

ПРОБЛЕМИ ВИВЧЕННЯ І ЗБЕРЕЖЕННЯ БІОРІЗНОМАНІТТЯ

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MATERIALS TO *CRYPTOPHYTA* FLORA OF UKRAINE

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The list of 52 taxons (51 species, 1 form) of *Cryptophyta*, known from the water reservoirs of Ukraine, is adduced. On the basis of the original and literary data the peculiarities of ecology and diffusion of representatives of six genera: *Cryptochrysis Pascher*, *Rhodomonas Karsten*, *Chroomonas Hansgirg*, *Cryptomonas Ehrenberg*, *Chilomonas Ehrenberg*, *Cyathomonas Fromentel* are analyzed. It is shown, that distribution of *Cryptophyta* species composition in natural zones of Ukraine is uneven and it makes from 2 species in water reservoirs of the Ukrainian Carpathian Mountains up to 41 species in the forest-steppe zone. The data on the find of a new species *Chilomonas cryptomonadoides* Skuja for the flora of Ukraine are adduced for the first time.

Key words: *Cryptophyta*, flora, Ukraine, natural zones, diffusion

¹*Cryptophyta* algae are a precisely outlined group of algae which is not numerous in the species respect. Nowadays about 200 species in modern conception and modern interpretation of volume and features of a group are included into the structure of *Cryptophyta* [12].

In ecological respect *Cryptophyta* are a rather heterogenous group in relation to temperature, salinity, organic matter, pH, and also a typology of water reservoirs on the whole [13]. Owing to a small number of species composition of the group, difficulties in determination and necessity of work with alive material, information on *Cryptophyta* diffusion is rather limited. More often floral lists include 1-2 most widespread species. At the same time, the research of the last years shows, that *Cryptophyta* have a considerably wider diffusion than it is given in various references [16, 20, 21].

The purpose of this work is the generalization and the analysis of the data on ecology and general diffusion of representatives of six genera that are known in the flora of Ukraine.

MATERIALS AND METHODS

The material for this work was the literary data, results of the authors' original research and also information from the archive of the Botany Department of Kharkiv National University. After publication of the determinant [13] and the review article [2], devoted to *Cryptophyta*, new finds have been made at algae and floristic studying of polytypic water reservoirs of Ukraine [3-7, 17-19], including water reservoirs of the "Nizhnevorsklyanskiy" regional landscape park (Poltava region) [14, 15]; the results of studying algae flora of water reservoirs of Iran [22] are also taken into account.

During the work the authors used both standard procedures of collection and processing algorithmical materials [1], and special methods of *Cryptophyta* studying [13, 23].

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Archive materials of A.M. Matvienko

Original images	Translate
<p><i>Chilomonas cryptomonadoides</i> Skuja Закарпатська обл., Межгірський р-н, с. Синекуп, Сфагнумове озеро у парку в Яворовцях. Висхідна із болото сфагнума. Собиє А.М. Мельничук 24.VII.67 Оупс. А.М. Мамбіленко</p>	<p>Zakarpattia reg., Mezhgirria distr., Synevir village, Sphagnum bog near Javorovets. Squeeze from Sphagnum. Leg.: G.M. Mordvintzeva Det.: A.M. Matvienko</p>
<p><i>Cryptomonas ovata</i> Ehr. Закарпатська обл. на р. 26.IV.78? (серія) с. Писча Собиє А.М. Мельничук Оупс. А.М. Мамбіленко</p>	<p>Chernobyl NPP on river Pripjat. On surface, plankton grid. Leg.: T.A. Vinogradskaja Det.: A.M. Matvienko</p>
<p><i>Cryptomonas ovata</i> Ehr. Волинська обл., Любомльський р-н, с. Писча, озеро Писчанське Собиє А.М. Билека 7.VIII.76? Оупс. А.М. Мамбіленко</p>	<p>Volyn reg., Ljuboml distr., Pischavillage, Pischanske lake. Leg.: A.M. Bileka Det.: A.M. Matvienko</p>

RESULTS AND DISCUSSION

Processing and analysis of literary, archival and original data show that nowadays *Cryptophyta* flora of Ukraine numbers 51* species and 1 form

* The species *Cryptomonas vulgaris* Rouchijanen (it is described from the Black Sea), *Cryptaulax thiophila* Skuja, *Phyllomitus apiculatus* Skuja (they are adduced from the soils of Ukraine) are left out of account.

(tabl. 1) that makes about 50 % of the world *Cryptophyta* flora of continental water reservoirs [24].

Accumulation of the data on *Cryptophyta* flora of Ukraine passed rather slowly. Thus, in the appropriate issue of the Russian series of determinants of freshwater algae [11] for Ukraine 7 species from two *Cryptophyta* genera (*Cryptomonas* – 6, *Chilomonas* – 1) are given, that

Table 2

The spreading Cryptophyta, known from water bodies of Ukraine

№	Taxons	Spread in Ukraine *	General spreading **				
			1	2	3	4	5
	<i>Cryptophyceae</i>						
	<i>Cryptomonadales</i>						
	<i>Cryptochrysidaceae</i>						
	<i>Cryptochrysis</i> Pascher						
1	<i>C. minor</i> Nygaard	FS					
2	<i>C. polychloris</i> Pascher	ST					
	<i>Cryptomonadaceae</i>						
	<i>Rhodomonas</i> Karsten						
3	<i>Rh. lacustris</i> Pascher et Rutner	ST	+				
4	<i>Rh. pusilla</i> (Bachmann) Javonicky	UP, FS			+		
5	<i>Rh. tenuis</i> Skuja	ST					
	<i>Chroomonas</i> Hansgirg						
6	<i>Ch. acuta</i> Utermöhl	UP, FS, ST, MC	+				
7	<i>Ch. breviciliata</i> Nygaard	FS	+				
8	<i>Ch. caudata</i> Geitler	FS, ST			+		
9	<i>Ch. coerulea</i> (Geitler) Skuja	FS	+				
10	<i>Ch. longicauda</i> Korschikov	FS, ST	+				
11	<i>Ch. nordstedtii</i> Hansgirg	FS, ST		+		+	
12	<i>Ch. pochmannii</i> Huber-Pestalozzi	FS	+				
13	<i>Ch. pulex</i> Pascher	FS, ST	+				
14	<i>Ch. rosenbergae</i> Huber-Pestalozzi	UP					
	<i>Cryptomonas</i> Ehrenberg						
15	<i>C. anas</i> Javonicky	FS					
16	<i>C. borealis</i> Skuja	FS, ST	+		+		
17	<i>C. brevis</i> Schiller	FS					
18	<i>C. caudata</i> Schiller	FS, ST					
19	<i>C. compressa</i> Pascher	FS			+		
20	<i>C. curvata</i> Ehrenberg	UP, FS, ST	+				
21	<i>C. cylindracea</i> Skuja	ST					
22	<i>C. cylindrica</i> Ehrenberg	FS, ST					
23	<i>C. dangeardii</i> Hollande	UP					
24	<i>C. erosa</i> Ehrenberg	UP, FS, ST, MC	+				+
25	<i>C. frigoris</i> Javonicky et Hindak	UC					
26	<i>C. gracilis</i> Skuja	FS					
27	<i>C. incurva</i> Matvienko	FS, ST					
28	<i>C. lobata</i> Korschikov	FS					
29	<i>C. lucens</i> Skuja	UP, FS					
30	<i>C. marssonii</i> Skuja	UP, FS, ST	+	+			
31	<i>C. nasuta</i> Pascher	FS					
32	<i>C. obovata</i> Skuja	FS, ST	+		+		
33	<i>C. obovoidea</i> Pascher	UP, FS, ST					
34	<i>C. ovata</i> Ehrenberg	UP, FS, ST, MC	+		+		+
35	<i>C. phaseolus</i> Skuja	FS, ST					
36	<i>C. platyuris</i> Skuja	FS	+				
37	<i>C. pseudolobata</i> Ettl	FS					
38	<i>C. pyrenoidifera</i> Geitler f. pyrenoidifera	UP, FS, ST			+		
39	<i>C. pyrenoidifera</i> Geitler f. procera (Schiller) Javonicky	FS					
40	<i>C. rapa</i> Ettl	FS, ST					
41	<i>C. reflexa</i> (Marsson) Skuja	UP, FS, ST, MC	+		+		
42	<i>C. rufescens</i> Skuja	FS, ST					
43	<i>C. salina</i> Wislouch	MC, ST	+		+		
44	<i>C. skujae</i> Ettl	UP, FS, ST	+				
45	<i>C. spinifera</i> Ettl	FS					
46	<i>C. stigmatica</i> Wislouch	MC, ST	+		+		
47	<i>C. tenuis</i> Pascher	FS					
48	<i>C. tetrapyrenoidosa</i> Skuja	FS					
	<i>Chilomonas</i> Ehrenberg						
49	<i>Ch. cryptomonadoides</i> Skuja	UC					
50	<i>Ch. paramaecium</i> Ehrenberg	UP, FS, ST, MC	+		+		
51	<i>Ch. oblonga</i> Pascher	FS					
	<i>Cyathomonadaceae</i>						
	<i>Cyathomonas</i> Fromentel						
52	<i>C. truncata</i> (Fresenius) Fisch	UP					

* UC – Ukrainian Carpathians, UP – Ukrainian Polissia, FS – Forest-Steppe, ST – Steppe, MC – Mountain Crimea.

** 1 – Asia, 2 – Africa, 3 – America, 4 – Australia, 5 – New Zealand.

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has made 11,9% of the general number of species specified in the determinant. Except for three species (*Cryptomonas salina* – salty lakes of the Crimea; *C. obovoidea* and *C. lobata* – water reservoirs of the Kharkiv region), other species are widely spread, found everywhere, including water reservoirs of Ukraine.

For the subsequent more than 20 years the list of *Cryptophyta* flora of Ukraine has considerably been replenished and it included 29 species or 39,2% of the species composition of the group included in the determinant [13]. Taking into account the species *Cyathomonas truncata* [8], which was missed by the authors by mistake, the number of *Cryptophyta* representatives in the flora of Ukraine has made 30 (40,5%).

During the further algae floristic work in the water reservoirs of the Kharkiv region the list of *Cryptophyta* has been replenished with 18 species, which are new for the flora of Ukraine [2]. The author notes, that at small total number of *Cryptophyta*, representatives of the group are found rather frequently and can even give mass development (up to 1-2 million cpl). It is often observed in high eutrophic fertilized fish ponds, small water reservoirs with a significant recreational load, and also water reservoirs-coolers of thermoelectric power stations and nuclear power stations [9].

The information on *Cryptophyta* diffusion in water reservoirs of Ukraine continues to be replenished; the data on both new location of already known species, and on the species, which are new for *Cryptophyta* flora of Ukraine [3-7, 14-19], appear. Thus, at algae studying of technogenic salty lakes of Donbass 5 *Cryptophyta* species, which are developing at high values of water salinity [7], were revealed. Most often the species *Chroomonas acuta* was found in lakes in autumn (October) with a relative abundance of 1 point at salinity of 8,17‰ and a relative abundance of 3-4 points at salinity of 22,08-26,50‰. The species *Chroomonas longicauda* (October, 26,50 ‰) and *Cryptomonas erosa* (April, 15,77‰) had a relative abundance of 2 points. The species *Cryptomonas obovata* with a relative abundance from 1 point up to "+" was found in lakes only in June. The species *Cryptomonas phaseolus* (9,47-31,04‰) was found most frequently in all lakes, but with the minimal relative abundance (+), in a wide range of water salinity.

According to the results of studying of 46 water reservoirs of six regions of Ukraine in the period 1998-2003 generic spectra of algae flora [3] were made and analyzed. It is established, that ge-

nus *Cryptomonas* can be part of a spectrum of ten leading genera of algae flora of the rivers (the 8-th rank place), water reservoirs (the 10-th rank place) and ponds (the 7-th rank place). For floodplain water reservoirs genus *Cryptomonas* has not been noted in the spectrum of the leading genera.

At processing of the working archives of professor Matvienko A.M. the unpublished data on new finds of some species of *Cryptophyta*, including the new for the flora of Ukraine species of *Chilomonas* genus, were found. In connection with preparation of the planned issue of "Algae-flora of Continental Water Reservoirs of Ukraine", devoted to *Cryptophyta*, Matvienko A.M. has processed materials of algateca of N.G. Kholodny Botany Institute of the National Science Academy of Ukraine (unfortunately, the work on preparation of the issue of "Flora" has not been completed). With the purpose of confirmation of the find which was made, the authors consider it necessary to present photos of the cards found in the archive of Matvienko A.M., with the indication of the exact place of material collection and the surname of the collector (tab. 1).

The distribution of the revealed *Cryptophyta* species composition in natural zones of Ukraine is rather uneven (tab. 2) that is connected first of all with various levels of algae studying in water reservoirs of the appropriate zone. Nowadays the greatest number of *Cryptophyta* species is known for a forest-steppe zone – 41; in water reservoirs of a steppe zone 28 species are revealed; *Cryptophyta* of the Ukrainian Polesye (15 species), the Crimea (7) and the Ukrainian Carpathian Mountains (2 species) are studied to a smaller degree.

Processing of the literary data and the results of algae flora studying of water reservoirs of Iran show that in geographical respect *Cryptophyta* are spread everywhere. The species *Chroomonas caudata*, *Ch. nordstedtii*, *Cryptomonas borealis*, *C. erosa*, *C. marssonii*, *C. obovata*, *C. ovata*, *C. reflexa*, *Chilomonas paramecium* are noted repeatedly in water reservoirs of various natural zones of Ukraine and other European countries, besides Europe they are given for 2-3 continents (tab. 2) that gives reason to consider the listed species cosmopolitans. Typically halophilous species *Cryptomonas salina* and *C. stigmatica* should be related to Holarctic goeement of algae-flora of Ukraine.

Thus, nowadays *Cryptophyta* flora of Ukraine includes 51 species and 1 form that makes about 50 % of the world *Cryptophyta* flora of continental water reservoirs. Distribution of *Crypto-*

phyta species composition in natural zones of Ukraine is uneven and makes from 2 species in water reservoirs of the Ukrainian Carpathian Mountains up to 41 species in a forest-steppe zone. The data on a find of a new for the flora of Ukraine species *Chilomonas cryptomonadoides* Skuja are given for the first time.

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МАТЕРІАЛИ ДО ФЛОРИ CRYPTOPHYTA УКРАЇНИ

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Наводиться список 52 таксонів (51 вид, 1 форма) *Cryptophyta*, знайдених у водоймах України. На підставі оригінальних та літературних даних проаналізовано особливості екології та поширення представників шести родів: *Cryptochrysis Pascher*, *Rhodomonas Karsten*, *Chroomonas Hansgirg*, *Cryptomonas Ehrenberg*, *Chilomonas Ehrenberg*, *Cyathomonas Fromental*. Відзначається нерівномірність поширення *Cryptophyta* у природних зонах: від двох видів в Українських Карпатах до 41 у водоймах лісостепової зони. Вперше наведено відомості щодо знахідки нового для флори України виду *Chilomonas cryptomonadoides* Skuja.

Ключові слова: *Cryptophyta*, флора, Україна, природні зони, розповсюдження

МАТЕРИАЛЫ К ФЛОРЕ CRYPTOPHYTA УКРАИНЫ

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Приводится список 52 таксонов (51 вид, 1 форма) *Cryptophyta*, известных из водоемов Украины. На основе оригинальных и литературных данных анализируются особенности экологии и распространения представителей шести родов: *Cryptochrysis Pascher*, *Rhodomonas Karsten*, *Chroomonas Hansgirg*, *Cryptomonas Ehrenberg*, *Chilomonas Ehrenberg*, *Cyathomonas Fromental*. Показано, что распределение видового состава *Cryptophyta* по природным зонам Украины неравномерно и составляет от 2 видов в водоемах Украинских Карпат до 41 – в лесостепной зоне. Впервые приведены данные о находке нового для флоры Украины вида *Chilomonas cryptomonadoides* Skuja.

Ключевые слова: *Cryptophyta*, флора, Украина, природные зоны, распространение