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New, Rare, and Unusual Algae from Montana

Abstract

A checklist of taxa previously unreported or infrequently reported as occurring in Montana is presented. The 163 species and varieties include those in the Rhodophyta (1), Xanthophyta (4), Chlorophyta (5), Chrysophyta (11), and the largest group, Bacillariophyta (142).

Introduction

This checklist has been prepared to extend the freshwater algal flora of Montana. The first published reference to Montana algae appeared in 1891 (Anderson and Kelsey). In the following year, Dr. T. F. Allen identified three charophytes from a Montana pond (Williams 1892). Since these first two reports, a number of other papers pertaining to the Montana algal flora have been published. This literature was reviewed and brought up to date through 1977 by Prescott and Dillard (1979). Bahls (1981, 1982) made further additions to the diatom flora. One checklist of freshwater algae near this area (British Columbia: Stein 1975) has also appeared, part of an overall study of the freshwater algae of British Columbia (see also Stein and Gerrath 1968, 1969).

As a contribution to a continuing effort to expand knowledge of the state's algal flora, the present report lists, in annotated form, species and varieties rarely reported or previously unreported as occurring in northwest Montana. In an area that is ecologically well suited to support a diverse algal flora, few representative taxa have been reported. While many of the species included in this paper are known to have a cosmopolitan distribution, the need for complete phytogeographical data justifies placing them on record in Montana.

It is noteworthy that some of the species listed here are reported previously only from northern European and Alaskan stations. Their appearance in Montana, therefore substantiates their north temperate distribution. Although many forms, have a wide and very general range, numerous species seem to fall into either latitudinal or longitudinal zonations (Prescott and Croasdale 1942).

Material and Methods

Field collections from Flathead, Lake, Lincoln, Glacier, and Missoula counties (Table 1) were made during the summer of 1976 and 1977, examined live, or preserved (5 percent formalin or a few drops of 1 percent OsO₄) in the laboratory. The collections

TABLE 1. Algae collecting sites in northwest Montana. The number after each collecting site is used to identify locations for each taxon in the checklist.

Flathead County	Lake County
Bitterroot Lake (1)	Black Lake (16)
Echo Lake (2)	Lake Mary Ronan (17)
Egan Slough (3)	Lost Creek (18)
Foy Lake (4)	Jette Lake (19)
Hungry Horse Reservoir (5)	Mission Reservoir (20)
Lake of the Woods (6)	Mission Wells Pond (12)
Little Bitterroot Lake (7)	Ninepipe Reservoir (22)
McDonald Lake (8)	Pablo Reservoir (23)
Shaws Slough (9)	
Smith Lake (10)	Lincoln County
Swan Pond (11)	Crystal Lake (24)
Swan River (12)	Dickey Lake (25)
Yellow Bay (Flathead Lake) (13)	Lake Kooacanusa (26)
	Loon Lake (27)
Glacier County	Murphy Lake (28)
Cleveland Hanging Bog (14)	Thomson Lake, Lower (29)
Saint Mary Lake (15)	
	Missoula County
	Lake Alva (31)
	Lake Inez (32)
	Seeley Lake (33)
	Summit Lake (34)

were made from over 30 ponds, lakes, streams, oxbows and ephemeral ponds (Fig. 1). Electron micrographs for identification of taxa belonging to the Mallomonadaceae were prepared from material air-dried on stubs for scanning electron microscopy (SEM) and coated with gold in either a Hummer I sputter coater or a Varians vacuum evaporator. Observations were made with a JEOL-35 or an AMR-1200 SEM. For transmission electron microscopy (TEM), material was air-dried on Formvar coated grids and examined in a Philips EM 300. Diatoms were acid cleaned and mounted in Hyrax (Wujek 1966). Light photomicrographs were made on Kodachrome 25 or Panatomic X film using a Zeiss microscope (bright field, phase contrast, Nomarski interference contrast). Preserved material, diatom slides, and light and electron micrographs documenting this report are deposited in the herbarium of Central Michigan University (CMC) or in the private collections of the authors.

Nomenclature and taxonomic arrangement within the checklist follow that of Prescott (1962), Patrick and Reimer (1966), Bourrelly (1966, 1968) and Ettl (1978). For each taxon, the location from which the collection was made is indicated by a number (specific county localities are listed in Table 1). Systematic notes and habitat distribution notes are given where appropriate.

Chrysophyta

Mallomonadaceae

- Chryso-sphaerella brevispina* Lauterborn (1)¹
- C. longispina* Lauterborn emend Nicholls (11)
- Mallomonas actinoloma* Asmund & Takahashi (26)
- M. papillosa* Harris & Bradley (25)
- M. pumilo* Harris & Bradley (28)

¹See Table 1 for specific location corresponding to number(s).

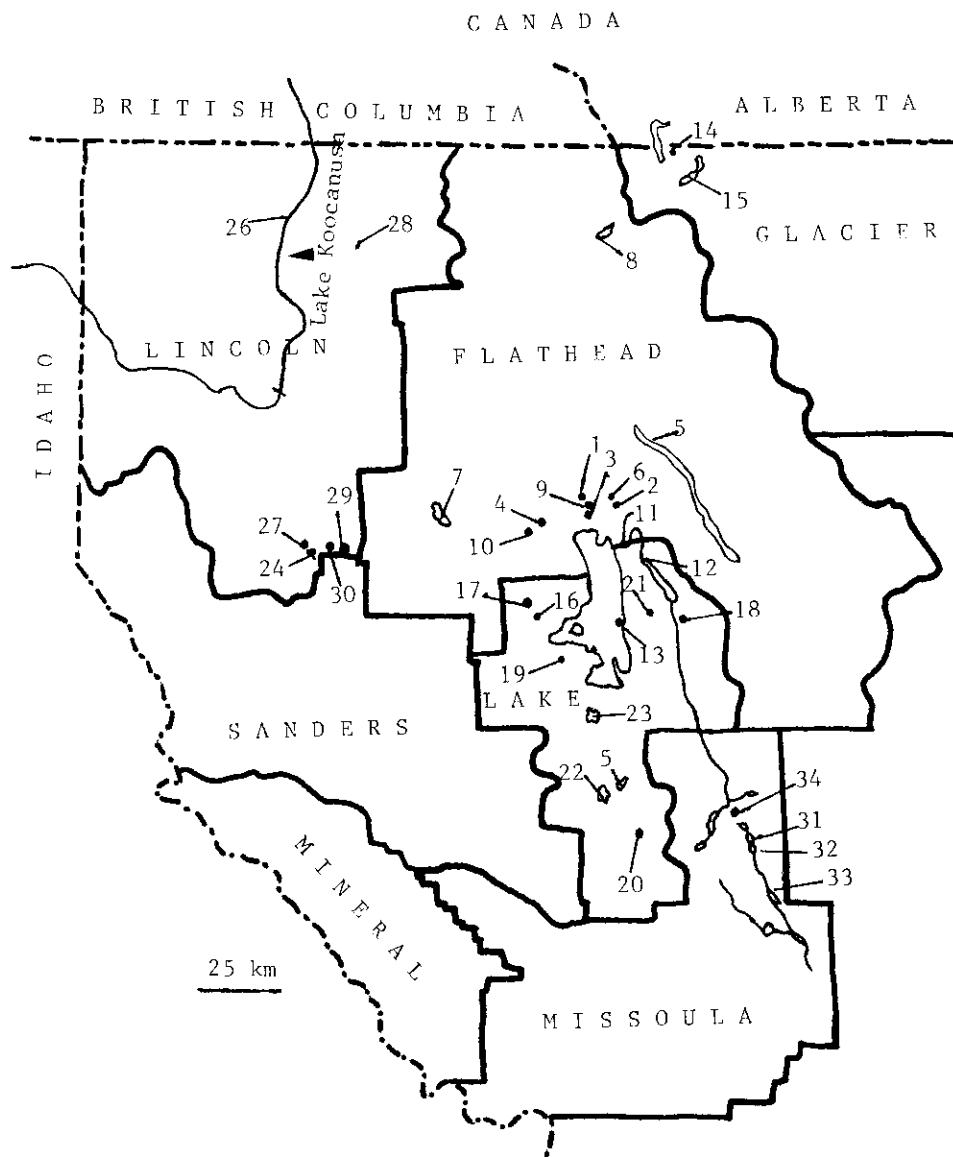


Figure 1. Location of sampling sites. See Table 1 for names of specific collecting sites.

Paraphysomonas vestita (Stokes) de Saedeler (1)

Synura echinulata Korsh. (7)

S. petersenii Korsh. (17)

Ochromonadaceae

Epipyxis utriculus Ehr. (31)

Chrysococcaceae

Biocoeca lacustris Clark (18)

Lepochromulina calyx Scherf (34)

Genus previously reported for North America by Stein (1975).

Chlorophyta

Characiaceae

Actidesmium bookeri Reinsch (20)

Chlorangiaceae

Stylosphaeridium stipitatum Geitl. & Gimesi (19)

Coleochaetaceae

Coleochaete divergens Pringsheim (34)

Tetrasporaceae

Paulschulzia pseudovolvox (Schulz) Skuja (6,12)

Volvocaceae

Pledorina californica Shaw (19)

Xanthophyta

Botryochloridaceae

Ducelliera chodatii (Ducella.) Teil. (34)

Colonial colorless alga. Considered by some authors to be a phycomycetous fungus, perhaps in the Saprolegniales (Kusel-Fetzman and Novak 1981).

Gloeobotrydaceae

Chlorobotrys ellipsoidea (Pasch.) Bourrelly (5)

Neonemataceae

Neonema quadratum Prascher (21)

Tribonemataceae

Bumilleriopsis brevis Printz (34)

Rhodophyta

Batrachospermaceae

Batrachospermum ectocarpum Sirodot (13)

Attached to rocks at 24 m depth.

Bacillariophyta

Coscinodiscaceae

Cyclotella striata (Kütz.) Grun. (34)

Stephanodiscus subtilis (Van Goor) A. Cl. (8)

Rhizosoleniaceae

Rhizosolenia curvata (Kütz.) Grun., ex Rabh. (3)

Diatomaceae

Diatoma anceps v. *linearis* M. Perag. (6)

D. Hiemale v. *hiemale* (Roth) Heib. (13)

Denticula pelagia v. *intermedia* Hust. (34)

D. subtilis Grun. (14)

D. tenuis v. *crassula* (Naeg.) Hust. (8,12,34)

Fragilariaceae

Asterionella formosa Hassall (3,8,12,32,34)

Fragilaria constricta Ehr. (32)

Synedra amphicephala Kütz. v. *amphicephala* (8)

S. filiformis v. *exilis* Cl. (21)

S. minuscula Grun. v. *minuscula* (3)

S. rumpens v. *familiaris* (Kütz.) Grun. (6,21)

S. ulna v. *chaseana* Thomas (8)

S. ulna v. *longissima* (W. Sm.) Grun. (8,32)

S. ulna v. *obtusa* V. H. (21)

Eunotiaceae

Eunotia fallax A. Cl. (34)

E. flexuosa v. *eurycephala* Grun. (21)

E. incisa W. Sm. ex Greg. v. *incisa* (34)

E. monodon Ehr. (3)

E. naegeli Migula (11,12,21)

E. tenella (Grun.) Cl. (34)

E. valida Hust. (12,13)

E. vanbeuckii v. *intermedia* (Krasske ex Hust.) Patr. (21,34)

Achnanthaceae

Achnanthes hauckiana Grun. v. *hauckiana* (22)

A. lanceolata v. *omissa* Reim. (32)

A. lapidosa Krasske (14)

A. laterostrata Hust. (32)

A. linearis (W. Smith) Grun. (32,34)

A. marginulata Grun. (32)

A. peragallii Brun. & Herib. (32)

A. plonensis Hust. (34)

Naviculaceae

Anomoeoneis vitrea (Grun.) Ross v. *vitrea* (3,6,8,34)

Caloneis alpestris (Grun.) Cl. (14)

C. ventricosa v. *minuta* (Grun.) Patr. (8)

C. ventricosa v. *truncatula* (Grun.) Meist. (8,34)

Diploneis marginestriata Hust. v. *marginestriata* (14)
D. oblongella (Naeg. ex Kütz.) Ross (22)
Mastogloia grevillei W. Sm. (34)
Navicula americana v. *moesta* Temp. & Perag. (14)
N. amphibola Cl. (3,21)
N. biconica Patr. v. *biconica* (32)
N. canalis Patr. v. *canalis* (22)
N. caroliniana Patr. v. *caroliniana* (4)
N. cincta (Ehr.) Ralfs (19,21)
N. gottlandica Grun. (8)
N. halophila (Grun.) Cl. (4)
N. heufleri Grun. v. *heufleri* (8)
N. ilopangoensis Hust. v. *ilopangoensis* (6)
N. lacustris Greg. v. *lacustris* (14)
N. latelongitudinalis Patr. v. *latelongitudinalis* (21)
N. menisculus Schum. v. *menisculus* (8)
N. modica Hust. (34)
N. mournei Patr. v. *mournei* (34)
N. mutica v. *cohnii* (Hilse) Grun. (8,34)
N. mutica v. *tropica* Hust. (3)
N. mutica v. *ventricosa* (Kütz.) Cl. (8)
N. notha Wallace (4)
N. paludosa Hust. (19)
N. plausibilis Hust. (8)
N. protracta Grun. v. *protracta* (13,32)
N. rhombicula Hust. v. *rhombicula* (21)
N. rhyngocephala Kütz. (21)
Frustulia rhomboides v. *capitata* (A. Mayer) Patr. (12,14,19,34)
F. rhomboides v. *crassinervia* (Breb. ex W. Sm.) Ross (12,34)
F. rhomboides (Shr.) DrT. v. *rhomboides* (12)
F. vulgaris (Thwaites) DeT. v. *vulgaris* (34)
Neidum affine v. *longiceps* (Greg.) Cl. (34)
N. bisulcatum (Lagerst.) Cl. v. *Bisulcatum* (34)
N. iridis (Ehr.) Cl. v. *iridis* (32)
Pinnularia abaujensis v. *rostrata* (Patr.) Patr. (32)
P. acuminata v. *bielawskii* (Herib. & Perag.) Patr. (14)
P. braunii v. *amphicephala* (A. Mayer) Hust. (34)
P. dactylus Ehr. v. *dactylus* (34)
P. divergens v. *bacillaris* (M. Perag.) Mills (12)
P. divergens W. Sm. v. *divergens* (12)
P. flexuosa Cl. v. *flexuosa* (19)
P. gibba v. *mesogongyla* (Ehr.) Hust. (21)
P. gibba v. *parva* (Ehr. Grun. (34)
P. intermedia (Lagerst.) Cl. v. *intermedia* (34)
P. mesolepta v. *angusta* Cl. (34)
P. obscura Krasske v. *obscura* (8)
P. polyonca (Breb.) O. Mull. v. *polyonca* (21)

- P. stomatophora* (Grun.) Cl. v. *stomatophora* (34)
P. subcapitata Greg. (8,14,34)
P. torta (Mann.) Patr. v. *torta* (34)
P. viridis v. *minor* Cl. (34)
Stauroneis fluminea Patr. & Freese v. *fluminea* (32)

Gomphonemataceae

- Gomphonema acuminatum* v. *pusilla* Grun. (19,21,32,34)
G. affine Kütz. v. *affine* (3,11,14)
G. affine v. *insigne* (Greg.) Andrews (13)
G. angustatum v. *citera* (Hohn & Hellerm.) Patr. (13)
G. angustatum v. *intermedia* Grun. (8)
G. angustatum v. *sarcophagus* (Greg.) Grun. (8,21,34)
G. brebissonii Kütz. v. *brebissonii* (14)
G. consector Hohn & Hellerm. v. *consector* (6,8,21)
G. dichotomum Kütz. (6)
G. grunowii Patr. v. *grunowii* (21)
G. septum Mogh. v. *septum* (13,34)
G. subclavatum (Grun.) Grun. v. *subclavatum* (14)
G. subtile v. *sagitta* (Schum.) Cl. (34)
G. tenellum Kütz. v. *tenellum* (3,6,11)
G. truncatum v. *capitatum* (Ehr.) Patr. (19,21,34)
G. truncatum Ehr. v. *truncatum* (3,6,11,19,32,34)

Cymbellaceae

- Amphora ovalis* v. *affinis* (Kütz.) V. H. ex DeT. (6,14,19)
A. perpusilla (Grun.) Grun. (8,32)
Cymbella angustata (W. Sm.) Cl. v. *angustata* (8,14,21)
C. cymbiformis v. *nonpunctata* Font. (8)
C. heteropleura v. *subrostrata* Cl. (14)
C. inaequalis (Ehr.) Robin. v. *inaequalis* (14,34)
C. lunata W. Sm. v. *lunata* (3,12,14,19,21,32,34)
C. minuta v. *latens* (Karaske) Reim. (8,14)
C. minuta Hilse ex Rabh. v. *minuta* (3,8,12,13,14,19,32,34)
C. minuta v. *pseudogracilis* (Choln.) Reim. (12)
C. minuta v. *silesiaca* (Bleisch ex Rabh.) Reim. (8)
C. muelleri Hust. v. *muelleri* (21)
C. prostrata v. *auerswaldii* (Rabh.) Reim. (21,34)
C. rupicola Grun. v. *rupicola* (3)
C. subaequalis Grun. v. *subaequalis* (8)

Epithemiaceae

- Epithemia adnata* v. *minor* (Perag. & Herib.) Patr. (3,19)
E. adnata v. *porcellus* (Kütz.) Patr. (21,33,34)
E. adnata v. *probosidea* (Kütz.) Patr. (11,21)
E. argus v. *alpestris* Grun. (12,32,34)

- E. turgida* v. *westermanii* (Ehr.) Grun. (34)
Rhopalodia musculus (Kütz.) O. Mull. v. *musculus* (14,19)
R. parallela (Grun.) O. Mull. v. *parallela* (32)

Nitzchiaceae

- Hantzschia amphioxys* v. *capitata* O. Mull. (8,12,34)
H. amphioxys (Hantz.) Grun. v. *vivax* (8)
H. elongata (Hantz.) Grun. (32,34)
Nitzschia flexa Schum. (8,34)
N. frustulum v. *perpusilla* (Rabh.) Grun. (19)
N. ignorata Krasske v. *ignorata* (32)
N. invisitata Hust. v. *invisitata* (34)
N. thermalis Kütz. (19,21)
N. vivax W. Sm. (32,34)

Surirellaceae

- Campylodiscus clypeus* Ehr. v. *clypeus* (16)
C. noricus v. *hibernicus* (Ehr.) Grun. (3)
Cymatopleura elliptica (Breb.) W. Sm. v. *elliptica* (32)
Surirella biseriata v. *constricta* Grun. (32)
S. linearis v. *constricta* (Ehr.) Grun. (32)
Stenopterobia intermedia Lewis v. *intermedia* (34)

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