

Red List of the Bulgarian algae. I. Macroalgae

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Abstract. The Red List presented in this paper is focused on the threatened Bulgarian macroalgae and is based on critical reading of the references and on the evaluation of the most recent data on their distribution according to authors' findings and observations. The list contains 83 species, one subspecies, one variety and three forms from five classes of four divisions distributed in six IUCN categories, and is organized in the following way: category of threat, the main taxonomic group and relevant taxon with the exact formula of threat, its synonyms, distribution in Bulgaria and in the Black Sea, additional notes and references.

Key words: algae, Black Sea, Bulgaria, Red List, threatened species

Introduction

Red Lists are among the worldwide recognized tools for showing the risk of extinction and designating the threatened status of various organisms. They play a valuable role in the nature conservation activities. Therefore it is not surprising that in addition to the general IUCN Red List, regional Red Lists have become quite common in almost all European countries. Originally, the European Red Lists did not concern the algae. However, with the efforts of many phycologists, ever more species, varieties and forms of these organisms became enlisted in these important zoological tools (e.g. Krause 1984; Gutowski & Mollenhauer 1996; Knappe & al. 1996; Lange-Bertalot & Steindorf 1996; Mollenhauer & Christensen 1996; Kusel-Fetzmann 1999; Lenzenweger 1999; Blaženčić & al. 2006; Siemińska 2006). The latest edition of the *IUCN Red List of Threatened Species* (2004) includes 75 algae from the classes *Florideophyceae*, *Chlorophyceae*, *Ulvo-phyceae*, and *Phaeophyceae*.

The Red List proposed below is the first list published for Bulgaria. However, we should underline that formerly there were attempts to lay a stress on the most endangered species, while in the comprehensive reviews or single publications some threatened algae were enlisted with proposals for protection (Vodenicharov & al. 1993; Draganov & Stoyneva 1994; Dimitrova-Konaklieva 2000; Temniskova & al. 2005). Most recently, six macrophytes have been included in the new *Bulgarian Red Data Book* (Stoyneva & Temniskova in prepar.; Temniskova & Stoyneva in prepar.; Temniskova & al. in prepar.). The list presented in this paper is focused on macroalgae and is based on critical reading of the references and on evaluation of the most recent data on their distribution according to the authors' findings and observations.

The Red List provided below is organized in the following way: category of threat, main taxonomic group and relevant taxon with the exact formula (except for the cases of Regionally Extinct and Data Deficient taxa) and its synonyms (**Syn.**) used in the sources for Bulgarian localities. The synonyms are followed by

the distribution of species (variety or form) in Bulgaria and along the Bulgarian Black Sea coastal line (**Bu**), which is cited exactly and without changes according to the original sources. For seaweeds, the distribution in other Black Sea aquatories (**BS**) is added, following Dimitrova-Konaklieva (2000). Text on the species distribution in the Black Sea (BS) is added also in cases when the species is known only from the Bulgarian aquatory. The distribution along the Bulgarian Black Sea coastal line follows the regions and subregions proposed by Dimitrova-Konaklieva (2000): Kaliakra, Varna, Bourgas and Sozopol regions, where the latest is subdivided into the Sozopol-Tsarevo and Ahtopol subregions. For seaweeds, the most recent website of the *Black Sea Red Data Book* (2007) was checked, despite of the fact that it does not contain exact information on the Bulgarian aquatory and literature. When necessary, additional notes (**Note**) are added about the threatened taxon, which reflect mainly some uncertainties in its identification and localities, wrongly written names, or contradictions in literature. References on each taxon are provided at the end of description, abbreviated as **Refer**. They include all sources, where the taxon has been mentioned, even in cases of re-citation or of taxonomic discussion. Therefore, references for some species could be quite recent but this does not necessarily mean that there is a new finding or confirmation of a locality. For some of the taxa in the old sources, there are quite strange descriptions of the locality or of the habitat, presumably due to typographical errors. However, following the line of correctness, we cite these notes completely but in cases of obvious contradictions indicate the possibility of printing mistakes. When the locality is identified according to the Inventory of Bulgarian Wetlands (Michev & Stoyneva 2007b), its inventory identification number (**IBWXXXX**) is provided in brackets in order to facilitate the work of future researchers. Information on the recent status of identified localities and habitats is given in superscript, with capital letters, according to the same Inventory (Michev & Stoyneva 2007b): the sites which have been transformed are indicated by (**T**), the sites known to be destroyed nowadays are indicated by (**D**), the remnants of former large water bodies are indicated by (**R**) and the sites of uncertain status are indicated by (**U**). The algal and authors' names have been checked according to the *Algae Database* (2007) and the abbreviations of the authors' names follow John (2002) and Brumitt & Powell (1992).

In general, the authors have tried to abide by the world-wide accepted IUCN criteria for designation of the threatened status. The provided categories and formulas follow the *IUCN Red List of Categories and Criteria* (2001) and *Guidelines for Application of IUCN Red List Criteria at Regional Levels* (2003). An exception makes the category Least Concern (**LC**) to which no taxa have fitted. According to the IUCN recommendations (2001), we avoided the general categories *Extinct* (**E**) and *Extinct in the Wild* (**EW**), and indicated the category *Regional Extinct* (**RE**) for species, which have not been confirmed for the country's territory during the last five decades. The category *Data Deficient* (**DD**) has been applied to species for which there have been no confirmations during the last 30 years, but the authors believe that their finding in the country is still possible. The same category was applied to some species which cannot be distinguished in the field from their commonly appearing relatives and our expert evaluation is that data on them from personal communications or some internal reports are not reliable (e.g. of the genus *Polysiphonia* Grev.). Following Watanabe (2005), we find this category very important because in spite of not being exactly a category of threat, it shows the necessity to pay more attention to those taxa for which we are anxious on the basis of our expert knowledge. The categories *Vulnerable* (**VU**) and *Near Threatened* (**NT**) were designated to some species which have been found in one or two localities only, but according to our knowledge about their ecology, their broader distribution in the country is assumed. In these cases, the exact category was given in an arbitrary way based on our expert evaluation of the peculiarities of the species (ecology and life history) and knowledge about the state of its habitats and localities. The subjective character of the assessments of algae in relation to IUCN criteria when compared with vertebrates, flowering plants, beetles, butterflies, etc. was underlined recently by Watanabe (2005). But mention deserves the fact that the same author wrote: "Even if this is a subjective process, it must be made for each algal species and population based on present knowledge" (Watanabe 2005: 421).

It should be also underlined that in some special cases of algae and peculiar conditions of some of the localities we had to make arbitrary decisions for the categories *Critically Endangered* (**CR**) and *Endangered* (**EN**), despite the fact that for some taxa there were more localities enlisted than the number set by IUCN

criteria for the relevant category. Here we should mention that for some species only the region of distribution is known from the earlier literature but the exact number of localities was never reported and, therefore, comparisons with the modern status are practically impossible. Some of the localities were described briefly, without exact coordinates and their recent checking is quite problematic. At the same time, the region where the species should be situated according to the sources, had been strongly disturbed and changed in the last decades (e.g. the tributaries and rivers Vucha, Trigradska, Muglenska, Chepelarska, and Arda in the Rhodopi Mts, the upstream stretches of many rivers in the Balkan Range, such as Cherni Osum, Beli Osum, Vit, etc. – Temniskova & al. 2005; Kirijakov & in prepar.). Besides the registered habitat destruction, the authors also had to take into account both land restitution in some localities (which is a potential threat to the habitats) and direct changes of some localities

already noted in the literature on Bulgarian algae (e.g. Vodenicharov & al. 1993; Temniskova & al. 2005). The latter concerns in particular the wetlands and the habitats of the thermal springs and their effluents (e.g. Petkoff 1929b; Stoyneva 2003; Stoyneva & Gärtner 2004; Temniskova & al. 2005; Michev & Stoyneva 2005, 2007a; Stoyneva & Michev 2007). In many cases, the sensitivity of the species has been also taken into account. The extinction of most species, or threats to them are mainly due to direct destruction of the pristine habitats, or their strong disturbance and changes (mainly of water quality, depth and area), as well as to direct collection by tourists in cases of the most beautiful and attractive species.

After taking all these considerations into account, the Red List of Threatened Bulgarian Macroalgae contains 83 species, one subspecies, one variety, and three forms from four divisions, distributed into six IUCN categories (Table 1).

Table 1. Distribution of the threatened Bulgarian macroalgae into taxonomic divisions and IUCN categories*.

| category \ IUCN | <i>Rhodophyta</i> | <i>Ochrophyta</i> | <i>Chlorophyta</i> | <i>Streptophyta</i> | Total |
|-----------------|-------------------|-------------------|--------------------|----------------------|--------------------------------|
| RE | 5 sp. | 2 sp. | – | 4 sp. | 11 sp. |
| CR | 7 sp. | 5 sp. | 2 sp. | 3 sp. | 17 sp. |
| EN | 8 sp., 1 f. | 3 sp. | 1 sp. | – | 12 sp., 1 f. |
| VU | 10 sp. | 6 sp. | 3 sp., 1 subsp. | 3 sp., 1 f. | 22 sp., 1 subsp., 1 f. |
| NT | 6 sp. | 1 sp. | 1 sp. | 1 sp. | 9 sp. |
| DD | 3 sp. | 1 sp. | 1 sp. | 7 sp., 1 var., 1 f. | 12 sp., 1 var., 1 f. |
| Total | 39 sp., 1 f. | 18 sp. | 8 sp., 1 subsp. | 18 sp., 1 var., 2 f. | 83 sp., 1 subsp., 1 var., 3 f. |

*Abbreviations of the categories are standard and in conformity with the text above.

Red List

I. REGIONALLY EXTINCT SPECIES (RE)

I.1. Division *Rhodophyta* (Class *Florideophyceae*)

Cystoclonium purpureum (Huds.) Batters

Bu: Varna region of the Black Sea.

BS: Russia.

Note: Published as *C. purpurascens* (Huds.) Kütz.

Refer.: Petkoff 1943; Dimitrova-Konaklieva 2000.

Furcellaria lumbricalis (Huds.) J.V. Lamour.

Syn. *F. fastigiata* (Huds.) J.V. Lamour.

Bu: Varna region of the Black Sea.

BS: only in Bulgaria.

Note: Published as *Fastigiaria furceolata* (L.) Stockh.

Refer.: Petkoff 1932, 1943; Dimitrova-Konaklieva 2000.

Helminthora divaricata (C. Agardh) J. Agardh

Bu: Varna region of the Black Sea.

BS: Russia.

Note: Marked with a question mark (?) by Petkoff (1932) and indicated for only one locality – in the vicinity of the St Konstantin Resort^U).

Refer.: Petkoff 1932; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Laurencia lacustris Skolka

Bu: Shabla lake (IBW0247).

Refer.: Vodenicharov 1964; Vodenicharov & al. 1991.

Lemanea ciliata (Sirodot) De Toni

Bu: In running waters in the Dyovlen peat bogs (Devinski Torfisha^U– IBW8231) in the Rhodopi Mts.

Note: The species was published by Vodenicharov & al.

(1991) only from this location in Bulgaria, based on the herbarium specimen collected by D. Jordanov in 1930 and determined by him as *L. fluviatilis* (L.) C. Agardh f. *longa*.

Refer.: Vodeničarov & al. 1991; Temniskova & Kirjakov 2006.

I.2. Division *Ochrophyta* (Class *Phaeophyceae*)

Nereia filiformis (J. Agardh) Zanardini

Bu: Varna region of the Black Sea.

BS: Russia and Turkey.

Refer.: Petkoff 1943; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Punctaria plantaginea (Roth) Grev.

Bu: Bourgas region of the Black Sea.

BS: Russia.

Refer.: Petkoff 1905, 1929a, 1932; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

I.3. Division *Streptophyta* (Class *Charophyceae*)

Chara aculeolata Kütz.

Syn. *C. intermedia* f. *bulgarica* Vilh.

Bu: In the vicinity of Vratsa town, Western Balkan Range.

Refer.: Vilhelm 1908; Temniskova & al. 2005; Blaženčić & Temniskova (unpubl.).

Nitella capillaris (Krock) J. Groves & Bull.-Webst.

Bu: In clear slow waters in peat areas; particularly common at new excavations, Mt Lyulin; meadows in the vicinity of Dragalevtsi village at the foothills of Mt Vitosha; in the floods near Kazichene village^U (IBW0783), Sofia region.

Note: Published as *N. capitata* (Krocker) J. Groves & Bull.-Webst. Indicated as *Tolypella hispanica* Nordst. in Petkoff (1922) but subsequently corrected by him and referred to “*N. capitata* (Nees ab. Es.) Agardh.”

Refer.: Petkoff 1922, 1925, 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Nitella mucronata (A. Braun) Miq.

Bu: In the swamps near Dragoman, at the foothills of Mt Chepun (IBW0012) and near Dragichevo in Mt Lyulin (IBW0019).

Refer.: Petkoff 1913, 1914, 1922, 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Nitella opaca (C. Agardh ex Bruzelius) C. Agardh

Bu: In peat pools and in the Kazichene peat bog^R

(IBW0735), in the swamp near Slivnitsa^D (IBW0015) in Sofia region. According to Vodenicharov & al. (1971), it is distributed predominantly in larger water bodies, as well as in standing and running waters.

Refer.: Petkoff 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

II. CRITICALLY ENDANGERED SPECIES (CR)

II.1. Division *Rhodophyta* (Class *Florideophyceae*)

Coccotylus truncatus (Pall.) M.J. Wynne & J.W. Heine

Syn. *Phyllophora truncata* (Pall.) Zinova

[CR B2ab(i,ii,iii); C1]

Bu: Varna region of the Black Sea.

BS: Russia and Romania.

Refer.: Zinova 1967; Dimitrova 1969; Dimitrova-Konaklieva 2000.

Gymnogongrus griffithsiae (W.B. Turner) Mart.

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Turkey.

Refer.: Dimitrova-Konaklieva 1973, 2000; Kalugina-Gutnik 1975.

Halitilon virgatum (Zanardini) Garbary & H.W. Johans.

Syn. *Corallina granifera* J. Ellis & Sol.

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Turkey.

Refer.: Dimitrova-Konaklieva 1974, 2000.

Nemalion helminthoides (Velley) Batters

Syn. *N. lubricum* Duby

[CR B1ab(i,ii,iii); C1]

Bu: Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region of the Black Sea.

BS: Russia and Turkey.

Refer.: Petkoff 1905, 1929a; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1976; Dimitrova-Konaklieva 2000; Temniskova & Stoyneva (in prepar.).

Polysiphonia subulata (Ducluz.) P. Crouan & H. Crouan

Syn. *P. subulata* (Ducluz.) J. Agardh

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Turkey.

Refer.: Zinova & Dimitrova-Konaklieva 1974; Dimitrova-Konaklieva 2000.

Polysiphonia tripinnata J. Agardh

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: only in Bulgaria.

Refer.: Dimitrova-Konaklieva 1974, 2000; Zinova & Dimitrova-Konaklieva 1975.

Thorea hispida (Thore) Desv.

Syn. *T. ramosissima* Bory

[CR B1ab(i,ii,iii); C1]

Bu: Below the thermal springs of Malo Belovo in the Rhodopes^T (IBW0825); river Veleka near Brodilovo village in Mt Strandzha; Nevestino village in Gotse Delchev region in the valley of river Strouma.

Note: According to Petkoff (1904), the first finding in Malo Belovo region belongs to Prof. S. Georgieff (unpubl.). The peculiar forms of this species noted by Prof. A. Vulkanov and discussed by Petkoff (1942) from the thermal springs in the region of Gotse Delchev are not included here, owing to the need of more detailed taxonomic studies on this material.

Refer.: Petkoff 1904, 1908/1909, 1929a, b, 1942, 1950; Vodenicharov & al. 1991; Vodenicharov & al. 1993; Draganov & Stoyneva 1994; Temniskova & al. 2005; Temniskova & Kirjakov 2006; Kirjakov & Temniskova (in press); Stoyneva & al. (in prepar.).

II.2. Division Ochrophyta (Class Phaeophyceae)

Asperococcus ensiformis (Chiaje) M.J. Wynne

Syn. *A. compressus* A.W. Griffiths ex Hook.

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: only in Bulgaria.

Refer.: Zinova & Dimitrova-Konaklieva 1976; Dimitrova-Konaklieva 2000.

Dictyota fasciola (Roth) J.V. Lamour.

Syn. *Dilophus fasciola* (Roth) M. Howe; *D. repens* (J. Agardh) J. Agardh; *D. simplex* Kütz.

[CR B2ab(i,ii,iii); C1]

Bu: Varna and Sozopol regions of the Black Sea with

both Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region.

BS: Russia, Romania and Turkey.

Note: Published as *D. repens* J. Agardh. Petkoff (1905) gave among the other synonyms *Dilophus repens*, which currently is regarded as a synonym of *Dictyota fasciola* var. *repens* (J. Agardh) Ardiss.

Refer.: Petkoff 1905; Zinova & Dimitrova-Konaklieva 1974; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Dictyota spiralis Mont.

Syn. *Dilophus spiralis* (Mont.) Hamel, *D. ligulatus* (Kütz.) Feldmann

[CR B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia.

Note: Published as *D. ligulata* (Kütz.) Feldmann.

Refer.: Zinova & Dimitrova-Konaklieva 1974; Dimitrova-Konaklieva 2000.

Padina pavonica (L.) Thivy

Syn. *P. pavonia* J.V. Lamour.

[CR B2ab(i,ii,iii); C1]

Bu: Limited to a few sites of the Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

BS: Russia, Romania and Turkey.

Note: Published as *P. pavonica* (L.) J.V. Lamour. and as *P. pavonia* (L.) Gaillon.

Refer.: Petkoff 1943; Dimitrova 1969; Kalugina-Gutnik 1975; Draganov & Stoyneva 1994; Vodenicharov & al. 1993; Dimitrova-Konaklieva 2000; Stoyneva & Temniskova (in prepar.).

Striaria attenuata (Grev.) Grev.

[CR B2ab(i,ii,iii); C2a(ii)]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia.

Note: Published as *S. attenuata* (C. Agardh) Grev.

Refer.: Dimitrova-Konaklieva 1973, 2000; Kalugina-Gutnik 1975.

II.3. Division Chlorophyta (Class Ulvophyceae)

Bryopsis adriatica (J. Agardh) Frauent. **Syn.** *B. adriatica* (J. Agardh) Menegh.

[CR B2ab(i,ii,iii); C1]

Bu: Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Georgiev & al. 1985; Dimitrova-Konaklieva 2000.

Bryopsis duplex De Not.

Syn. *B. balbisiana* J.V. Lamour.

[CR B2ab(i,ii,iii); C1]

Bu: Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Georgiev & al. 1985; Dimitrova-Konaklieva 2000.

II.4. Division *Streptophyta* (Class *Charophyceae*)

Chara canescens Desv. & Loisel.

Syn. *C. crinita* Wallr. f. *microsperma* A. Braun, *C. crinita* Wallr. f. *major* Mig., *C. crinita* Wallr. f. *stagnalis* Nordst.

[CR B2ab(i,ii,iii); D]

Bu: In Dyavolsko Blato locality^R (IBW0178), below the former Kyupriya village (recently Primorsko town), in stagnant and deep clear waters of the swamps, in the calcareous-mergel area between Balchik and Tatar-Suyuchouk^E (IBW0214), and in the morasses formed by a streamlet with slow waters near the haline swamps of Anhialo^U (IBW4800). According to Vodenicharov & al. (1971), in the haline waters along the Bulgarian Black Sea coast and near Gara Levski (?– IBW0150).

Refer.: Petkoff 1913, 1914, 1919, 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

Chara kokeilii A. Braun

Syn.: *C. globularis* Thuill. var. *kokeilii* (A. Braun) R.D. Wood

[CR B2ab(i,ii,iii); C1]

Bu: In stagnant waters in Primorsko region along the Black Sea coast.

Refer.: Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006.

Tolypella intricata (Trentep. ex Roth) Leonh.

[CR B2ab(i,ii,iii); C1]

Bu: In the region of Beglika in the Western Rhodopi Mts.

Note: Published as *T. intricata* (Trentep.) v. Leonh. ad f. n. *microcephala* Mig.

Refer.: Petkoff 1913, 1914; Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Temniskova & Kirjakov 2006;

Blaženčić & Temniskova (unpubl.); Temniskova & Stoyneva (in press).

III. ENDANGERED SPECIES (EN)

III.1. Division *Rhodophyta* (Class *Florideophyceae*)

Batrachospermum anatinum Sirodot

Syn. *B. ectocarpum* Sirodot

[EN B1ab(i,ii,iii); C1]

Bu: In the springs of river Mladezhka, Mt Strandzha.

Refer.: Vodenicharov & al. 1986; Vodeničarov & al. 1991; & Temniskova (in press).

Batrachospermum anatinum f. *confusum* (Bory) S. Stewart & Vis

Syn. *B. boryanum* var. *distensum* (Kylin) Israelson; *B. crouanianum* Sirodot

[EN B1ab(i,ii,iii); C1]

Bu: In river Mladezhka and its springs in Mt Strandzha, in a fountain trough near Bansko in the Pirin Mts.

Refer.: Vodenicharov & al. 1986; Vodeničarov & al. 1991; Kirjakov & Temniskova (in press).

Batrachospermum boryanum Sirodot

[EN B1ab(i,ii,iii); C1]

Bu: The the springs of rivers Mladezhka and Veleka in Mt Strandzha.

Refer.: Vodenicharov & al. 1986; Vodeničarov & al. 1991; Kirjakov & Temniskova (in prepar.).

Batrachospermum turfosum Bory

Syn. *B. vagum* (Roth) C. Agardh

[EN B1ab(i,ii,iii); C2a(i)]

Bu: In Shabla lake (IBW0212) and in river Aydere, in the vicinity of Malko Turnovo, Mt Strandzha.

Note: Indicated by Petkoff (1943) for Shabla lake as *B. vagum* Roth f. *densa*. close to *B. densum* Sirodot. Shabla lake was reported as a locality for *B. vagum* by Vodeničarov & al. (1991).

Refer.: Petkoff 1943; Vodenicharov & al. 1986; Vodeničarov & al. 1991; Kirjakov & Temniskova (in press).

Ceramium circinatum (Kütz.) J. Agardh

Syn. *C. areschougii* Kylin

[EN B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia, Romania and Turkey.

Refer.: Ziinova & Dimitrova-Konaklieva 1981; Dimitrova-Konaklieva 2000.

Ceramium virgatum Roth

Syn. *C. pedicellatum* (Duby) J. Agardh

[EN B2ab(i,ii,iii); D]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Refer.: Zinova & Dimitrova-Konaklieva 1981; Dimitrova-Konaklieva 2000.

Lemanea parvula Sirodot

[EN B1ab(i,ii,iii); C1]

Bu: In a leftside tributary of river Topolnitsa, between Koprivshitsa town and its railway station in Mt Sredna Gora.

Refer.: Vodenicharov & al. 1986; Vodenicharov & al. 1991.

Lemanea sudetica Kütz.

[EN B1ab(i,ii,iii); C2a(i)]

Bu: In Plavilski Dol, in Plaviloto locality, above Slaveyno village in the Smolyan region.

Refer.: Vodenicharov & al. 1991; Temniskova & Kirjakov 2006.

Lomentaria compressa (Kütz.) Kylin

[EN B2ab(i,ii,iii); C1]

Bu: Bourgas region of the Black Sea.

BS: Russia.

Refer.: Dimitrova-Konaklieva 2000.

III.2. Division Ochrophyta (Class Phaeophyceae)

Feldmannia irregularis (Kütz.) Hammel

Syn. *Ectocarpus arabicus* Fig. & De Not.

[EN B2ab(i,ii,iii); D]

Bu: Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Dimitrova 1969; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Pterocladia capillacea (S.G. Gmel.) Santel. & Hommers.

Syn. *Pterocladia pinnata* (Huds.) Papenf.

[EN B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Zinova & Dimitrova-Konaklieva 1976; Dimitrova-Konaklieva 2000.

Punctaria latifolia Grev.

[EN B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Refer.: Dimitrova-Konaklieva 1973, 2000; Kalugina-Gutnik 1975.

III.3. Division Chlorophyta (Class Ulvophyceae)

Bryopsis hypnoides J.V. Lamour.

[EN B2ab(i,ii,iii,iv); C2a(i)]

Bu: Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Zinova & Dimitrova-Konaklieva 1981; Georgiev & al. 1985; Dimitrova-Konaklieva 2000; Temniskova & Stoyneva (in prepar.).

IV. VULNERABLE SPECIES (VU)

IV.1. Division Rhodophyta

IV.1.1. Class Bangiophyceae

Porphyra leucosticta Thur.

[VU B2ab(i,ii,iii); C2a(ii)]

Bu: Along the entire Bulgarian Black Sea coast.

BS: Russia, Romania and Turkey.

Refer.: Petkoff 1905, 1929a, 1932; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

IV.1.2. Class Florideophyceae

Apoglossum ruscifolium (W.B. Turner) J. Agardh

Syn. *Delesseria ruscifolia* (W.B. Turner) J.V. Lamour.;

Hypoglossum ruscifolium Kütz.

[VU B2ab(i,ii,iii); C1]

Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Turkey.

Note: Published as *Delesseria rustifolia* C. Agardh.

Refer.: Petkoff 1905, 1932; Zinova 1967; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

Ceramium arborescens J. Agardh

[VU B2ab(i,ii,iii); D1]

Bu: Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Refer.: Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1981; Georgiev & al. 1985; Dimitrova-Konaklieva 2000.

Corallina elongata J. Ellis & Sol.

Syn. *C. mediterranea* Aresch.

[VU B2ab(i,ii,iii); D1]

Bu: Varna and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia, Romania and Turkey.

Refer.: Zinova & Dimitrova-Konaklieva 1981; Georgiev & al. 1985; Dimitrova-Konaklieva 2000.

Corallina officinalis L.

[VU B2ab(i,ii,iii); C1]

Bu: Kaliakra and Varna regions of the Black Sea, and Sozopol-Tsarevo subregion of Sozopol region too.

BS: Russia, Romania and Turkey.

Refer.: Petkoff 1905, 1929a; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Eupogodon spinellus (C. Agardh) Kütz.

Syn. *Dasyopsis spinella* (C. Agardh) Zanardini

[VU B2ab(i,ii,iii); C2a(ii)]

Bu: Sozopol-Tsarevo subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Dimitrova-Konaklieva 1969, 2000.

Gracilaria gracilis (Stackh.) M. Steentoft, L.M. Irvine & W.F. Farnham

Syn. *G. verrucosa* (Huds.) Papenf.

[VU B2ab(i,ii,iii); C2a(ii)]

Bu: Kaliakra, Varna and Bourgas regions of the Black Sea.

BS: Russia and Turkey.

Note: According to Dimitrova-Konaklieva (2000), included as *Gracilaria* sp. in Jordanov & Dimitrova (1958/1959).

Refer.: Jordanov & Dimitrova 1958/1959; Dimitrova-Konaklieva 2000.

Lemanea mamillosa Kütz.

[VU B1ab(i,ii,iii); C2a(i)]

Bu: In river Kutelska (a tributary to Malka Arda) in the Kazanite locality, near Slaveyno village, Smolyan region (Rhodopi Mts); at the entrance to the Vladaya catchment at the eastern foothills of Selimitsa on Mt Vitosha^U (IBW5621).

Note: Published as *L. mamillosa* (Sirotod) De Toni. According to Vodeničarov & al. (1991), indicated as *L. fluviatilis* by Petkoff (1922).

Refer.: Petkoff 1922; Vodenicharov & al. 1986; Vodeničarov & al. 1991; Temniskova & Kirjakov 2006.

Paralemanea annulata (Kütz.) Vis & Sheath

Syn. *Lemanea annulata* Kütz.

[VU B1ab(i,ii,iii); C2a(i)]

Bu: In the rivers Veleka (in the Kovach locality), Sredetska and its tributary (between the villages Draka and Vulchanovo), and Muti Vir (near the bridge to Muhovo village in Sofia region).

Refer.: Vodeničarov & al. 1991.

Paralemanea catenata (Kütz.) Vis & Sheath

Syn. *Lemanea nodosa* Kütz.

[VU B1ab(i,ii,iii); D1]

Bu: In river Osenovska above the village Gradevo in Simitli region; in river Temrushka above Hrabrino village in the Plovdiv region and in the leftside tributary of river Asenitsa near Kosovo village in the Smolyan region in the Rhodopi Mts.

Refer.: Vodeničarov & al. 1991; Temniskova & Kirjakov 2006.

IV.2. Division Ochrophyta (Class Phaeophyceae)

Cladostephus spongiosus (Huds.) C. Agardh

Syn. *C. verticillatus* (Lightf.) Lyngb.

[VU B2ab(i,ii,iii); C2a(ii)]

Bu: Along the entire Bulgarian Black Sea coast.

BS: Russia, Turkey and Romania.

Note: Published as *C. verticillatus* (Lightf.) Agardh and *C. myriophyllum* Agardh.

Refer.: Petkoff 1932; Dimitrova 1969; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

Ectocarpus fasciculatus Harv.

[VU B2ab(i,ii,iii); C1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia.

Refer.: Zinova & Dimitrova-Konaklieva 1981; Dimitrova-Konaklieva 2000.

Petalonia zosterifolia (Reinke) Kuntze

[VU B2ab(i,ii,iii); D1]

Bu: Kaliakra and Varna regions of the Black Sea and in Ahtopol subregion of the Sozopol region.

BS: Romania.

Refer.: Jordanov & Dimitrova 1958/1959; Dimitrova 1969; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Punctaria tenuissima (C. Agardh) Grev.

Syn. *D. tenuissimum* (C. Agardh) Kütz.

[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Note: Published as *Diplostromium tenuissimum* Kütz.

Refer.: Zinova & Dimitrova-Konaklieva 1976; Dimitrova-Konaklieva 2000.

Scytosiphon lomentaria (Lyngb.) Link

Syn. *S. simplicissimus* (Clemente) Cremades.

[VU B2ab(i,ii,iii); D1]

Bu: Distributed in Kaliakra, Varna, Bourgas and Sozopol regions of the Black Sea; the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Romania.

Note: Published as *S. lomentarius* (Lyngb.) Link. and as *S. lomentarius* (Lyngb.) J. Agardh.

Refer.: Petkoff 1905, 1932; Jordanov & Dimitrova 1958/1959; Dimitrova 1969; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1975; Georgiev & al., 1985; Dimitrova-Konaklieva 2000.

Stilophora tenella (Esper) P.C. Silva

Syn. *S. rhizodes* (C. Agardh) J. Agardh.

[VU B2ab(i,ii,iii); C2a(i)]

Bu: Sozopol-Tsarevo and Ahtopol subregions of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Note: Published as *S. rhizodes* (W.B. Turner) J. Agardh.

Refer.: Konaklieva 1969; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

IV.3. Division Chlorophyta (Class Ulvophyceae)

Bryopsis plumosa (Huds.) C. Agardh

Syn. *B. plumosa* var. *genuina* Hauck

[VU B2ab(i,ii,iii); C1]

Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Romania.

Refer.: Petkoff 1905, 1932; Jordanov & Dimitrova 1958/1959; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1975; Georgiev et al. 1985; Dimitrova-Konaklieva 2000.

Ulva clathrata (Roth) C. Agardh

Syn. *Enteromorpha clathrata* (Roth) Grev.

[VU B2ab(i,ii,iii); D1]

Bu: Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Refer.: Zinova & Dimitrova-Konaklieva 1974; Dimitrova-Konaklieva 2000.

Ulva flexuosa Wulfen

Syn. *Enteromorpha flexuosa* (Wulfen) J. Agardh

[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea; Saltworks of Pomorie town.

BS: Russia and Romania.

Note: According to Dimitrova-Konaklieva (2000), *E. flexuosa* has *E. plumosa* as a synonym, while in the AlgaeBase *E. flexuosa* is a synonym of *Ulva flexuosa* and *E. plumosa* is a synonym of *Ulva flexuosa* subsp. *paradoxa*.

Refer.: Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000; Stoyneva (unpubl.).

Ulva flexuosa subsp. *paradoxa* (C. Agardh) Kraft

Syn. *Enteromorpha plumosa* Kütz.

[VU B2ab(i,ii,iii); C1]

Bu: Varna region and Ahtopol subregion of the Sozopol region of the Black Sea.

BS: Russia and Romania.

Note: According to Dimitrova-Konaklieva (2000), *E. plumosa* is a synonym of *E. flexuosa*, while in the Algae Database *E. flexuosa* is a synonym of *Ulva flexuosa* and *E. plumosa* is a synonym of *Ulva flexuosa* subsp. *paradoxa*. The finding of *E. plumosa* (leg. *Vichodtsevsky*) was specially reported by Petkoff (1943: 55), because according to him the species had not been known for the coastal areas of the Black Sea. Jordanov & Dimitrova (1958/1959) indicated *E. plumosa* in single specimens, floating in the water in the region of Balchik.

Refer.: Petkoff 1943; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

IV.4. Division Streptophyta (Class Charophyceae)

Chara contraria A. Braun ex Kütz.

[VU B1ab(i,ii,iii); C1]

Bu: Ovcharovo reservoir, Shoumen region; nearby Kurdzhali reservoir.

Refer.: Temniskova & al. 2005; Blaženčić & al. 2006.

Chara contraria A. Braun f. *capillacea* Mig.

[VU B1ab(i,ii,iii); D1]

Bu: Ovcharovo reservoir, Shoumen region.

Refer.: Temniskova & al. 2005; Blaženčić & Temniskova (unpubl.).

Chara virgata Kütz.

Syn. *C. delicatula* C. Agardh

[VU B1ab(i,ii,iii); C2a(i)]

Bu: In a swamp in the Yuzhen Park of Sofia; in river Yantra, above Debelets village in Turnovo region.

Refer.: Temniskova 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

Nitellopsis obtusa (Desv.) J. Groves

[VU B1ab(i,ii,iii); D1]

Bu: In swamps along the Danube, fresh or oligohaline standing waters; regions of Radomir, Svishtov and Sliven.

Refer.: Wodenitscharov 1963; Vodenicharov & al. 1971; Blaženčić & Temniskova 2002.

V. NEAR THREATENED SPECIES (NT)

V.1. Division *Rhodophyta* (Class *Florideophyceae*)

Chondria capillarlis (Huds.) M.J. Wynne

Syn. *C. tenuissima* C. Agardh, *Alsidium tenuissimum* (Gooden. & Woodw.) Kütz.

Bu: Kaliakra, Varna and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia, Romania and Turkey.

Note: Published as: *Chondria tenuissima* (Gooden. & Woodw.) ??? Agardh; *Alsidium tenuissimum* Kütz. Reported by Jordanov & Dimitrova (1958/1959) as collected only from the wave-swept material on the coast in Balchik and collected earlier in Sozopol, near Galata in Varna Bay and near cape Kaliakra.

Refer.: Petkoff 1932; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1974; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.

Dasya baillouviana (S.G. Gmel.) Mont.

Syn. *D. elegans* (G. Martens) C. Agardh, *D. pedicellata* (C. Agardh) C. Agardh, *D. kützingiana* Biasol.

Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia, Romania and Turkey.

Refer.: Petkoff 1905, 1929a, 1932; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1975; Dimitrova-Konaklieva 2000.

Hildenbrandia rivularis (Liebm.) J. Agardh

Bu: In the Rhodopi Mts – in the thermal springs and their effluents in the vicinity of the Belovo town^T (IBW0825) and in river Tsruncha; in the outlet of the Zhitolyub karst spring near Lakatnik village and in river Leva, in the vicinities of Zgorigrad in the Balkan Range, in the river Vedena near Zheleznitsa village and in the rivers Dragalevska and Iskur in Mt Vitosha.

Refer.: Petkoff 1908/1909, 1929b, 1950; Vodenicharov & al. 1991; Stoyneva & al. 2002, 2003; Temniskova & al. 2005; Temniskova & Kirjakov 2006.

Paralemanea catenata (Kütz.) Vis & Sheath

Syn. *Lemanea catenata* Kütz.

Bu: In the vicinity of Slaveyno village in the Smolyan region, in the tributaries of the rivers Malka Arda and Kutelska in Padalski Dol; in a leftside tributary of river Topolnitsa, between the Koprivshtitsa town and its railway station in Mt Sredna Gora.

Refer.: Vodenicharov & al. 1991; Temniskova & Kirjakov 2006.

Paralemanea torulosa (Roth) Sheath & Sherwood

Syn. *Lemanea torulosa* (Roth) C. Agardh

[NT B2b(i,ii,iii,iv); D1]

Bu: In river Trigradska, below the Trigrad village; in several localities in the vicinity of Slaveyno village, Smolyan region in the Rhodopi Mts – Padalski Dol, between the peaks Stoudenets and Cherni Vruh, in the Murdzhova Kyupriya locality and in the river below the Belev Dol locality; in a leftside tributary of river Topolnitsa, between Koprivshtitsa town and its railway station in Mt Sredna Gora.

Refer.: Vodenicharov & al. 1986; Vodenicharov & al. 1991; Temniskova & Kirjakov 2006.

Osmundea pinnatifida (Huds.) Stackh.

Syn. *Laurencia pinnatifida* (Huds.) J.V. Lamour.

Bu: Varna, Bourgas and Sozopol regions of the Black Sea, the latter with both Sozopol-Tsarevo and Ahtopol subregions.

BS: Russia and Romania.

Note: Published as *Laurencia pinnatifida* (Gmel.) J.V. Lamour.

Refer.: Petkoff 1905, 1932; Jordanov & Dimitrova 1958/1959; Zinova & Dimitrova-Konaklieva 1981; Dimitrova-Konaklieva 2000.

V.2. Division Ochrophyta (Class Phaeophyceae)*Heribaudiella fluviatilis* (Aresch.) Sved.**Bu:** In the outlet of the Zhitolyub karst spring, near Lakatnik village in the Balkan Range, in river Vedenia near Zheleznitsa village and in the rivers Dragalevska and Iskur in Mt Vitoshka.**Refer.:** Stoyneva & al. 2003.**V.3. Division Chlorophyta (Class Chlorophyceae)***Cladophora coelothrix* Kütz.**Syn.** *C. repens* (J. Agardh) Harv.

[NT B2b(i,ii,iii,iv); D1]

Bu: Kaliakra and Bourgas regions of the Black Sea; Ahtopol subregion of the Sozopol region of the Black Sea and in lake Shabla (IBW0219).**BS:** Russia and Turkey.**Note:** Published as *C. repens* Harv.**Refer.:** Petkoff 1905; Kalugina-Gutnik 1975; Zinova & Dimitrova-Konaklieva 1974, Dimitrova-Konaklieva 2000.**V.4. Division Streptophyta (Class Charophyceae)***Nitella gracilis* (J.E. Smith) C. Agardh**Bu:** In the swamp behind Slivnitsa^D (IBW0015) and Kazichensko peat bog^R (IBW0735) in Sofia region, in the floods of river Yantra nearby Draganovo village, in the region of Gorna Oryahovitsa.**Refer.:** Petkoff 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006.**VI. DATA DEFICIENT SPECIES (DD)****VI.1. Division Rhodophyta (Class Florideophyceae)***Brongniartella byssoides* (Gooden. & Woodw.) F. Schmitz**Syn.** *Polysiphonia byssoides* (Gooden. & Woodw.) Grev.**Bu:** Varna region of the Black Sea.**BS:** only in Bulgaria**Note:** Petkoff (1943) indicated some similarities of the specimens with *P. asperula* Kütz. Therefore this finding needs verification.**Refer.:** Petkoff 1943; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.*Chondria dasyphylla* (Woodw.) C. Agardh**Bu:** Ahtopol subregion of the Sozopol region of the Black Sea.**BS:** Russia and Romania.**Refer.:** Zinova & Dimitrova-Konaklieva 1974; Dimitrova-Konaklieva 2000.*Polysiphonia brodiaei* (Dillwyn) Spreng.**Bu:** Bourgas region of the Black Sea.**BS:** Russia.**Note:** Published as *P. brodiaei* (Dillwyn) Grev. and as *P. brodiaei* Grev. Marked with a question mark (?) by Petkoff (1932).**Refer.:** Petkoff 1932; Dimitrova-Konaklieva 2000.**VI.2. Division Ochrophyta (Class Phaeophyceae)***Punctaria plantaginea* (Roth) Grev.**Bu:** Bourgas region of the Black Sea.**BS:** Russia.**Refer.:** Petkoff 1905, 1932; Kalugina-Gutnik 1975; Dimitrova-Konaklieva 2000.**VI.3. Division Chlorophyta (Class Chlorophyceae)***Chaetomorpha herbipolensis* Lagerh.**Bu:** In the Opitsvet thermal springs^T (IBW9020), in the springs of Devnya^T (IBW0725), in Sevlievo region and near Levski railway station.**Refer.:** Petkoff 1908/1909; Vodenicharov & al. 1971; Stoyneva & Gärtner 2004.**VI.4. Division Streptophyta (Class Charophyceae)***Chara aspera* Willd.**Bu:** In the haline pools near the Bourgas-Pomorie road and between lake Atanasovo and the Black Sea, Bourgas region.**Note:** Published as *C. aspera* (Dethard.) Willd. ad f. *marina* Mig. and as *C. aspera* Dethard. ex Willd.**Refer.:** Petkoff 1913; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.*Chara globularis* f. *connivens* (Salzm. ex A. Braun) R.D. Wood**Syn.** *C. connivens* Salzm. ex A. Braun, *C. connivens* var. *pygmaea* f. *rabichii* Petkoff**Bu:** In the former swampy lake Rabisha^T (IBW0252 – Petkoff 1934). According to Vodenicharov & al. (1971), the species is 'common in brackish waters along the Black Sea coast and occasional in fresh waters.'**Refer.:** Petkoff 1934; Vodenicharov & al. 1971; Blaženčić & al. 2006; Blazencic и Temniskova (unpubl.)*Chara hispida* L.**Syn.** *C. hispida* f. *typica* Mig.; *C. hispida* var. *hispida* R.D. Wood

Bu: In deep freshwater swamps in the Balchik region (?-IBW0214).

Refer.: Petkoff 1913, 1914, 1919; Wodenitscharov 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Chara hispida* var. *major (Hartm.) R. D. Wood

Bu: Predominantly in standing, slightly haline waters, Vratsa region.

Note: Published as *C. hispida* var. *major* (Vaill. ex Hy) R.D. Wood.

Refer.: Wodenitscharow 1963; Vodenicharov & al. 1971.

***Chara tomentosa* L.**

Syn. *C. tomentosa* var. *tomentosa* R.D. Wood, *C. ceratophylla* Wallr. f. *microteles* Vilh.

Bu: Predominantly in large water bodies with stagnant fresh water but also in brackish waters; in Sadovo, in the Plovdiv region, and Abramova Kuriya locality in the Sliven region.

Refer.: Vilhelm 1908; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Lamprothamnus papulosus (Wallr.) Bég. & Formigg.

Bu: In stagnant waters along the Black Sea coast in the vicinity of Bourgas^U (according to Petkoff 1934) – without indication of halinity; in stagnant fresh waters in the Bourgas region (according to Vodenicharov & al. 1971).

Note: Published as *L. papulosum* (Wallr.) J. Groves, *Lamprothamnion alopecuroides* (Del.) A. Braun and as *Lamprothamnion papulosum* (Wallr.) J. Groves. Petkoff (1943) reported that the material was collected in the summer of 1910 by his student V. Popova and contained only two partially destroyed specimens.

Refer.: Petkoff 1934; Wodenitscharov 1963; Vodenicharov & al. 1971; Temniskova & al. 2005; Blaženčić & al. 2006; Blaženčić & Temniskova (unpubl.).

Nitella flexilis (L.) C. Agardh

Bu: Predominantly in shallow, slow and standing waters, Mt Lyulin and in the vicinity of Bourgas.

Note: Published as *N. flexilis* (L.) C. Agardh ad. var. *subcapitata* A. Braun.

Refer.: Petkoff 1913, 1914; Wodenicharoff 1957/1958, Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Nitella tenuissima (Desv.) Kütz.

Bu: Swamp Novgradsko Blato^R (IBW0212) in Svishtov region.

Refer.: Petkoff 1934; Wodenitscharow 1963; Vodenicharov & al. 1971; Blaženčić & al. 2006.

Spirogyra rhodopea Petkoff

Bu: In a spring with slow waters and its effluents above Yugovo village^U (IBW5567) in the Rhodopes.

Refer.: Petkoff 1934-1935, 1950.

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