



Typification of *Chara* (*Charales*, *Charophyceae*) species described by C.F. Lessing, F.J. Ruprecht and M.M. Hollerbach

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The original material for some charophyte species described by Lessing (1835), Ruprecht (1845) and Hollerbach (1960) was located in the Herbarium of the Komarov Botanical Institute of the Russian Academy of Sciences (LE) in attempt to clarify their nomenclature and taxonomy. Study of the original material allowed designation of lectotypes here in accordance with ICN Art. 9.3 (Turland & al., 2018). The specimens are stored in paper envelopes, but the envelope labels are usually not the original ones, and both labels are cited below. Russian text in labels is reproduced with a translation in brackets. LE barcodes are indicated for each specimen.

Chara commutata Ruprecht 1845: 9

Lectotype (here designated): [Russian Federation, Saint Petersburg] ad viam Peterhofianam, pr. Ulianka / 17 Juni 1839 / Grewenitz (LE A0000405)

Current name: *Nitella flexilis* (Linnaeus) C.Agardh 1824: 124. Conserved type (Gregor & al. 2019: 1363): [United Kingdom, England], E. Sussex, Catsfield [nr. Battle] / “595” [Mai 1895] / Salmon (BM barcode BM013735408)

Specimens in the protologue: ‘*Petropoli: in aquis dulcibus stagnantibus* (Hb. Acad.! L. Bar. Grewenitz!); *Pskow* (Hb. excell. Fischer!); Kamtschatka: *in aquis stagnantibus ad promontorium Lopatka*. (Rieder! in Hb. horti Imp. bot.)’.

Syntypes (LE!): 1. Authentic label: *Chara commutata* Rupr. (*Ch. flexilis* Al.Br. et auct. non) / ad viam Peterhofianam, pr. Ulianka / 17 Juni 1839 / Lib. Barok [Baron?] Grewenitz legit et edit 1845. Envelope label: *Nitella flexilis* (L. ex p.) Ag. (*Chara commutata* Rupr.) / Ленинградская обл., по Петергофскому шоссе около Ульянки [Leningrad Oblast, along Petergof highway, near Ul'yanka] / 17.VI.1839 / Leg. et det. Grevenitz / T[este] М.М.Голлербах [M.M.Hollerbach] / LE A0000405. 2. Authentic label: *Chara flexilis* Auct. et *Ch. capillacea* Thuill. mixtae (Rupr[echt]) No. 2. *Callitriche verna* β *minima* Fl. Suec. γ *minima* Fl. Lapp. / [several illegible words] bei der Lopatka. Kamtschatka / 1883 / Rieder. Envelope label: *Nitella flexilis* var *Frieri* Groves / Камчатка [Kamtchatka] / 1883 / Rieder / det. М.Голлербах [M.M.Hollerbach], 09.XI.1950 / LE A0000404. – Entangled with *C. globularis* Thuill.

Comments: The third syntype indicated in the protologue (‘Pskow (Hb. excell. Fischer!)’) was not found at LE. Additionally, one specimen referred by Ruprecht to *C. commutata* but not cited in the protologue was located in LE: Authentic label: *Chara commutata* (*flexilis*) / Isthmus Kareliae pr. Kivinemi / 9 Aug. 1845 / Ruprecht. Envelope label: Карелия, возле Кивинемии [Karelia, near Kivinemi] / 9.VIII.1845 / Ruprecht / det. Ruprecht / T[este] М.М.Голлербах [M.M.Hollerbach] / LE A0000406. – *N. flexilis* (*C. commutata* Rupr.), det. М.М.Голлербах. *N. flexilis* vel *opaca* sterile, det. R.E.Romanov. One of two located syntypes contains both *N. flexilis* and *C. globularis*. The other specimen referred by Ruprecht to *C. commutata* but not listed in its protologue is sterile. Therefore, specimen from Saint Petersburg was selected as a lectotype.

Chara condensata Ruprecht 1845: 10

Lectotype (here designated): [Kazakhstan, East Kazakhstan Region, formerly Dzhungaria] [near Naryn River] на берегу реки [at river bank] [illegible words] тучной земли [rich soil] / Августа [August] 18[illegible characters] [18.VIII.1838] / no collector (LE A0000403)

Current name: *Nitella hyalina* (De Candolle) C.Agardh 1824: 126. Lectotype (Wood in Wood & Imahori 1965: 660): Lac de grand lieu / 1805 / Hectot (**G-DC**)

Specimen in the protologue: ‘*Songaria ad fl. Narym d. 18 Augusti mensis.* (Hb. Acad.)’.

Original material (**LE!**): Authentic labels: 1. *Chara tenuissima* Desv. β *major* Bongard et Meyer. Suppl. alter. in fl. alt. No. 330. *Chara condensata* Rupr. / Altai. 2. на берегу реки [at river bank] [illegible words] тучной земли [rich soil] / Августа [August] 18[illegible signs] / No. 327. No. 538 [illegible word]. Envelope label: *Nitella hyalina* Ag. (*sub nom. Chara tenuissima* Desv. β *major* et *Chara condensata* Rupr.) / Джунгария, у реки Нарым [Dzhungaria, near Narym River] / 18.VIII.1838 / Ruprecht? / det. М.М.Голлербах [M.M.Hollerbach], 16.VI.1933 / **LE** A0000403.

Comments: In addition, a single specimen referred by Ruprecht to *C. condensata* but not cited in the protologue was located at **LE**: Authentic label: *Chara condensata* Rupr. (*spec. juvenilis*) / [illegible words] Alakulj / 15 Juli [1842] / leg. Schrenk / CW. Cat[.] No. 3892. Envelope label: *Nitella hyalina* (D.C.) Ag. (= *Chara condensata* Rupr.) / Songaria, am Alakulj / 15.VII.1842 / Schrenk / det. М.М.Голлербах [M.M.Hollerbach], 10.VII.1945 / **LE** A0000418.

Chara eremosperma Ruprecht 1845: 12

Lectotype (here designated): [Kazakhstan, East Kazakhstan Oblast], Songaria: *ad fluv. Narym* / no date / Politow (**LE** A0000407)

Current name: *Chara braunii* C.C.Gmelin 1826: 646. Neotype (designated by Wood in Wood & Imahori 1965: 262): *Prope Oldenico (ditiō. Vercellensis) / Malinverni / aestate* 1856 (**NY00945633**) = *Chara coronata* Ziz ex Bischoff 1828: 3. Type not currently designated. = “*Chara songarica*” Ruprecht *nom. inval.* unpublished herbarium designation (**LE!**)

Specimen in the protologue: ‘*Songaria: ad fluv. Narym.* (Hb. Acad.)’ and another studied specimen: ‘*ex Astrachanensi ditiōne in Hb. Fisheriano vidi*’.

Original material (**LE!**): Authentic label: / *Chara (Charopsis) n. sp. (Charae tenuissimae β majori* B[ongard] et Meyer Suppl. *admixta* [illegible word]) / Songaria: *ad fluv. Narym* / no date / Politow leg. *Chara songarica* Rupr. – at one of the sheets. Envelope label: *Chara coronata* Ziz. Songaria: *ad fluv. Narym* / no date / Politow [Politow] / det. A.Braun / **LE** A0000407.

Determinative slips: 1. *Chara (Charopsis) songarica* Ruprecht 2. *Chara coronata* Ziz, [C.] *Braunii* Gmel. var. *Ch. eremosperma* Rupr. Beitr., *Ch. songarica* Rupr. / A.Braun / Herb. A.Braun.

Comment: Material from the Astrakhan Oblast, Russian Federation, was not found at **LE**.

Chara glomerulifera Ruprecht 1845: 7

Current name: *Tolypella glomerata* (Desvaux) Leonhardi 1863: 129

Specimen in the protologue: ‘*In aquis pigris deserti Cumani* (Hb. M. Bieb.)’.

Comment: Original material was not found at **LE** to date and a type has not been designated.

Chara interrupta Ruprecht 1845: 11

Lectotype (here designated): [Kazakhstan, Karagandy Oblast], Dshilantschik [River] / 25 Jul[i] [18]42 / Schrenk (**LE** A0000413)

Isolectotypes: [Kazakhstan, Karagandy Oblast], Dschilantshik / 1842 / Schrenk (**LE** A0000402). [Kazakhstan, Karagandy Oblast], Songaria. In Dschilantschik / 25 Jul. 1842 / [Schrenk] (**LE** A0000415)

Current name: *Nitella hyalina* (De Candolle) C.Agardh 1824: 126. Lectotype: (for *Chara hyalina* De Candolle) designated by Wood in Wood & Imahori 1965: 660): *Lac de grand lieu* / 1805 / Hectot (**G-DC**)

Specimen in the protologue: ‘*Songaria: ad fl. Dshilantschik.* (Exped. Schrenk!)’.

Original material (**LE!**): 1. Authentic labels: 1.1. *Najas major?* *Chara (Nitella) interrupta* Ruprecht / Dshilantschik / 25 Jul[i] [18]42 / Schrenk / No. 42. 1.2. *Chara interrupta* Rupr. / Schrenk / No. 42., CW. Cat. No. 3889. Envelope label: *Nitella hyalina* (D.C.) Ag. (= *Chara interrupta* Ruprecht) / Dshilantschik / 25.VII.1842 / Schrenk / det. М.М.Голлербах [M.M.Hollerbach], 06.VII.1945 / **LE** A0000413. 2. Authentic label: *Chara interrupta* Ruprecht / Songaria. In Dschilantschik / 25 Jul. 1842 / M. 1847. Envelope label: *Nitella hyalina* (D.C.) Ag. (= *Chara interrupta* Ruprecht) / Songaria. In Dshilantschik / 25.VII.1842 / Schrenk / det. М.М.Голлербах [M.M.Hollerbach], 04.VII.1945 / **LE** A0000415. 3. Authentic label: *Chara* / Dschilantshik [Dshilantschik] / 1842 / Schrenk. Envelope label: *Nitella hyalina* Ag. / Dschilantschik [Dshilantschik] / 1842 / Schrenk / det. Vilhelm / **LE** A0000402. 4. Authentic labels: 4.1. *Chara (Nitella) interrupta* Rupr. N. Dshilantschik / 25 Jul. 1842. 4.2. *Chara condensata* Rupr. (*spec. juvenilis*) / Songaria, in [illegible words] Alakulj / 15 Juli. *Determinavit* slip: *Nitella hyalina* (De Cand.) A.Br., *Ch. (Nit.) condensata et interrupta* Rupr. / A.Br[un]. Envelope label: *Nitella hyalina* (D.C.) Ag. (= *Chara interrupta* Rupr.) In aq. fl. Dshilantschik / 25.VII.1842 / Schrenk / det. A.Braun / **LE** A0000414.

Comments: The original material of *C. interrupta* is stored in four envelopes, but one of them includes labels contradicting one other (No. 4). The specimen in the best condition was selected as a lectotype.

Chara karelinii Lessing 1835: 213 ('*Karelini*')

Lectotype (here designated): [Kazakhstan, Atyrau Oblast], in aquis ad osti fluvii Ural / no date [1832] / G. Karelin (**LE** A0000408)

Isolectotype: [Kazakhstan, Atyrau Oblast], устье Урала [mouth of Ural River] / 1832 / Karelin (**LE** A0000412)

Current name: *Chara canescens* Loiseleur 1810: 139 Lectotype (designated by Wood in Wood & Imahori 1965: 159): *in aquis stag. circa Tolonum* / no date / no collector (**PC**, herb. Desvaux)

Specimen cited in the protologue: '*Pr. Gurief in mari Caspio legit cl. Karelin*'.

Original material (**LE!**): 1. Envelope with three sheets inside, two of them with authentic labels/ 1.1. *Chara crinitae* Wallr. var., *C. karelinii* Less. in lett. / устье Урала [mouth of Ural River] / 1832 / Karelin / Hb. Fischer. 1.2. *Chara crinitae* var. / In aquis ad ostia fluvii Ural / no date / Leg. G. Karelin / Reliq. Fischer. Envelope label: *Chara crinita* Wallr. / устье Урала [mouth of Ural River] / 1832 / Карелин [Karelin] / **LE** A0000412. – This envelope has entangled *C. canescens* and *C. aspera* var. *subinermis* Kützing, det. R.E. Romanov. 2. Envelope with two authentic labels inside: 2.1. *Chara Karelini* Lessing, *Chara crinita* var. / In aquis ad osti fluvii Ural / no date / leg. G. Karelin 2.2. *Chara crinitae* Wallr. var., *Chara Karelinii* n.s. / Устье Урала [Mouth of Ural River] / no date / Karelin / Hb. Fischer. Acc. 1833 [received by the herbarium in 1833] / Al.Braun. – It was inscribed in various inks by different persons. Envelope label: *Chara crinita* Wallr. var. / no locality / no date / no collector / **LE** A0000408.

Comment: The original material contains both female and male plants and was stored in two envelopes. One of them also contains *C. aspera* var. *subinermis* Kützing. Accordingly, the envelope with only *C. canescens* was recognised as a lectotype. This species was described under name '*Chara Karelini*'.

Chara locuples Hollerbach 1960: 105, figs. 14–26

Lectotype (here designated): [Kazakhstan, Akmola Oblast] Заповедник «Боровое», оз. Большое Чебачье, против «Холодного» ключа под г. Синюха, гл. 3 м [Reserve 'Borovoe', Lake Bol'shoe Chebach'e, in front of 'Kholodny' spring at the foot of Sinyukha Mountain, 3 m depth] / 07.VIII.1948 / Л.Демченко [L.Demczenko] (**LE** A0000409).



Current name: *Chara strigosa* A.Braun 1847: 16. Neotype (designated by Wood in Wood & Imahori 1965: 208): Thumsee bei Reichenhall / August und Anfang September 1869 / A.Braun / Braun, Rabenhorst & Stizenberger, Characeen Eur. 92 (NY00945627)

Specimens in the protologue: ‘*Kazachstania, regio Cocczetavensis, reservatio ‘Borovoje’, lacus Coturcul (in parte occidentali, 3 m alt.)*. L. Demczenko 25 VIII 1948 legit (plantae numerosae, completae). *Ibidem, lacus Boljshoje Czebaczje (sub monte Sinjucha, 3 m alt.)*. L. Demczenko 7 VIII 1948 legit (caules aliquot steriles)’.

Syntypes (LE!): 1. *Chara locuples* Hollerb. sp. nov. / Заповедник «Боровое», оз. Котуркуль, западная часть, гл. 3 м [Reserve ‘Borovoe’, Lake Koturkul’, western part, depth 3 m] / 25.VIII.1948 / No. 3. Л.Демченко [L.Demczenko] / Det. М.М.Голлербах [M.M.Hollerbach] 24.VIII.1949. Envelope label: *Chara locuples* Hollerb. sp. nov. / Каз. ССР. Кокчетавская обл., заповедник «Боровое», оз. Котуркуль, зап. часть [Kazakhstan SSR, Kokchetav Oblast, ‘Borovoe’ Reserve, Lake Koturkul’, western part] / 25.VIII.1948 / Л.Демченко [L.Demchenko] / LE A0000409. 2. *Chara fragilis* Desv. f. *humilis* Mig. steril., *Chara locuples* Hollerb. sp. nov. Заповедник «Боровое», оз. Большое Чебачье, против «Холодного» ключа под г. Синюха, гл. 3 м [Reserve ‘Borovoe’, Lake Bol’shoe Chebach’e, in front of ‘Kholodny’ spring at the foot of Sinyukha Mountain, 3 m depth] / 07.VIII.1948 / No. 7. Л.Демченко [L.Demczenko] / teste М.Голлербах [M.M.Hollerbach]. Envelope label: *Chara fragilis* Desv. f. *humilis* Mig. steril., *Ch. locuples* Hollerb. sp. nov. / Каз. ССР. Кокчетавская обл., заповедник «Боровое», оз. Большое Чебачье под г. Синюха [Reserve ‘Borovoe’, Lake Bol’shoe Chebach’e, at the foot of Sinyukha Mountain, 3 m depth] / 07.VIII.1948 / Л.Демченко [L.Demchenko] / 09.IX.1949, опр. М.М.Голлербах [det M.M.Hollerbach] / LE A0000420.

Comments: One of the syntypes contains fertile plants, whereas the other one consists of sterile plants mixed with *C. globularis*. Therefore, the first specimen was designated as a lectotype. *Chara locuples* is a morphotype of *C. strigosa* with mostly or solely haplostephanous stipulodes, a trait occurring with variable frequency over species distribution range; both haplostephanous and diplostephanous stipulodes can occur within the same plant (Romanov & al., 2014; Romanov, unpubl. data).

Chara longifurca Ruprecht 1845: 10

Lectotype (here designated): [Kazakstan, East Kazakhstan Oblast], Songaria: ad fl. Narym / no date / Politow (LE A0000416)

Current name: *Nitella mucronata* (A.Braun) Miquel in H.C.Hall 1840: 428 Neotype (designated by Wood & Imahori 1965: 504): Salem / Oktober 1858 / Jack / Braun, Rabenhorst & Stizenberger, Characeen Eur. 30 (NY)

Specimen in the protologue: ‘*Songaria ad fluv. Narym. (Hb. Acad.!)*’.

Original material (LE!): *Chara (Nitella) cuspidata* Rupr. f. *longifurca* [illegible word] in *Symb.* p. 78, *admixta* [illegible word] *C. tenuissima* β *major* B. et M. in *Suppl.* / Songaria: ad fl. Narym / no date / Politow leg. This envelope contains partly illegible determinative slip by A.Braun with statement about similarity with *Chara flabellata* Rchb. Envelope label: *Nitella mucronata* A.Braun. (под назв. [under] *Chara longifurca* Rupr.) / Songaria: ad fl. Narym / no date / Politow / det. Ruprecht / T[este] М.М.Голлербах [M.M.Hollerbach] / LE A0000416.

Chara spinosa-vaillantii Ruprecht 1845: 15

Lectotype (here designated): [Latvia], Curonia, Durben [Durbe] / no date / Fleischner (LE A0000411)

=*Chara subspinosa* Ruprecht 1846: 225; Lectotype: (designated by Gregor & al. in *Arbeitsgruppe Characeen Deutschlands* 2016: 345): *Ex herbario florum ingrisciae; in lacu horti Imp. Gatschinae* / 3. Aug. 1846 / R[uprecht] (LE A0000421) = *Chara hispida* var. *rudis* A.Braun in Braun, Rabenhorst & Stizenberger 1857: no. 4; Lectotype (designated by Wood & Imahori 1965: 145):

In einem Teiche bei Constanz / 1856 / Stizenberger / Braun, Rabenhorst & Stizenberger, Characeen Eur. 4a (NY 9945641) ≡ Chara rudis (A. Braun) Leonhardi 1863: 66, nom. illeg. Specimens in the protologue: ‘Normalis in Curonia pr. Durben, incrustata vel subviridis, subinde etiam var. inflata Wallr.! (Fleischer!); Petropoli in lacu pr. Duderhof! crescit var. tenuior, munda, ramulis tantum 5–7, bracteis nukulâ plerumque brevioribus, an β. gracilis Ag. 1824? – Specimina Dahurica in aquis putridis ad Werchne Angara m. Aug. 1772 a Georgio lecta, nisi acidis olim tractata, var. gymotelem Braunii exhibent, saltem huic proximam; nullibi enim incrustata et caulis apicem versus tantum hispida’.

Syntypes (LE!): 1.1. Authentic label: *Chara hispida* / Curonia / no date / [Fleischer] / *Chara spinosa Vaillantii* R. Symb. P. 83, *Chara hispida* Smith, Wallr. non Linnè et Wahlb[e]rg. The envelope contains two other original labels: [1.1.1] Durben / Dr. Fleischer / No. 7. [1.1.2] Durben / Dr. Fleischer / No. 8. Envelope label: *Chara hispida* Smith, Wallr. non L. / Латвийская ССР: гор. Дурбе (б. Дурбен) [Latvian SSR: town of Durbe (formerly Durben)] / no date / Fleischer / No. 7, 8 / LE A0000411. 1.2. Authentic labels: 1.2.1. [*Chara*] *hispida* / Durben / no date / Dr. Fleischer / No. 5. 1.2.2. Durben / no date / Dr. Fleischer / No. 6 et 7. 1.2.3. *admixta Ch. latifoliae* / Dürben [two illegible words in brackets] / Dr. Fleischer. No. 4. Envelope label: *Chara hispida* / Латвийская ССР: гор. Дурбе (б. Дурбен) [Latvian SSR: town of Durbe (formerly Durben)] / no date / no collector / LE A0000419. 2. Authentic label: *Chara hispida* L. Sm. var. *tenuior* [several illegible letters] / *in lacu pr. Duderhof* / 26 Aug[ust] 1844 / K. et R. Envelope label: *Chara hispida* / Ленингр. Обл.: Дудергоф [Leningrad Oblast: Duderhof] / 1844 / no collector / LE A0000410. 3. Authentic label: *Chara vulgaris* Linn / ad Werchangara, in aquis putridis / Lecta Aug 1772 / [Georgi]. Determinative slip: *Chara hispida* Auct., *Ch. spinosa* Rupr. [Ruprecht] forma *micracantha munda* / A. Braun. Envelope label: Сибирь: Ангара [Siberia: Angara River] / 1772 / no collector / det. A. Braun / LE A0000417. – *C. papillosa* Kützing, det. R. Romanov.

Comments: Because two of the syntypes belong to the same species, and the third one to another, *C. papillosa*, and Ruprecht used the epithet ‘*normalis*’ for the first of syntypes listed in his article, the specimen from Durbe was selected as a lectotype in accordance with Arts 9.3 and 9.14 (Turland & al., 2018). This name was published as ‘*Chara spinosa Vaillantii**’, the asterisk was indicating all new species described by Ruprecht (1845). It could be recognised as a reference to an invalid pre-starting-point polynomial designation of Vaillant (1719, p. 18: ‘*Chara major, caulibus spinosis*’), because Ruprecht listed last polynomial name (without comma) as a synonym. The name ‘*C. spinosa Vaillant ex Ruprecht*’ thus could be tentatively suggested as a validation of Vaillant’s designation, but as such, it should be illegitimate as it is a later homonym of *Chara spinosa* Amici (Amici 1833: 214). But no original material by Vaillant is known and his drawings (Vaillant 1721: plate 3, fig. 3) are not enough to be sure in species identity with specimens by Ruprecht. ‘*C. spinosa Vaillantii*’ seems to be acceptable as a species name published as consisting of two words. In this case it should be hyphenated according the articles 23.1 and 60.11 (Turland et al., 2018). *Chara spinosa-vaillantii* Ruprecht is currently recognised as a synonym of *C. hispida* Linnaeus (see Wood & Imahori, 1965), but a study of original material implemented here has shown that it is conspecific with *C. subspinosa* Ruprecht (Ruprecht 1846: 225), which is the later valid name.

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Agardh, C.A. (1824). *Systema algarum*. pp. [i]-xxxvii, [1]-312. Lundae [Lund]: Literis Berlingianis [Berling].



- Amici, G.B. (1827). Descrizione di alcune specie nuove di *Chara* ed ossevazioni microscopiche sulle medesime. *Memorie della Reale Accademia di Scienze, Lettere ed Arti di Modena* 1(I/II): 199-221, 5 pls.
- Arbeitsgruppe Armleuchteralgen Deutschland (2016). *Armlauchteralgen, Die Characeen Deutschlands*. pp. [i]-xviii, 1-618. Berlin Heidelberg: Springer Spektrum.
- Bischoff, G.W. (1828). *Die kryptogamische Gewächse mit besonderer Berücksichtigung der Flora Deutschlands und der Schweiz, organographisch, anatomisch, physiologisch und systematisch bearbeitet. 1: Die Chareen und Equiseteen*. Nürnberg: Johann Leonhard Schrag.
- Braun, A. (1849). Uebersicht der Schweizerischen Characeen. Ein Beitrag zur Flora der Schweiz. *Neue Denkschriften der Allgemeinen Schweizerischen Gesellschaft für die Gesamten Naturwissenschaften*. 10(3): 1-23.
- Braun, A., Rabenhorst, L. & Stizenberger, E. (1857-1878). *Die Characeen Europas*. Fasc I-V. Dresden. Fasc. I: 1-25 (1857); II: 26-50 (1859); III: 51-75 (1867); IV: 76-100 (1870); V: 101-121 (1878). Dresden.
- Gmelin, C.C. (1826). *Flora Badensis, Alsatica et confinium regionum cis et transrhenana plantas a lacu Bodamico usque ad confluentem Mosellae et Rheni sponte nascentes: exhibens secundum systema sexuale cum iconibus ad naturam dileneatis*. Vol. 4. Carlsruhae: In Officina Aul. Mülleriana.
- Gregor, T., Blindow, I., Casanova, M.T. & Schubert, H. (2019). (2721) Proposal to conserve the name *Chara flexilis* (*Nitella flexilis*) (Characeae) with a conserved type. *Taxon* 68: 1363-1364.
- Hall, H.C. (1840). *Flora belgii septentrionalis sive florae batavae compendium* Vol. II, pars II continens lichenes et algas. pp. i-xvi, 1-477, [1-4]. Te Amsterdam: bij J.C. Sepp.
- Hollerbach, M.M. (1960). De speciebus novis generis *Chara* e sectione Haplostephanae Triplostichae. *Botanicheskije materialy otdela sporovyh rastenii Botanicheskogo Instituta imeni V. L. Komarova Akademii Nauk SSSR / Notulae Systematicae e Sectione Cryptogamica Instituti Botanici nomini V.L. Komarovii Academiae Scientiarum URSS* 13: 101-107. [In Russian and Latin]
- Leonhardi, H.F. v[on] (1863). Die bisher bekannten Oesterreichischen Armleuchter-Gewächse besprochen von morphogenetischen Standpunkte. *Sitzungsberichte Verhandlungen des naturforschenden Vereines in Brünn* 2: 122-224.
- Lessing, C.F. (1835). Beitrag zur Flora des südlichen Urals und der Steppen. *Linnaea* 9(2): 145-213.
- Loiseleur Deslongschamps, J.L.A. (1810). *Notice sur les plantes à ajouter à la flore de France (Flora Gallica) avec quelques corrections et observations*. pp. 1-172, 21 pls. Paris: J.B. Sajou.
- Romanov, R.E., Chemeris, E.V., Vishnyakov, V.S., Chepinoga, V.V., Azovskii, M.G., Kuklin, A.P., Timofeeva, V.V. (2014). *Chara strigosa* (Streptophyta: Charales) in Russia. *Botanicheskii zhurnal* 99(10): 1148-1161. [In Russian]
- Ruprecht, F.J. (1845). Distributio cryptogamarum vascularium in Imperio Rossico. *Beiträge der Pflanzenkunde des Russischen Reiches*. Dritte Lieferung. pp. [1]-56. Petropoli [St Petersburg]: Buchdruckerei der Kaiserlichen Akademie der Wissenschaften.
- Ruprecht, F.J. (1846). *Symbolae ad historiam et geographiam plantarum Rossicarum*. pp. [1]-242, 6 pls. Petropoli [St Petersburg]: typis et impensis academinae imperialis scientiarum.
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F., editors (2018). *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code)* adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. *Regnum Vegetabile*, Vol. 159. pp. [i]-xxxviii, 1-253. Glashütten: Koeltz Botanical Books.
- Vaillant S. (1721). Caracteres de quatorze genres de plantes: le dénombrement de leurs espèces; les descriptions de quelques-unes, & les figures de plusieurs. *Mémoires de l'Académie royale des*



sciences (Paris) 1719: 9-47, pl. I-IV.

Wood, R.D. & Imahori, K. (1965). *A revision of the Characeae*. First Part. Monograph of the Characeae. pp. i-xxiv, 1-904. Weinheim: Verlag von J.Cramer.