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NEW DATA ON CHAROPHYTES (CHARACEAE) OF THE VOLOGDA REGION

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During field studies conducted in recent years in the Vologda Region, *Nitella confervacea*, one of the rarest species of Russian flora, has been rediscovered. The species, currently listed in the regional Red Data Book as endangered, was discovered in a temporary waterbody of anthropogenic origin. Data on the species' locality, habitat, morphology, and voucher specimens are provided. Distributional data on three generalist species, *Chara contraria*, *C. globularis*, and *C. vulgaris*, are also presented.

Keywords: aquatic flora, *Chara contraria*, *Chara globularis*, *Chara vulgaris*, *Nitella confervacea*, rare species

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INTRODUCTION

Charophyte flora of the Vologda Region, a vast territory in northern European Russia, currently includes 17 species from the genera *Chara* L., *Nitella* C. Agardh, and *Sphaerochara* Mädler: *C. aculeolata* Kütz., *C. aspera* Willd., *C. braunii* C.C. Gmelin, *C. contraria* A. Braun ex Kütz., *C. globularis* Thuill., *C. papillosa* Kütz., *C. strigosa* A. Braun, *C. tomentosa* L., *C. virgata* Kütz., *C. vulgaris* L., *N. confervacea* (Breb.) A. Braun ex Leonh., *N. flexilis* (L.) C. Agardh, *N. mucronata* (A. Braun) Miquel, *N. opaca* (C. Agardh ex Bruzelius) C. Agardh, *N. syncarpa* (Thuill.) Chevall., *N. wahlbergiana* Wallm., and *Sphaerochara prolifera* (A. Braun) Soulié-Märsche [Chemeris et al., 2011, 2013; Vishnyakov, Philippov, 2018; Vishnyakov et al., 2021; Kotkova et al., 2022]. The Vologda Region flora appears to be relatively well studied and comprises ~70% of the species known from northern European Russia [cf. Romanov et al., 2018]. In particular, the region represents one of the main areas of distribution of *C. strigosa* and *N. wahlbergiana* in Russia and supports populations of the extremely rare *C. aculeolata* and *N. confervacea*.

Our field studies conducted in recent years have added relatively few data on the regional charophyte flora; however, they are notable for the discovery of *N. confervacea*. This species has been known in the region from the Koy River mouth, Lake Kubenskoe, the only extant locality of the species in European Russia, where it was first collected in 2018 [Vishnyakov et al., 2021]. Due to its rarity and low abundance, the species has been recommended for inclusion in the Red Data Book of the Vologda Region and is currently listed as endangered (status categories 2/EN/I) [Postanovlenie…, 2024]. In 2025, a new locality of *N. confervacea* was discovered ~120 km southeast of the previously known.

This article aims to provide new data on *N. confervacea* from the Vologda Region and to present distributional data on three additional charophyte species recorded in recent years.

MATERIAL AND METHODS

Nitella confervacea was found during field studies in southern central part of the Vologda Region. A few specimens were isolated and preserved as of herbarium vouchers and in 95% ethanol. Total dissolved solids (TDS) and pH were measured using a portable multifunctional detector (YAGO Technology Co., Ltd., Shenzhen, China).

The specimens were studied under an NSZ818 Nexcope stereomicroscope (Ningbo Yongxin Optics Co., Ltd., China) equipped with a digital camera.

Herbarium vouchers are stored at the Herbarium of the Mire Research Group of Papanin Institute for Biology of Inland Waters RAS (MIRE). The distribution of charophytes is additionally given in squares of the Atlas Florae Europaeae (AFE) [Atlas…, 2026].

RESULTS AND DISCUSSION

New locality of *N. confervacea* (Fig. 1): Vologda Region, Mezhdurechensky District, selo Shuyskoe, northwest of Sovetskaya Street, 59°22′26″N, 41°00′48″E (AFE: 37VFF1), power line clearing, puddle, clay-silt substrate, depth 0.2 m, pH 7.6, TDS 94 ppm, leg. Philippov, 6 September 2025, det. Vishnyakov, MIRE # 25-0357.

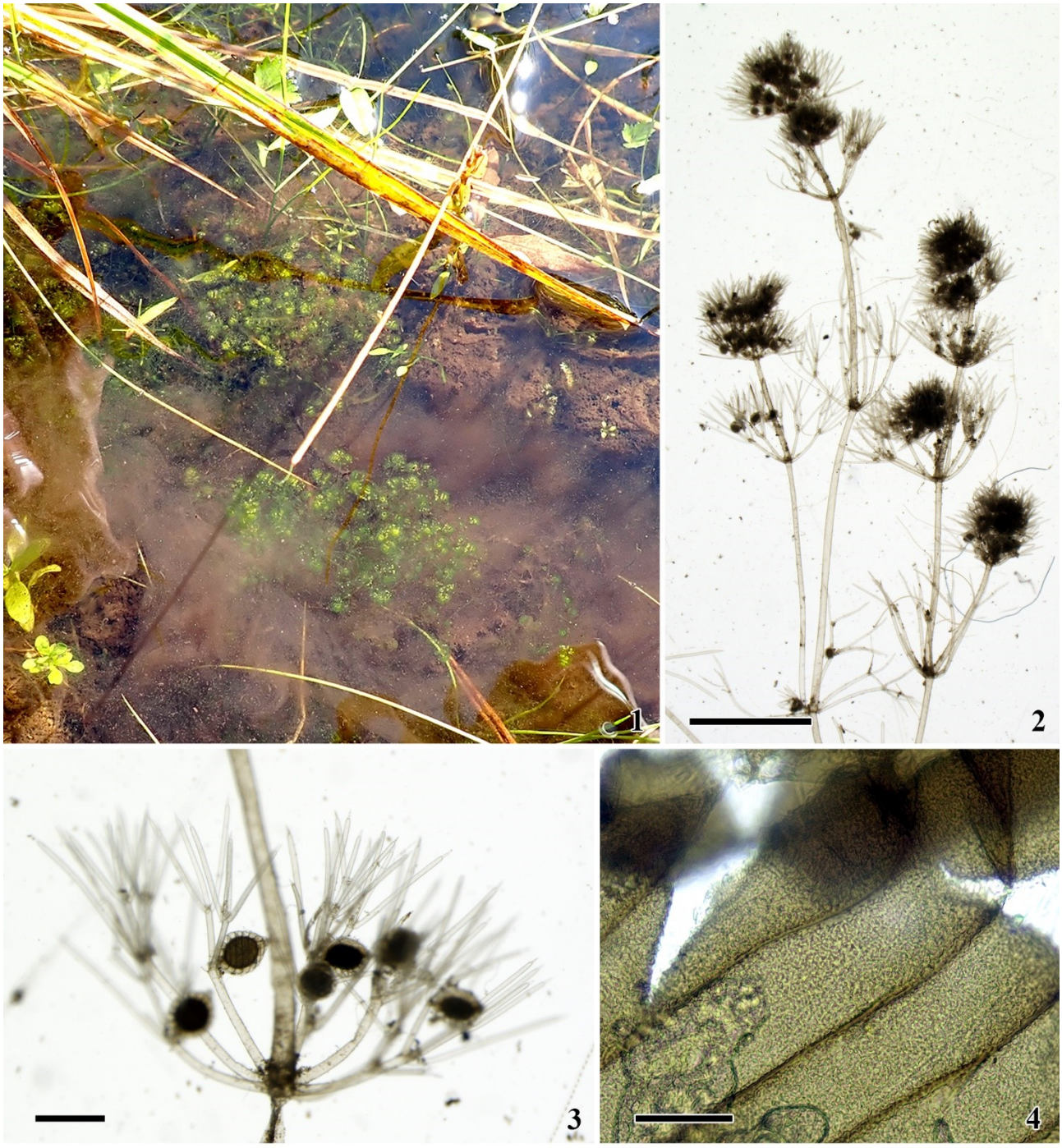

Fig. 1–4. *Nitella confervacea* from the Vologda Region: 1 — habitat; 2 — general view of upper section of plants; 3 — whorl of branchlets bearing gametangia at first furcation; 4 — granulate oospore surface. Scales: 2 — 3 mm, 3 — 0.5 mm, 4 — 30 µm.

Morphology (Fig. 2–4). Plants 1.5–3 cm tall; axis diameter 120–200 µm. Fertile branchlets 1.5–3 mm long, 1–3 times divided, composed of 3–5 cells. Dactyls 2-celled, with short terminal cell forming an apiculate tip. Gametangia conjoined, born at the first and additionally the second branchlet nodes. Oogonia (without coronula) 320–350×280–310 µm. Antheridia 130–160 µm in diameter. Oospores brown, 220–240×200–220 µm, with 6–9 striae and granulate surface.

Nitella confervacea was accidently found in temporary shallow water on a rarely used unpaved road along a clearing that had been cut the previous year. Poorly drained sections with water accumulation are typically occupied by communities dominated by species characteristic of early successional stages, with a prominent role of *Juncus articulatus* L., *Ranunculus repens* L., *R. flammula* L., *Callitriche palustris* L., and *Myosotis palustris* (L.) Hill. These conditions are consistent with the ecological preferences of the species, which typically

occurs in shallow lakes, ponds, quarries, and ditches lacking dense hydrophyte vegetation, with clean, circumneutral water of low conductivity [van de Weyer, Stewart, 2024]. Approximately 700 m of the clearing was surveyed, and *N. confervacea* was found in only a single puddle, where it occurred at very low abundance, not exceeding 3 patches of aggregated plants per square meter. These observations confirm the rarity of the species.

The discovery of a new locality of *N. confervacea* in the Vologda Region amends current knowledge of its distribution in northern European Russia. The species was previously known from the Koy River mouth in Lake Kubenskoe, a relatively large waterbody with an unstable water level regime favoring the formation of weakly competitive habitats [Vishnyakov et al., 2021]. The new record from a disturbed habitat suggests that moderate anthropogenic impact may also facilitate the persistence or re-establishment of the species. The record also indicates that *N. confervacea* may be more widespread in the region but overlooked due to its small size and/or low abundance. However, many similar habitats sampled in this and previous studies are commonly occupied by widely distributed and common species, particularly *C. vulgaris*, *C. globularis*, and *C. contraria* [Vishnyakov, Philippov, 2018; Vishnyakov et al., 2021; this study, see below]. Therefore, despite the occurrence in a disturbed, anthropogenic habitat, *N. confervacea* remains a rare species in the Vologda Region flora and requires attention and conservation measures. Further targeted studies are needed, with particular attention to small and temporary waterbodies similar to the habitat described here, as well as the preservation of current hydrological conditions at known localities.

In addition, we provide data on recent records of other charophyte species in the Vologda Region, which confirm the common occurrence of three generalist species. Note, the number of previously known and newly recorded localities is indicated in square brackets:

Chara contraria [6+2]: Nyuksensky District, village Bobrovskoe, near the bridge over the Bol'shaya Bobrovka River, 60°28′50″N, 44°45′48″E (AFE: 38VMN4), shallow water, depth 0.1–0.3 m, silty substrate, 10 August 2025, Philippov, MIRE, # 25-0358; ibid., south of the village Bobrovskoe, left bank slope of the Bol'shaya Bobrovka River, 60°28′36.0″N, 44°46′05.5″E (AFE: 38VMN4), spring fen, puddles, depth 0.1–0.3 m, pH 7.6, 8.1, TDS 251, 1130 ppm, 10 August 2025, Philippov, MIRE ## 25-0354, 25-0362, 25-0364.

Chara globularis [52+2]: Mezhdurechensky District, 0.3 km north of the village Dyakonovo, near the village of "Dyakonovskaya Polyana", 59°10′07.5″N, 40°38′33.0″E (AFE: 37VEF3), excavated pond, sandy-rocky substrate, depth 0.3–0.8 m, pH 9.2, TDS 135 ppm, *Chara* communities, 22 July 2025, Philippov, MIRE # 25-0356; Nyuksensky District, northwest of Bobrovskoye village, Sukhona River near the mouth of the Bolshaya Bobrovka River, 60°29′25.0″N, 44°45′59.5″E (AFE: 38VMN4), residual water body (between the riverbed and the bank), sandy and rocky substrate, depth 0.1–0.3 m, pH 7.7, TDS 835 ppm, 10 August 2025, Philippov, MIRE ## 25-0359, 25-0360.

Chara vulgaris [14+4]: Mezhdurechensky District, 0.3 km north of the village Dyakonovo, near the place "Dyakonovskaya Polyana", 59°10′07.5″N, 40°38′33.0″E (AFE: 37VEF3), excavated pond, sandy-rocky substrate, depth 0.3–0.8 m, pH 9.2, TDS 135 ppm, *Chara* communities, 22 July 2025, Philippov, MIRE # 25-0356; Nyuksensky District, northwest of village Bobrovskoe, Sukhona River near the mouth of the Bol'shaya Bobrovka River, 60°29′25.0″N, 44°45′59.5″E (AFE: 38VMN4), residual water body (between the riverbed and the bank), sandy and rocky substrate, depth 0.1–0.3 m, pH 7.7, TDS 835 ppm, 10 August 2025, Philippov, MIRE # 25-0361; Vologda City, south of the "Raduga 7" gardening community, Barankovskie Ponds, 59°13′14″N, 39°58′31″E (AFE: 37VEF3), excavated pond, depth 0.1–0.2 m clay-rocky and silty substrate, TDS 617 ppm, *Chara-Elodea* communities, 14 September 2023, Philippov, MIRE # 23-0363; Vologda District, northeast of the "Aviator" gardening community, 59°17′57.5″N, 39°57′01.5″E (AFE: 37VEF3), puddle in a forest road, clay substrate, depth 0.05 m, TDS 91 ppm, 27 August 2023, Philippov, MIRE # 23-0353.

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НОВЫЕ ДАННЫЕ О ХАРОВЫХ ВОДОРОСЛЯХ (CHARACEAE) ВОЛОГОДСКОЙ ОБЛАСТИ

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В ходе полевых исследований, проведенных в последние годы в Вологодской обл., был заново обнаружен *Nitella confervacea* — один из самых редких видов флоры России. Этот вид, в настоящее время занесенный в региональную Красную книгу как угрожаемый, был обнаружен во временном водоеме антропогенного происхождения. Приведены данные о местонахождении, местообитании, морфологии и гербарных образцах. Также представлены данные о распространении трех видов-генералистов: *Chara contraria*, *C. globularis* и *C. vulgaris*.

Ключевые слова: водная флора, *Chara contraria*, *Chara globularis*, *Chara vulgaris*, *Nitella confervacea*, редкий вид.