

Working Copy

THE LICHENS OF SUGARLOAF PRESERVE

Final Report

by

Clifford M. Wetmore
Dept. of Plant Biology
University of Minnesota
St. Paul, Minn. 55108

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ABSTRACT

Lichen collections were made at 10 localities in the Sugarloaf Preserve in July, 1995. The total species list shows 134 species present. Additional species lists give the species present at each of the localities.

No species were found that are on the Minnesota Endangered/Threatened list. The lichen flora is fairly diverse for this kind of area which has limited vegetational variability. The richest locality for lichens was on the point, especially the rock shores, and the poorest locality was the upper open, flat area near the road.

PREFACE

Under a contract from the Sugarloaf Interpretive Center Association a lichen survey was conducted in the Sugarloaf Preserve (SLP). The objectives of the study were to collect lichens in all habitats with notes on the different substrates for the species, produce a species list for SLP, indicate the presence of any lichens on the Minnesota Threatened and Endangered list, and provide a final report on the project along with detailed map with indications of the collection localities. This report also includes a discussion of the lichen flora and recommendations.

INTRODUCTION

Lichens are composite plants composed of two different types of organisms. The lichen plant body (thallus) is made of fungi and algae living together in a symbiotic arrangement in which both partners are benefited and the composite plant body can grow in places where neither component could live alone. The thallus has no protective layer on the outside, such as the epidermis of a leaf, so the air in the thallus has free exchange with the atmosphere. Lichens are slow growing (a few millimeters per year) and remain alive for many years and so must have a habitat that is relatively undisturbed in order to survive. Lichens vary greatly in their ecological requirements but almost all of them can grow in places that only receive periodic moisture. When moisture is lacking they go dormant until the next rain or dew-fall. Some species can grow in habitats with very infrequent occurrences of moisture while others need high humidity and frequent wetting in order to survive. This difference in moisture requirements is very important in the distribution of lichens.

Lichens are known to be very sensitive to low levels of many atmospheric pollutants. Some are damaged or killed by levels of sulfur dioxide as low as 13 ug/cubic meter (annual average) or by nitrogen oxides at 3834-7668 ug/cubic meter or by other strongly oxidizing compounds such as ozone. Other lichens are less sensitive and a few

can tolerate levels of sulfur dioxide over 300 ug/cubic meter. After the lichen dies it disappears from the substrate within a few months to a year as it disintegrates and decomposes (Wetmore, 1982).

Sugarloaf Preserve is located along the northern shore of Lake Superior near the southwestern corner of Cook County, Minnesota. The area includes some open area on an upper terrace near Highway 61. The open area was grassland with some young balsam poplar and a pine plantation. Very few lichens were found in this area. The fairly steep slopes leading to the shore had occasional rock outcrops among birch and aspen had numerous lichens, especially on the rock outcrops. The flatland near shore west of the buildings was mostly brush but with a few stands of middle-aged balsam poplar with good lichens. West of the stream at the west end was a dense plantation of conifers with no lichens. The best area for lichens was on the point itself that sticks out into the lake forming a small bay.

METHODS

Field work was done during 10-12 July, 1995. Collections were made at 10 localities and 270 lichen collections were obtained. A complete list of collection localities is given in Appendix I and are indicated on Fig. 1 and have been indicated on enlarged air photos previously submitted. These localities were chosen to include all vegetation types and possible lichen habitats within the SLP.

Localities for collecting were selected first to give a general coverage of the area, second, to sample all vegetational types, third, to be in localities that should be rich in lichens. The areas within each locality were uniform in vegetation type. At each locality voucher specimens of all species found were collected to record the total flora for each locality and to avoid missing different species that might appear similar in the field.

Identifications were carried out at the University of Minnesota with the aid of comparison material in the herbarium and using thin layer chromatography for identifi-

cation of the lichen substances where necessary. The original packet of each collection has been deposited in the University of Minnesota Herbarium, St. Paul, Minn (MIN). All specimens deposited at the University of Minnesota have been entered into the computerized data base maintained there. Lists of species found at each locality are included in this report.

LICHEN FLORA

The following lists of lichens is based on my collections. There are no literature reports of lichens previously collected in the area. This list includes 134 species collected for this study but there are a few additional unidentified species. There were no species in the Minnesota Endangered, Threatened, or Special Concern list.

The first list (Total Species List) is an alphabetical list of all species collected in SLP with author citations according to the arrangement of genera and species accepted in the University of Minnesota Herbarium. The individual locality lists that follow give species found in that locality with substrates but no authorities.

TOTAL SPECIES LIST

Acarospora americana Magn.
Acarospora badiofusca (Nyl.) Th. Fr.
Acarospora fuscata (Nyl.) Arn.
Arthonia caesia (Flot.) Körb.
Aspicilia caesiocinerea (Nyl. ex Malbr.) Arn.
Aspicilia cinerea (L.) Körb.
Bacidia populorum (Mass.) Trev.
Bacidia sabuletorum (Schreb.) Lett.
Baeomyces rufus (Huds.) Rebert.
Buellia punctata (Hoffm.) Mass.
Calicium glaucellum Ach.
Caloplaca arenaria (Pers.) Müll. Arg.
Caloplaca atroalba (Tuck.) Zahlbr.
Caloplaca cerina (Ehrh.) Th. Fr.
Caloplaca flavovirescens (Wulf.) Dalla Torre & Sarnth.
Caloplaca holocarpa (Hoffm.) Wade
Caloplaca modesta (Zahlbr.) Fink
Caloplaca oxfordensis Fink
Candelariella efflorescens R. Harris & Buck
Candelariella vitellina (Hoffm.) Müll. Arg.
Cetraria halei W. & C. Culb.
Cetraria orbata (Nyl.) Fink
Cetraria pinastri (Scop.) Gray
Cetraria sepincola (Ehrh.) Ach.

Cetrelia olivetorum (Nyl.) W. & C. Culb.
Cladina mitis (Sandst.) Hustich
Cladina rangiferina (L.) Nyl.
Cladonia amaurocraea (Flörke) Schaer.
Cladonia bacillaris Nyl.
Cladonia caespiticia (Pers.) Flörke
Cladonia cenotea (Ach.) Schaer.
Cladonia chlorophaea (Flörke ex Somm.) Spreng.
Cladonia coniocraea (Flörke) Spreng.
Cladonia cornuta (L.) Hoffm.
Cladonia cristatella Tuck.
Cladonia fimbriata (L.) Fr.
Cladonia gracilis (L.) Willd.
Cladonia merochlorophaea Asah.
Cladonia multiformis G. K. Merr.
Cladonia pleurota (Flörke) Schaer.
Cladonia pyxidata (L.) Hoffm.
Cladonia rei Schaer.
Cladonia scabriuscula (Delise in Duby) Nyl.
Cladonia symphycarpa (Ach.) Fr.
Cladonia verticillata (Hoffm.) Schaer.
Collema polycarpon Hoffm.
Collema undulatum Laurer ex Flot.
Dermatocarpon luridum (With.) Laundon
Dermatocarpon miniatum (L.) Mann
Evernia mesomorpha Nyl.
Gonohymenia nigritella (Lett.) Henss.
Gyalecta jenensis (Batsch) Zahlbr.
Heterodermia speciosa (Wulf.) Trev.
Hypogymnia physodes (L.) Nal.
Hypogymnia tubulosa (Schaer.) Havaas
Icmadophila ericetorum (L.) Zahlbr.
Imshaugia aleurites (Ach.) S. F. Meyer
Lecanactis chloroconia Tuck.
Lecania erysibe (Ach.) Mudd
Lecanora argopholis (Ach.) Ach.
Lecanora cenisia Ach.
Lecanora fuliginosa Brodo
Lecanora hybocarpa (Tuck.) Brodo
Lecanora muralis (Schreb.) Rabenh.
Lecanora polytropa (Hoffm.) Rabenh.
Lecanora pulicaris (Pers.) Ach.
Lecanora symmicta (Ach.) Ach.
Lecanora wisconsinensis Magn.
Lecidea erratica Körb.
Lecidea nylanderii (Anzi) Th. Fr.
Lecidea tessellata Flörke
Lecidella carpathica Körb.
Lecidella elaeochroma (Ach.) Choisy
Lecidella stigmatia (Ach.) Hert. & Leuck.
Leptorhaphis epidermidis (Ach.) Th. Fr.
Micarea melaena (Nyl.) Hedl.
Micarea peliocarpa (Anzi) Coppins & R. Sant.
Ochrolechia arborea (Kreyer) Almb.

Parmelia caperata (L.) Ach.
Parmelia conspersa (Ach.) Ach.
Parmelia cumberlandia (Gyeln.) Hale
Parmelia flaventior Stirt.
Parmelia infumata Nyl.
Parmelia plittii Gyeln.
Parmelia rudecta Ach.
Parmelia septentrionalis (Lynge) Ahti
Parmelia somloensis Gyeln.
Parmelia soledica Nyl.
Parmelia squarrosa Hale
Parmelia subaurifera Nyl.
Parmelia subrudecta Nyl.
Parmelia sulcata Tayl.
Parmeliopsis ambigua (Wulf. in Jacq.) Nyl.
Peltigera didactyla (With.) Laundon
Peltigera elisabethae Gyeln.
Peltigera lepidophora (Nyl. ex Vain.) Bitter
Phaeocalicium populneum (Brond. ex Duby) Schmidt
Phaeophyscia adiastrata (Essl.) Essl.
Phaeophyscia chloantha (Ach.) Moberg
Phaeophyscia endococcina (Körb.) Moberg
Phaeophyscia pusilloides (Zahlbr.) Essl.
Phaeophyscia rubropulchra (Degel.) Essl.
Phaeophyscia sciastra (Ach.) Moberg
Physcia adscendens (Th. Fr.) Oliv.
Physcia caesia (Hoffm.) Fűrnr.
Physcia halei Thoms.
Physcia stellaris (L.) Nyl.
Physconia deterosa (Nyl.) Poelt
Placynthium nigrum (Huds.) Gray
Polyblastia theleodes (Somm.) Th. Fr.
Polysporina simplex (Dav.) Vezda
Porpidia crustulata (Ach.) Hert. & Knoph
Porpidia speirea (Ach.) Kremp.
Protoblastenia rupestris (Scop.) Steiner
Pseudevernia consocians (Vain.) Hale & W. Culb.
Psora globifera (Ach.) Mass.
Ramalina intermedia (Del. ex Nyl.) Nyl.
Rhizocarpon concentricum (Dav.) Beltram.
Rhizocarpon disporum (Naeg. ex Hepp) Müll. Arg.
Rhizocarpon geminatum Körb.
Rhizoplaca chrysoleuca (Sm.) Zopf
Rinodina archaea (Ach.) Arn.
Scoliciosporum chlorococcum (Graewe ex Stenh.) Vezda
Scoliciosporum umbrinum (Ach.) Arn.
Staurothele areolata (Ach.) Lett.
Staurothele drummondii (Tuck.) Tuck.
Stereocaulon saxatile Magn.
Trapelia coarctata (Sm.) Choisy in Werner
Trapelia placodioides Coppins & James
Trapeliopsis flexuosa (Fr.) Coppins & James
Usnea hirta (L.) Weber ex Wigg.
Xanthoria elegans (Link) Th. Fr.

Xanthoria fallax (Hepp in Arn.) Arn.
Xanthoria soredata (Vain.) Poelt

134 species

SUGARLOAF PRESERVE SPECIES ARRANGED BY LOCALITY

Loc. 1 OPEN AREA EAST OF DRIVE 10 July 1995

Cladonia cristatella on soil
Cladonia pleurota on soil
Cladonia verticillata on soil
Evernia mesomorpha on lilac
Lecidea erratica on rock
Parmelia flaventior on lilac
Parmelia subaurifera on lilac
Parmelia sulcata on lilac
Phaeocalicium populneum on balsam poplar
Physcia adscendens on lilac
Trapelia coarctata on rock
11 species

Loc. 2. ROCK OUTCROP ON HILLSIDE 10 July 1995

Acarospora fuscata on rock
Aspicilia cinerea on rock
Caloplaca oxfordensis on rock
Candelariella vitellina on quaking aspen, on rock
Cetraria pinastri on white birch
Cladina mitis on soil
Cladina rangiferina on soil
Cladonia caespiticia on soil
Cladonia cornuta on log
Cladonia gracilis on soil
Cladonia rei on soil
Cladonia verticillata on soil
Hypogymnia physodes on white birch
Lecanora polytropha on rock
Parmelia cumberlandia on rock
Parmelia sulcata on rock
Peltigera didactyla on soil
Porpidia crustulata on rock
Rinodina archaea on quaking aspen
Scoliciosporum umbrinum on rock
Stereocaulon saxatile on soil
Trapelia placodioides on rock
22 species

Loc. 3 OPENING ON HILLSIDE 10 July 1995

Cetraria halei on red pine
Cetraria orbata on red pine
Cladonia merochlorophaea on soil
Evernia mesomorpha on red pine
Lecanora hybocarpa on mountain ash by house
Lecanora pulicaris on mountain ash by house
Lecanora symmicta on log

Leptorhaphis epidermidis on white birch
Parmelia flaventior on white birch
Parmelia subrudecta on mountain ash
Scoliciosporum chlorococcum on red pine
Usnea hirta on red pine
12 species

Loc. 4. END OF ROCKY POINT

11 July 1995

Acarospora americana on rock
Acarospora badiofusca on rock
Acarospora fuscata on rock
Aspicilia caesiocinerea on rock
Aspicilia cinerea on rock
Bacidia sabuletorum on mossy rock
Buellia punctata on Thuja
Caloplaca arenaria on rock
Caloplaca atroalba on rock
Caloplaca flavovirescens on rock
Caloplaca holocarpa on rock
Caloplaca modesta on rock
Candelariella vitellina on rock, on Thuja
Collema polycarpon on rock
Collema undulatum on rock
Dermatocarpon miniatum on rock
Gonohymenia nigritella on rock
Gyalecta jenensis on soil
Hypogymnia physodes on Thuja
Lecanora argopholis on rock
Lecanora fuliginosa on soil
Lecanora muralis on rock
Lecanora wisconsinensis on Thuja
Lecidea tessellata on rock
Lecidella elaeochroma on Thuja
Lecidella stigmatea on rock
Ochrolechia arborea on Thuja
Parmelia conspersa on rock
Parmelia flaventior on Thuja
Parmelia plittii on rock
Parmelia somloensis on rock
Parmelia subrudecta on Thuja
Phaeophyscia sciastra on rock
Physcia adscendens on rock
Physcia caesia on rock
Physcia halei on rock
Placynthium nigrum on rock
Polyblastia theleodes on rock
Porpidia speirea on rock
Protoblastenia rupestris on rock
Psora globifera in rock crack
Rhizocarpon concentricum on rock
Rhizocarpon geminatum on rock
Rhizoplaca chrysoleuca on rock
Staurothele areolata on rock
Staurothele drummondii on rock

Xanthoria elegans on rock
Xanthoria sorediata on rock
48 species

Loc. 5 N SHORE OF POINT AND WOODS ON TOP 11 July 1995

Acarospora fuscata on rock
Baeomyces rufus on rock, on soil
Calicium glaucellum on stump
Candelariella efflorescens on Thuja
Cetraria halei on white birch
Cetraria pinastri on balsam fir
Cetraria sepincola on balsam fir on shore
Cladina mitis on soil
Cladonia amaurocraea on soil
Cladonia bacillaris on log, on rock
Cladonia cenotea on soil
Cladonia chlorophaea on soil
Cladonia coniocraea on soil
Cladonia fimbriata on soil
Cladonia pleurota on soil
Cladonia scabriuscula on soil
Evernia mesomorpha on white birch
Heterodermia speciosa on Thuja
Hypogymnia tubulosa on mossy rock
Icmadophila ericetorum on stump
Imshaugia aleurites on log
Lecanactis chloroconia on stump
Lecanora hybocarpa on black spruce
Lecanora polytropa on rock
Lecidella elaeochroma on Thuja
Micarea peliocarpa on soil
Parmelia infumata on rock
Parmelia rudecta on mossy rock
Parmelia squarrosa on Thuja
Parmelia subaurifera on white birch
Parmelia subrudecta on Thuja
Parmelia sulcata on white birch
Peltigera lepidophora on soil
Phaeophyscia adiastrata on Thuja
Physconia detersa on Thuja
Porpidia crustulata on rock
Pseudevernia consocians on white birch
Ramalina intermedia on rock
Scoliciosporum chlorococcum on balsam fir
Scoliciosporum umbrinum on rock
Trapeliopsis flexuosa on mountain ash log
Usnea hirta on white birch
42 species

Loc. 6 BALSAM POPLAR STAND ON FLATS 11 July 1995

Bacidia populorum on balsam poplar
Caloplaca cerina on balsam poplar
Caloplaca holocarpa on balsam poplar
Candelariella vitellina on balsam poplar

Lecanora hybocarpa on balsam poplar
Lecanora symmicta on balsam poplar
Parmelia septentrionalis on balsam poplar
Parmelia subaurifera on balsam poplar
Parmelia sulcata on balsam poplar
Phaeophyscia chloantha on balsam poplar
Phaeophyscia pusilloides on balsam poplar
Phaeophyscia rubropulchra on balsam poplar
Physcia adscendens on balsam poplar
Physcia stellaris on balsam poplar
14 species

Loc. 7 ALONG STREAM AT W END

11 July 1995

Bacidia sabuletorum on moss
Cetraria halei on black spruce
Cetraria orbata on black spruce
Cetraria pinastri on white birch
Cladonia bacillaris on mountain ash
Cladonia pyxidata on soil
Dermatocarpon luridum on rock in stream
Lecidea nylanderii on black spruce
Ochrolechia arborea on quaking aspen
Parmelia soledica on mountain ash
Parmelia subrudecta on mountain ash
Parmeliopsis ambigua on black spruce
Peltigera elisabethae on soil
Phaeophyscia sciastra on rock
14 species

Loc. 8 GULLY ABOVE CARETAKER'S HOUSE

11 July 1995

Acarospora fuscata on rock
Arthonia caesia on mountain maple
Cetrelia olivetorum on rock
Cladonia coniocraea on rotten log
Cladonia pyxidata on soil
Lecanora cenisia on rock
Parmelia caperata on rock
Parmelia squarrosa on mossy rock
Stereocaulon saxatile on soil
9 species

Loc. 9 HILLSIDE NE OF HOUSE ON ROCK

11 July 1995

Caloplaca arenaria on rock
Caloplaca oxfordensis on rock
Cladina mitis on soil
Cladina rangiferina on soil
Cladonia cristatella on soil
Cladonia gracilis on soil
Cladonia multififormis on soil
Cladonia symphylicarpa on soil
Cladonia verticillata on soil
Lecanora muralis on rock
Micarea melaena on stump
Parmelia somloensis on rock

Peltigera didactyla on soil
Phaeophyscia sciastra on rock
Polysporina simplex on rock
Staurothele areolata on rock
16 species

Loc. 10 ROCKY MAIN SHORE NE OF HOUSE 12 July 1995

Acarospora badiofusca on rock
Aspicilia caesiocinerea on rock
Aspicilia cinerea on rock
Caloplaca flavovirescens on rock
Caloplaca holocarpa on rock
Caloplaca oxfordensis on rock
Candelariella vitellina on rock
Collema undulatum on rock
Dermatocarpon miniatum on rock
Gonohymenia nigritella on rock
Lecania erysibe on rock
Lecanora argopholis on rock
Lecanora muralis on rock
Lecidea tessellata on rock
Lecidella carpathica on rock
Lecidella stigmatea on rock
Parmelia cumberlandia on rock
Parmelia plittii on rock
Parmelia rudecta on rock
Phaeophyscia endococcina on rock
Phaeophyscia sciastra on rock
Physcia caesia on rock
Physcia halei on rock
Placynthium nigrum on rock
Polyblastia theleodes on rock
Protoblastenia rupestris on rock
Psora globifera in rock crack
Ramalina intermedia on rock
Rhizocarpon disporum on rock
Rhizocarpon geminatum on rock
Staurothele drummondii on rock
Xanthoria elegans on rock
Xanthoria fallax on rock
Xanthoria sorediata on rock
34 species

DISCUSSION OF LICHEN FLORA

The lichen flora is quite diverse for such a small area with only moderate ecological diversity. There are about 550 species known from the whole state. At Shovel Point near Silver Bay there are 94 species known. The rocky point of SLP has 88 species (including both Loc. 4 and 5) which is quite comparable to Shovel Point in habitat and

number of species. The black ash bogs and white cedar swamps of northern Minnesota are especially rich in lichens but these do not occur in SLP. There were 183 species in the whole of Grand Portage National Monument (Wetmore, 1992) and 460 from all of Voyageurs National Park (Wetmore & Bennett, 1992) and both are considerably larger than SLP. As the forest of SLP matures the lichen flora should increase. There are a number of lichens that are restricted to "old growth forests" but few studies have been done on this subject in North America.

Given the importance of the rocky point for lichens, it rightly deserves the designation of Scientific and Natural Area.

RECOMMENDATIONS

1. If there is a significant increase in visitor traffic some thought should be given to additional protection for the rocky point. Other areas of SLP would probably not be damaged by some additional visitation.

2. There is an opportunity for long term monitoring of the lichens in SLP. It is recommended that 10 or 20 year restudy be done to document these changes.

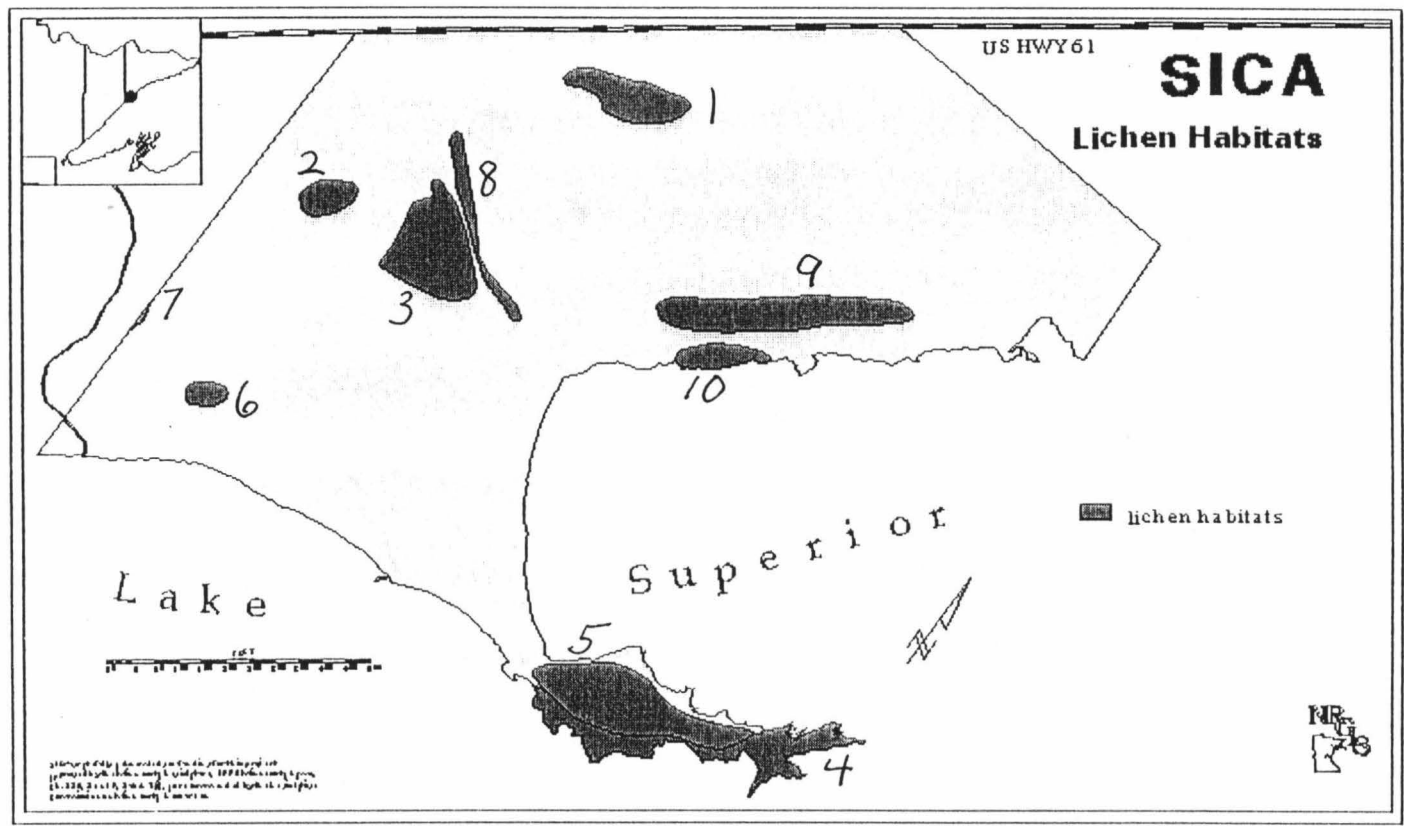
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Lichen collection localities



APPENDIX I

Collection Localities

Collection localities for lichens. Collections by Clifford Wetmore, Univ. of Minnesota 10-12 July 1995. Locality numbers on photo-map correspond to the numbers in the left column. In the second column are the specimen collection numbers. The description of the locality is in the third column.

Cook County, Minnesota

- 1 75244-75255 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). In open area E of drive and at edge of trees. Sec. 20, T58N, R5W. 10 July 1995.
- 2 75256- 75280 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). On rock outcrop on hillside W of drive with white birch. Sec. 20, T58N, R5W. 10 July 1995.
- 3 75281-75292 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). Opening on hillside E of drive above house with red pine, white birch and 5292 mountain ash. Sec. 20, T58N, R5W. 10 July 1995.
- 4 75293-75357 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). On end of rocky point and on S shore of point. Sec. 29, T58N, R5W. 11 July 1995.
- 5 75358-75406 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). On N shore of point and in woods on top of point with Thuja, balsam fir, white birch and mountain ash. Sec. 29, T58N, R5W. 11 July 1995.
- 6 75407-75419 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). In balsam poplar stand on flats W of garage. Sec. 29, T58N, R5W. 11 July 1995.
- 7 75420-75434 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). 6 75407- Along stream at W end of preserve with white birch, black spruce and 75419 mountain ash. Sec. 20, T58N, R5W. 11 July 1995.
- 8 75435-75443 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). Along steep gully between road and caretaker's house E of drive with white birch and mountain ash. Sec. 20, T58N, R5W. 11 July 1995.
- 9 75444-75463 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). Along hillside NE of house on rock outcrops and in black spruce and white birch. Sec. 20, T58N, R5W. 11 July 1995.

10 75464-75513 Sugarloaf Preserve along shore of Lake Superior (10 mi SW of Tofte). On rocky main shore NE of house. Sec. 20, T58N, R5W. 12 July 1995.