van Heurek, 1880-1885	-	-	s-o	-
<i>C. turgida</i> (Greg.) Cleve, 1894-1895	-	-	S-O	-
<i>Dieiloma elongation</i> (Lyngb.) Agardh, 1824	s-o	s	0	-
<i>D. vulgare</i> Bory, 1828	o	s	s	s
-var. <i>linearis</i> Bore, 1828	s-o	s	s-o	s
-var. <i>breve</i> Grunow, 1862	s	s	s-o	s
1). <i>hiemale</i> (Lyngb.) Heiberg, 1863	-	s	-	-
<i>Dimeregramma julvum</i> (Greg.) Ralfs, 1861	-	s	-	-
1). <i>minor</i> (Greg.) Ralfs, 1861	s	s-o	-	-
<i>Diploneis bombus</i> Ehrenberg, 1844	s	s	-	-
1). <i>chersonensis</i> (Grun.) Cleve, 1894-1895	s	R.S-O	-	-
<i>D. crabro</i> Ehr. var. <i>crabro</i> Ehrenberg, 1854	s-o	s	-	-
<i>D. didyma</i> Ehrenberg, 1854	s-o	s	-	-
<i>D. fusea</i> (Greg.) Cleve, 1894-1895	s-o	-	-	-
1). <i>gemmata</i> (Grev.) var. <i>pristiophora</i> (Jan.) Cleve, 1894-1895	-	s	-	-
<i>D. litoralis</i> (Donk.) Cleve, 1894	s	-	-	-
<i>D. notahilis</i> (Grev.) Cleve, 1894-1895	s	s	-	-

<i>-var. noliabilis</i> Cleve. 1894-1895	-	S	-	-
<i>-var. tenera</i> I'r.-I. avrenko. 1963	S	S	-	-
<i>I). oblongella</i> (Xaegeli el kutz) Cleve-Etiler. 1922	S	-	-	-
<i>I), oculata</i> tlireh.) Cleve. 1894	S	S	-	-
<i>IX papula</i> (.I.S.I ('leve var. <i>papula</i> ('leve. 1894-1895	-	S	-	-
<i>I). smithii</i> (I3reb.) Cleve. 1894-1895 var. <i>smithii</i>	S-O	S	-	-
<i>-var. punulla</i> (Grun.) Hustedt. 192"-193"	S-O	S	-	-
<i>IX. splendida</i> (Greg.) Cleve. 1894-1895	-	S	-	S
<i>IX subadvena</i> Hustedt. 192"-193"	I.S	I.S	-	-
<i>I). vaeillans</i> t.I.S) Cleve. 1894-1895	-	S	-	-
<i>Entomoneis</i> (<i>Amphiprora</i>) <i>alala</i> (Ehr) Ehrenberg. 1845	S-O	S	-	S
<i>E. paltdasa</i> (II'. Sin.) I'atriekel Reuner. 19 5	S	S	-	S
<i>-var. duplex</i> Grunow, 1880	S-O	S	-	S
<i>Epithemia sores</i> kutzing. 1844	S	-	-	S
<i>/:. turgida</i> (Ehr.) kutzing. 1844	S	-	S	S
<i>I' construerii</i> (Ehr i Grunow. 1862	S	-	-	-
<i>Gomphoneina acuminatum</i> Ehrenberg. 1836	S-O	-	O	S
<i>-var tttrris</i> (Ehr.) Cleve. 1894				
<i>G constriction</i> Erenherg. 1830				
<i>-var capitation</i> , Grunow. 1880				
<i>G. domnieiae</i> Gusljakow. 1981	O-S	S	O	S
<i>G. olivaceum</i> (Lyngb.) kutzing. 1833-1836	S	-	O	S
<i>C parvulim</i> kutzing. 1849	S	-	M	S
<i>Grammatophora marina</i> (Lyngb.l kutzing. 1844	O	M	-	-
<i>G. serpentina</i> (Ralfs) Ehrenberg. IH44		M-O	-	O

<i>Gyrosigma altenuslum</i> 1 Kutz. > Kilheilhorst. /894-1X95	S	s	-	-
<i>G. balticum</i> (Ehr.) Rabenhorst. 1853	O	s	-	s
<i>G. eximium</i> (Phw.) Rover. 192"	S-O	s	-	o
<i>G. fasciola</i> (Ehr.) Griffdth et Henfrey. 1856	s-o	s	-	s
<i>G. prolongation</i> (W.Sm.) Griffith et Henfrey. 1856	s	s	-	-
<i>G. spenceri</i> (W.Sm.) Griffith el Henfrey. 1856	o	S-O	-	-
<i>llaslea subagnita</i> (Pr.-Lavr.) Makarova el Karajeva. 19~3	o	o	-	s
<i>Hantzschia crassa</i> Pentocsek. 19(12)	s	s	-	o
-var. <i>obtusata</i> Wislonch et Poretzkv. 1924	s	s	-	o
<i>ll. virgata</i> (Roper) Grunow. 188(1)	s-o	s	-	o
<i>llaslea</i> (<i>Xavictila</i>) <i>suhangilal</i> Pr.-Lavr.) Karajeva	-	s	-	-
<i>Hyaloiliseus amhiquus</i> Grunow. 1889-1895	-	s	-	-
<i>ll. solicits</i> (Kutz.) Grunow. 18~9	s	s	-	s
<i>Lyre/la ahrupla</i> (lonk.) Gusljakow et Karajeva. 1992	s	s	-	-
<i>L. dissipala</i> (llust.) Gusljakow et Karajeva. /992	IS	IS	-	-
<i>L. forcipaia</i> (Grev.) Gusljakow et Karajeva. 1992	s	s-o	-	s-o
<i>/. hennedyi</i> (W.Sm.) Gusljakow et Karajeva, 1992	s	o-s	-	-
<i>L. inatiingens</i> (Simon- sen) Gusljakow el Karaeva. 1992	S.I	-	-	-
<i>h. bra</i> (Ehr.) Karajeva. 1983	s	0	-	s
-var. <i>allanliea</i> (A.S.) Gusljakoq et Karajeva. 1992	s	o	-	-
-var. <i>elliptica</i> (A.S.) Gusljakow et Karajeva. 1992	s	o	-	-
<i>h pygmaeu</i> (Kutz.) Makarova et Karajeva. 19S"	o	s	-	o
<i>I. rudiformis</i> (Hust.) Gusljakow el Karajeva, 1992	IS	IS	-	-
<i>L. suhforciputa</i> Illust. I Gusljakow el Karajeva. 1992	S.I	S.I	-	-
<i>l.tcmaphora ahbreviata</i> Agard, 1831	o	O-M	-	-

<i>/. communis tleih.i Grunow, 1881</i>	M-O	(-)S	-	-
<i>l. ctalmatico (Kutz.) Grunow. 186~</i>	O-S	0	-	-
<i>l. ehrenbergii (Kutz.) Grunow. 186"</i>	O-S	M	-	-
<i>L. gracilis (Kutz.) Grunow. 186"</i>	M	M	-	s-o
<i>l.grandis (Kutz.) Grunow. 1880-1885</i>	s	s-o	-	-
<i>l.. hastata Mereschkowsky, 1901</i>	s-o	S-O	-	-
<i>l.. ovulum Mereschkowsky. 1902</i>	s	s	-	-
<i>L. parailoxa Agard. 1836</i>	s	o-s	-	-
<i>-var. parailoxa</i>	-	s	-	-
<i>Mastogloia angulala Lewis. 1861</i>	s	s-o	-	-
<i>Mapieulata W. Smith. 1853-1856</i>	-	s	-	-
<i>M. hahljikiana Grunow. 18~4 1958</i>	s	s	-	-
<i>XI. binotata (Grun) Cleve.. 1894-1895</i>	s	s-o	-	s
<i>M. braunii Grunow. 1863</i>	s	s	-	s
<i>M. erueicula (Grun.) Cleve. 1895</i>	s-o	0	-	s
<i>M. ervthraea Grunow. 1860</i>	s	s	-	-
<i>-var. biocellala Grunow. 18"</i>	s	s	-	-
<i>M. ignorata Hustedt, 192'-193"</i>	-	s	-	-
<i>XL lahuensis Cleve. 18~4-1959</i>	s	s	-	-
<i>M. lanceolala (Ago Kutzing. 1844</i>	s	s	-	-
<i>M. ovulum Hustedt. 1933</i>	s	s-o	-	s
<i>\l. parailoxa Grunow. 18~8</i>	s-o	s-o	-	-
<i>-var. tenera I'r - kavrenko. 1963</i>	-	s	-	-
<i>XI. pumilla (Grun.) Cleve. 1894-1895</i>				
<i>M pusilla Grunow, 1fS~8</i>	s-o	0	-	-

-var. <i>subrhombica</i> Pr.-Lavrenko, 1963	S	s	-	s
<i>M. smithii</i> Phwaites. 1853-1X56	s	s	-	s
<i>M tenera</i> Hustedt. 1933	s	s	-	-
<i>Melosira moniliformis</i> (O.Mull.) Agardh. 1824	M	\	-	o
-var <i>octogona</i> (Grun.). Hustedt.192'	s	s	-	s
-var <i>subglobosa</i> (Grun.). Hustedt. 192~	M	o	-	s
<i>Xarieula agnita</i> Hustedt. 1955	s	-	-	s
<i>X. eaneellata</i> Donkln, 18"l-18'2	s	-	-	s
<i>X. capitata</i> Ehrenberg, 1838	s	-	-	-
<i>X. eineta</i> (Ehr.) Ralfs. 1861	s	s	-	-
<i>X. eryptocephala</i> Kutzing. 1844	M	o	-	M
\ <i>erueigera</i> ill' Sm i < leve 1X94-1X95	s	s	-	-
<i>X. cuspidata</i> Kutzing, 1844	s	s	-	-
<i>X. digito-radiala</i> (Greg.) Ralfs. 1861	s	o	-	s
-var. <i>eyprinus</i> (Ehr.) It'. Smidth. 1853-1X56	-	s	-	-
<i>X. directa</i> W. Smith. 1853-1856	o	o	-	s
<i>X. distans</i> (IV.Sm.) Ralfs. 1842-1949	s	-	-	-
<i>X. gomphonematoides</i> Gusljakow, 1992	o	-	-	o
<i>X. gothlandiea</i> Grunow. 1880-1885	s	s	-	-
<i>X. glabriuscula</i> Hustedt. 1X33	-	-	-	s
-var. <i>ellipsoidalis</i> Pr.-Lavrenko, 1963	s	s	-	-
<i>X. grevilleana</i> . Ilender. 1964				
-rar. <i>pararhomhiea</i> (Pr.-Lavr), Gusljakow, et Gerasimuk. 1992				
-var. <i>remotiva</i> (Pr.-I.ayi-) Gusljakow et Gerasimuk, 1992	s	s	-	-
<i>X. halophila</i> (Grun.) Cleve, 1894	s	-	s	s

-var. <i>convergens</i> Pr.-Lavrenko, 1963	S	-	-	-
<i>X. hamidifera</i> Onmom; 1880	-	s	-	-
-var. <i>plicata</i> Pr.-Lavrenko. 1963	S	s	-	-
\. <i>humerosa</i> Brebisson, 1853-1856	s	-	-	s
<i>X. meniscnlux</i> Schumann. 186~	s	s	-	s
<i>X. mutica</i> kutzing, 1844	s-o	-	s	o
<i>X. ostrearia</i> Turpin. 1824	-	s	-	-
<i>X. palpchralis</i> Brebisson, 1853-1856	s	s	-	s
-var. <i>scmiplena</i> (Greg.) Cleve. /894-1895	s-o	s	-	o
<i>X. pennala</i> var. <i>politico</i> Meresclikovsky. /902	M	o	-	-
<i>X. peregrina</i> (Ehr.) kutzing. 1844	O-M	s	o	s
<i>X. Pi</i> Cleve. 1893-1896	s	s	-	-
<i>X. racliosa</i> kutzing. 1844	s	s	-	s
<i>X. ramosissima</i> (Ag.) Cleve. /894-/895	M	M	-	M
<i>X. reinhanltii</i> (Grun.) Cleve. 1894-1895	s	-	-	s
<i>X. rhynchocephala</i> kutzing. 1844	s	-	s	-
<i>X. rostellala</i> kutzing. 1844	s	-	-	-
<i>X. rombica</i> Gregory, 1885	s	s	-	-
<i>X. salinarum</i> Grunow. 1880	M	o-s	s	o
<i>X. septata</i> Pr.-Lavrenko. 1963	s	-	-	-
<i>X. speetahilis</i> Gregory, 185~	-	s	-	-
<i>X. spicttla</i> (llickeh) Cleve. 1891	M-O	-	O-M	s
<i>V. sithrosiellala</i> llusleclt. 1955	S.I	S.I	-	s
<i>X. versicolor</i> (Grun.) Cleve. 1894-1895	s	s	-	s
<i>Xeossynedra delicatissimat</i> Pr.-liter.I (iusljakow, 1992	M-O	s	-	s

<i>Sitzschia acuminata</i> (W.Sm.) Grunow, ISSO	O-S	o-s	-	()
<i>X. amphibia</i> Grunow. IS62	0	s	-	M-S
<i>X. annularis</i> W. Smith. IS53-IS54	s	s	-	S
<i>X. angustata</i> (W. Sm.) Grunow. 1980	s	-	-	-
<i>X. apiculata</i> (Grag.) Grunow. ISSO	o-s	s	-	-
<i>X. (Cylindroiheca)eloslerium</i> (Ehr.) W.Smith 1855-1856	-	s	-	-
<i>X. communis</i> Redienh, IS48-IS60	s	-	-	0
-var. <i>ahhrcviata</i> Grunow. ISSO	0	s	-	0
<i>X. commutata</i> Grunow, ISSO	s	-	-	-
<i>X. constricta</i> (Greg.) Grunow, 1880	s	s	-	s
<i>X. circumsula</i> (Hail) Grunow. 1880	s-o	s	-	s
\ <i>delicatissima</i> Cleve. 189'	0	()	-	O-S
V. <i>dissipata</i> (Kutz.) Grunow. 1882	s	s	-	s
<i>X. distans</i> Gregory, 185'	s	-	-	-
<i>X. frustulum</i> (Kutz.) Grunow. ISSO	s	-	-	-
-var <i>suhsulina</i> Hustedt. 1930	s	-	-	-
<i>X. hungarica</i> Grunow. 1862				
<i>X. hybrida</i> Grunow. 1980	M	0	-	s
<i>X. intermedia</i> Hantzsch, ISSO	s	-	-	-
<i>X. kutzingiana</i> Hilse, 1860	0	s	-	0
<i>X. lanceolata</i> W. Smith, 1853-1856	0	s	-	-
-var. <i>minima</i> I'. Heurek. 1880-1885	-	s	-	-
-var. <i>minor</i> Γ. Heurek. 1880-1885	-	s	-	-
<i>X. levidensis</i> (W. Sm.) Grunow. 1880-1883	s	s	-	s
<i>X. lorenziana</i> Grunow. ISSO	s	-	-	-

<i>N. longissima</i> (Breb.) Ralfs 1842-/849	O-S	-	-	-
<i>N. marginulata</i> Grunow, 1880	s	-	-	-
<i>N. microcephala</i> Grunow, 1880	o-s	s	-	-
<i>N. navicularis</i> (Breb.) Grunow, 1880				
<i>N. obtusa</i> W. Smith, 1853-1856	s	s	-	-
-var. <i>scalpeliformis</i> Grunow, 1880	s	s	s-o	s
<i>N. ovalis</i> Arnott, 1880	o	-	-	-
<i>N. panduriformis</i> Gregory, 185"				
<i>N. punctata</i> (W.Sm.) Grunow, 1880	s	0	-	s
-var. <i>coartat</i> Grunow, 1880	s	0	-	-
-var. <i>minutissima</i> l'oret- zky, 1940	s	s	-	-
-var. <i>punctata</i> Grunow, 1880	-	s	-	-
<i>N. reversa</i> W. Smith. 1853-/856	s-o	s	-	M-S
<i>N. rupestris</i> Pr.-Lavrenko, /963	M-O	-	-	s-o
<i>N. sigma</i> W. Smith, 1853	s-o	s	-	s
<i>N. sigmatiformis</i> Hustedt, 1955	s	s	-	s
<i>N. tenuirostris</i> Mere, 1902	s	s	-	-
<i>N. trivhionella</i> Hantzsch, 1864	s-o	-	-	s
-var. <i>debilis</i> (Am.) Grunow. 1880	0	-	-	s
<i>N. vidovichii</i> (Grun.) Peraga- do. 189"-1908	-	s	-	-
<i>N. vitrea</i> Normann, 1861	-	s	-	-
<i>Opephora marina</i> (Greg.) Petit, 1881	s-o	s	-	-
<i>O. martyi</i> Heriboud, /902	o	s	-	o
<i>Parafia sulcata</i> (Ehr.) Cleve, 18-3	0	s-o	-	s
<i>Pinnularia ambigua</i> Cleve, 1894-1895	s	s		-

<i>P. interrupta</i> W.Sm. var. <i>crassior</i> Grunow, 1891	S-O	s	-	-
<i>P. quadralarea</i> (A.S.) Cleve. 1894-1895	S	-	-	-
<i>Plagiotropis elegans</i> (W.Sm.) Reimer. 1966	S	s	-	-
<i>P. lepidoptera</i> (Greg.) Reimer. 1966	s	s	-	-
<i>Pleurosigma angulation</i> (Queek.) W. Smith. 1853-1856	s	s	-	-
<i>P. elongation</i> W Smith. 1852	S-O	s	-	-
<i>P. formosum</i> W. Smith, 1852	s-o	s	-	-
<i>P. rigidum</i> W Smith. 1853- 1856	s	s	-	-
<i>P. lewis</i> Smith. 1853-1856		s-o	-	o-s
<i>Pleroncola hyalina</i> (Kutz.) Gusljakow. 1992	M	M-O	-	M
<i>Psammodiscus nitidus</i> (Greg.) Rondel Maun. 19~8	0	o	-	s-o
<i>Rhabdonema adrialieum</i> Kutzling, 1844	s	M	-	-
<i>R. arcuatum</i> (Lyngb.) Kutzling, 1844	S.l	S.I	-	-
<i>Rhoicosphenia eurvala</i> (Kutz.) Grunow, 1867	M	s	-	-
<i>R. marina</i> (W.Sm.) M Schmidt IS'4-1958	-	s	-	-
<i>Rhopalodia gibba</i> (Ehr.) (). Midler, 189"	s	s	-	-
<i>R. gihherula</i> (Ehr.) O.Midler. 189"	o	s	-	-
<i>R. muscidus</i> (Kutz.) O. Midler. 1899	o	s	-	-
<i>Sceletonema costatum</i> (Grev.) Cleve. IS"8	m	M-O	-	M-O
<i>Stauroneis anceps</i> Ehreherg. 1841	s	-	s	-
<i>S. constricta</i> (Ehr.) Cleve. 1894-1895	O-M	-	-	o
<i>S. phoenicenteron</i> Ehrenberg. 1841	s	-	-	s-o
<i>S. salina</i> W. Smith. 1853- 1856	S-O	s	-	-
<i>S. wislouchii</i> Poretzsky et Anissimova, 1933	-	-	0	-
<i>Staurosirellapinnata</i> (Ehr.) Williams et Rouna. 198"	s	s	0	s-o

<i>Stephanidiscus hantzschii</i> Ehrenberg, 1844	S-O	s	-	s-o
<i>Striatella delicatula</i> (Kutz.) Grunow, 1880-1885	s-o	M	-	0
<i>S. interrupta</i> (Ehr.) Ieiberg, 1863	S	s-o	-	-
<i>S. unipunctata</i> (Lyngb.) Agard, 1832	S	s	-	s
<i>Surirella fasluosa</i> Ehrenberg, 1893				
<i>S. gemma</i> Ehrenberg, 1839	-	s	-	-
<i>S. oralis</i> Brebisson, 1844	O-S	s	-	s
<i>S. ovata</i> Kutzing, 1844	0	s	-	s
<i>-var. pinnaia</i> (II'.Sm.) Hustedt, 1930	o-s	-	-	-
<i>-var. salina</i> (IV.Sm.) Hustedt, 1930	0	-	-	s
<i>S. panditra</i> I'eragallo, 189"-1908	s	s	-	-
<i>S. striatula</i> Turpin, 1828	s	-	-	-
<i>S. subtilis</i> Pr.-Lavrenko, 1963	s	s	-	-
<i>Synedra fascicllata</i> (Ag.) Kutzing.				
<i>S. gaillonii</i> (Bory) Ehrenberg, 1830				
<i>S. pulehella</i> (Ralfs) Kutzing				
<i>S. ulna</i> (Sitzseh.) Ehrenberg, 1838				
<i>Thalassionema nitzschioides</i> Grunow, 1880-1885	s-o	s	-	-
<i>Thalassiosira baltica</i> (Grun.) Oslenfeld, 1901	s-o	s	-	-
<i>T. ineerta</i> Makarova, 1961	s	s	-	-
<i>T. parva</i> Pr.-Lavrenko, 1955	o	s	-	-
<i>Toxarium undulatum</i> Bailer, 1853	0	0	-	-
<i>Trachyneis aspera</i> (Ehr.) Cleve, 1894-1895	0	0	-	-
<i>I'riceralium antediluvianum</i> (Ehr.) Grunow, 18-0	s	s	-	-

Legend:

M - mass species

S - sparse

I - introduced

E - endemic

O - often

S-O - sparse-often

Table 5. Floristic Composition of Higher Algae of the Northwestern Part of the Black Sea

	Number of Species					
	Odessa Bay*	Coastal Areas from the Danube to Dnepr	Egorlitsky Tendrovsky Dzhagarylgashsky Bay	Karkinitzky Bay	Total in Northwestern Black Sea	In Black Sea (Kalugina, 1979)
Cloropyta	35 / 48.5	36/43.0	29 / 27.1	34 / 25.1	51	85
Charophyta	-	-	8/7.5	8 / 5.8	8	-
Phaeophyta	11 / 15.3	16/ 19.0	26 / 24.3	35 /26.1	38	77
Rhodophyta	26/36.1	32 / 38.0	44/41.1	57/42.6	71	142
Total amount of species	72	84	107	134	168	304

Data for last 15 years, from 1965 to 1991- 1995 species unknown.

Table 6. Changes in the volume of phytosaprobies in the coastal waters near Odessa (1965-1991).

	Number of species		Number of species		Number of species		Total number of	
	1965	%	1978	%	1991	1992	known species	%
Poly saprobies	12	20	12	24	13	35	16	19
Mesosaprobies	31	50	28	56	20	54	44	52
Oligosaprobies	18	30	10	20	4	11	25	29
Total amount of species	61	71.8	50	58.8	37	43.5	85	100

* In comparison to 1965 only 60.7% species have been registered in 1991.

Table 7. List of Macrophytobenthos Species

Species	Till 1975	Contemporary State Areas			
		NWBS*	Crimea	Water Bodies	
				Marine	Brackish
CHLOROPHYTA					
<i>Prasinoeladus niriuis</i> (Cienk.) It'aern., 1952	-	-	R	-	-
<i>Ulothrixflacca</i> (Dilw.J Thw: 1863	R	R	R	R	-
<i>I'.tenuissima</i> Kutz., 1833	R	R	-	R	R
<i>C.Pseudoflaeea</i> With. 1901	At	At	-	At	Al
<i>IJ.implexa</i> (Kutz.) Kutz., 1849	At	At	R	Al	At
<i>U.tenerrima</i> (Kutz.) Kutz., 1843	R	R	R	R	R
<i>Pilintci rimosa</i> Kutz., 1843	-	-	R	-	-
(<i>haetophorapiriformis</i> (Roth.) Ag., 1812	-	-	R	-	-
<i>I Ivella lens</i> (Crouan) Crouan. 1859	R	R	R	-	-
<i>Pseudulvi 11 a nadsonii</i> Rochl., 1932	-	-	R	-	-
<i>Pringsheimiella scutata</i> (Reinke) Marschew. 1924	R	R	At	R	R
<i>Holhoeoleon pili/erum</i> Pringsh., 1862	R	-	R	R	-
<i>Phaeophila dendroides</i> (Crouan) Hall., 1902	R	R	R	R	-
<i>Ph.engleri</i> Reinke., 1889	-	-	R	-	-
<i>Eetoehaete leptohaete</i> (Hither.) Wide., 1909	-	-	R	-	-
<i>E.wittroekii</i> (Utile) Kyi in. /938	-	-	R	-	-
<i>Entocladia viridis</i> Reinke. 18~9	At	At	At	At	R
<i>E.perjoranee</i> (Hither) Levi.: 193~	-	-	R	-	-

<i>Epicladia pontica</i> Rochl., 1939	-	-	R	-	-
<i>Monostroma oxyspermam</i> (Kutz.) Doty., 194"	-	R	-	-	-
<i>M.fuscum</i> (Post, et Rupr) Il'itr., 1866	R	R	-	R	-
<i>Capsosiphon fulvescens</i> (Ap.i Setch. et Gardn., 1920	-	-	R	-	-
<i>Blidingia minima</i> (\Ag.) Kylin., 194"	-	-	R	-	-
<i>Percursariapercursa</i> (.lg.) Bory.. 1828	R	R	-	R	-
<i>Enteromorpha prolifera</i> (O.Mull) J.Ag.. 1882	R	At	R	Al	-
<i>E.Ahlnneriana</i> (Bliding), 1933	R	At	R	JII	-
<i>E.fle.xuosa</i> (IVulf.) J.Ag., 1882-1883	At	At	At	At	-
<i>E.clathrata</i> (Roth.) Grew. 1830	At	At	Al	At	At
<i>E.crinita</i> (Roth.) J.Ag., 1882	-	-	R	-	-
<i>E./inza</i> (E.)J.Ag.. 1882-1883	I.	I.	I	At	-
<i>E.compressa</i> (E.) Grev., 1830	At	I.	L	I,	L
<i>E. intestinal is</i> (E.) Link, 1820	I.	L	L	I.	I.
<i>E.maeotica</i> Pr.-Lavr., 1945	R	R	R	R	-
<i>I Iva rigida</i> Ag.. 1822	At	R	I.	At	-
<i>Chlorocystis reinhardii</i> (Gardn) A.I.in.. 1885	-	-	R	-	-
<i>Gomontia polyrrhiza</i> (Lagerh.) Born, el Flah., 1888	At	R	R	-	-
<i>Chaetomorpha crassa</i> (Ag.) Knlz., 1845	-	-	R	-	-
<i>Ch.aerea</i> (Dillw) Knlz., 1849	I.	At	At	Al	-
<i>Ch.lnmim</i> (Mont.) Kutz., 1845	Al	At	At	At	-
<i>(h.chlorotica</i> (Mont.) kutz.. 1849	At	At	At	At	At
<i>Ch.capillaris</i> (Kttz.)Borg., 1925	-	-	R	-	-
<i>Ch.gracilis</i> Kutz., 1845	-	-	R	-	-
<i>Ch.zernovii</i> Worbnich., 1925	R	R	-	-	-

<i>Rhizoclonium riparium</i> (Roth.) Ham., 1849	-	-	R	-	-
<i>Rh.tortuosum</i> (Dillw.) Kutz., 1845	-	-	R	-	-
<i>Rh.implexum</i> (Dillw.) Kutz., 1845	At	At	R	At	At
' <i>Rh.lueroglyphicum</i> (A.) Kutz., 1845	At	R	R	-	-
<i>Stigeoclonium temte</i> Kutz., 1843	R	R	-	R	R
<i>Cladophora coelothrix</i> Kutz., 1843	-	-	R	-	-
' <i>.echinus</i> (Bias.) Kutz., 1849	-	-	R	-	-
<i>C.sericea</i> (Iluds.) Kutz., 1843	Al	At	R	At	III
<i>C.albida</i> (Iluds.) Kutz., 1849	At	At	At	At	-
<i>C.liniformis</i> Kutz., 1849	-	-	R	-	-
<i>C.laetevirens</i> (Dillw.) Kutz., 1843	At	At	-	At	-
<i>C.vadorum</i> (Aresch.) Kutz., 1849	-	-	R	-	-
<i>C.vagahunda</i> (L.) Hock., 1963	I	I.	I	I.	-
<i>C.dolmatica</i> Kutz., 1843	-	-	I.	-	-
<i>C.siwascensis</i> (.Meyer., 1922	-	-	-	Al	-
(<i>gloiuerato</i> (L. t Kutz., 1X43	-	-	-	R	I.
<i>C.cystalina</i> (Roth.) Kutz., 1843	-	-	At	-	-
<i>Urosporapenicilliformis</i> (Roth.) Aresch., 1866	At	I,	At	At	At
<i>Acrosiphonia centralis</i> (Lyngb.) (Kjellm., 1893	R	R	R	-	-
<i>Spongomorpha lanosa</i> (Roth) Kutz., 1845	R	R	-	R	-
<i>Cladophoropsis membranacea</i> (Ag.) Borg., 1905	-	-	R	-	-
<i>Siphonocladus pusillus</i> (Kutz.) Пουκ., 1885	-	-	R	-	-
<i>Bryopsis plumosa</i> (Iluds.) Ag., 1822	Al	L	I.		-
<i>B.adrialica</i> (J.Ag.) Menegh., 1856	-	-	R	-	-
<i>B.halbisiana</i> Lamour., 1813	-	-	R	-	-

<i>B.hypnoides</i> Lamour., 1809	At	R	At	Al	-
<i>B. corymbosa</i> J. Ag., 1842	-	-	R	-	-
<i>Derbesia lamourouxii</i> (G. Ag.) Sol., 184~	-	-	R	-	-
<i>Codium vermdara</i> (Olivi) Delle Chiaje, 1829	-	-	At	-	-
<i>Ostreobium queckettii</i> Born, et blah., 1889	R	-	R	-	-
<i>Laucheria litorea</i> Llofm- Bang et Ag., 1823	R	R	-	R	-
PHAEOPHYTA					
<i>Pylaiella littoralis</i> (L.) Kjellm., 1842	At	R	R	R	-
<i>Ectocarpus arachicus</i> h'ig. et De Sot., 1851	At	R	Al	R	-
<i>E. confervoides</i> (Roth.) He Jolls, 1863	At	At	At	At	R
<i>E. penicillatus</i> (Ag.) Kjellm., 1890	-	-	R	-	-
<i>E. fasciculatus</i> , 1841	R	R	At	R	-
<i>E. dasycarpus</i> Knack, 1891	-	-	R	-	-
<i>E. siliculosus</i> (Dilw.) Lyngb., 1819	At	R	At	R	-
<i>E. hiemalis</i> Crouan, 1852	At	R	R	R	-
<i>h'eldmannia lehelii</i> (Aresch.) Ilameh, 1939	-	-	R	-	-
<i>F. irregularis</i> (Kutz.) Hamel, 1939	-	-	At	-	-
<i>F. paradoxa</i> (Mont.) Hamel, 1939	-	-	R	-	-
<i>Entonema oligosporum</i> (Stromf.) Kylin., 1942	-	-	R	-	-
<i>E. parasiticum</i> (Sauv.) Hamel, 1939	R	R	R	-	-
<i>E. effusion</i> (Kylin) Kylin., 1942	-	-	R	-	-
<i>Phaeostroma hertholdii</i> Kuck, 1895	-	-	R	-	-
<i>Myrionema strangulans</i> Grev., 1822	-	-	R	-	-
<i>Myrionema seriatum</i> (Reinke) Kylin., 1942	-	-	R	-	-

<i>M.halticum</i> (Reinke) hos/ie, 1894	-	-	R	-	-
<i>[scocvelus orbicularis</i> L.Ag.) <u>Uagn.</u> IS"4	K	R	R	R	-
<i>I'seudolihoclerma extension</i> fCrouan) S.Lund., 1959	K	R	R	-	-
<i>Ralfsiu verrucosa</i> (Aresch.) J.Ag. IS4S	R	R	l	-	-
<i>Streblonema spliaericuni</i> Derb. et Sol.. 1S51	-	-	R	-	-
<i>S. tenuissimtm</i> I lauck., 1SS5	-	-	R	-	-
<i>Mvriactula rivulariae</i> tSulir) heldin.. 193"	JII	R	At	-	-
<i>M.arabica</i> (Kut:.) heldin.. 193"	-	-	R	-	-
<i>Elachista scutulata</i> (Sm.) DUBY.. 1830	-	-	R	-	-
<i>L.fucieola</i> (Veil.) Aresch.. IS42	-	-	R	-	-
<i>I.eatltesia difformis</i> (I.) Aresch.. 184"	At	-	R	R	-
<i>Corynophlaea uinhellala</i> (Ag.) Kut:.. 1843	R	R	l.	-	-
<i>C.flaccida</i> Kut:., 1858	-	-	At	-	-
<i>Cylindrocarpus microscopicus</i> Crouan, 1851	-	-	R	-	-
<i>Liehinannia leveillei</i> J.Ag.. /842	-	-	R	-	-
<i>Cladosiphon mediterraneus</i> Kut:.. 1843	-	-	R	R	-
<i>Ccontortus</i> tLhur.) Kylin.. /940	-	R	R	-	-
<i>Eudesme virescens</i> iCarm) J.Ag. 1880-1881	-	-	R	-	-
<i>Sperinaloclinus paradoxus</i> (Roth.) Kut:.. 1S43	-	-	R	-	-
<i>Stilophoru rhi:odes</i> (Ehrh.) J.Ag.. 1841	At	-	l.	-	-
<i>S.tuberculosa</i> (Horn.) Reinke. 1889	-	-	At	-	-
<i>Sereia /iliformis</i> (J.Ag). 1845	-	-	l,	-	-
<i>Zanardiniaprototypus</i> Xardo . 1S41	At	R	I.	-	-
<i>Arthrocladia villosa</i> (luds.) DUBY.. IS30	-	-	At	-	-
<i>Acinetospora crinita</i> (Conu.) Konuu.. 1953	-	-	R	-	-

<i>Diciyota dichotoma</i> (Huds.) Lamour., 1809	-	-	-	At	-
<i>D.linearis</i> (Ag.) Grew. 1830	-	-	R	-	-
<i>Dilophusfasciola</i> (Roth.) Howe., 1914	At	-	I.	-	-
<i>D.spiralis</i> (Mont.) Hamel., 1931	-	-	R	-	-
<i>Padinapavonia</i> (L.) (hull., 1828	-	-	L	-	-
<i>Sphacelaria cirrhosa</i> (Roth.) Ag., 1824	-	-	I,	R	-
<i>S.saxatilis</i> (Kuek.) Sauw. 1900	-	-	At	-	-
<i>Stypoeaulon seoparium</i> (L.) Kutz., 1843	-	-	At	-	-
<i>Gladostephts vertieillatus</i> (Lightl.) Ag., 181"	R	-	I.	-	-
<i>C.spongiosis</i> (Lightl.) Ag., 1828	-	-	K	-	-
<i>Choristocatpus tenellus</i> (Kutz) Y.anard., 1860	-	-	K	-	-
<i>Sc\ tosiphon lomentaria</i> (Lyngb.) J.Ag., 1848	At	At	L	-	-
<i>Petalonia zosterifolia</i> (Reinke) Kutz, 1898	-	R	R	-	-
<i>Desmotriehum undulatum</i> (J.Ag.) Reinke., 1889	At	R	R	R	-
<i>Punetaria lalifolia</i> Grew., 1830	-	At	R	-	-
<i>P.plantaguinea</i> (Roth.) Grew. 1830	-	-	R	-	-
<i>Striaria attenuate!</i> (Ag.) Grew, 1828	R	R	At	-	-
<i>Slielyosiphon sori ferns</i> tReinke I Rosenw. 1935	-	-	R	-	-
<i>S.adriatieus</i> Kutz., 1843	-	-	At	-	-
<i>Giraudya sphaelarioides</i> Derb. et Sol., 1851	-	-	At	-	-
<i>Myriotriehia repens</i> (Июцк.) Karsak., /892	-	-	R	-	-
<i>Asperococcus bullosas</i> L.amour . 1813	-	-	R	-	-
<i>Cystoseira barbata</i> (Good, el Wood.) Ag., 1821	l.	-	I.	At	-
('.crinita iDesf.) Hon., 1832	-	-	I.	-	-
<i>Desmarestia viridis</i> (Mull.). Lain.,1813	-	t.	-	-	-

RHODOPHYTA					
<i>Asterocytis ramosa</i> (Tim.) Gobi.. 18~9	R	R	R	R	-
<i>A.wol/eana</i> (Tlansg.) Lagerh, 1886	R	R	R	-	-
<i>Goniotrichum elegcois</i> (Chauw.) Zanarcl.. 184~	R	R	R	R	-
<i>Eryllvocludiu suhoilegra</i> Rosenw. 1909	-	-	R	-	-
<i>E.carnea</i> (Dillw.) J.Ag. 1882-1883	-	-	At	-	-
<i>E.invesliens</i> (Zanarcl.) Horn.. 1892	-	-	R	-	-
<i>E.reflexa</i> (Crouan) Thur.	-	-	R	-	-
<i>Bangia fuseopurpurea</i> (Dillw.) lyngh . 1819	L	L	I.	-	-
<i>B.atropurpurea</i> (Roth.) Ag.. 1824	R	R	-	-	Al
<i>I'orphyra leucosticta</i> Thur., 1863	L	I.	I.	-	-
<i>Kylinia inicroseopiaea</i> (Nag) Kylin.. 1944	R	R	R	-	-
<i>K.parvula</i> (Kylin) Kylin.. 1944	-	-	R	-	-
<i>K.hattersiana</i> (Hamel) Kylin.. 1944	-	-	R	-	-
<i>K.humilis</i> (Rosenw.) Papenf., 194	-	-	R	-	-
<i>K.seeunclala</i> (Lyngh.) Papenf.. 194'	At	At	Al	At	-
<i>K.vigralula</i> (llarv.) Papenf, 194"	L	At	L	-	-
<i>Aeroehaetium thuretii</i> (Born.) Coll. et lien'.. 191~	-	-	At	-	-
<i>A.davwsii</i> fDillw.) Nag.. 1861	-	-	R	-	-
<i>A.savianum</i> (Menegh.) Nag., 1861	-	-	R	-	-
<i>Rhodoehoiion penieilli/ornc</i> (Kjellm) Rosenw. 1898	-	-	R	-	-
<i>Rh.purpureum</i> (Light./.) Rosenv.. 1900	-	-	R	-	-
<i>Rh.velutinum</i> (Hauek.) Hamel, 1928	-	-	R	-	-
<i>Audouinella memhranaeaa</i> (Magn.) Papenf, 1945	-	-	R	-	-

<i>Xemalion helminthoides</i> (Yell) Batt., 1902	-	-	At	-	-
<i>Gelidium crinale</i> (Turn.) Lcimour., 1825	-	-	I.	-	-
<i>G.latifolium</i> (Grev.) Born et Thur., 18~6	-	-	I.	-	-
<i>Pterocodiapinnata</i> (Huds.) Papenf., 1950	R	-	R	-	-
<i>Gelidiella antipai</i> Сект., 1938	-	-	R	-	-
<i>Peyssonnelia rubra</i> (Grev.) J.Ag., 1851	-	-	L	-	-
<i>P.dubyi</i> Crouan., 1844	R	-	At	-	-
<i>Hddenbrandtia prototypus</i> Sardo., 1834	-	-	R	-	-
<i>Phymatolithon polymorphum</i> (L.) Foslie., 1899	-	-	R	-	-
<i>hilhothamnion lenormandi</i> (Aresch.) h'eslie. 1895	-	-	I.	-	-
<i>P.pdithon membranaceum</i> (lisp.) Ileydr. 189"	-	-	L	-	-
<i>Dermatolithon cvstoseirae</i> (Πουσκ.) Huve, 1962	R	-	I	-	-
<i>D.puslulatuin</i> (humour.) Foslie., 1899	-	-	R	-	-
<i>Melobesia farinosa</i> Lamour., 1816	L	R	L	R	R
<i>M.lejolisii</i> Rosan., 1866	-	-	At	-	-
<i>M.minutula</i> . 1905	-	-	R	-	-
<i>Choreonema thurelii</i> (Born.) Schmil:.. 1889	-	-	R	-	-
<i>Corallina officinalis</i> L., 1 "56	-	-	I.	-	-
<i>Cmediterranea</i> Aresch., 1852	-	-	I	-	-
<i>C.granifera</i> Ell. et Soland. 1"86	-	-	At	-	-
<i>Jania ruhens</i> (L.) Lamour., 1816	-	-	At	-	-
<i>(irateloupia dicholoma</i> J.Ag.. 1842	-	-	I.	-	-
<i>Cruoriopsis rosenvingii</i> Borg.. 1929	-	-	At	-	-
<i>Gracilaria verrucosa</i> (Huds.) Papenf., 1950	-	-	L	-	-
<i>C. dura</i> (Ag.) J.Ag.. 1842	-	-	At	-	-

<i>Sphaerococcus corono. (Good, et Wood.) Stackh., 1 "95-1811</i>	-	-	R	-	-
<i>Furcellariafastigiata (lluds.) Lamour.. 1813</i>	-	-f	R	-	-
<i>Cystoclonium purpureum lluds.) Bat!., 1902</i>	-	-	R	-	-
<i>llvpnea musciformis (Will!.) Lamour.. 1813</i>	-	-	R	-	-
<i>Pltydophora brodiaei (Turn.) .l. Ig . 1842</i>	Al**		-	-	-
<i>P.pseudoceranoides (Gniel.) Near, et Tayl., 19~l</i>	Al....	At**	-	-	-
<i>P.nervosa tl)(!.) Grev.. 1830</i>	l.**	I **	I.	-	-
<i>P.lraillii Holm, et Bait. 1890</i>	-	-	R	-	-
<i>Gigartina acicularis (ll'u!.) Lamour., 1813</i>	-	-	R	-	-
<i>G.teedii i Roth) Lamour.. 18/3</i>	-	-	R	-	-
<i>Lomenlaria articulate! (lluds.) Lyngb., 1819</i>	-	-	R	-	-
<i>L.clavellosa (Turn.) Gad. 1863</i>	At	K	JII	-	-
<i>L.uiictnata Menegli.. 1840</i>	-	-	R	-	-
<i>L.compressa (Kut:.) Kylin.. 1931</i>	-	-	R	-	-
<i>L.jirma (.J.Ag) Kylin.. 1931</i>	-	-	R	-	-
<i>Chylocladia squarrosa (Kut:) l.e Job's.. 1863</i>	-	-	R	-	-
<i>Cli.re/le.xa (Cliaiiv.) I.enorm.. 1841</i>	-	-	R	-	-
<i>Aiililhamnion plumula (Ell.) Thur., 1863</i>	-	-	At	-	-
<i>A.crueialum (Ag.) Nag.. 1861</i>	R	R	At	-	-
<i>A. lenuissimiim (Ilouck.) Schiff</i>	R	R	R	-	-
<i>(eramium lenuissimiim (Lyngb.) J.Ag.. 1851</i>	Al	At	R	Al	Al
<i>('. deslongcliampii ('hauv.. 1826-1831</i>	-	-	R	-	-
<i>C.strichum Grev. el llarv.. 1851</i>	R	R	At	-	-
<i>G.diaphaniim (l.iglil!.) Roth.. 1806</i>	l.	I	I.	-	Al
<i>C.elegans Ducl. 1809</i>	l.	l	At	R	-

<i>C.ciliatum</i> (Eli) Duel., 1809	-	-	L	-	-
<i>C.arborescens</i> J.Ag. 1893-1894	-	-	At	-	-
<i>C.circiimalum</i> (Kutz.) J.Ag. 1851	R	R	At	-	-
<i>C.rubrum</i> (lluds.) Ag, 1810-1812	L	L	L	Al	-
<i>C.pedicellatum</i> (Duby) J.Ag. 1893-/894	R	R	At	-	-
<i>C.secundatum</i> Lyngb., /819	-	-	R	-	-
<i>Callithamnion corymbosum</i> (.1.1: Smith.I Lyngb.. 1819	At	At	At	At	-
<i>C.granulatum</i> (Duel) Ag.. 1828	R	-	R	-	-
<i>Seirosora interrupta</i> (J.E.Smith.) Sehmitz.. 1893	-	-	R	-	-
<i>Compsolittmnion gracillimum</i> (linn:) Sag., 1861	-	-	R	-	-
<i>Griffithsia Jlosculosa</i> (Ell.) halt 1902	-	-	R	-	-
<i>Spermothamnion striatum</i> (Ag.) Ardiss.. 1883	-	-	At	-	-
<i>Lejolisia mediterranea</i> Born., 1859	-	-	R	-	-
<i>llypoglossum voodwardii</i> Kutz., 1843	-	-	R	-	-
<i>Apoglossum ruseifoliim</i> (Turn.) J.Ag. 1898	-	-	L	-	-
<i>Sitophyllum punctatum</i> (Staekh.) Grev.. 1830	-	-	At	-	-
<i>Dasyapedicellate</i> (Ag.) Ag. 1824	R	R	At	-	-
<i>Darhuseula</i> IDillw:) Ag. 1828	-	-	R	-	-
<i>Dasyopsis apieulata</i> (Ag.) A/in.. 1828-1835	-	-	At	-	-
<i>llelerosiphonia plumosa</i> (E.I '.) Hail.. 1902	-	-	R	-	-
<i>Polysiphoniapttlvinata</i> Kutz., 1863	-	-	R	-	-
<i>P.breviarticulata</i> (Ag.) Zanarcl. 1841	-	-	R	-	-
<i>P.violacea</i> iRolh.) Grev.. 1849	-	-	R	-	-
<i>P.sangiunea</i> (Ag.) Zanard., 1841	-	Al	R	-	-
<i>P.spinulosa</i> Grev., 1824	R	R	R	R	R

<i>P.elongate/ lluds.i</i> Han.: /833	L	At	L	R	
<i>P.denudata</i> (Dillw.) Kutz.. 1849	L	At	L	At	-
<i>P.suhlifera</i> (Ag.) Han.: 1834	At	At	L,	-	-
<i>P.nigrescens</i> (Dilhw.) Grev., 1833	-	-	R	-	-
<i>P.opaca</i> (Ag.) V.anard.. 1841	At	Al	L.	R	-
<i>Alsidiuin eorallinu/n</i> Ag.. 182~	-	-	R	-	-
<i>Pterosiphoniapennata</i> (Roth.) h'alkenh.. 1901	-	-	K	-	-
<i>Dipterosiphonia rigens</i> (Sehoush.) h'alkenh.. 1901	-	-	R	-	-
<i>l/ei-posiphonia lenella</i> (Ag.) Sag . 1846	-	-	R	-	-
<i>l.ophosphonia ohseuici</i> (Ag) h'alkenh.. 1901	At	At	At	At	-
<i>l reptahunda iSuhr i Kytin</i> 1956	-	-	Al	-	-
<i>Ghondria tenuissi/na</i> (Good, el Wood.) Ag. 1523	At	-	L.	-	-
<i>G.dasyphylla</i> (Wood.) Ag.. 1822	R	-	At	-	-
<i>Laurencia papillosa</i> (k'orsk.t Grev.. 1830	-	-	L	-	-
<i>L.panieulata</i> J.Ag.. 1863	-	-	At	-	-
<i>Leoronopus</i> J.Ag., 1863	-	-	L.	-	-
<i>L.hvhrida</i> (DC.) Lenonn . 1830	-	-	At	-	-
<i>L.ohtusa</i> (Hits.) Lamour.. 1813	-	-	L	-	-
<i>L.pinnatijida iConel</i> Lamour., 1813	-	-	R	-	-

Note: * - Northwestern Black Sea - not including Egorlitsky and Tendrovsky Bays, hut included in Crimea because of floristic similarity.

Freshwater limans - Dneprovsky. Dnestrovsky.

Saltwater - Sukhoi. Grigirievsky. Kuyalnik. Tiligulsky

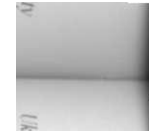
** - Encountered only in Zernov's Phyllophora field, absent in coastal /one

Table 8. List of Meiobenthos Species

Species	Till 1975	Contemporary State Areas		
	(NWBS)	NW'BS	Crimea	Sea of Azov
FORAMINIFERA				
<i>Ammobacitites ponticus</i> Mikludovich, 1968	-	+	-	-
<i>Discummino imperspica</i> Janko, 19'4	-	+	-	+
<i>Eggerella scabra</i> Williamson, 1858	-	+	-	-
<i>Cyclogyra planorhis</i> Schultze, 1854	-	+	-	-
<i>Quinqueloculina ex gr. hicornis</i> Walker et Jacob, 1826	-	+	-	-
<i>O.laevigata</i> cl'Orbigny, 1826	-	+	-	-
<i>O.semiuulum</i> Linne, 1-6~	-	+	-	+
<i>Massilina seeans</i> cl'Orbigny, 1826	+		-	-
<i>Ortlomorphina ca/amorpba</i> Reus, 1X66	-	+	-	-
<i>L.agena vulgaris</i> Williamson, 1858	-	+	-	-
<i>Esosvrinx jalzkoi</i> Janko, 19~4	-	+	-	-
<i>Laringosigma williamsoni</i> Michalevicht, 1968	-	+	-	-
<i>Entolingulina Jeplanala</i> Janko, 19~9	-	+	-	-
<i>Fissurina ex gr. solitila</i> Segtienza.	-	+	-	-
<i>I'ara/issurina aventricosa</i> Bollovskoj, 1981)	-	+	-	-
<i>I'.clzemeuliniea</i> Janko, 9~9	-	+	-	-
<i>P. ex gr lateralis</i> Cuslman, 1839	-	+	-	-
<i>Aubignyna perlucicla</i> Heron-Allen et Earlancl, 1913	-	+	-	+

<i>Rosalind catesbyana</i> d'Orbigny, 1839	-	i	-	-
<i>Rosalina</i> sp.	-	+	-	-
<i>Sonion matagordamts</i> (iishman, 1939)	-	+	-	+
<i>Sonion</i> sp	-	+	-	-
<i>Ammonia ammoniformis</i> d'Orbigny, 1826	-	+	-	-
<i>A.compacta</i> llojker	-	+	-	-
<i>A.novoeuxinica</i> Janko, 19~9	-	+	-	+
<i>A.parasovica</i> Stschedrina el Mayer, 19~5	-	+	-	+
<i>A.lepida</i> (iishman, 1928)	-	+	-	+
<i>Canalifera parkerae</i> Janko, 19~4	-	+	-	+
<i>Lorosioionion marie obi</i> Rogdanowich,	-	+	-	-
<i>L.maticohi poilicium</i> Janko, 19~9	-	-	-	+
<i>L.snhgranosiis ligger</i> , 185'	-	+	-	-
<i>L.laynesina anglica</i> Murray, 1965	-	+	-	+
<i>L.phidium caspieum</i> Mayer, 19~9	-	+	-	+
<i>E.caspicum aroviciuu</i> Janko,	-	-	-	+
<i>E.ponticum Dolgopolskiju</i> el l'ditli, 1931	-	+	-	+
<i>(i)hroelphidium percursum</i> Janko, 19~4	-	+	-	-
<i>(')poeyonum</i> d'Orbigny, 1839	-	+	-	+
<i>Mayerella brozkajae</i> Mayer el Janko, 1968	-	+	-	+
<i>i'rochammina iijjala</i> (Montagu, 1808)	+	-	-	+
<i>Milidinmiid fused</i> Brad)	-	-	-	+

TURBELLARIA				
NEMATODA				
<i>Areolaimus ponticus</i> Filipjev 1922	-	+	+	-
<i>A.-osterae</i> (Filipjev 1918)	-	-	+	-
<i>Acmaeolaimus diplopeltoides</i> Fil. 1918	-	-	+	-
<i>Diplopeltis cirrhotics</i> (Eberth 1865)	-	+	+	-
<i>Diplopcllula onusto</i> (Vieser 1956)	-	-	+	+
<i>Campylaimus siwaschensis</i> Sergeeva 1981	-	-	-	+
<i>C.ponticus</i> Sergeeva 1981	-	+	1	+
<i>Tarodontophora epiadristicha</i> (Stekhoven 1950)	-	-	+	-
<i>A.xonolainius setosus</i> Filipjev 1918	-	III	III	+
<i>A.ponticus</i> Filipjev 1918	-	III	+	+
<i>A.arcuattis</i> (Stekhoven 1950)	-	-	+	-
<i>Leptolaimus steineri</i> (Filipjev 1922)	-	+	+	-
<i>Camacolaimus bathycola</i> Filipjev 1922	-	-	+	-
<i>C.dolichocercus</i> Filipjev 1922	-	-	+	-
<i>Odonthophora angustilainius</i> (Filipjev 1918)	-	+	+	-
<i>Southerniella conicauda</i> (Stekhoven 1950)	-	-	+	-
<i>Syringolaimus caspersi</i> Gerlach 1951	-	-	+	-
<i>Terschellingia pontica</i> Filipjev 1918	-	III	•	-
<i>Tdongicaudata</i> De Man 1907	+	in	III	III
<i>Metalinhoioeus zosteræ</i> Filipjev 1918	+		+	-
<i>M.typicus</i> De Man 1917	-	-	+	-



<i>Linhomoeus hirsutus</i> Bastion 1865	-	-	+	-
<i>Antyclus iniquus</i> (Wieser 1959)	-	-	+	-
<i>Paralinhomoeus filijormis</i> (Filipjev 1918)	-	+	+	-
<i>P.tenuicaudatus</i> (Biitschli 18'4)	-	-	+	-
<i>P.deeonineki</i> Groza-Rojancovski 19"2	-	-	+	-
<i>Sphaerocphtm crassicanda</i> Filipjev 1918	-	+	+	+
<i>Fleutherolaimus longus</i> Filipjev 1922	-	+	+	+
<i>Sphaerolaimus dispar</i> hilipjev 1918	-	-	+	-
<i>Sph.macrocirculus</i> Filipjev 1918	-	+	+	+
<i>Sph.gracilis</i> De Man 1906	-	m	+	+
<i>Sph.ostreae</i> Filipjev 1918	-	m	+	+
<i>Sphdiorrendus</i> Sergeeva 1981	-	-	+	-
<i>Sph.minutus</i> Vitiello 19"1	-	-	+	-
<i>Sph.megainphis</i> Wieser 1956	-	-	+	-
<i>Prosphaerolaimus eurypharynx</i> Filipjev 1918	-	-	+	+
<i>Disconema alaima</i> Filipjev 1918	-	-	+	-
<i>Monhystera longicapitata</i> Filipjev 1922	-	+	+	-
<i>M.parva</i> iBaslian 1865)	-	+	+	+
<i>Mcollaris</i> Filipjev 1922	-	+	+	-
<i>M.ampulucauda</i> Paramonov 1926	-	+	+	-
<i>M.attenuala</i> Filipjev 1922	-	+	+	-
<i>M.jlliformis</i> Bastion 1865	-	+	-	-
<i>M.rotndicapitala</i> hilipjev 1922	-	m	m	+
<i>M.contea</i> Filipjev 1922	-	m	+	in
<i>Paramonohystera elliptica</i> Filipjev 1918	-	+	+	-

<i>Theristus latissimus</i> Filipjev 1922	+	+	+	-
<i>Th. littoralis</i> Filipjev 1922	-	+	+	+
<i>Th. acer</i> Bastion 1865	-	-	+	-
<i>Th. sobulicola</i> (Filipjev 1918)	-	+	in	+
<i>Fh. euximus</i> (Filipjev 1918)	-	+	+	-
<i>Cylindrotheristus longicaudatus</i> (hilipjev 1922)	+	III	+	III
<i>C. maeoticus</i> (hilipjev 1922)	-	m	+	+
<i>C. oxycereus</i> (De Man 1888)	-	+	+	-
<i>Mesotheristus setosus</i> (Butschli 18"4)	+	+	+	-
<i>Cobbia trioclonta</i> hilipjev 1918	-	-	+	-
<i>Steineria pontica</i> Croza-Rojancovski 19'2	-	-	+	-
<i>Melachromadora cystoseira</i> hilipjev 1918	-	-	+	-
<i>Mmacroutero</i> hilipjev 1918	-	in	in	-
<i>Spirinio sahulicola</i> (hilipjev 1918)	-	+	+	-
<i>S. parasilifera</i> (Bastion 1865)	-	-	+	-
<i>Onyx prjectus</i> Cobb 1891	-	-	+	-
<i>Microlaimus kaurii</i> Wieser 1954	-	+	+	-
<i>Bolbolaitnus murinoe</i> (Sergeeva 19~6)	-	+	+	-
<i>Desmodora pontica</i> Filipjev 1922	-	+	+	-
<i>Dconica l'itiello</i> 19~1	-	-	+	-
<i>Ceramonema annulata</i> (Filipjev 1922)	-	-	+	-
<i>(hromaspirina pool tea</i> Filipjev 1918	-	-	+	-
<i>Monoposthia eostata</i> (Bastion 1865)	-	-	+	-
<i>Draconema ponlicum</i> Filipjev 1918	-	-	+	-
<i>D. cephalatum</i> Cobb 1913	-	-	+	-

<i>Comesoma stenocephalum</i> Filipjev 1918	-	-	+	-
<i>Paracomesomea dubium</i> /Filipjev 1918)	-	-	+	-
<i>Sabatieria abyssalis</i> /Filipjev 1918)	-	+	m	+
<i>S.longicaudata</i> Filipjev 1922	-	-	+	-
<i>S.quadripopillata</i> hilipjev 1922	-	+	+	+
<i>S.pulchra</i> (G.Schneider 1906)	+		in	+
<i>S.asperu/n</i> Sergeeva I9~3	-	-	+	-
(<i>hromadorita gracilis</i> I hilipjev 1922)	-	+	+	+
<i>Chdeuckaiii</i> (De Man 18"6)	-	+	+	+
<i>Ch.de/naniana</i> Filipjev 1922	-	-	+	-
<i>Diehromadara cephalata</i> iSteiner 1916)	+	+	+	+
(<i>hromadora midicapilala</i> Haslian 1865	-	+	+	+
<i>Neochromadora poecilosomoides</i> /Filipjev 1918)	-	-	m	+
<i>S sabulicola</i> /Filipjev 1918)	-	+	+	-
<i>Pomponema mullipapillaluin</i> I hilipjev 1922)	-	-	+	-
<i>Ptycholaimellusponticus</i> (hilipjev 1922)	-	-	+	+
<i>I'rochroiittdoro megodonla</i> hilipjev 1922	-	-	+	-
<i>Prochromadorella hrachyura</i> Stekhoven 1950	-	-	+	-
<i>P.mediterranea</i> (Mieoletzky 1922)	-	in	+	+
<i>Chromadoiina ohlusa</i> Filipjev 1918	-	+	+	-
<i>Spilophorella euxina</i> hilipjev 1918	-	+	+	-
<i>S.paradoxa</i> (De Man 1888)	+	+	+	-
<i>Chromadorella ntytilicola</i> hilipjev 1918	-	+	+	+
<i>Euchromadora striata</i> (Eherth 1863)	-	-	+	-
<i>Seolonchus corcundits</i> iGerlach 1956)	-	-	+	-

<i>Gyatholaimus gracilis</i> (Eberth 1863)	-	+	+	+
<i>Paracanthochus caecus</i> (Bastian 1865)	-	m	in	+
<i>Cohbionema acrocerca</i> Filipjev 1922	-	+	+	-
<i>C.cylindrolaimoides</i> Stekhoven 1950	-		+	-
<i>Ethmolaimus multipapillatus</i> Paramonov 1926	-	+	-	-
<i>Halichoanolaimus dolichurus</i> Saweljev 1912	-	+	+	-
<i>H.robustus</i> (Bastian 1865)	-	-	+	-
<i>I llukjanovae</i> Sergeeva 19~3	-	-	+	-
<i>Iatroncina ej. piratieum</i> Il'ieser 1959	-	-	+	-
<i>Cheironeluis vorax</i> Cobb 191~	-	-	+	-
<i>Ih'sinoscolex tenuisela</i> Filipjev 1922	-	+	+	-
<i>D.minutus</i> Claparede 1863	+	-	+	-
<i>(Jiiadrieoia earvcrieits</i> (hilipjev 1922/	-	-	+	-
<i>Odorieala hilipjev</i> 1922	-	-	+	-
<i>O. media</i> (Reinhard 1881)	-		t	-
<i>O.steineri</i> Filipjev 1922	-	-	+	-
<i>O.reinhardi</i> hilipjev 1922		-	+	-
<i>0.pontica</i> hilipjev 1922	-	-	+	-
<i>Tricoma nematoides</i> (Greeff 1869)		-	+	-
<i>Tplatycephala</i> hilipjev 1922	-	-	+	-
<i>T.bacescui</i> (Pahet Andriescu 1963)	-	-	+	-
<i>Anticoma acuminata</i> (Eberth 1863)	+	+	+	-
<i>A platonovae</i> Sergeeva 19~2	-	-		-
<i>I.eptosomatium punctatum</i> (Eberth 1863)	-	+	+	-
<i>I.bacillatiin</i> (Eberth 1863)	-	+	+	-

<i>L.elongatum</i> Bastian 1865	-	-	+	-
<i>Leptosomatides euxinus</i> hilipjev 1918	-	+	+	-
<i>Oxystomina elongata</i> (Biitschli 1874)	-	+	+	+
<i>O.clavicauda</i> (Filipjev 1918)	-	+	+	-
<i>O.cf. nidrosiensis</i> Allgen 1933	-	-	+	-
<i>O.propria</i> Sergeeva 19"3	-	-	+	-
<i>O. unguieulata</i> Stekhoven 1935	-	-	+	-
<i>O.breviceps</i> Sergeeva 1973	-	-	+	-
<i>Nemanema fliformis</i> (Filipjev 1918)	-	-	+	-
<i>Thalassoalaimus mediterraneus</i> I'tiello 19"0	-	-	+	-
<i>Ilalalaimus pontieum</i> Filipjev 1922	-	+	+	-
<i>H.anne</i> Sergeeva 19"2	-		+	-
<i>H. wodjanizkii</i> Sergeeva 19~2	-	+	+	+
<i>Il.hrevispiculum</i> Sergeeva 19~3	-	-	+	-
<i>Il.jtdtensis</i> Sergeeva 19"3	-	-	+	-
<i>Ponlonema zernovi</i> (hilipjev 1916)	-	+	+	-
<i>Oncholai.ncllus mediterraneus</i> Stekhoven 1942	-	-	+	+
<i>Rhahdoiimania pontica</i> Flalonova 1965	-	+	+	+
<i>I'hanoderma albidum</i> Bastian 1865	-	+	+	-
<i>Ph.tuberculatum</i> (Fberih 1863/	-	-	+	-
<i>Pelagonema ohtusicauda</i> Filipjev 1918	-	+	+	-
<i>Pandolaimus ponticus</i> (Sergeeva 19~2)	-	-		-
<i>Anoplostoma viviparum</i> (Bastion 1865)	+	+	+	+
<i>A.brevispiculum</i> Sergeeva 19"4	-	-	+	-
<i>Eurystomina assimilis</i> (De Man 18~6)	+	+	+	+

<i>E.Jilispiculum Cieiach 195-1</i>	-	-		-
<i>Symplocostomaponiticum hilipjev 1918</i>	-	+	+	-
<i>S.lenuicolle (Eberth 1863)</i>	+	+	+	-
<i>Polygastrophora hexabulba (Filipjev 1918)</i>	-	-	+	-
<i>P.pentabulba Sergeeva 19"4</i>	-	-	+	-
<i>(atalaimus sabulicola (hilipjev 1918)</i>	+	+	+	-
<i>(.longicaudalus Sergeeva 19~4</i>	-	-	+	-
<i>Euthoracostoinopsis filipjevi Sergeeva 19'4</i>	-	-	+	-
<i>Enoploides disparilis Sergeeva 19~4</i>	-	-	+	-
<i>E.Jürsiütus hilipjev 1918</i>	-	4	+	-
<i>E.hrevis Filipjev 1918</i>	-	+	+	+
<i>Eeirrhahus Filipjev 1918</i>	-	+	+	-
<i>E.ainphioxi hilipjev 1918</i>	-	+	+	-
<i>E.ponticus Sergeeva 19~4</i>	-	-	+	-
<i>Enoplus quadridentatus Berlin 1853</i>	+	III	+	-
<i>E.inaeoticus hilipjev 1916</i>	-	III	+	-
<i>Elittoralis Filipjev 1918</i>	-	+	+	-
<i>Mesacantldon conicum i hilipjev 1918)</i>	-	-	+	-
<i>Mdielerospieulum Sergeeva 19"4</i>	-	-	+	-
<i>Oxyonchus dubius (hilipjev 1918)</i>	-	-	+	-
<i>Epacanhion nadjae Sergeeva 19~4</i>	-	-	+	-
<i>Paramesaeanthion Iruncum l'tiello 19~1</i>	-	-	+	-
<i>Tripyioides marinus (Butschli 18"4)</i>	-	+	+	+
<i>Bathylaimus australis (i>hh IS94</i>	-	+	+	-
B.co66I Filipjev 1922	-	+	+	-

<i>Halanonchus bulletins Geiiach 1964</i>	-	-	+	-
<i>Metoneholaimus demani l/uz Strassen 1X94)</i>	-	+	m	+
<i>Pruoncholaimus eberth! (hilipjev 1918)</i>	-	-	+	-
<i>P.banyalensis Inglis 1962</i>	-	-	+	-
<i>Oncholaimus dujardinil De Man 18-6</i>	-	+	+	+
<i>O.brevicaudatus hilipjev 1918</i>	+	+	+	-
<i>O.compyloercoides Con.et Stekhoven 1933</i>	-	+	+	+
<i>Viscosia glabra (Bastian 1865)</i>	-	+	+	+
<i>I .minor hilipjev 1918</i>	+	+	+	+
<i>Y.eobbi hilipjev 1918</i>	-	+		+
<i>V.elongata hilipjev 1922</i>	-	+	+	+
<i>Wminudonta lltiello 19"l)</i>	-	-	+	-
<i>Dorylaimus filipjevi Geiiach 1951</i>	-	-	+	-
<i>Dorvlaimus sp.</i>	-	-	+	-
GASTROTRICHA				
<i>Xenotrichula heauchampi Levi, 1950</i>	-	+	-	-
<i>Turbanella cornuta Remane, 1925</i>	-	+	-	-
<i>P.pontica Valkanov, 195"</i>	-	+	-	-
KINORHYNCHA				
<i>Pycnophyes clentatus (Reinhardt, 188')</i>	+	-	-	-
<i>P.ponticus (Reinhardt, 188')</i>	+	-	-	-
<i>(entroderes spinosus (Reinh.. 18811</i>	+	-	-	-
<i>Eehinoderes dubius (Reinh.. 188')</i>	+	-	-	-

<i>Echinoderes sp.</i>	+	-	-	-
OLIGOCHAETA				
POLYCHAETA				
CYCLOPOIDA				
<i>Cyclopinoidea littoralis (Brady. 18~2)</i>	-	+	+	+
<i>Cyclopinatus eximius (Monchenko, 1981)</i>	-	+	+	-
<i>Cyclopina gracilis (Lau. 1863)</i>	-	+	-	+
<i>C.pontica Monchenko. 19</i>	-	-	+	-
<i>C.esilis Brian. 1938</i>	-	+	+	+
<i>C.parapsaiuinophila Monchenko. 1980</i>	-	+	+	-
<i>C.hadzii I'etkovski. 1955</i>	-	+	+	+
<i>C.ohlivia Monchenko. 1981</i>	-	-	+	-
<i>Euryte longicauda Phi/ippi. 1843</i>	+	+	+	-
<i>Euryte sp.</i>	-	-	+	-
<i>Neocyclops remanei vicinus Herbst. 1955</i>	-	+	+	-
<i>Halicyclops magniceps (Lill, 1853)</i>	-	+	+	+
<i>H.neglectus Kiejer, 1935</i>	-	+	+	+
<i>H.seplentnonalis Kiejer, 1935</i>	-	-	+	+
<i>H.hrevispinosus meridionalis Herbst. 1953</i>	-	+	+	+
<i>H.rotundipes Kiejer, 1935</i>	-	+	+	+
<i>H.validus Monchenko, 19"4</i>	-	+	-	+
<i>H.cryptus Monchenko, 1979</i>	-	-	-	+

<i>H.cryptus secundus</i> Monchenko, 1982	-	-	-	+
<i>Smirnoviella redncta</i> Monchenko, 19"	-	+	-	-
<i>Colpoeoclops longispinosus</i> (Monchenko. 19~4)	-	+	-	-
<i>C.duleis</i> Monchenko, 1977	-	+	-	-
<i>Paracyclops ddatatus ivanegai</i> Monchenko, 1977	-	+	-	-
HARPACTICOIDA				
<i>Longipedia pontica</i> Kriczagin, 1877	-	-	+	-
<i>Canueda perplexa</i> T.el A.Scott. 1893	+	+	m	+
(<i>Jurcigera</i> Sens, 1903	-	-	+	+
<i>Eetinosoma sarsi</i> lioeck. 18~2	-	-	+	-
<i>E.abrau</i> (Kriczagin). 18"	+	+	-	+
<i>E.melaniceps</i> Boeck, 1864	+	m	m	-
<i>Pseudohradio minor</i> (T.el A.Scott. 1894)	-	-	+	-
<i>Horsiella hrevicornix</i> (Douwe, 1904)	+	-	-	-
<i>Microarthridion litorale</i> (Poppe. 1881)	+	-	m	-
<i>llarpacticus jlexits</i> Brady et Robertson, 1873	-	-	+	+
<i>ll.gracilis</i> (Tans, 1863	+	+	+	-
<i>ll. littoralis</i> Sars, 1910	-	in	in	-
<i>H.compsonyx</i> Monard, 1926	-	-	+	-
<i>H.uniremis</i> Kroyer.1842	+	-	-	+
<i>Tisbe furcata</i> (Baird. 183')	+	m	in	+
<i>T.dilatata</i> Kite, 1949	-	-	+	-
<i>Tisbe</i> sp.	-	-	m	-
<i>Scutellidium longicaudata</i> (Philippi, 1840)	+	-	in	-

<i>lilic/a pa/lidula</i> Sars. 1905	-	-	+	-
<i>Porcellidium viride</i> (Philippi,1840)	-	-	+	-
<i>Alteutha typica</i> Czerniavsky, 1868	-	-	+	-
<i>Tegasles longtmanus</i> (Claus. 1863/	-	-	III	-
<i>Thalestris longimana</i> Claus. 1863	-	-	+	-
<i>Tli.rufoviolaseeii</i> ('laus, 1860	-	-	+	-
<i>Parathaleslrir harpaclcoides</i> (Claus. 1863)	-	-	+	-
<i>P.clausii</i> (Norman, 1868)	-	-	+	-
<i>Phyllothaleslrir mvsis</i> Claus. 1863	-	-	+	-
<i>Rlivnchothalestris rufocincta</i> (Brady, 1880)	-	-	+	-
<i>Diarthrodes pygmaeus</i> (Tel A.Scott, 1895)	-	-	+	-
<i>I).ponticus</i> (Kriczagin. 18"3)	-	-	+	-
<i>D.ininutus</i> (I 'laus. 1863)	-	-	+	-
<i>D.nobilis</i> (Baird, 1845)	-	-	+	-
<i>Dactvlopodia tisboides</i> /('laus. 1863)	+	-	III	-
<i>Paradactvlopodia latipes</i> (Bocck. 1864)	-	-	+	-
<i>P.brevicomis</i> (Claus, /866)	-	-	+	-
<i>Eudactvlopus spectahilis</i> (Brian. 1923)	-	-	+	-
<i>Dactvlopodella flava</i> (Claus. 1866)	-	-	+	-
<i>Stenhelia normani</i> T.Scott. 1905	-	-	+	-
<i>S.elisabethae</i> Por, 1960	-	-	+	-
<i>S.tethysensis</i> Monard, 1928	-	-	+	-
<i>S.reflexa</i> Brady et Robertson, 1880	-	-	III	-
<i>Diosaccus leniieornis</i> (Clans. 1863)	-	-	+	-
<i>Amphasens sinitatus</i> Sars.) 906	-	-	+	-

<i>Amphiascopsis thalestroides</i> (Sars, 1911)	-	-	+	-
<i>Ainonarclia similis</i> ((<i>laus</i> , 1866/	+	-	-	-
<i>A.normani</i> (Brady, 18~21	-	-	+	-
<i>Paramphiascopsis longirostris</i> (Claus, 1863/	-	-	+	-
<i>Bulhampluascus imus</i> (Brady. 18"2)	-	-	+	-
<i>I'yphlamphiascus confusus</i> (T.Scott, 1902)	-	-	+	-
<i>Ampluascoides subdebilis</i> (Wilier. 1935)	-	-	+	-
<i>A.neglecta</i> (Sorman et T.Scott,1905)	-	-	+	-
<i>A.debit is</i> (Giesbrechl, 1881)	-	-	+	-
<i>Haloschizopera pontarchis</i> Par. 1959	-	-	m	-
<i>H.junodi</i> (Monard, 1935)	-	-	+	-
<i>Il mathoi</i> (Monard. 1935)	-	-	+	-
<i>Paramphiaseoides rarareusis</i> (T.Scott, 1903)	-	-	+	-
<i>Robertgurneya similis</i> (A.Scott, 1896)	-	-	+	-
<i>Prostrate</i> (Curner. 192")	-	-	+	-
<i>R.ecaudata</i> (Monard. 1936)	-	-	+	-
<i>Metis ignea</i> Philippi, 1843	+	+	+	+
<i>Aineira parvtlla</i> ((<i>laus</i> . 1860)	+	+	+	+
<i>A.scold brevicomis</i> Monard, 1928	-	-	+	-
<i>Proameira simplex</i> (Norman et T.Scott, 1905)	-	-	+	-
<i>Nitocra lacustris</i> (Schlankevitsch, 18~5)	+	+	-	+
<i>N.liibernica</i> (Brady. 1880)	+	-	+	+
<i>N.pusilla</i> Sars, 1911	-	+	-	-
<i>N.spinipes</i> Bocck, 1864	-	+	-	-
<i>N.affinis</i> Curney. 192"	-	+	-	-

<i>Psyllocamptus propinquus</i> (T.Scott, 1895)	-	-	+	-
<i>Ameiropsis longicornis</i> Sars, 1907	-	-	+	-
<i>Stenocopia longicaudata pontica</i> Griga, 1964	-	-	+	-
<i>(anthocainptus staphylinus</i> (Jurine. 1820)	+	-	-	-
<i>Mesochra pygmaea</i> ((laus. 1863)	+	-	m	-
<i>M.rapiens</i> (Schmeil, 1894)	-	-	+	-
<i>M.lilljeborgi</i> Boeck.1853	+	-	-	-
<i>Maestuarii</i> Gurney; 1921	+	-	-	-
<i>Phyllopodopsyllus hradii</i> (T.Scott, 1892)	-	-	+	-
<i>Stenocaris pontica</i> Chappuis et Serhan, 1953	-	+	-	-
<i>Arenopontia suhterranea</i> Kunz. 193"	-	+	-	-
<i>Paralcptaslacus spinicauda</i> Iriseta, Sodl, 1954	+	+	-	-
<i>(letodes longicaudatus</i> (lloeck, 18~2)	-	-	+	-
<i>C.limicola</i> Brady, 18"2	-	-	+	-
<i>C.tenuipes</i> T.Scott. 1896	-	-	+	+
<i>Enhydrosoma caeni</i> Raibeut, 1965	-	-		-
<i>Esarsi</i> (T.Scott, 1904)	-	-	+	-
<i>Cletocamptus retrogressus</i> Schmaukevilsch, 18"5	+	-	-	-
<i>C.conjluens</i> (Schmeil. 1894)	+	-	-	+
<i>Rhuzothrix curvata</i> Brady; 1880	-	-	+	-
<i>Eurycletodes lotus</i> (T.Scott, 1892)	-	-	+	-
<i>E.parasimilis</i> Poz, 1959	-	-	+	-
<i>Esimilis</i> (T.Scott, 1895)	-	-	+	-
<i>Limnocletodes behningi</i> Borutzky, 1926	-	-	-	+
<i>Stylicletodes longicaudatus</i> (Brady, 1880)	-	-	+	-

<i>Heteropsyllus dimorphus</i> Poz, 1959	-	-	+	-
<i>Laophonte setosa</i> Boeck, 1864	+	-	m	-
<i>L.elongate</i> var. <i>Iriardculata</i> Monard, 1928	-	-	+	-
<i>L.brevifurca</i> Sars, 1920	-	-	+	-
<i>L.longicaudata</i> (Boeck, 1864)	-	-	-	+
<i>Heterolaophonte stromi</i> i Baird. 1834)	-	-	in	-
<i>ll.uneinala</i> (Czcrniavskv, 1868)	-	-	+	-
<i>Paranychocamptus leuke</i> Pot; 1959	-	-	+	-
<i>Paralaophonte hrevirostris</i> (Claus, 1863)	-	-	+	-
<i>Asellopsis sarmalica</i> Jakubisiak, 1938	+	-	-	-
<i>Onychocuinptus mohctmmed</i> Blanchard et Richard, 1891	+	-	-	-
<i>h'sola typhlops</i> var. <i>pontica</i> Par. 1959	-	-	+	-
<i>Normanella mucronata reducia</i> Xoodl, 1955	-	-	+	-
<i>Lininuta</i> (Boeck, 18'2)	-	-	+	-
<i>.X.serrata</i> for, 1959	-	-	+	-
<i>haophonlhodes bicornis</i> A.Scott. 1896	-	-	+	-
<i>Microarthridion fallax</i> , Perkins, 1956	-	+	-	-
<i>Enhvdrosoma caeni</i> . Radiant, 1965	+	+	-	-
<i>P. gariensis</i> , Gurney, 1930	+	+	-	-
<i>Rohertsonia monarch</i> (Klie. 193~)	+	+	-	-
<i>Schizopera borutzkyi</i> , Montshenko, 196"	+	+	-	-
<i>S.jugurta</i> , (Blanchard et Richard) 1891	+	+	-	-
<i>S.negleeta</i> , Acatova, 1935	+	+	-	-

OSTRACODA				
<i>Polycope frequens</i> G. IF Midler. 1894	-	-	+	-
<i>Bairdia raripila</i> G. W. Midler. 1894	-	-	+	-
<i>Darwinda stevensoni</i> (Brady et Robertson, 18~0)	-	-	y	-
<i>Aglaiocypris compliniato</i> (Brady et Robertson, 1869)	-	-	+	-
<i>Candona schweyeri</i> Sehornikov. 1964	-	+	+	-
<i>C.angulata</i> /.' meridionalis Petkovski, 1958	-	+	-	-
<i>Candonopsis kingsleii</i> /Brady et Robertson. 18'1)	-	+	-	4-
<i>Cyprinolus salina</i> (Brady. 1868)	-	+	-	4-
<i>Eueypns injlala</i> (G.O.Sars. 1903)	-	+	y	-
<i>Cypridopsis aeuleala</i> (Costa. 1,84")	-		l	+
<i>Potamoeypris sleuari</i> Kite. 1935	-	+	+	+
<i>Ponloc\ there tchernjawsii</i> Duhowsky, 1939	-	-	+	-
<i>P.baceseoi</i> (('aroion, 1960)	-	-	+	+
<i>Cyprideis torosa</i> var. <i>litloralis</i> Brady. 1864	-	+	+	+
<i>C.torosa</i> var. <i>torosa</i> (Jones, 1850)	-	+	+	+
<i>Cytheridea acuminata</i> (Bosquet. 1852)	-	+	-	4-
<i>CytheromorphaJuscata</i> (Brady. 1869)	-	+	-	-
<i>Microcytheriira nigrescens</i> G. W. Midler, 1894	-	-	+	+
<i>MJulvoides</i> Duhowsky. 1939	-	y	+	+
<i>heptocy there longu</i> (Segadaev. 1955)	-	+	+	-
<i>l. cvmhula</i> (hivenal. 1929)	-	+	-	-
<i>L.pedi/or mis</i> Sehornikov. 1966	-	+	-	-
<i>k.gracilloides</i> Sehornikov. 1964	-	+	-	-

<i>L.relicta</i> Sehornikov. 1964	-	+	-	-
<i>L.fabaeformis</i> (G. W. Midler, 1894)	-	-	+	-
<i>L.roiuoso</i> (Rome. 1942)	-	-	+	-
<i>L.multipunctata multipunctata</i> (Seguenza, 1884)	-	+	+	+
<i>L.devexa</i> Sehornikov, 1966	-	+	-	+
<i>h.maeal/eiui</i> (Hradv el Roheison. 18"(ll	-	-	+	-
<i>L nitida</i> Sehornikov. 1966	-	-	+	-
<i>Ldiislrana</i> Caraion. 1964	-	+	+	+
<i>Lrara</i> (Gil'.Midler. 1894)	-	+	-	-
<i>L.lopaliei</i> Sehornikov. 1964	-		+	+
<i>L.quinqueluberculata</i> (Schweyer. 1949)	-	+	+	-
<i>I haeuana</i> (l.ivenlal. 1929,	-	1	+	-
('allisloeythere <i>abjecta</i> Sehornikov. 1966	-	-		-
<i>C.crispata</i> (Brady. 1866)	-	-	+	-
('lavido/usca Ritggieri, 1953	-	+	+	-
<i>C.diffusa</i> (G. II.Midler, 1894)	+	+	+	-
<i>G.inediterranea</i> (G. IV.Midler. 1894)	-	+	+	-
<i>Carinoeythereis carinala</i> (Roemer, 1838)	-	-	+	-
<i>G.rubra</i> (G. W. Midler, 1894)	-	+	+	-
<i>Aurila duhowskyi</i> n.sp.	-	-	+	-
<i>Heteroeythereis reticulata</i> n.sp.	-	-	+	-
<i>Ivrrhenocythere amnicola donetziensis</i> Duhowsky, 1926	-	-	+	-
<i>I rocythereis margaritifera</i> (G. IV. Midler. 1894/	-	-	+	-
<i>Cytheroma variabilis</i> (G. IV.Midler. 1894)	-	-	+	-
('.karadaginis Duhowsky. 1939	-	-	+	-

<i>(.marinovi n.sp.</i>	-	-	+	-
<i>Ponlocytheroia arenaria Marinov. 1963</i>	-	-	+	-
<i>Loxococoncha rhothoidea (Fischer, 1855)</i>	+	+	+	-
<i>k.hulgarica Caraiou, 1961</i>	+	+	+	+
<i>/.pontica Klie. 193~</i>	+	+	+	+
<i>l. elliptica Hradý. 1868</i>	-	+	+	+
<i>L.lepida Slepanaitys, 1962</i>	+	+	-	+
<i>/.granulata G.O.Sars, 1866</i>	+	+	+	-
<i>l. aesluarii Marinov. 1963</i>	-	+	+	+
<i>l. glohosa Sehornikov. 1965</i>	-	-	+	-
<i>l.nana Marinov, 1962</i>	-	-	+	+
<i>h.rennata Sehornikov, 1965</i>	-	+	+	-
<i>L.immodtilata Slepanaitys, 1962</i>	-	+	+	-
<i>Loxocauda mulleri sp.nov.</i>	-	-	+	-
<i>Paraeytheridae paulii Dubowsky, 1939</i>	-	+	+	-
<i>l leinicytherura hulgarica (klie 193~)</i>	-	+	+	-
<i>lindens ((.IV.Midler. 1894)</i>	-	-	+	-
<i>l'seudocytherura pontica l hihowsky, 1939</i>	-	-	+	-
<i>hevocytheriira pontica (Marinov. 1962)</i>	-	-	-	+
<i>l.remanei (Marinov. 1964)</i>	-	-	+	-
<i>Semicytherura virgata n.sp.</i>	-	+	+	+
<i>S.euxinica (('araion. 196")</i>	-	+	+	+
<i>S. calainilica sp. n</i>	-	+	+	-
<i>Cyltherura ventriangulata n.sp.</i>	-	-		+
<i>Xesloleberis deeipiens (j. IV \muller. 1H94</i>	-	+	+	-

<i>X.cornelii</i> (Turuion. 1963	+	+	+	-
<i>X.acutipenis</i> (Araion, 1963	-	-	+	-
<i>X.aurantia</i> (Baird. 1838)	-	+	+	+
<i>Microcythere longianteiinata</i> Marinov. 1962	-	+	-	-
<i>Parvocythere hartmanni</i> Marinov, 1962	-	+	-	-
<i>Bythocythere turgido</i> CO.Sars. IS66	-	-	+	-
<i>Sclerochilus gewemulleri</i> Dubowsky, 1939	-	-	+	-
<i>S.dubowskvi</i> Marinov. 1962	-	-	+	-
<i>Paracytherois agigensis</i> (Araion. 1963	-	-	+	-
(<i>^literals cepa</i> Klie 193 ')	+	+	+	+
(<i>pseudovitrea psetidovtlrea</i> Dubowsky, 1939	-	-	f	-
<i>C.earcinilica</i> Marinov. 1964	-	-	+	-
(<i>planus</i> sp u.	-	-	+	-
<i>C.valcanovi</i> Klie. 193"	+	+	+	-
<i>Csuccinoides</i> Dubowsky, 1939	-	-	+	-
(<i>niger</i> Sehornikov 1965	-	-	+	-
<i>Parado.xosloma intermedium</i> (j.It.Midler, 1X94	-	+	+	+
<i>P.naviculitm</i> Sehornikov. 1965	-	-	+	-
<i>P.ponticum</i> Klie. 1942	-	-	+	-
<i>P.simile</i> C. II'.Midler. 1S94	-	-	+	-
<i>P.variabile</i> (Baird. IS35i	-	-	+	-
<i>P.tauricum</i> Sehornikov. 1965	-	-	+	-
<i>P.convexum</i> Sehornikov. 1965	-	-	+	+
<i>P.guttatum</i> Sehornikov. 1965	-	-	+	-

ACARINA

<i>.tgaue ehevruxi</i> (Trouessart, 1889)	-	+	+	-
<i>Agauopsis brevipalpus</i> (Trouessart, 1889)	-	+	+	-
<i>Lohmannella falcata</i> (Hodge, 1863)	-	+	-	-
<i>Copidognathus brevirostris</i> I lets, 192~	-	-	+	-
<i>C.ponteitxinus</i> I'iets, 1928	-	in	+	-
<i>C.ponteuxinus</i> var. <i>pectiniger</i> Motas et Soares, 1940	-	+	-	-
<i>C.magnipalpus</i> var. <i>ponticus</i> I'iets, 1936	-	+	-	-
<i>C.magnipalpus</i> var. <i>serratisetus</i> I'iets, 1928	-	+	-	-
<i>(.rhodosdigma</i> (Gosse, 1855)	-	-	+	-
<i>Roinhognathus notops</i> (Gosse, 1855)	-	m	-	-
<i>Rii. mangiroslris</i> Trouessart, 1889	-	-	+	-
<i>Rh.dentieulalus</i> Soeolov, 1952	-	+	-	-
<i>Rh.pascens</i> (Lohmann, 1889)	-	m	-	-
<i>llalacarellus hexaeanthus</i> I'iets.192"	-	+	-	-
<i>H.basteri</i> var. <i>affinis</i> Trouessart, 1896	-	+	+	-
<i>H. procerus</i> I'iets, 192"	-	+	-	-
<i>H.capuzinus</i> Lohmann, 1893	-	+	-	-
<i>II.floridearum</i> (Lohmann, 1889)	-	+	-	-
<i>H.longipes</i> Trouessart, 1888	-	+	-	-
<i>Halacarus</i> sp.	-	+	-	-
<i>Pontarachna pontica</i> I lets, 1928	-	-	+	-
<i>P.punctulum</i> Philippi, 1840	-	-	+	-
<i>Litarachna divergens</i> Walter, 1925	-	-	+	-

<i>Rhodacarus olgae</i> Scherbak, 19~4	-	+	-	-
<i>Rhodocaropsis inexpectatus</i> Willman, 1935	-	m	-	-
<i>Mediorhodacarus tetranodulus</i> g.sp. Scherbak, 19~6	-	+	-	-
<i>Tyrophagus putrescentiae</i> Sclirank, 1888	-	+	-	-
<i>Ilalolaelaps nodosus</i> WHlman. 1952	-	in	-	-
<i>Il.saproincisus</i> Hyatt, 1956	-	+	-	-
<i>Hydrogamasns</i> sp. Trouessart, 1891)	-	+	-	-
<i>Typhlodroiiiis soliger</i> Rib.. 1916	-	+	-	-
<i>Brevipalpus obovalus</i> Dauuadiru. 1975	-	+	-	-
<i>Hypoaspis aculifer</i> Canestriiu.. 1883	-	+	-	-
<i>Il.heselbausi</i> Oudeinmans. 1900	-	+	-	-
<i>Tetranectins carpini</i> Oudeiiinans. 191)2	-	+	-	-
GASTROPODA				
BIVALVIA				

Table 9. List of Macrozoobenthos

Species	Till 1975	Contemporary state Areas			
		NWBS	Crimea	w ater bodies	
				salty	fresh
PORIFERA					
<i>Sycon ciliatum</i> (Fabricius, 18~0)	+	-	+	-	-
<i>S. setosum</i> (Schmidt, 1862)	+	-	+	-	-
<i>Suberites carnosus</i> (Johnston, 1848)	+	-	+	-	-
<i>S. prototipus</i> (Swartschewsky, 1905)	E	-	-	-	-
<i>Cliona vastifica</i> Hancock, 1848	+	-	-	-	-
<i>Mycale syrix</i> (Schmidt, 1862)		-	-	-	-
<i>l. issodendorix variisclera</i> (Swartschewsky, 1905)	E	-	-	-	-
<i>llymedesmia hrondsledi</i> billion. 1930	+	-	-	-	-
<i>l hdicliondria panicea</i> (alias, 1766)	+	-	+	-	-
<i>llymeniacidon sanguinea</i> (Grant) liowerhank. 1826	+	-	-	-	-
<i>llaliclona atpiaeductus</i> (Schmidt. 1862)	+	-	-	-	-
II. gracilis (Miklucho-Maklay, 1870)	+	-	-	-	-
II. ascidia (Schmidt. 18~0)	+	-	+	-	-
II. cinerea (Grant. 182~)	+	-	-	-	-
II implexa (Schmidt. 1868)	+	+	+	-	-
II pallida (liowerhank. 1860)	+	-	-	-	-
II. jlavescens (Topsenl. 1894)	+	-	-	-	-
<i>llalielonissa digitala</i> (Schmidt. 1866)	+	+	-	-	-

<i>Petrosia dura</i> (Schmidt. 1X62)	+	-	-	-	-
<i>Dysidea fragilis</i> (Montagu, ISIS)	+	+	+	-	-
<i>Halisarca dujardini</i> Johnston. IS42	+	-	-	-	-
<i>Spongia lacustris</i> (h.)	+	-	-	-	+
COELENTERATA					
Protohydra leuckartii Greet". 1870	+	-	-	-	+
Cordylophora caspia (Pallas. 1770)	R	-	-	-	+
Rathkea octopunctata (M.Sars, 1835)	+	-	-	-	-
1 [ydractinia carnea (M.Sars. 1846)	+	-	+	-	-
Bougainvillia megas (Kinne. 1956)	+	-	-	-	+
(or\ morplia nutans M.Sars. 1 S35	+	-	+	-	-
Tubularia simplex Alder. 1862	+	-	-	-	-
C'ladonema radiatum Dujardin. 1X43	+	-	-	-	-
Comic tubulosa (M.Sars. 1X35)	+	-	-	-	-
Eudendrium ramosum (L... 175X)	+	-	-	-	-
Campanularia integriformis Markt.-Turn., 1X90	+	-	-	-	-
C.johnstoni (Alder. 1X56)	+	-	+	-	-
C. volubilis(L., 1758)	+	-	-	-	-
Obelia gelatinosa (Pallas. 1766)	+	+	-	-	-
O. loveni (Allman. 1859)	+	-	-	-	-
O. longissima (Pallas. 1766)	+	+	-	+	-
Blackfordia virginica Mayer. 1910	+	-	-	-	-
Campanulina lacerata (Johnston. 1847)	+	-	-	-	-
Sertularella pol\onias (L.1758)	+	-	-	-	-

<i>Plumularia halecioides</i> Alder. 1859	+	-	-	-	-
<i>Aglaophenia pluma</i> (L., 1758)	+	+	-	-	-
<i>Moeresia maeotica</i> (Ostroumow. 1896)	+	-	-	-	-
<i>Lucernaria campanula</i> Lamouroux, 1815	+	+	+	-	-
<i>Pachy cerianthus solitarius</i> (Rapp. 1829)	+	+	+	-	-
<i>Actinia equina</i> (L., 1766)	+	+	+	+	-
<i>Actinothoe clavata</i> (Ilmoni, 1830)	+	+	+	-	-
<i>Idarsia clapedi</i> Pane. 1869	+	+	+	-	-
<i>Idra vulgaris</i> Pallas. 1766	+	-	-	-	+
<i>Pelmatohydra oligactis</i>	+	-	-	-	+
TURBELLARIA					
<i>Aphanastoma diversicolor</i> (Iersted	+	-	-	-	-
<i>Promesosloma bilinealum</i> Per.	+	-	-	-	-
<i>Proxenetes plebeius</i> Bekl.	+	-	-	-	-
<i>P. lictor</i> Bekl.	+	-	-	-	-
<i>Polycystlis intubata</i> (ir. var. <i>erythrea</i> Bekl.	+	-	-	-	-
<i>P. tripalmata</i> Bekl.	+	-	-	-	-
<i>Phaenocora salinarum</i> (dr.) var. <i>subsalsa</i> Bekl.	+	-	-	-	-
<i>Solenopharynx obecatus</i> Per.	+	-	-	-	-
<i>Koinocystis spinosa</i> Bekl.	+	-	-	-	-
<i>Phonorhynchus mamertimus</i> (Gr.)	+	-	-	-	-
<i>Plagiastomum giardi</i> (O. Schm.)	+	-	-	-	-
<i>Monoophorum graffi</i> Beauch.	+	-	-	-	-
<i>M. eatinosum</i> Bekl.	+	-	-	-	-

M. granulosum Bekl.	+	-	-	-	-
Monocelis lineata (O.F.Muller)	+	-	-	-	-
M. longipes Cir.	+	-	-	-	-
M. agilis ((iragg)	+	-	-	-	-
M. aff. unipunctata (Fabricius)	+	-	-	-	-
Procnodes lobata (). Schm.	+	-	-	-	-
Dendrocoelum laeleum (O.F.Muller)	+	-	-	-	+
U. ingulensis	+	-	-	-	i
Leptoplana tremellaris (O.F.Muller)	+	-	+	-	-
St\ lochus tauricus Yacubova	+	-	-	-	-
Stylochoplana maculata (Ouatrefages)	+	-	-	-	-
Paleodendrocoelum romanodanubialis Codreanu	+	-	-	-	+
Turbellaria g. sp.	+	+	+	+	+
NEMERTINI					
<i>Cephalotrix linearis i Ratlike, 1799)</i>	+	-	-	-	-
<i>Linens laeteus (Rathke, 1843)</i>	+	-	-	-	-
<i>Cerebratulus ventrosuleatus Burger, 1892</i>	+	+	-	-	-
<i>C. marginalus /Renter, 1804)</i>	+	-	+	-	-
<i>Micrura faseiolata Ehrenberg, 1831</i>	+	+	-	-	-
<i>Emplectoneina graeile (Johnston, 183~)</i>	+	-	-	-	-
<i>Prosorehoehinus elaparedi Keferstein. 1862</i>	+	-	-	-	-
<i>8 Oerstedtia dorsalis lAbildgard. 1806) -</i>	+	-	-	-	-
<i>Amphiponts pulcher (Johnston, 1828) + - -</i>	+	-	-	-	-
<i>Tetrastenima melanocephalum /Johnston. 183")</i>	+	-	-	-	-

<i>Prostoma graecense</i> (Bohmig, 1892)	+	-	-	-	-
<i>Malacobdellagrossa</i> (O.F.Muller, 1~6)	+	-	-	-	-
<i>Nemertini g.sp.</i>	+	+	+	+	-
POLYCHAETA					
<i>Phyllodoce paretli</i> (Hlainvil/e. 1849)	+	+	+	-	-
<i>Ph. tuberculoid</i> Bobretzky, 1868	+	+	+	-	-
<i>Ph. nana</i> Saint-Joseph, 1901	+	-	+	-	-
<i>Ph. lineata</i> (Claparede, 1870)	+	+	+	-	-
<i>Ph. maculata</i> (L.. 1~58)	+	+	+	-	-
<i>Ph. mucosa</i> Oersted, 1843	+	+	+	+	-
<i>Fulalia viridis</i> (Midler, 1863)	+	+	+	-	-
<i>li. sanguined</i> (Oersted, 1843)	+	-	+	-	-
<i>hi limbata</i> Claparede, 1868	+	-	+	-	-
<i>li. macroeros</i> Grube, 1860	+	-	+	-	-
<i>liteone picta</i> OuatreJages. 1865	+	+	+	-	-
<i>Mystides limbata</i> (Saint-Joseph, 1888)	+	-	S	-	-
<i>Harmothoe imhricata</i> (L., 1767)	+	+	+	+	-
<i>ll. reticulata</i> Claparede, 1870	+	+	+	+	-
<i>Lagisca extenuata</i> (Grube, 1840)	+	-	s	-	-
<i>Sthenelais boa</i> (Johnston, 1865)	+	-	+	-	-
<i>Pholoe synophthalmica</i> Claparede, 1868	+	+	+	-	-
<i>Praegeria remola</i> Southern, 1914	+	-	s	-	-
<i>G/vcera tridactvla</i> Schmarda. 1861	+	.	+	-	-
<i>G. alba</i> Ratlike, 18~0	+	+	+	-	-

<i>Goniada bobretzkii</i> Annenkova, 1929	E	-	+	-	-
<i>Syllis gracilis</i> Grube, 1840	+	+	+	-	-
<i>S. prolifera</i> Krohn, 1852	+	+	-	-	-
<i>S. variegata</i> Grube, 1863	+	-	s	-	-
<i>S. hyalina</i> Grube, 1863	+	-	+	-	-
<i>Syllides longicirrata</i> Oersted, 1843	+	-	s	-	-
<i>Pterosyllis formosa</i> Claparede, 1863	+	-	-	-	-
<i>Iionosyllis pulligera</i> Krohn, 1852	+	-	+	-	-
<i>Exogone gemmifera</i> Pagebstecheri, 1884	+	+	+	-	-
<i>Sphaerosyllis erinaceus</i> (Claparede, 1863)	+	+	-	-	-
<i>S. hulbosa</i> Southern, 1914	+	-	+	-	-
<i>Gritbea limbata</i> Claparede, 1868	+	+	+	-	-
<i>G. elavata</i> (Claparede, 1863)	+	+	+	-	-
<i>Autolytts aurantiacus</i> Claparede, 1868	+	-	s	-	-
<i>Microphthalmia similis</i> bobretzky, 1870	+	+	-	-	-
<i>M.jrogilis</i> Bobretzky, 1870	+	-	+	-	-
<i>Lycastopsis pontica</i> (Bobretzky, 18~2)	+	+	+	-	-
<i>Nereis succinea</i> keuckart, 1847	+	M	+	+	+
<i>N. diversicolor</i> O.F.Muller, 1~"6	+	M	+	+	+
<i>N. rava</i> Ehlers, 1868	+	s	-	-	-
<i>N. zonula</i> Malmgren, 186~	+	+	+	-	-
<i>N. fucata</i> (Savigny, 1821) 1	+	-	+	-	-
<i>N. longissima</i> (Johnston, 1865)	+	-	+	-	-
<i>Perinereis cultrifera</i> (Grube, 1840)	+	+	+	-	-
<i>Platynereis dumerilii</i> (Audouin et M.-Edwards, 1834) 1	+	+	+	-	-

<i>Nephtys hombergii</i> Audouin et M.-Edwards, 1834	+	+	+	+	-
<i>N. cirrosa</i> Ehlers, 1868	+	+	+	+	-
<i>N. eiliata</i> (O.F Midler. 1"6)	+	-	+	-	-
<i>Micronephtys stammeri</i> (Augener. 1932)	+	+	+	-	-
<i>Sphaerodoritn elaparedii</i> Greeff, 1866	+	-	-	-	
<i>Eunice villain</i> (Delle Ghiaje, 1841)	+	+	+	-	-
<i>l.vsidice ninella</i> Audouin el M-Edwards, 1834	+	-	+	-	-
<i>Nemalonereis unicornis</i> (Grube, 1840)	+	-	s	-	-
<i>Slauroeephidus ke/ersleini</i> Mcintosh. 1X69	+	+	+	-	-
<i>S. rudolphd</i> (Delle Ghiaje. 1841)	+	+	+		-
<i>S. rubrovillatus</i> Grube. 1855	f	-	+	-	-
<i>Nerinides Iridenlala</i> Southern. 1914	+	+	+	-	-
<i>N. cantahra</i> Riojo. 1919	+	-	-	-	-
<i>Aricidea lalreillii</i> Audouin et M.-Edwards, 1834	+	-	-		
<i>Nainereis laevigata</i> (Grube. 1851)	+	-	+	-	-
<i>Scolelepis eiliata</i> Kejerslein. 1862	+	-	+		
<i>S. fuliginoso</i> Claparede, 1868	+	-	+		
<i>haoniee eirrato</i> Sars, 1861	+	-	-	-	-
<i>Anodes paucibranchiola</i> Southern. 1914	+	+	+		
<i>A oxyeephalo</i> (Sars. 18'21	+	-	+	-	-
<i>Microspio mecznikowianus</i> (Claparede. 1869)	+	-	+	-	-
<i>Serine eirratidus</i> (Delia ('hiaje. 182')	+	+	+	-	-
<i>Spio fdicornis</i> (O.F.Muller. I "6)	+	+		+	-
<i>l'gospio elegans</i> Claparede. 1863	+	-	+	-	-
<i>Rolydora eiliata</i> (Johnston. 1838)	+	-	+	-	-

<i>P. eiliata limicola</i> Annenkova, 1934	+	M	-	+	-
<i>Prionospio cirrifera</i> Wiren, 1883	+	+	+	-	-
<i>P. mahngreni</i> Claparede, 1868	+	-	+	-	-
<i>Magelona minuta</i> Eliasson, 1962	+	-	+	-	-
<i>Aricidea claudiae</i> Laubier, 1965	+	+	+	-	-
<i>Audouinia tentaculata</i> (Montagu, 1828)	+	-	+	-	-
<i>Tharix marioni</i> (Saint-Joseph, 1894)	+	-	s	-	-
<i>Heterocirrus caput-esocis</i> Saint Joseph, 1894	+	-	-	-	+
<i>I leterocirrus</i> sp.	+	-	+	-	-
<i>Ophelia bicornis</i> Savigny, 1820	+	-	-	-	-
<i>O. limanica</i> (Rathke, 1843)	+	-	+	-	-
<i>Polyopthahnus pictus</i> (Lujardin, 1839)	+	-	+	-	-
<i>Heteromastus fdiformis</i> (Claparede, 1864)	+	+	+	+	-
<i>Capitella capitata europaea</i> Wuliao-hing, 1964	+	+	+	+	-
<i>Capilomastus minimus</i> (Langerhans, 1880)	+	+	+	+	-
<i>Xolomastus profundus</i> Pisig, 188"	+	-	+	-	-
<i>Arenicola marina</i> (L., 1 "58)	+	-	+	-	-
<i>A. grubii</i> Claparede, 1863	+	-	+	-	-
<i>Clymene collaris</i> (Claparede, 1868)	+	-	+	-	-
<i>90 heiochone clypeata</i> Saint-Joseph, 1894	+	+	+	-	-
<i>Sabellaria taurica</i> (Rathke, 183~)	+	+	+	-	-
<i>Pectinaria belgica</i> Pallas, I "8	+	+	+	-	-
<i>P. koreni</i> Malmgren, 1865	+	+	+	-	-
<i>Melinna palmata</i> Grube, 1869	+	M	+	+	-
<i>Hypania invalida</i> (Grube, 1860)	R	M	-	+	+

<i>Hypaniola kowalewskii</i> (Grimm, 18")	R	M	-	-	+
<i>Terebellides stroemi</i> Sars. 1861	+	M	+	-	-
<i>Amphitrite gracilis</i> (Grube. 1866)	+	+	+	-	-
<i>Polycirrus caliendrum</i> (Claparede. 186V	+	+		-	-
<i>P.juhatus</i> Bobretzky, 1868	+	-	+	-	-
<i>Pabricia sahella</i> (Ehrenberg. 183")	+	+	-	+	-
<i>Manajuncia caspica</i> Annenkova, 1929	R	-	-	-	-
<i>Oriopsis armandi</i> (Claparede. 1864)	+	-	+	-	-
<i>Vermiliopsis infundibulum</i> (Philippi, 1844)	+	-	-	-	-
<i>Pomatoceros triqueter</i> (L... 1 "6")	+	!	+	-	-
<i>Spirorbis pusilla</i> Rathke. 183"	+	+	+	-	-
<i>S. corrugatus</i> Montagu. 1803	+	-	+	-	-
<i>S. militaris</i> (Claparede. 1868)	+	-	+	-	-
<i>S. pagenslecheri</i> Ouatrejages. 1865	+	-	+	-	-
<i>Protodrilus flavoeapitatus</i> (I Ijanin, 18""")	+	-	+	-	-
<i>P. purpureas</i> (Schneider. 1868)	+	-	t	-	-
<i>Nerilla antennata</i> Schmidt. 185~	+	-	+	-	-
<i>Saccocirrus papillocercus</i> Bobretzky, 18" 1	+	-	+	-	-
<i>Polygordius neapolitanus</i> Fraipont var. <i>ponticus</i> Zolensky, 1882	+	-	+	-	-
OLIGOCHAETA					
<i>Stylaria lacustris</i> (L... 1 "6")	+	-	-	-	+
<i>Enehytraeus albidus</i> llenle. 183"	+	-	-	-	+
<i>E. vermicularis</i> Grimm, 18~6	+	-	-	-	-
<i>Paranais litoralis</i> (Midler. 1~84)	+	-	-	-	-

<i>P. simplex</i> Urate. 1936	R	-	-	-	+
<i>P. mullisetosa</i> Finogenova	L	-	-	-	+
<i>P. friet</i> Urate. 1941	R	-	-	<	+
<i>Hydrophilus easpicus</i> (Lastockin, 1937)	R	-	-	-	-
<i>H. heuscheri</i> Bretscher. 1900	+	-	-	-	+
<i>Sais elingius</i> Muller, 1~3 + - - *	+	-	-	+	+
<i>N. barbata</i> Muller. 1~3	+	-	-	-	+
<i>N. variabilis</i> Pignatelli. 1906,	+	-	-	-	+
<i>Ophidonais serpentina</i> (Muller, 193)	+	-	-	-	+
<i>Chaetogaster limnaei</i> Baer, 182~	+	-	-	-	+
<i>Isiella mieliaelseni</i> Lastockin, 1936)	+	-	-	-	+
<i>I. newaensis</i> (Mieliaelsen)	+	-	-	-	+
<i>Limnodrilus hoffmeisteri</i> (Claparede, 1862)	+	M	-	-	+
<i>L. heterotens</i> Pignatelli, 1913	+	-	-	-	+
<i>L. udekemiamts</i> Claparede, 1862	+	M	-	-	+
<i>L. profundicola</i> (Verrill)	+	-	-	-	+
<i>L. claparedeanus</i> Pagnanelli. 1868	+	-	-	-	+
<i>Pentamothrix hammoniensis</i> (Mieliaelsen. 1901)	+	M	-	-	+
<i>P. moldaviensis</i> Pevzner et Mrazek. 1902	+	-	-	-	+
<i>Psammoryctes harhatus</i> (Grube, 1861)	+	-	-	-	+
<i>P. alveola</i> (Mieliaelsen. 1901)	+	-	-	-	+
<i>P. deserticola</i> (Grimm. 1858)	R	-	-	M	+
<i>P. deserticola</i> ssp. lastockini	M	-	-	-	+
<i>Tubifex lutifex</i> Muller, 193)	M	-	-	-	+
<i>L. costatus</i> (Claparede, 1863)	+	-	-	-	+

<i>Tubificoides svirencovi</i> Jaroschenko, 1948	i;	-	-	+	+
<i>Eiseniella tetraedra</i> (Savigny, 1826)	+	-	-	-	+
<i>Julodrilus limnobius</i> Bretscher, 1899	+	-	-	-	+
<i>Branchiura sowerbyi</i> Beddard, 1892	+	-	-	-	+
<i>Pelosco/exferox</i> (Eisen, 1879)	+	-	-	-	+
<i>P. svlrenkoi</i> (Jaroschenko, 1948)	+	-	-	-	+
<i>Proppapus volki</i> Michaelsen, 1915	+	-	-	-	+
<i>Oligochaeta g. sp.</i>	+	+	+	+	-
HIRUDINEA					
<i>P/scicola geomelra</i> (L., 1 61)	+	-	-	-	+
<i>P. fasciata</i> (Kollar, 1842)	E	-	-	-	
<i>Erpobdella octoculata</i> (L... 1758)	+	-	-	-	+
<i>E. lineata</i> (OPMuller)	+	-	-	-	+
<i>Glossiphonia complanata</i> (L... 1~58)	+	-	-	-	+
<i>G. heteroclila</i> (L... 161)	+	-	-	-	+
<i>(aspiobdella JadeJewi</i> (Epspein, 1961)	R	-	-	-	+
<i>(ystobranchnus fasciatus</i> (Kollar, 1842)	+	-	-	-	+
<i>Herpobdella nigricollis</i> (Brandes, 1900)	+	-	-	-	i
<i>II. octoculata</i> (L... 1758)	+	-	-	-	+
<i>Hirudo medicinalis</i> L.. 1~58	+	-	-	-	+
<i>Haemopsis sanguisuga</i> (L... 1 '58)	+	-	-	-	+
<i>Hemiclepsis marginata</i> (O.F.Muller, 1 ~~4)	+	-	-	-	+
<i>Batracobdellapaludosa</i> (('arena, 1823)	+	-	-	-	+
<i>Haementeria costata</i> (O.F.Muller, 1846)	+	-	-	-	+

BRYOZOA					
<i>(onopciini senrati l('ami. 1928)</i>	+	M	+	+	-
<i>Membranipora pilosa (L... 1~6~)</i>	+	-	-	-	-
<i>\l zostericola (Sorilman. 1840)</i>	+	-	-	-	-
<i>Lepralia turgenevi fOstroumow, 1886)</i>	+	-	-	-	-
<i>/. pallasiana (Moll. 1803)</i>	+	-	-	-	-
<i>Schizoporella auriculata llassall. 1S41</i>	+	-	-	-	-
<i>Scrupocellaria bertholletii Aud. var. capreolus Hell., 186"</i>					
<i>Howcrhankia gracilis Leidi. 1855</i>	+	-	+	-	-
<i>l'lumalella Jiuigosa l'a lias</i>	+	-	-	-	+
<i>P. emarginata Allman</i>	+	-	-	-	+
<i>P. frulicosa Allman</i>	+	-	-	-	1
<i>P. repens L... 1767</i>	+	-	-	-	+
<i>Palludicella articulaia (Ehren.)</i>	+	-	-	-	+
PHORONIDEA					
<i>Phoronis euxinicola Saint-Long. 190"</i>	+	+	+	-	-
<i>Phoronidca g. sp.</i>	-	-	+	-	-

PHYLLOPODA					
<i>Artemia salina</i> L., 1 58	+	-	-	+	-
CIRRIPIEDIA					
<i>Balanus improvisus</i> Darwin, 1854	+	M	+	+	-
<i>B. ebumeus</i> Gould, 1841	+	-	+	-	-
<i>B. amphitrile hawaiiensis</i> Brocb.	+	-	-	-	-
<i>Chthamalus stellatus</i> (Poll, 1791)	+	-	-	-	-
<i>Verruca spengleri</i> Darwin, 1854	+	-	-	-	-
DECAPODA					
<i>Ilypollyc longirostris</i> fCzemiavsky, 1869)	+	+	+	-	-
<i>Il. biennis</i> Leach, 1815	+	-	+	-	-
<i>Lysmata seticaudata</i> (Risso, 1816)	+	-	+	-	-
<i>Alpheus dentipes</i> Guerin. 1832	+	-	s	-	-
<i>Alhanas nitescens</i> Leach, 1814	+	+	+	-	-
<i>Palaemon elegans</i> Rathke. 183~	+	+	+	+	-
<i>P. adspersus</i> Rathke, 183"	+	+	+	+	-
<i>Crangon crangon</i> ft., 1 "58)	+	+	+	+	-
<i>Pontophilus trispinosus</i> Hailstone, 1835	+	-	s	-	-
<i>P. fasciatus</i> Risso, 1816	+	-	s	-	-
<i>Processa edulis</i> Risso. 1816	+	-	s	-	-
<i>Astacus astacus</i> L., 1 "58	+	-	-	-	+
<i>Pontastacus leptodactilus</i> Eschscholtz, 1823	R	-	-	-	+

<i>P. pachypus</i> Rathke, 183"	+	-	-	-	+
<i>P. cubanicus</i> Birslein et W'uiogradow, 1934	+	-	-	-	+
<i>P. eichwaldi</i> hessarabicus Hrodski. 196"	+	-	-	-	+
<i>Homarus gammarus</i> L., 1~58	+	-	s	-	-
<i>l'pogebiapusilla</i> tPetagna. 1~92)	+	+	+	-	-
<i>l'" Callianassapeslai</i> De-Man. /939	+	+	+	-	-
<i>18 C. tnoteata</i> (Hard el Bonnier. /890	+	-	+	-	-
<i>19 Diogenes pugilator</i> Rous, 1828	+	+	+	-	-
<i>C/ihanarius erythropus</i> hatreille. 1S/8	+	-	+	-	-
<i>Pisidia longimana</i> (Risso. 1815)	+	+	+	-	-
<i>Maeropodia longirostris</i> (Fabricius, 1~98)	+	-	s	-	-
<i>M. rostrala</i> (1... Γ61)	+	-	s	-	-
<i>Pirimela dentieulala</i> Montagu, 180S	+	+	s	-	-
<i>Carcimts aeshuarii</i> (mediterraneus) Sordo. 184"	+	+	+	+	-
<i>Maeropipus areuattts</i> (Leach. 1S14)	+	S	+	-	-
<i>\1 depurator</i> (h., 1~6)	+	+	+	-	-
<i>M holsalus</i> Fabricius, 1~98	+	-	-	-	-
<i>Piumnus hirllellus</i> (1... Γ58)	+	s	+	-	-
<i>Friphia verrucosa</i> L'orskid. 1"5	+	-	s	-	-
<i>Xanllio poressa</i> (Olivi. 1 "92)	+	s	+	-	-
<i>Rhithropanopeus harrisi</i> Iridentata (Mailland. 18"4)	1	+	+	+	-
<i>Brachvnotus se.xdenlalus</i> Risso. 182"	+	+	+	-	-
<i>Pachygrapsus marmoralus</i> (Fabricius, 1~93)	+	-	s	-	-
<i>Portumnus talipes</i> (Pennant. 1)	+	-	s	-	-
<i>Potamon tauricum</i> Czerniavsky, 1884	+	-	-	-	s

ANISOPODA					
<i>Apsseudopsis ostroumovi</i> Bacescu et Carausu. 194	y	+	+	-	-
<i>Leptoehelia savignyi</i> (Kroyer, 1842)	+	+	+	-	-
ISOPODA					
<i>Limnoria tuberculata</i> Sowinsky, 1884	+	-	-	-	-
<i>Eurydice spinigera</i> Hansen. 1890	+	+	-	-	-
<i>E. racovdzae</i> Baceseo. 1949		+	+	-	-
<i>/•. dolt/us</i> i Monod, 1930	+	+	+	-	-
<i>Xaesa hidenlala</i> (Adams. 1800)	+	-	+	-	-
<i>Sphaeroma serralum</i> (Fabricius, 1~8)	+	-	+	-	-
<i>S. pulehelliim</i> (Colosi, 1921)	+	M	+	+	-
<i>Cymodoce erythraea euxiniea</i> Baceseo. 1959	E	-	+	-	-
<i>Idotea baltica basteri</i> Audouin. 182"	+	M	+	+	-
<i>Synisoma capita</i> (Rathke. 183")	+	+	+	-	-
<i>Tylos ponticus</i> Orebnitzky. 18"4	+	+	-	-	-
<i>Jaera sarsi</i> 1 'alkanov, 1936	+	M	-	+	+
<i>J. sarsi caspica</i> Kesselyak	+	-	-	-	+
<i>J. nordmanni</i> (Rathke, 183")	+	-	-	-	-
<i>Ligia italica</i> Fabricius, 1 "98	+	+	+	-	-
<i>Onathia monodi</i> Bacescu, 1960	+	+	+	-	-
<i>G. o.xyurae</i> (Lilljeborg, 1853)	+	-	+	-	-
<i>Asellus aquaticus</i> L., 1"58	+	-	-	-	+

CUMACEA					
<i>Schizorhynchus eudoixiloides</i> (CO.Sars, 1894)	R	+	-	+	+
<i>Seh.seabriusculus</i> (C.O.Sars, 1894)	R	-	-	-	M
<i>Sch. scahricidas typica</i> (GO.Sars, 1895)	R	-	-	-	+
<i>I'terociuna rostrala</i> (GO.Sars, 1894)	K	+	-	-	+
<i>P pectinata</i> (Sowinskyi. 1894)	R	+	-	+	M
<i>PsL'udocuma eiliata</i> GO.Sars, 1899	+	-	+	-	-
<i>/' longicormspontica</i> Hoivscii, 19.VI	+	-	+	-	-
<i>8 P. cercaroides</i> Sars	+	-	-	-	+
<i>9 P. tenuicauda</i> (Sars. 1893)	R	-	-	-	+
<i>lo/goeuina lelnnitoplora</i> Derzliavin. 1912	R	-	-	-	+
<i>Slenociana gracilis</i> (Sars)	R	-	-	-	M
<i>S. graciloules</i> (Sars)	R	+	-	+	M
<i>S. levis</i> (G. O.Sars. 1914)	R	-	-	-	+
<i>('aspiocuma campylaspoides</i> Sars, 1899	R	-	-	+	+
<i>Boclotriu arenosa mediterranea</i> (Slener. 1938)	+	+	+	+	-
<i>Iphinoe maeotica</i> /Sowinskyi. 1893)	K	+	+	+	-
<i>I. tenella</i> GO Sars. 1873	+	+	+	-	-
<i>I. elisac</i> Bacescu. 1950	i:	+	+	-	-
<i>Cuinopsis goodsiri</i> (Pan Beneden. 1868)	+	+	+	-	-
<i>Cumella limicola</i> GO.Sars, 18-9	+	+	+	-	-
<i>C pygmaea euxinica</i> Bacescu. 1950	E	+	-	-	-
<i>Eudorella Iruncatula</i> (Bale, 1856)	+	+	+	-	-

<i>Callinectes sapidus</i> Rcithhun, 1896	I	-	S	-	-
MYSIDACEA					
<i>Siriella jaltensis jaltensis</i> (Czerniavsky, 1868	+	-	+	-	-
<i>Gastrosaccus sanctus</i> (Van Beneden, 1861)	+	+	-	-	-
<i>Leptomysis sardica pontica</i> (Czerniavsky, 1882)	+	-	+	-	-
<i>Hemimysis anomala</i> GO.Sars, 1907	R	-	-	-	-
<i>H. lamornae pontica</i> Czerniavsky, 1882	E	-	-	+	-
<i>Diamysis hahirensis meeznikmii</i> (Czerniavsky, 1882)	+	+	-	+	-
<i>D. pengoi</i> (Czerniavsky, 1882)	E	-	-	-	+
<i>Mesopodopsis slabheri</i> (I 'an Beneden. 1861)	+	+	-	-	-
<i>Limnomysis henedeni</i> Czerniavsky, 1882	R	-	-	-	+
<i>Paramysis lacustris</i> (Czerniavsky. 1882)	R	+	-	-	-
<i>P. lacustris tanaiea</i> (Martynov. 1924)	+	-	-	-	+
<i>P. nilskyi</i> (Czerniavsky, 1882)	R	-	-	-	+
<i>P. kroyeri</i> (Czerniavsky, 1882)	E	+	-	+	-
<i>P. agigensis</i> Bacescu, 1940	E	-	-	+	-
<i>P. intermedia</i> (Czerniavsky, 1882)	R	-	-	-	+
<i>P. pontica</i> Bacescu, 1940	E	+	-	+	-
<i>P. sarsi</i> Derzhavin, 1925	+	-	-	-	+
<i>P. baeri</i> Czerniavsky	+	-	-	-	+
<i>P. baeri hispinosa</i> Martinov. 1924	R	-	-	-	+
<i>Katamysis warpachovskiyi</i> Czerniavsky. 1882	R	-	-	-	+

AMPHIPODA					
<i>Orchomene humilis</i> (A.Costa, 1853)	+	+	+	-	-
<i>Ampelisca diadema</i> . 1 (Oslo, 1853)	+	+	+	+	-
<i>Bothyporeia guilliamsoniana</i> (Hale. 185")	+	+	-	-	
<i>Slenothoe monocidoides</i> (Montagu. 1815)	+	+	+	+	-
<i>Perioculoides longimonus</i> (Bate et Westwood, 1868)	i	+	+	+	-
<i>Apherusa bispinosa</i> (Bale. 185")	+	+	+	-	-
<i>Synekeleidiuin inoculation</i> Stabbing, 1906	+	+	+	-	-
<i>Monocidoides gibbosum</i> (hevreux. 1900	+	+	+	-	-
<i>Xototropis gultatus</i> (A.Costa. 1851)	+	+	+	-	-
<i>Canunarus sitbtypicus</i> Slock, 1966	t	+	-	-	-
<i>C. oei/uicauda</i> Mart, 1931	+	+	-	+	-
<i>C. insensihilis</i> Slock. 1966	+	+	i	+	-
<i>Ci. lacustris</i> (it).Sars	+	-	-	-	+
<i>(i. zadcinchi</i> Sexton, 1912		-	-	-	+
<i>Marmogc. nnarus morinus</i> Leach, 1815	+	-	-	-	-
<i>M. olivii</i> M.-Edwards, 1830	+	+	+	+	-
<i>Caiuniarellus carinalus</i> (Rathke, 183")	E	-	-	-	-
<i>Megaluropus agilis</i> lloek, 1889	+	-	-	-	-
<i>Media palmetto</i> (Montagu. 1804)	+	+	+	+	-
<i>Cardiophilus baeri</i> GO.Sars, 1896	κ	+	+	+	+
<i>Chaetogammarus ischnas</i> (Stehhing. 1898)	R	-	-	-	M
<i>Ch ischnus hehningi</i> Martynov, 1919	R	+	-	-	-
<i>Ch. placidus</i> GO.Sars. 1895	κ	-	-	+	+

<i>Ch. warpachowskyi</i> (CO.Sars. 1894)	R	-	-	+	+
<i>Niphargoides deminutus</i> (Stebbing)	R	-	-	-	+
<i>S. intermedius</i> S.Carausus. 1943	R	-	-	-	\\
<i>N. spinicaudatus</i> S.Carausus. 1943	R	-	-	-	+
<i>N. vedaehieus</i> Dohreanu et Manolaeke. 1933	R	-	-	-	+
<i>Amathdina pusilia</i> CO.Sars	+	-	-	-	+
<i>A. eristata</i> G.O.Sars, 1894	+	-	-	-	+
<i>Iphigenella aiulusowi</i> CO.Sars. 1896	R	-	-	-)
<i>Gmelina costata</i> (G.O.Sars. 1894)	+	-	-	-	+
<i>C. costata aestuarica</i> S.Carausus. 1943	R	-	-	-	+
<i>G. pusilia</i> GO.Sars. 1896	R	-	-	-	+
<i>35 Gmelinopsis tuherculata</i> G.O.Sars, 1896	R	-	-	-	+
<i>Dikerogammarus villosus</i> (Sowinskyi, 1894)	R	+	-	+	+
<i>D. haemobaphes</i> (Eichwald, 1841)	R	-	-	+	M
<i>D. haemobaphesfluviatilis</i> A. Martynov. 1919	R	-	-	-	+
<i>Pontogammarus inaeoticus</i> (Sowinskyi. 1894)	R	M	-	+	+
<i>P. erassus</i> (G.O.Sars. 1894)	R	-	-	-	M
<i>P. obesus</i> (G.O.Sars. 1896)	R	-	-	-	+
<i>P. subnudus</i> (G.O.Sars, 1896)	R	-	-	-	+
<i>P. rohustoides</i> (Grimm, 1894)	R	-	-	+	\\
<i>P. abbreviatus</i> (Sars)	R	-	-	-	+
<i>P. sarsi</i> (Sowinskyi. /898)	R	-	-	+	+
<i>P. weidmani</i> (G.O.Sars. 1896)	R	-	-	+	+
<i>Stenogammarus comressus</i> G.O.Sars. 1894	R	-	-	+	+
<i>S. macrurus</i> (G.O.Sars, 1894)	R	-	-	-	+

<i>S. similis</i> (G.O.Sars, 1894,	R	-	-	+	+
<i>Tritaeta gibbosa</i> (Bate, 1862)	+	-	-	-	-
<i>Dexamine spinosa</i> (Montagu. 1813)	+	+	+	+	-
<i>Orehestia gammarella</i> (Pallas, 1~66,	+	-	-	-	-
<i>O. montagui</i> Audouin, 1826	+	+	-	-	-
<i>O. bottae</i> M.-Edwards, 1840	+	+	-	+	-
<i>Talorchestia deshayesii</i> (Audouin, 1826)	+	+	-	-	-
<i>I hale pontica</i> Rathke, 183~	+	+	+	-	-
<i>Ii. perieri</i> (Lucas, 1846)	+	-	+	+	-
<i>Ii. prevostii</i> (M.-Edwards. 1830)	+	-	-	-	-
<i>Ii. dollfusi</i> Clievreux, 1911	+	-	+	-	-
<i>Coremapus versiculatus</i> (Bate. /856)	+	+	-	-	-
<i>Microdeutopus grylloialpa</i> . IX 'osta, 1853	+	+	+	+	-
<i>M. stations</i> Delia 1 (die. 1893	+	-	-	-	
<i>\l. damnoniensis</i> /Bale. 1850)	+	+	+	-	-
<i>M. anomalus</i> (Rathke, 1843)	+	+	+	-	-
<i>Microprotopus minutus</i> Sowinskyi, 1893	E	+	-	+	-
<i>Megamphopus commits</i> Sorman. 1809	+	+	-	-	-
<i>Biancolina funiculus</i> (Stebbing, 18~4)	+	-	+	-	-
<i>Pleonexes gummaroides</i> Bate, 185"	+	-	+	-	-
<i>Amphithoe vailland</i> Lucas, 1846	+	+	+	+	-
<i>Grubia crassicornis</i> (A. Costa, 185~)	+	-	-	-	-
<i>Siphonoecetes del/aval</i> let Stebbing. 1899	+	-	-	-	-
<i>Jassa ocia</i> (Bate, 1862)	+	+	+	+	-
<i>Erichthonius difformis</i> M.-Edwards, 1830	+	+	+	+	-

<i>Corophium crass/come</i> Bruzelius, 1859	+	+	+	-	-
<i>C. bonelli</i> (M.-Edwards, 1830)	v	+	-	+	-
<i>C. runcicorne</i> Delia Valle, 1893	v	+	+	-	-
<i>C. robustum</i> G.O.Sars, 1895	R	-	-	-	M
<i>C. curvispinum</i> G.O.Sars, 1895	R	-	-	+	M
(<i>. orientalis</i> (Shellcnherg/Stock, 1960/	R	-	-	+	-
<i>C. validator</i> (Pallas, 1766/	R	+	-	+	M
<i>C. nobile</i> G.O.Sars. 1895	R	+	-	-	M
<i>C. maeoticum</i> Sowinskyi, 1898	R	+	-	-	+
<i>C. imicronatuin</i> Sowinskyi, 1894	R	-	-	-	+
<i>C. chelicome</i> G.O.Sars, 1895	R	-	-	-	M
<i>Chelura terebrans</i> Philippi, 1839	+	-	-	-	-
<i>Phtisica marina</i> Slabber, 1788	+	+	+	-	-
<i>Pseudoprotella phasma</i> (Montagu, 1804)	+	-	+	-	-
<i>Caprella acanti/era</i> Leach, 1814	+	-	+	-	-
<i>C. aeanti/era variabilis</i> A.Cora usu et S.Carausu, 1959	+	+	-	-	-
<i>G. aeanti/era jerox</i> (Czerinavski, 1868)	+	+	+	-	-
(<i>. liparotensis</i> Holler, 1879	+	-	+	-	-
<i>C. donilevskyi</i> Ciernjavski, 1868	+	-	-	-	-
<i>C. mitts</i> Mayer, 1890	+	-	+	-	-
PAINTOPODA					
<i>Callipallene brevirosris</i> (Johnston. 183~)	+	-	-	-	-
<i>C. phantoma</i> (Dohrn, 1881 /	+	+	+	-	-
<i>Anoplodactylus petiolalus</i> (Kfoyer. 1844)	+	-	+	-	-

<i>B. leaei</i> (Seheppard, 1823)	+	-	-	-	+
<i>Boristhenia naticina</i> (Menke)	+	-	-	-	+
<i>Choanomphalus rossmaessleri</i> (Schmidt)	+	-	-	-	+
<i>Lithoglyphus naticoides</i> Pfeiffer, 1828	+	-	-	-	MI
<i>Turricaspia variabilis</i> (Eichwald, 1838)	R	-	-	-	+
<i>I. caspla lincta</i> (Milaclievitch, 1908)	R	-	-	-	+
<i>Truncatella subcylindrica</i> (L... 1 '58)	+	+	+	-	-
<i>T. montagui</i> I.owe, 1831	+	+	-	-	-
<i>Melaraphe neritoides</i> (h.,1-5~)	+	-	+	-	-
<i>Caecum elegans</i> Perejaslavtsevu, 1891	+	-	-	-	-
<i>(alvptreae chalcosis</i> /L... 1 '58)	+	+	+	-	-
<i>Cerithidium pusillum</i> (Jeffreys, 1856)	+	+	-	-	-
<i>Billium reticulatum</i> (Osla, 1 ~99)	+	i	+	-	-
<i>Cerithium vulgatum</i> Bruguiere, 1789	+	-	+	-	-
<i>(erilhiopsis minima</i> (Brasilia, 1864)	+	+	+	-	-
<i>(' suhulata</i> (Wood, 1850)	+	-	-	-	-
<i>C tubercularis</i> (Montagu, 1803)	+	-	+	-	+
<i>Triphora perversa</i> (L., 1'58)	+	+	+	-	+
<i>T. parva</i> (Milaehvitch, 1909)	+	+	-	-	+
<i>P. obestda</i> Buccpoy, Daitzzenberg et Dollfus, 1884	+	-	-	-	+
<i>Tritia reticulata</i> (L., 1~58)	+	+	+	-	-
<i>Sana neritea</i> (L.,1 '58)	+	-	+	-	+
<i>S. donovani</i> (Risso, 1826)	+	-	+	-	+
<i>Rapana thomasiana thomasiana</i> Crosse. 1861	I	+	+	-	+
<i>I rophonopsis breviata</i> (Jeffreys, 1882)	+	-	-	-	+

<i>H. aciculina</i> (Bourguignat, 18~6)	E	-	-	4	-
<i>H. salinasii</i> ((alcara et Arciclas, 1845,	E	-	-	+	-
<i>H. procerula paladilche</i> Paladilche, 1869	l	-	-	+	-
<i>H ventrosa</i> Montagu	+	-	-	+	+
<i>Samisalsa modessieri</i> (Bourguignat, 1876)	E	-	-	-	+
<i>Pseudopaludinella arenalum</i> I Bourguignat. 1876)	E	-	-	-	+
<i>P. leneumiera</i> (Bourguignat. 1S~6)	E	-	-	-	+
<i>Fagotia esperi</i> Ferussac, 1832	E	-	-	-	+
<i>F. acicularis</i> Ferussac. 1832	E	-	-	-	+
<i>Physa taslei</i> Bourguignat. infill	E	-	-	-	+
<i>Lymnaea stagnalis</i> L.. 1~58	+	-	-	-	+
<i>L. auricularia</i> L... 1~5H	+	-	-	-	+
<i>Radix ovata</i> tDraparnaud, 1805)	+	-	-	-	+
<i>R. lagotis</i> (Scdrank, 1803)	+	-	-	-	+
<i>R pereger</i> (). F. Muller, 1 "4)	+	-	-	-	+
<i>Galba</i> (Stagnicola) palustris (O.F.Muller, 1 "4)	f	-	-	-	+
<i>G. glabra</i> (O.F.Muller, 1774)	+	-	-	-	+
<i>G. truncatula</i> (O.F.Muller, 1774)	+	-	-	-	+
<i>Physa loiliualis</i> (L... 1~58,	+	-	-	-	+
<i>Ph. acuta</i> Draparnaud, 1805	+	-	-	-	+
<i>Planorbis carinatus</i> O.F.Midler. 174	+	-	-	-	+
<i>P planorbis</i> (L. 158)	+	-	-	+	+
<i>Planorbarius grandis</i> L... 1~58	+	-	-	-	+
<i>P. corneus</i> (L... 1~58)	+	-	-	-	+
<i>AncyusJluviatilis</i> O.F.Muller, (L., 158)	+	-	-	-	+

<i>Anisus se/ienigirulus</i> (Rossmacsslci; 1835)	+	-	-	-	+
<i>A. spirorbis</i> (L., 1758)	+	-	-	-	+
<i>A. (Spiralina) vortex</i> (1... 1~58)	+	-	-	-	+
<i>A. (S.) vorticulus</i> (Troschel. 1834)	+	-	-	-	+
<i>A. (Bathyomphalus) contorius</i> (1... 1~58)	+	-	-	-	+
<i>. trmigar crista</i> (L., 1~58)	+	-	-	-	+
<i>G. gredleri</i> (Rich) (livelier, 1853)	+	-	-	-	+
<i>Segmentina nitida</i> (O.F.Midler, 1 "41	+	-	-	-	+
<i>Acroloxus lacustris</i> (i., 1~58)	+	-	-	-	+
<i>Succinea putris</i> L., 1758	+	-	-	-	+
<i>S elegans</i> Risco. 1826	+	-	-	-	+
<i>S oblonga</i> Draparnaud, 1801	+	-	-	-	+
<i>I'ertigo antivertigo</i> (Draparnaud, 18(11)	+	-	-	-	f
<i>Goniodiscus ruderalis</i> Stader. 1820	1	-	-	-	+
<i>Oxycbilus gletber</i> (Stud.) Fer. 1822	+	-	-	-	+
<i>Zenobiella incarnata</i> O.F.Muller, 1 "4	+	-	-	-	+
<i>Viviparus ater</i> (Stag.)	+	-	-	-	+
<i>V. contectus</i> (Millet. 1813)	+	-	-	-	+
<i>V. viviparus</i> 1... 1~58	+	-	-	-	M
<i>Valvata piscinalis</i> (Mull)	+	-	-	-	M
<i>V. planorbulina</i> Palodilne	+	-	-	-	+
Г. pulcbetla Studer. 1820	+	-	-	-	+
Г cristata O.F.Muller, 1"4	+	-	-	-	+
<i>V. naticina</i> Meke, 1845	+	-	-	-	+
<i>Bithynia tentaculata</i> (1... 1 '58)	+	-	-	-	+

<i>Ianystylum conirostre</i> (Dohrn, 1881)	+	-	+	-	-
LORICATA					
<i>Lepidochitona cinerea</i> (L., 1766)	+	+	+	-	-
<i>Acanthochitona fascicularis</i> (L., 1767)	+	-	S	-	-
GASTROPODA					
<i>Patella tarenina</i> Salts, 1893	+	-	+	-	-
<i>Tricolia pulla</i> (P., 1858)	+	+	+	-	-
<i>Gibbula dixarieata</i> (L., 1758)	+	+	+	-	-
<i>G. albida</i> (Gmelin, 1790)	+	-	+	-	-
<i>G. adriatica</i> (Pflüppel, 1844)	+	+	+	-	-
<i>Theodoxus jluviatilis</i> (P., 1858)	+	+	-	-	+
<i>P. euxinus</i> (Glessin, 1885)	R	+	-	-	-
<i>T. danubialis</i> G.Pfeiffer, 1821	E	-	-	+	+
<i>Rissoa splendida</i> Eichwald, 1830	+	+	+	-	-
<i>R. xenusta</i> Pflüppel, 1844	+	+	-	-	-
<i>R. rufilabrum</i> Alder, 1815	+	-	-	-	-
<i>R. membranacea</i> Adams, 1797	+	+	+	+	-
<i>Mohrensternia parva</i> (Costa, 1809)	+	+	+	-	-
<i>XI. lineolata</i> (Léveillé, 1882)	+	+	+	+	-
<i>Sella valvatoides</i> Xlidaevitch, 1909	+	+	+	+	-
<i>Hydrobia leneumica</i> (Bourguignat, 1866)	+	-	+	-	-
<i>H. maritima</i> Xlidaevitch, 1916	+	-	-	-	-
<i>H. acuta</i> (Draparnaud, 1805)	+	+	+	+	-

<i>Cytharella costata</i> (Pennant, 1 ~6~i	+	+	-	-	+
<i>Bela nebula</i> (Montagu, 1803)	+	-	-	-	+
<i>Odostomia rissoides</i> Hartley, 1844	+	+	-	-	+
<i>O. pallida</i> (Montagu, 1803)	+	-	+	-	+
<i>O. albella</i> (Loven.J	+	-	+	-	+
<i>O plieata</i> (Montagu. 1809)	+	-	-	-	+
<i>Chrysallida incerta</i> Milachevitch. 1916	+	-	-	-	+
<i>Parthenina terebellum</i> (Philippi, 1844)	+	+	+	-	+
<i>I' interslincla i</i> Montagu, 1803)	+	-	-	-	+
<i>Turbonilla delicata</i> (Monterosato. 18~8)	+	-	-	-	+
<i>T. pusilla</i> (Philippi, 1844)	+	-	-	-	+
<i>Belonidium acicctla</i> (Philippi, 1844/	+	-	-	-	-
<i>Balcis incurva</i> (Renieri, 1804)	+	-	+	-	i
<i>(lathrus aitulatus</i> (Milachevitch, 1909)	+	-	+	-	+
<i>Retusa trwcatella</i> (l.oear, 1892)	+	+	+	+	+
<i>R sriatula</i> (Forbes. 1843)	+	-	+	-	+
<i>(yltchnina variabilis</i> (Milachevitch, 1909)	+	+	+	-	+
<i>C. rohagliana</i> (Fischer, 186')	+	-	+	-	+
<i>Doto coronata</i> (Gmelin, 1890)	+	-	+	-	+
<i>Tenellia adspersa</i> (ordntan, 1845)	+	+	+	+	+
<i>Tergipes lergipes</i> (Forskal, 1 ~~5)	+	-	-	-	-
<i>Doridella ohscura</i> l'errill. 18~0	+	1	1	-	+
<i>Ovatella myosolis</i> (Draparnaiul. 1801)	+	4	+	-	+

BIVALVIA					
<i>Gastrochaena dahia</i> (Pennant, 1)	+	-	+	-	+
<i>Galaeteda lactea</i> (L., 1758)	+	+	+	-	+
<i>Cunearca cornea</i> (Reeve, 1844)	+	I	l	-	+
<i>Mytilaster lineatus</i> (Gmelin, 1~90)	+	M	+	+	+
<i>Mytilus galloprovincialis</i> Lamarck, 1819	+	M	+	+	+
<i>Modiolus phaseolinus</i> (Philippi, 1844)	+	+	+	-	1
<i>M. adriaticus</i> (Lamarck, 1819)	+	+	+	-	+
<i>Ostrea edulis</i> L... 1 "58	+	-	s	-	
<i>O lamellosa</i> Rocchi, 1814	+	-	-	-	+
<i>Flexopecten ponticus</i> (Bucquoy, Daulzenberg et Doll/us, 1889)	f	s	+	-	+
<i>Thraeia papyracea</i> (Poli, 1791)	+	-	s	-	+
<i>Lueinella divaricala</i> (L..1 "58)	+	+	+	-	+
<i>Loupes lucinalis</i> (Lamarck, 1818)	+	+	+	-	+
<i>Mysella hidentata</i> (Montagu, 1803)	+	+	+	-	+
<i>Erycina nitida</i> (Lurton, 1822)	+	-	+	-	+
<i>Donax trunculus</i> L... 1 "58	+	-	+	-	+
<i>D. semistriatus</i> Poli, 1~91	+	-	+	-	+
<i>Acanthocardia paucicostata</i> (Sowerby, 1859)	+	+	+	-	+
<i>Erastoderma glaucum</i> Poirel, 1 "89	+	+	+	+	+
<i>C. lamarcki lamarcki</i> (Reeve, 1844)	+	+	-	-	+
<i>C. clodiense</i> (Renieri, 1804)	+	+	-	+	+
<i>Parvieardium exigium</i> (Gmelin, 1~90)	+	+	+	-	+
<i>Plagioeardium simile</i> 1 Milachevitch, 1909)	+	+	+	-	+



<i>P. papillosum</i> (Poli, 1781)	+	+	-	-	+
<i>Hypanis colorata</i> (Eichwald, 1829)	Rr	-	-	-	+
<i>H. pontica</i> (Eichwald, 1838)	R	-	-	-	+
<i>H. plicata relictata</i> (Milachevitch, 1916)	R	-	-	-	+
<i>Coukilia minima</i> (Montagu, 1803)	+	+	+	-	+
<i>Pilar rudis</i> (Poli, 1791)	+	+	+	-	+
<i>Irus irus</i> (L... 1~58)	+	+	+	-	+
<i>(hamelea gallina</i> (L... 1 '58)	+	+	+	-	+
<i>Politiitapes aurea</i> (Cnclin, 1 '90)	+	+	+	-	+
<i>P. petalina</i> (Lamarck, 1818)	+	+	+	-	+
<i>Petricola lithopltaga</i> (Retzius, 1 '86)	+	-	+	-	+
<i>Spisula triangula</i> (Renieri, 1804)	+	+	+	-	4
<i>S. subtruncata</i> (Costa, 1~8)	+	+	+	-	+
<i>Mactra slultorum</i> (L, 1758)	+	-	S	-	+
<i>Domiciliu! cornea</i> (Poli, 1~91)	+	-	-	-	+
<i>A bra ovatu</i> (Philippi, 1836)	+	+	+	+	-
<i>A. nitida milachewichi</i> Xevesskaja, 1963	+	+	+	+	+
<i>A. alba occitanica</i> (Recluz, 1843)	+	+	+	-	+
<i>A renieri</i> (Broun, 1836)	+	+	+	-	+
<i>(iaslranaJragilis</i> (L... 1~58)	+	+	H	-	+
<i>Moerella donacina</i> (L... 1 '58)	+	+	+	-	+
<i>M. tenuis</i> (Costa, 1 8)	+	+	+	-	+
<i>Fuhitlinii fabula</i> (Gronovius, 1'81)	+	-		-	f
<i>Dreissena polymorpha polymorpha</i> (Pallas, 1" 1)	R	-	-	-	\1
<i>D. rosloformis bugensis</i> (Andrusov, 189')	R	-	-	-	M

<i>Solen vagina</i> L.. / "58	y	-	-	-	+
<i>Mya arenaria</i> L.. 1 "58	I	\	-	-	+
<i>Lentidium mediterraneum</i> (Costa, 1829)	+	M	-	-	+
<i>I'holas daetylus</i> L.I ~58	+	-	-	-	+
<i>Barnea Candida</i> (L... I ~58)	+	-	-	-	+
<i>Teredo utriculus</i> Cmelin, 1 "90	+	-	-	-	+
<i>T. navalis</i> L.,I "58	+	-	-	-	+
(<i>niopictorum</i> (L... 1~58)	+	-	-	-	+
<i>I'. pictorum ponderosum</i> Spilzi in Rossmuessler, 1844	+	-	-	-	+
<i>V. conns boryst/enieus</i> Kohelt, 18~9	E	-	-	-	+
<i>I'. tuiuidus</i> I'lilipsson, 1~88	+	-	-	-	+
<i>Colletopterum ponderosum rumanicum</i> Bourguignat. 1880	E	-	-	-	+
(' <i>subcirculare platenicum</i> tSerain. 1881)	E	-	-	-	+
<i>Anodonta eygnea</i> (L... I"58)	+	-	-	-	+
<i>A. piscinalis</i> Silsson, 1822	+	-	-	-	i
<i>A. subcircularis</i> C/essin	+	-	-	-	+
<i>Pseudoanadonta complanata</i> (Ziegler in Rossmuessler, 1835)	E	-	-	-	f
<i>P elongata tanousi</i> Bourguignat, 1880	E	-	-	-	+
<i>Pisidium oblusale</i> (Lam.) Jenvns. 1X45	+	-	-	-	+
<i>P. milium</i> Held.. 1836	+	-	-	-	+
ECHINODERMATA					
<i>Stereoderma kirschbergi</i> IHeller. 1868)	+	-	-	-	4
<i>Leplosynapta inhaerens</i> (O.Muller, 1~6)	+	-	-	-	+
<i>Oestergrenia</i> sp.	+	-	-	-	+

<i>Synapta hispida</i> Heller, 1868	+	-	-	-	+
<i>Amphiura stepanovi</i> Djakonov, 1954	+	-	-	-	+
TUNICATA					
<i>Eugyra adriatica</i> Drasche, 1884	+	-	+	-	+
<i>Ctenicella appendiculatci</i> (Heller, 18'-i	+	+	+	-	+
<i>Molgula euprocla</i> Drasche, 1884	+	-	+	-	f
<i>Botryllus schlosseri</i> (Pallas, 1776)	+	-	-	-	+
<i>Asciidiella uspersa</i> (Midler, 1 ~-6)	+	+	+	-	+
<i>Ciona intestinalis</i> ~6~)	+	+		-	+
<i>Diplosoma listerianum</i> (Milne - Edwards, 1841)	+	-	-	-	+
ODONATA					
<i>Platyonemispennipes</i> (Pallas, 1"1)	+	-	-	-	+
<i>Lestes sponsa</i> Hanseman, 1823	+	-	-	-	!
<i>Ischmira elegans</i> Ian c/er Linden, 1820	+	-	-	-	+
<i>L pumilio</i> Charpenlier, 1825	+	-	-	-	+
<i>Enallagma cyathigerum</i> Charpentier, 1840	+	-	-	-	+
<i>Coenagrion scitulum</i> Rambur, 1842	+	-	-	-	+
<i>Erylhroma najas</i> Hanseman, 1823	+	-	-	-	+
<i>Aeschna isosceles</i> Midler, 1 ~6~	+	-	-	-	+
<i>Anax imperator</i> Leach, 1815	+	-	-	-	+
<i>Gomphns flavipes</i> (harpentier, 1825	+	-	-	-	+
(i. vulgatissiiinus /., 1~58	+	-	-	-	+
<i>Libellula quadrimacidata</i> L., 1 ~58	+	-	-	-	+

<i>Crocothemis erythrea</i> Brulle, 1832	+	-	-	-	+
<i>Sympetrum flaveolum</i> L., 1758	+	-	-	-	+
<i>S. meridionale</i> Selys, 1841	+	-	-	-	+
EPHEMEROPTERA					
<i>Palingenia suhlonglcaida</i> (Oliver, 1 "91)	+	-	-	-	+
<i>Caenis macrura</i> Stephens, 1835	+	-	-	-	+
<i>C. horaria</i> (L., 1758)	+	-	-	-	+
<i>C. laetec</i> Pictet, 1843-1845	+	-	-	-	+
<i>Cloen dipterum</i> (L... 1-6l)	+	-	-	-	+
<i>C. rufulum</i> (Muller, 1776)	+	-	-	-	+
<i>Procleon bifidum</i> (Pengtsson, 1912)	+	-	-	-	+
<i>Ileplagenia Jlava</i> Rostock, 18"	+	-	-	-	+
<i>Ii. corulans</i> Rostock, 18"	+	-	-	-	+
HEMIPTERA-HETEROPTERA					
<i>Cymatia eoleoprata</i> (P., 1 "6)	+	-	-	-	+
<i>Mieronecta meridionaiis</i> (Costa. 1860)	+	-	-	-	+
<i>Sigara linnei</i> (h'ieh.. 1848)	+	-	-	-	+
<i>S. transversa</i> 1 h'ieh.. 1848)	+	-	-	-	+
<i>S. lateralis</i> (Leach, 1818)	+	-	-	-	+
<i>S iugusiris</i> h'ieh . 1848	+	-	-	-	+
<i>S. striata</i> (L... 1 5)	+	-	-	-	+
<i>S. fallen!</i> (Pieh., 1848)	+	-	-	-	+
<i>S'epa cinerea</i> L... 1~58	+	-	-	-	+

<i>Ranatra linearis</i> (L... 1'58)	+	-	-	-	+
<i>Ilyocoris cimicoides</i> (L... 1'58)	+	-	-	-	+
<i>Notonecta glauca</i> L.. 1~58	+	-	-	-	+
<i>N. lutea</i> A killer. 1"6	+	-	-	-	+
<i>Flea leachi</i> Mac dreg el Kirk. 1899	+	-	-	-	+
<i>P. minutissima</i> Leach	+	-	-	-	+
<i>Mesovelia furcata</i> Mills. 1852	+	-	-	-	+
<i>Microvelia schneicleri</i> (Scholtz. 1846)	+	-	-	-	+
<i>(ierris ihoracicus</i> Schuinin. 1832	+	-	-	-	+
<i>G. argentatus</i> Schuinin. 1832	+	-	-	-	+
COLEOPRATA					
<i>Peltodytes caesiis</i> (Duftschmid, 1805)	+	-	-	-	+
<i>Bemhidion assimile</i> Civil	+	-	-	-	
<i>7 achys hislrialus</i> Pk.	+	-	-	-	+
<i>Haliphus ru/collis</i> (De Geer, 1'4)	+	-	-	-	+
<i>H. fluvial</i> , I is Aube. 1836	+	-	-	-	+
<i>H. variegatus</i> Sturm, 1834	+	-	-	-	+
<i>N. Crassicornis</i> (Midler, 1"6)	+	-	-	-	+
<i>П clavicornis</i> (I)e deer. 1"6)	+	-	-	-	+
<i>Laccophilus hyalinus</i> (De Geer, 1"4)	+	-	-	-	+
<i>l. variegatus</i> (German. 1812)	+	-	-	-	+
<i>Hyphydrus ovatus</i> (L.. 1'61)	+	-	-	-	+
<i>llydrovatus cuspidatus</i> (Kunze, 1818)	+	-	-	-	+
<i>Bidessus unistriatus</i> (Schränk. 1~81)	+	-	-	-	+

<i>Hydrotus inaequalis</i> (Fabricius. 1 /	+	-	-	-	+
<i>H versicolor</i> (Schaller, 1~83)	+	-	-	-	+
<i>Coelambus impressopunctatus</i> (Schaller. 1~83)	+	-	-	-	+
<i>C. parallelogrunanus</i> (Ahrens. IHI2)	+	-	-	-	+
<i>Uydropsus irisilis</i> (Paykull. 1 "98)	+	-	-	-	+
<i>II. ahscurus</i> Sturm. 1835	+	-	-	-	+
<i>Hydaticus seminiger</i> (De Geer, 1 "~4>	+	-	-	-	+
<i>Graphoderes catereus</i> (L... 1~58)	+	-	-	-	+
<i>Gaurodytes bipustulatus</i> L... 1 "58	+	-	-	-	+
<i>Dytiscus marginalis</i> (L... 1 "58)	+	-	-	-	+
<i>l) latissimus</i> /... / 758	+	-	-	-	+
<i>Helophorus hrevipalpis</i> lied	+	-	-	-	+
<i>Gyrinits easpius \leucines</i> . 1832	+	-	-	-	+
<i>G. marinus</i> Gyllenhal, 1808	+	-	-	-	+
<i>llydrochus elengatiis</i> Schall.	+	-	-	-	+
<i>Ochihehius puslllus</i> Steph.	+	-	-	-	+
<i>O. marinus</i> Pk.	+	-	-	-	+
<i>() . meredionalls</i> Rosenh.	+	-	-	-	+
<i>Spercheus emarginatus</i> Schall.	+	-	-	-	+
<i>lierosus spinosns</i> Steph.	+	-	-	-	+
<i>li. signalicollis</i> Charp.	+	-	-	-	+
<i>B. luridus</i> L.	+	-	-	-	+
<i>Hydrous piceus</i> /..	+	-	-	-	+
<i>Linozenus niger</i> /..schach.		-	-	-	+
<i>Hydrohius fuscipes</i> /..	+	-	-	-	

<i>Anacaena globulus</i> Tk.	+	-	-	-	+
<i>A. limbata</i> Fabricius	+	-	-	-	+
<i>Paracymus aeneus</i> Germ.	+	-	-	-	+
<i>Enoehrus minus</i> Fabricius	+	-	-	-	+
<i>F. frontalis</i> F.r.	+	-	-	-	+
<i>E. testaceus</i> Fabricius	+	-	-	-	+
<i>F. bicolor</i> Fabricius	+	-	-	-	+
<i>C ymbiotlyta marginellus</i> Fabricius	+	-	-	-	+
<i>Laccobius minutus</i> L.	+	-	-	-	+
<i>Chaetarthria seminulum</i> llhsl.	+	-	-	-	+
<i>Limnebius truncatellus</i> T/inh.					
<i>L., picinus</i> Marsh	+	-	-	-	+
<i>Bryaxis longicornis</i> Leach	+	-	-	-	+
<i>Driops auriculatus</i> Geoffr.	+	-	-	-	+
<i>Paramecosoma melanocephalum</i> llhsl.	+	-	-	-	+
<i>Galerucella nymphaeala</i> L.					
<i>Aphlhona iiolacea</i> Koch.	+	-	-	-	+
<i>Longitarsus anchusae</i> Pk.	+	-	-	-	+
<i>Psylliodes clulcamare</i> Koch.	+	-	-	-	+
<i>Sitona crmilus</i> llbst.	+	-	-	-	+
<i>S. humeralis</i> Steph.					
<i>Alophus triguttatus</i> Fabricius	+	-	-	-	+
<i>Phylobius canaliculatus</i> Labricius	+	-	-	-	+
<i>Solaris aelhiops</i> Fabricius	+	-	-	-	+
<i>Thrvogenes scirrhusus</i> Gyll.	+	-	-	-	+

MEGALOPTERA					
<i>Sialis hilaria</i> F.	+	-	-	-	+
TRICHOPTERA					
<i>Agraylea multipunctata</i> Curtis	+	-	-	-	+
<i>Hydroptila maclachlani</i> Klapalek, 1893	+	-	-	-	+
<i>Oxvelhira costalis</i> Curtis					
<i>Leioichiton fagesii</i> Guitterd	+	-	-	-	+
<i>Tinodes waeneri!</i> ..., 1~58	+	-	-	-	+
<i>Ecnomus tenedus</i> (Rambur)	+	-	-	-	+
<i>Cyrnus flavidus</i> McL.	+	-	-	-	+
<i>Psychomyia pusilla</i> l'ahricius					
<i>Polycentropus flavomaculatus</i> Pictet, 1834	+	-	-	-	+
<i>Neuroclipsis himaculata</i> /..	+	-	-	-	+
<i>(hacmatopsyche lepida</i> (Pictet,J	+	-	-	-	+
<i>I hydropsyche bulgaromanorum</i> (Bolt, and Kum.)	+	-	-	-	+
<i>II. ornatula</i> McLachlan					
<i>II. pedlucidida</i> Curtis	+	-	-	-	+
<i>Grammotaulius nitidus</i> Muder	+	-	-	-	+
<i>Limnophilus decipiens</i> Kolenati	+	-	-	-	+
<i>Triaenodes bicolor</i> Curtis	+	-	-	-	+
<i>Uecetis intima</i> Mcl.achkm					
<i>O. ochracea</i> Curtis	+	-	-	-	+
<i>O. furva</i> Rambur	+	-	-	-	+

LEPIDOPTERA					
<i>Paraponix stratiotata</i> P	+	-	-	-	+
<i>Nymphula nymphaeata</i> L.					
<i>N. stagnate</i> : Donn.	+	-	-	-	+
(<i>alaclysta lemnala</i> L.	+	-	-	-	+
<i>Acentropus niveus</i> Oliv.	+	-	-	-	+
CULIC IDAE					
<i>Anopheles inaeilipennis</i> Meigen					
(<i>nle.x modestns</i> Piealhi	+	-	-	-	+
(<i>. pipiens</i> L.	+	-	-	-	+
CHIRONOMIDAE					
(<i>rteotopus vitripennis</i> (Meigen. PSIS)	+	+	-	-	+
<i>C. ex gr. silveslris</i> (Pahrieias, 1-94)					
<i>C. exgr. algarum</i> Kieffer. 1911	+	-	-	-	+
<i>Microcrieotopus hieolor</i> (Zetterstedt, 1843)	+	-	-	-	+
<i>I Italagomyio frauenfeldi</i> (Shiner. 1850) -	+	+	-	-	+
(<i>lunio marinus</i> (Holiday. 1855)	+	+	+	-	+
<i>C. ponticus</i> Michaitovo. 1980	+	+	-	-	-
<i>Proeladius jerrugineus</i> Kieffer. 1919	+	-	-	-	M
<i>P. ehoreus</i> (Meigen)	+	-	-	-	+
<i>P. nigriventris</i> Kieffer	+	-	-	-	+
<i>Cryptochironomus delectus</i> Kieffer. 1921	+	-	-	-	M

<i>C. ex gr. confingciis</i> Kieffer					
<i>C. ex gr. fuscimanus</i> Kieffer	+	-	-	-	+
<i>(?ryptoladopelma viridu/a</i> 1 Fabricius 1	+	-	-	-	+
<i>Demicryptochironomus mineralus</i> (Zetterstedt)	+	-	-	-	+
<i>I larnichia fuscimana</i> Kieffer	+	-	-	-	M
<i>Il. burganadzeae</i> (f'schernovskii)					
<i>I. eplocliironontits lener</i> (Kieffer, 1921)	+	-	-	-	+
<i>Parachironomus pararoslratus</i> llarnisch. 1923	+	-	-	-	+
<i>(liironoimis plumosus</i> (L., 1 ~58)	+	-	-	-	M
<i>(li. fl. sal i nar ins</i> Kieffer. 1921	+	+	-	-	+
<i>(h. J.I. halop/iilus</i> Kieffer					
<i>(? . /? . lluimini</i> Kieffer	+	-	-	-	+
<i>Ch. f.l. semireduclus</i> ken:	+	-	-	-	+
<i>(h. dorsalis</i> <u>Veigen</u>	+	-	-	-	+
<i>Limnochironomus ex gr. ncrrosus</i> (Siacger. 1839)	1	-	-	-	M
<i>I., ex gr. tritomas</i> Kieffer, 1916	+	-	-	-	+
<i>hhlm-ltmiiuumus uupar 4 ulker. 1 S.Vf</i>	+	-	-	-	+
<i>/:'. slackelbergi</i> Goetghebuer	+	-	-	-	+
<i>F. ex gr. sigiialicoruus</i> Kieffer	+	-	-	-	+
<i>I'olypedilitin nuheculosum</i> (Meigen. 1818)	+	-	-	-	+
<i>P. bicreiialuin</i> Kieffer. 1921	+	-	-	-	+
<i>P. scalaenum</i> (Schranck. 1803)	+	-	-	-	+
<i>P. conviction</i> Walker. 1856	+	-	-	-	+
<i>P. brevianthennatum</i> I'scliernovskij, 1949	+	-	-	-	+
<i>Cladotanytarsus ex gr. mancusi</i> Walker. 1856)	+	-	-	-	+

<i>Paratanytarsus gr. lauterborni</i> Kieffer. 1909	+	-	-	-	+
<i>P. inopterus</i> (Walker)	+	-	-	-	+
<i>P. lauterborni</i> Kieffer	+	-	-	-	+
<i>Rheotantarsus gr. exinutts</i> Johansen	+	-	-	-	+
<i>Iam tarsus reruovi</i> Olivary. 1955	E	-	-	+	+
<i>I. ex gr. gregarius</i> Kieffer	+	-	-	-	+
<i>T. ex gr. lauterborni</i> Kieffer	+	-	-	-	+
<i>P. ex gr. lobatifrons</i> Kieffer	+	-	-	-	+
<i>P. borysthenicus</i> Olivary, 1955	+	-	-	-	+
<i>Tanypus vilipeiuis</i> Kieffer	+	-	-	-	+
<i>Penlapediluin exectum</i> Kieffer					
<i>P. sondens</i> (Wan der Walp)	+	-	-	-	+
<i>Anatopynia plumipes</i> Fries	+	-	-	-	+
<i>Ablabesmia ex gr. monillis</i> L	+	-	-	-	+
<i>Einfeldia carbonaria</i> (Meigen)	+	-	-	-	+
<i>E.f.l. pagana</i> Meigen					
<i>Glyptotendipcs gtaeus</i> Meigen	+	-	-	-	+
<i>G. ex gr. gripekoveni</i> Kieffer	+	-	-	-	+
<i>G. ex gr. mancanianus</i> Edwards	+	-	-	-	+
<i>G. ex gr. paripes</i>	+	-	-	-	+
<i>G. ex gr. polytomus</i> Kieffer					
<i>Pseelroeladius ex gr. dilatalus</i> Kieffer	+	-	-	-	+
<i>Pelopia punetipennis</i> Meigen	+	-	-	-	+
<i>Trissoeladius gr/seipennis</i> Goelg/iebuer. 1913	+	-	-	-	+
<i>Eukiefferiella luspida</i> Edwards. 1929	+	-	-	-	+

HELEIDAE					
<i>Culicoides nubeculosus Meigen, 1818</i>	+	-	-	-	+
<i>Probezzia sp.</i>	+	-	-	-	+
<i>Palpomyia sp.</i>	+	-	-	-	+
<i>Sphaeromyias piclus Meigen</i>	+	-	-	-	+
<i>S. candidatus Loew</i>	+	-	-	-	+
STRATIOMYIDAE					
<i>Stratiomyia sp.</i>	+	-	-	-	+
<i>Eulalia sp.</i>	+	-	-	-	+
EPHYDRIDAE					
<i>Ephydra sp.</i>	+	-	-	-	+

Table 10. List of Fish Species

Species	Till 1975	Contemporary State Areas				Bibliography
		NWBS	Crimea	Water Bodies		
				Marine	Brackish	
Squalidae						
<i>Squalus acanthias</i> L., /~58	+	+	+		S	1.2.6.7.8
Rajidae						
<i>Raja clavata</i> P. /~58'	+	+	+			1.2.6.7.8
Dasyatidae						
<i>Dasyatis pastinaca</i> L., /~58	+	+	+			1.2.6.7.8
Acipenseridae						
<i>Huso huso</i> L., /~58	+	s	s	+	+	1.2.6.7.8
<i>Acipenser nudiventris</i> , Lovetzky, 1828	+	+	+			1.2.6.7.8
<i>A. ruthenus</i> L., /'58	S	s				1.2.6.7.8
<i>A.gUldenstadti colchicus</i> ГMarti, 1940	+	s	s	S	S	1.2.6.7.8
<i>A.sturio</i> L., 1 '58	s	s	s	s	s	1.2.6.7.8
<i>A.stellatus</i> Pallas. 1 "1	s	s	s			1.2.6.7.8
Clupeidae						
<i>Clupeonella cultriventris cultriventris</i> (Xordiiann. 1840)	M	M	s	s	M	1.2.3.6.7.8
<i>Sordino pilchardus</i> (Walbaum, 1 '92)	s		s			7.8
<i>Sprattus sprattus phalericus</i> (Risso. 1826)	M	M	M	M		1.2.3.4. 6.7.8
<i>. llosa caspia nordmanni</i> Antipa, 1906	+	s	+	s	+	1.2.6.7.8
<i>. [kessleri pontica</i> (Eichwald, 1838)	+	+	+	s	+	12 6,- 8
<i>A.Jolox nilotieo</i> ((ieoffroy, 1829)	S\		Sv			6.7.8

<i>A.caspia tanaica</i> (Grimm, 1901)	Sv		S\			6.7.8
Engraulidae						
<i>Engraulis encrasicolus ponticus</i> Aleksandrov, 1927	M	M	M	s		1.2.3.4. 5.6.7.8
<i>E. encrasicolus maeolicits</i> Pusanov. 1926			+			7.8
Salmonidae						
<i>Salmo titta labrax</i> Pallas. 1811	s	s	s	s	s	1.2.6.7.8
Esocidae						
<i>I. sox lucius</i> /., /~58	Sv	Sv			Sv	1.2.6
Cyprinidae						
<i>Abramis braiua</i> (L.J '58)	Sv	Sv			+	1.2.6
<i>A. salpa</i> (Pallas.1811)	Sv	Sv			+	1.2.6
<i>Aspius aspius</i> (L... 1~58)	Sv	Sv			+	1.2.6
<i>Alburnus alburnus</i> (L.J ~58)	Sv	Sv			+	1.2.6
<i>Blicca hjorna</i> (L.J '58)	Sv	Sv			+	1.2.6
<i>Carassius carassius</i> (L.J '58)	Sv	Sv			+	1.2.6
<i>Cyprinus carpio</i> (L... 1 '58)	Sv	Sv			+	1.2.6
<i>Chalcalbitrimis chalcoides damibius</i> (Antipa, 1909)	s	S			+	
<i>Hypophthalmichthys molitrix</i> (T'alenciennes, 1844)	Sv	Sv			+	1.2.6
<i>Pelecus cultratus</i> (L., 1~58)	Sv	Sv			+	1.2.6
<i>Rutilus rutilus</i> fl... 1 "58)	S\	S\			+	1.2.6
<i>R. rutilus heckeli</i> Nordmann, 1840	s	S\			+	1.2.6
<i>R. jrisii</i> (Nordmann, 1840)	Sv	Sv			+	1.2.6
<i>Scardinius erythrophthalmus</i> (L... 1~58)	S\	S\			+	1.2.6
<i>Leuciscus delineatus</i> (Meckel, 1843)	S\	S\			+	1.2.6
<i>Leuciscus idus</i> (L. 1~58)	S\	Sv			+	1.2.6

<i>Tinea tineae</i> L... 1 "58	Sv	Sv			+	1.2.6
1 "nba vimba vimba n. carinata (Pallets. 1811)	Sv	Sv			+	1.2.6
<i>Ctenopharyngodon idella</i> Valenciennes, 1844)	Sv	Sv			+	1.2.6
Cobitidae						
<i>Misgurnus lissilis</i> P. 1 "58	Sv	Sv			+	1.2.6
(<i>obitids</i> giants P. 1~58	Sv	Sv			+	
Anguillidae						
<i>Anguilla anguilla</i> L... 1 ~58)	S	S	s	s	s	1.2.6.7.X
Congridae						
(<i>anger conger</i> (L. 1~58)	Sv		Sv			7.8
Belonidae						
<i>Belone belone</i> eu.xini (iu/ilher. 1866	+	+	+	+		1.2.3.6.7.8
Gadidae						
(<i>uddropsurus mediterraneus</i> L.,... 1~58)	s	s	s			1.2.3.6.7.8
<i>Meiianthus merlangius</i> euxinus (Sordmann, 1840)						
<i>Lota lota</i> .. 1 "58	+	+	+	s		1.2.3.6.7.8
Gasterosteidae						
(<i>asterosteus aculeatus</i> L... 1 '58	+	+	+	.	+	1.2.3.6.7.8
<i>Pungilius platygaster</i> platygaster (Kessle. 1859)	+	+	+	+	+	1.2.3.6.7.8
Syngnathidae						
<i>Hippocampus ramulosus</i> (Peach. 18")	+	s	s	s	s	1.2.3.6.7.8
<i>Seroplus ophidian</i> /T., 1 "58)	+	+	+	+		1.2.3.6.7.8
<i>Syngnathus abaster</i> Risso. 1810	M	M	M	+	s	1.2.3.6.7.8
<i>S.phlegon schmidtii</i> Popov, 'Vjs	s	s	s			1.2.3.6.7.8
<i>S.tenuirostris</i> Rathke. 183"	s	s	s			1.2.7.8

to
1-J

<i>S.iyphe</i> L..1'58	M	M	M	+	Sv	1.2.3. 6.7.8
<i>S.variegatus</i> Pallas, 1811	S	s	s			2.6.7.8
Zeidae						
<i>Zeus faher puugio</i> 1 aleiicieines. 1835	Sv		S\			1.2.7.8
Sphyraenidae						
<i>Sphyraena sphyraena</i> 1... / 758	S\	Sv	S\			7.8
Mugilidae						
<i>Mugil cephalus</i> 1... 1'58	Sv	Sv	Sv	+	Sv	1.2.3.4.6.7.8
<i>M.soiuv</i> Ilasilewskv, 1855	+	+	+	+		
<i>Liza ramada</i> (Risso, 1810)	S		s			7.8
<i>L.aurala</i> (Risso. 1810)	M	+	+	+		1.2.3.6.7.8
<i>L. sa/iens</i> (Risso. 1810)	M	+	+	+		1.2.3.4.6.7.8
Atherinidae						
<i>Atherina boveri</i> Risso. 1810	M	M	M	M	S	1.2.3. 6.7.8
<i>A.bonaparlei</i> lioulenger. 190'	s		s			2.7.8
<i>A.hepselus</i> /... / '58	+		+			2.7.8
Percidae						
<i>Percarina deinidofji</i> Sordnuuvi. 1858	+	+	+	+		1.2.6.7.8
<i>Slizostedion niarinus</i> ((uvier. 1830)	+	+	+	+		1.2.6.7.8
<i>Lucioperea lucioperca</i> (1.1 ~58)	Sv	Sv			+	1.2
<i>Perca</i> /uvialilis 1 . i ~5S	Sv	Sv				1.2
<i>Accriua sehraelser</i> /... / '58	S\	S\			+	1.2
Serranidae						
<i>Dicentrarchus lahrax</i> (1... 1'59)	S			s		1.2.7.8
<i>Serranus scriha</i> (1... 1~58)	S	S	s			1.2.7.8

Centrarchidae						
<i>Lepomis gibbosus</i> L., 1~58	S\	Sv			s	1.2.7.8
Pomatomidae						
<i>Pomatomus saltator</i> ~58)	+	S\	Sv			1.2.3.4.6.7.8
Carangidae						
<i>Saucrates ductor</i> (L... 1 "58)	Sv	Sv				2.7.8
<i>Trachurus trachurus</i> (L., 1 '58)	S	s				7.8
'/. mediterraneus ponticus Aleev, 1956	fl	M	M	+		1.2.3.4.6.7.8
Sciaenidae						
<i>Seiaena umbra</i> L., 1~5S	S	s	s			1.2.6.7.8
<i>Imbrina eirrisa</i> (L... 1~5S)	s	s	s			1.2.6.7.8
Sparidae						
<i>Hoops hoops</i> (L.J '58)	s	s				7.8
<i>Diplodus annularis</i> (L. 1 "58)	s	s	s			1.2.7.8
<i>D.sargus</i> (L.J~58)	Sv		Sv			7.8
<i>Pagellus eiyhrinus</i> (L... 1 '58)	Sv		Sv			2.7.8
<i>Puntazzo puntazzo</i> (Gmelin, 1~89)	S		s			7.8
<i>Denle.x denies</i> (L... 1~58)	Sv		Sv			2.7.8
Centracanthidae						
<i>Spicara Jlexuosa</i> Rajinesque, 1811	+	s	+			7.8
Mullidae						
<i>Mulltis barbatus ponticus</i> Pssipov. 192'	fl	+	+	s		1.2.3.4.6.7.8
Pomacentridae						
<i>Chromis chromis</i> (L... 1 58)	+	+	+			1.2.6.7.8

Labridae						
<i>Ctenolabrus rupestris</i> (L., 1 "58)	+	s	+			1.2.6.7.8
<i>Labrus viridis</i> L... 1~58	S	+				1.2.6.7.8
<i>Synpliodns cinerens</i> (Bonnatciic. 1~K8)	+	+	+			1.2.6.7.8
<i>S.occllatus</i> (Forsskal. 1 "5)	+	+	+	+		1.2.6.7.8
<i>S.scinu</i> (i'orsskal, 1~51	+	+				7.8
<i>S.roissali</i> (Risso, 1810)	+	s	s	s		2.6.7.8
<i>S.tinea</i> L., 1758	+	s	+			2.6.7.8
Trachinidae						
<i>Trachinus draco</i> L... 1 "58	+	+	+			1.2.3.4.6.7.8
Uranoscopidae						
<i>Uranoscopus scaber</i> /... /~58	+	+	+			1.2.6.7.8
Blenniidae						
<i>Rlcnnins ocellaris</i> L... 1 '58	Sv		S\			7.8
<i>B.pavo</i> Risso. 1810	S		s			7.8
<i>B.sangiinolentns</i> l'allas. IS1 /	+	+	+			2.7.8
<i>B.sphynx</i> Valenciennes, 1836	+	+	+			2.7.8
<i>B.tentactlaris</i> Britnnich. 1 "68	+	+	+			2.7.8
<i>B.zvonimfi</i> Kolomhalovic, 1893	s	s	s			2.7.8
<i>(oryphoblennius galerila</i> (L., 1~58)	s	s				2.7.8
Tripterygidae						
<i>Tripterygion triplcronottts</i> i Risso Isllii	Sv					7.8

Ophidiidae						
<i>Ophidian rochei</i> Mailer, 1H45	+	+	+			1.2.3.7.8
Ammodvtidae						
<i>Gymnammodyies eicerelus</i> (Rajlnesque, 1810)	Fd	+	+			1.2.0.!.*
Callionymidae						
<i>Callionymus helenus</i> Risso, 1826	+	s	s			1.2.4.6.7.S
<i>C.pusillits</i> Delaroche.1809	S	Sv	Sv			1.2.6.7.8
Scombridae						
<i>Sarda sarda</i> lllloeh, 1~93)	+	Sv	Sv			1.2.3.6.7.8
<i>Scomber scomber</i> 1... 1 '58	M	Sv	Sv			1.2.6.7.8
<i>Sjaponnicus lloulluxn</i> , 1~64	S\	Sv	S\			2.7.8
<i>Thunnus tinnitus</i> 1... 1 '58	S\	Sv	Sv			2.7.8
Gobiidae						
<i>Aphia minuta</i> (Risso, 1810)	+	+	+	+		1.2.6.7.8
<i>Renlhopiloides slellalus</i> (Sauvage, 18")	s	s	s			1.2.6.7.8
<i>B hrauneri</i> liellng el lljin. 192'	s	s	s			6.7.8
<i>(aspiosoma caspium</i> (Kessler, 18")	+	s	+			1.2.6.7.8
<i>(hromogohius ipiadriviltaliisl</i> Steindachner, 1S'O)	Sv	Sv				
<i>Gobius auralus</i> Risso. 1810	Sv		Sv			7.8
<i>G.hucchichi</i> Sleindaehner. 1810	Sv		Sv			2.7.8
<i>G.cobitis</i> Ratios. 1811	+	+	+	+		2.7.8
<i>G.niger</i> 1... 1 '58	+	+	+	+		1.2.6.7.8
<i>G.ophiocephalus</i> Pallas. 1811	+	+	+	+	s	1.2.6.7.8
<i>kniponitschia georghievi</i> Pinchuk, 19"	s	s	s	s		2.7.8
<i>Mcsogobius batrochocephalus</i> Pallas. 18111	+	+	+	+	+	1.2.6.7.8

<i>Xeogohins eephalarges</i> (Pallas. 1811)	+	+	+	+	+	1.2.6.7.8
<i>X.cephalargoides</i> Pincluk. 19~6	S	s	s			7
<i>X./iiviattlis</i> (Pallas. 1811)	M	M	+	+	+	1.2.6.7.8
<i>X.gymnotrachehis</i> (kessler. 185~)	+	+	+	s		2.6.7.8
<i>X.kessleri</i> (Guther, 1861)	s	s	s	s		6.7.8
<i>X.melanostonuts</i> (Pallas. /811)	M	M	+	+	+	6.7.8
<i>X.platyrostris</i> (Pallas. 1811)	s	s	s			6.7.8
<i>X.ratan fXordmaitn.</i> 1840)	+	+	+	+	+	2.6.7.8
\ svrimtit (<i>Xordinaiin.</i> 1840)	s	s	s	s	s	6.7.8
<i>Pomatosshislus caitcasiciis</i> (ka'vrajsk) lierg, 1916	+	+	+	+		1.2.6. 7.8
<i>P.marmoratns</i> (Risso. 1810)	+	+	+	+		6.7.8
<i>P.minutus elongatus</i> (Cattestyini. 1861)	+	+	+			1.2.6.7.8
<i>Prolerorhinus martiioratitsf</i> Pallas. 1811)	+	+	+	s		1.2.6.7.8
<i>Scorpaenidae</i>						
<i>Scorpaena parens</i> L., 1 "58	+	p	+			1.2.6.7.8
<i>S.nolata</i> Rajinesipte, 1810	s	s	s			6.7.8
<i>Triglidae</i>						
<i>Aspitrigla cticulus</i> (L... 1~58)	Sv		Sv			6.7.8
<i>Trigla Interna</i> L... 1 "58	s	s	s			1.2.6.7.8
<i>'ephalacaitthidae</i>						
<i>Cephalacantlms</i> vol Hans L... 1 "58	Sv		Sv			7
Both id ac						
<i>Aiioglossas kessleri</i> Schmidt. 1915	s	s	s			2.6.7.8
<i>Scophthalmidae</i>						
<i>Pselta maeolica</i> (Pallas, 1811)	+	+	+	+		1.2.6.7.8

<i>Scophthalmus rhombus</i> ft... 1~58)	S	s	s			6.7.8
Pleuronectidae						
<i>Platlethys flesus luscus</i> Pallas, 1811)	+	+	+	+	+	1.2.6.7.8
Soleidae						
<i>Solea vulgaris</i> Quensel, 1806	s		s			6.7
<i>S.iasula</i> (Pallas, 1811)	s	s	s			1.2.6.7.8
(iohiesoidea)						
<i>Dipleogaster blmacu/ala euxinica</i> (Murgoci, 1940)	s	Sv	s			2.6.7.8
<i>Lepadogaster cundollei</i> Risso, 1810	s		s			2.6.7.8
<i>L..lepadogaster Lepadogaster</i> (Bonnaterra, 1~88)	s		s			2.6.7.8
<i>L.ophidae</i>						
<i>L.ophites piseatorius</i> L... 1~58	S\	Sv	Sv			2.6.7.8

Legend

M - mass

S - rare

Sv - disappearing

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Table 11. Characteristics of the main Marine Wetlands of Ukraine

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs)	Season accumulations of birds (max, individuals) 3	Proposed category 4
32 800	A river delta	II - Ph.a., T.h., T.l., Car.a., Car.p., Car.acu. III - Ph.a., Ta., T.l., P.p., P.per., Tr.n., N.I. N.a., S.l. J.C., AT. IV - L.m., L.g., Il.p., P.d. V - A.s., A.g., A.p., El.r., Il.m.	C.o.(60). A.a.(150). A.p.(220), F.a.(350). I.e.(200-3000). S.h.(2200)	C.o.(500). A.a.(1 400). P.o.(2 100). P.c.(7 000). p.p.d зон). A.p.(23 000). A.q.(6 000)	i
10 000	II Hood-land marsh in the river delta	II - Ph.a., Ta., IT, Car.a., Carp., Car.acu. III - Ph.a., T.a., T.l., P.p., P.per., Tr.n., N.I. N.a., S.l. A c A.f. IV - L.m., L.g., Il.p., P.d. V - A.s., A.g., A.p., l-l.r., Il.m.	Co.(250). A.l'(1 800). N.r.(400), F.a.(3 000). P.crs.(1 200). Pl.(350). E.a.(400)	Pepsi 1 500). C.o.(2 000). A.p.(20 000)	i
21 000	A reservoir in the place of a half-closed estuary	III - Ph.a., Q.m., P.p., P.per.	P.ers.(130). S.h.(4 500). F. a.(500). A.f.(170), L.c.(250), G. p.(60)	P.O.(2 000). Co.(6 000). A.alb.(20 000). Jl.p.(15 000). A.f.(18 000). A.ful.(12 000). M.a.(3 000). l л.(14 000),	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category 4
				L.c.(4 000)	
19 000	Half-closed estuaries of small rivers	III - Z.m.. R.m.. P.p.. Ph.a.. B.m. IV - S.c.. S.p.. S.s.. L.g.. L.s.. Art.s.	I.e.(2 800). S.a.(25). G. p.(60), H. h.(40), V.v.(110). Ca.(30)	A.a.(700), A.alb.(13 000). A.p.(25 000). R.a.(1 300). C.alp.(5 500). L.c.(18 000)	i
27 600	A river delta with channels and Hood-land lakes: an estuary of half-closed type	II - T.p.. C'aiw.. tar.a.. Ph.a.. T.k. Γ.a. III - Ph.a.. T.k. Γ.a.. I r n . N.I.. N.a.m N.p.. S.n. VII - C.a.. (... B.I.. P.a.. A.pec.	N.n.(2 500). E. a.(350), P.c.(2 000). F. a.(2 700). A.p.(200). A.a.(130). P.I.O 300). P.crs.(300). Co.(60). L.r.(60)-120)	A.p.(4 000). F.a.(5 000). C.o.(140-160). A.a.(200). N.n.(3 000). Jl.c.(25 000). L.r.(5 000). A.q.(1 500)	i
11 000	An estuary of half-closed type	III - Z.m.. R.m. P.p.. Cel. IV - P.S.. L.s., L.g.m.. K.p.. S.c.. S.p.. S.s. VI - B.m.. P.cL Art.s.. A.I.	S.h.(3 500). T.t.(400). F.a.(430), P.crs.(250), IM" (200). S.a.(120)	A.p.(15 000). A.f.(5 000). F.a.(7 000). F.a.(900). A.alb.(8 000). L.r.(17 000). L.m.(7 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) ^	Proposed category 4
				L.e.(5 000). P.crs.(1 200)	
26 000	A river delta	II - I l . l . . Ph.a.. Car.acu.. Car.o. III - Tr.n.. N.p.. P.nat.. P.n.. S.n. VII - A.d.. Asp.e.. l .a.. C.n.. Th.b.	P.c.(4 500). A.cin.(1 800). N.n.(450). E.a.(350-700). F.a.(500-900). P.crs. (200-400)	P.c.(10 000). F.a.(90 000). A.p.(30 000). A.ful.(5 000). A.f.(6 000). M.s.(300)	i
34 000	A sea ha\	III - R.m.. /,p.. C.d.. N.m.. P.p.. Ph.a.. T.lax.. S.l. IV - S.e.. Arts.. S.p.. Пл.. l . - VII - l . - . S.c. Cb.. Ce.	S.m.(700). L.c.(4 000). S.h.(1 500). P.c(270)	P.c.(15 000). F.a.(50 000). Co.(10 000). A.p.(80 000). F.g.(40 000). A.m.(50 000). P.pug.(6 000). C.alp.(5 000)	i
38 000	A sea bay	II - Ph.a.. S.l.. S.t. III - Z.m., R.m.. C.d.. N.m.. P.p.. P.per. IV - S.c. S.p.. Art.s.. Пп.. II \ VII - L.sab.. Cp.. Ir.t.. Arg.s.. S.s.. Cт.. Ce.	L.m.(5 250 -33 600). L.g.(6 800 -37 450). T.s.(8 300 -28 800). F.a.(120), P.crs.(150). R.a.(250)	l'a.(400 000). C.o.(11 000). A.p.(100 000). A.f.(60 000). A.m.(25 000-40 000). A.alb.(15 000-40 000). A.a.(400-2 000). P.pug.(10 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category
				A.cin.(5 000). E.g.(76 000)	
87 000	Sea bays	III - Z.m.. Re., /..p.. C.d.. N.m.. P.p. IV - S.c. S.p.. L.g.. I in.. P.d. VII - I.sab.. Cp.. Ce.. Art.sco.. Art.p.. P.Im.	L.c.(K 000). L.m.(6 000 -17 000). L.g.(300). S.h.d 000). S.a.(150). G.n.(40). T.s.(5 000). A.cin.(1 200). Il.c(200-570). I.a.(200-700). E.g. (500-970). P.c(1 400 -2 400). M.s.(90). T. tad. (70)	P.c(2 500). E.a.(37 500). A.p.(17 000-43 000). A.pen.d 500). A.l.(7 900). A.m.(700). I.lad.dOO). C.c.(900). I ,c.(6 000). L.i.(300). L.r.&L.m.(25000). E.g.(400). E.a.(800)	i
9 600	A sea. rocky coast		P.a.(500). Cl i \.(120). ().o.(70). A.aps.(200). A.mel.(IO)	A.m.-numerous A.fill.-n umerous A.p.-ordinary A.f.-ordinary (i. a.-ordinary P. crs.-scanty P.n.-scanty	n
80 000	A salt lake with distilled bays and \cry intended coastal line, with a ureal	I - Ph.a.. T.lax.. S.I.. St. III - / ni.. / ï . R.m. IV - U.S.. S.s.. C T . . Пл.. II.p.. S.c. L.g.. L.s.	L.c.(3 800). L.i.(245). L.m.(2 000). L.g.(1 300). d.n.(2(00). S.h.(300).	L.mel.&L.r.& L.m.&L.g.(8 000). C.n.&C.I.(2 000). V.v.&P.lob.&	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category 4
	number of saline drops	V - Lm Lg Art p P.d Bin Tin T.b. VII L.sab.. Arg.s.. Ce.. Arte.	P.c.(550). A.cin.(20)	C.sp.(3 000). Co.(500). G.g.(100-300). 1 tad.(500). A.cin.&E.a.& E.g.(300)	
165 000	A sail lake with distilled bays and very intended coastal line, with a great number of saline drops	I - Pl.a.. T.lax.. ST. St. III - / in . / п.. R.m. IV - II.s.. S.s.. C T.. II.v.. II.p.. S.e.. L.g. L.s. V - .I in., .I.g.. Art.p.. P.d. Km.. I in T.b. VII - I.sab.. Arg.s.. Co.. Arte.	L.c.(11 600). L.i.(360). L.g.(850). L.mel.(450). II.e.(470). S.h.(2 800). S.a.(360). G.n.(1 15). T.s.(4700). P.c.(7 860). A.cm.(800). P. I.(500). E. a.(500). L.g.(500). A.pur.(200). N.n.(200). Co.(80). F. a.(500). II.h.(600-800). R.a.(600). I.I.(500) .Anas spp. & Aythya spp.(700)	P.pug.(43 500). Calp.(127 600). Cm.(26 700). T.t.(11 800). A.alb.(200 000). A.p.(65 000). I lad.(12 000). A.pen.(65 000). A.acu.(35 000) I.r.(12 500)	i
26 000	An Azov Sea bal of estuary type	III - /r.: . /p.. k.e. IV - S.e.. S.s.. L.g. VII - L.sab.. Co.. Art.p.. Car.a.	L. c.(60). S.h.(100). T.t.(200),	A.a.(200-3 000). A.p.(9 000-14 000).	n

Area of wetland (ha)	Type of wetland	Mass species of plants	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category ⁴
22 400	An estuary at the mouth of Molochnava river	Elm., .l.g.. J.m. III - Z.m.. /.p.. Re. IV - S.c.. S.s.. E.g. VII - E.sab.. C.e.. Art.p.. Car.c. El.m.. .l.e.. J.m.	R.a.(60). j H.h.(20). A.cin.(20). A.pur.(15) A.ein.(800). A.alb.(250). P.crs.(250). A.p.(50). G.h.(300). L.c.(5500). P.c.(3000). V.v.(80). R.a.(50-250)	C.o.(16000). A.alb.(22 000). A.m.(3 000). F.a.(18 000). L.c.(7 000). Anas spp.-ordinarv P.c.-ordinary A.ein.-ordinary E.a.-ordinary <u>(.sp.-ordinary)</u> A.alb.(25 000-40 000). A.p.(25 000-30 000). A.m.(80 000-100 000). L.c.(5 000-10 000). Kr.(5 000-15 000). Fa.(15 000-ro 000). C.o.(2 000-5 000). J.a.(K) 000-12 000). P.crs.(5 000-	

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) ^	Season accumulations of birds (max, individuals) 3	Proposed category
				12 000). M.a.(5 000-12 000). P.n.(5 000-10 000)	
20 000	A bay in the Azov Sea	II - Ph.a., B.in., S.l., S.s. IV - S.e., L.m., S.m. V - Il.vul., Ce., P.a., I.g., P.g. VII - E.m., L.r., L.t., Arg.s., S.s. E.s., I.d., Car.c.	P.c.O 330). L.c.(230). E.a.(120). T.I.(26-100)	A.m.(6 000). A.p.(7 000). A.alb.(5 000)	i
1 800	A bay in the Azov Sea and delta of small river	I - Ph.a., T.lax., S.l., S.t. III - /..m., C.d., P.p., N.m. IV - Arts., L.m., Пп., II v P.d.P.c VII - L.sab., E.m., Cp., (i.e., (i.g., C., Arg.s., Car.c., G.p.	T.s.(800). P.c(1 200). S.h.(600). E.a.(70). E.g.(40)	A.p.&A.n.& Л.ИИ.&ЛГ.& A.alb.&...(40 000)	i
2 000	A bay in the Azov Sea	I - Ph.a., T.lax., S.l., S.t. III - Air... C.d., P.p., N.m. IV - Arts., L.m., Пп., II v P.d.P.c VII - L.sab., L.m., Cp., (i.e., (i.g., C c , Arg.s., Car.c., G.p.	S.h.(700-2 000). T.s.(500-1 000). S.a.(100). T.t.(50). H.h.(25)	L.r.&L.c.& P.pug.&C.l.& C.n.&...(1 000)	i
1 400	A bay in the Azov Sea	I - Ph.a., T.lax., S.l., S.t. III - /..m., C.d., P.p., N.m. IV - Art.s., L.m., Пп., Пп., P.d.P.c VII - L.sab., E.m., Cp., G.c., G.g.,	S.h.(12 000). T.s.(5 000). L.r.(200). I.t.-numerous. K.a.-numerous.	L.r.(5 000-10 000). L.c.(5 000). L.m.(7 000). S.h.(5 000).	i

Area of wetland (ha)	Type of wetland	Mass species of plants 2	Main species of breeding birds (max, pairs) 3	Season accumulations of birds (max, individuals) 3	Proposed category 4
		C.e.. Arg.s.. Car.c (i.p.	Il.h.-numerous,	C.n.(2 500). C.l.(1 000). C.sp.dcw thous.)	

* name of wetland sec legend Fig. 18

- I (Grass-marshy complex). II (Marshy complex). III (Water complex). IV (Galophytes complex). V (Meadow complex). VI (Meadow-galophyte complex). VII (Psammophytes complex):

A.c. - *Azolla caroliniana*; A.d. - *Agropyron dosyanthum*; A.f. - *Azolla fdciculoides*; A.g. - *Agrostis gigantea*; A.l. - *Aeluropus Httoralis*; A.p. - *Alopecurus pratensis*; A.pec. - *Agropyron pectinatus*; A.s. - *Agrostis stolonifera*; Arg.s. - *Argusio sibirico*; Arl.c. - *Artemisia comprestis*; Art.p. - *I pontiaca*; Art.s. - *A. santoniaca*; Art.sco. - *A scorparia*; Asp.c. - *Asperylla cynanchica*; B.m. - *Bolboschoenus maritimus*; B.t. - *Bromopsis imermis*; C.a. - *Centaurea arenaria*; C.b. - *C. borystenica*; C.d. - *Ceratophyllum demersum*; C.e. - *Calamagrostis epigeios*; C.m. - *Camphorosma monspliaca*; C.n. - *Cerastium nerainicum*; C.p. - *Crampe pontica*; Car.a. - *Cares acutiformes*; Car.acu. - *C. acuta*; Car.c. - *C colchica*; Car.o. - *C omskiniana*; Car.p. - *C pseudocyperus*; Car.v. - *C. vesicoria*; B.a. - *Euphorbia agraria*; E.d. - *Ephedra distachia*; E.m. - *Eryngium maritimum*; E.s. - *Euphorbia seguierana*; El.r. - *Elytrygia repens*; El.m. - *E. moeotica*; E.v. - *Festuca valesiaca*; G.c. - *Glycyrrhiza cehinata*; G.g. - *G. glabra*; G.p. - *Gypsophila paniculata*; G.t. - *G. tasligiata*; H.p. - *Halimione pedunculata*; Il.s. - *Ilalocncmum strobilaceum*; Пл. - *Holimione verrucifera*; H.vul. - *Holschenus vulgare*; J.g. - *Juncus gerardii*; J.m. - *J. maritimus*; K.p. - *Kochia prostrata*; E.g. - *Limonium gmelinii*; E.m. - *Limonium ineveri*; l.s. - *Leymus racemosus*; L.s. - *Limonium suffriticosum*; L.sab. - *Leymus sahulosus*; L.t. - *Lactuca tatarica*; N.a. - *Nymphae alba*; N.I. - *Nyphar lutea*; N.m. - *Najas marina*; N.p. - *Nymphoides peltata*; F.a. - *Poa angttstfolia*; P.c. - *Plantago cornuti*; P.d. - *Puccinellia distans*; P.g. - *P. gigantea*; P.n. - *Potamogeton nodosus*; P.p. - *P. pectinatus*; P.S. - *Plantago salsa*; Ph.a. - *Phragmites australis*; P.nat. - *Potamogeton nutans*; P.per. - *P. perfoliatus*; R.e. - *Ruppia eirrhosa*; R.m. - *Ruppia maritima*; S.c. - *Syrenia cona*; S.c. - *Salicornia europaea*; S.l. - *Scirpus lacustris*; Sin. - *Suaeda maritima*; S.n. - *Salvinia natans*; S.p. - *Suaeda prostrata*; S.s. - *Salsola soda*; S.t. - *Scirpus tabernaemontanii*; Г.а. - *Typka angustifolia*; T.b. - *Triglochium hessarabicum*; T.I. -

Typha latifolia; T.lax. - *T. laxmanii*: L.m. - *Triglochin maritimum*; T.p. - *Theleperis palustris*: Th.b. - *Thymus borysthenicus*; Tr.n. - *Trapa natans*; L.m. - *Zostera marina*: Z.n. - *Z. noetii*: Z.p. - *Zannichellia palustris*.

3 — A.a. - *Anser anser*; A.acu. - *A. acuta*: A.alb. - *Anser albifrons*: A.aps. - *A. alp.*; A.c. - *A. crecca*: A.cin. - *Ardea cinerea*: A.f. - *Aythya ferina*; A.ful. - *Aythya fuligula*: A.m. - *Aythya mania*: A.mel. - *A. melba*: A.n. - *Aythya nyroca*; A.p. - *A. platyrhynchos*: A.pen. - *A. penelope*: A.pur. - *Ardea purpurea*: A.q. - *Ardea querquedula*: C.a. - *Cladradrius alexandrinus*: ("alp. - *Calidris alpina*: C.c. - *Cygnus cygnus*: C.I. - *Chlidonias leucoptera*: C.liv. - *Columba livia*: C.m. - *Calidris minuta*: C.n. - *Chlidonias nigra*: C.o. - *Cygnus olor*: C.sp. - *Calidris spp.*: E.a. - *Egretta alba*: E.g. - *Egretta garzetta*: E.a. - *Eulica atra*: G.a. - *Gavia arctica*: G.C. - *Gallinula chloropus*: (i.g. - *G. sibilatrix*: G.n. - *Gelochelidon nilotica*: G.p. - *G/areola pratincola*: H.e. - *Hydroprogne caspia*: H.h. - *Himantopus himantopus*: L.c. - *Larus cachinnans*: E.g. - *L. argentatus*: L.i. - *Larus ichthyophaga*: L.m. - *Larus argentatus*: L.mel. - *Larus melanocephalus*: L.r. - *Larus ridibundus*: M.a. - *Mergus albellus*: M.S. - *Mergus serrator*: N.n. - *Sycticorax nycticorax*: N.r. - *Oenanthe oenanthe*: O.o. - *Oenanthe oenanthe*: P.a. - *Phalacrocorax aristotelis*: P.e. - *Phalacrocorax carbo*: Peps. - *Pelecanus crispus*: P.ers. - *Podiceps cristatus*: P.Г. - *Podiceps falcinellus*: P.I. - *Plalalea leucorodia*: P.lob. - *Phalaropus lobatus*: P.n. - *Podiceps nigricollis*: P.O. - *Pelecanus onocrotalus*: P.p. - *Phalacrocorax pygmaeus*: P.pug. - *Philomachus pugnax*: R.a. - *Recurvirostra avosetta*: S.a. - *Sterna albifrons*: S.h. - *Sterna hirsuta*: S.m. - *Somateria mollissima*: T.s. - *Ithalasseus sandvicensis*: T.t. - *Tringa totanus*: T.tad. - *Tadorna tadorna*: V.v. - *Vanellus vanellus*.

4 i - international: n - national.

Table 12. List of Species of Flora and Fauna Entered in the Red Data Book of Ukraine and Protected on Reserve Territories

Species	Reserves	
	DP*	CB**
PLANTS		
<i>Chara tenuissima</i>	-	+
<i>Th'ula horvsthnica</i> Kink.	-	f
<i>C'ctitaurca hrcviceps</i> Il'ui	+	+
<i>Leiticojuuii aelivuin</i> I.	-	+
<i>Tulipa schrenkii</i> Regcl.	-	i
<i>Pulsatilla nigricians</i> Slorck	-	+
<i>Ornitliogatlutii amp/ii/olium</i> Y.ahar	-	4
<i>Stipa horvsthwnica</i> Klok.	-	+
<i>S. capi</i> I lata/..	-	+
<i>Chrysopogon grvllus</i> (L.) Trin.	-	+
<i>Aslrodaucus littoralis</i> (Bieh.) Drude	-	+
<i>Orchis picta</i> Loiscl	-	
<i>O.coriophora</i> /..	-	+
<i>O.morio</i> L.	-	+
<i>O.nerviilosa</i> Sacalo	-	+
<i>O.fragrans</i> Pollini	-	
<i>()palustris</i> Jacg.	f	+

<i>O.laxifora Lam.</i>	-	
<i>Allium scythicum /oz.</i>		
<i>Trapa natans</i>	+	-
<i>Nymphoides peltata</i>	+	-
<i>Salvinia natans</i>	<	-
ANIMALS		
Crustacea		
<i>/ pogehia pusilia Pelagna. 1 '92</i>	-	
<i>Pachygrapsus marmaralus Labrieius, 1~93</i>	-	+
<i>(arcinus aesluarii Sarda. IS4~</i>	-	
Insecta		
<i>P.mpusa fasciuta Bridle. IS36</i>	-	+
<i>E.pennieornia 1 Pallas. 1~S6)</i>	-	.
<i>Bradyporus multilurbereulala 1 Piseher-ITaldbeim. IS33)</i>	-	+
<i>Saga peda 1 Pallas. 1 '86,</i>	-	t
<i>Galosoma sveophanla 1 Linnaeus. 1 '58)</i>	-	+
<i>Lueanus cervus Linnaeus. 1 '58</i>	-	
<i>Seolia maeulala Drum. 1~~3</i>	-	+
<i>Salanas gigas pversmann. IS55</i>	+	+
<i>Pudia pavonia 1 Linnaeus). 1 '58</i>	-	+
<i>p.spini (Denis el Schujjermuller. 1 "5)</i>	-	+
<i>Aglia lau (Linnaeus). 1 '58</i>	-	f
<i>Prosperpinus prosperpina (Pallas), 1 "2</i>	-	f
<i>Gallimorpha quadripunctata (Poda. 1'64)</i>	-	+

<i>Limnitis populi</i> (Linnaeus. 1758)	-	+
<i>Astitoides spongia</i> Linne. 1766	-	
<i>Papilio maclurei</i> (Linnaeus. 1758)	+	+
<i>Ipchilides podaltritis</i> (Linnaeus. 1758)	+	
<i>Zerynthia polixena</i> (Denis. Schiffenmuller. 1755)	-	+
<i>Zegris cuplieme</i> (L. sper, 1805)	-	+
<i>Acherontia atropos</i> (Linnaeus. 1758)	+	+
<i>Anax imperator</i> Leach. 1815	-	+
<i>Ordulegaster annulatus annulatus</i> (Latreille. 1805)	-	+
<i>Iris polydictica</i> (L. Scier-ll'aldteini, 1833)	-	
<i>Hipparchia salicinus</i> (Hufnagel, 1766)	-	+
<i>Xylocopa valga</i> (L. Staecker. 1820)	-	+
<i>Osinodiina eremita</i>	+	-
<i>Leogopis scoticornis</i>		-
<i>Hoinhus laesus</i>	+	-
<i>Alloperix splendens taurica</i> (Selvs. 1853)	-	+
<i>C. virgo</i> (Linnaeus. 1758)	-	+
<i>C. eralophylus polyceros</i> (Pallas. 1771)	-	+
<i>Leucomigus candidulus</i> (Pallas. 1771)	-	+
<i>Utetheisapidchella</i> (Linnaeus, 1758)	-	+
Mollusca		
<i>Osireia edidis</i> Linneus. 1758	-	
Pisces		
<i>Huso huso pouticus</i> Salnicov, 1934	+	+
<i>Salmo initio labrax</i> Pallas, 1814	+	+

<i>Hippocampus guttulatus microstephanus</i> Salastenenko, 193'	-	+
<i>Xlorone labrax</i> (Linnaeus, 1758)	-	+
<i>Trigla lucerna</i> Linnaeus, 1~58	+	+
<i>Lophius piscatorius</i> Linnaeus, 1~58	-	+
<i>Acipenser nudiventris</i> Lovetzky, 1828	+	+
<i>Acipenser sturio</i>	t	-
<i>A.ruthenus</i>		-
<i>llueho hueho</i>	+	-
<i>Umbra krameri</i>	+	-
<i>Rutilus frisii</i>	+	-
<i>(iobto uranoseopus</i>	+	-
<i>Zingel zingel</i>	+	-
<i>Z. streher</i>	+	-
<i>Cymnocephalus schraetser</i>	!	-
<i>Neogobius cephalarges</i>	+	-
Reptilia		
<i>hdaplie quatuorlineata</i> , (Ratios, 1814)	-	+
<i>(jo/ither jaularis</i> , Gmelin, 1 "89	-	+
<i>Coronella austriaco</i> , haurentl, 1768	-	+
<i>Vipera ursini</i> , Christoph, 1861	-	+
Aves		
<i>Pelecanus onocrotalus</i> , Linnaeus, 1 D8	+	+
<i>P. crispus</i> . Bruch, 1832	+	+
<i>Ardeola ralloides</i> (Scopoli, 1~69)	+	+
<i>Plalalea leucorodia</i> , Linnaeus, 1 "58	+	+

<i>Plegadis falcinellus</i> (Linnaeus. 1 ~66)	+	+
<i>Ciconia nigra</i> (Linnaeus. 1~58)	+	+
<i>Rujihrenta ruficollis</i> (Pallas. 1~69)		+
<i>Cygnus bewickii</i> . Yarrel. 185(1)	+	+
<i>Tadorna ferruginea</i> (Pallas. 1~46)	+	+
<i>Anthya nyroca</i> (Culdenstadl. 1"0)	+	+
<i>Bucepliala clangula</i> (Linnaeus. 1 ~58)	+	+
<i>Soniatertia mollissiina</i> (Linnaeus. 1 ~58)	+	+
<i>Mergus serrator</i> . Linnaeus. 1 '58	+	+
<i>Pandion haliaetus</i> (Linnaeus. 1 ~58)	+	+
<i>Circus cvaneus</i> (Linnaeus. 1"66)	1	+
<i>Cinacrourus</i> (S.C.Celin. 1~1)	+	+
<i>Buteo rufinus</i> (Cretrsckmar, 182')	-	+
<i>Circaetus gallicus</i> (Gmelin, 1~88)	-	+
<i>Hieraaetus pennants</i> (Gmelin. 1 "88)		
<i>Aquila zapax</i> (Pemmunek. 1828)	-	+
<i>A.clanga</i> . Pallas. 1811	+	+
<i>A.pomarina</i> C I. lire/on. 1831	+	+
<i>A.heliaea</i> . Savigny: 1809	+	+
<i>A. ebrvsaelos</i> . (Linnaeus. 1~58)	+	+
<i>Ilaliaeetus alhicilla</i> (Linnaeus, 1 '58)	+	+
<i>Gypsulvus</i> (Hablizl, 183)	-	.
<i>Laleo cherrug</i> . Grow 1834	+	
<i>F.peregrinus</i> , Punsllal. 1~1	+	+
<i>F.naumanni</i> . Pluseker, 1818	+	1

<i>Grus grisea</i> , (Linnaeus, 1~58)	+	+
<i>Anthropoides virgo</i> . Linnaeus, 1 "58	+	+
<i>Otis tarda</i> , Linnaeus, 1~58	4	+
<i>O.tetra.x</i> (Linnaeus, 1~58)	+	+
<i>Burhinus oedipoda</i> (Linnaeus, 1~58)	+	+
(<i>haradridus alexandrinus</i> . Linnaeus, 1 "5^	•	4
<i>Himantopus himantopus</i> . (Linnaeus, 1758)	+	+
<i>Ilaeobes oestrupus</i> , Linnaeus. 1~58	+	4
<i>Lringa stagnatilis</i> (Bechstein. 1803)	i	+
<i>Xtimenius tenuirostris</i> . Vieill. 181"	+	4
<i>Xarquata</i> , (Linnaeus. 1~58)	+	+
<i>Xphaeopus</i> . (Linnaeus. 1~58)	+	4
(<i>ilareola pratensis</i> . 1 Linnaeus, 1~66)	+	1
<i>G.nordmanni</i> , Xordinann. 1842	+	4
<i>Iarus icltt/vaetus</i> . / <i>alius</i> , 1~3	+	+
<i>Iydroprogne caspia</i> , (Pallas, 1""0)	+	+
<i>Bubo huho</i> , (Linnaeus, 1~58)	•	+
<i>Tyto a/ha</i> (Scopoli, 1 "69)	-	+
<i>Lanius excubitor</i> . Linnaeus, 1 "58	+	+
<i>L.senator</i> . Linnaeus, 1 "58	+	+
<i>Monticola saxatilis</i> , (Linnaeus, 1766)	-	+
<i>Emberiza melanocephala</i> , Scopoli, 1~69	-	+
<i>Stirnis roseus</i> . (Linnaeus. 1~58)	-	+
<i>Acrocephalus paludicola</i> , (1 "teillot. 181")	+	+
<i>Regulus ignicapillus</i> (Temminck, 1820)	+	+

<i>Phalacrocorax /ngmae</i> (Pallas. 1"3)	+	-
<i>P.arestotelis</i> (Linnaeus. 1~61)	+	-
<i>Oxynra lencocephala</i>	+	-
<i>Mihtts milviis</i>	+	-
<i>Strix nralensis</i>	+	-
<i>Pastor rosens</i>	+	-
Mammalia		
<i>Mvctaltts leisleri</i> . Kulil, 1818	-	4
<i>Sieista snblilis</i> . Pallas. 1~33	-	+
<i>Allactaga jaculus</i> , Pallas. 1 "8	-	+
<i>Seirtopoda telinn fah-jcini</i> . Lichtenstein. 1823	-	4
<i>Spalax arenarius</i> . Reshetnik, 1939	-	4
<i>Muslella erminea</i> . Linnaeus, 1~58	-	+
<i>M.lulreola</i> . Linnaeus, 1"61	-	+
<i>l.tttra Intra</i> . Linnaeus. 1~58	-	.
<i>Meles meles</i> , Linnaeus. 1~58	-	+
<i>Lurstops o uueatus ponticus</i> . Harahascl. 194(1	-	4
<i>Phoeoena phoeoena relicta</i> Abel. 1905	-	4
<i>Delphinus deiptis pottlieus</i> Barahash-Sikiforv. 1935	-	4
<i>Mottachus inonaeltus</i> . Hermann. 1~"9		-

Note: D1'* - Dunaiskie Plavni Reserve

CB** - Chernomorsk) Biosphere Reserve

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For millennia, the waters of the Black Sea have supported a rich and diverse marine life. However, in recent decades the Black Sea has come under severe threat due to the combined impacts of eutrophication, anoxia, and chemical, biological and bacterial pollution. The various anthropogenic impacts are causing significant changes in the distribution and community composition of marine and coastal species. The Black Sea Environmental Programme has sponsored a series of detailed national assessment reports examining the scientific evidence for changes in the coastal and marine biological diversity of each Black Sea country. The main objective of present report is to give a systematic overview of the biodiversity of the Ukrainian waters of the Black and Azov Seas which will then serve as a scientific basis for the preparation of national and regional strategies for the conservation, and sustainable use of the natural ecosystems of the sea and coastal water bodies.



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