

AN HISTORICAL REVIEW OF THE IDENTIFICATION OF THE NETHERLANDS' CHAROPHYTA

by

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In 1938, Verdam published an account of the then-known Charophyta of the Netherlands in the English language (cf. this journal, vol. 3), and one year later (1939) another in our own language in "Nederlandsch Kruidkundig Archief". In both papers reference was made to only five Netherlands' publications on the same subject, the oldest of which is dating from 1846. In studying i.a. the history of the Malaysian Charophyta (Zaneveld, 1940) I found that much more was published on the Charophyta of our Low Countries. As will be seen below, it became evident that the first printed record of a Netherlands' Charophyte dates as far back as 1636. It seems worth while to publish these notes on the history of the identification of our Charophyta as, moreover, a number of additional facts have become known.

The data of the present review have been taken from the following sources (chronologically arranged): 1. herbals; 2. catalogues of Botanic Gardens; 3. local floras; 4. general floras and taxonomic textbooks; 5. monographs.

I. The XVIth and XVIIth centuries.

1. Data from herbals. The well-known Netherlands' physician, Rembertus Dodoens or Dodonaeus (*1516, †1585), in 1582 appointed professor of botany at the Leiden University, was the first to draw attention in our own language (instead of the usual Latin) to a foreign plant, which afterwards was identified as *Chara vulgaris* L. Properly speaking, this was not done by Dodoens himself, but by J. van Ravelingen, who translated and revised Dodoens' "Stirpium historiae Pemptades sex" of 1583 and published it under the name of "Cruydt-Boeck". In the 2nd and 3rd revisions of 1618 and 1644 respectively — not in the first of 1608 — reference is made to the "Stinkende Peerdsteert-cruydt" (Stinking Water-Horsetail), described in 1596 by C. Bauhin in the "Phytopinax" as *Equisetum olidum*. The superficial resemblance of the vegetative parts and the occurrence in the same habitat were reasons for formerly placing the Charophyta under the genera *Equisetum* or *Hippuris*.

A corresponding notation is to be found in two herbals of professor Abraham Munting (*1626, †1683) of Groningen, entitled "Waare Oeffening der Planten", edited in 1672, a very useful treatise on general botany, and "Naauwkeurige Beschryving der Aardgewassen", printed in 1696, 13 years after the author's death. In both herbals mention is made to an *Equisetum album tenuifolium minimum*, which was collected at Peize (province of Drente) about 1680. As in the case of Dodoens, the descriptions are too insufficient to identify the species, but there is hardly any doubt that a *Chara* was meant.

2. Data from catalogues of Botanic Gardens. In both centuries the catalogues of the Leiden University Gardens are of primary importance for the knowledge of the occurrence of indigenous plants. The original garden, dating from 1587 (cf. Veendorp & Baas Becking, 1938), issued its first catalogue in 1594, but only in that of 1636 the first Charophyte is mentioned. This catalogue, entitled "Catalogus Plantarum Horti Academici Lugduno-Batavi", published by Adolf de Vorst (Adolf Vorstius, *1597, †1663, professor at Leiden 1625—'63), contains an appendix, in which the wild flora of the neighbourhood of Leiden has been enumerated. In this "Index Plantarum indigenarum, quae in locis paludosis, pratensibus, arenosis, & sylvestribus prope Lugdunum in Batavis nascuntur", one may read on p. 57: "*Equisetum foetidum sub aqua repens Bauh.*". Under this name C. Bauhin published in 1620 a plant, which, on account of its simultaneously published figure, could be identified as *Chara vulgaris* L. As this paper and the second edition of De Vorst's catalogue are very rare, the picture and the accompanying part of the text are reproduced here. In his first edition (1633) the plant was not yet cited. It will be seen from the reproduction that the arrangement of the plants in this catalogue is merely alphabetical and that no particular system is used.

The same plant is mentioned by the same name in the Leiden Gardens' catalogue of 1668 by Florens Schuyt (*1619, †1669), Horti Praefectus from 1667—'69, and also in Paul Hermann's catalogue (*1640, †1695, praefectus from 1680—'95) of the Leiden Hortus, printed in 1687. In both publications the alphabetical arrangement has been maintained.

3. Data from local floras. As far as I am aware, the first publication in which the flora of a certain locality is enumerated, is that by Hendrik Bruman (*?, †1679), Rector of the Latin Schools at Zwolle. In 1662 he published an: "Index stirpium quae prope Zuollam in Transisalaniam nascuntur". On p. 8 of this alphabetically arranged "Index" *Equisetum foetidum pallustre* is mentioned, another phrase name for *Chara vulgaris* L., which was detected in the vicinity of Zwolle (province of Overijssel).

Fig. 1 (above). — DE VORST's catalogue of 1636: title-page, and part of the text, on which the first Netherlands' Charophyte was mentioned (nat. size).

Fig. 2 (below). — Reproduction of the oldest-known illustration of any Charophyte, probably *Chara vulgaris* L., with accompanying text. From C. BAUHIN, 1620, p. 25 (nat. size).

CATALOGVS
PLANTARVM
HORTI ACADEMICI
LVGDVNO-BATAVI.

Quibus is instructus erat ANNO
CLO I D C XXXV.

Prefecto ejusdem Horti D. ADOLFO
VORSTIO, Medicinæ & Botanices
Professore.

ACCESSIT

Index Plantarum indigenarum, quæ
prope Lugdunum in Batavis
nascuntur.



Lugd. Batavorum,
Ex Officina Elseviriana.
CLO I D C XXXVI.

Equisetum fœtidum sub aqua
repens.

INDIGENARVM. 57

Cicuta serotina minor hirsuta.
Circea.
Cochlearia Batavica.
Convolvulus major, & minor varior. colorum.
Convolvulus nigrum Dod.
Conyza major folio Helenii.
Conyza fastida.
Coronopus repens, & assurgens.
Cotyla fastida, & non fastida fl. alb.
Cotyledon palustris.
Crista Galli.
Cruciata, Gentianella species.
Cyperus aquaticus varia species.
Cynoglossum.

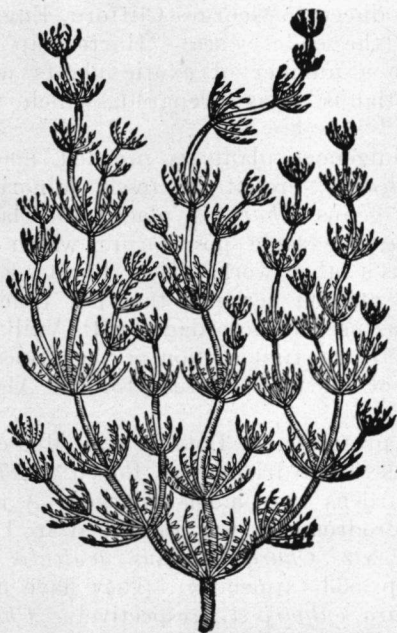
D.

Delphinium ceruleum.
Dens leonis.
Dipsacus sylvestris.
Dracontium aquaticum.
Dulcamara, f. Solanum lignosum.

E.

Echium Alciabiadeum.
Echium Scorpioeides majus, & minus.
Elatine Lobelii.
Ereica scoparia.
Ereica florida.
Eruca sylvestris.
Equisetum mas, femina, & minus.
Equisetum fœtidum sub aqua repens
Bauh.

D 5 Eryn-



V. **EQUISETUM** fœtidum sub aqua repens: Radice est fibrosa, caulibus tenuissimis, rotundis, per obliquum, vt Saccharum penidium, striatis, geniculatis, fragilibus per terram sparsis, quandoq, cubitalibus, in plures cauliculos brachiatis, folijs aliquot breuibz, in breues apices distinctis, ad genicula iunctis. Tota planta fragilis, quæ aquis cœnosis dū innatat viridis est, at extracta & exiccata, incana & friabilis, ita vt non solum digitis in puluerem comminui possit sed sponte in puluerem abeat. Odoris est lutosi & sulphurei. Solum in aquis cœnosis demersum reperitur, quod primum Patauij in fossis Thermarum Aponitarum: dein non longe Lucernæ: tum Basileæ cis pontem Birsæ, Michelsfeldæ & Hunnigæ, in fossis obseruauimus.

4. Data from general floras. For the first time a general review of the Netherlands' flora was published in 1683 by Johannes Commelijn (Joannes Commelinus, a commercial man, *1629, †1692). On p. 31 of his alphabetically arranged "Catalogus Plantarum Indigenarum Hollandiae" *Equisetum foetidum sub aqua repens* is mentioned, occurring in the "waters and ditches". The exact locality is not known, but is probably situated in the province of Noord-Holland, as, in his later years, Commelijn possessed a country-seat near Haarlem, from which excursions were made.

Surveying the seventeenth century we may state that the knowledge of the Charophyta and their distribution was still very poor. During the whole century *Chara vulgaris* L. was the only species known.

II. The XVIIIth century.

1. Data from catalogues of Botanic Gardens. In this century the first mention of any Charophyte is found again in a catalogue of the Leiden Botanic Gardens. In 1710, the famous medical and botanical professor, Herman Boerhaave (*1668, †1738), edited his "Index Plantarum", in which *Equisetum foetidum sub aqua repens* is again cited. In this catalogue the plants are not arranged alphabetically, but mainly in accordance with the systems of Ray and Tournefort. *Chara*, under the name of *Equisetum*, is cited under the "*Plantae Apetalae*".

Quite an event in this century was the visit of Linnaeus to Holland from 1735 until 1738, where he took his doctor's degree at the Harderwijk University and, afterwards, became a student at the University of Leiden. Through Boerhaave, Linnaeus was introduced to Georges Clifford, English Envoy at Amsterdam, who possessed the country-seat "Hartecamp" in the neighbourhood of Haarlem, where a number of exotic plants were cultivated. Here the "Hortus Cliffortianus" was prepared, which was published at Amsterdam in 1737.

In this book also a number of indigenous plants is inserted, among them on p. 477 *Chara caulibus aculeatis*, "crescit in fossis minoribus frequentissima per Hollandiam". The genus *Chara* is placed in Classis XXIV, *Cryptogamia*, under the *Algae*, the same position in which we find it in the first editions of Linnaeus's other works (Gen. Plant., Flor. Lapp., Flor. Suec.). The name *Chara*, printed here for the first time in a publication on Netherlands' plants, was used in accordance with Vaillant, the author of the name *Chara* (1719). In the first edition of the "Species Plantarum" (1753), the starting point of the nomenclature for the *Algae*, this species is named *Chara vulgaris*.

The successor of Boerhaave as a professor in Botany and Medicine and as a praefect of the Leiden Hortus was Adriaan van Royen (*1704, †1779), under whose directorate the Gardens were much enlarged. A new catalogue, entitled: "Flora Leydensis Prodrromus", was published in 1740 in which two *Chara*'s are mentioned, viz. *Chara caulibus aculeatis* on p. 214 and *Chara caulibus laevibus* on p. 533 (appendix). They have now to be named *Chara hispida* L. and *Chara vulgaris* L., respectively. *Chara*

was treated as a genus of the *Algae* and placed in his Classis XIX, "*Cryptantherae*".

In 1747, in "Horti Ultraiectini Index", a catalogue of the Utrecht University Garden published by professor Van Wachendorff (*1702, †1758), four species of *Chara* are mentioned, viz.: 1. *Chara caulibus laevibus* (modern name *C. vulgaris* L.); 2. *Chara aculeis caulinis ovatis* (now *C. tomentosa* L.); 3. *Chara aculeis caulinis capillaribus* (now *C. hispida* L.); 4. *Chara caulium articulis inermibus, diaphanis: superne latioribus* (now *Nitella flexilis* [L.] Ag.). The genus *Chara* is again mentioned under the *Algae* in the Class "*Cryptanthae*". Although Van Wachendorff did not mention it particularly we have to assume that the plants were cultivated. It is a remarkable coincidence that the same four *Chara* species are quoted in the *Flora Suecica* by Linnaeus, which was published two years earlier.

3. **Data from local floras.** A well-known flora of the eighteenth century is the "*Flora Frisica*" by David Meese (*1723, †1770), curator of the University Garden of Franeker, edited in 1760. In this little book the Linnean classification is followed, but not his binomial nomenclature. For the province of Friesland two species (nos 504 and 505) are recorded, viz. *Chara caulibus laevibus* (= *C. vulgaris* L.) and *Chara aculeis caulinis capillaribus confertis* (= *C. hispida* L.).

The most prominent man in the second part of this century is David de Gorter (*1717, †1783), professor at the University of Harderwijk (1743—'54) and personal physician (1754—'64) to the empress Elizabeth of Russia. In his first local flora, "*Flora Gelro-Zutphanica*", published in 1745, only one Charophyte is mentioned, viz. *Chara caulibus aculeatis* (now *C. hispida* L.), collected in pools near the IJssel river. In De Gorter's "*Flora Zutphanica*" of 1781 another species is mentioned, viz. *Chara vulgaris*, collected in similar habitats. In this book the genus *Chara* is no longer arranged under the *Algae*, but, probably in accordance with Reichard's posthumous (7th) edition of the *Genera Plantarum* of 1778, under the *Monandria* of Class XXI, *Monoecia*. At the time the antheridia were considered stamina and the oogonia pistils.

Much more important than these local floras are the general ones of De Gorter, which will be described in the following paragraph.

4. **Data from general floras and taxonomical textbooks.** In his first general flora, the "*Flora Belgica*" of 1767, De Gorter mentions two species, *Chara vulgaris* L. and *Chara hispida* L., both under their phrase and Linnean names. These species are also enumerated in De Gorter's principal work, the "*Flora VII Provinciarum Belgii Foederati indigena*", published in 1781, being an account of all the then-known Netherlands' wild-growing plants and their localities.

The second edition of 1814 did not give any more annotations on the genus *Chara*. The fact that De Gorter did not mention the two other *Chara* species of Van Wachendorff, viz. *Chara tomentosa* and *Nitella flexilis*, corroborate the supposition that these must be considered cultivated ones.

Another work on taxonomic botany and zoology, is "*Natuurlyke Historie*" by M. Houttuyn (*1720, †1794, a physician at Hoorn). It is a

translation and revision in the Netherlands' language of Linnaeus's *Species Plantarum*. Consequently, it is of minor importance for the identification of our flora, as nothing has been said about localities. The same four Charophyta, already cited by Van Wachendorff, are mentioned here (Part 2, 14, 1783). It must be noticed that Houttuyn gives original Netherlands' names which, however, have not come into general use.

Surveying the eighteenth century we may state that only one species had been added to the wild Charophyta flora, viz. *Chara hispida* L. Two other species were mentioned for the first time, viz. *Chara tomentosa* L. and *Nitella flexilis* (L.) Ag. which, however, must be considered cultivated. The number of localities had greatly increased.

As to the place in the system, we observe a regression in the conception, since the Charophyta were no longer considered *Algae* but *Phanerogamae*.

III. The XIXth century.

1. Data from catalogues of Botanic Gardens. In this century the significance of this kind of sources decreases, whereas that of the local floras is raised. As far as I know, there is only one catalogue containing a Charophyte, viz. that by S. J. Brugmans (*1763, †1819), professor at the Leiden University. It was printed in 1819 and contains only one *Chara*, viz. *C. vulgaris* L. (p. 35). It is mentioned under the *Monoecia Monandria*.

Deviating from the sequence hitherto followed, we will at present first review the general works of this century.

2. Data from general floras and taxonomic textbooks. Following Persoon's "*Synopsis Plantarum*" (1805), H. Schuurmans Stekhoven (*1757, †1839), at first horticulturist, later on curator at the Leiden Gardens, published, in 1815 a synopsis on the *Plantae Phanerogamicae*, followed in 1818 by a similar work on the *Plantae Cryptogamicae*. These were written both in the Latin and in the Netherlands' languages. The same two species as mentioned in De Gorter's floras are cited here and, with one exception, the same localities. According to Persoon's *Synopsis*, the genus *Chara* is arranged under the *Monoecia Monandria*.

A work of far-reaching importance for the development of the knowledge of the Netherlands' flora is the "*Flora Belgii Septentrionalis*" by professor H. C. van Hall (*1801, †1874) of Groningen. The Phanerogams were published in Part I in 1825 and 1836, the Cryptogams in Part II in 1832 and 1840. In Part I the plants are arranged according to the sexual system of Linnaeus and, consequently, the Charophyta are mentioned here. Only two species are inserted, viz. *Chara vulgaris* L. and *C. hispida* L.

In Part II of this flora, containing the Cryptogams, the Charophyta are again described (1840), this time by F. A. W. Miquel (*1811, †1871), later professor at Utrecht and at the same time director of the Rijks-herbarium at Leiden. The Charophyta are extensively treated and in the

introduction it is explained that they have to be considered Cryptogams, forming a separate order "Charinae", for which the Netherlands' popular name "*Kranswieren*" (Whorled Algae) was chosen, a very appropriate name, which is still in use.

Miquel distinguishes two genera, viz. *Nitella* and *Chara*, and of these the following species are described (the author's name being often omitted): *N. flexilis* Ag. (present name *N. flexilis* [L.] Ag.); *N. mucronata* (now *N. mucronata* [A. Br.] Miquel¹); *N. mucronata* β *nidifica* (now *Tolypella prolifera* [A. Br.] v. Leonh.); *N. syncarpa* (now *N. syncarpa* [Thuill.] Chevall.); *C. hispida* L. (now ditto); *C. hispida* β *aculeolata* (the specimen proved to be *C. vulgaris* L. f. *longibracteata* [Kg.] Mig.); *C. vulgaris* Ag. (now *C. vulgaris* L.); *C. fragilis* Desv. (now *C. globularis* Thuill., cf. Zaneveld 1940); *C. fragilis* β *capillacea* (now *C. globularis* Thuill. var. *capillacea* [Thuill.] Zanev.). The result of this publication is a sudden rise of the number of indigenous Charophyta, *N. mucronata* β *nidifica*, *N. syncarpa* and *C. fragilis* being additions to our flora. It is a lucky circumstance that most specimens mentioned by Miquel have been preserved and still can be studied.

Another investigator to whom the Netherlands' Algology is much indebted is again a medical man, R. B. van den Bosch (*1810, †1862), who lived at Goes (province of Zeeland). His first contribution to the algal flora appeared in 1846 and was concerning the flora of Zeeland. Three *Chara* species were mentioned, all of them previously known. In 1846 and 1848 Van den Bosch published two contributions to the algal flora of the Netherlands, both in "Nederlandsch Kruidkundig Archief", then the sole journal of the "Nederlandsche Botanische Vereeniging", *N. polysperma* (now *Tolypella intricata* [Trentep.] v. Leonh.), *Chara aspera* Willd., *C. polysperma* (now *C. vulgaris* L. f. *polysperma* [Kg.] Mig.), *C. vulgaris* L. f. *longibracteata* (Kg.) Mig. and *C. crinita* (now *C. canescens* Loisel.) being additions to our flora.

However, the most important contribution to the promotion of the knowledge of the Netherlands' Charophyta was furnished by Van den Bosch in his revision of this group in the "Prodromus Florae Batavae" of 1853 (Vol. II, pars 2). His study was based on the dried specimens extant in the various herbaria, and containing the localities already mentioned in the "Flora Belgii Septentrionalis" of 1840. In total, 6 species of *Nitella* and 8 of *Chara* are enumerated. Of these some were described as new, but they later on all proved to be identic with previously mentioned ones.

This work remained the leading one on our Charophyta during about ninety years. And, owing to its excellent qualities, the number of records could afterwards easily be increased.

A paper of minor importance is that by H. de Vries, "Flora van Nederland" (1870), in which the same species have been enumerated only, whereas no localities have been mentioned at all.

¹) MIQUEL was the first to transfer *Chara mucronata* A. Br. to the genus *Nitella*; the specimen referred to is now identified as *N. flexilis* (L.) Ag.

3. Data from local floras. In the eighteenth century the number of this kind of floras is very much increased and, as has already been stated, they are of particular importance for the localities, whereas some of them are also recording new species.

In 1818, a flora of the vicinity of Leiden was published by Nicolaas Mulder, in which only *Chara vulgaris* L. is mentioned. The same species is quoted in the "Initia Florae Groninganae", published in 1825 by Stratingh, Westerhoff and Tresling, and, in 1826, in the flora of the neighbourhood of Breda, compiled by J. A. Kuyper van Wäschpenning.

In 1843 Gevers Deynoot's "Flora Rheno-Trajectina" appeared, which recorded *Nitella syncarpa* (Thuill.) Chev. and *Chara vulgaris* L.

In 1848, F. J. J. van Hoven describes in his "Flora van 's Hertogenbosch" three *Chara* species and one *Nitella*, viz. *N. translucens* (Pers.) Ag., which was new to our flora. The second edition of 1879 contains no additions to our Charophyta flora.

The contribution to the flora of the "Westland" in 1852 by J. E. van der Trappen, mentioning three, and the "Guide du Botaniste dans les environs de Maestricht", published in 1868 by Dumoulin, mentioning four species, only adding new localities.

In 1870, *Chara tenuispina* A. Br. and *C. connivens* A. Br. were added to the Netherlands' Charophyta flora, namely by Fr. Holkema in his splendid work "De plantengroei der Nederlandsche Noordzee-eilanden". This author did not find the genus *Nitella* represented in the Netherlands' Frisian islands. In the same paper *C. intermedia* A. Br. was described as new, but the species proved to be synonymous with *C. aculeolata* Kg. ap. Reichenb.

Reviewing the nineteenth century, we may state that the number of indigenous Charophyta species had greatly increased. Whereas at the beginning of this century four species (one of *Nitella*, three of *Chara*) were known, of which only two were definitely described as wild, the total number of species at the end of this century is three for *Nitella*, eight for *Chara* and two for *Tolypella*.

The number of localities of all species was much enlarged. The genera *Nitella* and *Chara* were definitely separated, and, though two species of *Tolypella* were known, that genus was not yet distinguished. Finally, there is a renewed progress in that Charophyta are again placed in the *Algae*.

IV. The XXth century.

As far as I know, in this century all papers on the Charophyta of the Netherlands were published in periodicals, but none of these appeared until more than 35 years had elapsed. In 1937, in "Nederlandsch Kruidkundig Archief", Miss K. J. Hocke Hoogenboom described the algal flora of the coasts of the IJsselmeer, i.e. the Zuiderzee after it had been cut off from the Waddenzee by the big barrage dam in 1932. Before this time, according to Van Goor (1932), Charophyta were not at all present in this inland sea on account of the relatively high salinity. Three species were

mentioned, one of which was new to our flora, but the plant referred to was not correctly identified and afterwards proved to be a form of *Tolypella glomerata* (Desv. ap. Loisel.) v. Leonh., which was not yet previously recorded either.

In 1938, H. D. Verdam published a list of the Charophyta collected up to that time in the Netherlands and preserved in a number of herbaria, to which some particulars concerning the variability and distribution were added (Blumea III). However, no record was made of localities mentioned in papers earlier than the Prodrum of 1853. In this work, as well as in another one which was published in 1939 by the same author in our own language in "Nederlandsch Kruidkundig Archief", mention was made of 6 *Nitella*, 3 *Tolypella*, 1 *Nitelopsis* and 13 *Chara* species.

This local monograph is of much interest, as first of all four genera were distinguished, and secondly a number of species were added to the list of indigenous Charophyta. These newly recorded species are: *Nitella capillaris* (Krocker) J. Groves & Bull. Webst., *N. opaca* (Bruz.) Ag., *N. hyalina* (DC.) Ag., *Tolypella glomerata* (Desv. ap. Loisel.) v. Leonh., *Nitelopsis obtusa* (Desv. ap. Loisel.) J. Groves, *Chara contraria* A. Br. ex Kg., *C. baltica* Fr. ex Aspegr., *C. galioides* DC., *C. connivens* A. Br., and *C. verrucosa* Itzigs. (= *C. delicatula* Ag.). No more papers than these have been published in the 20th century.

It must be noted that none of the papers mentioned above give illustrations of our Charophyta, nor are these to be found in the splendid series of illustrations of indigenous plants, entitled "Flora Batava", which was started in 1800 and was continued until 1934.

Another remark may be added on the two oldest preserved specimens. These were both collected in 1829 by Van Hall near St Jacobi Parochie (province of Friesland) and were identified as *C. vulgaris* L. f. *longibracteata* (Kg.) Mig. (now ditto) and as *C. fragilis* Desv. f. *Hedwigii* (Ag.) Mig. (now to be named *C. globularis* Thuill. var. *Hedwigii* [Ag. ap. Bruz.] Zanev.). Both specimens are extant in the collections of the "Nederlandsche Botanische Vereeniging", preserved in the Rijksherbarium at Leiden.

In comparing Verdam's list with those of the surrounding countries, it is somewhat surprising that some species are lacking. Already, Braun & Nordstedt in their splendid monograph (1882), and Migula in his admirable work on the German Charophyta, both mention for our country i. a. *Chara Braunii* Gmel. and *C. rudis* (A. Br.) v. Leonh. However, no specimens of these species are extant in our herbaria, but it is very well possible that they some time will be rediscovered in the field. Other species which may be expected to be native in our country are: *Nitella mucronata* (A. Br.) Miq. (already mentioned in 1840, but this specimen proved to be *N. flexilis* [L.] Ag.), *N. gracilis* (Smith) Ag. and *N. tenuissima* (Desv.) Kg.

Thus, though many blanks have already been filled in, it must be admitted that in our country with its many waters, the distribution of most of the species has not yet been ascertained. May it be one of the primary algological objects to attain this end in the years to come!

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