

Plant communities of the class *Charetea* Fukarek ex Krausch 1964 in Ukraine: an overview

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Abstract: The paper presents the results of the first syntaxonomical survey of the submerged plant communities belonging to the class of *Charetea* Fukarek ex Krausch 1964 in Ukraine based on the interpretation of about 80 published and unpublished phytosociological relevés. Fourteen associations of two alliances and one order are characterized briefly. The diversity of charophyte communities in Ukraine is also described in brief. A preliminary prodromus of charophyte communities in Ukraine is given. Associations of *Charetum intermediae* (Corillion 1957) Fijałkowski 1960, *Charetum rudis* Dąmbska 1966, *Nitelletum gracilis* Corillion 1957 are indicated for Ukraine for the first time.

Key words: syntaxonomy, charophytes, *Charetea*, Ukraine

1. Introduction

Charophytes (*Charales*) are benthic submerged macrophytes growing in freshwater and brackish water bodies of different types where they could form dense meadows and play a significant role as primary producers. These macroscopic algae are usually considered sensitive indicators of good ecological quality of aquatic ecosystems (Coops 2002).

At present, 41 species of *Charales* are recorded in the flora of Ukraine based on herbarium collections, published and original data (Hollerbach & Palamar-Mordvintseva 1991; Palamar-Mordvintseva 1998; Palamar-Mordvintseva & Tsarenko 2004a, 2004b; Borysova 2005; Palamar-Mordvintseva *et al.* 2005; Palamar-Mordvintseva & Borysova 2006; Borysova & Honcharenko 2007, 2011; Borysova *et al.* 2008; Borysova & Tkachenko 2008; Borysova & Orlov 2009; Borysova & Chorna 2011). These include 25 species of the *Chara* L. genus, 10 species of the *Nitella* C. Agardh genus, 3 species of the *Tolypella* (A. Braun) A. Braun genus and one species of each of the *Lamprothamnium* J. Groves, *Lychnothamnus* (Rupr.) Leonh. emend. A. Braun, and *Nitellopsis* Hy genera. Over the last two decades, 31 species were found again (3 of them are indicated as new for Ukraine), but 10 species known

only from literature sources. The most widespread species are: *Chara vulgaris* L. and *C. globularis* Thuill. The second most abundant species including *C. contraria* A. Braun ex Kütz., *Nitella flexilis* (L.) C. Agardh and *Nitellopsis obtusa* (Desv. in Loisel.) J. Groves occur less frequently. A number of species such as *C. aspera* Dethard. ex Willd., *C. delicatula* C. Agardh, *C. intermedia* A. Braun in A. Braun, Rabenh. & Stitzenb., *C. hispida* L., *Nitella mucronata* (A. Braun) Miq. in C.H. Hall and *Lamprothamnium papulosum* (Wallr.) J. Groves are rather common only in certain regions (the Western or Central Ukraine, Black Sea etc.). The remaining ones are rare to very rare and are included in the Red list of *Charales* of Ukraine (Palamar-Mordvintseva & Tsarenko 2004b), 9 of them – in the Red Data Book of Ukraine (Didukh 2009).

However, the syntaxonomy of charophyte plant communities has not been developed yet and, therefore, the plants are not cited in the national vegetation surveys (Solomakha 1996; Dubyna 2006). Also our knowledge on the distribution, environmental preferences and structure of charophyte communities in Ukraine is still incomplete (Palamar-Mordvintseva *et al.* 2005). The first publications with phytosociological relevés of 9 associations belonging to the class *Charetea* Fukarek ex Krausch 1964 have appeared just recently (Iakushenko

et al. 2007; Borysova & Iakushenko 2008; Solomakha 2008; Orlov *et al.* 2009; Borysova & Chorna 2011; Iakushenko 2011).

The aim of the article is to describe the diversity of charophyte communities in Ukraine, to characterize them briefly in the acceptable form for Prodrumus of the Vegetation of Ukraine and to present a comprehensive syntaxonomy scheme of charophyte communities for the area under current stage of our studies.

2. Materials and methods

The phytosociological surveys were performed in the years 2004–2010 in different types of water bodies situated in the northern, western and central parts of Ukraine. About 80 relevés were made according to the Braun-Blanquet method (Westhoff & van der Maarel 1973). The phytosociological relevés were stored in the TURBOVEG database (Hennekens & Schaminée 2001) and classified by TWINSPAN protocol (Hill 1979) using JUICE 6.5 software package (Tichý 2002).

Charophytes were identified with the use of identification guides by Hollerbach & Palamar-Mordvintseva (1991) and Krause (1997). The names of vascular plants species followed Tutin *et al.* (1968–1993). The authors of the plant names given by Brummitt & Powell (1992). The nomenclature of the syntaxa followed the 3rd edition of the International Code of Phytocoenological Nomenclature (ICPN) (Weber *et al.* 2000). The syntaxonomy scheme of the Ukrainian charophyte communities was compiled according to that presented in the book chapter by Šumberová *et al.* (2011) as the most relevant for the ICPN rules; other surveys were taken into consideration, too (Corillion 1957; Krausch 1964; Dąbbska 1966; Krause & Lang 1977; Doll 1989; Dąbbska 1996; Brzeg & Wojterska 2001; Husák 2001; O'ahel'ová 2001; Hrivnák *et al.* 2005; Gąbka & Pelechaty 2006; Gąbka 2010).

3. Results

The Prodrumus of the *Charetea* F. Fukarek ex Krausch 1964 communities in Ukraine:

Charetea Fukarek ex Krausch 1964

Synonyms: *Charetea* F. Fukarek 1961, *Charo-Potametea* Kępczyński et Ceynowa-Giełdon 1972 p.p., *Charetea globularis* sensu auct.

Diagnostic species (only taxa occurring in the analyzed relevés are given): *Chara aspera*, *C. contraria*, *C. delicatula*, *C. globularis*, *C. intermedia*, *C. rudis* (A. Braun) Leonh., *C. tenuispina* A. Braun, *C. vulgaris*, *Lychnothamnus barbatus* (Meyen) Leonh., *Nitella flexilis*, *N. gracilis* (Smith) C. Agardh., *N. mucronata*, *N. syncarpa* (Thuill.) Chev., *Nitellopsis obtusa*.

Communities of submerged charophytes in mesotrophic and eutrophic inland fresh to brackish waters and sea littoral zone.

Charetalia hispidae Sauer ex Krausch 1964

Synonyms: *Charetalia fragilis* Sauer 1937, *Charetalia hispidae* Sauer 1937, *Nitelletalia flexilis* Krause 1969.

Diagnostic species: as diagnostic species for the class.

Communities of submerged charophytes in mesotrophic and eutrophic water bodies.

Charion globularis Krausch 1964

Synonyms: *Charicion* Rübél 1933 (orig. form), *Charion* Sauer 1937, *Charion canescentis* Corillion 1957, *Charion canescentis* Krausch 1964, *Charion fragilis* Krausch 1964 em. van Raam et Schaminée in Schaminée *et al.* 1995, *Limno-Charion* Krausch 1964, *Limno-Charion* Krausch 1968, *Charion asperae* Krause 1969, *Thero-Charion asperae* Krause 1969, *Tolypellion* Krause 1969, *Charion vulgaris* (Krause ex Krause et Lang 1977) Krause 1981, *Charion vulgaris* Dąbbska 1966 ex Krause 1981, *Charion contrario-asperae* Pietsch 1987, *Charion rudis-hispidae* Pietsch 1987.

Diagnostic species: *Chara aspera*, *C. contraria*, *C. delicatula*, *C. globularis*, *C. hispida*, *C. intermedia*, *C. rudis*, *C. vulgaris*, *Lychnothamnus barbatus*, *Nitellopsis obtusa*.

Submerged charophytes communities dominated mainly by *Chara* species in mesotrophic and eutrophic, slightly acid, neutral to alkaline water bodies.

1. *Charetum asperae* Corillion 1957

Diagnostic species: *Chara aspera*.

Habitats: Littoral zone of relatively large calcareous mesotrophic lakes with sandy, silty-sand or carbonate deposits, mainly in shallow parts (0.1–0.3 m depth), sometimes to 10.0 m depth.

Distribution in Ukraine: Rare in the Western Polissia (Lake Svitiaz, Lake PISOCHNE). Protected in the Shatsk National Nature Park.

Phytosociological materials: Borysova & Iakushenko 2008 (P. 229, Table 1., rel. 2–19), Borysova & Chorna 2011 (P. 109, Table 2, rel. 2). See also Table 1, column 4 *hoc loco*.

2. *Charetum contrariae* Corillion 1957

Diagnostic species: *Chara contraria*.

Habitats: Mesotrophic calcareous water bodies with clay and silt deposits at the depth from 0.5 to 3.0–5.0 m.

Distribution in Ukraine: Sporadically. Protected in the Shatsk National Nature Park (Lake Svitiaz, Volyn Region).

Table 1. Synoptic table of some charophyte communities from Ukraine

Column number	1	2	3	4	5	6	7	8
Number of relevés	6	6	5	18	11	10	10	6
Total number of species	14	15	11	6	14	10	17	9
D.s. Cl. Charetea								
<i>Chara vulgaris</i>	V ⁴⁻⁵	V ⁴⁻⁵	.	.	.	.	.	.
<i>Nitella flexilis</i>	.	.	V ⁵	.	.	.	.	.
<i>Chara aspera</i>	.	.	.	V ⁵	.	I ⁺	I ¹	.
<i>Chara globularis</i>	.	.	.	.	V ⁴⁻⁵	.	I ¹	.
<i>Nitellopsis obtusa</i>	.	.	.	.	.	V ⁴⁻⁵	I ⁺⁴	.
<i>Chara delicatula</i>	.	.	.	.	I ⁺	.	V ³⁻⁵	V ²⁻⁵
<i>Chara intermedia</i>	.	.	.	.	.	.	II ⁵	.
D.s. Al. Nymphaeion								
<i>Nymphaea candida</i>	.	.	.	.	III ¹⁻⁵	I ⁴⁻⁵	II ²⁻⁵	.
<i>Potamogeton natans</i>	II ²	.	.	.	I ¹	I ²	I ²	.
<i>Nuphar lutea</i>	.	.	I ¹	.	I ³	I ²	I ²	.
<i>Nymphaea alba</i>	.	.	I ⁵	.	.	.	.	.
<i>Trapa natans</i>	.	I ⁺
D.s. Cl. Potametea								
<i>Elodea canadensis</i>	I ⁴	II ⁺¹	I ¹	.	.	I ⁴	I ¹	II ¹
<i>Potamogeton pectinatus</i>	II ²⁻⁴	.	.	I ²	I ⁴⁻⁵	.	.	.
<i>Myriophyllum verticillatum</i>	.	I ⁺	IV ¹⁻²	.	I ¹	.	.	.
<i>Ceratophyllum demersum</i>	.	IV ⁺	I ¹	.	II ¹⁻³	.	I ³	.
<i>Potamogeton friesii</i>	.	.	.	.	III ³⁻⁵	.	I ¹⁻²	.
<i>Potamogeton compressus</i>	.	.	.	.	II ⁴	.	.	.
<i>Potamogeton lucens</i>	.	.	.	I ³	.	IV ³⁻⁵	II ¹⁻⁵	.
<i>Myriophyllum spicatum</i>	.	.	.	.	.	I ¹⁻²	III ⁺⁴	V ¹
<i>Potamogeton praelongus</i>	.	.	.	.	.	.	.	III ¹
<i>Ranunculus trichophyllus</i>	.	.	.	.	.	.	.	II ¹
<i>Potamogeton perfoliatus</i>	.	.	.	I ¹⁻²	.	.	.	I ²
<i>Potamogeton berchtoldii</i>	.	II ⁺
D.s. Cl. Lemnetea								
<i>Hydrocharis morsus-ranae</i>	.	II ⁺	I ¹	.
<i>Lemna trisulca</i>	.	V ⁺¹	.	.	II ⁻²	.	.	.
<i>Spirodela polyrrhiza</i>	.	II ⁺¹	.	.	.	.	.	.
<i>Lemna minor</i>	.	II ⁺
<i>Wolffia arrhiza</i>	.	II ⁺
<i>Utricularia vulgaris</i>	.	I ⁺	III ¹	.	I ⁺	.	.	.
<i>Stratiotes aloides</i>	.	.	.	.	III ¹⁻²	.	I ¹⁻³	I ⁺
<i>Aldrovanda vesiculosa</i>	.	.	.	.	.	I ²	I ¹	.
D.s. Cl. Littorelletea								
<i>Eleocharis acicularis</i>	.	.	III ²	.	.	.	.	.
<i>Utricularia minor</i>	.	.	I ⁺	.	.	.	II ¹⁻²	.
<i>Potamogeton gramineus</i>	.	.	.	.	.	.	.	I ¹
D.s. Cl. Phragmitetea								
<i>Alisma plantago-aquatica</i>	IV ⁺¹	I ⁺
<i>Eleocharis palustris</i>	I ¹	.	.	.	.	.	.	.
<i>Equisetum fluviatile</i>	I ¹	.	.	.	.	.	.	.
<i>Glyceria fluitans</i>	I ¹	.	.	.	.	.	.	.
<i>Lycopus europaeus</i>	I ⁺
<i>Sparganium erectum</i>	I ¹	.	.	.	.	.	.	.
<i>Oenanthe aquatica</i>	.	III ⁺
<i>Glyceria maxima</i>	.	I ⁺
<i>Sagittaria sagittifolia</i>	.	.	I ⁵	.	.	.	.	.
<i>Phragmites australis</i>	.	.	.	I ³	I ²	.	.	.
<i>Typha angustifolia</i>	.	.	.	.	.	I ¹	.	.
Other species								
<i>Juncus articulatus</i>	II ¹	.	.	.	.	.	.	.
<i>Callitriche cophocarpa</i>	I ²	.	III ²	.	.	.	.	.
<i>Veronica beccabunga</i>	I ¹	.	.	.	.	.	.	.
<i>Veronica anagalis-aquatica</i>	I ⁺
<i>Zanichellia palustris</i>	.	.	.	I ¹	.	.	.	.
<i>Aegagropila linnaei</i>	.	.	.	.	.	.	.	II ⁵

Association names and sources of the relevés:

1 – *Charetum vulgaris*: Ivano-Frankivsk region, Kosiv district, „Hutsulshchyna” NNP, Iakushenko *et al.* 2011 (P. 282, Table 9.18, rel. 10-13, P. 285, Table 9.19, rel. 6, 18); 2 – *Charetum vulgaris*: Kharkiv and Cherkasy regions, Borysova & Chorna 2011 (P. 108, Table 1, rel. 6-11); 3 – *Nitellum flexilis*: Zhytomyr region, Ovruch district, 1.5 km N from Mozhary village, D. Iakushenko, 2006, unpubl.; 4 – *Charetum asperae*: Volyn region, Shatsk district, Shatsk NNP, Lake Svitiáz, Borysova & Iakushenko 2008 (P. 229, Table 1, rel. 2-19); 5 – *Charetum globularis*: Volyn region, Shatsk district, Shatsk NNP, D. Iakushenko, 2005, unpubl.; 6 – *Nitellopsidetum obtusae*: Volyn region, Shatsk district, Shatsk NNP, Lake Svitiáz, D. Iakushenko, 2005, unpubl.; 7 – *Charetum delicatulae*: Volyn region, Shatsk district, Shatsk NNP, Lake Svitiáz, D. Iakushenko, 2005, unpubl.; 8 – *Charetum delicatulae*: Rivne region, Volodymyrets district, Rivne Natural Reserve, Lake Bile, Orlov, Iakushenko, Borysova, 2009 (P. 261, Table 1, rel. 1-6)

Phytosociological materials: Borysova & Iakushenko 2008 (P. 230, Table 2, rel. 5-7).

3. *Charetum delicatulae* Doll 1989 ex Gąbka et Owsiany 2010

Synonym: *Charetum delicatulae* Doll 1989 nom. nudum, *Charetum delicatulae* Blažencić et Blažencić 1994 prov.

Diagnostic species: *Chara delicatula*.

Habitats: Mesotrophic to meso-eutrophic slightly acidic standing waters (lakes, forest pools, open pits) with silt, silty-peat or sandy-silty bottom deposits at the depth from 0.5 to 10 m.

Distribution in Ukraine: Sporadically in the Right-Bank Polissia: Volyn (Lake Svitiáz), Rivne (Lake Bile), and Zhytomyr regions, also known from Male Polissia and Ukrainian Carpathians (very rare). *Chara delicatula* is listed in the Red Data Book of Ukraine (2009). Protected in the Rivne Natural Reserve and the Shatsk National Nature Park.

Phytosociological materials: Borysova & Iakushenko 2008 (P. 230, Table 2, rel. 3-4); Orlov, Iakushenko, Borysova 2009 (P. 261, Table 1, rel. 1-6). See also Table 1, columns 7-8 *hoc loco*.

4. *Charetum globularis* Zutshi ex Šumberová, Hrivnák, Rydlo et Ořaheřová in Chytrý 2011

Synonyms: *Charetum fragilis* Corillion 1957, *Charetum fragilis* Fijałkowski 1960 prov., *Charetum globularis* Zutshi 1975, *Charetum globularis* Schaminée et al. 1988.

Diagnostic species: *Chara globularis*.

Habitats: Eutrophic and mesotrophic water bodies (lakes, pools, pits, channels etc.) with standing or slow-flowing water and different types of bottom deposits, at the depth from 1.0 to 7.0 m.

Distribution in Ukraine: Common in the northern (Polissia), western and central (Forest-Steppe) regions.

Phytosociological materials: Borysova & Iakushenko 2008 (P. 230, Table 2, rel. 1-2), Borysova & Chorna 2011 (P. 108, Table 1, rel. 3-5). See also Table 1, column 5 *hoc loco*.

5. *Charetum intermediae* (Corillion 1957) Fijałkowski 1960

Synonym: *Charetum aculeolatae* Corillion 1957, *Magnocharetum aculeolatae* Corillion 1957, *Charetum aculeolatae* Dąbbska 1966 prov.

Diagnostic species: *Chara intermedia*.

Habitats: Shallow mesotrophic neutral low-calcium lakes and pools with silty-peat deposits, drainage channels on the fens and bogs, from 0.5 to 1.7 m depth.

Distribution in Ukraine: Sporadically in the Forest-Steppe area and in the Western Polissia (Volyn

Region). Protected in the Shatsk National Nature Park.

Phytosociological materials: Borysova & Chorna 2011 (P. 109, Table 2, rel. 3-5), also – rel. 139, 19.07.2005, Volyn Region, Shatsk district, Shatsk National Nature Park, Lake Svitiáz, Buzhnia bay. Relevé area – 10 m², depth – 1.5 m, surface cover – 15%, total cover – 100%. *Potamogeton natans* L. – 10%, *Hydrocharis morsus-ranae* L. – 1%, *Nymphaea candida* C. Presl – 5%; *Chara intermedia* – 80%, *Ch. delicatula* – 20%, *Nitellopsis obtusa* – +, *Utricularia minor* L. – 10%. D. Iakushenko (unpubl.).

6. *Charetum rudis* Dąbbska 1966

Diagnostic species: *Chara rudis*.

Habitats: Mainly in small ponds, from 0.3 to 1.5 m depth, with springs on the bottom and clear, highly transparent water with low nutrient contents, on highly hydrated organic substratum.

Distribution in Ukraine: Very rare, only one locality known in vicinities of Kniazhdvir village (Ivano-Frankivsk Region). This association is reported for Ukraine for the first time.

Phytosociological materials: 03.06.2008, Ivano-Frankivsk Region, Kolomyia district, Kniazhdvir village, shallow part of the small pond with bottom spring. Relevé area – 25 m², depth – 0.4 m, total cover – 80%. *Chara rudis* – 70%, *Potamogeton trichoides* Cham. & Schltld. – 10%, *Myriophyllum spicatum* L. – +. D. Iakushenko (unpubl.).

7. *Charetum tenuispinae* Dąbbska 1966 ex Tomaszewicz 1979

Synonyms: *Charetum tenuispinae* Dąbbska 1966 prov.

Diagnostic species: *Chara tenuispina*.

Habitats: Drainage channels and small ponds with slow-flowing water and peaty bottom deposits in carbonate fens, at 0.5-1.0 m depth.

Distribution in Ukraine: Rare, mainly in vicinities of Brody (Lviv Region).

Phytosociological materials: Borysova & Chorna 2011 (P. 109, Table 2, rel. 1).

8. *Charetum vulgaris* Corillion 1957

Synonyms: *Chara-Tolypelletum glomeratae* Corillion 1957 p.p., *Thero-Charetum vulgaris* Krause 1969, *Charetum vulgaris* Zutshi 1975

Diagnostic species: *Chara vulgaris*.

Habitats: Standing neutral or slightly alkaline eutrophic and mesoeutrophic shallow water bodies with silty, sandy or silty-peat deposits, from 0.2 to 1.5 m in depth.

Distribution in Ukraine: Common in the central and western regions, sporadically in the northern areas (Polissia).

Phytosociological materials: Borysova & Chorna 2011 (P. 108, Table 1, rel. 6-11); Iakushenko *et al.* 2011 (P. 282, Table 9.18, rel. 10-13, P. 285, Table 9.19, rel. 6, 18). See also Table 1, columns 1-2 *hoc loco*.

9. *Lychnothamnium barbati* (Gołdyn 1984) Brzeg
et M. Wojterska 2001

Diagnostic species: *Lychnothamnium barbatus*.
Habitats: Mesotrophic lakes with muddy bottom
deposits at the depth from 1.5 to 7.0-10.0 m.

Distribution in Ukraine: Very rare in Volyn
Region (Svitiaz Lake). Protected in the Shatsk National
Nature Park.

Phytosociological materials: Borysova &
Iakushenko 2008 (P. 230, Table 2, rel. 8-9).

10. *Nitellopsidetum obtusae* (Sauer 1937)
Dąbska 1961

Synonym: *Chareto-Nitellopsidetum obtusae* J.
Blažencić 1983 p.p.

Diagnostic species: *Nitellopsis obtusa*.

Habitats: Eu-mesotrophic and eutrophic standing
water bodies (lakes, river oxbows) with deep muddy
deposits.

Distribution in Ukraine: Sporadically in
Polissia. This species is listed in the Red Data Book of
Ukraine (2009). This association is reported for Ukraine
for the first time.

Phytosociological materials: Table 1, col-
umn 6 *hoc loco*.

Nitellion flexilis Krause 1969

Synonyms: *Nitellion flexilis* Corillion 1957,
Nitellion Segal 1965, *Nitellion* Dąbska 1966 prov.,
Nitellion syncarpae-tenuissimae Krause 1969.

Diagnostic species: *Nitella flexilis*, *N. gracilis*,
Nitella mucronata, *N. syncarpa*.

Submerged charophytes communities dominated by
Nitella species in acidic to neutral, low nutrient, car-
bonates poor, shallow water bodies.

11. *Nitelletum flexilis* Corillion 1957

Synonym: *Nitelletum flexilis* (Corillion 1957)
Dąbska 1966

Diagnostic species: *Nitella flexilis*.

Habitats: Shallow, slightly acidic forest pools, open
pits, ephemeral water bodies with sandy-silty bottom
deposits.

Distribution in Ukraine: Sporadically in the
Right-Bank Polissia (Volyn, Rivne and Zhytomyr Re-
gions). Protected in the Rivne and Cheremskyi Natural
reserves.

Phytosociological materials: Table 1,
column 3 *hoc loco*.

12. *Nitelletum gracilis* Corillion 1957

Synonym: *Nitelletum gracilis* Tomaszewicz 1979

Diagnostic species: *Nitella gracilis*.

Habitats: Shallow standing acidic water bodies (for-
est ponds) with silty or sandy bottom deposits.

Distribution in Ukraine: only one locality
on the Western Polissia (the Rivne Natural Reserve) is
known so far. *Nitella gracilis* is listed in the Red Data
Book of Ukraine (2009) and in the Red List of *Charales*
in Ukraine (Palamar-Mordvintseva & Tsarenko 2004b).
This association is reported for Ukraine for the first time.
Phytosociological materials: 14.07.2009,
Rivne Region, Rivne Natural Reserve, Karasyn forestry,
q. 22; ephemeral brown-colored humic waterbody on
ground road with hard sandy bottom. Relevé area – 1 m²,
depth – 0.1 m, cover – 70%. Aggregation (monodo-
minant stand) of *Nitella gracilis* – 70%. D. Iakushenko
(unpubl.).

13. *Nitelletum mucronatae* Corillion
et Guerlesquin 1972

Synonym: *Nitelletum mucronatae* Tomaszewicz
1979 ex Hrivnák *et al.* 2001

Diagnostic species: *Nitella mucronata*.

Habitats: Standing shallow humic pools, eutrophic
bogs, ephemeral water bodies, open pits with silty-peat
deposits and detritus, from 0.5 to 1.5 m depth.

Distribution in Ukraine: Sporadically in
Polissia and Forest-Steppe regions.

Phytosociological materials: Borysova &
Chorna 2011 (P. 108, Table 1, rel. 1-2).

14. *Nitelletum syncarpae* (Corillion 1957)
Dąbska 1966

Synonym: *Nitelletum syncarpo-tenuissimae* Krause
1969

Diagnostic species: *Nitella syncarpa*.

Habitats: Shallow (up to 0.3 m depth) littoral plots
with sandy deposits in mesotrophic lakes.

Distribution in Ukraine: Very rare, known
in Volyn Region (Lake Svitiaz). Protected in the Shatsk
National Nature Park.

Phytosociological materials: Borysova &
Iakushenko 2008 (P. 229, Table 1, rel. 1).

4. Discussion

The first challenge, connected with the charophyte
syntaxonomy, was to choose the accepted name for the
class according to the ICPN rules. Despite the fact that
the name *Charetea fragilis* Fukarek 1961 is commonly
used in scientific literature (Schaminée *et al.* 1995;
Otahefova 2001; Hrivnák *et al.* 2005; Gąbka 2010; etc.),
we support the well-argued opinion of Czech colleagues

that the accepted name for this class is *Charetea* Fukarek ex Krausch 1964 (according to art. 2b ICPN) (Šumberová *et al.* 2011). Also we agree with the opinion that there are not sufficient floristic and nomenclatural criteria for the recognition of neither the distinct order *Nitelletalia flexilis* Krause 1969, nor the alliances *Nitellion syncarpae-tenuissimae* Krause 1969 and *Charion vulgaris* (Krause ex Krause et Lang 1977) Krause 1981.

The other problem is that less than one hundred phytosociological relevés are currently available from the studied area and only a minor part of them are published, so the present syntaxonomical scheme is not adequate to the charophytes species richness of Ukraine. The prodromus of the Ukrainian plant communities of the class *Charetea* is preliminary and includes 14 associations so far. The list of diagnostic species consists of about 34 % from the general number of the *Charales* species known in Ukraine (45% from the ones found during recent two decades).

Nevertheless, it covers the communities typical for Ukrainian territory occurring more frequently in all its parts or in some separated regions. Associations such as *Charetum globularis*, *Charetum contrariae*, and *Charetum vulgaris* are found elsewhere in Ukraine. However, *Charetum globularis* occurs more frequently in the northern, western and central regions; *Charetum vulgaris* – in the central and southern areas; *Charetum contrariae* – elsewhere, but rather seldom. The distribution of the other associations is restricted to only some regions of Ukraine. For example, *Charetum delicatulae* and *Nitelletum flexilis* occur mainly in the north-western and northern regions, respectively.

The syntaxonomical scheme also includes such associations as: *Charetum rudis*, *Charetum tenuispinae*, *Lychnothamnetum barbati*, *Nitelletum gracilis*, *Nitelletum syncarpae* whose diagnostic species are rare not only for Ukraine but also for Europe in general. In Ukraine, they were found only in 1-2 localities.

Thus, even this preliminary prodromus displays a rather rich diversity of syntaxa due to a high variety of geographic, climatic and hydrological conditions. In the near future, it could be amended by some new syntaxa, after conducting the phytosociological investigations of the charophyte species whose capacity to form stands and chorology are well known from previous studies. Recurrent studies are also necessary due to a disappearance of most species caused by anthropogenic transformation of their habitats. Among them, the most interesting species are: *Chara hispida* L. and *Lamprothamnium papulosum* which were widely distributed in the early twentieth century through South Ukraine (Podlessky 1936; Pogrebnyak *et al.* 1973; Maslov & Borysova 2008), *Chara connivens* Salzm. ex A. Braun, *C. neglecta* Hollerb., *Nitella capillaris* (Krock.) J. Groves et Bull.-Webst., rather rare species for Ukrainian territory (Palamar-Mordvintseva & Borysova 2005; Borysova & Orlov 2008); *Tolypella prolifera* (Ziz ex A. Braun) Leonh., occurs scarcely in the south-east regions (Borysova 2005), as well as *Chara uzbekistanica* Hollerb., inhabits mainly in the lake Yalpuh (Odesa region) (Tkachenko 2005). New research focused on the description of community structure and environmental conditions in various water bodies and different geographical regions is urgently needed.

5. Conclusion

The preliminary prodromus of the charophyte communities from the territory of Ukraine is presented. For the first time, 3 associations (*Charetum intermediae* (Corillion 1957) Fijałkowski 1960, *Charetum rudis* Dąbwska 1966, *Nitelletum gracilis* Corillion 1957) are indicated for the investigated area. The syntaxonomical scheme consists of 14 associations, 2 alliances and 1 order within the class *Charetea* Fukarek ex Krausch 1964.

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