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A. Jiyenbekov[1], A. Bigaliev[1], S. Nurashov[2], E. Sametova[2]

[1]Al-Farabi Kazakh National University, Almaty, Kazakhstan,
[2]«Institute of Botany and phytointroduction», Almaty, Kazakhstan.
E-mail: zh-ai-bek@mail.ru; aitkhazha@gmail.ru;nurashs@mail.ru;elyasam@mail.ru

BIODIVERSITY OF DIATOMS ALGAE OF ALAKOL LAKE AND ITS SYSTEMATICS

Abstract. In Kazakhstan, there are many specially protected natural territories: nurseries, national parks, reserves, sanctuaries, wildlife areas, natural monuments, botanical gardens established for the preservation of biological diversity of the state. In many of those areas, the scientists-florists conducted scientific research related to the inventory of vascular plants. Despite the substantial interest for the study of flora, the research into their diversity in various natural communities is insufficient, especially the flora of water reservoirs. The algae of water reservoirs remain studied to a small extent.Nevertheless recently we have conducted the study of algae flora in the specially protected natural territories of various regions of Kazakhstan. In the article, the authors provide research data's for the first timeinvestigate of the algal flora of Alakol lake, which flows through 15 rivers (the Urzhar, the Katynsu, the Emelkuisa, the Yrgaity, the Zhamanty, the Zhamanotkel, the Tastu etc.). The found seaweeds were divided into: 1-systematic division, 3-classes, 13-orders, 23-families, 103-species and species belonging to 41-genures. Biodiversity of specially established types of seaweed has developed and modern taxonomy has been created. In the studied lake of the algae are found cosmopolitan species in different areas [2-5]. Most of the species listed here are of the plankton bacterial species and some species are of benthos.

Key words: algae, plankton, benthos, systematics, lake Alakol.

Introduction. TheLake Alakol is a saline drainage lake located on the Balkhash-Alakol lowland, which is located on the border of the Almaty and East Kazakhstan regions, in the eastern part of the Balkhash-Alakol Basin.More than 15 tributaries flow into the lake, of which the main are the rivers Urzhar, Katynsu, Emelkysa, Ygrajty, Zhamanty, Zhamanotkel, Tasty.The area of the lake (with islands) is 2696 square kilometers. The volume of water is 58.56 cubic km. Length-104 km. Width-52 km. Average depth-22 m. The greatest depth is 54 m.The length of the coastline is 348 km.

Together with the lakes Sasykkol, Uyaly, Zhalanashkol and others, smaller, they form the Alakol lake system.In the center of Alakol, there are islands: Ulken, Kishkeni Araltobe, Belkuduk, etc. The climate of the coast is sharply continental. A complex wind regime is observed above the lake. The maximum wind speed over the northern parts of the lake reaches 40-50 m/s, over the southeastern and central 50-60 m/s. The most active winds in the autumn-winter period, when the wave height can be up to 2-2,5 m.

The duration of freeze-up is about 2 months (February-March). The largest thickness of ice is 0.8 m (in February). Melting ice-April-early May. The water temperature reaches +7+ 15^0C in late May. Mineralization of water in the water varies from 1.2 to 11.6 g/l. The composition of water is chloride-sodium and chloride-sulfate-sodium. In the waters of the Lake Alakol, the high content of fluorine and bromine. In 1994, the Parliament of Kazakhstan ratified the Convention on Biological Diversity, thus affirming its desire to preserve the unique richness of nature. A real step towards the implementation of these documents was the creation in 1998 of the Alakol State Reserve.

Material and methods

The material of this article is selected 2016-2017. During the summer expedition time, a species was collected from different points of the Alakol lake. Along the collection of algae, meteorological conditions of the water, air and water temperature were determined. The water depth is determined by the Sekki disk, water ph- universal indicator paper. The water temperature showed the sample at 22°C, and the water was Ph-7.5.In the course of the work, commonly known classical methods of hydrobotanics and algae were used. To determine phytoplankton samples is a specific examination by M. Gollerbach and B. N. Polyansky, also by the method of N. P. Masiuk and others use Apshtain netting with diameter 45 cm is filtered by plankton grid number 76 [1, 2]. The collected material was fixed there in 4% solution of formalin and 96% etanol. During harvesting, the algae type, color, colony, etc. p. signs are logged. 26 algae samples from plankton, periphyton, and benthos were collected from the lake. Diatomic algae preparations are investigated by heating. Formalin-treated material is coated with glass and heated in the electric cooker. Final preparations are used to identify the types of algae diatoms. Organic cleaning of algae piglets is carried out by firing in strong acids [6-13].

In the identification of species, light microscope MBI-3 and binoculars were produced using a computer program with the binoculars Motic BA 400 microscope, and the size of the cells was obtained by using an ocular micrometer.

Results and discussion

As a result of processing algae samples collected from Lake Alakol, analysis of algae obtained from the lake was investigated and modern systematic groups were identified.They are as follows:

1-division (*Baccillariophyta*), 3-klass (*Baccillariophyceae, Coscinodiscophyceae, Mediophyceae*), 13-order (*Thalassiophysales, Aulacoseirales, Naviculales, Cymbellales, Cocconeidales, Stephanodiscales, Licmophorales, Tabellariales, Surirellales, Fragilariales, Rhopalodiales, Bacillariales, Mastogloiales*), 23- family (*Catenulaceae, Aulacoseiraceae, Cymbellaceae, Naviculaceae, Cocconeidaceae, Stephanodiscaceae, Ulnariaceae, Tabellariaceae, Gomphonemataceae, Entomoneidaceae, Rhopalodiaceae, Fragilariaceae, Amphipleuraceae, Bacillariaceae, Mastogloiaceae, Neidiaceae, Pinnulariaceae, Pleurosigmataceae, Achnanthidiaceae, Achnanthaceae, Surirellaceae, Stauroneidaceae, Rhoicospheniaceae*), 41-genius (*Amphora, Aulacoseira, Brebissonia, Caloneis, Cocconeis, Cyclotella, Cymbella, Cymbopleura, Craticula, Ctenophora, Diatoma, Encyonema, Entomoneis, Epithemia, Fragilaria, Frustulia, Gomphonema, Hannaea, Halamphora, Gyrosigma, Hantzschia, Mastogloia, Navicula, Neidiomorpha, Neidium, Nitzschia, Odontidium, Pinnularia, Pleurosigma, Planothidium, Platessa, Placoneis, Rhoicosphenia, Rhopalodia, Staurosira, Ulnaria, Surirella, Synedra, Tabularia, Tryblionella, Stauroneis*)the species belong to interdisciplinary forms with the following, 103 - species [13-20].

Type of the Alakol lake algae

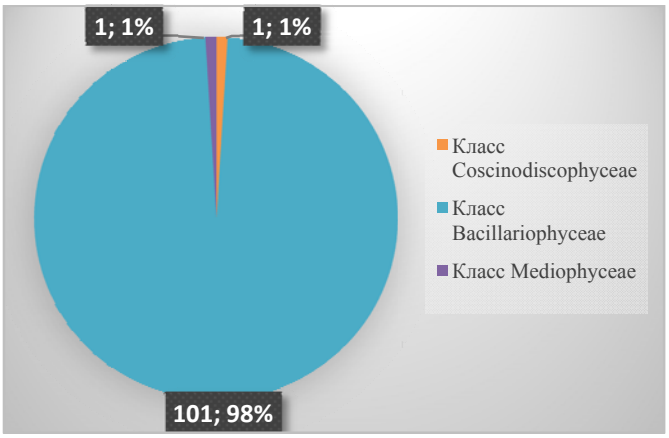
№	Name of species	№	Name of species
1	*Amphora. eximia* J.R.C.	13	*Cym. cistula* (Ehr.) O.Kir.
2	*Am. ovalis* (Kütz) Kütz.	14	*Cym. cymbiformis* C.Ag.
3	*Am. lineolata* Ehr.	15	*Cym. affinis* Kütz.
4	*Am.ambigua* (Grun.) Sim.	16	*Cym. affinis* var. *neoprocera* W.Silva.
5	*Brebissonia lanceolata* (C.Ag.) R.	17	*Cym. helvetica* Kütz.
6	*Caloneis latiuscula* (Kütz.) Cl.	18	*Cymbopleura inaequalis* (Ehr.) Kr.
7	*Cal. westii* (W.Sm.) Hen.	19	*Craticulaambigua* (Ehr.) D.G.Mann in Round.
8	*Cal. amphisbaena* (Bory) Cl.	20	Ctenophora *pulchella* var. *lacerata*(Hust.) Buk.
9	*Cal. amphisbaena* var. *subsalina* (Donk.) Cl.	21	*Cten. pulchella* (Ralfs ex Kützing) D.M.
10	*Cocconeisplacentula* var. *euglypta* (Ehr.) Grun.	22	*Diatomamoniliformis* (Kütz.) D.M.Wil.
11	*Cyclotella meneghiniana* Kütz.	23	*Encyonemaleibleinii (C.Ag.) W.J.Silva.*
12	*Cymbella parva* (W.Sm.) Kirch.	24	*En. silesiacum (Bleisch) D.G.Mann.*

1-table continuation

25	*Entomoneis paludosa var. subsalina (Cl.) Kr. in L.-B.*	53	*Han. arcus* var. *amphioxys* (Rab.) R.M.Pat.
26	*Ent. paludosa* (W.Sm.) R.	54	*Halamphora veneta* (Kütz.) Lev.
27	*Epithemia argus* var. *alpestris*(W.Sm.) Grun.	55	*Hantzschia amphioxys* (Ehr.) Grun.
28	*Epith. argus* var. *angustata* Tarn.	56	*Hant. amphioxys* var. *constricta* Pant.
29	*Epith. adnata* var. *porcellus* (Kütz.) R.Ros.	57	*Mastogloia smithii* Thw. ex W.Sm.
30	*Epith. sorex* Kütz.	58	*Mast. albertii* A.Pav., E.J., C.E.W., L.E. & Z.L.
31	*Epith. turgida* (Ehr.) Kütz.	59	*Mast. pumila* (Grun.) Cl.
32	*Epith. adnata* var. *saxonica* (Kütz.) R.M.P.	60	*Navicula cuspidata* f. *primigena* Dip.
33	*Encyonema silesiacum* (Bl.) D.G.	61	*Nav. pusilla* var. *jacutica* Kis.
34	*Enc. subventricosum* (Chol.) Kr.	62	*Nav. rhynchotella* L.-B.
35	*Fragilaria rumpens* (Kütz.) G.W.F.Car.	63	*Nav. sphaerophora* Ehr.
36	*Frag. capucina* Desm.	64	*Nav. dicephala* Ehr.
37	*Frag. crotonensis* Kit.	65	*Nav. tripunctata* (O.F.Mül.) B.
38	*Frag. acus* (Kütz.) L.-B. in Kr. & L.-B.	66	*Nav. radiosa* Kütz.
39	*Frustulia rhomboides* (Ehr.) De Ton.	67	*Nav. trivialis* L.-B.
40	*Frus. crassinervia* (Br. ex W.Smi.) L.-B. & K.	68	*Neidiomorpha binodis* (Ehr.) M.
41	*Gomphonema constrictum* Ehr. in Kütz.	69	*Neidium productum* (W.Sm.) Cl.
42	*Gom. angustatum* (Kütz.) Rab.	70	*Nei. ampliatum* (Ehr.) Kr.
43	*Gom. olivaceum* (Horn.) Bréb.	71	*Nitzschia acicularis* (Kütz.)W.Sm.
44	*Gom. parvulum* (Kütz.) Kütz.	77	*Nit. vermicularis* (Kütz.) Hant.
45	*Gom. vibrio* Ehr.	78	*Nit. scalpelliformis* Grun.
46	*Gom. calcareum* Cl.	79	*Odontidium mesodon (Kütz.)Kütz.*
47	*Gom. gracile* Ehr.	80	*Pinnularia brauniana* (Grun.) St.
48	*Gom. insigne* W.Greg.	81	*Pin. viridis* (Nitzsch) Ehr.
49	*Gyrosigma acuminatum* (Kütz.) Rab.	82	*Pin. hemiptera* Bréb. ex Gr.
50	*Halamphora veneta* (Kütz.) Lev.	83	*Pleurosigma elongatum* W.Sm.
51	*Hal. coffeiformis (C.Ag.) Lev.*	84	*Planothidiumlanceolatum* (Br. ex Kütz.) Lang.-Ber.
52	*Hannaea arcus (Ehr.) R.M.Pat.*	85	*Platessa salinarum* (Grun.) Lang.-Ber.

1-table continuation

86	*Placoneis elginensis* (W.Greg.) E.J.Cox	95	Synedra *familiaris* Kütz.
87	*Rhoicosphenia abbreviata* (C.Ag.) Lang.-Ber.	96	*Syn. rumpens* var. *scotica* Grun.
88	*Rhopalodia gibba* var. *ventricosa* (Kütz.) H.P. & M.P.	97	*Tabularia fasciculata* (C.Ag.) D.M.
89	*Rh. gibba* (Ehr.) Otto Mül.	98	*Tryblionella levidensis* W.Sm.
90	*Staurosira venter* (Ehr.) Cl.	99	*Tryb. hungarica* (Grun.) Freng.
91	*Stauroneis phoenicenteron* (Nitzsch) Ehr.	100	*Tryb. navicularis* (Bréb.) Ral.
92	Surirella *elegans* Ehr.	101	*Ulnaria amphirhynchus* (Ehr.) Com. & Bukh.
93	*Sur. brebissonii* Kr. & Lan.-Ber.	102	*Ul. amphirhynchus* (Ehr.) Com.
94	*Sur. librile* (Ehr.) Ehr.	103	*Ul. ulna* (Nitzsch) Comp.



Percentage-dimensional indicators of diatomite Alakol lake

Discussing the results, many water reservoirs, alga flora of river lakes in our country have been studied, including the Caspian Sea, Syrdarya, Ili, Baskan and Sarkand, Shar and Kokpekty rivers and algal flora and algal biological diversity of the Alakol lake were not investigated by the country's algal specialists. One of the main objectives of the UN Conference on Biodiversity Conservation, adopted in 1992 in Rio de Janeiro is to preserve biodiversity in the environment and prevent the disappearance of species. The algal diversity of the lake is the basis for this goal. The Kazakh Fisheries Research Institute and the Zoology Research Institute have not studied of Alakol Lake Algapholics byhydrobiotes and ichthyofauna.

During our special algaeological investigations, several times this scientific expedition was built. Algae samples from the northern, southern and south-western parts of the lake were removed and the second part was mixed with 4% solution of formalin and 96% solution of ethanol. A microscopic analysis was carried out to determine the types obtained in the laboratory and the study revealed the varieties of diatomaceous algae and its modern taxonomy. Moreover, we have seen in the study that the Alcohol content of some parts of Lake Alacol Lake is very rich. But in recent years, it can be seen that anthropogenic impact on the stability of lake ecosystems and biodiversity linked to the transformation of the lake into a tourist destination. In this article, the authors regulate the stability of the lake water biota, which is the wealth of algaflora. Consequently, it saves the gaseous, salinity of the water, Ph-levels, mineral composition, and biotic content.

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А. К. Джиенбеков[1], А. Б. Бигалиев[1], С. Б. Нурашов[2], Э. С. Саметова[2]

[1]Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан,
[2]РМК «Ботаника және фитоинтродукция институты», Алматы, Қазақстан.

АЛАКӨЛ КӨЛІНІҢ ДИАТОМДЫ БАЛДЫРЛАРЫНЫҢ АЛУАНТҮРЛІЛІГІ ЖӘНЕ ОНЫҢ СИСТЕМАТИКАСЫ

Аннотация. Қазақстанда көптеген ерекше қорғауға алынған табиғи аймақтар кездеседі: питомниктер, ұлттық саябақтар, қорықтар, жабайы табиғи аймақтар, табиғат ескерткіштері, ботаникалық бақтар мемлекеттің биологиялық әртүрлілігін сақтау үшін құрылған. Осы салалардың көбінде флорист ғалымдар тамырлы өсімдіктерді түгендеуге қатысып, ғылыми зерттеулер жүргізді. Өсімдіктерді зерттеуге үлкен қызығушылық болсада да, әртүрлі табиғатты қорғау қауымдастықтарында олардың алуан түрлілігіне байланысты зерттеулер, әсіресе, су объектілерінің флорасын зерттеу жеткіліксіз. Су балдырларының құрамын зерттеу төменгі деңгейде қалып отыр. Дегенмен альголог ғалымдар Қазақстанның түрлі өңірлерінің ерекше қорғалатын табиғи аумақтарында балдырлар флорасын зерттеуді жүргіздік.Бұл мақалада авторлар 15 өзендер келіп құйатын (Үржар, Қатынсу, Емелқұйса, Ырғайты, Жаманты, Жаманөткель, Тастыт.б) Алакөл көлінің альгофлорасына алғаш рет мәліметтер беріліп отыр. Табылған балдырлар 1 бөлімге, 3 класқа, 13 қатарға, 23 тұқымдасқа, 41 туысқа жататын 103 түрлері мен түр аралық формалары анықталды. Анықталған балдырлар түрлерінің биологиялық сипаттамасы жасалып, заманауи систематикасы жасалынды. Зерттелуші көлден анықталған балдырлардың көпшілігі әртүрлі суайдындарында кеңінен таралған – космополит түрлер болып саналады [2-5]. Көрсетіліп отырған түрлердің көпшілігі планктондық, аздаған түрлері бентостық түрлерге жатады.

Түйін сөздер: балдырлар, планктон, бентос, систематика, Алакөл көлі.

А. К. Джиенбеков[1], А. Б. Бигалиев [1], С. Б. Нурашов [2], Э. С. Саметова[2]

[1]Казахский национальный университет им. аль-Фараби, Алматы, Казахстан,
[2]РГП «Институт ботаники и фитоинтродукции», Алматы, Казахстан

БИОРАЗНООБРАЗИЯ ДИАТОМОВЫХ ВОДОРОСЛЕЙ ОЗЕРА АЛАКОЛЬ И ЕЕ СИСТЕМАТИКИ

Аннотация. В Казахстане существует много особо охраняемых природных территории: питомники, национальные парки, заповедники, районы дикой природы, памятники природы, ботанические сады, созданные для сохранения биологических многообразие растений. Во многих из этих областей ученые-флористы

провели научные исследования, связанные синвентаризаций сосудистых растений. Несмотря на существенные интересык изучению флоры, исследование их разнообразие в различных природоохранных сообществах является недостаточным, особенно флоры водоемов. Вводорослив водоемах остаются изученными в незначительной степени.Тем не менее недавно альгологи провели исследование флоры водорослей в особо охраняемых природных территориях различных регионов Казахстана. В статье авторы впервые приводят данные по изучению альгофлоры 15 рек (Урджар, Катынсу, Эмелькуйса, Ыргайты, Жаманты, Жаманутқель, Тасты и т.д.) втекающие в озеро Алакол. Список обнаруженных видов водорослей включает:103 видов, разновидностей и форм, относящиеся к 41 родам, 23 семейству, 13 порядкам, 3 классам и 1 отделу. Составлен конспект и биологическое описание обнаруженных видов водорослей и проведена современная систематика. Большинство видов водорослей, обнаруженные в исследуемых озерах относятся к космополитным формам, широко распространенным в различных типах водоемов [2-5]. Подавляющее большинство обнаруженных видов относятся к планктонным, малая часть видов – бентосные.

Ключевые слова: водоросли, планктон, бентос, систематика, озера Алаколь.

Information about authors:

Jiyenbekov Aibek Kaplanbekovich – PhD doctoral student of the Faculty of Biology and Biotechnology of the Al-Faraby Kazakh National University, the author of more than 15 scientific articles (3 in English) zh-ai-bek@mail.ru.

Bigaliev Aitkhazha Bigalievich – Doctor of Biological Sciences, Professor of the Faculty of Biology and Biotechnology of the Al-Fartaby Kazakh National University, the author of more than 300 scientific articles (50 in English) and the author of more than 10 books 4 monograph's, 6 texstboockaitkhazha@gmail.ru.

Nurashov Satpai Bakytbaevich – Candidate of Biological Sciences, Head of Mycology and Algology Laboratory of the Institute of Botany and Phytointroduction, author of more than 120 scientific articles (5 in English) nurashs@mail.ru.

Sametova Elmira Sailaukhanovna – Candidate of Biological Sciences, Academic Secretary of the Institute of Botany and Phytointroduction, the author of more than 120 scientific articles (5 in English) elyasam@mail.ru

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