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Studies on the Bryophytes of Southern Manitoba. V. Collections from Whiteshell Provincial Park

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Abstract. One hundred and twenty-nine taxa of bryophytes were collected in the western part of Whiteshell Provincial Park, Manitoba. The following eight taxa have not previously been recorded for the province: *Frullania bolanderi, Lophozia excisa, L. hatcheri, Porella platyphylloidea, Anomodon rostratus, Grimmia donniana, G. unicolor,* and *Hygroamblystegium fluviatile* var. *orthocladum.*

Introduction

Whiteshell Provincial Park lies in the southeastern corner of Manitoba, approximately 110 km from Winnipeg. Its eastern limit is on the Ontario border, and its southern boundary is approximately 70 km from the Manitoba–Minnesota border.

Although the area has been developed as a park since 1962, much of its 2703 km^2 is still inaccessible except by air, hiking trail, or portaged canoe. The numerous lakes (131 in all), many linked by the Winnipeg or Whiteshell Rivers, provide the major water routes, while some of the larger rock outcrops and most of the lakes provide suitable landing sites for helicopters or small bush aircraft.

The rather low pattern of relief of the area caused by the post-glacial deposition of lacustrine materials is somewhat modified by morainic ridges, fluvial terraces, and rock outcrops (Rowe 1959). These last (Figure 1), which are a very conspicuous feature of the park, are largely composed of the Precambrian gneisses of the southern edge of the Canadian Shield, and are mainly acidic though with some basic pockets. Some of the outcrops may reach considerable proportions, *e.g.* the Tie Creek Boulder Mosaic outcrop which is upwards of 9 acres (0.036 km^2) (Steinbring 1970).

The entire park falls within the Lower English River Section of the Boreal Forest Region (Rowe 1959). Much of the area is forested. White spruce (*Picea glauca*)[2] – balsam fir (*Abies balsamea*) forest is frequent on well-drained sites, sometimes with an admixture of paper birch (*Betula papyrifera*). Along the river valleys, mixed wood or mixed hardwood forest, frequently dominated by balsam poplar (*Populus balsamifera*), is of general occurrence, with aspen (*Populus tremuloides*) on the slopes. Jack pine forest (*Pinus banksiana*) is common on sandier soils, while low-lying, poorly-drained parts of the park have tracts of bog forest dominated by black spruce (*Picea mariana*) or tamarack (*Larix laricina*).

Little botanical work has been published on the park. The only published recordings of bryophytes are of three species new to the province reported by Longton (1972) for the controlled area of the Whiteshell Nuclear Research Establishment near the western boundary.

With the exception of site 11, the area covered in the present study lies within the western part of the park, in the region of Dorothy, Betula, and George lakes (Figure 2). Site 11 (49°49′ N, 95°16′ W) is in the southern part but is included in this publication as it had a number of species not recorded elsewhere in the park.

Twenty-eight sites were visited, chiefly in June and July 1972. Collections at sites 7, 13, 14, and 16 were made in August and September 1972. Voucher specimens have been deposited in the authors' own herbarium and at the University of Winnipeg.

[2]Vascular plant nomenclature follows Scoggan (1957).

FIGURE 1. Rock outcrop at George Lake, Whiteshell Provincial Park. Dominant tree species are white spruce and jack pine.

Bryophytes Collected

A total of 129 taxa were collected from Whiteshell Provincial Park; these are listed. Nomenclature of Sphagnobrya and Eubrya follows Crum et al. (1965), with modification according to Crum (1971). Hepatic nomenclature is based on Schuster (1953, 1966, 1969), with abbreviations of authorities modified to conform to the list given by Sayre et al. (1964). Nomenclature of Mniaceae follows Koponen (1968, 1971).

HEPATICAE

Chiloscyphus pallescens (Ehrh.) Dum.
Chiloscyphus polyanthus (L.) Corda
Frullania bolanderi Aust.
Frullania eboracensis Gott.
Frullania inflata Gott.
Jamesoniella autumnalis (DC.) Steph.
Lepidozia reptans (L.) Dum.
Lophocolea bidentata (L.) Dum.
Lophocolea heterophylla (Schrad.) Dum.
Lophocolea minor Nees
Lophozia barbata (Schmid.) Dum.
Lophozia excisa (Dicks.) Dum.
Lophozia hatcheri (Evans) Steph.
Lophozia kunzeana (Hüb.) Evans
Lophozia ventricosa (Dicks.) Dum.
Marchantia polymorpha L.
Plagiochila asplenioides (L.) Dum.
Porella platyphylla (L.) Lindb.
Porella platyphylloidea (Schwein.) Lindb.
Ptilidium ciliare (L.) Nees
Ptilidium pulcherrimum (Web.) Hampe
Radula complanata (L.) Dum.
Riccardia palmata (Hedw.) Carruth.
Riccardia pinguis (L.) S. Gray

SPHAGNOBRYA

Sphagnum capillaceum (Weiss) Schrank
Sphagnum capillaceum (Weiss) Schrank var. *tenellum* (Schimp.) Andr.
Sphagnum magellanicum Brid.
Sphagnum recurvum P. Beauv.
Sphagnum squarrosum Sw. *ex.* Crome

EUBRYA

Abietinella abietina (Hedw.) Fleisch.
Amblystegium juratzkanum Schimp.
Amblystegium serpens (Hedw.) B.S.G.

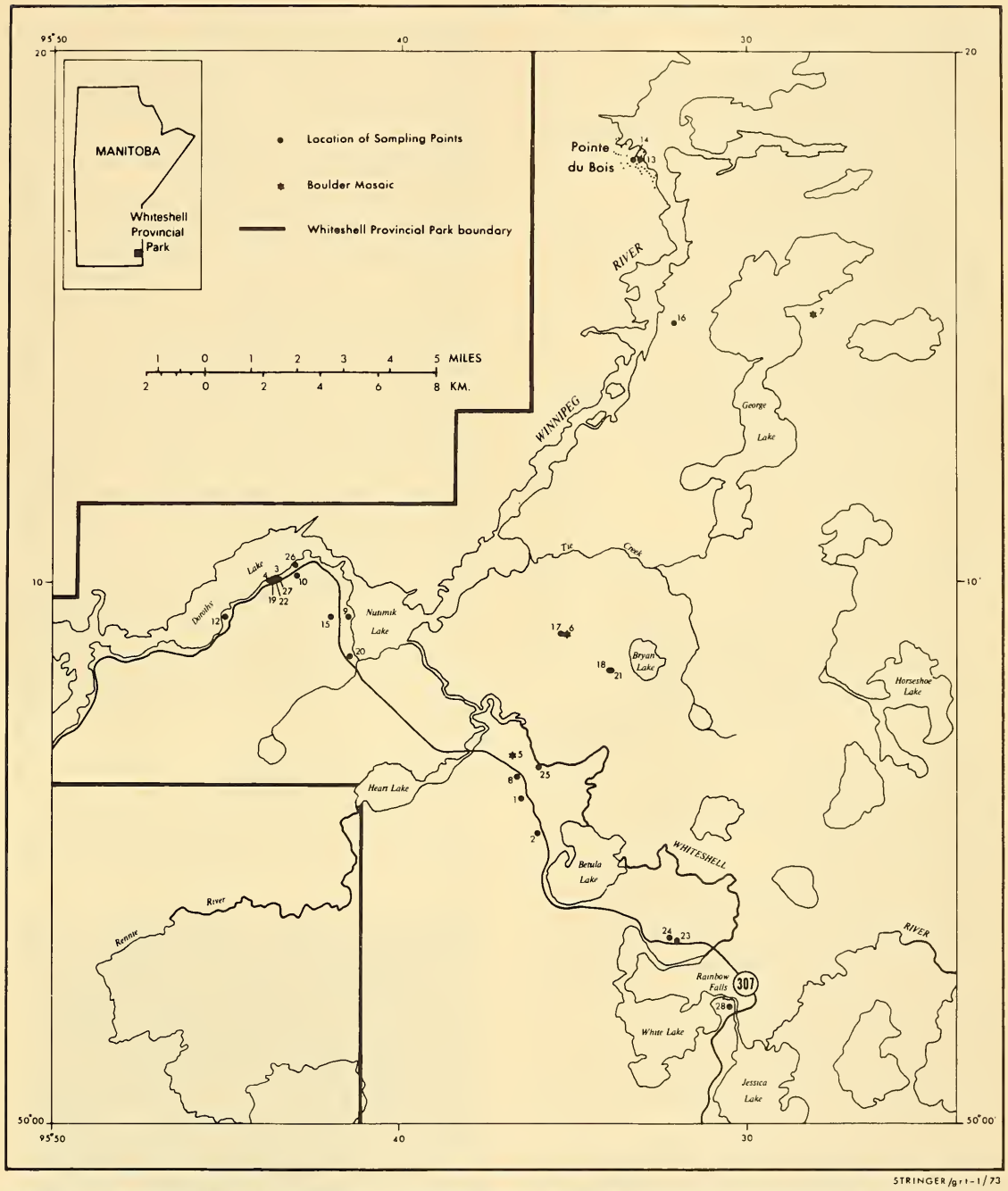

FIGURE 2. Western part of Whiteshell Provincial Park, showing bryophyte collecting sites 1–10, 12–28.

Amblystegium varium (Hedw.) Lindb.
Anomodon attenuatus (Hedw.) Hüb.
Anomodon rostratus (Hedw.) Schimp.
Aulacomnium palustre (Hedw.) Schwaegr.
Barbula convoluta Hedw.
Barbula unguiculata Hedw.
Bartramia pomiformis Hedw.
Brachythecium campestre (C. Müll.) B.S.G.

Brachythecium collinum (Schleich. *ex.* C. Müll.) B.S.G.
Brachythecium rivulare B.S.G.
Brachythecium rutabulum (Hedw.) B.S.G.
Brachythecium salebrosum (Web. and Mohr) B.S.G.
Brachythecium velutinum (Hedw.) B.S.G.
Bryoerythrophyllum recurvirostrum (Hedw.) Chen
Bryum angustirete Kindb. *ex* Mac.
Bryum caespiticium Hedw.
Bryum creberrimum Tayl.
Bryum pallescens Schleich. *ex* Schwaegr.
Bryum pseudotriquetrum (Hedw.) Gaertn., Meyer and Scherb.
Callicladium haldanianum (Grev.) Crum
Calliergon giganteum (Schimp.) Kindb.
Campylium chrysophyllum (Brid.) J. Lange
Campylium hispidulum (Brid.) Mitt.
Campylium stellatum (Hedw.) C. Jens.
Ceratodon purpureus (Hedw.) Brid.
Climacium dendroides (Hedw.) Web. and Mohr
Dicranella heteromalla (Hedw.) Schimp.
Dicranella schreberiana (Hedw.) Schimp.
Dicranum bonjeanii De Not. *ex* Lisa
Dicranum drummondii C. Müll.
Dicranum flagellare Hedw.
Dicranum fragilifolium Lindb.
Dicranum fuscescens Turn.
Dicranum montanum Hedw.
Dicranum polysetum Sw.
Dicranum scoparium Hedw.
Dicranum undulatum Brid.
Drepanocladus aduncus (Hedw.) Warnst.
Drepanocladus aduncus (Hedw.) Warnst. var. *polycarpus* (Bland. *ex* Voit) Roth
Drepanocladus fluitans (Hedw.) Warnst.
Drepanocladus uncinatus (Hedw.) Warnst.
Drepanocladus vernicosus (Lindb. *ex* C. Hartm.) Warnst.
Encalypta ciliata Hedw.
Encalypta procera Bruch
Eurhynchium pulchellum (Hedw.) Jenn.
Funaria hygrometrica Hedw.
Grimmia alpicola Hedw.
Grimmia apocarpa Hedw.
Grimmia donniana Sm. *ex* Sm. and Sowerby
Grimmia unicolor Hook. *ex* Grev.
Haplocladium microphyllum (Hedw.) Broth.
Hedwigia ciliata (Hedw.) P. Beauv.
Hygroamblystegium fluviatile (Hedw.) Loeske var. *orthocladum* P. Beauv.
Hylocomium splendens (Hedw.) B.S.G.
Hypnum cupressiforme Hedw.
Hypnum lindbergii Mitt.
Hypnum pallescens (Hedw.) P. Beauv.
Hypnum pratense Koch *ex* Spruce
Isopterygium turfaceum (Lindb.) Lindb.
Leptobryum pyriforme (Hedw.) Wils.
Leptodictyum riparium (Hedw.) Warnst.
Leptodictyum trichopodium (Schultz) Warnst.
Leptodictyum trichopodium (Schultz) Warnst. var. *kochii* (B.S.G.) Broth.
Leskea polycarpa Hedw.
Leskeela nervosa (Brid.) Loeske
Leucobryum glaucum (Hedw.) Angstr. *ex* Fr.
Mnium spinulosum B.S.G.
Neckera pennata Hedw.
Oncophorus wahlenbergii Brid.
Orthotrichum obtusifolium Brid.
Orthotrichum speciosum Nees *ex* Sturm
Paraleucobryum longifolium (Hedw.) Loeske
Plagiomnium cuspidatum (Hedw.) Kop.
Plagiomnium drummondii (Bruch and Schimp.) Kop.
Plagiomnium rugicum (Laur.) Kop.
Plagiothecium denticulatum (Hedw.) B.S.G.
Platydictya subtile (Hedw.) Crum
Platygyrium repens (Brid.) B.S.G.
Pleurozium schreberi (Brid.) Mitt.
Pohlia nutans (Hedw.) Lindb.
Pohlia wahlenbergii (Web. and Mohr) Andr.
Polytrichum commune Hedw.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.
Ptilium crista-castrensis (Hedw.) De Not.
Pylaisiella polyantha (Hedw.) Grout
Rhodobryum roseum (Hedw.) Limpr.
Rhytidiadelphus triquetrus (Hedw.) Warnst.
Rhytidium rugosum (Hedw.) Kindb.
Tetraphis pellucida Hedw.
Tetraplodon mnioides (Hedw.) B.S.G.
Thuidium delicatulum (Hedw.) B.S..G
Thuidium delicatulum (Hedw.) B.S.G. var. *radicans* Crum, Steere and Anderson
Thuidium recognitum (Hedw.) Lindb.
Tomenthypnum nitens (Hedw.) Loeske
Tortula mucronifolia Schwaegr.
Tortula ruralis (Hedw.) Gaertn., Meyer and Scherb.

A detailed annotated list of species is available at a nominal charge from the Depository of Unpublished Data, National Science Library, National Research Council of Canada, Ottawa, Canada K1A 0S2.

Bryophyte Habitat Relations

Several rock outcrops (sites 1–7, Figure 2) were searched for bryophytes. Of these, some were open with little vascular plant cover (1,

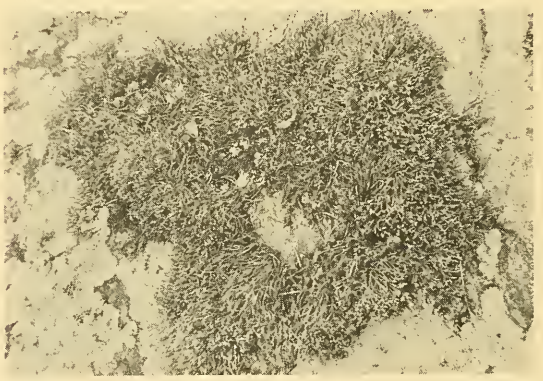

FIGURE 3. *Hedwigia ciliata* on a rock outcrop near Dorothy Lake, Whiteshell Provincial Park. Several large patches of lichen are also present.

3, 4, 5), while some had moist fissures, wet hollows, or moist shaded faces (2, 4, 7). Sites 2 and 7 had forested depressions.

On bare rock or rock with little cover of humus or soil, *Hedwigia ciliata* was common and often abundant (Figure 3). Small patches of *Grimmia apocarpa* were also frequent. Both these saxicolous species were quite common on erratic boulders in forested areas as well as on rock outcrops.

Where humus had accumulated over the rock, several large acrocarps were present, often in abundance, *e.g. Dicranum scoparium, D. polysetum, D. drummondii, Polytrichum juniperinum,* and *Plagiomnium cuspidatum,* along with the pleurocarpous species *Pleurozium schreberi, Eurhynchium pulchellum, Ptilium crista-castrensis, Brachythecium campestre,* and, less frequently, *Plagiothecium denticulatum.*

In the moister rock hollows, light greenish-yellow patches of *Aulacomnium palustre* were conspicuous, while vivid green tufts of *Bartramia pomiformis* could be seen on humus in cracks or hollows in the rock surface. One very large cushion of *Leucobryum glaucum,* a species of wet, acid habitats, was found in a moist hollow at site 7. The only previous report of *L. glaucum* in the prairie provinces was by Lowe (1943) for southeastern Manitoba.

Neckera pennata, a species usually found on trunks of deciduous trees, but also found on rock ledges and cliffs in the eastern part of Canada and the United States, was very abundant on moist, vertical rock faces at site 4.

On pockets of mineral soil in the rock, *Polytrichum piliferum* was common.

Liverworts were frequent on thin layers of humus and plant litter over the rocks. *Lophozia excisa, L. barbata,* and *Ptilidium pulcherrimum* were especially common. On bare rock faces, reddish-brown colonies of *Frullania eboracensis* were not infrequent. This species, a pioneer on both bark and rock (Schuster 1957), was also found on bark of live trees in white spruce – balsam fir forests where it was often associated with *Radula complanata* and probably represented part of the *Frullania – Radula – Porella* Associule as described by Schuster (1957).

Collections were also made in jack pine forests (sites 8–11), some of which had moist depressions (8), a considerable amount of deadfall (10), or erratic boulders (8, 10, 11).

Here hepatics were much less abundant, *Ptilidium pulcherrimum* being the only species collected with any degree of frequency. This species was usually found on rotten wood and formed part of the bryophytic communities on deadfall in most types of forested sites. Other species typically growing on wood in advanced stages of decay included *Lophocolea heterophylla, Callicladium haldanianum, Dicranum flagellare, D. montanum, D. fragilifolium, Oncophorus wahlenbergii, Hypnum pallescens,* and *Pohlia nutans. Pylaisiella polyantha,* a very common species of tree bases at most sites, was sometimes also part of these rotten wood colonies.

Ground cover of moss in jack pine-dominated forests was usually abundant, consisting largely of *Dicranum polysetum, D. drummondii, Pleurozium schreberi, Polytrichum juniperinum, P. commune,* and *Brachythecium salebrosum.*

On open patches of mineral soil, *Ceratodon purpureus* and *Polytrichum piliferum* were often present.

Of the white spruce-dominated forests (sites 12–20), some had an admixture of balsam fir (12, 17, 18, 19), some balsam poplar (13), some jack pine (19), paper birch (17, 20), and aspen (12). They varied from mesic (12) to wet (19). Sites 14 and 20 were disturbed.

White spruce-dominated forests were rich in bryophytes. Hepatics were common, and included most of the species prominent on rock outcrops. *Radula complanata* was frequent on rotten wood as well as on live bark, while *Frullania inflata,* previously reported only for the Winnipeg area (Stringer and Stringer 1973) was found on humus over an erratic boulder at site 16.

Besides the other common species of rotten wood, *Haplocladium microphyllum, Campylium hispidulum,* and *Isopterygium turfaceum* could be found on well-rotted logs in the white spruce forests.

In the more mesic sites of this group, ground-cover dominants were essentially those of the

jack pine forests, with *Dicranum scoparium, Plagiomnium cuspidatum, Hylocomium splendens,* and *Eurhynchium pulchellum* also prominent. *Plagiomnium cuspidatum* was sometimes found on rotten wood. *Abietinella abietina,* as well as forming part of the ground cover at several sites, was also a conspicuous component of the tree stockings at site 16 where it occurred up to 0.5 m above ground level.

In the wetter white spruce forests, *Climacium dendroides, Thuidium recognitum, Thuidium delicatulum* var. *radicans,* and *Brachythecium rutabulum* constituted an appreciable proportion of the ground cover.

It was impossible to inspect very wet forested areas and marshes thoroughly as they remained flooded and inaccessible throughout the season. However, some collections were made at sites 21–23 (black spruce bog forest) and 24 (tamarack). Sites 25–28 were nonforested wet areas such as *Carex* or *Carex–Equisetum* marshes, and rocks, gravel, mud and moist earth along the banks of the Whiteshell River.

The most prominent bryophytes of the bog forest floors were *Sphagnum* species, including *S. capillaceum, S. capillaceum* var. *tenellum, S. magellanicum,* and *S. recurvum.* These often formed large hummocks. *Pleurozium schreberi* was still a common species at sites 23 and 24.

A number of other typically wetland species were abundant at some of the waterlogged sites. These included *Aulacomnium palustre, Calliergon giganteum, Campylium stellatum, Tomenthypnum nitens, Leptodictyum riparium, Drepanocladus aduncus, D. fluitans,* and *D. vernicosus.*

New Records and Notes on Distribution

A number of species seemed to be strictly or predominantly eastern or eastern-central in their distribution. These included several species common in the study area, i.e. *Dicranum montanum, D. flagellare, D. drummondii, Callicladium haldanianum, Isopterygium turfaceum,* and *Thuidium delicatulum* var. *radicans.*

Eight species had not previouly been recorded for the province, *i.e. Frullania bolanderi, Lophozia excisa, L. hatcheri, Porella platyphylloidea, Anomodon rostratus, Grimmia donniana, G. unicolor,* and *Hygroamblystegium fluviatile* var. *orthocladum.*

A single collection of *Frullania bolanderi* was made on a shaded, east-facing rock face at site 4. Although usually considered a pioneer on bark, this species may also be a pioneer on rock surfaces (Schuster 1953). According to Schuster (1958), it is a Pacific Coast Lowland species recurring as a disjunct in the Great Lakes region. The present recording appears to be a northwestern extension of its distribution in the Great Lakes area.

Lophozia excisa, a pioneer on rocks of widely varied pH (Schuster 1969), appears to fall within its known range. Recordings have been made in Alberta (Bird 1966) and Minnesota (Schuster 1969).

Lophozia hatcheri, characteristic of the upper edge of the boreal forest and the lower edge of the tundra (Schuster 1953), is here near the southern limit of its range.

No recordings of *Porella platyphylloidea* have been made for any of the prairie provinces (Bird 1966), although Crowe and Barclay-Estrup (1971) have reported it from the Lake Superior region. According to Schuster (1953), it is common in Minnesota but of restricted occurrence westwards and in the extreme northeast. The present recording thus extends its known northwestern distribution.

The only collection of *Anomodon rostratus* was made on moss litter and thick humus at the wet base of a vertical rock face at site 11. According to Grout (1934, page 73), it is very common in the northeastern United States and eastern Canada and has been reported from Vancouver Island by Macoun. It has not, however, been reported for any of the prairie provinces (Bird 1966).

Grimmia donniana and *G. unicolor,* saxicolous species, were both found at site 5. *Grimmia donniana* has been recorded for Alberta but *G. unicolor* has not previously been recorded for any of the prairie provinces (Bird 1966).

Hygroamblystegium fluviatile var. *orthocladum* was abundant as thick, fine mats on silt over rocks at site 25. It appears to fall within

the known range of the taxon given by Grout (1934) as *H. orthocladum*. Bird (1969) reported the species f om the Roseau River, 13 km south of St. Malmo, Manitoba. No other reports for either the species or the variety exist for west-central Canada (Bird 1966).

Acknowledgments

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