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LINNAEAN TYPES FOR CHARACEAE¹

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The taxonomy of Characeae has been plagued by inconsistencies in nomenclature. It is the author's objective to present the facts necessary to support argument, and to determine the nomenclature by application of the principles of the *International Code of Botanical Nomenclature* (Lanjouw *et al.*, 1956).

The starting point for nomenclature of Characeae is Linnaeus' *Species Plantarum*, 1753. In this work four species were described, and the specimens are presumed to have been preserved in the Linnaean herbarium, now in London.

The author was granted access to the Linnaean herbarium in July 1956, and permitted to study the specimens. There are five herbarium sheets, numbered and named as follows:

- 1088.1 *Chara tomentosa*
- 1088.2 *Chara vulgaris*
- 1088.3 *Chara vulgaris*
- 1088.4 *Chara hispida*
- 1088.5 *Chara flexilis?*

The plants were carefully examined with a stereoscopic microscope using 10×, 20×, and 30× magnification and descriptions were prepared.³ Photographs of each sheet and photomicrographs of details were taken with a 35-mm. camera under library table conditions (Pls. II–IV). Whereas the photographs are rather unsatisfactory, they do reveal sufficient detail to permit identification. Drawings from them (Pl. I) were prepared by the skillful hand of the writer's esteemed colleague, Dr. Kozo Imahori of Kanazawa, Japan.

The Linnaean specimens are rather typical specimens of widely recognized species, and were identified by the writer in accordance with currently accepted taxonomy as follows:

	LINNAEUS' NAME	CURRENT NAME ⁴
1088.1	<i>C. tomentosa</i>	<i>C. tomentosa</i>
1088.2	<i>C. vulgaris</i>	<i>C. globularis</i>
1088.3	<i>C. vulgaris</i>	<i>C. vulgaris</i>
1088.4	<i>C. hispida</i>	<i>C. aculeolata</i>
1088.5	<i>C. flexilis?</i>	<i>C. globularis</i>

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²The author gratefully acknowledges the gentle guidance and constant encouragement of his major professor, Dr. L. H. Tiffany, who smoothed his way in a dedicated effort to solve the problems of Characeae and in whose honor this paper is submitted.

³Copies of the present author's annotations have been filed at the Linnaean Herbarium (LINN), the New York Botanical Garden (NY), with G. O. Allen, and in the author's records.

⁴As listed in the author's tentative list of recognized species of Characeae, Bot. Rev., 18: 323 ff. 1952.

The writer believes that there should be no disagreement among taxonomists on these identifications. In fact, G. O. Allen, Esq., of Godalming, Surrey, England, was invited to check the identification, and he has reported no disagreement. Specimen 1088.5 might be construed to be *C. aspera* Deth. ex Willd., but the absence of spine-cells, as well as the general appearance of the branchlet nodes, clearly indicates *C. globularis* Thuill., possibly in the sense of *C. delicatula* Ag.

Based upon these facts, and in accordance with the *Code*, the proper nomenclature can be easily established for two of the species. For the other two species, monographic consideration is necessary. The case for each is presented herewith.

I. *C. TOMENTOSA* L.

1088.1 is clearly HOLOTYPE of *C. tomentosa*.

II. *C. VULGARIS* L.

With two original specimens, 1088.2 and 1088.3 both named *C. vulgaris* agreeing equally well with the original description, one must be selected as lectotype. Since 1088.3 agrees with current circumscription, the writer hereby selects 1088.3 as LECTOTYPE of *C. vulgaris*.

III. *C. HISPIDA* L.

Since 1088.4 agrees in all essential respects with Kützing's type (L.)^{5,6} of *C. aculeolata* Kütz. ex Reich., there is no doubt that *C. hispida* is the correct name for *C. aculeolata*. As a result, it would seem that the larger and coarser *C. hispida* of current authors must be assigned a different synonym. Fortunately, the writer's monographic work indicates that both *C. aculeolata* (*C. hispida* L.) and *C. hispida* auct. (non L.) fall within a single broad specific circumscription; and the problem is conveniently solved by assigning the correct name, *C. hispida* L., now used in *sens. lat.*, to the population which includes both taxa. Thus, 1088.4 is the HOLOTYPE of *C. hispida*.

⁵Kützing [Collector?] [Im Bruchteich bei] Tennstaedt [in Thuringen] (L) No. 936,300-286 as *Chara hispida*. Herb. Kützing as *Chara aculeolata* (in Kützing's script). LECTOTYPE selected by R. D. Wood, Aug. 18, 1956, and so annotated.

⁶Herbarium abbreviations follow Lanjouw and Stafleu (1959).

EXPLANATION OF PLATE I

Drawings of the specimens of *Chara* in the Linnaean Herbarium (LINN), London. Drawn by Dr. Kozo Imahori, Kanazawa, Japan.

- FIG. 1. *Chara tomentosa* L., 1088.1 (LINN), HOLOTYPE (× 1).
- FIG. 2. *Ibid.*, an axial node showing stipulodes, branchlet construction, axial cortex, and spine-cells.
- FIG. 3. *Chara hispida* L., 1088.4 (LINN), HOLOTYPE, an axial node showing branchlet construction, axial cortex, and the elongate spine-cells.
- FIG. 4. *Ibid.*, habit (× 1).
- FIG. 5. *Chara vulgaris* L., 1088.3 (LINN), LECTOTYPE (× 1).
- FIG. 6. *Ibid.*, an axial node showing branchlet construction and the axial cortex.
- FIG. 7. *Chara vulgaris* (non L.), 1088.2 (LINN) (= *Chara globularis* Thuill.) (× 1).
- FIG. 8. *Ibid.*, an axial node showing branchlet construction and axial cortex.
- FIG. 9. *Chara flexilis* (non L.), 1088.5 (LINN) (= *Chara globularis* Thuill.), an axial node showing branchlet construction and axial cortex. (× 1).
- FIG. 10. *Ibid.*, habitat (× 1).

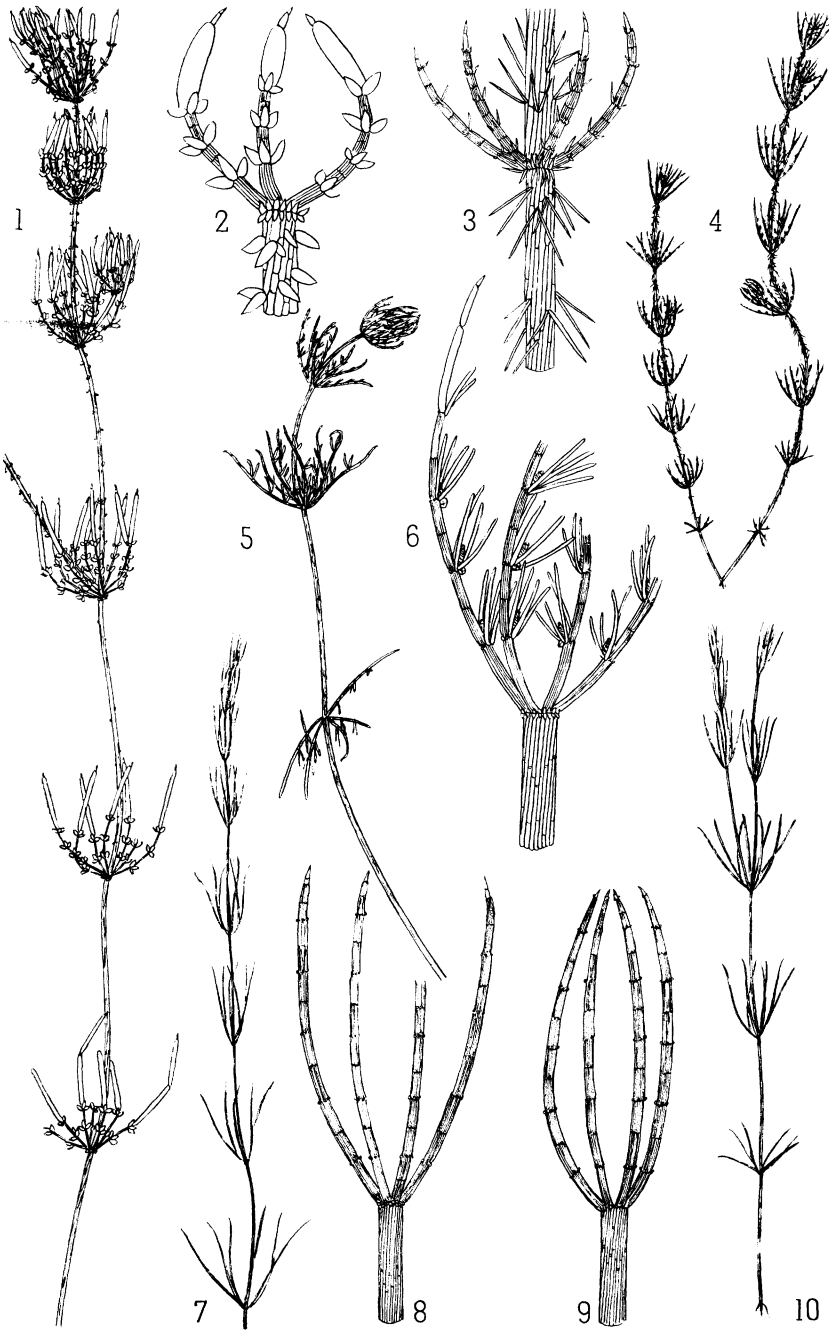
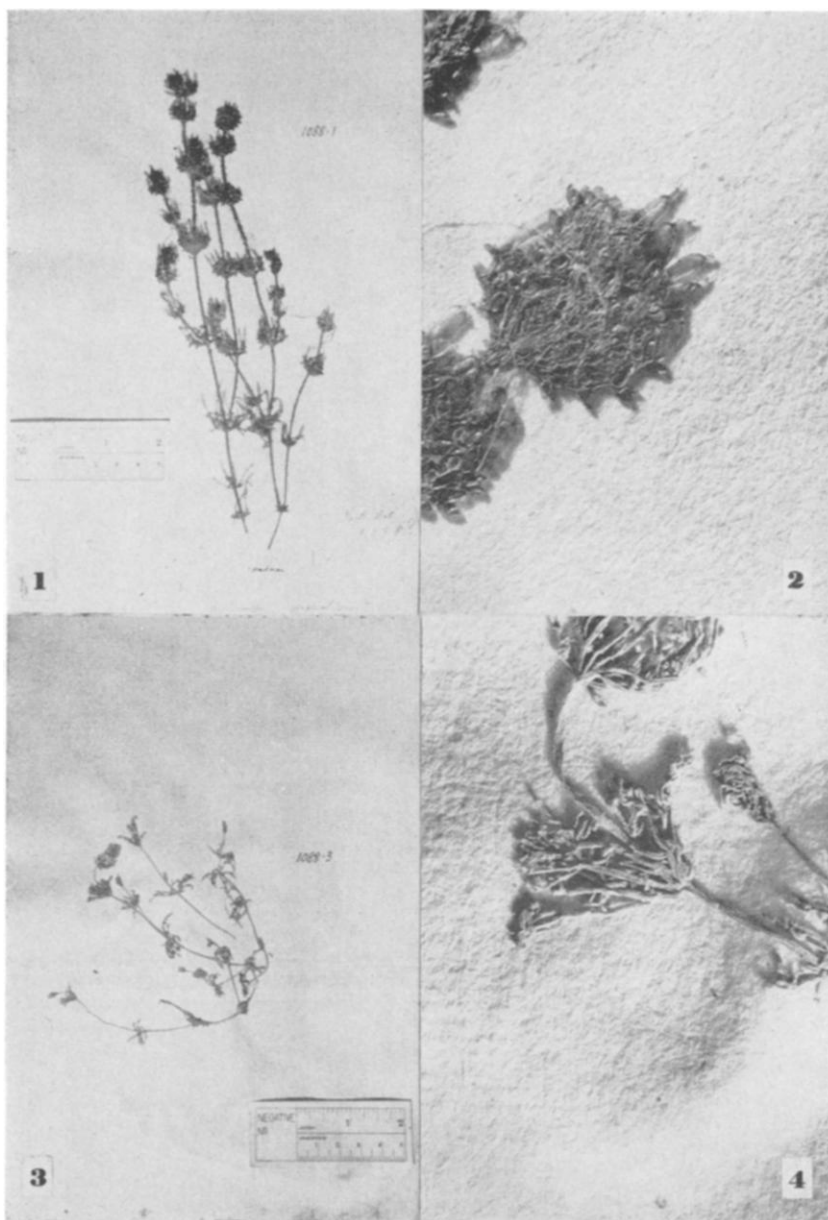


PLATE I



EXPLANATION OF PLATE II

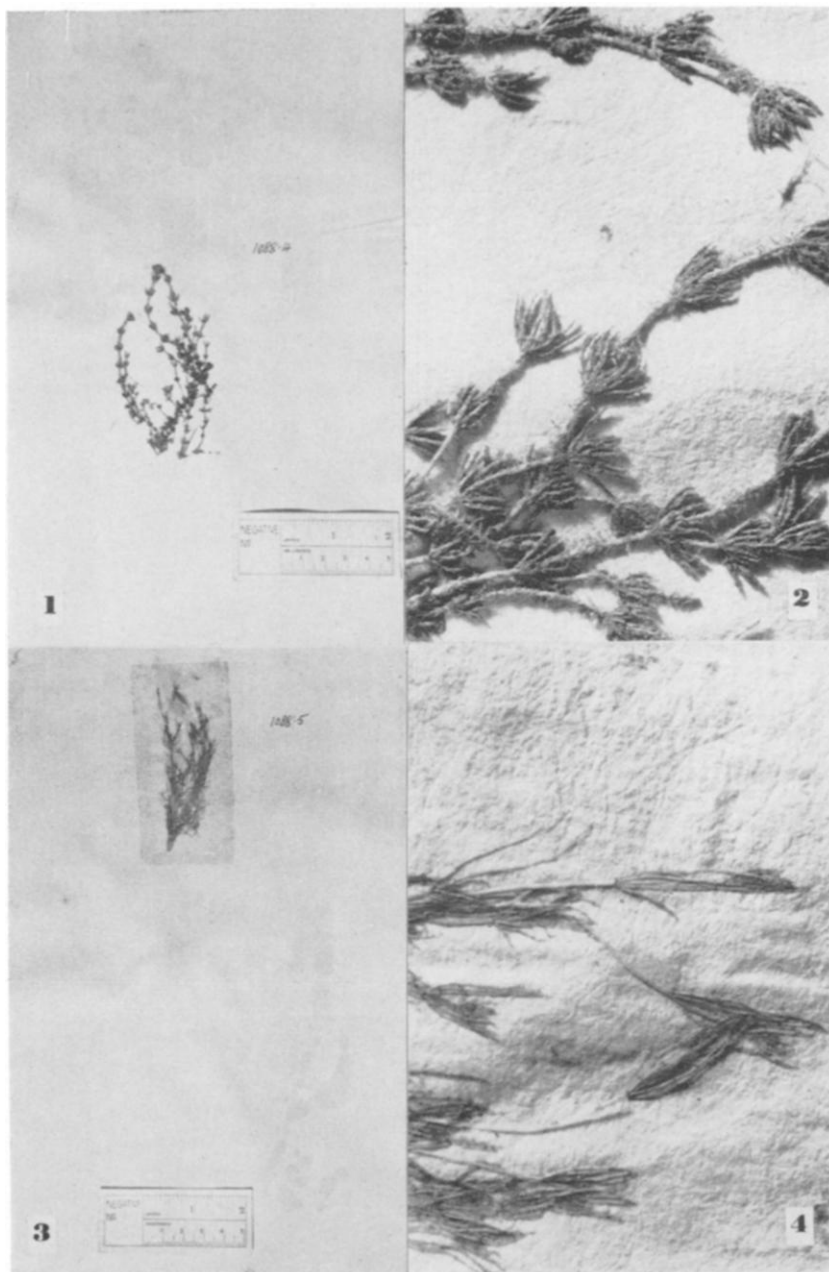
Photographs of herbarium sheets and photomacrographs of details of specimens of *Chara* in the Linnaean Herbarium (LINN), London.

FIG. 1. *Chara tomentosa* L., 1088.1 (LINN), HOLOTYPE ($\times \frac{1}{3}$).

FIG. 2. *Ibid.*, details of a branchlet whorl ($\times 2$).

FIG. 3. *Chara vulgaris* L., 1088.3 (LINN), LECTOTYPE ($\times \frac{1}{3}$).

FIG. 4. *Ibid.*, details of a branchlet whorl ($\times 2$).



EXPLANATION OF PLATE III

Photographs of herbarium sheets and photomicrographs of details of specimens of *Chara* in the Linnaean Herbarium (LINN), London.

FIG. 1. *Chara hispida* L. (*non auct.*), 1088.4 (LINN), HOLOTYPE ($\times \frac{1}{3}$).

FIG. 2. *Ibid.*, details of several axes and branchlet whorls ($\times 2$).

FIG. 3. *Chara flexilis* (*non* L.), 1088.5 (LINN) (= *Chara globularis* Thuill.) ($\times \frac{1}{3}$).
The doubtful specimen labelled "*Chara flexilis*?."

FIG. 4. *Ibid.*, details of several axes and branchlet whorls ($\times 2$).

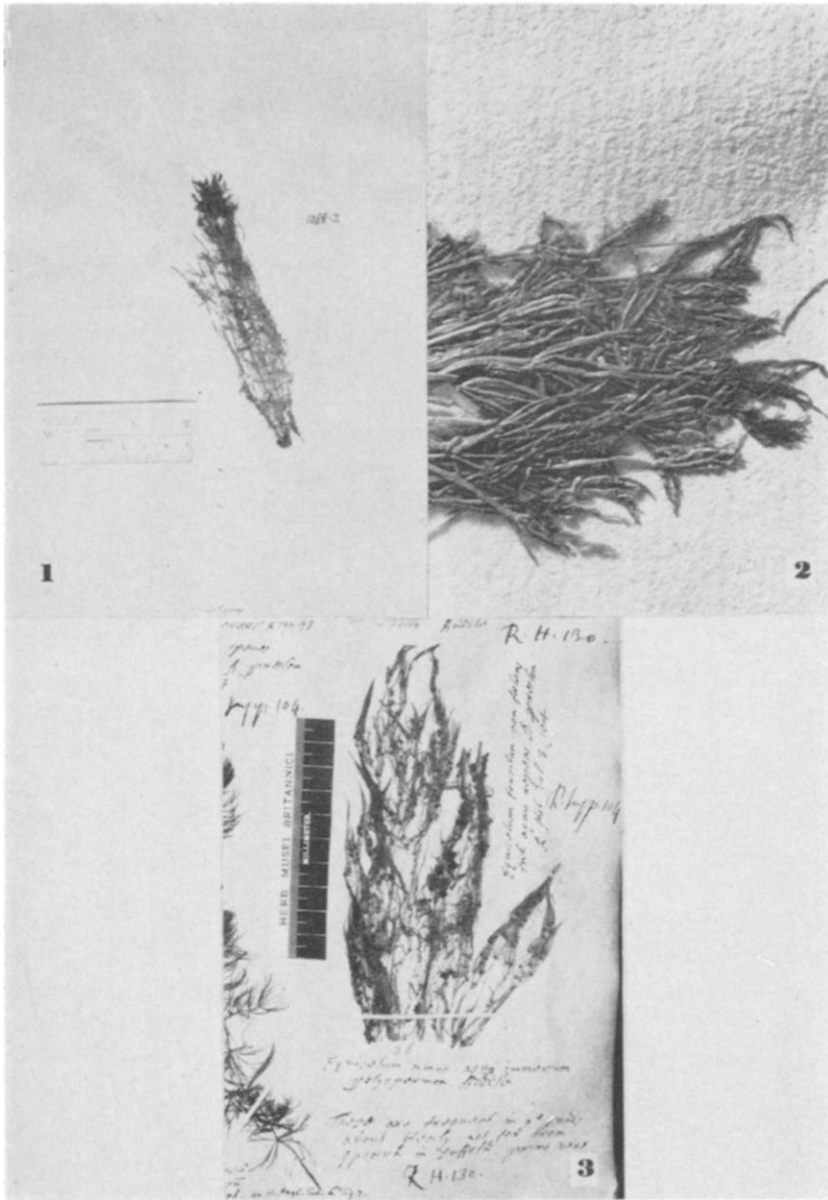
IV. *C. FLEXILIS* L., pp.

The specimen 1088.5 labelled "*C. flexilis?*" is subject to doubt. Savage (1945) indicates that it is not verifiable whether it was actually in Linnaeus' original collection. Rather, it may well have been inserted later, perhaps by Linnaeus' son. This, together with the "?" in the label, is convincing evidence that the specimen is of doubtful validity as a type. Added doubt is found by noting that it does not agree with Linnaeus' description: "*Chara caulium articulatis inermibus diaphanis superne latioribus*." "*Diaphanis*" implies ecorticated; whereas 1088.5 is clearly corticated. "*Superne latioribus*" suggests branching in upper parts; whereas the specimen exhibits whorls uniformly distributed along the axis.

Since no valid specimen of *C. flexilis* exists in the Linnaean herbarium, the type must be sought elsewhere. Linnaeus cited two specimens, one in his *Iter. Goth.* (1745: 215) and the other in *Flora Suec.* (1745: 363). To date, these specimens have never been found. Pending their possible rediscovery, a substitute or temporary type must be sought.

Bruzelius (1824: 14), in a dissertation possibly written by C. A. Agardh (see Pritzel, 1871), discussed this problem at some length. There was confusion, he states, between *C. flexilis* and *C. nidifica* O. Müll. (now *Tolypella nidifica* (O. Müll.) Leonh.); but that in Linnaeus' first treatment of *Chara* in the first edition of *Flora Suec.*, he listed only Ray's synonym. In later works, Linnaeus continued to cite Ray's specimen although he added other specimen citations. Bruzelius, as the first succeeding monographer, considers the original synonym of prime importance, and has in effect designated Ray's specimen as the lectotype. This synonym of *C. flexilis* is cited in *Spec. Plant.* (1753: 1156) as "*Chara translucens minor flexilis* Raj. Angl. 3: 133" [= Ray, Syn. Meth.]. Arguments and uncertainties to the effect that Linnaeus' specimens included a mixture of *C. flexilis* and *T. nidifica* have been raised by Nordstedt (1863: 35; 1865: 40) and quoted by J. Groves and B.-W. (1920: 106). This was even taken as basis for changing the name of the long-established species *Nitella flexilis* (L.) Ag., which is based upon *C. flexilis* L., to *Tolypella nidifica*; and in consequence the names of the genera *Nitella* and *Tolypella* might have required reversing. Such grounds are totally irrelevant under the present Code since the name is fixed by the type and not subsequent collections.

The Ray specimen is extant in the herbarium of John Ray, in the Sloan Herbarium, often abbreviated "H.S.," at the British Museum (Natural History) (BM) in London. Mr. Ross of that herbarium has graciously located the sheet, determined the material to be *Nitella*, and has had a photograph (Pl. IV) prepared. It can be seen to be a *Nitella*, and to agree with Linnaeus' description by being ecorticated ("*diaphanis*") and by having branching (=branchlets) concentrated in upper parts ("*superne latioribus*"). It was collected at Henly, not far from Ipswich in Suffolk, a shire from which *N. flexilis* is reported (J. Groves and B.W., 1920: 104). It appears to be a form of *N. flexilis* near the variation sometimes designated as var. *subcapitata*. The present writer, therefore, is in accord with Bruzelius' selection of Ray's specimen, R. H. 130 (BM) as LECTOTYPE of *Chara flexilis* L. and excludes 1088.5 (LINN) (= *C. globularis*).



EXPLANATION OF PLATE IV

Photographs of herbarium sheets and photomicrographs of details of specimens of *Chara* in the Linnaean Herbarium (LINN) and the British Museum (BM), London.

FIG. 3. provided by R. Ross, British Museum.

FIG. 1. *Chara vulgaris* (non L.), 1088.2 (LINN) (= *Chara globularis* Thuill.) ($\times \frac{1}{3}$).

FIG. 2. *Ibid.*, details of upper portion of specimen ($\times 2$).

FIG. 3. *Nitella flexilis* (L., *pp.*) Ag., which is here based upon *Chara flexilis* L., LECTOTYPE, R. H. 130 (BM) is the "*Chara translucens minor flexilis* Raj. Angl. 3: 133," a pre-Linnaean synonym cited by Linnaeus (*Species Plantarum*, p. 1156. 1753).

These findings are summarized in the following typifications.:

Chara tomentosa L., Species Plantarum, 1753, p. 1156, HOLOTYPE: 1088.1 (LINN).

Chara vulgaris L., Species Plantarum, 1753, p. 1156, LECTOTYPE: 1088.3 (LINN). (excl. 1088.2=*C. globularis* Thuill.)

Chara hispida L., Species Plantarum, 1753, p. 1156, HOLOTYPE: 1088.4 (LINN). (*C. aculeolata* Kütz. ex Reich., non *C. hispida* of modern writers, but *C. hispida* L., sens. lat., of the present author's forthcoming monograph.)

Nitella flexilis (L., pp.) Agardh, Systema Algarum, 1824, p. 124. *Chara flexilis* L., Species Plantarum, 1753, p. 1156. Synonym cited from Joannes Raii (John Ray), Synopsis Methodica Stirpium Britannicarum, Ed. 3, p. 133, 1724, as *Chara translucens minor flexilis*, LECTOTYPE: Buddle, "Frequent in the ponds about Henly not far from Ipswich, Suffolk," Herb. Buddle, Vol. 4, in Herb. Sloan, H. S., Vol. 117, fol. 10 (BM).

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