The CYATAXO Database

Databáze sinic CYATAXO

Jaroslava K o m á r k o v á & Jiří N e d o m a

Hydrobiological Institute AS CR and Biological Faculty of Univ. of South Bohemia Na sádkách 7, 370 05 České Budějovice, Czech Republic
jarkakom@hbu.cas.cz
nedoma@hbu.cas.cz

Abstract

The CYATAXO Database presented here is available on CD, attached to Czech Phycology 6. Our database will help in identification of cyanobacterial morphotypes (morphospecies) forming blue-green blooms. This database focuses on European planktonic cyanobacterial taxa.
The database is not a professional one and data are not protected. However, this makes the database flexible and you may choose which records you need, which ones you want to delete, and what you would like to change. Further colleagues provided data, helped with descriptions, photographs etc.: J. Komárek, G. Cronberg, F. Hindák, L. Lepistö, P. Kuupo, P. Znachor, E. Zapomělová, G. Tedioli, R. Willame. We also thank M. Procházková, D. Švehlová and M. Kupková for technical help.

Introduction

Cyanobacterial water blooms in European lakes, reservoirs and fishponds became a serious nuisance phenomenon during warm months. Especially highly eutrophicated highly productive fishponds are localities typical for heavy cyanobacterial water blooms. Blue green scums or compact layers of cyanobacteria floating on the surface can cause the oxygen depletion during warm summer days and excess in concentration of oxygen or ammonia ion at such localities especially during the decay of the bloom. A massive mortality of fishstock can be a consequence. As the nutrient

supply for renovation of the blooms is deposited in the bottom mud of the fishponds, the bloom is often coming back
in summers.
Most careful control should be performed in water bodies used for drinking water supply or recreation. Cyanobacterial hepatotoxins and neurotoxins (microcystins, anatoxins, saxitoxins etc.) endanger human health when present in high concentrations, or they accumulate in human tissues and act as a cancer enhancer (CHORUS & BARTRAM 1999, CHORUS 2001).
Many studies were done during last years and many more papers will be published in future on cyanobacterial water blooms dealing with taxonomic composition, ecological impact, toxicity, factors that influence their occurrence, possibilities to diminish their concentration or prevention of their appearance. The objects of all these studies are populations or assemblages of cyanobacteria, which had to be identified and named by proper and valid names. Our database will help in identification of cyanobacterial morphotypes (morphospecies) forming blue-green blooms. Morphospecies of cyanobacteria, which appear in European countries in smaller abundance in phytoplankton together with algae are also involved in our database, as they can be also carriers of dangerous cyanotoxins. Moreover, studies on diversity of natural populations need to be realized on the full list of present taxa.
In the CYATAXO database, traditional approach of botanical classification has been applied. Recently an intensive research is realized in verification of morphological criteria in cyanobacteria classification by molecular methods. However, up to now used sequencing seems to verify the taxa on the level of genus, and polyphasic approach (Rajaniemi & al. 2005) could not be applied in all the cases. Our database could help also in case of deep study of the taxa position and nomenclature, as it contains basic data known from the literature together with citations, most lifelike drawings and descriptions from literature. The photographs and data on the occurrence illustrate natural populations collected during last years in the field by experienced scientists in European water-bodies.

The CYATAXO Database of European planktonic cyanobacteria has been worked out on the results of the MIDI-CHIP Project (EVK2-CT99-00026), the project “Water Quality Control” S60117004 awarded to HBI AS CR and the GA ASCR project No. IAA6005308.
Further colleagues provided data, helped with descriptions, photographs etc.: J. Komárek, G. Cronberg, F. Hindák, L. Lepistö, P. Kuupo, P. Znachor, E. Zapomělová, G. Tedioli, R. Willame. We also thank M. Procházková, D. Švehlová and M. Kupková for technical help.

How to use the database

The database is not a professional one and data are not protected. However, this makes the database flexible and you may choose which records you need, which ones you want to delete, and what you would like to change. You can also expand the database of further measurements or completely change the contents. However, be aware of the fragility of the system and always keep a copy in another medium. Don't rename the directory or the photographs and don't move the joined directories of photographs and cultures to another directory or you will loose the "hyperlinks".
After opening the database, chose **“SPECIES”.**

The edited database consists of several sheets

The "MAIN" sheet where the name of the morphospecies, name (s) of the author (s) and year of the description, description in English, most instructive drawing, taxonomic appurtenance, information about the presence/absence of aerotopes, about the trophy of the locality, pH (low, medium, high), reference windows for photographs and cultivation protocols are placed. The bottom line shows the number of the record, and the label with the asterisk enables addition of a new record. Both the first and the bottom lines are projected at the full screen.
The sheet **"Localities"** shows several columns with basic data and measurements, abbreviations used in column headers are explained after pressing the button "Explanation of abbreviations".
The sheets **"Notes 1"** and "**Notes 2"** enable the user to add any additional notes, for example, descriptions in his own language, another author’s description, new data about the species etc.
Further sheets present descriptions in "German" and another language (here "Czech"), The sheets **"Further drawings 1"** and **"Further drawings 2"** are prepared for further drawings from the literature or for your own drawings scanned and placed there.

Forms and Tables

The data are presented in two ways: as the "Forms" and as the "Tables". New data can be entered both to "Forms" and “Tables” - they are linked each to other. More suitable is to enter data to “Forms”.

The Access program does not enable changes to the text formatting inside text boxes (line spacing, or changes in the font). It is also not possible to transpose words between the lines etc. It is possible to copy the text from Access and paste it into, e.g., MS Word, however, not all the special spelling forms of the individual languages might be transferred without mistakes.

Dealing with "Photo" and "Cultures"

"Photo":
Photographs are gathered under a special directory that must be placed just beside the main program. The hyperlink for each photograph file is created as follows: 1. Click the chosen window with the left button on your mouse. 2. Click the right button and choose "Hyperlink" and then "Edit hyperlink". In the "Insert hyperlink" choose "Browse" and look for the file you want to have edited in your image examiner. Then click OK. The first letter of the directory (C) will appear in the window followed by the file name.
"Cultures":
The compartment is managed in the same way as "Photo". You may link any file with information from Excel, MSWord, graphic programs etc.

Descriptions, data on ecology and drawings were mainly reproduced (or translated) from:

HINDÁK F. (2001): Fotografický atlas mikroskopických siníc.- Veda, vydavatelstvo Slovenskej akadémie vied, Bratislava 2001, 127 pp.
Indicated Hindák 2001

CHORUS I. & BARTRAM J. (ed.) (1999): Toxic Cyanobacteria in Water. – E. & F. N. Spon, London and New York, 416 pp.

CHORUS I. (ed.) (2001): Cyanotoxins, occurrence, causes, consequences. – Springer-Verlag Berlin Heidelberg New York, 357 pp.

KOMÁREK J. & ANAGNOSTIDIS K. (1999): Cyanoprocaryota, 1,Teil, Chroococcales. In ETTL H., GÄRTNER, G., HEYNIG, H. & MOLLENHAUER, D. (eds.), Suesswasserflora von Mitteleuropa 19/1, Gustav Fischer Verl., Jena, Stuttgart, Lübeck, Ulm, 548 pp,
Indicated Chroo-K&A

KOMÁREK J. & ANAGNOSTIDIS K. (2005): Cyanoprocaryota, 2.Teil, Oscillatoriales. In Büdel, K., Krienitz L., Gärtner, G. & Schagerl M. (eds.), Suesswasserflora von Mitteleuropa 19/2, Elsevier, Spektrum Akademische Verl., Heidelberg, 758 pp.
Indicated Oscill-K&A.

KOMÁREK J. & KOMÁRKOVÁ J. (2006**):** Diversity of *Aphanizomenon*-like cyanobacteria.
Diverzita sinic z okruhu rodu *Aphanizomenon.* – Czech Phycology 6: 1-32.

KOMÁREK J., KLING H. & KOMÁRKOVÁ J. (2003): Filamentous cyanobacteria. In: WEHR J.D. & SHEATH, R.G. (eds), Freshwater Algae of North America, Ecology and Classification. Academic Press, Amsterdam, Boston, London etc.: 117-196

KOMÁREK, J. (1999): Übersicht der planktischen Blaualgen (Cyanobakterien) im Einzugsgebiet der Elbe. -Internationale Komission zum Schutz der Elbe. Magdeburg, 54 pp, 134 Fig.
Indicated Komárek, Elbe, Labe .

KOMÁRKOVÁ - LEGNEROVÁ J. & ELORANTA P. (1992): Planktic blue-green algae (Cyanophyta) from Central Finland (Jyväskylä region) with special reference to the genus Anabaena. - Arch.Hydrobiol./Algological Studies 67: 103-133.
Indicated Kom.Legn. & Eloranta 1992

KOMÁRKOVÁ - LEGNEROVÁ J. & CRONBERG G. (1992): New and recombined filamentous Cyanophytes from lakes in South Scania, Sweden. - Arch Hydrobiol./Algol. Studies 67: 21-32.
Indicated Kom.-Legn. & Cronberg 1992

CRONBERG G. & KOMÁRKOVÁ J. (submitted): Planktic blue - green algae from lakes in South Scania, Sweden. - Part II. Oscillatoriales and Nostocales.- Arch. Hydrobiol./ Algological Studies (Cyanobacterial Research).
Indicated MSCR., Cronb.& Kom.-Legn.

STARMACH K. (1966), Cyanophyta-sinice Glaucophyta – Glaukofity. – Flora slodkowodna Polski, Tom 2. – Państwowe Wydawnictwo naukowe, Warszawa 1966, 807 pp.
Indicated Starmach 1966

RAJANIEMI P., HROUZEK P., KAŠTOVSKÁ K., WILLAME R., RANTALA A., HOFFMANN L., KOMÁREK J. & SIVONEN, K. (2005): Phylogenetic and morphological evaluation of genera *Anabaena, Aphanizomenon, Trichormus* and *Nostoc* (Nostocales, Cyanobacteria). – Internat. J. Syst. Evol. Microbiol. 55: 11-26.

German descriptions were reproduced from:

KOMÁREK, J. (1999): Übersicht der planktischen Blaualgen (Cyanobakterien) im Einzugsgebiet der Elbe. - Internationale Komission zum Schutz der Elbe. Magdeburg, 54 pp, 134 Fig.
Indicated Komárek, Elbe

Czech version of descriptions was taken from:

KOMÁREK J. (1999): Přehled planktonních sinic v povodí Labe. Mezinárodní komise pro ochranu Labe, Magdeburg, 54 pp., 134 Fig.
Indicated Komárek, Labe

HINDÁK F. (ed.)(1978): Sinice a riasy. - Slovenské pedagogické nakladatelstvo Bratislava, 781 pp. (Translations).
Indicated Hindák 1978.

Otherwise translations from English or German.

List of the morphospecies involved in the CYATAXON Database:

Anabaena affinis
Anabaena bergii var. minor
Anabaena circinalis
Anabaena compacta
Anabaena crassa
Anabaena danica
Anabaena flos-aquae
Anabaena heterospora
Anabaena lemmermannii
Anabaena macrospora
Anabaena mendotae
Anabaena mucosa
Anabaena perturbata
Anabaena planctonica
Anabaena reniformis
Anabaena sigmoidea
Anabaena smithii
Anabaena solitaria
Anabaena spiroides
Anabaena viguieri
Anabaenopsis arnoldii
Anabaenopsis elenkinii
Anabaenopsis milleri
Aphanizomenon
Aphanizomenon flexuosum
Aphanizomenon flos-aquae
Aphanizomenon gracile
Aphanizomenon hungaricum
Aphanizomenon klebahnii
Aphanizomenon ovalisporum
Aphanizomenon skujae
Aphanizomenon yezoenze
Aphanocapsa conferta
Aphanocapsa delicatissima
Aphanocapsa holsatica
Aphanocapsa incerta
Aphanocapsa nubilum
Aphanothece bachmannii

Aphanothece clathrata
Aphanothece minutissima
Aphanothece nidulans
Aphanothece smithii
Aphanothece stagnina
Coelomoron pusillum
Coelosphaerium
Coelosphaerium subarcticum
Cuspidothrix elenkinii
Cuspidothrix issatschenkoi
Cyanodictyon imperfectum
Cyanodictyon planktonicum
Cyanodictyon reticulatum
Cyanonephron styloides
Cylindrospermopsis
Gloeotrichia echinulata
Chroococcus dispersus
Chroococcus distans
Chroococcus limneticus
Chroococcus microscopicus
Chroococcus minutus
Chroococcus obliteratus
Chroococcus prescotii
Lemmermaniella pallida
Limnothrix lauterbornii
Limnothrix meffertae
Limnothrix planktonica
Limnothrix redekei
Lyngbya hieronymusii
Merismopedia elegans
Merismopedia glauca
Merismopedia marssonii
Merismopedia punctata
Merismopedia tenuissima
Merismopedia trolleri
Merismopedia warmingiana
Microcystis aeruginosa
Microcystis botrys

Microcystis firma
Microcystis flos-aquae
Microcystis ichthyoblabe
Microcystis novacekii
Microcystis viridis
Microcystis wesenbergii
Pannus spumosus
Planktolyngbya contorta
Planktolyngbya limnetica
Planktothrix agardhii
Planktothrix clathrata
Planktothrix mougeotii
Planktothrix rubescens
Planktothrix suspensa
Pseudanabaena acicularis
Pseudanabaena catenata
Pseudanabaena limnetica
Pseudanabaena mucicola
Radiocystis geminata
Rhabdoderma compositum
Rhabdoderma lineare
Rhabdogloea
Rhabdogloea smithii
Romeria elegans
Snowella atomus
Snowella fennica
Snowella lacustris
Snowella litoralis
Snowella septentrionalis
Spirulina major
Woronichinia compacta
Woronichinia naegeliana