

Contributions to the Ontario flora of lichens and allied fungi, with emphasis on the Great Lakes Basin

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ABSTRACT. – One-hundred and sixty-three new or noteworthy lichens and allied fungi are reported from Ontario based on new collections. The lichens *Lecanora atromarginata*, *L. gisleriana*, *Rhizocarpon ridescens* and *Sclerococcum griseisporodochium* are new to North America. The reported species new to Canada are: *Abrothallus bertianus*, *Absconditella trivialis*, *Agonimia opuntiella*, *Diploschistes gypsaceus*, *Ephebe solida*, *Heterodermia japonica*, *Minutoexcipula tuckerae*, *Peltula bolanderi*, *Placynthium petersii*, *Protothelenella sphinctrinoides*, *Pycnora praestabilis*, *Thelopsis melathelia*, *Toninia tecta* and *Verrucaria quercina*. Sixty-one taxa reported new to Ontario include: *Abrothallus peyritschii*, *A. usneae*, *Agonimia tristicula*, *Arctoparmelia subcentrifuga*, *Arthrorhaphis citronella*, *Bachmanniomyces uncialicola*, *Baeomyces placophyllus*, *Biatora printzenii*, *Bilimbia lobulata*, *Calicium lucidum*, *Caloplaca stillicidiorum*, *Cetraria nigricans*, *Chaenothecopsis australis*, *Cystocoleus ebeneus*, *Dactylospora lobariella*, *Dendriscoaulon intricatum*, *Dermatocarpon schaechtelinii*, *Enchylium conglomeratum*, *Endocarpon pulvinatum*, *Gyroglypha gyrocarpa*, *Henrica theleodes*, *Heterodermia neglecta*, *Homostegia piggottii*, *Hypotrachyna afrorevoluta*, *H. revoluta*, *Lathagrium auriforme*, *Lecanora appalachensis*, *Lecanora epibryon*, *Lecanora orae-frigidiae*, *Lecidea lapicida*, *Lecidella wulfenii*, *Lempholemma radiatum*, *Lepraria oxybapha*, *Lichenocodium usneae*, *Lichenomphalia umbellifera*, *Lichenostigma elongata*, *Lopadium coralloideum*, *Ophioparma lapponica*, *Pertusaria bryontha*, *P. coriacea*, *P. globularis*, *Phylliscum demangeonii*, *Rhizocarpon lichenum*, *Polycauliona stellata*, *Porpidia flavicunda*, *Pseudosagedia chlorotica*, *Rhizocarpon eupetraeoides*, *Rostania ceranisca*, *Sclerophora farinacea*, *Scytinium schraderi*, *Solorina bispora*, *Sphaerellothecium minutum*, *Sticta beauvoisii*, *S. fuliginosa*, *Tetramelas papillatus*, *Tremella cetrariicola*, *Umbilicaria lyngei*, *Usnea ceratina*, *Xanthomendoza fulva* and *Xylographa opegraphella*. Details on additional rare or otherwise rarely collected species new to explored counties and districts are also provided. These include: *Acarospora bullata*, *Ahtiana aurescens*, *Amygdalaria panaeola*, *Anaptychia crinalis*, *Arctoparmelia incurva*, *Arthonia diffusella*, *Baeomyces carneus*, *Blastenia ferruginea*, *Buellia badia*, *Calicium abietinum*, *Caloplaca saxicola*, *Cetraria aculeata*, *Chaenotheca stemonea*, *Chaenothecopsis perforata*, *Cliostomum griffithii*, *Cyphobasidium hypogymniicola*, *Dermatocarpon dolomiticum*, *Dibaeis baeomyces*, *Flavocetraria nivalis*, *Fuscopannaria leucosticta*, *Heppia adglutinata*, *Heterodermia hypoleuca*, *H. obscurata*, *Hyperphyscia syncolla*, *Hypogymnia vittata*, *Immersaria athrocarpa*, *Inoderma byssaceum*, *Lecanora epanora*, *Lepraria cryophila*, *Leproplaca chrysodeta*, *Leptogium rivulare*, *Lichenodiplis lecanorae*, *Lichenostigma cosmopolites*, *Lithothelium hyalosporum*, *Lobaria scrobiculata*, *Lobothallia alphoplaca*, *Lopadium disciforme*, *Melanelixia albertana*, *M. subargentifera*, *Melanohalea halei*, *M. subolivacea*, *Muellerella erratica*, *Mycoblastus alpinus*, *Mycoglaena myricae*, *Myelochroa obsessa*, *Oviculispora parmeliae*, *Pannaria tavaresii*, *Parmotrema hypotropum*, *P. reticulatum*, *P. stuppeum*, *Peltigera venosa*, *Pertusaria superiana*, *Phacopsis oxyspora* var. *oxyspora*, *Physcia americana*, *Physcia tenella*, *Physconia grumosa*, *Placidium arboreum*, *Polychidium muscicola*, *Porina scabrada*, *Porpidia degelii*, *Pseudocyphellaria holarctica*, *Pseudoschismatomma rufescens*, *Psoroma hypnorum*, *Punctelia appalachensis*, *P. stictica*, *Rhizocarpon eupetraeum*, *Rinodina pachysperma*, *Sarea difformis*, *Scytinium gelatinosum*, *Scytinium intermedium*, *Sphaerophorus fragilis*, *S. globosus*, *Stictis radiata*, *Synalissa ramulosa*, *Syzygospora physciarcearum*, *Teloschistes chrysophthalmus*, *Thyrea confusa*, *Toninia aromatica*, *Tremella everniae*, *Umbilicaria arctica*, *U. hirsuta*, *U. proboscidea*, *U. torrefacta*, *Usnea glabrescens* and *Xanthoparmelia angustiphylla*.

KEYWORDS. – Appalachian, arctic-alpine, biodiversity, old-growth, rare species.

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INTRODUCTION

Lichen occurrence records form an important source of knowledge about regional biodiversity, its distribution, status, and changes in communities over time (Allen et al. 2019). Many species of lichens are known from Ontario from just a few locations and some are known only from historical occurrences that lack recent observations. Several are federally listed species at risk of extirpation and have been the focus of recent conservation efforts (e.g. *Fuscopannaria leucosticta* (Tuck.) P.M. Jørg., *Leptogium rivulare* (Ach.) Mont., *Physconia subpallida* Essl., *Teloschistes chrysophthalmus* (L.) Th. Fr.), while many more lack adequate distributional and ecological knowledge to determine their conservation status.

In the last several years there has been a revival of interest in documenting the lichens and allied fungi in the Province of Ontario. Recent studies have produced many new and noteworthy provincial records (e.g. Brodo et al. 2013, Lewis 2014, Lewis & Brinker 2017, Maloles et al. 2018, McMullin & Lendemer 2016, McMullin et al. 2015). This work has also led to the discovery of new species to science, additions to the lichen flora of North America and Canada, and the discovery of noteworthy disjuncts (e.g. Ahti et al. 2018, Brodo et al. 2013, Brinker & Knudsen 2019, Gockman et al. 2019, Lewis & Śliwa 2012, McMullin et al. 2018, McMullin et al. 2020). This is perhaps not surprising since the number of lichenologists is small in relation to the area available for study. Regardless of the underlying factors, Ontario is still much underexplored for lichens and related fungi. The aim of this paper is to continue to improve our understanding of the distribution and status of lichens by reporting on new and otherwise significant discoveries made during the regular course of fieldwork in Ontario between the years 2010–2020 and to stimulate further lichenological work.

MATERIALS AND METHODS

The study material was collected during routine floristic surveys carried out between the years 2010 and 2020 in various parts of the province with emphasis on the Great Lakes Basin, but also from the Hudson Bay Lowland in Ontario's Far North (Fig. 1). Six primary habitats were the focus of this work in the Great Lakes Basin including: xerothermic alvars and alkaline barrens, diabase and other base-rich cliffs, volcanic bedrock shorelines of Lake Superior, mature conifer swamps, mature deciduous/mixed upland forest and talus slopes (Fig. 2). Opportunistic habitats briefly sampled in the Hudson Bay Lowland while conducting detailed vascular plant inventories include maritime tundra bordering the treeline near Hudson Bay and open spruce woodlands on raised beaches and permafrost levees along rivers (Fig. 3A & 3B). Locality details are given in the enumeration of specimens. Specimens were identified using chemical spot tests, microscopy, and ultraviolet light following Brodo et al. (2001). Thin-layer chromatography was generously conducted by James Lendemer in Solvents C or A (Lendemer 2011) and Einar Timdal in Solvent C following methods described by Culberson (1972). To determine whether these species were new reports for their respective regions, specimens were examined at the Canadian Museum of Nature (CANL).

Distribution maps were created using ESRI ArcMap 10.1 and data used to generate these maps were obtained from the Consortium of North American Lichen Herbaria (CNALH) containing digitized records from 90 herbaria, the herbarium of the Canadian Museum of Nature and relevant literature for each species. In the enumeration of specimens, the abbreviations indicate where each is deposited, including the Canadian Museum of Nature (CANL), University of Hamburg (HBG), Lakehead (LKHD), Real Jardín Botánico (MA), New York Botanical Garden (NY), Oslo (O), Oregon State University (OSC), as well as the private herbaria of Javier Etayo (hb. Etayo) and the author (hb. Brinker).

RESULTS

A total of 163 species are reported from the study area representing 119 genera. Non-lichenized and lichenicolous fungi which are the least studied of this group, account for 28 species of the total reported here. Four taxa are new to the North American lichenized fungi biota: *Lecanora atromarginata*, *Lecanora gisleriana*, *Rhizocarpon ridescens*, and *Sclerococcum griseisporodochium*. Eleven lichens and three lichenicolous fungi are newly reported from Canada: *Abrothallus bertianus*, *Absoconditella trivialis*, *Agonimia opuntiella*, *Diploschistes gypsaceus*, *Ephebe solida*, *Heterodermia japonica*, *Minutoexcipula tuckerae*, *Peltula bolanderi*, *Placynthium petersii*, *Protothelenella sphinctrinoides*, *Pycnora praestabilis*, *Thelopsis melathelia*, *Toninia tecta* and *Verrucaria quercina*. A total of 51 lichens and 10 lichenicolous fungi are new for the Province of Ontario: *Abrothallus peyritschii*, *A. usneae*, *Agonimia tristicula*, *Arctoparmelia subcentrifuga*, *Arthrorhaphis citronella*,

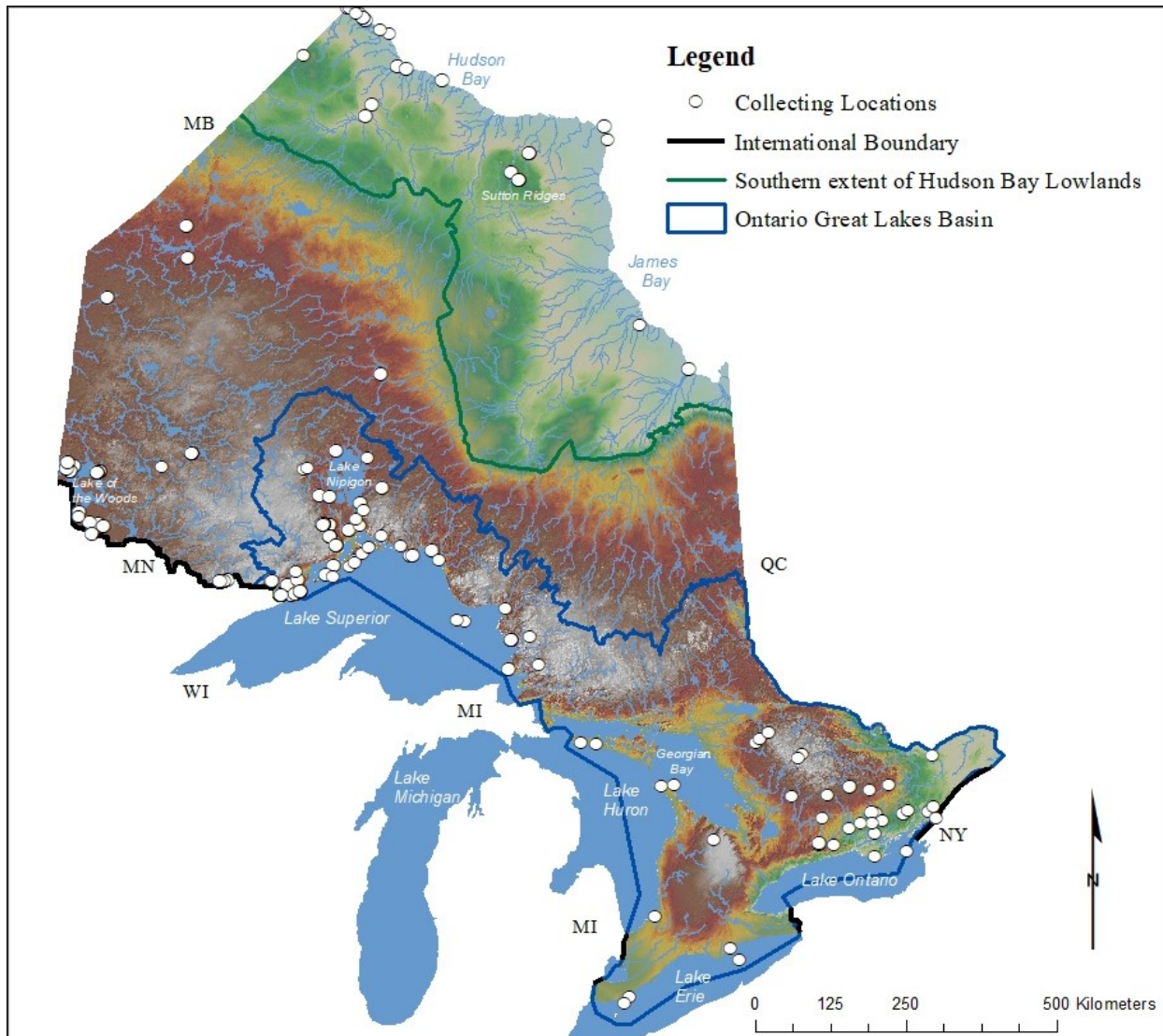


Figure 1. Collecting locations of the author within the Province of Ontario, Canada, that are cited in the text.

Bachmanniomyces uncialicola, *Baeomyces placophyllus*, *Biatora printzenii*, *Bilimbia lobulata*, *Calicium lucidum*, *Caloplaca stillicidiorum*, *Cetraria nigricans*, *Chaenothecopsis australis*, *Cystocoleus ebeneus*, *Dactylospora lobariella*, *Dendriscocaulon intricatulum*, *Dermatocarpon schaechtelinii*, *Enchylium conglomeratum*, *Endocarpon pulvinatum*, *Gyrographa gyrocarpa*, *Henrica theleodes*, *Heterodermia neglecta*, *Homostegia piggottii*, *Hypotrachyna afrorevoluta*, *H. revoluta*, *Lathagrium auriforme*, *Lecanora appalachensis*, *Lecanora epibryon*, *Lecanora orae-frigidae*, *Lecidea lapicida*, *Lecidella wulfenii*, *Lempholemma radiatum*, *Lepraria oxybapha*, *Lichenocodium usneae*, *Lichenomphalia umbellifera*, *Lichenostigma elongata*, *Lopadium coralloideum*, *Ophioparma lapponica*, *Pertusaria bryontha*, *P. coriacea*, *P. globularis*, *Phylliscum demangeonii*, *Plectocarpon lichenum*, *Polycauliona stellata*, *Porpidia flavicunda*, *Pseudosagedia chlorotica*, *Rhizocarpon eupetraeoides*, *Rostania ceranisca*, *Sclerophora farinacea*, *Scytinium schraderi*, *Solorina bispora*, *Sphaerellothecium minutum*, *Sticta beauvoisii*, *S. fuliginosa*, *Tetramelas papillatus*, *Tremella cetrariicola*, *Umbilicaria lyngei*, *Usnea ceratina*, *Xanthomendoza fulva* and *Xylographa opegraphella*.

Notes on an additional 73 lichens and 12 lichenicolous fungi that are rare or otherwise seldom collected from Ontario are also provided: *Acarospora bullata*, *Ahtiana aurescens*, *Amygdalaria panaeola*, *Anaptychia crinalis*, *Arctoparmelia incurva*, *Arthonia diffusella*, *Baeomyces carneus*, *Blastenia ferruginea*, *Buellia badia*, *Calicium abietinum*, *Caloplaca saxicola*, *Cetraria aculeata*, *Chaenotheca stemonea*, *Chaenothecopsis perforata*, *Cliostomum griffithii*, *Cyphobasidium hypogymniicola*, *Dermatocarpon dolomiticum*, *Dibaeis baeomyces*,

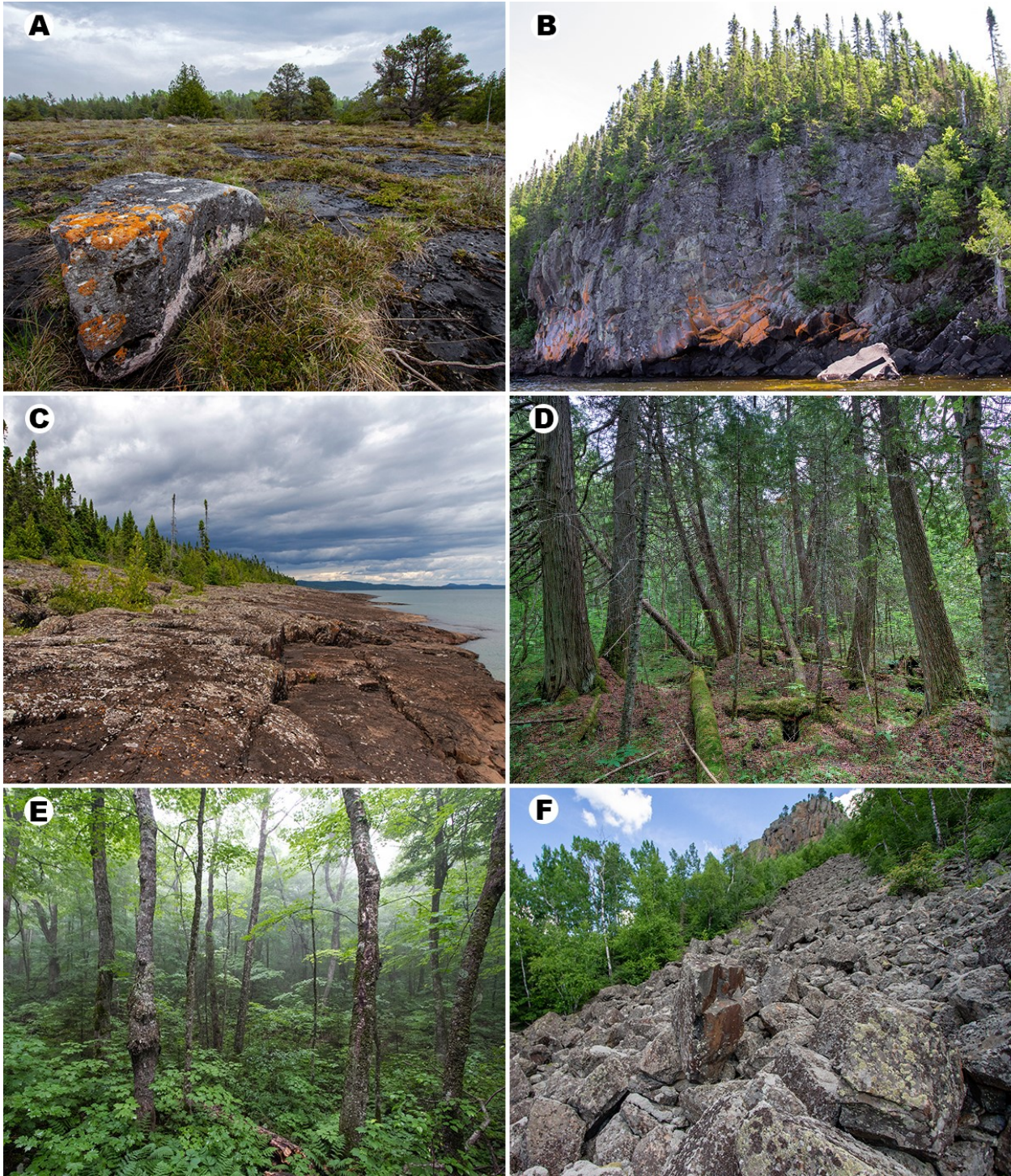


Figure 2. Representative photographs of six critical lichen habitats evaluated during this study in the Ontario portion of the Great Lakes Basin. **A**, xerothermic alvars. **B**, diabase and other base-rich cliffs. **C**, volcanic bedrock shorelines along the Lake Superior coast. **D**, mature conifer swamps. **E**, mature deciduous and mixed upland forests. **F**, talus slopes.

Flavocetraria nivalis, *Fuscopannaria leucosticta*, *Heppia adglutinata*, *Heterodermia hypoleuca*, *H. obscurata*, *Hyperphyscia syncolla*, *Hypogymnia vittata*, *Immersaria athroocarpa*, *Inoderma byssaceum*, *Lecanora epanora*, *Lepraria cryophila*, *Leproplaca chrysodeta*, *Leptogium rivulare*, *Lichenodiplis lecanorae*, *Lichenostigma cosmopolites*, *Lithothelium hyalosporum*, *Lobaria scrobiculata*, *Lobothallia alphoplaca*, *Lopadium disciforme*, *Melanelixia albertana*, *M. subargentifera*, *Melanohalea halei*, *M. subolivacea*, *Muellerella erratica*, *Mycoblastus alpinus*, *Mycoglaena myricae*, *Myelochroa obsessa*, *Ovicuculispora parmeliae*, *Pannaria tavaresii*, *Parmotrema hypotropum*, *P. reticulatum*, *P. stuppeum*, *Peltigera venosa*, *Pertusaria superiana*, *Phacopsis oxyspora* var. *oxyspora*, *Physcia americana*, *Physcia tenella*, *Physconia grumosa*, *Placidium arboreum*, *Polychidium muscicola*, *Porina scabrida*, *Porpidia degelii*, *Pseudocyphellaria holarctica*, *Pseudoschismatomma rufescens*, *Psoroma hypnorum*, *Punctelia appalachensis*, *P. stictica*, *Rhizocarpon eupetraeum*, *Rinodina pachysperma*, *Sarea difformis*, *Scytinium gelatinosum*, *Scytinium intermedium*, *Sphaerophorus fragilis*, *S. globosus*, *Stictis radiata*, *Synalissa ramulosa*, *Syzygospora physciacearum*, *Teloschistes chrysophthalmus*, *Thyrea confusa*, *Toninia aromatica*, *Tremella everniae*, *Umbilicaria arctica*, *U. hirsuta*, *U. proboscidea*, *U. torrefacta*, *U. glabrescens* and *Xanthoparmelia angustiphylla*.

The reports are arranged alphabetically by genus and species in order of their relative significance (new to North America, new to Canada, new to Ontario, additional noteworthy provincial/regional collections). The notes presented below for many species include details on the previously known North American distribution, but usually do not discuss worldwide distribution. Nonlichenized fungi traditionally treated with lichens are denoted by a dagger (†). Nomenclature follows Esslinger (2019).

SPECIES NEW TO NORTH AMERICA

The following four species were not included in Esslinger (2019) and are newly reported to the North American lichen biota.

Lecanora atromarginata (Ach.) Rambold & Pietschm.

FIGURE 3A.

NOTES. – *Lecanora atromarginata* has a bipolar distribution and is found in portions of arctic Asia, Europe, Scandinavia and Antarctica, where it occurs on calcareous and other base-rich rock at high elevations (Edwards et al. 2009, Hansen 2009, Śliwa & Olech 2002). The species is characterized by a K+ yellow, KC+ yellow, P+ weakly orange thallus which produces usnic and stictic acids, its continuous cream to yellowish coloured thallus often with a distinct dark or blue-grey prothallus, initially immersed apothecia, and restriction to calcareous rock (Edwards et al. 2009, Śliwa & Olech 2002). It is most likely to be confused with *L. marginata* (Schaer.) Hertel & Rambold which differs in chemistry, having a thallus that is K+ pale yellow, P+ pale yellow containing atranorin, usnic acid and terpenoids. That species also lacks a dark prothallus, and has a preference for non-calcareous or weakly calcareous rock (McCune 2017, Edwards et al. 2009). The specimen reported here contained usnic and stictic acid detected by TLC.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: N shore of Lake Superior, S side of Lamb Island, exposed coastal rocky headland, 20.vii.2019, on volcanic rock, *S.R. Brinker 7807* (CANL, O); N shore of Lake Superior, Worthington Bay, exposed coastal rocky headland, 26.vii.2019, on volcanic rock, *S.R. Brinker 7939* (CANL, O; det. E. Timdal).

†*Lecanora gisleriana* Müll.Arg.

FIGURE 3B.

NOTES. – Across its range, *Lecanora gisleriana* is reported as a very rare lichenicolous fungus of montane areas that typically parasitizes other species of *Lecanora* Ach. growing on metal-rich rock, particularly *L. epanora* (Ach.) Ach., *L. handellii* J. Steiner, and *L. subaurea* Zahlbr. (Edwards et al. 2009). However, *L. gisleriana* has also been reported from Poland growing on *L. polytropa* (Hoffm.) Rabenh., a common crustose species of siliceous rock (Kossowska 2008). *Lecanora gisleriana* is distinct in being the only lichenicolous species of *Lecanora* with red-brown apothecia containing fusiform ascospores measuring 8.5–11 × 4–5 µm that occur alone or in small groups, with or without a reduced thallus composed of small orange-grey areoles that are P- (Edwards et al. 2009, Hawksworth et al. 2010, Purvis 1985). Numerous small reddish-brown pruinose apothecia (Fig. 3B) were found growing on *L. epanora* and *L. handellii* on several cliffs associated with the Gunflint Formation which extends for 175 kilometers along the Gunflint Range from northeastern Minnesota, U.S.A., to Thunder Bay in Canada, and is known for its iron-rich rock (Jirsa & Fralick 2015). Such areas of exposed bedrock rich in heavy metals are geologically and ecologically distinct from surrounding areas, are important to regional biodiversity, and known to

support other rare metallophyte lichens (e.g. Lewis & Brinker 2017). Given the scarcity of its hosts and habitat, *L. gisleriana* is likely a very rare species in Ontario.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: 42 km SW of Thunder Bay, 1.5 km N of Pigeon Bay, moist shaded rockface with scattered canopy of *Betula papyrifera*, *Abies balsamea*, *Pinus resinosa* and *Pinus strobus*, 18.vii.2016, on *Lecanora epanora* over metamorphic rock, S.R. Brinker 5092B (CANL); 40 km SW of Kakabeka Falls, 3 km S of Mackies, SW side of Whitefish Lake, sheltered N-facing cryptogram-dominated cliff with localized seepage, 25.viii.2016, on *L. epanora* over sedimentary (shale) rock, S.R. Brinker 5416 (O; conf. E. Timdal).

***Rhizocarpon ridescens* (Nyl.) Zahlbr.**

FIGURE 3C.

NOTES. – These are the first published records of *Rhizocarpon ridescens* from North America. It is an easily recognizable saxicolous species being the only yellow sorediate *Rhizocarpon* Ramond ex DC. with an areolate thallus dispersed over a distinct black prothallus (Fletcher et al. 2009c), though it could be confused with yellow sorediate *Lecanora* species, in particular *L. epanora*. It differs chemically from *L. epanora* in having a P+ yellow medulla due to the presence of psoromic acid, whereas *L. epanora* lacks psoromic acid, has a P- medulla and lacks a dark prothallus (Edwards et al. 2009, Fletcher et al. 2009c). *Rhizocarpon ridescens* grows on siliceous rocks rich in iron and prefers protected, dry, steep sides of boulders (Matwiejuk 2008). *Rhizocarpon ridescens* is known from a single site in Great Britain on a metal-rich, vertical siliceous crag, and has been reported from scattered montane regions of Asia, Australia, Europe, and Turkey (Elix et al. 2019, Fletcher et al. 2009c, Kinalioglu & Aptroot 2016). In the study area, it was restricted to humid, well-lit, south and southeast-facing sheltered rockfaces and co-occurred with several other metallophyte lichens on iron-rich slate outcrops associated with the Gunflint Formation in the southwestern portion of the Thunder Bay District. Associated metallophyte species included *Acarospora sinopica* (Wahlenb.) Körb., *L. epanora*, *L. gisleriana*, *Myriospora smaragdula* (Wahlenb. ex Ach.) Nägeli ex Uloth and *R. oederi* (Weber) Körb. Its restriction in the study area to outcrops of heavy metal-rich rock of the Gunflint Formation indicates *R. ridescens* is likely a very rare species in Ontario.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: 42 km SW of Thunder Bay, 1.5 km N of Pigeon Bay, moist shaded rockface with scattered canopy of *Betula papyrifera*, *Abies balsamea*, *Pinus resinosa* and *Pinus strobus*, 18.vii.2016, on shale, S.R. Brinker 5097 (CANL); Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, partially shaded E-facing shale outcrop at base of cliff with open canopy of *B. papyrifera* and *A. balsamea*, 19.vii.2017, on shale, S.R. Brinker 5819 (CANL).

***Sclerococcum griseisporodochium* Etayo**

FIGURE 3D.

NOTES. – This peculiar species produces rather evenly spaced grayish to mauve sporodochia which resemble soralia or moribund tufts of the terrestrial filamentous algae *Trentepohlia*. While it was described as a lichenicolous fungus associated with a species of *Opegrapha*, facultative lichenization of this taxon was recognized (Etayo 1995) and it is sometimes treated as a lichenized hyphomycete (e.g. Smith 2009). It occurs on shaded calcareous overhangs and rockfaces away from direct rain in particularly humid sites, usually within forest stands, and often associated with *Opegrapha dolomitica* (Arnold) Torrente & Egea and *Botryolepraria lesdainii* (Hue) Canals, Hernández-Mariné, Gómez-Bolea and Llimona (Smith 2009). It has been reported from portions of Europe including the Czech Republic, France, Great Britain, Italy, Spain and Ukraine (Ertz et al. 2008, Malicek et al. 2014, Vondrák et al. 2010). In the study area, *Sclerococcum griseisporodochium* was found on sheltered underhangs and boulders of Silurian and Ordovician dolomitic limestone in humid *Thuja occidentalis*-dominated coniferous forests with *Botryolepraria lesdainii*, *Gyalecta jenensis* (Batsch) Zahlbr., *Lepraria finkii* (B. de Lesd.) R.C. Harris and *Leproplaca chrysodeta* (Vain.) J. R. Laundon ex Ahti. It should be looked for elsewhere in the study area where similar exposures of dolostone in humid forests occur, particularly along the Niagara Escarpment and in the Ottawa Valley.

Specimens examined. – **CANADA. ONTARIO.** BRUCE CO.: Fathom Five National Marine Conservation Area, Georgian Bay, W side of Echo Island, 5.7 km N of Tobermory, open conifer woods on N-facing slope with *Thuja occidentalis*, *Abies balsamea* and *Betula papyrifera*, 14.vi.2017, on sheltered limestone rockface, 14.vi.2017, S.R. Brinker 5642 (NY). GREY CO.: Eugenia Falls Conservation Area W of Eugenia Lake, humid *T. occidentalis*-dominated conifer forest on rocky slope, 15.vi.2018, on limestone boulder, S.R. Brinker 7604 (CANL). PETERBOROUGH CO.: Warsaw Caves Conservation Area 12 km E of Lakefield, *T. occidentalis*-dominated coniferous forest with limestone outcrops, 5.v.2020, on sheltered limestone underhang, S.R. Brinker 8375 (hb. Brinker).

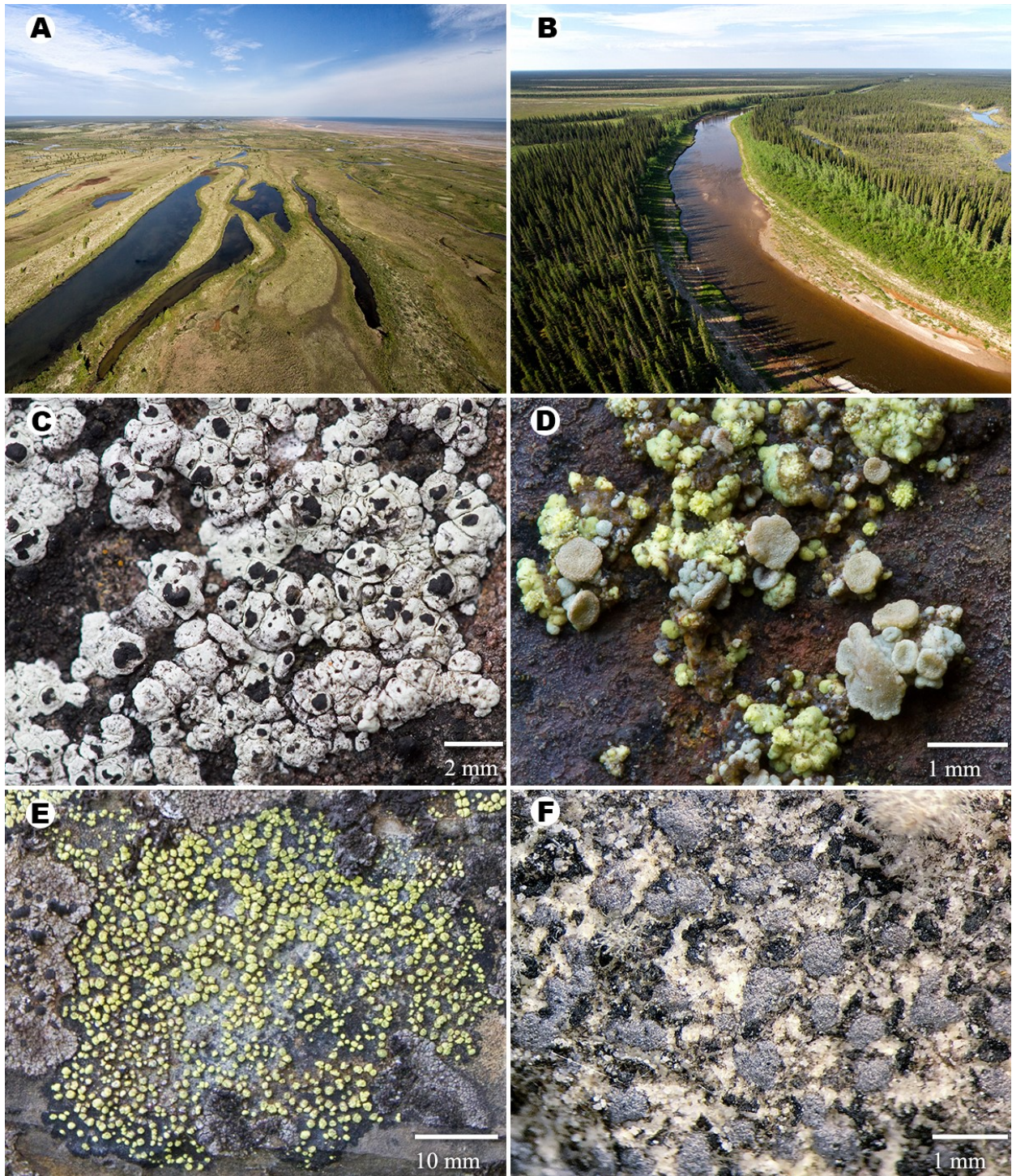


Figure 3. Photographs of lichen habitats studied in the Arctic Watershed portion of Ontario in the Hudson Bay Lowland and lichens or allied fungi newly reported for North America. **A**, maritime tundra bordering the treeline along Hudson Bay. **B**, spruce woodland along river levee. **C**, *Lecanora atromarginata* (photo taken in situ, Brinker 7807). **D**, saturated areoles and apothecia of *L. gisleriana* lichenicolous on *L. epanora* (photo taken in situ, Brinker 5092B). **E**, yellow *Rhizocarpon ridescens* areolae with distinct black prothallus and granular soredia (photo taken in situ, Brinker 5819). **F**, *Sclerococcum griseisporodochium* sporodochia on calcite (Brinker 7604).

SPECIES NEW TO CANADA

It is difficult to assess what constitutes a first report for Canada as there is no published checklist of Canadian lichens currently. However, based on a review of relevant literature and unpublished lists dealing with Canadian lichens, the Consortium of North American Lichen Herbaria and the Canadian Museum of Nature, the following 11 lichens and three lichenicolous fungi appear to represent either the first Canadian collection or first published record.

†*Abrothallus bertianus* De Not.

FIGURE 4A.

NOTES. – *Abrothallus bertianus* was first reported from North America from Arizona (Triebel et al. 1991) although Diederich (2003) suggested the supporting specimen likely belonged to *A. caerulescens* Kotte; this appears to be the first report of this species from Canada. It grows on a variety of hosts such as *Melanelia*, *Melanelixia*, *Melanohalea*, *Parmelia*, *Pseudephebe*, *Nephroma*, and *Xanthoparmelia* (Czarnota et al. 2018, Hawksworth & Minter 1980, Kukwa & Flakus 2009, Triebel et al. 1991). Here it was lichenicolous on *Punctelia caseana* Lendemer & Hodk. It is characterized by its epruinose apothecia (rarely slightly green pruinose) arising directly on the host thallus with ascospores ranging from $9\text{--}13 \times 5\text{--}7 \mu\text{m}$, and hyphae that turn intensely blue with iodine (Hawksworth 1983, Suija et al. 2018). It is most likely to be confused with *A. parmeliarum* (Sommerf.) Arnold in the study area, but that species typically has apothecia that are green-pruinose with longer ascospores ($14\text{--}18 \mu\text{m}$) and hyphae that do not turn blue with iodine (Hawksworth & Minter 1980, Suija et al. 2018).

Specimen examined. – CANADA. ONTARIO. MANITOULIN DIST.: Cockburn Island, 10.2 km S of Tolsmaville, E end of Sand Bay, rich *Thuja occidentalis* coniferous swamp, 30.v.2014, on *Punctelia caseana* on bark of *T. occidentalis*, S.R. Brinker 3344 (NY; det. A. Suija).

Abscuditella trivialis (Willey ex Tuck.) Vězda

FIGURE 4B.

NOTES. – This genus comprises minute crustose lichens that produce pale-coloured concave apothecia, usually associated with algal films over decaying wood, bryophytes, or soil (Bielczyk & Kiszka 2001). Species of *Abscuditella* can be differentiated from more commonly collected and similar looking species in the genera *Coenogonium* and *Gyalecta* by having a chlorococcoid algae (not *Trentepohlia*) as a photobiont and an I- hymenium (vs. I+ blue). *Abscuditella trivialis* is an ephemeral species of acidic and often metal-contaminated soils (Coppins 2009a). Here it was found on algal encrusted shallow soil over granite in an open rock barren. Previous collections are known from the Great Lakes Basin in Michigan (Harris 2015). One other species, *A. lignicola* Vězda & Pišút, has been reported from Ontario (McMullin et al. 2015). It can be differentiated from *A. trivialis* in its preference for lignicolous substrates in contrast to growing on soil, and its smaller ascospores ranging from $10\text{--}15 \times 4.5\text{--}6.5 \mu\text{m}$ vs. $(17\text{--})19\text{--}24(\text{--}28) \times (4\text{--})4.7\text{--}5.5(\text{--}7) \mu\text{m}$ in *A. trivialis*. *Cryptodiscus gloeocapsus* (Nitschke ex Arnold) Baloch, Gilenstam & Wedin is also superficially similar looking to *A. trivialis*, forming thin gelatinous crusts over recently disturbed soils and bryophytes. It also has minute, concave apothecia with 8-spored asci and 3-4 septate spores, however *C. gloeocapsus* has larger ascocarps, thin-walled asci (vs. thick), a K/I+ hymenium and narrower spores, averaging $1.5\text{--}2 \mu\text{m}$ (Baloch et al. 2009).

Specimen examined. – CANADA. ONTARIO. PETERBOROUGH CO.: 22 km N of Havelock, SW side of Kashabog Lake, open rock barren with scattered *Pinus strobus*, *Acer rubrum*, *Juniperus communis* and *Danthonia spicata*, 1.v.2018, on shallow algal-encrusted soil over granitic bedrock, S.R. Brinker 6376 (CANL).

Agonimia opuntiella (Buschardt & Poelt) Vězda

FIGURES 4C & 4D.

NOTES. – This small and inconspicuous lichen has surely been overlooked given the number of newly reported localities elsewhere (e.g. Aptroot 2003b, 2011; Harris & Ladd 2005; Lendemer 2004, 2006a; Lendemer et al. 2013; van den Boom 2012). It grows on moss and humus over soil and rock and is often corticolous in tropical regions (Aptroot 2011). It was reported to be lichenicolous on *Lathagrium cristatum* (L.) Otálora, P.M. Jørg. & Wedin by Hafellner (2014, as *Collema cristatum* (L.) F. H. Wigg.). In Europe, its preferred habitat is well-lit rocky areas, particularly limestone or schists up to 1000 meters above sea level (Hafellner 2014) or in crevices of siliceous rocks in open habitats (Orange & Purvis 2009). All three localities reported here are from partially-shaded, south-facing calcareous rockfaces along alkaline lakeshores, where it was lichenicolous on *Placidium arboreum* (Schw. ex Tuck.) Lendemer, and a small sterile species of *Collema*. The echinate hyaline hairs on the minute greenish to brownish squamules (Fig. 4C) differentiate it from superficially similar *A. tristricula* (Nyl.) Zahlbr. It was mapped by

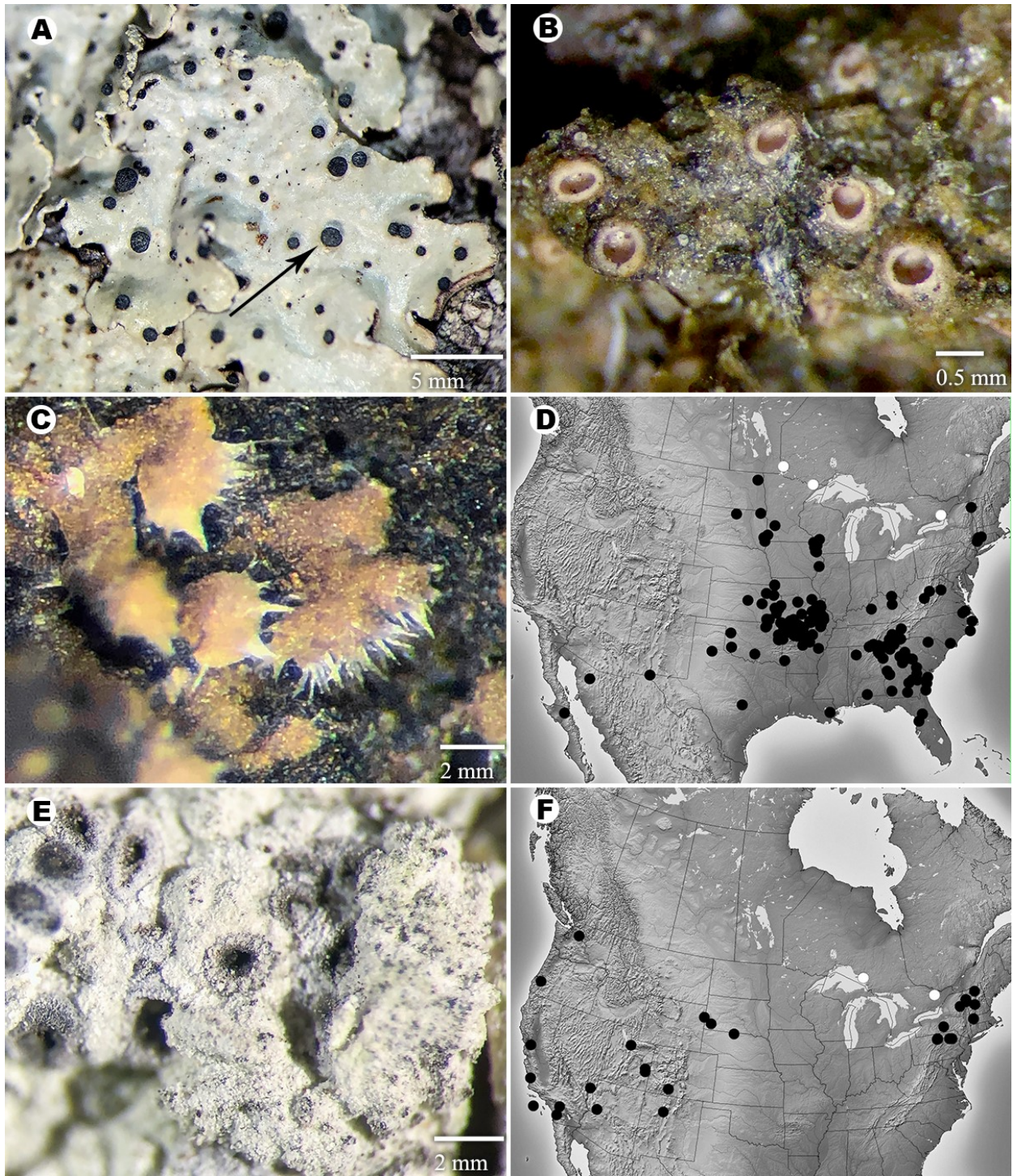


Figure 4. Photographs and distribution maps of lichens and allied fungi new to Canada (white = newly reported Ontario records, black = previous collections). **A**, arrow indicating *Abrothallus bertianus* ascomata lichenicolous on thallus of *Punctelia caseana* (Brinker 3344). **B**, *Absconditella trivialis* (Brinker 6376). **C**, *Agonimia opuntiella* showing hyaline hairs (Brinker 2943). **D**, distribution of *Agonimia opuntiella* in North America. **E**, *Diploschistes gypsaceus* (Brinker 3923). **F**, distribution of *D. gypsaceus* in North America.

Lendemer et al. (2013) in eastern North America from Florida and the Ozarks north to Connecticut. These records extend its range considerably northward, and the Lock Lake collection reported here is the most northerly reported location in North America (Fig. 4D). All Ontario populations of this lichen that I have studied are sterile.

Specimens examined. – **CANADA. ONTARIO.** FRONTENAC CO.: Frontenac Provincial Park, N shore of Birch Lake, shaded S-facing marble rock outcrop along shore of alkaline lake, 19.ix.2018, on *P. arboreum* over rock in epilittoral zone, *S.R. Brinker 7311B* (CANL). KENORA DIST.: Lock Lake, just S of Ash Rapids, 26 km SW of Kenora, base of S-facing rockface among talus boulders in open mixed-woods below cliff, 11.vi.2013, on thalli of *Collema* sp. over rock, *S.R. Brinker 2943* (CANL). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, NW shore of Ottertrack Lake, 1.5 km E of Plough Lake, partially shaded S-facing cliff with open canopy of *Thuja occidentalis*, 18.viii.2016, on *Placidium arboreum* over rock in epilittoral zone, *S.R. Brinker 5244B* (CANL).

***Diploschistes gypsaceus* (Ach.) Zahlbr.**

FIGURES 4E & 4F.

NOTES. – *Diploschistes gypsaceus* is a crustose lichen of calcareous rock in partially shaded habitats (Lumbsch 1988). It is widespread in North America, though apparently uncommon and represented by relatively few collections (Fig. 4F). It can be separated from other members of the genus that occur in Ontario (i.e., *D. actinostomus* (Ach.) Zahlbr., *D. scruposus* (Schreber) Norman and *D. muscorum* (Scop.) R. Sant.) by its densely white farinose thallus that is K-, its typically 4-spored asci and its preference for calcareous rock. *Diploschistes actinostomus* also differs from *D. gypsaceus* in possessing immersed perithecioid apothecia rather than having urceolate apothecia, and *D. muscorum* is normally parasitic (at least initially) on *Cladonia* squamules (Fletcher & Hawksworth 2009). Here, *D. gypsaceus* is reported from the splash zone of coastal volcanic bedrock shorelines of Lake Superior where it occurred on base-rich rock. An earlier unpublished collection from Renfrew County (*Wong 1388*, CANL) made in 1973 was recently determined to be this species by James Lendemer (CNALH 2010).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior Provincial Park, Old Woman Bay, 25 km S of Wawa, exposed rocky shoreline of lake, 10.viii.2018, on rock in epilittoral zone, *S.R. Brinker 7146* (hb. Brinker). THUNDER BAY DIST.: Slate Islands Provincial Park, N-central shore of Mortimer Island, 1 km W of Delaute Island, Lake Superior, sheltered coastal area on cliff face under broken canopy of *Abies balsamea*, 15.vii.2014, on rock, *S.R. Brinker 3922, 3923* (CANL, NY; det. J.C. Lendemer).

***Ephebe solida* Bornet**

FIGURES 5A & 5B.

NOTES. – *Ephebe solida* is a north-temperate to boreal-montane species occurring in both western and eastern portions of North America (Fig. 5B). It was noted as rare in New England with no records in the last century (Hinds & Hinds 2007) and rare in Montana and Wyoming (McCune 2017, Thomson 1951). The species is found on damp, often seasonally inundated siliceous rock and is likely overlooked given its specialized habitat and superficial similarity to other members of the genus. In the study area it was collected from moist rock in the splash zone of an extensive coastal rocky shoreline of Lake Superior. *Ephebe solida* can be distinguished from other members of the genus found in Ontario (i.e., *E. hispidula* (Ach.) Horwood, *E. lanata* (L.) Vain and *E. perspinulosa* Nyl.) by its sparingly branched prostrate thallus with mature filaments that are very thick (130–260 µm versus most other species which generally range from 70–140 µm) with filaments often ending in a whorl of branchlets (Hinds & Hinds 2007, McCune 2017). *Ephebe hispidula* can possess filaments up to 220 µm but it produces abundant short lateral branchlets that are much narrower and perpendicular to the main filaments, akin to squarrose rhizines, and does not produce a whorl of branchlets at ultimate segments of mature filaments (McCune 2017).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior, Slate Islands Provincial Park, Mortimer Island, E side of Copper Harbour, edge of *Picea-Abies-Thuja-Betula* coastal forest and shoreline with exposed cliffs, 14.vii.2014, on siliceous rock in spray zone, *S.R. Brinker 3909* (NY; det. J.C. Lendemer).

***Heterodermia japonica* (Sato) Swinscow & Krog**

FIGURES 5C & 5D.

NOTES. – Lendemer (2009a) reported this species as occurring on hardwoods in the Coastal Plain and Piedmont regions of southeastern North America and it has subsequently been found at higher elevations in the Appalachian Mountains (Tripp & Lendemer 2019). In the study area, it was most frequently encountered on the bark (rarely branches) of various softwoods (particularly *Thuja occidentalis*) in humid, typically mature, mixed conifer forests near Lake Superior, though several collections were made from inland locations as far north as Fort Hope in

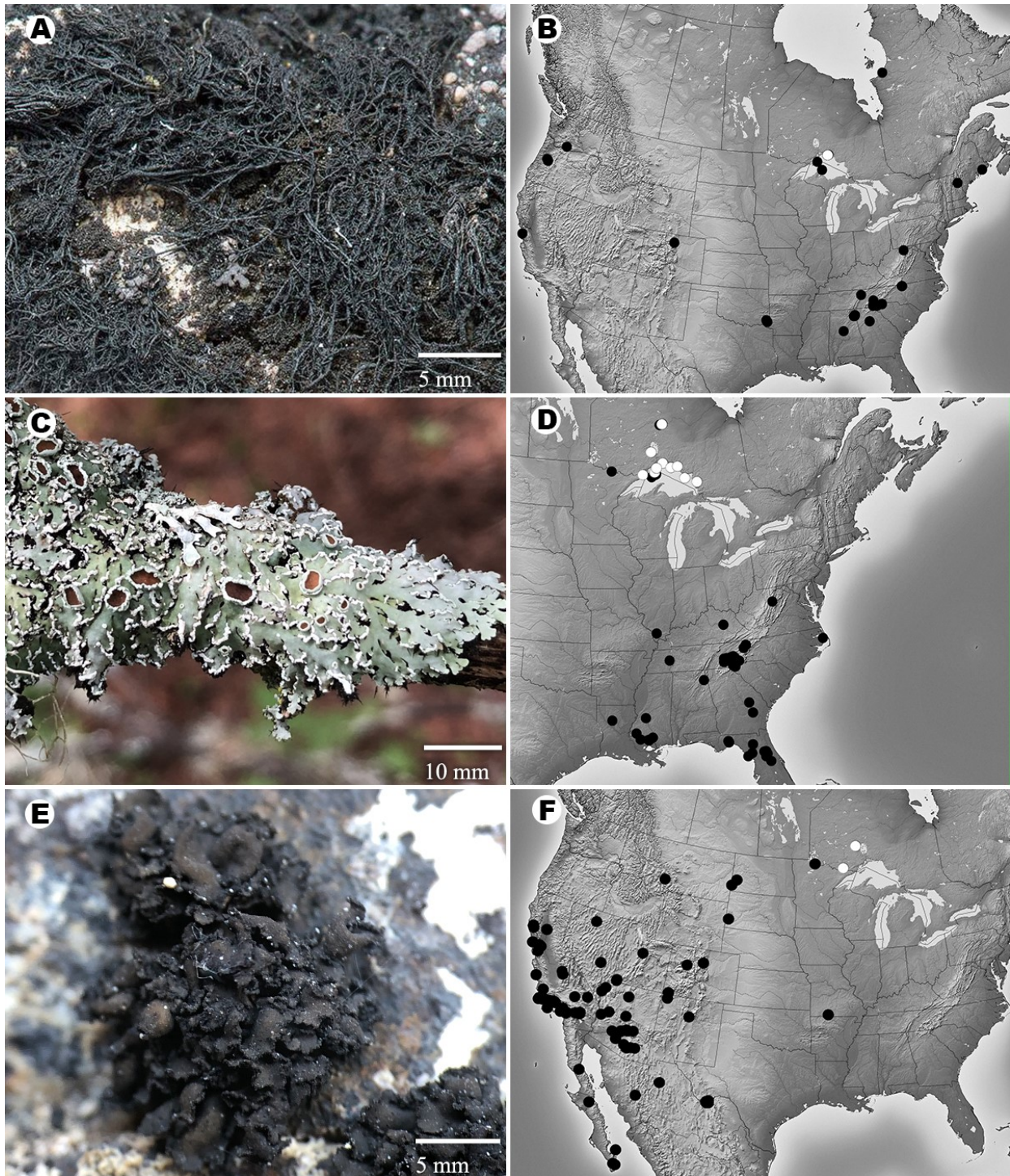


Figure 5. Photographs and distribution maps of lichens new to Canada (white = newly reported Ontario records, black = previous collections). **A**, *Ephebe solida* (Brinker 3909). **B**, distribution of *E. solida* in North America. **C**, *Heterodermia japonica* (photo taken in situ; Brinker 7704). **D**, distribution of *H. japonica* in eastern North America. **E**, *Peltula bolanderi* (photo taken in situ, Brinker 6992). **F**, distribution of *P. bolanderi* in North America.

Kenora District. These records represent a significant range extension north to the Great Lakes-St. Lawrence and southern Boreal Forest Regions of the Northeast (Fig. 5D). It can be recognized by its ecorticate lower surface (that either lack yellow/orange pigment or the pigment is K-) with dark squarrose rhizines and narrow marginal soralia. In Ontario, *Heterodermia japonica* may be confused with the much more common *H. speciosa* (Wulfen) Trevis., but that species has a corticate undersurface and pale rhizines. *Heterodermia japonica* is also similar to *H. galactophylla* (Tuck.) Culb. However, that species has soralia on broadened, reflexed labriform lobe tips and possesses pale rhizines (Brodo 2016, Lendemer 2009a). Two specimens collected during this study possessed apothecia (Fig. 5C) not previously observed in eastern North American material according to Lendemer (2009).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: 6.5 km N of Montreal Falls, 700 metres SE of Mader Lake, edge of lake and coniferous forest with *T. occidentalis*, *P. mariana* and *A. balsamea*, 16.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7682 (CANL); Lake Superior Provincial Park, E shore of Lake Superior, Katherine Cove area, rocky coniferous woods along coast with *T. occidentalis* and *Pinus resinosa*, 28.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7970 (CANL). KENORA DIST.: 24.4 km SSE of Fort Hope, N bank of the Albany River downstream of Frenchman’s Rapids, moist alluvial forest with *Picea glauca*, *Thuja occidentalis* and *Populus balsamifera*, 19.vii.2013, on bark of *P. balsamifera*, S.R. Brinker 3022A (NY; det. J.C. Lendemer). THUNDER BAY DIST.: SW corner of Mortimer Island, Lake Superior, just S of Mortimer Lake, open mixed *Abies-Thuja-Betula* woods along small stream, 15.vii.2014, on bark of *T. occidentalis*, S.R. Brinker 3950 (CANL); N side of Channel Lake opposite trail from Quebec Harbour, Michipicoten Island, Lake Superior, mature *Acer saccharum* deciduous forest with *Acer spicatum* and *Taxus canadensis*, 29.vii.2015, on bark of *A. saccharum*, S.R. Brinker 4589 (CANL); Lake Superior Provincial Park, E side of Sand River at rapids, 1.3 km upstream from mouth at Lake Superior, mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Betula papyrifera*, *T. occidentalis* and *Acer spicatum*, 11.vii.2016, on bark of *T. occidentalis*, S.R. Brinker 4949 (CANL); Lake Nipigon, 70 km NW of Nipigon, S end of Grand Bay at Tchaitang Bluffs, rocky coniferous woods below cliff along shoreline with *A. balsamea*, *T. occidentalis* and *B. papyrifera*, 12.vii.2016, on bark of *T. occidentalis*, S.R. Brinker 4958 (CANL); 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old *T. occidentalis* swamp with *A. balsamea* and *Alnus incana* spp. *rugosa*, 25.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5991 (CANL); Lake Superior National Marine Conservation Area, NE side of Brodeur Island, 51 km S of Nipigon, small, moist *T. occidentalis*-dominated stand in small valley bordering beaver pond, 25.vii.2018, on bark of *T. occidentalis*, S.R. Brinker 6853 (CANL); N shore of Lake Superior, Pic River Dunes at mouth of Pic River, rolling upland mossy coniferous woods with *P. glauca*, *A. balsamea* and *P. mariana* over aeolian sand, 17.vii.2019, on bark and branches of *P. glauca*, S.R. Brinker 7703, 7704 (CANL); N shore of Lake Superior, n-central interior of Agate Island s of St. Ignace Island, mixed boreal forest with *B. papyrifera*, *A. balsamea* and *P. glauca*, 19.vii.2019, on bark of *Sorbus decora*, S.R. Brinker 7734 (CANL); Gravel River Provincial Nature Reserve, 20 km NW of Rosspport, 8 km E of Gurney, edge of mixed boreal forest and oxbow pond of former river channel, 24.vii.2019, S.R. Brinker 7890 (CANL).

†*Minutoexcipula tuckerae* Atienza & D. Hawksw.

NOTES. – *Minutoexcipula tuckerae* is a conidial lichenicolous fungus that forms black, convex sporodochia on thalli of *Pertusaria*, and occurs from Florida north to New York and west to Missouri and Texas (Atienza & Hawksworth 1994). The specimen cited here expands the range of this species into the Boundary Waters Canoe Area Wilderness and appears to be the most northerly North American report.

Specimen examined. – **CANADA. ONTARIO.** RAINY RIVER DIST.: Quetico Provincial Park, 1.5 km S of Cache Bay, N shore of Swamp Lake at narrows, small stand of *Quercus macrocarpa* with *Viburnum rafinesquianum*, *Corylus cornuta* and *Abies balsamea*, 23.viii.2016, on *Pertusaria* sp. on bark of *Q. macrocarpa*, S.R. Brinker 5393 (CANL, hb. Etayo; det. J. Etayo).

Peltula bolanderi (Tuck.) Wetmore

FIGURES 5E & 5F.

NOTES. – *Peltula bolanderi* is a mainly western taxon (Fig. 5F) in North America, found on partially shaded to well-lit rock outcrops in dry to semi-arid regions, particularly on large ledges with a reasonable amount of substrate stability (Wetmore 1970). Here it was found on vertical rockfaces along alkaline lakes. This sorediate species is similar to *P. euploca* (Ach.) Pišút but is distinguished by its polyphyllous thallus consisting of smaller and thinner squamules with undulate margins, and its dark olive green versus tan to olive thallus (Büdel & Nash 2002, Wetmore 1970). The nearest record appears to be from northwestern Minnesota where it is listed as a threatened species (MDNR 2018).

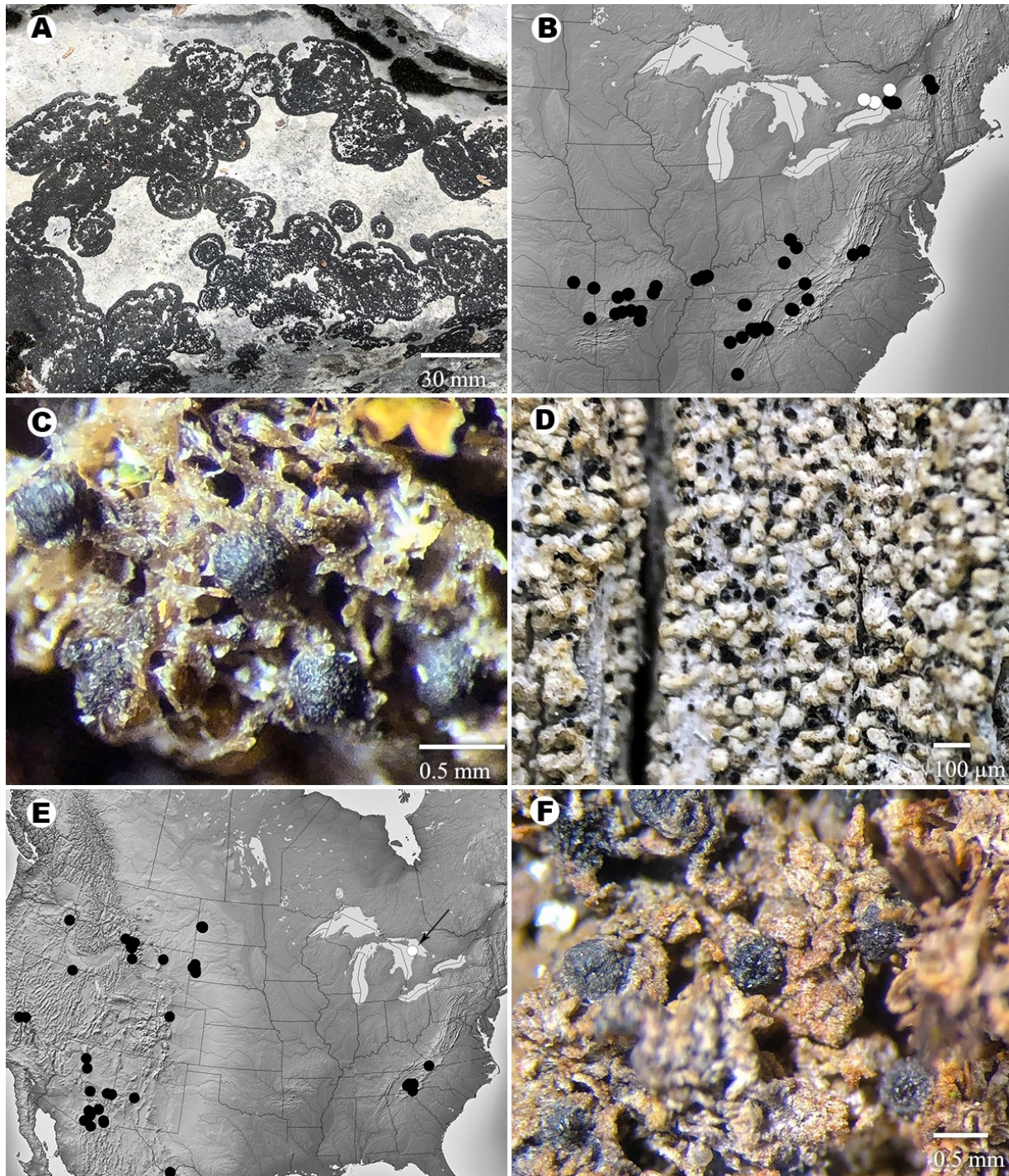


Figure 6. Photographs and distribution maps of lichens new to Canada (white = newly reported Ontario records, black = previous collections). **A**, concentric rings of *Placynthium petersii* thalli on limestone (photo taken in situ, Brinker 8383). **B**, distribution of *P. petersii* in North America. **C**, bryicolous *Protothelenella sphinctrinoides* with perithecia (Brinker 3585). **D**, *Pycnora praestabilis* lignicolous on decorticated trunk of *Thuja occidentalis* (Brinker 6631). **E**, distribution of *P. praestabilis* in North America. **F**, bryicolous *Thelopsis melathelia* with perithecia (Brinker 6609).

Specimens examined. – CANADA. ONTARIO. RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, large SE bay of Ottertrack Lake along N shore, edge of conifer forest and bedrock shoreline, 23.viii.2016, on rock in epilittoral zone of lake, *S.R. Brinker 5386* & *P. Scott* (CANL). THUNDER BAY DIST.: Obonga-Ottertooth Provincial Park, 41 km SW of Armstrong, N shore of Obonga Lake, S-facing cliff along lakeshore, 03.viii.2018, on rock in epilittoral zone of lake, *S.R. Brinker 6992* & *C. Terwissen* (CANL, hb. Brinker).

***Placynthium petersii* (Nyl.) Burnham**

FIGURE 6A & 6B.

NOTES. – *Placynthium petersii* is a cyanolichen that forms distinct patterns of dark concentric rings (Fig. 6A) contrasting against the lighter limestone on which it typically grows. It is widespread in xerothermic alkaline habitats throughout the southeastern United States with scattered collections north to New York (Henssen 1963b; Fig. 6B). The presence of the species in Ontario is not surprising given its occurrence in alvars in adjacent New York State described by LaGreca (2010) which are floristically similar to those found in eastern Ontario on the Napanee Plain and Prince Edward Peninsula. Though, despite other lichenological surveys of alvar and alkaline barrens, which resulted in interesting discoveries such as *Heppia adglutinata* (Kremp.) A. Massal., *Psora decipiens* (Hedw.) Hoffm. and *Thyrea confusa* (Scop.) Henssen (Brodo et al. 2013, Lewis & Brinker 2017, McMullin 2019a, Wong & Brodo 1973), it eluded detection. During the present study, specimens were collected from limestone and marble, the metamorphic equivalent of limestone. Marble outcrops are known to provide similar habitat to alvars and in Ontario possess numerous alvar indicator species (e.g. Brownell & Riley 2000, Catling et al. 2014) yet are more commonly characterized by near vertical exposures or steep slopes as opposed to level plains that typify alvars. *Placynthium petersii* is morphologically similar to *P. stenophyllum* (Tuck.) Fink, with which it can often grow, but *P. stenophyllum* has filiform lobes to 0.1 mm wide (vs. flattened lobes 0.15–0.25 mm wide in *P. petersii*) with pale lower surfaces and apothecia with thalline margins, whereas *P. petersii* has blue-green lower surfaces and apothecia with proper margins (Brodo 2016, Henssen 1963b). The species is probably rare in Ontario given its restriction to alvars and marble barrens which in turn are of provincial conservation concern (Bakowsky 1996, Reschke et al. 1999).

Specimens examined. – CANADA. ONTARIO. HASTINGS CO.: 22 km E of Belleville, 2.5 km N of Marysville, *Juniperus virginiana* treed alvar, 15.v.2019, on limestone pavement, *S.R. Brinker 7525* (hb. Brinker); Crowe River, Callaghan's Rapids Conservation Area, 3.5 km S of Marmora, edge of coniferous forest along riverbank with exposures of limestone bedrock, 24.v.2020, on limestone, *S.R. Brinker 8383* (CANL, hb. Brinker). LEEDS & GRENVILLE CO.: Charleston Lake Provincial Park, Democrat Island, 13 km NW of Mallorytown, exposed sloping metasedimentary bedrock above epilittoral zone of shoreline, 23.viii.2018, on marble, *S.R. Brinker 7202* (CANL).

***Protothelenella sphinctrinoides* (Nyl.) H. Mayrh. & Poelt**

FIGURE 6C.

NOTES. – This is the first published report of *Protothelenella sphinctrinoides* from Canada. Previous unpublished collections are known from Nunavut (*K.A. Kershaw s.n.*, CANL) and British Columbia (*I.M. Brodo & T. Goward 28506*, CANL). It is a bryicolous lichen of boreal-montane and arctic-alpine regions of the Northern Hemisphere (Ohmura & Mayrhofer 2016, Thomson 1997). Here it is reported from maritime tundra along Hudson Bay which is characterized by a series of inland fossil marine beach ridges (Fig. 3A) that formed during the regression of the early post-glacial Tyrrell Sea and are now stranded due to residual post-glacial isostatic rebound (Andrews 1968, Martini 1981). This rarely collected species is characterized by small, dark, globose to pear-shaped perithecia (0.2–0.5 mm) that are partially buried in the thallus, and by colourless muriform ascospores (Brodo 2016). It differs from *P. sphinctrinoidella* (Nyl.) H. Mayrhofer & Poelt by its larger, strongly muriform ascospores (Orange 2013).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Niskibi Cape, 53 km NW of Fort Severn, 8.5 km E of Niskibi River, 8 km S of Hudson Bay coast, open tundra beach ridge with *Rhododendron lapponicum*, *Vaccinium vitis-idaea*, *Empetrum nigrum* and *Dryas integrifolia*, 22.vi.2014, on bryophytes over tundra heath, *S.R. Brinker 3585* (CANL).

***Pycnora praestabilis* (Nyl.) Hafellner**

FIGURE 6D & 6DE.

NOTES. – *Pycnora praestabilis* is a lignicolous crust found on hard, decorticate wood, and occurs mostly throughout western montane areas of North America (McCune 2017, Nash & Elix 2002). It was only recently reported from eastern North America from high elevations of the southern Appalachian Mountains (Hodkinson

2010), suggesting a broader boreal North American distribution (Lendemer et al. 2013). This record represents the first collection from the Great Lakes Basin, expanding its range significantly northward (Fig. 6D). In Ontario, *P. praestabilis* could be confused with the closely related *P. sorophora* (Vainio) Hafellner but differs from that species by not producing soralia (Timdal 1984).

Specimen examined. – **CANADA. ONTARIO.** BRUCE CO.: Bruce Peninsula National Park, E shore of Lake Huron, between Johnston’s Harbour and Scugog Lake, *Thuja occidentalis* alvar woodland with *Picea glauca*, *Juniperus horizontalis* and *Arctostaphylos uva-ursi*, 15.vi.2018, on decorticate trunk of *T. occidentalis*, *S.R. Brinker 6631* (NY, conf. J.C. Lendemer).

***Thelopsis melathelia* Nyl.**

FIGURE 6F & 7A.

NOTES. – *Thelopsis melathelia* is a rarely reported circumpolar arctic-alpine lichen of calcareous rock outcrops where it grows over bryophytes and decaying vegetation (Fryday 1996, Rose et al. 2009). Relatively few North American records exist for this taxon, which was first reported by Harris (1979) from Isle Royale in Michigan. These additional Great Lakes Basin records extend its range south to Lake Huron in Georgian Bay (Fig. 7A) where other unusual disjunct arctic-alpine species are known to occur on the upper Bruce Peninsula (Brodo et al. 2013). The species is recognized by its hard, semi-gelatinous (when wet), rough/warty, orange-red to red-brown perithecia, trentepohlioid photobiont, persistent paraphyses, and thin-walled, multispored asci containing simple or few-celled ascospores averaging $11\text{--}20 \times 4\text{--}7 \mu\text{m}$ with a thickened perispore (Aptroot et al. 2014, Harris 1979, Orange 2013, Rose et al. 2009). The specimens examined during this study were on moribund bryophytes collected from base-rich bedrock and large talus boulders.

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior Provincial Park, S side of Old Woman Bay, steep rocky hillside along shoreline with *Thuja occidentalis* and *Betula papyrifera*, 25.vii.2016, on bryophytes over volcanic rock, *S.R. Brinker 5205* (CNAL). BRUCE CO.: Georgian Bay, N side of Cabot Head, 26 km SE of Tobermory, exposed E-facing talus slope with stunted *T. occidentalis*, *Carex eburnea*, and *Campanula rotundifolia*, 14.vi.2018, on bryophytes on a large dolostone boulder, *S.R. Brinker 6609*. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, Brodeur Island, exposed coastal rocky headland with *Sibbaldia tridentata*, *Poa glauca* and *Artemisia campestris*, 25.vii.2018, on bryophytes over volcanic rock, *S.R. Brinker 6832* (CANL); N shore of Lake Superior, Agate Island, exposed rocky coastline, 18.vii.2019, on bryophytes on sheltered rockface, *S.R. Brinker 7743* (CANL).

†*Toninia tecta* C.A. Morse & Ladd

FIGURE 7B.

NOTES. – *Toninia tecta* is unique among species in the genus as it is restricted to the lower surfaces of saxicolous, umbilicate taxa of *Dermatocarpon* (Ladd & Morse 2018). The thalli are endokapylic, with dark, superficial apothecia characterized by a reddish brown hypothecium and grey to greenish epithecium that reacts KOH–, HNO₃+ violet, 3-septate ellipsoid ascospores measuring $14\text{--}18.7 \times 3.7\text{--}5.0 \mu\text{m}$ and elongate filiform conidia which have not been noted in related species. *Toninia tecta* was described from scattered locations in arid regions of the northern Chihuahuan Desert and southern Rocky Mountains eastward across the Great Plains through the Ozark Highlands to the extreme southern Great Lakes region in northeastern Illinois, roughly corresponding to the Grassland Biome region of North America. In the study area, small clusters of ascomata were found on the lower surfaces of several thalli of *D. moulinsii* (Mont.) Zahlbr. on a shaded marble cliff, extending its range roughly 1,000 kilometers northeast into the Great Lakes-St. Lawrence Forest Region. It may prove to be more widespread with additional study, particularly since several of its hosts are widely distributed throughout this area.

Specimen examined. – **CANADA. ONTARIO.** FRONTENAC CO.: ca. 10.5 km NE of Plevna, Palmerston Lake, partially shaded marble cliff with *Thuja occidentalis*, *Cornus rugosa*, and *Diervilla lonicera*, 10.vii.2018, on lower surfaces of *Dermatocarpon moulinsii* on near-vertical marble outcrop, *S.R. Brinker 6678* & *C. Terwissen* (CANL, hb. Brinker).

***Verrucaria quercina* Breuss**

FIGURE 7C.

NOTES. – *Verrucaria quercina* is an inconspicuous crustose perithecioid lichen that grows on bark or on bryophytes over bark that was described from the Sonoran Desert region (Breuss 2007). This is the first report for this species from Canada. It is characterized by its corticolous habit, partially immersed perithecia, clavate, 8-spored asci and simple, hyaline spores measuring $24\text{--}28 \times 11\text{--}13 \mu\text{m}$ (Breuss 2007, Lendemer & Breuss 2009). The collect-

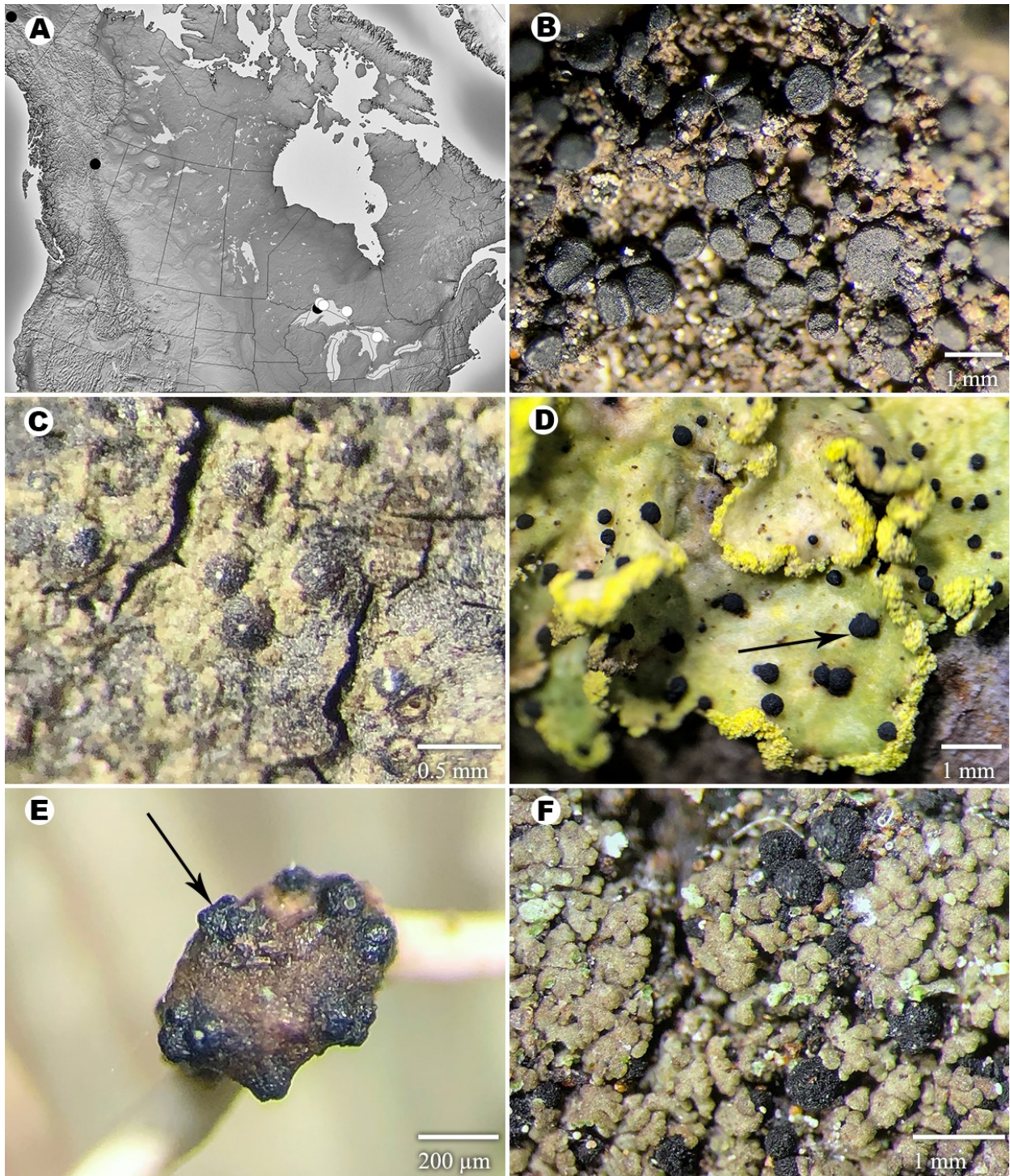


Figure 7. Photographs and distribution map of lichens and allied fungi new to Canada or to Ontario (white = newly reported Ontario records, black = previous collections). **A**, distribution of *Thelopsis melathelia* in North America. **B**, *Toninia tecta* ascomata on lower surface of *Dermatomarpon moulinsii* (Brinker 6678). **C**, close-up of *Verrucaria quercina* perithecia (Brinker 2788). **D**, arrow indicating *Abrothallus peyritschii* ascomata on *Vulpicida pinastri* (Brinker 7727). **E**, arrow indicating *Abrothallus usneae* ascomata on basidiomata infecting *Usnea* host (Brinker 6062). **F**, *Agonimia tristicula* (Brinker 4987).

-ions reported here were from the lower trunks of seasonally flooded *Acer ×freemanii* and *Fraxinus pennsylvanica* in mature deciduous floodplain forests.

Specimens examined. – **CANADA. ONTARIO.** HASTINGS CO.: 7 km SE of Stoco Lake, 6.4 km E of Duff's Corners, 600 metres W of Deroche Rd., seasonally flooded gorge in rocky deciduous forest over limestone with *Acer/Fraxinus/Ulmus*, 16.x.2016, on lower bole of seasonally flooded *Acer ×freemanii*, S.R. Brinker 2788 (NY, hb. Brinker; det. J.C. Lendemer). PETERBOROUGH CO.: Squirrel Creek Conservation Area, 10 km S of Peterborough, mature deciduous floodplain forest with *F. pennsylvanica*, *A. ×freemanii* and *Rhamnus cathartica*, 22.ii.2019, on lower bole of *F. pennsylvanica*, S.R. Brinker 7376 (CANL, NY).

SPECIES NEW TO ONTARIO

The following 51 lichens and 10 lichenicolous fungi were not included in the published Ontario lichen checklist (Newmaster et al. 1998) or other more recent relevant literature, and are newly reported here.

†*Abrothallus peyritschii* (Stein) Kotte

FIGURE 7D.

NOTES. – *Abrothallus peyritschii* was previously reported from Canada from Alberta (Triebel et al. 1991) and Québec (Cole & Hawksworth 2001). It is a northern boreal lichenicolous ascomycete confined to thalli of *Vulpicida pinastri* (Scop.) J.-E. Mattsson & M.J. Lai (Triebel et al. 1991). The species is probably common considering its host is ubiquitous throughout much of the northern portion of the study area.

Specimens examined. – **CANADA. ONTARIO.** KENORA DIST.: 57 km SW of Deer Lake airport on the NE end of Stout Lake, W-facing, exposed rocky shoreline with granite outcrops, 30.vi.2011, on *Vulpicida pinastri*, S.R. Brinker 2030k (NY; det. R.C. Harris). THUNDER BAY DIST.: Lake Superior, St. Ignace Island, Canada Pacific Railroad Slip area, 40 km SE of Nipigon, edge of shingle beach and conifer woods, 18.vii.2019, on *V. pinastri* on conifer twigs, S.R. Brinker 7727 (CANL); N shore of Lake Superior, Worthington Bay, 4 km S of Schreiber, edge of conifer forest and rocky shoreline, 26.vii.2019, on *V. pinastri* on *P. glauca* twigs, S.R. Brinker 7940 (CANL).

†*Abrothallus usneae* Rabenh.

FIGURE 7E.

NOTES. – *Abrothallus usneae* was previously reported from British Columbia (Diederich 2003). Here it is reported for the first time from Ontario from the Thunder Bay District. It can be associated with basidiomata of *Biatoropsis usnearum* Räsänen and *Cystobasidium usneicola* Diederich & Ahti but also occurs on thalli of *Usnea* not infected by those species (Diederich 2003, Diederich & Christiansen 1994).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Ouimet Canyon Provincial Park, 8 km W of Dorion, 2.2 km N of Gulch Lake, sheltered base of cliff in mixed forest, 27.vii.2017, on *Biatoropsis* on *Usnea longissima* over *Acer spicatum* twigs and vertical rockface, S.R. Brinker 6052 (MA).

Agonimia tristicula (Nyl.) Zahlbr.

FIGURE 7F & 8A.

NOTES. – *Agonimia tristicula* is widely distributed, occurring throughout portions of Asia, Australia, Europe, Macaronesia, North America and South America (Hafellner 2014). In North America it occurs mainly in montane areas of the west and as far east as the Great Lakes Basin (Fig. 8A). It was first reported from Canada from Osoyoos in British Columbia (Goward et al. 1994). In Europe it is rare in lowland habitats but increases in frequency in montane and high alpine vegetation habitats where it grows among bryophytes over calcareous substrates or can be lichenicolous on cyanolichens such as *Peltigera*, *Collema*, and *Leptogium* (Hafellner 2014). In the study area it was associated with a large talus slope below a cliff growing over bryophytes. It can be distinguished from other members of the genus by a combination of its large muriform ascospores (57–120 × 25–50 µm) that become brownish with age, 2-spored asci and its greenish to brown squamules (Hafellner 2014, Orange & Purvis 2009).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Pijitawabik Palisades, 37 km N of Nipigon, blocky talus slope under canopy of *Thuja occidentalis* and *Betula papyrifera*, 13.vii.2016, among bryophytes on moist volcanic (diabase) rock, S.R. Brinker 4987 (CANL).

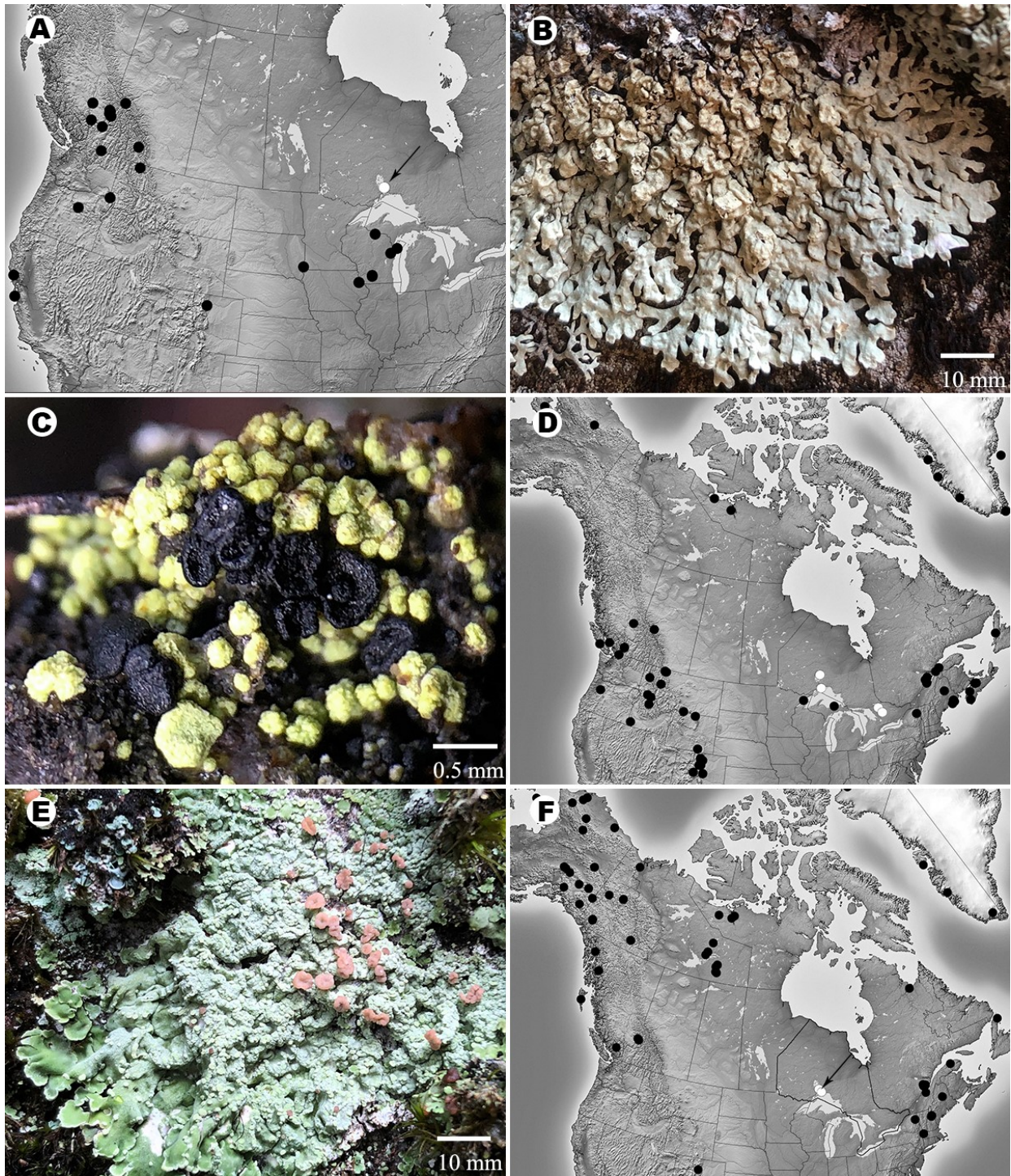


Figure 8. Photographs and distribution maps of lichens new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, distribution of *Agonimia tristicula* in North America. **B**, *Arctoparmelia subcentrifuga* (photo taken in situ, Brinker 8236). **C**, *Arthrorhaphis citronella* (photo taken in situ, Brinker 7754). **D**, distribution of *A. citronella* in North America. **E**, *Baeomyces placophyllus* (photo taken in situ, Brinker 7008A). **F**, distribution of *B. placophyllus* in North America.

***Arctoparmelia subcentrifuga* (Oksner) Hale**

FIGURE 8B.

NOTES. – *Arctoparmelia subcentrifuga* was mentioned as a rare arctic and alpine species occurring sporadically from Greenland, Baffin Island and the north shore of Lake Superior in Canada by Hale (1986), though no supporting Ontario specimens were cited and it was not included on the first list of Ontario lichens (Newmaster et al. 1998). It has a dark purplish to blackish lower surface similar to *A. separata* (Th. Fr.) Hale, but the upper surface is strongly and coarsely rugose-pustulate (Hale 1986). It is known from adjacent Minnesota where it is listed as a species of Special Concern due to its restricted range and confinement to rare humid talus slopes associated with several lakes in the region (MDNR 2018). It was also considered to be rare in Michigan (Fryday & Wetmore 2002) and seems to be a rare and restricted species in Ontario.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Ruby Lake Provincial Park, 7 km SE of Nipigon, N-facing talus slope with scattered stunted *Picea mariana*, 7.viii.2018, on rock, *S.R. Brinker 7082* (CANL); The Pinnacles, 5.5 km NW of Dorion, 1 km N of Miner Lake, E-facing talus slope below cliff, 12.ix.2019, on gabbro, *S.R. Brinker 8236* (CANL).

***Arthrorhaphis citrinella* (Ach.) Poelt**

FIGURE 8C & 8D.

NOTES. – This small yellow crustose lichen often begins as a lichenicolous fungus on thalli of *Baeomyces rufus* (Hudson) Rebert. (Ihlen 1998) over acidic soil or rock in boreal and arctic-alpine habitats (Hansen & Obermayer 1999). It differs from *A. alpina* (Schaer.) R. Sant. which has been reported from Ontario (Lewis & Brinker 2017) by the absence of oxalate crystals in the medulla and in having a thallus composed of small squamules (<0.5 mm) that often dissolve into granular soredia, whereas *A. alpina* has oxalate crystals in the thallus medulla and a thallus composed of large, convex areoles that only occasionally dissolve into soredia (Brodo 2016, Hansen & Obermayer 1999). In North America, *A. citrinella* ranges from Alaska and Nunavut south through the Rocky Mountains and alpine zones of Québec, as well as portions of coastal Maine, Nova Scotia and Newfoundland (Fig. 8D). Disjunct populations are known from the Great Lakes region in Michigan and Minnesota, where it is listed as Threatened (MNDNR 2018).

Selected specimens examined. – **CANADA. ONTARIO.** HALIBURTON CO.: 2.5 km N of Dorset, between Lake of Bays and Charcoal Lake, base of large W-facing sloping rockface in mixed forest, 21.x.2019, over *B. rufus* and bryophytes on siliceous rock, *S.R. Brinker 8294* (CANL). PARRY SOUND DIST.: Eagle Lake Rd., 1.5 km S of South River, W-facing steep sandy slope disturbed by all-terrain vehicles bordering upland mixed woods, 21.ix.2019, on *Baeomyces rufus* over sand, *S.R. Brinker 8292* (CANL). THUNDER BAY DIST.: 2.3 km E of Ombabika Bay, Lake Nipigon, 59 km N of Beardmore, edge of immature conifer forest along forest access road, 6.viii.2018, on exposed mossy sandbank, *S.R. Brinker 7055* & *C. Terwissen* (CANL); N shore of Lake Superior, E side of Bowman Island, S of St. Ignace Island, sparsely treed rockface along rocky shore, 19.vii.2019, on shallow soil among rock crevices, *S.R. Brinker 7754* & *D. Tate* (CANL).

†*Bachmanniomyces uncialicola* (Zopf) D. Hawksw.

NOTES. – This lichenicolous fungus normally induces the formation of conspicuous galls on species of *Cladonia* (Diederich 2003). Here it was found growing on *C. uncialis* (L.) F.H. Wigg. Three previous records exist for Canada including two from British Columbia and one from Newfoundland (Diederich 2003, Hawksworth 1981). This is the first report from Ontario. It was considered a rare lichenicolous fungus in North America by Lendemer et al. (2013).

Specimen examined. – **CANADA. ONTARIO.** KENORA DIST.: 50 km NE of Sandy Lake airport, 6.5 km SW of Broadside Lake, SE portion of Opasquia Provincial Park, well-drained sandy terrace along small lake under *Pinus banksiana*, 4.vii.2011, on *Cladonia uncialis*, *S.R. Brinker 2142s* (NY; det. J.C. Lendemer).

***Baeomyces placophyllus* Ach.**

FIGURE 8E & 8F.

NOTES. – *Baeomyces placophyllus* is widespread in alpine and northern boreal regions of North America in portions of Alaska, Yukon, Northwest Territories, British Columbia, Nunavut, New England and Newfoundland (Thomson 1984). These are the first confirmed reports for the Great Lakes Basin which are disjunct from the nearest occurrences in the White Mountains of New Hampshire by nearly 1,300 kilometres (Fig. 8F). Newmaster et al. (1998) included this species on the first Ontario lichen list but no specimens were cited, there are no supporting reports in the literature, and no voucher was found at CANL. It is the only foliose-squamulose species of *Baeomyces*

Pers. containing stictic acid (Thomson 1967) making it distinctive in the genus. Here it was terricolous as well as saxicolous over mossy rock in damp, shaded boreal forest habitat with associated cliff and talus features.

Specimens examined. – **CANADA. ONTARIO. THUNDER BAY DIST.:** Pijitawabik Palisades, 26 km N of Nipigon, 13 km E of Jessie Lake, shaded mossy talus slope under *Betula papyrifera*, *Abies balsamea* and *Picea mariana*, 5.viii.2018, among moss over rock, *S.R. Brinker 7008A* (hb. Brinker); Kama Hills Conservation Reserve, 23 km NE of Nipigon, shaded N-facing rocky slope with *B. papyrifera*, *Sorbus decora*, *A. balsamea* and *Alnus alnobetula* ssp. *crispa*, 9.viii.2018, on moist mossy rockface, *S.R. Brinker 7116* (CANL); Ruby Lake Provincial Park, 3 km SE of Nipigon, N-facing talus slope under open canopy of *A. balsamea*, *B. papyrifera* and *Populus tremuloides*, 23.vii.2019, on shallow soil over rock, *S.R. Brinker 7876* (CANL).

***Biatora printzenii* Tønsberg**

NOTES. – This crustose lichen has an Appalachian – Great Lakes distribution in North America, occurring from Québec and Maine, south to Georgia, where it is widespread on the bark of hardwoods, especially *Acer rubrum* (Tønsberg 2002). It was mistakenly reported from Ontario by Tønsberg (2002) from a single site northwest of Ottawa in Gatineau Park, which is actually in the province of Québec. The specimen cited here confirms its occurrence in Ontario. It is characterized by its blue-gray to greenish thallus that is P+ orange-red and C+ pink (gyrophoric acid and argopsin) and bright-green soralia (Printzen et al. 2016).

Specimen examined. – **CANADA. ONTARIO. PETERBOROUGH CO.:** Otonabee River, 3.4 km S of Peterborough Airport, mature riparian deciduous swamp with *Acer ×freemaniae*, *Fraxinus pennsylvanica*, *Betula alleghaniensis* and *Thuja occidentalis*, 2.ii.2013, on bark of *A. ×freemaniae*, *S.R. Brinker 2803* (NY; det. J.C. Lendemer).

***Bilimbia lobulata* (Sommerf.) Hafellner & Coppins**

NOTES. – *Bilimbia lobulata* is a circumpolar cool-temperate to arctic-alpine species that grows on calcareous soils, often among bryophytes or on decaying vegetation (Thomson 1997). Here it was found growing among bryophytes on shallow calcareous soil over localized marble outcrops in conifer woods. It is distinct in the genus due to the minutely squamulose thallus with 3-septate spores averaging less than 24 µm in length (McCune 2017).

Specimen examined. – **CANADA. ONTARIO. RENFREW CO.:** Mountain Chute Station at Norcan Lake, conifer woods on S-facing rocky slope under open canopy of *Thuja occidentalis*, *Pinus resinosa* and *Picea glauca*, 9.vi.2016, among bryophytes over partially exposed marble bedrock, *S.R. Brinker 4877* (CANL, O; det. E. Timdal).

***Calicium lucidum* (Th. Fr.) M. Prieto & Wedin**

NOTES. – *Calicium lucidum* is endemic to North America, reported from Arizona, Minnesota, Michigan and New York (Harris 2004, 2015; Weber 1967; as *Cyphelium lucidum* (Th. Fr.) Th. Fr.). It is a corticolous species of conifer bark, distinguished from other North American species by its bright yellow, areolate thallus with prominent, cup-like, sessile, black apothecia, sometimes with a yellow pruinose mazaedium and always with a yellow pruinose mazaedial rim, 1-septate ascospores measuring 17–22 × 8–10 µm, and by the production of vulpinic acid (Brodo et al. 2001, McCune 2017, Weber 1967). It was listed as a rare member of the Caliciales of late-successional humid forests in the Acadian Forest Region by Selva (2003). *Calicium notarisii* (Tul.) M. Prieto & Wedin, another species with a yellow-green thallus has also been reported from the study area (Wong & Brodo 1992, as *Cyphelium notarisii* (Tul.) M. Prieto & Wedin), but it has immersed, epruinose apothecia and submuriform ascospores, and produces rhizocarpic acid (Brodo 2016). It was neither included in the checklist of lichens in Ontario by Newmaster et al. (1998), nor was it listed by Crowe (1994) from the Thunder Bay District though was mapped from a small area of eastern Lake Superior by Brodo et al. (2001). This appears to be the first report from Ontario.

Specimen examined. – **CANADA. ONTARIO. KENORA DIST.:** Shoal Lake, Drum Island, 37 km SW of Kenora, old, open coniferous forest with *Pinus strobus*, *Abies balsamea*, and *Betula papyrifera*, 12.ix.2017, on bark of *P. strobus*, *S.R. Brinker 6122* (CANL).

***Caloplaca stillicidiorum* (Vahl) Lyngby**

FIGURE 9A.

NOTES. – *Caloplaca stillicidiorum* is a circumpolar, mainly arctic-alpine species that grows over mosses, plant debris, wood, bark of low shrubs or rarely rocks, in calcareous habitats (Šoun et al. 2011). Sometimes treated as a synonym of *Caloplaca cerina* (Ehrh. ex Hedwig) Th. Fr. (e.g. Wetmore 2007a), *C. stillicidiorum* was shown to be distinct by Šoun et al. (2011). It can be recognized by its ecology, its yellow-orange apothecia with pruinose discs, grey or black pruinose apothecial margins, ascospores measuring (11–)12–15(–18) × (7–)8–9(–10) µm and a

septum measuring (3–)4–6(–8) μm (McCune 2017, Šoun et al. 2011). While these are the first reports from Ontario, it is expected to be more locally common with additional study given the extent of suitable maritime tundra in Ontario along the coast of Hudson Bay.

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** West Pen Island, 123 km NW of Fort Severn, 7.6 km NW of Oosteguanako Creek mouth, Hudson Bay, moist dwarf shrub tundra with *Rhododendron lapponicum* and *Vaccinium uliginosum*, 26.vi.2014, on decaying vegetation, *S.R. Brinker 3768* (CANL); Pen Islands Important Bird Area 143, ca. 106 km NW of Fort Severn, 20 km SE of Manitoba border, mesic dwarf-shrub tundra with *R. lapponicum*, *Salix reticulata*, *Empetrum nigrum* and *Dryas integrifolia*, 27.vi.2014, growing over decaying *D. integrifolia* leaves, *S.R. Brinker 3783* (CANL).

***Cetraria nigricans* Nyl.**

FIGURE 9B.

NOTES. – *Cetraria nigricans* is a circumpolar boreal-arctic species forming small, dense colonies on wind-exposed rock outcrops and in heathlands, ranging in North America from Newfoundland to Alaska and south in alpine areas to the Gaspé Peninsula in Québec (Brodo et al. 2001, Thomson 1984). It can be recognized by its ecology, chemistry (P-, K-, protolichesterinic acid), brown-black upper surface, and inconspicuous marginal pseudocyphellae occurring on its pale-brown lower surface (Stenroos et al. 2016). Here it occurred on the Sutton Ridges, part of a massive Precambrian inlier forming a cuesta within an otherwise saturated peat-dominated landscape of the Ontario portion of the Hudson Bay Lowland. This is the first published report from Ontario (Fig. 9B).

Specimen examined. – **CANADA. ONTARIO. KENORA DIST.:** Sutton Ridges, 98 km SE of Peawanuck airport, 4.3 km E of Aquatuk Lake, open cryptogram-dominated talus slope at base of W-facing cliff, 6.viii.2014, on siliceous rock outcrop, *S.R. Brinker 4125* (CANL).

†*Chaenothecopsis australis* Tibell

FIGURE 9C.

NOTES. – *Chaenothecopsis australis* was described from old-growth *Nothofagus* forests of Argentina and Chile by Tibell (1998). It was first reported for North America from the Acadian Forest of New Brunswick, Canada, where it was considered rare (Selva 2014) and more recently from Great Smoky Mountains National Park in North Carolina where it was also considered rare (Selva 2016). This is the first record from Ontario. *Chaenothecopsis australis* is associated with free-living *Trentepohlia* or thalli of the lichen genus *Lecanactis* Körber which are typically corticolous on *Acer saccharum* Marshall and *Thuja occidentalis* L. (Selva 2014). Material collected for the current study was found on a free-living colony of *Trentepohlia* growing over sheltered rock.

Specimens examined. – **CANADA. ONTARIO. THUNDER BAY DIST.:** Pijitawabik Palisades, 26 km NNE of Nipigon, 300 metres E of Wanogu Lake, base of shaded W-facing talus slope with *Thuja occidentalis*, *Abies balsamea*, and *Betula papyrifera*, 9.viii.2018, lichenicolous on *Trentepohlia* on shaded rockface, *S.R. Brinker 7108* (CANL, hb. Brinker; det. S. Selva).

***Cystocoleus ebeneus* (Dillwyn) Thwaites**

FIGURE 9D & 9E.

NOTES. – *Cystocoleus ebeneus* is a sterile filamentous lichen that ranges in North America in montane areas of the Rocky Mountains, Ozarks and Appalachian Mountains (Fig. 9E). It is characterized by its dark fungal hyphae that surround filaments of the green alga *Trentepohlia* creating small, black, tangled, felt-like mats. It occurs on massive acidic rock overhangs and other sheltered vertical siliceous rocks in areas with high humidity protected from direct rain (Hawksworth et al. 2011, Lendemer 2009b). It is superficially similar to *Racodium rupestre* Pers. with which it is often reported growing intertwined with (Fletcher & Dalby 2009) but can be distinguished microscopically by the arrangement of fungal hyphae surrounding the algal host (Brodo et al. 2001, McCune 2017). In *C. ebeneus*, the hyphal arrangement appears twisted and contorted, the walls appearing papillate, whereas in *R. rupestre* the hyphae are arranged vertically, appearing neatly parallel and smooth (Fletcher & Dalby 2009). These are the first reports from Ontario.

Specimens examined. – **CANADA. ONTARIO. PARRY SOUND DIST.:** Pickerel Lake, 14 km SW of Commanda, mature coniferous forest on N-facing slope with *Tsuga canadensis*, *Thuja occidentalis* and *Betula alleghaniensis*, on sheltered vertical rockface, 23.vi.2020, *S.R. Brinker 8449* (CANL). **THUNDER BAY DIST.:** Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, sheltered E-facing diabase cliff along shoreline, 31.vii.2018, on vertical rock, *S.R. Brinker 6927* (CANL, OSC; conf. B. McCune).

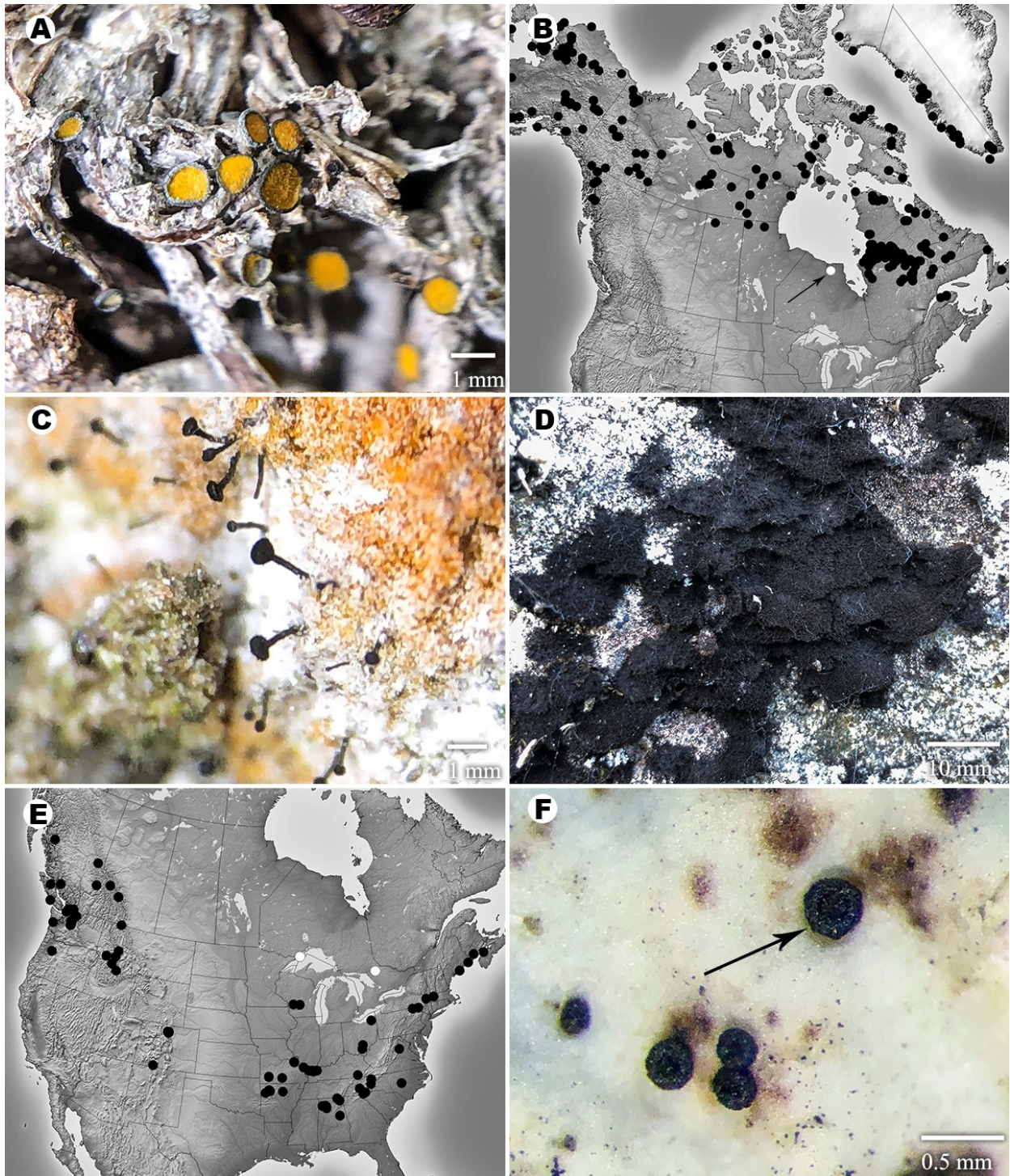


Figure 9. Photographs and distribution maps of lichens and allied fungi new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Caloplaca stillicidiorum* (Brinker 3768). **B**, distribution of *Cetraria nigricans* in North America. **C**, *Chaenothecopsis australis* (Brinker 7108). **D**, saxicolous tufts of *Cystocoleus ebeneus* (photo taken in situ, Brinker 6927). **E**, distribution of *C. ebeneus* in North America. **F**, arrow indicating *Dactylospora lobiariella* ascomata lichenicolous on thallus of *Ricasolia quercizans* (Brinker 5520).

†*Dactylospora lobariella* (Nyl.) Hafellner

FIGURE 9F & 10A.

NOTES. – *Dactylospora lobariella* is a rarely reported lichenicolous ascomycete in North America known from British Columbia (Goward et al. 1994), New Brunswick (Diederich 2003), North Carolina (Lendemer et al. 2013), and Virginia (Hodkinson et al. 2009) (Fig. 10A). It is confined to species of *Lobaria* and *Ricasolia*, having been reported elsewhere on *L. pulmonaria* (L.) Hoffm., *R. quercizans* (Michx.) Stizenb. and *R. amplissima* (Scop.) De Not. (Etayo & Diederich 1996). The material collected during this study was lichenicolous on *R. quercizans* in mature productive hardwood forests in areas with a long history of forest continuity. The species is likely uncommon in the study area given the restriction of its hosts to old forest stands.

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: 15 km N of Montreal Lake, 12 km SE of Elton, mature *Acer saccharum*-dominated hardwoods on N-facing slope, 15.vii.2019, on thallus of *R. quercizans* on bark of *A. saccharum*, S.R. Brinker 7686 (CANL). HALIBURTON CO.: 20 km N of Apsley, N side of W Eels Lake Rd., just N of Eels Lake, mature deciduous forest with *Acer saccharum*, *Fraxinus americana* and *Tilia americana*, 07.v.2017, on *Ricasolia quercizans* over bark of *A. saccharum*, S.R. Brinker 5520 (CANL). PARRY SOUND DIST.: 12.4 km NE of South River, 6 km W of Kawawaymog Lake, *A. saccharum*-dominated deciduous forest with *Betula alleghaniensis*, *Tsuga canadensis* and *Fagus grandifolia*, 29.x.2017, on *R. quercizans* over bark of *Acer saccharum*, S.R. Brinker 6264B (CANL).

Dendriscoaulon intricatum (Nyl.) Henssen

NOTES. – A subset of lichens within the order Peltigerales form tripartite associations, where three partners engage in the symbiotic association, and both photobionts are present (Rikkinen 2015, Tønsberg et al. 2016). Alternative associations by a single fungal species in which either one of the two photobionts is the primary producer are referred to as photomorphs (Tønsberg et al. 2016). Photomorphs may be morphologically identical where they are both foliose, or occur as distinct growth forms, with the fungus forming a foliose tripartite lichen and a fruticose cyanomorph (James & Henssen 1976). Species with fruticose, dendriscoauloid, cyanomorphs occur exclusively in the Lobariaceae (Magain et al. 2012, Moncada et al. 2013). Members of the genus *Dendriscoaulon* are the fruticose, cyanobacterial morphotypes (cyanomorphs) primarily of tripartite members of *Ricasolia* De Not., or green algal members of *Sticta* (Schreber) Ach. (Magain et al. 2012, as *Lobaria* (Schreber) Hoffm.). *Dendriscoaulon intricatum* is believed to be a dendriscoauloid cyanomorph of *Ricasolia quercizans* (Werier 2009, as *L. quercizans* Michaux). Cyanomorphs can be found growing attached to the parent thallus, or they can be separate and free-living, as appears to be the case in *D. intricatum* (Brodo et al. 2001, Derr et al. 2003). *Dendriscoaulon intricatum* occurs sporadically in suboceanic and high elevation forests in the Pacific Northwest, southern Appalachians and Acadian Forest region, with disjunct populations in the Ozarks and Great Lakes Basin (Tripp & Lendemer 2020a). It forms small, richly branched, cushion-like thalli that are brownish-green to bluish gray at the tips and paler towards the interior, and usually occurs on bark of hardwoods or less commonly on rock in very humid microhabitats (Hinds & Hinds 2007). These are the first reports from Ontario where it was found in mature boreal forest on an exceptionally large trunk of *Populus balsamifera* and on shaded mossy rock.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Wolf Lake, 14.5 km NW of Dorion, shaded talus slope in boreal forest below cliff with *Picea glauca*, *Betula papyrifera* and *Cornus rugosa*, 30.viii.2018, among bryophytes on shaded boulder, S.R. Brinker 6917 & C. Terwissen (CANL, hb. Brinker); Obonga-Ottertooth Provincial Park, Obonga Lake, 47 km SW of Armstrong, 38 km W of Lake Nipigon, old boreal forest with *Thuja occidentalis*, *Populus balsamifera* and *Abies balsamea*, 3.viii.2018, on bark of *P. balsamifera*, S.R. Brinker 6990 & C. Terwissen (CANL).

Dermatocarpon schaehtelinii Werner

FIGURE 10B

NOTES. – *Dermatocarpon schaehtelinii* is a western montane species in North America that occurs on basic rock outcrops, particularly sandstone (Heiðmarsson & Breuss 2004). It is a small to medium-sized foliose lichen with 11–45 mm wide lobes and lower surfaces with abundant rhizinomorphs and attaches to the substrate by a single umbilicus. It closely resembles *D. moulinsii* (Mont.) Zahlbr. which also has rhizinomorphs and is found in similar habitat, but can be differentiated on rhizinomorph structure, and thickness of the lobe cortex. In *D. schaehtelinii*, the rhizinomorphs have an inner white medulla surrounded by a dark outer cortex and are therefore wider in diameter, measuring 50–130 µm, while in *D. moulinsii* the rhizinomorphs are narrower, composed of only the dark lower cortex tissue lacking an inner pale medulla, measuring 30–70 µm in diameter (Heiðmarsson & Breuss 2004). The medulla of thallus lobes in *D. schaehtelinii* are also relatively thick, measuring 170–380 µm while in *D. moulinsii* the medulla of thallus lobes are thinner, measuring 50–110 µm (Heiðmarsson & Breuss 2004). These are

the first reports of *D. schaechtelinii* from Ontario and the Great Lakes Basin. Here it grew on sandstone cliffs in the Lake of the Woods and Thunder Bay regions.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: Lake of the Woods, N shore just W of Ash Rapids, 26 km E of Manitoba border, S-facing rocky slope with *Artemisia frigida*, *Potentilla pensylvanica* and *Poa glauca*, 12.ix.2017, on vertical rockface along shoreline, *S.R. Brinker 6131* (CANL, hb. Brinker). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, N shore of Ottertrack Lake, 1.5 km W of Swamp Lake, S-facing partially shaded cliff with open canopy of *Thuja occidentalis*, 17.viii.2016, on shaded rockface, *S.R. Brinker 5226* & *P. Scott* (CANL). THUNDER BAY DIST.: E shore of Wolf Lake, 13.5 km NW of Dorion, sheltered, moderately lit, W-facing rock underhang along shore of lake, 30.vii.2018, on sandstone above high water mark, *S.R. Brinker 6901* & *C. Terwissen* (CANL); Obonga-Ottertooth Provincial Park, Ottertooth Canyon, 52 km SW of Armstrong, N-facing cliff with stunted *T. occidentalis*, 2.viii.2018, on rockface above lakeshore, *S.R. Brinker 6947* & *C. Terwissen* (CANL).

***Enchylium conglomeratum* (Hoffm.) Otálora, P. M. Jørg. & Wedin**

FIGURE 10C & 10D.

NOTES. – *Enchylium conglomeratum* is a widespread species of temperate and subtropical regions and is usually corticolous on subneutral or basic bark of hardwoods (Jørgensen 2012a, Hinds & Hinds 2007, as *Collema conglomeratum* Hoffm.). In the study area it was found growing on the bark of *Fraxinus nigra* and *Thuja occidentalis* in mature mixed conifer swamp habitat. It can be recognized by its cushion-forming thallus with small radiating lobes under 3 mm wide that swell when wet crowded, usually abundant, stalked apothecia and 1 (occasionally to 3)-septate, fusiform ascospores measuring (13–)15–25(–26) × 3–6 µm (Brodo 2016, Jørgensen 2010a, as *C. conglomeratum*). These are the first reports from Ontario.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: Lake of the Woods, up from Picture Rock Point, 4.3 km W of Bishop Point Island, *Thuja*-dominated conifer swamp with *Abies balsamea*, 11.ix.2017, on bark of *T. occidentalis*, *S.R. Brinker 6101* & *C. Martin* (CANL); W side of Clytie Bay Rd. between Crowduck Lake and Rush Bay, Lake of the Woods, 35 km SW of Kenora, *Thuja*-dominated conifer swamp with *A. balsamea* and *Alnus incana*, 13.ix.2017, on bark of *T. occidentalis*, *S.R. Brinker 6154* (CANL). PARRY SOUND DIST.: 28.5 km W of South River, 21 km N of Magnetawan, 1 km SW of Pickerel Lake, mixed swamp with *Fraxinus nigra*, *Ulmus americana*, *Betula alleghaniensis* and *Thuja occidentalis*, 29.ix.2016, on bark of *F. nigra*, *S.R. Brinker 5445* (CANL).

***Endocarpon pulvinatum* Th. Fr.**

FIGURE 10E.

NOTES. – *Endocarpon pulvinatum* is an arctic-alpine species with a circumpolar distribution (Heidmarsson et al. 2017). In North America its range is western-montane, occurring from British Columbia south to Arizona where it grows on rocks and soil (Breuss 2002, Goward & Thor 1992). It can be recognized by its long (to 7 mm) and narrow, erect, subcylindrical squamules forming subfruticose thalli (Breuss 2002), a thallus morphology unique in the genus. Despite a major difference in thallus structure, *E. pulvinatum* shows similarities with species of *Staurothele* (i.e., muriform ascospores and presence of hymenial algae, two traits also shared with *Endocarpon*), and the new combination *Staurothele pulvinatum* (Th. Fr.) Heidmarsson was recently proposed by Heidmarsson et al. (2017) based on molecular data. For consistency, *E. pulvinatum* is retained here following Esslinger (2019). This is the first report of this species from Ontario and is disjunct in the Great Lakes Basin from its mainly western range.

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, S side of Talbot Island, N shore of Lake Superior, exposed coastal rocky shoreline with splash pools, 20.vii.2019, on volcanic rock subject to periodic flushing, *S.R. Brinker 7778* (CANL, hb. Brinker).

***Gyrophysa gyrocarpa* (Flotow) Ertz & Tehler**

NOTES. – *Gyrophysa gyrocarpa* is a saxicolous crustose lichen of humid, often vertical or overhanging, shaded siliceous rockfaces, particularly in old forest stands as well as lakeshores and seashores (McCune 2017, Pentecost & James 2009; as *Opegrapha gyrocarpa* Flotow). In North America it is known from coastal areas of the western and eastern seaboard as well as high elevations in the southern Appalachian Mountains (Lendemer et al. 2013, McCune 2017). This is the first report from Ontario and the Great Lakes Basin. In the study area it was collected on a steep rockface and adjacent large inverted boulders in a mixed forest adjacent to a wetland. *Gyrophysa gyrocarpa* can be identified by its ecology, pinkish to brown sorediate thallus, and C+ red or pink reaction due to gyrophoric acid (Lendemer et al. 2013).

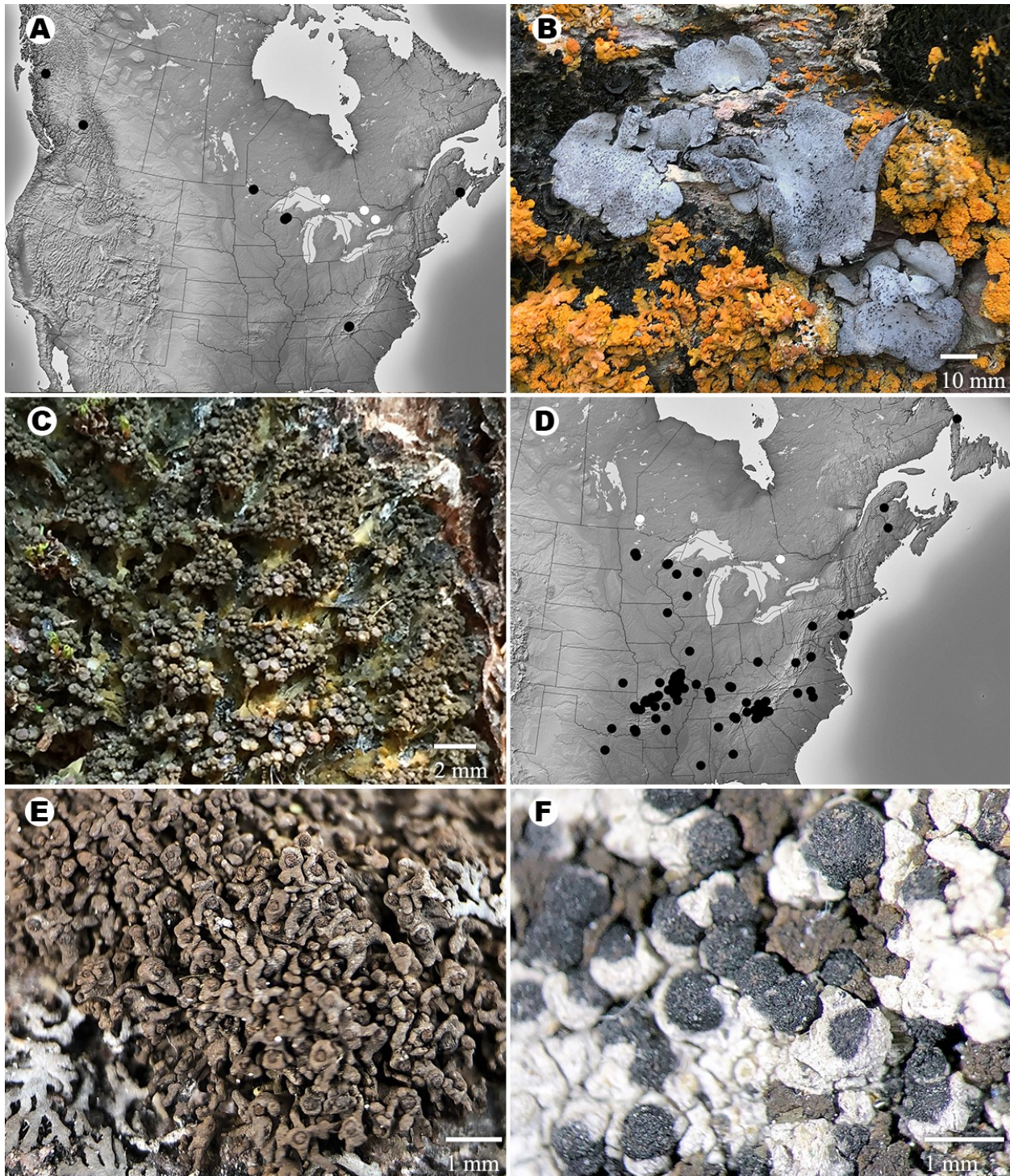


Figure 10. Photographs and distribution maps of lichens new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, distribution of *Dactylospora lobariella* in North America. **B**, *Dermatocarpon schaechtelinii* (photo taken in situ, Brinker 6901). **C**, *Enchylium conglomeratum* (Brinker 6154). **D**, distribution of *Enchylium conglomeratum* in eastern North America. **E**, *Endocarpon pulvinatum* (Brinker 7778). **F**, *Henrica theleodes perithecia* (Brinker 7103).

Specimen examined. – CANADA. ONTARIO. HALIBURTON CO.: 2.5 km N of Dorset, between Lake of Bays and Charcoal Lake, mixed forest at edge of wetland with rocky slope and large scattered boulders 21.x.2019, on siliceous rock in underhang, S.R. Brinker 8296 (CANL, NY, hb. Brinker).

***Henrica theleodes* (Sommerf.) Savić, Tibell & Nav.-Ros.**

FIGURE 10F.

NOTES. – *Henrica theleodes* is a saxicolous pyrenocarpous lichen found on moist calcareous rock in arctic and alpine zones of Europe, Greenland and North America (Orange 2013). It is typically found along shorelines of rivers or lakes, and is often associated with cyanolichens such as *Collema*, *Lempholemma*, *Placynthium* and *Psorotichia* (Savić & Tibell 2008). The specimen reported here was growing on a wave-splashed rocky shoreline with the cyanolichens *Enchylium polycarpon* (Hoffm.) Otálora, P.M. Jørg. & Wedin, *Placynthium nigrum* (Huds.) Gray, *Phylliscum demangeonii* (Moug. & Mont.) Nyl. and *Thermutis velutina* (Ach.) Flotow. It can be identified by its ecology, smooth to areolate, white or brownish thallus that forms angular areoles separated by narrow cracks, its semi-immersed, black hemispherical perithecia ranging 0.58–0.76 mm in diameter, 8-spored asci, and brown muriform ascospores measuring 52–69 × 26–32 µm (Savić & Tibell 2008). This is the first report from Ontario.

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Nipigon Conservation Reserve, S shore of Lake Nipigon above Pijitawabik Bay, 21.5 km SW of Beardmore, rocky shoreline with low cliff and large boulders above splash zone, 9.viii.2018, on sheltered rockface and ledges, S.R. Brinker 7103 & C. Terwissen (CANL).

***Heterodermia neglecta* Lendemer, R.C. Harris & E. Tripp**

FIGURE 11A & 11B.

NOTES. – This mainly corticolous species was reportedly restricted to middle and high elevational forests of the southern Appalachians with disjunct occurrences in the Acadian Forest Region of several Maritime Provinces (Lendemer et al. 2007, Lendemer 2009a). These are the first collections from the Great Lakes Basin (Fig. 11B). It was collected in mature, humid coastal transitional forest of Lake Superior on well-lit bark of *Betula alleghaniensis* and *Thuja occidentalis*. In Ontario, *H. neglecta* could be confused with several other rare *Heterodermia* taxa, particularly *H. obscurata* and *H. galactophylla*. It differs from *H. obscurata* in having small patches of orange pigment restricted to the lower surfaces of lobe tips (vs. lower surfaces with continuous orange pigment; Lendemer 2009a) and by its thinner and narrower lobes, coarser soredia and recurved secondary lobes (Lendemer et al. 2007). *Heterodermia galactophylla* differs in the absence of orange pigment on the lower surfaces of the lobes (Lendemer 2009a). The discovery of this species in the study area was unexpected, although it fits in the context of several other reported species with disjunct Appalachian distributions. These specimens belong to the norstictic acid-deficient chemotype. For a more comprehensive discussion of the chemotypes refer to Lendemer (2009a).

Specimens examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park, E side of Sand River at rapids, 1.3 km upstream from mouth at Lake Superior, edge of mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Betula papyrifera*, *Thuja occidentalis* and *Acer spicatum*, 11.vii.2016, on branch of *T. occidentalis*, S.R. Brinker 4947 (NY; conf. J.C. Lendemer); 0.5 km NW of Orphan Lake along Baldhead River, riparian conifer-dominated forest with *T. occidentalis*, *Picea glauca*, *B. alleghaniensis* and *Alnus incana* ssp. *rugosa*, 11.viii.2018, on bark of *B. alleghaniensis*, S.R. Brinker 7157 (NY, hb. Brinker; conf. J.C. Lendemer).

†***Homostegia piggottii* (Berk. & Broome) P. Karst.**

FIGURE 11C & 11D.

NOTES. – *Homostegia piggottii* a lichenicolous ascomycete that forms conspicuous black galls with immersed perithecia on species of *Parmelia* Ach. In North America, it seems to have an Appalachian distribution with these being the first reports from the Great Lakes Basin (Fig. 11D). In Canada, it was previously known from Québec and Prince Edward Island (Cole & Hawksworth 2001, McMullin 2015). It is characterized by its curved ascospores measuring 20–23 × 7–8.5 µm (Hawksworth et al. 2004). *Homostegia hertelii* D. Hawksw., V. Atienza & M. Cole is similar but can be distinguished from *H. piggottii* by its larger ascospores and its host restriction to *Flavoparmelia* Hale (Hawksworth et al. 2004). Also, *H. hertelii* has yet to be reported from the study area.

Specimens examined. – CANADA. ONTARIO. PARRY SOUND DIST.: 20 km N of Magnetawan, 2.5 km N of Spring Lake, mature deciduous forest on NE-facing slope with *Acer saccharum*, *Betula alleghaniensis* and *Thuja occidentalis*, 23.vi.2020, on *Parmelia sulcata* on branch of *T. occidentalis*, S.R. Brinker 8445 (CANL). THUNDER BAY DIST.: 17 km NW of Rosspport, 6.5 km N of Cavers, E of Gravel River, edge of mixed *Betula papyrifera* – *Abies balsamea* forest and small talus slope below cliff, 24.vii.2019, on thallus of *Parmelia* sp. over rock, S.R. Brinker 7906 (CANL, hb. Etayo; conf. J. Etayo).

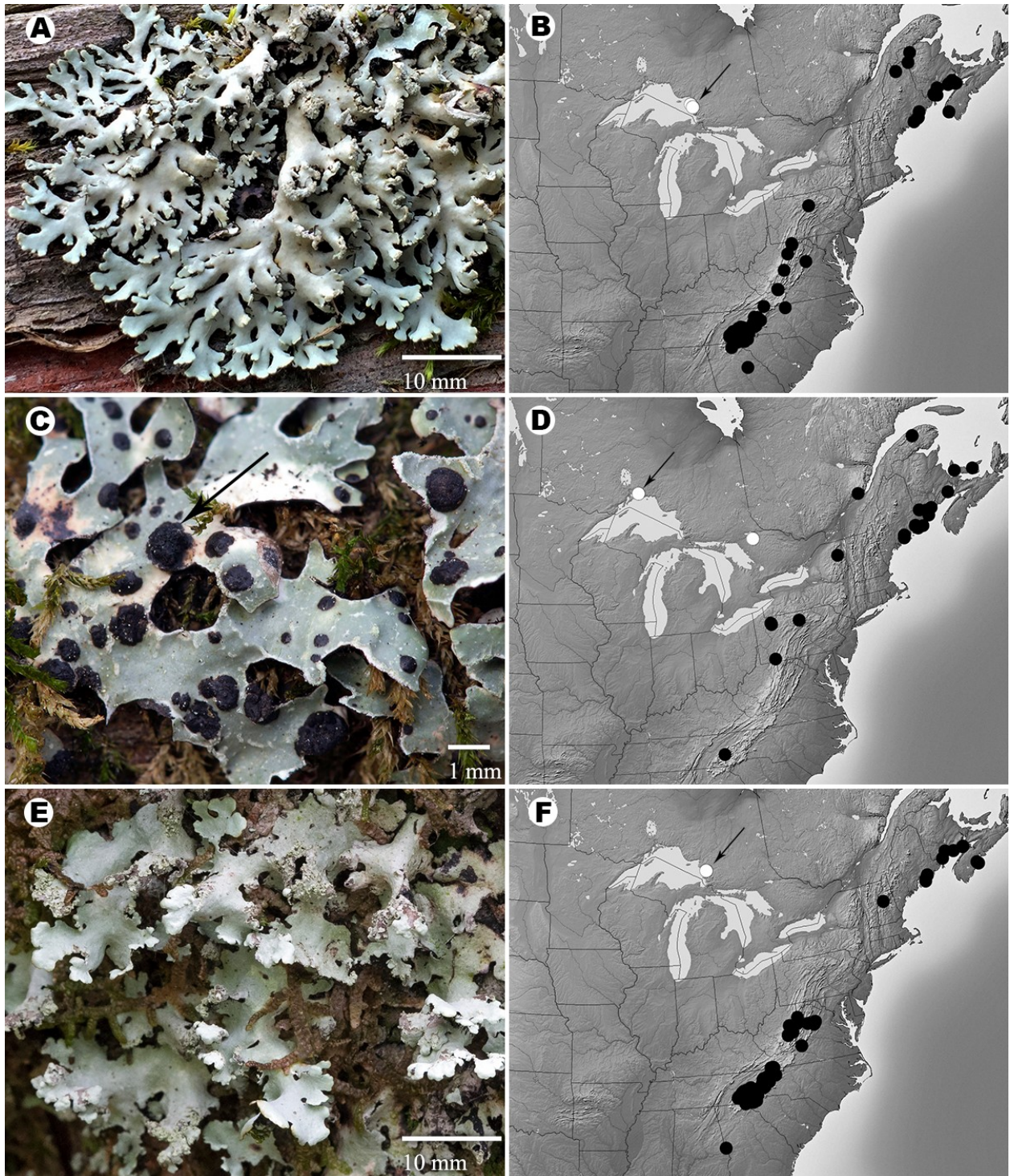


Figure 11. Photographs and distribution maps of lichens and allied fungi new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Heterodermia neglecta* (photo taken in situ, Brinker 4947). **B**, distribution of *H. neglecta* in eastern North America. **C**, arrow indicating *Homostegia piggotii* galls lichenicolous on thallus of *Parmelia sulcata* (Brinker 8445). **D**, distribution of *H. piggotii* in eastern North America. **E**, *Hypotrachyna afrorevoluta* (photo taken in situ, Brinker 7973). **F**, distribution of *H. afrorevoluta* in eastern North America.

Hypotrachyna afrorevoluta (Krog & Swinscow) Krog & Swinscow

FIGURE 11E & 11F.

NOTES. – The North American distribution of *H. afrorevoluta* is mainly Appalachian and oceanic, including coastal areas of California, Nova Scotia, New Brunswick and Maine (Fig. 11F). It occurs on the bark of hardwoods and conifers, but also on sheltered non-calcareous rock, and is reportedly an uncommon taxon on the continent (Knudsen & Lendemer 2005, Lendemer 2006b, Tripp & Lendemer 2020a). *Hypotrachyna afrorevoluta* is chemically similar to *H. revoluta* (Florke) Hale in producing gyrophoric acid and members of the hiassic acid aggregate (Knudsen & Lendemer 2005). However, it differs from *H. revoluta* in having larger thalli and laminal pustules that become erose and usually erode patches of the upper layers of the thallus to reveal the black lower cortex (Hinds & Hinds 2007, Tripp & Lendemer 2020b). In contrast, *H. revoluta* produces farinose soredia which develop near the tips of the upper surface of often elongate revolute lobes (Ertz et al. 2008, Sipman et al. 2009). This is the first record for the Great Lakes Basin where it was confined to an old forest stand where it was corticolous on the bark of *Thuja occidentalis*.

Specimen examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park, Sand River upstream from mouth at Lake Superior, mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Betula papyrifera*, *Thuja occidentalis* and *Acer spicatum*, 28.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7973 (CANL, NY; hb. Brinker).

Hypotrachyna revoluta (Florke) Hale

FIGURE 12A & 12B.

NOTES. – *Hypotrachyna revoluta* occurs sporadically throughout temperate portions of North America, in several widely separate regions including the southern Appalachians, Pacific Northwest, coastal areas of Maine, New Brunswick Nova Scotia, California, and disjunctly in the western Great Lakes Basin (Brodo et al. 2001, Hinds & Hinds 2007, Lendemer & Harris 2006; Fig. 12B). In Ontario, *H. revoluta* seems restricted to mature conifer swamps and adjacent lowland woods and coastal forests of Lake Superior, particularly those with an important cedar component, where it grows almost exclusively on well-lit conifer twigs. Despite being rather conspicuous, this medium-sized macrolichen was surprisingly not previously reported from the region (e.g., Ahti 1964, Ahti & Crowe 1995, Brodo 1993, Crowe 1994). Here it is reported from four separate districts of the province from Algoma and Thunder Bay Districts in the Great Lakes Basin west to Rainy River and Lake of the Woods Districts which are in the Hudson Bay Basin. In adjacent Michigan it was proposed as a rare and endangered species by Fryday and Wetmore (2002). A single specimen examined during this study produced apothecia (Fig. 12A) previously not seen in North American material (Tripp & Lendemer 2020b).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: 11 km W of Nipigon, 1 km E of Moseau Lake, open conifer swamp with *Thuja occidentalis*, *Picea glauca* and *Abies balsamea*, 14.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5004 (CANL); Castle Creek Provincial Nature Reserve, 41 km SW of Kakabeka Falls, 3.3 km SSW of Mackies, mossy conifer swamp with *T. occidentalis*, *Picea mariana*, and *A. balsamea*, 25.xiii.2016, on *A. balsamea* log, S.R. Brinker 5407 (CANL); Sleeping Giant Provincial Park, Middlebrun Bay, 2 km E of Silver Islet, humid conifer swamp with *T. occidentalis* and *P. mariana*, 29.vii.2018, on twigs, S.R. Brinker 6888 (CANL); Gravel River Conservation Reserve, E side of Gravel River, 6.8 km N of Cavers, mixed boreal forest with *Betula papyrifera*, *Populus tremuloides*, *P. glauca* and *Acer spicatum*, 9.viii.2018, on twigs of *A. balsamea*, S.R. Brinker 7125 (CANL); Pukaskwa National Park, 700 metres S of Pic River Mouth, mature coniferous forest with *P. mariana*, *T. occidentalis*, *B. papyrifera* and *A. balsamea*, 17.vii.2019, on twigs of *A. balsamea*, S.R. Brinker 7705 (hb. Brinker). KENORA DIST.: W side of Clytie Bay Rd. between Crowduck Lake and Rush Bay, Lake of the Woods, 35 km SW of Kenora, *Thuja*-dominated conifer swamp with *A. balsamea* and *A. incana* spp. *rugosa*, 13.ix.2017, on twigs of *A. balsamea*, S.R. Brinker 6142 (CANL); E of Witch Bay Camp Rd., 27 km SE of Kenora, 475 m W of Hook Lake, border of lowland conifer woods and conifer swamp with *T. occidentalis*, *A. balsamea*, *B. papyrifera*, and *A. incana* spp. *rugosa*, 14.ix.2017, on twigs of *A. balsamea*, S.R. Brinker 6163 (CANL); 27 km SE of Kenora, 750 m S of Witch Bay, Lake of the Woods, mixed swamp with *T. occidentalis*, *Fraxinus nigra*, *A. balsamea*, *A. incana* spp. *rugosa*, 14.ix.2017, on twigs of *A. balsamea*, S.R. Brinker 6177 (CANL). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, NW shore of Ottertrack Lake, 1.5 km E of Plough Lake, conifer-dominated forest with *T. occidentalis*, *A. balsamea*, *Pinus strobus* and *A. spicatum*, 18.viii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5238 (CANL); 26 km NW of Emo, 6km W of Black Hawk, *Thuja*-dominated conifer swamp with *A. balsamea*, *Populus balsamifera*, *P. glauca*, 15.ix.2017, on twigs of *Alnus incana* spp. *rugosa*, S.R. Brinker 6193 (CANL); W of Hwy 619, 12.5 km N of Pinewood, 8.5 km E of Gameland, *P. mariana* – *Larix laricina* dominated organic conifer swamp, 15.ix.2017, on twigs of *P. mariana*, S.R. Brinker 6200 (CANL). ALGOMA DIST.: 35 km NE of Batchewana Bay, 5 km SW of Mekatina, N-facing conifer-dominated slope with *T. occidentalis*

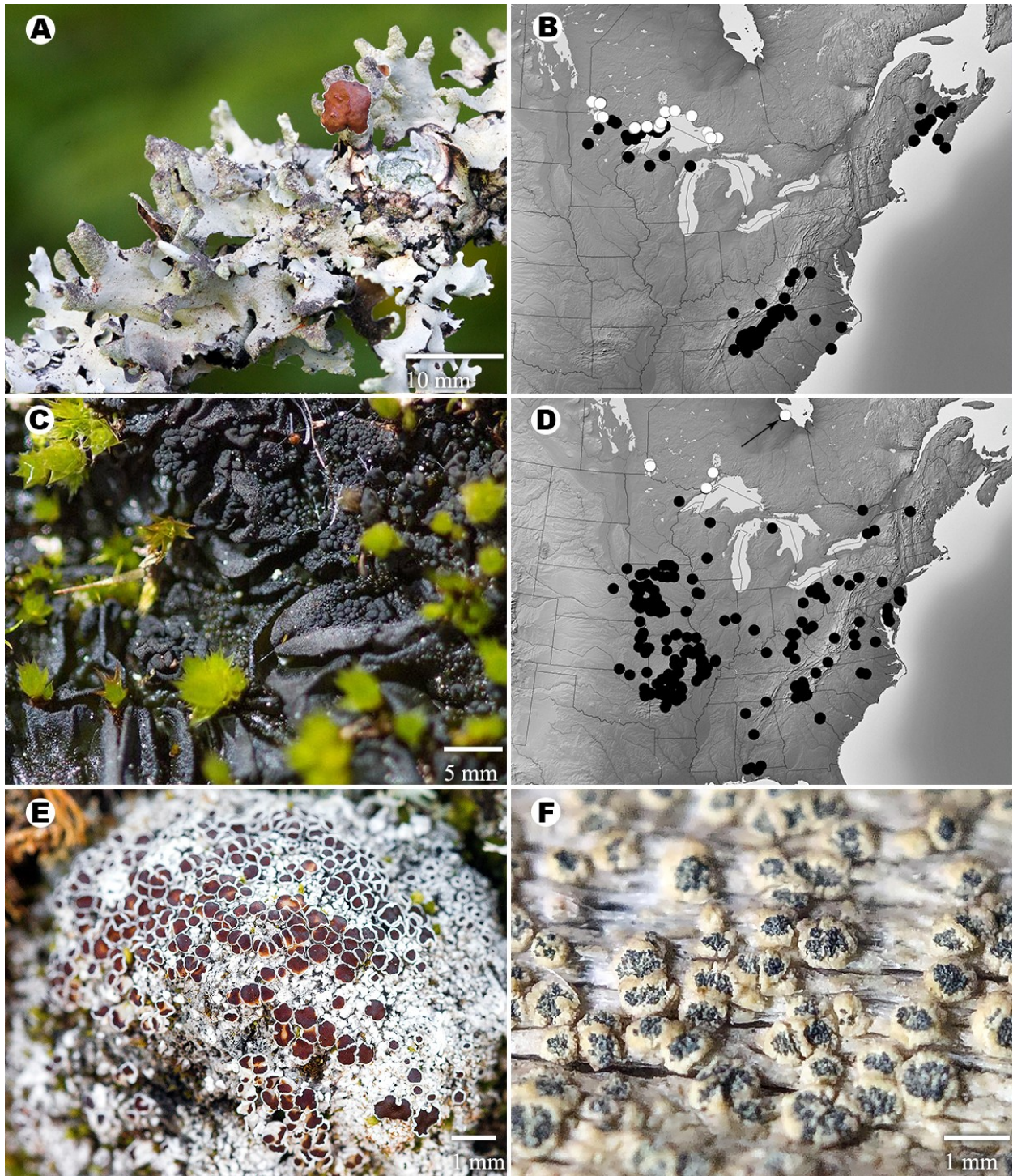


Figure 12. Photographs and distribution maps of lichens new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Hypotrachyna revoluta* producing apothecia (photo taken in situ, Brinker 8030). **B**, distribution of *H. revoluta* in eastern North America; **C**, *Lathagrium auriforme* (photo taken in situ, Brinker 3691). **D**, distribution of *Lecanora appalachensis* in eastern North America (arrow denoting record near James Bay). **E**, *L. epibryon* (photo taken in situ, Brinker 3556). **F**, *L. orae-frigidae* (Brinker 3534A).

-is, *A. balsamea*, *B. papyrifera*, 15.vii.2019, on twig of *T. occidentalis*, S.R. Brinker 7673 (CANL); Lake Superior Provincial Park, Dead Otter Lake, open conifer swamp with *T. occidentalis*, *A. balsamea* and *P. mariana*, 15.vii.2019, on twig of *A. balsamea*, S.R. Brinker 7680 (CANL); Lake Superior Provincial Park, Sand River upstream from mouth at Lake Superior, mature mixed forest with *B. alleghaniensis*, *A. balsamea*, *B. papyrifera* and *T. occidentalis*, 28.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7973 (CANL); Lake Superior Provincial Park Addition S of Montreal River Harbour, along Methany Creek 500 metres W of Gamma Lake, edge of mature mixed forest and small creek, 4.ix.2019, on twigs of *Abies balsamea*, S.R. Brinker 8030 (CANL).

***Lathagrium auriforme* (With.) Otálora, P. M. Jørg. & Wedin**

FIGURE 12C.

NOTES. – *Lathagrium auriforme* is a widely distributed cyanolichen in temperate regions of the Northern and Southern Hemisphere where it grows among mosses in moist, often shaded situations over calcareous soil or rock (Gilbert et al. 2009b, Wiczork et al. 2017). It is distinctive within the genus because of its large, thick lobes that are similar to *L. fuscovirens* (With.) Otálora, P.M. Jørg. & Wedin, which possesses a thinner, pustulose thallus, and is normally saxicolous (vs. bryicolous) (Jørgensen 2012a, as *Collema auriforme* (With.) Coppins & J. R. Laundon). These are the first reports of this species from the study area. The material grew over moss in calcareous tundra and clay of a steep riverbank at the edge of coniferous boreal woodland.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: W side of Severn River, 100 km SW of Fort Severn, 18 km S of Fawn River confluence, steep S-facing riverbank with scattered *Juniperus communis*, 23.vi.2014, on clay soil with scattered bryophytes, S.R. Brinker 3612A (CANL; det. F. Anderson); Little Shagamu River mouth, E side, 63 km E of Fort Severn, 500 m S of Hudson Bay coast, base of tundra slope with scattered *Salix planifolia*, 24.vi.2014, among low bryophyte cover, S.R. Brinker 3691 (hb. Brinker; det. F. Anderson); 64 km NW of Fort Severn, W side of Niskibi River, 3 km S of Hudson Bay coast, low tundra beach ridge with *Dryas integrifolia*, *Rhododendron lapponicum*, *Vaccinium uliginosum*, *Carex scirpoidea* and *Carex capillaris*, 29.vi.2014, among bryophytes, S.R. Brinker 3873 (CANL; det. F. Anderson).

***Lecanora appalachensis* Lendemer & R.C. Harris**

FIGURE 12D.

NOTES. – *Lecanora appalachensis* is a recently described, sorediate member of the *L. subfusca* (L.) Ach. group that is widespread in temperate to subtropical central and eastern portions of North America (Lendemer et al. 2013). It occurs on the bark of a wide variety of hardwoods and conifers (especially *Juniperus*) (Lendemer et al. 2013) typically remaining sterile. In the study area, it was collected from humid shaded sites, usually in mature conifer swamps or in river valleys, where it occurred on the bark of *Thuja occidentalis*. The species is distinct in having a thick, coarsely areolate thallus, frequently with a pale blue-green hue, and K+ yellow soredia that burst from, and eventually dissolve, the areoles (Lendemer et al. 2013). When fertile, the apothecia have distinct sorediate margins (Tripp & Lendemer 2020a). It is characterized chemically by the production of zeorin and atranorin (Lendemer et al. 2013). The specimens reported here expand its range north to James Bay in the Hudson Bay Lowland (Fig. 12D).

Specimens examined. – CANADA. ONTARIO. COCHRANE DIST.: S side of Kinosheo River, 16 km SE of Fort Albany airport, 7.5 km from James Bay, N-facing bank of Kinosheo River in coniferous forest with *Populus balsamifera*, 10.vii.2012, corticolous on mossy trunk of *P. balsamifera*, S.R. Brinker 2584 (NY; det. J.C. Lendemer). KENORA DIST.: Shoal Lake, Drum Island, 37 km SW of Kenora, old-growth conifer woods with *Pinus strobus*, *Abies balsamea*, *Betula papyrifera*, 12.ix.2017, corticolous on *T. occidentalis*, S.R. Brinker 6123 (NY; det. J.C. Lendemer). THUNDER BAY DIST.: 55 km WNW of Nipigon, 1.9 km SSW of Disraeli Lake, *Thuja occidentalis* dominated swamp with *Abies balsamea* and *Acer spicatum*, 17.vi.2017, on bark of *T. occidentalis*, S.R. Brinker 5748 (NY; det. J.C. Lendemer); S of Lankinen Rd., 12 km W of Cloud Lake, 21 km SE of Whitefish Lake, open conifer swamp with *T. occidentalis*, *Fraxinus nigra* and *Alnus incana* ssp. *rugosa*, 24.vi.2017, corticolous on *F. nigra*, S.R. Brinker 5960 (NY; det. J.C. Lendemer).

***Lecanora epibryon* (Ach.) Ach.**

FIGURE 12E.

NOTES. – *Lecanora epibryon* commonly occurs on mosses and decaying tundra vegetation in calcareous sites of arctic-alpine zones in North America (Thomson 1997) and rarely in cold-temperate grassland (McCune & Rosentreter 2007). It is a member of the *L. subfusca* group, resembling a terricolous or bryicolous *L. allophana* Nyl., which is a corticolous species of basic deciduous tree bark, particularly poplar and ash, and possesses a noticeably thinner thallus (Brodo et al. 2001). In the study area it was found in maritime tundra of the Hudson Bay Lowland.

Given the extent of suitable calcareous tundra in the study area adjoining Hudson Bay and northern James Bay, this species is likely more common than current collection records suggest.

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** 56 km NW of Fort Severn, 11 km E of Niskibi River mouth, 25 km NW of Blackcurrant River mouth, Low tundra ridge with *Empetrum nigrum*, *Hedysarum boreale* ssp. *mackenziei*, *Dryas integrifolia* and *Salix reticulata*, 19.vi.2014, growing over bryophytes, *S.R. Brinker 3440* (CANL); 91.5 km NW of Fort Severn, 7 km SE of Mintiagan Creek mouth, 4.5 km S of Hudson Bay coast, moist hummocky sedge-dominated tundra swale, 21.vi.2014, growing among bryophyte cover, *S.R. Brinker 3538A* (CANL); Niskibi Cape, 53 km NW of Fort Severn, 8.3 km E of Niskibi River, 8 km S of Hudson Bay coast, open tundra ridge with *Rhododendron lapponicum*, *Vaccinium vitis-idaea*, *Empetrum nigrum*, 22.vi.2014, *S.R. Brinker 3556* (CANL); Pen Islands Important Bird Area 143, ca. 106 km NW of Fort Severn, 20 km SE of Manitoba border, mesic, hummocky tundra with *Rhododendron lapponicum*, *Salix reticulata*, *Empetrum nigrum* and *Dryas integrifolia*, 27.vi.2014, growing over bryophytes, *S.R. Brinker 3782* (CANL).

***Lecanora orae-frigidae* R. Sant.**

FIGURE 12F.

NOTES. – *Lecanora orae-frigidae* occurs mainly on lignum along sea shores in arctic and boreal regions of the northern hemisphere (Thomson 1997, Węgrzyn et al. 2015). The absence of trees along the Hudson Bay coast in Ontario limits lignum sources to driftwood deposited on maritime beaches transported by water following currents and prevailing winds from the northwest or nearby river mouths draining the boreal interior regions of the Hudson Bay Lowland. The most common species of driftwood found in the region belong to such genera as *Abies*, *Larix*, *Picea*, *Populus* and *Salix* (Steelandt et al. 2015). The material collected during the current study was from the ribs of an old shipwreck several hundred metres inland of the coast now stranded due to ongoing isostatic rebound following ice-unloading of the Laurentide Ice Sheet (Andrews 1968). *Lecanora orae-frigidae* can be recognized by its areolate, yellow-green to green-gray thallus containing crystals in the cortex, and round to elliptical, delimited soralia often with blue-grey or gray-green soredia that are K-, C+ orange, KC + orange due to the presence of thiophanic acid (Stenroos et al. 2016, Thomson 1997).

Specimen examined. – **CANADA. ONTARIO. KENORA DIST.:** 68 km NW of Fort Severn, 2.7 km W of Mukaysee Creek mouth, 500 m S of Hudson Bay coast, low lying tundra with *Salix arctica*, *Arctous alpina*, and *Dryas integrifolia*, 21.vi.2014, on lignum, *S.R. Brinker 3534A* (CANL, hb. Brinker).

***Lecidea lapicida* (Ach.) Ach.**

FIGURE 13A.

NOTES. – *Lecidea lapicida* is a circumpolar arctic-alpine species of open, acidic rock outcrops (Thomson 1997). One adjacent Great Lakes Basin locality was mapped from Isle Royale in Michigan (Thomson 1997) so its presence in Ontario was expected. This extremely variable species can have a distinct, white to blue-gray or occasionally rust-coloured thallus (rusty morph due to the incorporation of iron oxides) or one that is almost entirely lacking (Fryday & Hertel 2014, Thomson 1997). It has a thallus that is K+ yellow (stictic acid), a brown epihymenium, and ascospores measuring 9–15 × 4.5–8 μm (Brodo 2016, McCune 2017).

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** 81.5 km SE of Peawanuck airport, W side of Sutton Narrows, between Sutton Lake and Hawley Lake, exposed, S-facing rocky ridgetop with scattered *Picea mariana*, 13.viii.2014, on siliceous rock, *S.R. Brinker 4403* (CANL).

***Lecidella wulfenii* (Hepp) Körb.**

FIGURE 13B.

NOTES. – *Lecidella wulfenii* is a common and widespread crustose lichen found in arctic-alpine environs in North America, where it grows over mosses and decaying vegetation (Brodo et al. 2001). It can be recognized by its ecology, white, esorediate thallus that reacts C+ orange due to the presence of xanthenes and K+ yellow due to the presence of atranorin, brown exciple, 8-spored *Lecanora*-type asci, and simple ascospores averaging 7–16(–18) × 7–8 μm (McCune 2017). While these are the first reports from Ontario (Fig. 13B), it is expected to be more locally common with additional study given the extent of suitable maritime tundra in the study area along the coast of Hudson Bay.

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** 64 km northwest of Fort Severn, W side of Niskibi River, 3 km S of Hudson Bay coast, low tundra beach ridge with *Dryas integrifolia*, *Rhododendron lapponicum*, *Vaccinium uliginosum*, 29.vi.2014, growing over bryophytes, *S.R. Brinker 3874* (CANL); 3 km NW of Hook Point, 21 km S of Cape Henrietta Maria along James Bay coast, raised tundra ridge with *Rhododendron lapponicum*, *Empetrum nigrum* and *Salix brachycarpa*, growing over bryophytes, *S.R. Brinker 4353* (CANL).

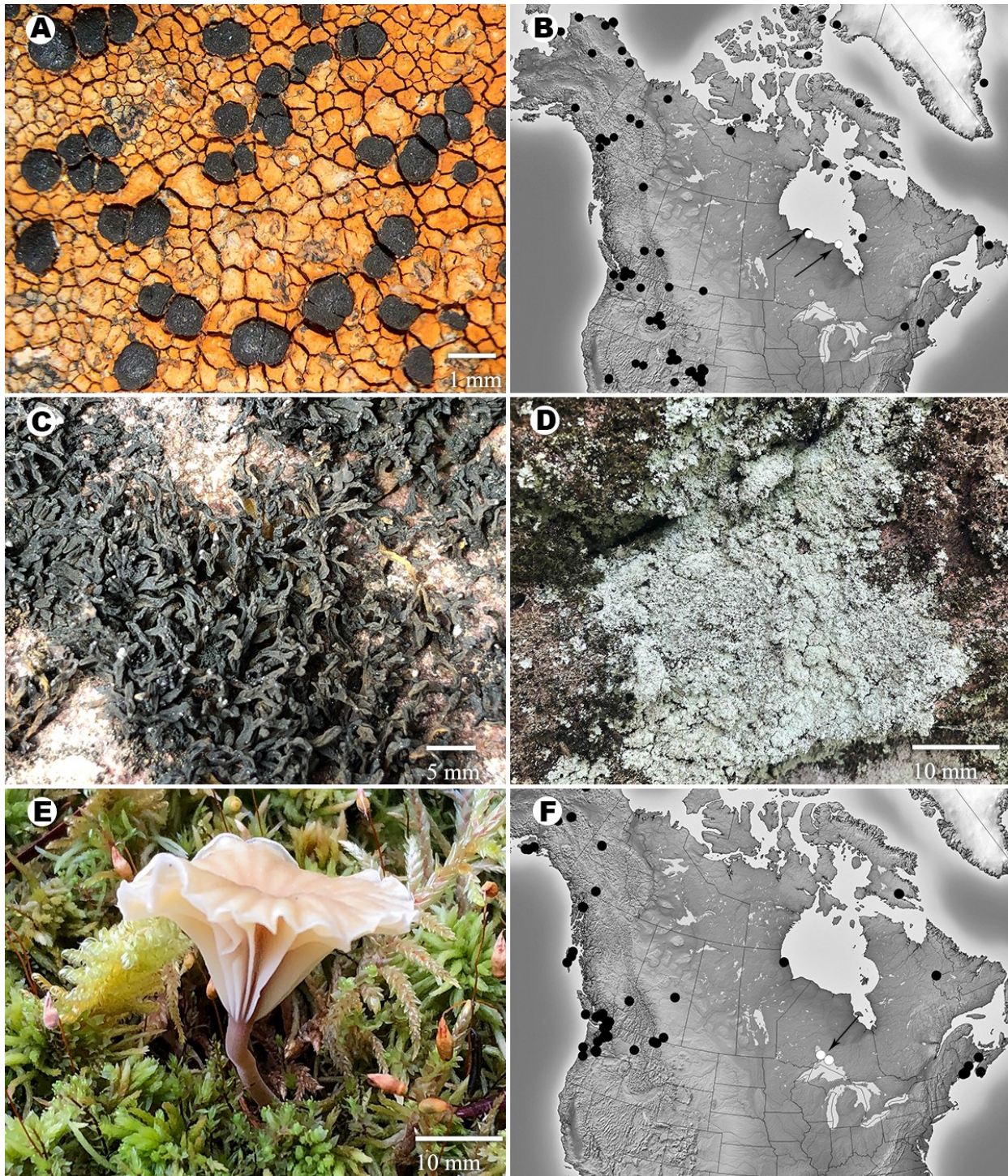


Figure 13. Photographs and distribution maps of lichens new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Lecidea lapicida* (Brinker 4403). **B**, distribution of *Lecidella wulfenii* in North America. **C**, *Lempholemma radiatum* (photo taken in situ, Brinker 7779). **D**, *Lepraria oxybapha* (photo taken in situ, Brinker 6642). **E**, the basidiolichen *Lichenomphalia umbellifera* (photo taken in situ, Brinker 7113). **F**, distribution of *L. umbellifera* in North America.

***Lempholemma radiatum* (Sommerf.) Henssen**

FIGURE 13C.

NOTES. – *Lempholemma radiatum* is a rare taxon that grows on moist calcareous rock, often among bryophytes, typically in montane regions (Jørgensen 2012c). The strap-like channeled lobes with clusters of globose to clavate isidia make it particularly distinct among cyanolichens (Gilbert et al. 2009a), and key features of the examined specimen fit published descriptions well. This new report appears to be disjunct, being the easternmost record in North America and the most southern non-alpine occurrence, as well as the first for the Great Lakes Basin. It was growing on a low-lying coastal rock outcrop in seepage tracks along the coast of Lake Superior with other interesting disjunct arctic-alpine species. It is likely very rare in Ontario, warranting a high provincial conservation status.

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, S side of Talbot Island, Lake Superior, extensive exposed coastal rocky shoreline with splash pools, 20.vii.2019, on volcanic rock, *S.R. Brinker 7779* (CANL, hb. Brinker).

***Lepraria oxybapha* Lendemer**

FIGURE 13D.

NOTES. – *Lepraria oxybapha* is a North American endemic whose range primarily includes the Appalachian Mountains and Ozark Region where it is common, with disjunct occurrences in the Great Plains and Sonoran Desert Region (Lendemer 2012a). It is generally restricted to humid, shaded sites where it grows on the bark of conifers and hardwoods, as well as sheltered, non-calcareous rockfaces and overhangs (Lendemer 2012a). It is morphologically identical to *L. normandinoides* Lendemer and R.C. Harris but differs chemically in the presence of fumarprotocetraric acid (Lendemer 2012a). For a more comprehensive discussion on similar species refer to Lendemer (2012a, 2013). It likely reaches its northern distributional limit in the Great Lakes Basin, and this is the first report from Ontario.

Specimen examined. – CANADA. ONTARIO. HALIBURTON CO.: Queen Elizabeth II Wildlands Provincial Park, 3.6 km W of Bob Lake, 1.45 km SE of Little Millward Lake, rocky outcrop in deciduous forest with *Betula papyrifera*, *Acer rubrum* and *Acer saccharum*, 20.vi.2018, saxicolous on mossy siliceous rockface, *S.R. Brinker 6642* (NY; det. J.C. Lendemer).

†*Lichenocodium usneae* (Anzi) D.Hawksw.

NOTES. – *Lichenocodium usneae* is a lichenicolous conidial fungus that infects the thallus and apothecia of a wide range of host lichens and lichenicolous heterobasidiomycetes (Diederich & Christiansen 1994, Hawksworth 1977, Ihlen & Wedin 2008). It was previously reported from Canada from British Columbia and Québec (Hafellner et al. 2002, Noble et al. 1987). One other species, *L. erodens* M.S. Christ. & D. Hawksw., has been reported from Ontario (Brodo et al. 2013). *Lichenocodium usneae* can be differentiated from *L. erodens* based on pycnidia and conidiogenous cell size. In *L. usneae*, pycnidia range from 50–80 µm in diameter with conidiogenous cells measuring (5–)7–9(–11) × (2–)2.5–3.5(–4) µm, whereas in *L. erodens* pycnidia are 30–50 µm in diameter and the conidiogenous cells are (3.5–)4–5(–6) × (2–)3–3.5(–4) µm (Hawksworth 1977). These are the first reports of *L. usneae* from Ontario.

Specimens examined. – CANADA. ONTARIO. ALGOMA DIST.: 12.3 km N of Batchawana Bay, NE side of Mamainse Lake, mixed forest with *Acer saccharum*, *Thuja occidentalis*, and *Abies balsamea*, 4.ix.2019, on apothecia and thalli of *Lecanora* on bark of *T. occidentalis*, *S.R. Brinker 8027* (CANL, hb. Brinker). KENORA DIST.: W side of Niskibi River, 60 km NW of Fort Severn, 6.5 km S of Niskibi River mouth, hummocky tundra ridge with stunted *Picea glauca*, *Rhododendron lapponicum*, *Tofieldia pusilla* and *Salix calcicola*, 19.vi.2014, on *Lecanora* cf. *symmicta* on conifer twig, *S.R. Brinker 3457B* (hb. Etayo; det. J. Etayo).

***Lichenomphalia umbellifera* (L.: Fr.) Redhead, Lutzoni, Moncalvo & Vilgalys**

FIGURE 13E & 13F.

NOTES. – *Lichenomphalia umbellifera* is a mushroom-forming fungus with a lichenized thallus of minute *Botrydina*-type pale green granules and a fruiting body that has a whitish to yellow brown convex cap when young, then becoming depressed to funnel-shaped with an entire-to-crenulate margin (Watling & Woods 2009). It is widespread throughout humid, mostly oceanic portions of temperate and boreal forests in North America (Fig. 13F) where it grows on rotting wood or mosses (Brodo et al. 2001). Although mapped from northern Ontario by Brodo et al. (2001), it was not mentioned from the region by Ahti (1964) or Crowe (1994), and no previous reports have been published from the study area. The collections cited here were from mossy rock outcrops in well-lit, mixed boreal forests. When fruiting bodies are absent, the minute granular thallus is essentially imperceptible.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Slate Islands Provincial Park, Lake Superior, Spar Island interior, humid mixed boreal forest, 27.vii.2014, on mossy rock ledge, *S.R. Brinker 3998* (CANL); Pijitawabik Palisades, 26 km N of Nipigon, 13 km E of Jessie Lake, shaded mossy talus slope under *Betula papyrifera*, *Abies balsamea* and *Picea mariana*, 9.viii.2018, among moss over rock, *S.R. Brinker 7113* & *C. Terwissen* (hb. Brinker).

†***Lichenostigma elongata* Nav.-Ros. & Hafellner**

NOTES. – *Lichenostigma elongata* is a lichenicolous fungus reported mainly from southwestern portions of North America where it is confined to species of *Aspicilia* and *Lobothallia* (Calatayud et al. 2004, Diederich 2003). It forms simple or scarcely branched, black vegetative hyphae (200–500 µm long) on infected host thalli, along with superficial, black, scattered, elongate ascomata with 1(–2)-septate ascospores (Calatayud et al. 2004). This is the first report from the Great Lakes Basin.

Specimen examined. – **CANADA. ONTARIO.** MANITOULIN DIST.: S shore of Manitoulin Island between Portage Bay and Murphy Harbour, 1.75 km S of Lorne Lake, opening in treed *Pinus banksiana* alvar, 15.ix.2015, on *Aspicilia* sp. on erratic boulder, *S.R. Brinker 4708* & *S. Dodsworth* (CANL, hb. Etayo; conf. J. Etayo).

***Lopadium coralloideum* (Nyl.) Lyngé**

FIGURE 14A.

NOTES. – *Lopadium coralloideum* is a circumpolar arctic-alpine species that grows on moss, humus or detritus over rock (Thomson 1997). Here it was found to be bryicolous in maritime tundra where it occurred along the Hudson Bay coast (Fig. 14A). It is distinct in the genus in having an isidiate to coralloid thallus with erect isidia averaging about 0.1 mm tall (McCune 2017). It is most likely to be confused with *L. pezizoideum* (Ach.) Körber with which it can occur within the study area on moss, but that species has an areolate or warty thallus that is not coralloid isidiate (McCune 2017).

Specimens examined. – **CANADA. ONTARIO.** KENORA DIST.: 91.5 km NW of Fort Severn, 7 km SE of Mintiagan Creek mouth, 4.5 km S of Hudson Bay coast, low tundra ridge with, *Empetrum nigrum*, *Rhododendron lapponicum*, *Dryas integrifolia* and invading *Picea glauca*, 21.vi.2014, on moss, *S.R. Brinker 3528* (CANL; det. R.T. McMullin); Niskibi Cape, 53 km NW of Fort Severn, 8.3 km E of Niskibi River, 8 km S of Hudson Bay, open tundra ridge with *R. lapponicum*, *Vaccinium vitis-idaea*, *E. nigrum* and *D. integrifolia*, 22.vi.2014, on moss, *S.R. Brinker 3566* (CANL); 97 km NW of Fort Severn, 9.4 km S of East Pen Island, 2.2 km S of Mintiagan Creek mouth, low, open tundra ridge with *R. lapponicum*, *Hedysarum boreale* ssp. *mackenziei*, *Vaccinium vitis-idaea*, *E. nigrum* and *D. integrifolia*, 22.vi.2014, on moss, *S.R. Brinker 3600* (CANL; det. R.T. McMullin); 123 km NW of Fort Severn, 7.7 km SW of West Pen Island, 4.6 km E of Manitoba border, moist hummocky dwarf shrub-sedge tundra, 26.vi.2014, on moss, *S.R. Brinker 3743B* (CANL).

***Ophioparma lapponica* (Räsänen) Hafellner & R.W. Rogers**

FIGURE 14B & 14C.

NOTES. – *Ophioparma lapponica* is a widespread arctic and boreal montane species in North America (May 1997; Fig. 14C). It occurs on exposed siliceous rocks, often subject to periodic moisture from seasonal flushing (May 1997, Thomson 1997). It can be recognized by its thick, pale-yellow or gray green-yellow rimose-areolate thallus containing usnic and divaricatic acid, and blood-red apothecia with straight, ellipsoid to fusiform ascospores averaging less than 30 µm long (May 1997). *Ophioparma ventosa* (L.) Norman is similar in overall morphology, but has longer ascospores (greater than 30 µm long) that are asymmetrically tapered (May 1997). This is the first report of *O. lapponica* from Ontario.

Specimen examined. – **CANADA. ONTARIO.** KENORA DIST.: 84 km ESE of Peawanuck Airport; 27 km ENE of Hawley Lake, exposed rock outcrop with *Vaccinium vitis-idea*, *Vaccinium uliginosum*, *Agrostis mertensii* and *Empetrum nigrum*, 11.vii.2010, on rock, *S.R. Brinker 1765* (CANL).

***Pertusaria bryontha* (Ach.) Nyl.**

NOTES. – In North America *Pertusaria bryontha* has a widespread arctic distribution, occurring from Labrador to Alaska where it grows over mosses, low vegetation, or less frequently on rocks, in calcareous habitats (Dibben 1980). It can be recognized by its ecology, expanded, usually brown apothecia, 1-spored asci, and a K+ strongly violet epithecium. It was not mapped from Ontario by Dibben (1980) and this is the first published report from the study area.

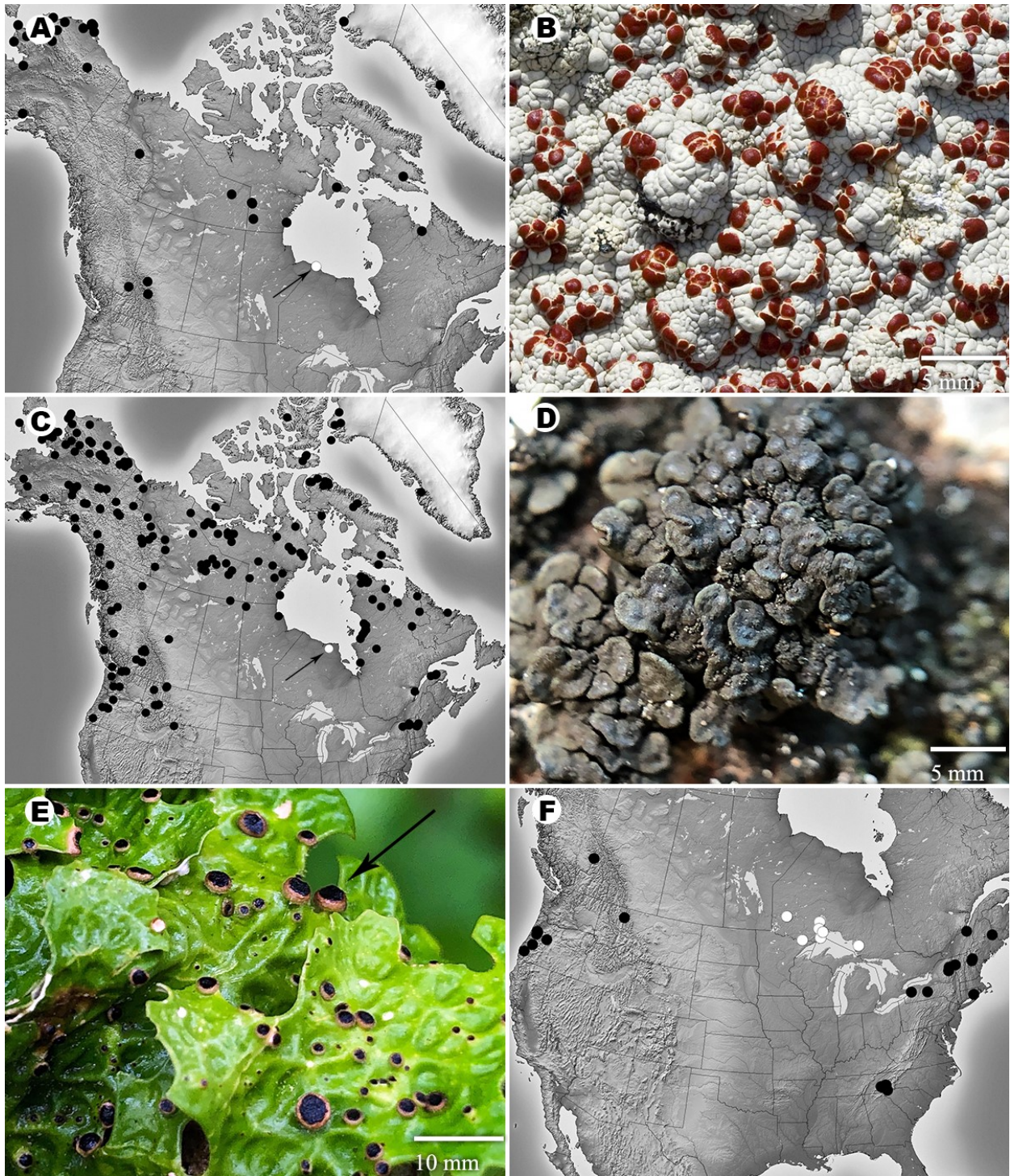


Figure 14. Photographs and distribution maps of lichens and allied fungi new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, distribution of *Lopadium coralloideum* in North America. **B**, *Ophioparma lapponica* (photo taken in situ, Brinker 1765). **C**, distribution of *O. lapponica* in North America. **D**, *Phyllicium demangeonii* (photo taken in situ, Brinker 8274). **E**, arrow indicating *Plectocarpon lichenum* galls lichenicolous on thallus of *Lobaria pulmonaria* (photo taken in situ, Brinker 5424). **F**, distribution of *P. lichenum* in North America.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: 91.5 km NW of Fort Severn, 7 km SE of Mintiagan Creek mouth, 4.5 km S of Hudson Bay coast, moist hummocky sedge-dominated tundra swale, 21.vi.2014, growing among bryophyte cover, *S.R. Brinker 3538B* (CANL, det. C. Lewis).

***Pertusaria coriacea* (Th. Fr.) Th. Fr.**

NOTES. – *Pertusaria coriacea* is a widespread circumpolar high-arctic taxon that grows on soil, decaying vegetation or mosses over rock (Thomson 1997, Dibben 1980). It was collected from the study area on a sparsely vegetated calcareous shingle beach ridge along Hudson Bay where it likely reaches its southern range limit. It is characterized by its off-white thallus with often papillate ostioles surrounded by a distinct white border, a medulla that is K+ yellow becoming red and P+ yellow becoming yellow-orange, due to the presence of norstictic, connorstictic and thiophanic acids, and ovate ascospores measuring 85–245 × 38–67 μm (McCune 2017, Dibben 1980). It is most similar to *P. subobducens* Nyl. but can be distinguished by its epithecium reaction (rarely K+ weakly violet vs. K+ deep violet) and presence of thiophanic acid (Dibben 1980).

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: Hudson Bay coast, Cape Henrietta Maria, 204 km E of Peawanuck, 24 km N of Hook Point, sparsely vegetated calcareous shingle beach ridge with *Dryas integrifolia*, *Empetrum nigrum* and *Saxifraga tricuspidata*, 12.viii.2014, growing over moss and *Draba nivalis*, *S.R. Brinker 4361* (CANL), *S.R. Brinker 4382A* (CANL, det. C. Lewis).

***Pertusaria globularis* (Ach.) Tuck.**

NOTES. – *Pertusaria globularis* is a mainly saxicolous crustose lichen that grows over bryophytes and is endemic to eastern North America where it has an Appalachian-Ozark distribution (Dibben 1980, Tripp & Lendemer 2019). It is characterized by its typically non-fertile, greenish to blue-gray, shiny, isidiate thallus, UV+ dull orange cortex, and negative cortical and medullary spot tests (K-, C-, KC-, P-; Tripp & Lendemer 2020a). *Pertusaria superiana* Lendemer & E. Tripp was recently separated from *P. globularis* based on the consistent absence of isidia and the consistent presence of apothecia (Tripp & Lendemer 2019). This is the first report of *P. globularis* from Ontario.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Ojibway Provincial Park, 18 km SW of Sioux Lookout, S side of Little Vermillion Lake, moist *Thuja occidentalis*, *Abies balsamea* and *Picea mariana* coniferous forest with rock outcrops, 19.vii.2016, on shaded mossy greenstone, *S.R. Brinker 5141* (CANL).

***Phylliscum demangeonii* (Moug. & Mont.) Nyl.**

FIGURE 14D.

NOTES. – *Phylliscum demangeonii* is mainly an arctic and boreal montane species in North America with disjunct occurrences in the southern Appalachians (Lendemer et al. 2017). It is usually found in seepage tracks on siliceous rocks, or on other periodically inundated, non-calcareous rock (Gilbert 2009, Jørgensen 2012c). In the study area it was collected on vertical rockfaces and boulders in areas of high humidity, typically along shorelines. The immersed ascomata and attachment to substrates via an umbilicus is distinctive within the Lichinaceae (Jørgensen 2012c).

Specimens examined. – CANADA. ONTARIO. LENNOX & ADDINGTON CO.: Puzzle Lake Provincial Park, E arm of Puzzle Lake towards Loyst Lake, S-facing granite cliff with ledges along lakeshore with *Quercus* spp., *Pinus strobus* and *Juniperus communis*, 10.ix.2019, on siliceous rockface in seepage track, *S.R. Brinker 8274 & H. Pacheco* (CANL). THUNDER BAY DIST.: Ouimet Canyon Provincial Park, 8 km W of Dorion, 2.2 km N of Gulch Lake, rocky shore of small lake in base of extensive canyon with talus slopes, 27.vii.2017, on seasonally flooded gabbro boulder, *S.R. Brinker 6044B* (CANL); Lake Superior National Marine Conservation Area, S shore of Perley Island, exposed coastal rocky headland, 23.vii.2018, on volcanic rock, *S.R. Brinker 6750* (HBG, hb. Brinker); Lake Nipigon, Pijitawabik Bay, 26 km SW of Beardmore, exposed rockface along shoreline, 9.viii.2018, on volcanic rock, *S.R. Brinker 7104 & C. Terwissen* (HBG).

†***Plectocarpon lichenum* (Sommerf.) D. Hawksw.**

FIGURE 14E & 14F.

NOTES. – This species induces the formation of conspicuous black galls with constricted bases and distinct thalline margins on species of *Lobaria* and *Pseudocyphellaria* (Ertz et al. 2005). It is one of the most widespread *Plectocarpon* species, found throughout portions of Africa, Asia, Europe and North America (Ertz et al. 2005). In North America it occurs mostly in the Appalachian Mountains and Acadian Forest in the east, and the Coast Mountains and Rocky Mountains in the west (Ertz et al. 2005; Fig. 14F herein). It was previously reported from Canada from British Columbia (Ertz et al. 2005) and Nova Scotia (McMullin 2019b). Collections reported here are

from old *Acer saccharum* or *Thuja occidentalis*-dominated stands in areas with a long forest continuity. The species is likely rare in the study area given its host restriction to *Lobaria pulmonaria*, a species particularly sensitive to disturbance and restricted to old forests (Barry et al. 2016, Hinds & Hinds 2007, Jüriado et al. 2011).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: 32 km NE of Montreal River Harbour, 10 km E of Eton, mature *Acer saccharum* dominated deciduous forest, 16.vii.2019, on *L. pulmonaria* over bark of *Acer saccharum*, S.R. Brinker 7685 (CANL). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, W end of portage between Emerald Lake and Plough Lake, old-growth forest with *T. occidentalis*, *F. nigra* and *A. spicatum*, 18.viii.2016, on *L. pulmonaria* over bark of *T. occidentalis*, S.R. Brinker 5263 (NY; conf. J.C. Lendemer). THUNDER BAY DIST.: 53 km WNW of Nipigon, just W of Albert Lake, old-growth mixed boreal forest with *Thuja occidentalis*, *Abies balsamea*, *Acer spicatum*, *Taxus canadensis*, and *Betula papyrifera*, 16.vii.2016, on *Lobaria pulmonaria* over bark of *T. occidentalis*, S.R. Brinker 5066 (CANL); W side of Black Sturgeon Rd., 16 km W of Grand Bay, Lake Nipigon, mature mixed boreal woods with *Picea glauca*, *T. occidentalis*, *B. papyrifera*, *A. spicatum*, and *A. balsamea*, 22.vii.2016, on *L. pulmonaria* over bark of *T. occidentalis*, S.R. Brinker 5176 (CANL); Sleeping Giant Provincial Park, 28 km E of Thunder Bay, 1 km S of Sawyer Bay, second-growth mixed forest at base of N-facing cliff with *B. papyrifera*, *P. glauca* and *A. balsamea*, 26.viii.2016, on *L. pulmonaria* over bark of *A. spicatum*, S.R. Brinker 5424 (CANL); 43 km W of Nipigon, 5.6 km S of Moraine Lake, old *T. occidentalis*-dominated swamp with *F. nigra*, *Salix bebbiana*, and *Rhamnus alnifolia*, 26.vii.2017, on *L. pulmonaria* over bark of *T. occidentalis*, S.R. Brinker 6019 (CANL);

***Polycauliona stellata* (Wetmore & Kärnefelt) Arup, Frödén & Söchting**

FIGURE 15A

NOTES. – *Polycauliona stellata* is unique among North American lobate sorediate members of the former *Caloplaca* genus (now split into several smaller genera, see Arup et al. 2013) because of its star-shaped lobes, small size (thalli up to 2 mm in diameter) and soredia that are produced on lobe tips (Wetmore & Kärnefelt 1998, as *C. stellata* Wetmore & Kärnefelt). It is a mainly Western Cordilleran species ranging from the Baja Peninsula north to British Columbia and east to Montana, where it is found on acidic rock. Disjunct occurrences exist in the western Lake Superior region from the type locality at Grand Portage, Minnesota (Wetmore & Kärnefelt 1998, as *C. stellata*). The specimen reported here appears to be the most easterly report, and the first from the Ontario portion of the Great Lakes Basin.

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, Brodeur Island, 50 km S of Nipigon, base of E-facing cliff in humid mixed boreal forest, 25.vii.2018, on rock in sheltered underhang, S.R. Brinker 6836 (CANL, hb. Brinker).

***Porpidia flavicunda* (Ach.) Gowan**

FIGURE 15B.

NOTES. – *Porpidia flavicunda* is a circumpolar arctic-alpine species of exposed siliceous rock (Gowan 1989, Thomson 1997) where it forms large, thick, brightly-coloured orange patches. It ranges widely in the North American Arctic, extending south to the northern Boreal Forest Region (Gowan 1989). This is the first report from Ontario where it occurred on the Sutton Ridges, a series of Precambrian bedrock outcrops surrounded by extensive wetlands of the Hudson Bay Lowland (Riley 2011). It can be recognized by its distinctly orange, esorediate crustose thallus often with gray margins and frequent black prothallus, a medulla that is IKI-, and its abundant black apothecia that are heavily pruinose (Gowan 1989).

Specimen examined. – **CANADA. ONTARIO.** KENORA DIST.: Sutton Ridges, 98 km SE of Peawanuck airport, 4.3 km E of Aquatuk Lake, cryptogram-dominated open talus slope at base of W-facing cliff, 6.viii.2014, on siliceous rock, S.R. Brinker 4122 (CANL).

***Protoblastenia incrustans* (DC.) J. Steiner**

FIGURE 15C & 15D.

NOTES. – *Protoblastenia incrustans* occurs on calcareous rocks sporadically in boreal-arctic regions of North America with reported disjuncts south to Pennsylvania (Fig. 15D) where it was documented from an abandoned limestone quarry (Brodo et al. 2001, Lendemer 2008). In the study area it occurred on an exposed, frost-heaved limestone shingle beach ridge paralleling James Bay. It can be recognized by its simple ascospores, endolithic thallus and immersed, pale-orange apothecia that form shallow pits in the rock. This is the first report from Ontario.

Specimen examined. – **CANADA. ONTARIO.** KENORA DIST.: Cape Henrietta Maria, Hudson Bay, 204 km E of Peawanuck, 24 km N of Hook Point, sparsely vegetated limestone shingle beach ridge with *Dryas integrifo-*

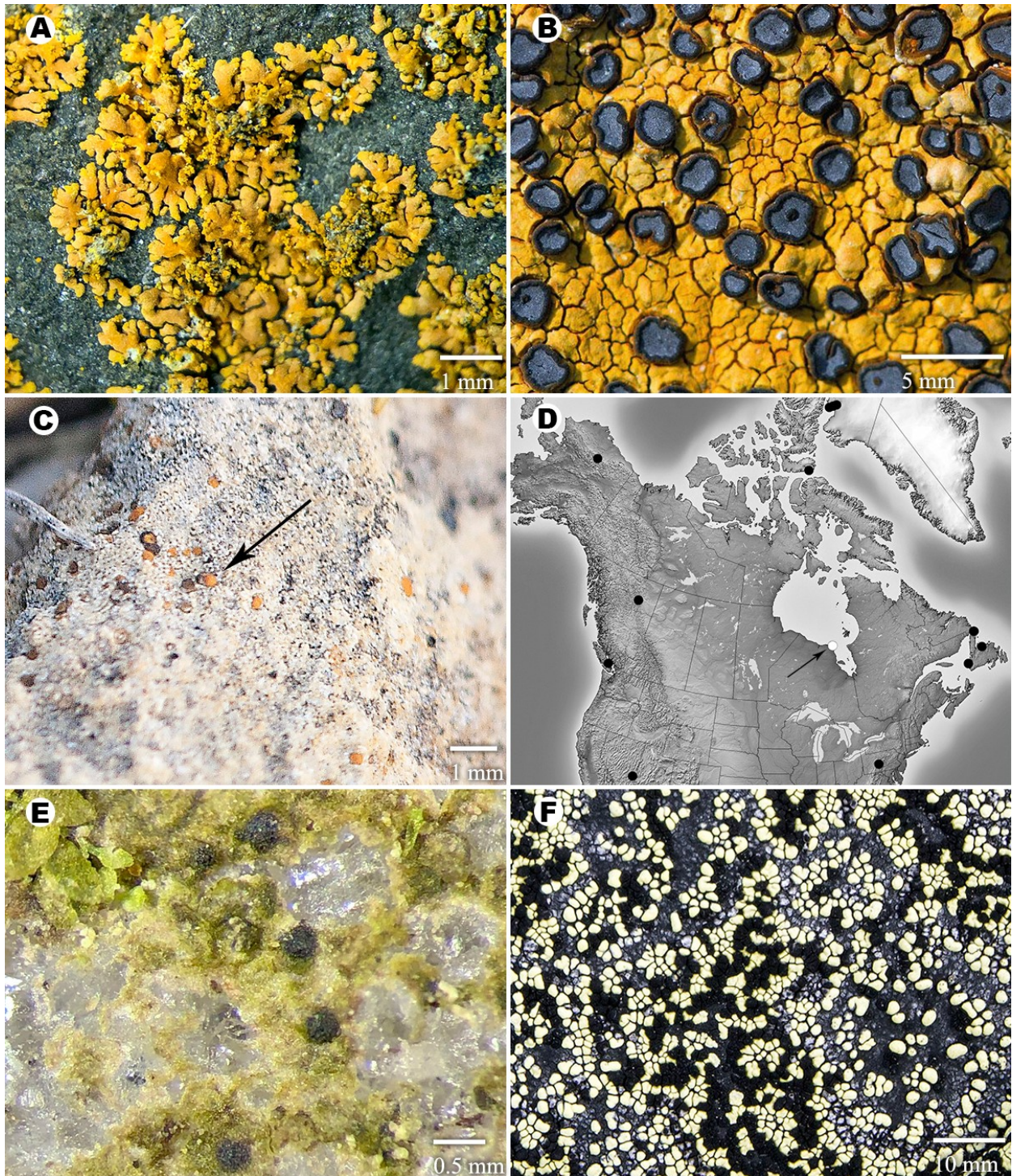


Figure 15. Photographs and distribution map of lichens new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Polycauliona stellata* (Brinker 6836). **B**, *Porpidia flavicunda* (Brinker 4122). **C**, arrow indicating semi-immersed orange perithecia of *Protoblastenia incrustans* on limestone (photo taken in situ, Brinker 4360). **D**, distribution of *P. incrustans* in North America. **E**, *Pseudosagedia chlorotica* perithecia on quartzite (Brinker 7521). **F**, *Rhizocarpon eupetraeoides* (photo taken in situ, Brinker 3831).

-lia, *Empetrum nigrum* and *Saxifraga tricuspidata*, 12.viii.2014, on exposed limestone, S.R. Brinker 4360 (CANL).

***Pseudosagedia chlorotica* (Ach.) Hafellner & Kalb**

FIGURE 15E

NOTES. – *Pseudosagedia chlorotica* is an early pioneering pyrenocarpous lichen of siliceous rock outcrops, boulders or pebbles in shaded, humid temperate woodlands, often near small streams or spray zones of water falls (Thüs & Schultz 2009). In North America it ranges in the west from Alaska to California and in the east through the Appalachian Mountains north to New Brunswick and west to the Ozark Mountains (Aptroot 2002, as *Porina chlorotica* (Ach.) Müll. Arg.; Harris & Ladd 2005; Harris & Lendemer 2005). It is characterized by its brownish to olive or sometimes bright-green (often translucent when wet), thin, continuous to cracked, crustose thallus, its minute, semi-immersed to sessile perithecia measuring 200–300 µm in diameter, and 3-septate ellipsoid ascospores measuring 15–25(–32) × 4–6 µm (Aptroot 2002, Thüs & Schultz 2009). One other species has been reported from Ontario, *P. aenea* (Wallr.) Hafellner & Kalb (Brodo et al. 2013). It can be separated from *P. chlorotica* based on substrate preference, preferring bark, whereas *P. chlorotica* is found primarily on rock (Brodo 2016). This is the first report from Ontario and the Great Lakes Basin.

Specimen examined. – CANADA. ONTARIO. LEEDS & GRENVILLE DIST.: Thousand Islands National Park, 5.3 km NE of Mallorytown Landing, W of Jones Creek, *Tsuga canadensis*-dominated coniferous forest in sheltered valley on south-facing slope, 15.v.2019, on siliceous rock near intermittent stream, S.R. Brinker 7521 & M. Burrell (CANL).

***Rhizocarpon eupetraeoides* (Nyl.) Blomb. & Forssell**

FIGURE 15F & 16A.

NOTES. – *Rhizocarpon eupetraeoides* is a circumpolar arctic-alpine crustose species of exposed siliceous rock (Thomson 1997; Fig. 16A herein). It is characterized by its whitish yellow, scattered or grouped, convex areoles up to 1.5 mm wide, 1-septate ascospores, green-brown epithecium and usually I+ blue medulla (Fletcher et al. 2009c, Matwiejuk 2008). This is the first report from Ontario where it occurred in maritime tundra near the coast of Hudson Bay.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Polar Bear Provincial Park, 76 km E of Fort Severn, 20 km E of Shagamu River, 2.3 km S of Hudson Bay coast, low tundra ridge with *Empetrum nigrum*, *Rhododendron lapponicum*, *Salix calcicola* var. *calcicola*, 28.vi.2014, on rock, S.R. Brinker 3831 (O, hb. Brinker)

***Rostania ceranisca* (Nyl.) Otálora, P.M. Jørg. & Wedin**

FIGURE 16B & 16C.

NOTES. – *Rostania ceranisca* is a circumpolar arctic-alpine species of calcareous soil, moss or turf (Jørgensen 2012a, *Collema ceraniscum* Nyl.). It can be recognized by its richly branched, ascending, isidium-like, terete lobes that are thickened apically, forming compact cushions, and its 4-(or rarely 2)-spored asci with muriform ascospores averaging 20–40 × 13–20 µm (Jørgensen 2012a). During the present study it was collected in maritime tundra near the coast of Hudson Bay, and this region likely represents the most southern non-alpine range limit of *R. ceranisca* in North America (Fig. 16C). This is the first report from Ontario.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: 105 km NW of Fort Severn, 8.7 km SW of East Pen Island, 1.5 km E of Mintiagan Creek, sandy blowout along terraced beach ridge with *Carex glacialis*, 27.vi.2014, on moist sand with occasional bryophytes, S.R. Brinker 3802 (CANL; conf. R.T. McMullin).

†*Sclerophora farinacea* (Chevall.) Chevall.

FIGURE 16D.

NOTES. – *Sclerophora farinacea* is a rare taxon, with previous eastern North America reports from New Brunswick and Québec (Selva 2013). It differs from other members of the genus by its typically dark brown stalks, collar forming excipulum which has a thick white pruina on the lower surfaces, cylindrical to narrowly-clavate asci and ascospores that are 7.0–9.0 µm (Selva 2014, Tibell 1999). Members of *Sclerophora* are indicators of long forest continuity and rare where they occur (Selva 2003, Tibell 1992). *Sclerophora farinacea* is considered one of the rarest species of the genus in Europe and is of conservation concern in many parts of its range (Liška 2006, Tibell 1999). These are the first reports from Ontario where it was found in deep fissures of exceptionally large *Populus balsamifera* trees in old forest stands with a strong *Thuja occidentalis* component.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Obonga-Ottertotooth Provincial Park 47 km SW of Armstrong, NE portion of Obonga Lake, mixed old-growth boreal forest with *Thuja occidentalis*, *Populus balsamifera*, *Abies balsamea*, and *Acer spicatum*, 3.viii.2018, on bark of exceptionally large *P. balsamifera*,

S.R. Brinker 6984 (CANL; conf. S. Selva), *S.R. Brinker 6987* (CANL; conf. S. Selva); 23 km NW of Dorion, 6 km S of Moraine Lake, mature conifer swamp with *T. occidentalis*, *A. balsamea* and *Fraxinus nigra*, 22.vii.2019, on *Populus balsamifera*, *S.R. Brinker 7858* (CANL).

***Scytinium schraderi* (Bernh.) Otálora, P.M. Jørg. & Wedin**

FIGURE 16E.

NOTES. – *Scytinium schraderi* is a xerophilous cyanolichen of open calcareous habitats, known from portions of Europe, the Mediterranean, New Zealand, North America and Russia (Björk 2010, Galloway & Ledingham 2012, Goward et al. 1994, Gilbert & Jørgensen 2009c, Llimona & Hladun 2001, Spribille et al. 2006, as *Leptogium schraderi* (Ach.) Nyl.). The species was previously reported from Canada from British Columbia and Nova Scotia (Anderson & Neily 2014, Goward et al 1994, as *L. schraderi*). It grows on calcareous rock outcrops, mosses, or directly on calcareous soil (e.g. Gilbert & Jørgensen 2009c, Stenroos et al. 2016, Urbanavichus & Urbanavichene 2017) and is red-listed in a portion of its range where it is restricted to alvar habitat (Thor 1998, as *L. schraderi*). Here, it typically occurred on limestone fragments or directly on exposed limestone pavement in moist depressions of alvars and edges of calcareous rocky woods. In one instance it was growing directly on shallow soil and over the thallus of *Heppia adglutinata* (Krempelh.) A. Massal. *Scytinium schraderi* is a small, distinctly fruticose species with tightly packed cylindrical, isidiate lobes 1–4 mm tall that are olive-brown to glossy dark-greenish brown, often heavily wrinkled (when dry), and inflating when moist. It rarely produces apothecia, which are brown, up to 1.5mm with a granular exciple, and submuriform spores, 25–30 × 10–12 µm (Stenroos et al. 2016). It is closely related to *Scytinium turgidum* (Ach.) Otálora, P.M. Jørg. & Wedin which has a more foliose thallus, and the two may be conspecific according to Jørgensen in Goward et al. (1994).

Specimens examined. – **CANADA. ONTARIO.** HASTINGS CO.: Rawdon Block, 5 km SE of Marmora, 3.5 km N of Bonarlaw, opening in rocky deciduous forest with shelving limestone outcrops, 13.v.2016, on limestone pavement, *S.R. Brinker 4850* (HBG, CANL); 3.5 km W of Marysville, 17 km E of Belleville, opening in *J. virginiana*-dominated treed alvar, 15.v.2019, on limestone, *S.R. Brinker 7526* (CANL). PETERBOROUGH CO.: Indian River, 1 km NE of Warsaw, small limestone outcrop adjacent to river, 3.xi.2019, on exposed localized limestone outcrop, *S.R. Brinker 8298* (CANL). PRINCE EDWARD CO.: Bay of Quinte, Massassauga Point Conservation Area off Massassauga Rd, remnant *Juniperus virginiana* treed alvar with *Sporobolus vaginiflorus* var. *ozarkanus* and *Ranunculus flabellaris*, 7.v.2013, on shallow calcareous soil and over *Heppia adglutinata*, *S.R. Brinker 2836B* (HBG). SIMCOE CO.: 6 km S of Washago, 1 km E of Lake Couchiching, small treed alvar with *Ulmus thomasi*, *Tilia americana* and *Juglans cinerea*, 19.x.2019, on limestone pavement, *S.R. Brinker 8283* (CANL, hb. Brinker).

***Solorina bispora* Nyl.**

NOTES. – *Solorina bispora* is a terricolous species of calcareous soil with a circumpolar arctic and boreal-montane distribution (Stenroos et al. 2016). Six species of *Solorina* Ach. are known from North America and are readily separated by numbers of spores in the ascus (McCune et al. 2014, Thomson & Thomson 1984). As the specific epithet implies, the asci of *Solorina bispora* contain two 1-septate spores. It is superficially similar in appearance to the more widespread and common *S. saccata* (L.) Ach., but that species has four spores in each ascus. *Solorina bispora* also differs from *S. saccata* in having pruinose lobes (Thomson 1984). The specimens examined here are from maritime tundra in the Hudson Bay Lowland, where it co-occurred with *S. saccata* and *S. spongiosa* (Ach.) Anzi. *Solorina spongiosa* resembles a smaller morphotype of *S. saccata* but is distinguished by its reduced thallus appearing as a narrow, 1–5 mm collar around the apothecia, the presence of external cephalodia, and (2)4-spored asci (Stenroos et al. 2016, Vitikainen 2012). This is the first published report for this species in Ontario.

Specimens examined. – **CANADA. ONTARIO. KENORA DISTRICT:** Niskibi Cape, 53 km NW of Fort Severn, 8.3 km E of Niskibi River, 8 km S of Hudson Bay coast, tundra ridge with *Rhododendron lapponicum*, *Vaccinium vitis-idaea*, *Empetrum nigrum* and *Dryas integrifolia*, 22.vi.2014, among bryophytes, *S.R. Brinker 3568*, *3581* (CANL).

†*Sphaerellothecium minutum* Hafellner

FIGURE 16F.

NOTES. – This lichenicolous fungus is known from arctic and alpine regions of both hemispheres where it occurs on *Sphaerophorus fragilis* (L.) Pers., the type host, as well as *S. globosus* (Hudson) Vain. (Alstrup et al. 2008, Brackel 2010, Hafellner 1993). It produces conspicuous, branched vegetative hyphae forming a dense reticulate pattern (Fig. 16F) along with miniscule, black, subglobose ascomata. The species was previously known in Canada from Nunavut (Hafellner 1993). This is the first report from Ontario.

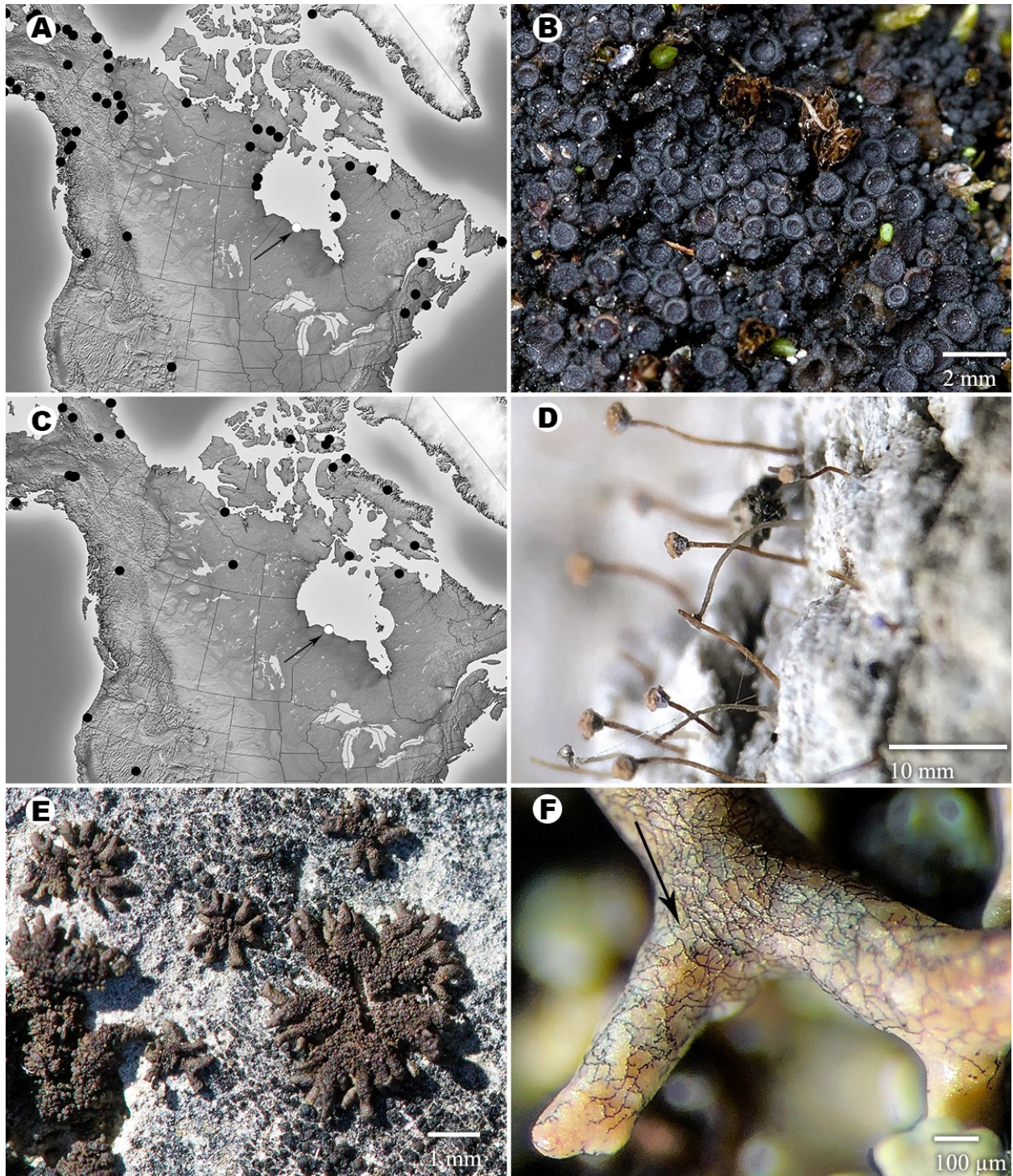


Figure 16. Photographs and distribution maps of lichens and allied fungi new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, distribution of *Rhizocarpon eupetraeoides* in North America. **B**, *Rostania ceranisca* (photo taken in situ, Brinker 3802). **C**, distribution of *R. ceranisca* in North America. **D**, *Sclerophora farinacea* (photo taken in situ, Brinker 6984). **E**, *Scytinium schraderi* (photo taken in situ, Brinker 8283). **F**, branched vegetative hyphae of *Sphaerellothecium minutum* on thallus of *Sphaerophorus fragilis* (Brinker 4121B).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Sutton Ridges, 98 km SE of Peawanuck airport, 4.3 km E of Aquatuk Lake, cryptogram-dominated open talus slope at base of W-facing cliff, 6.viii.2014, on *Sphaerophorus fragilis* on mafic rock, S.R. Brinker 4121B (CANL).

***Sticta beauvoisii* Delise**

FIGURE 17A & 17B.

NOTES. – *Sticta beauvoisii* is a rock and bark inhabiting cyanolichen with a mainly Appalachian distribution (Brodo et al. 2001) with disjunct records from several U.S. states in the Great Lakes Basin (e.g. Fryday & Wetmore 2002; Fig. 17B herein). Despite being the most commonly encountered species of *Sticta* in the Appalachian Mountains (McDonald et al. 2003), few recent records exist elsewhere in the Northeast where *S. beauvoisii* has clearly declined due to its sensitivity to air pollution and loss of mature forest cover (e.g., Hinds & Hinds 2007). In the Great Lakes Basin, it is listed as a species of Special Concern in Wisconsin (WDNR 2018) and was included on a proposed list of rare/endangered lichens in Michigan (Fryday & Wetmore 2002). It is differentiated from *S. fuliginosa*, by its granular to coralloid isidia restricted to lobe margins, scattered rhizines and its multi-lobed thallus (McDonald et al. 2003). Here, *S. beauvoisii* was corticolous on *Thuja occidentalis* where it occurred in an old conifer swamp. This is the first Ontario collection of this rare and declining species.

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Albert Lake Mesa Provincial Nature Reserve, 53 km WNW of Nipigon, just W of Albert Lake, remnant old-growth mixed boreal swamp with *Thuja occidentalis*, *Abies balsamea*, *Acer spicatum*, *Taxus canadensis*, and *Betula papyrifera*, 16.vii.2016, on bark of *T. occidentalis*, S.R. Brinker 5069 (CANL).

***Sticta fuliginosa* (Hoffm.) Ach.**

FIGURE 17C.

NOTES. – In North America *Sticta fuliginosa* occurs in humid localities along the west coast from Alaska to California and in the east throughout the Appalachian Mountains north to New Brunswick and Nova Scotia (Brodo et al 2001), as well as very locally in the Great Lakes Basin (e.g. Wetmore 2002C). The species is generally rare and has suffered declines due to a combination of its sensitivity to air pollution and confinement to old forests in regions with long-standing forest continuity. It is considered likely extirpated in New England (Hinds & Hinds 2007), and Wetmore (2002c) reported reductions in Minnesota due to extensive logging of old-growth forests. In much of Europe, *S. fuliginosa* is a focus of conservation programs and used as a key indicator of ecological continuity, the persistence of forests through time with minimal human-related disturbance (Coppins & Coppins 2002, Magain & Sérusiaux 2015). Its dependence on old forests make *S. fuliginosa* particularly vulnerable in Ontario given declines of this habitat type from widespread and extensive industrial forestry in the Great Lakes St. Lawrence and Boreal Forest Regions of the province (OMNR 1994). Since most forest stands tend to be harvested when they reach 75–100 years (average rotation age), the proportion of mature to old-growth forest in regions with intensive timber harvesting practices tends to decrease over time (e.g. Bergeron et al. 1999), posing a serious threat to the continued presence of this species and other associated rare cyanolichens including *S. beauvoisii*, *Leptogium corticola* (Taylor) Tuck., and *Fuscopannaria leucosticta* (Tuck.) P.M. Jørg. The specimens reported here were from old *Thuja occidentalis*-dominated conifer stands where it occurred mostly on leaning, mossy trunks, and once from a sheltered rockface adjacent to a conifer swamp. Given its restriction in Ontario to very old *Thuja*-dominated stands in areas with long forest continuity lacking human disturbances, the species is likely very rare in the province.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: Ojibway Provincial Park, 18 km SW of Sioux Lookout, S side of Little Vermillion Lake, edge of open *Thuja occidentalis* – dominated rocky conifer forest and swamp margin, 19.vii.2016, on partially shaded rockface and twigs of *T. occidentalis*, S.R. Brinker 5135 (CANL, hb. Brinker); 27 km SE of Kenora, 750 m S of Witch Bay, Lake of the Woods, in mixed swamp with *T. occidentalis*, *Fraxinus nigra*, *Abies balsamea* and *Alnus incana* spp. *rugosa*, 14.ix.2017, on bark of *F. nigra*, S.R. Brinker 6179 (CANL). RAINY RIVER DIST.: Quetico Provincial Park, 74 km SE of Atikokan, 200 N of NE corner of Emerald Lake, conifer swamp in valley with *T. occidentalis*, *A. balsamea*, *Picea glauca*, and *A. incana* spp. *rugosa*, 21.viii.2016, on bark of *T. occidentalis* and twig of *A. balsamea*, S.R. Brinker 5335 & P. Scott (CANL). THUNDER BAY DIST.: 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old-growth cedar-dominated conifer swamp with *A. balsamea*, 25.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5983 & C. Terwissen (CANL).

***Tetramelas papillatus* (Sommerf.) Kalb**

NOTES. – *Tetramelas papillatus* is a mainly boreal and arctic-alpine species that grows on decaying bryophytes, vegetation, or directly on soils that are calcareous, and has a bipolar distribution (Galloway et al. 1998,

McCune & Rosentreter 2007, Thomson 1997; as *Buellia papillata* (Sommerf.) Tuck.). It can be distinguished by its greyish to white, frequently convex, papillate thallus that is K+ yellow, and its 1-septate ascospores that are 18–24 × 8–10 µm (McCune 2017). This is the first report of this species from Ontario where it was terricolous on calcareous soil in open lichen-spruce conifer woodland. *Tetramelas* is a recent segregate of *Buellia* that was reinstated by Marbach (2000).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: 99 km W of Fort Severn, abandoned Mid-Canada Radar line site 518, open lichen-spruce woodland on fossil beach ridge, 21.v.2014, on soil, *S.R. Brinker 3505* (CANL).

†*Tremella cetrariicola* Diederich & Coppins

FIGURE 17D.

NOTES. – *Tremella cetrariicola* is a lichenicolous heterobasidiomycete that forms brown to black (pale when young) galls, typically with a central depression and a constricted base, on species of *Cetraria* and *Tuckermanopsis* (Diederich 1996, Pippola & Kotiranta 2008). It is a widespread taxon in the Northern Hemisphere (Diederich 1996, Suija 2005, Zhurbenko 2007) likely most frequent in conifer-dominated stands where its host are common. It was previously reported in Canada from British Columbia and Québec (Diederich 1996). These are the first reports from Ontario where it occurred in stands with *Picea* spp., *Larix laricina* and *Abies balsamea*. One previous report from the Great Lakes Basin is known from Isle Royale in Michigan (Diederich 2003). It is characterized by having predominantly 2-celled basidia and limoniform basidiospores with refractive apiculae at one end (Diederich 1996). It is probably common in the northern portion of the study area considering the abundance and distribution of known hosts and overall habitat availability.

Specimens examined. – CANADA. ONTARIO. PARRY SOUND DIST.: Eagle Lake Bog, 6.3 km SW of South River, 4 km E of Eagle Lake, edge of shrub - dominated peatland ringed with *Larix laricina* and *Picea mariana*, 13.v.2017, on *Tuckermanopsis* on twigs of conifers, *S.R. Brinker 5533* (CANL, hb. Brinker); Mikisew Provincial Park, W side of Eagle Lake, 10 km W of hamlet of South River, *Picea glauca* and *Abies balsamea* coniferous woods bordering beaver pond, 23.vi.2020, on *Tuckermanopsis* on twigs of conifers, *S.R. Brinker 8442* (CANL).

Umbilicaria lyngei Schol.

FIGURE 17E.

NOTES. – *Umbilicaria lyngei* is a high arctic species in North America with disjunct occurrences in alpine areas of Oregon and the Gulf of Saint Lawrence (Thomson 1984, as *Agyrophora lyngei* (Schol.) Llano). In the study area it was collected from a massive glacial erratic boulder in maritime tundra near the Hudson Bay coast. This may represent the most southerly non-alpine occurrence in North America (Fig. 17E). It has an umbilicate, monophyllous thallus that is pruinose, with reticulate ridges that fade toward the thallus margins, and a smooth, sooty black undersurface without deep folds around the umbilicus (Brodo 2016, Thomson 1984).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: 123 km NW of Fort Severn, 7.7 km SW of West Pen Island, 4.6 km E of Manitoba border, edge of pond in moist hummocky tundra, 26.vi.2014, on large igneous glacial erratic boulder, *S.R. Brinker 3735* (CANL; det. R.T. McMullin).

Usnea ceratina Ach.

FIGURE 17F.

NOTES. – *Usnea ceratina* is noted for its oceanic tendencies, occurring in areas with very high humidity (Halonen et al. 1998) on well-lit bark of typically very old trees (James et al. 2009). It occurs in portions of eastern, western, and southeastern North America (Clerc 2002), and can be locally common in mature high elevation forests of the southern Appalachians (e.g. Lendemer et al. 2013). It is disjunct in the Great Lakes Basin, reported from the Straits Counties of Michigan (Harris 2015) and noted as very rare in Wisconsin (Thomson 2003). It is identified by the presence of a rose pigment in the medulla (though is not always present), coarse sorediate branches with many large tubercles, usually pale-yellow thallus base and CK+ yellow reaction due to the presence of diffractaic acid (Halonen et al. 1998). In the study area it was encountered only once on *Betula alleghaniensis* in a remnant old-growth forest stand near Lake Superior.

Specimen examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park, Sand River, upstream from mouth at Lake Superior, mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Betula papyrifera*, *Thuja occidentalis* and *Acer spicatum*, 11.vii.2016, corticolous on mature *B. alleghaniensis*, *S.R. Brinker 4943, 7971* (CANL, NY, hb. Brinker; conf. J.C. Lendemer).

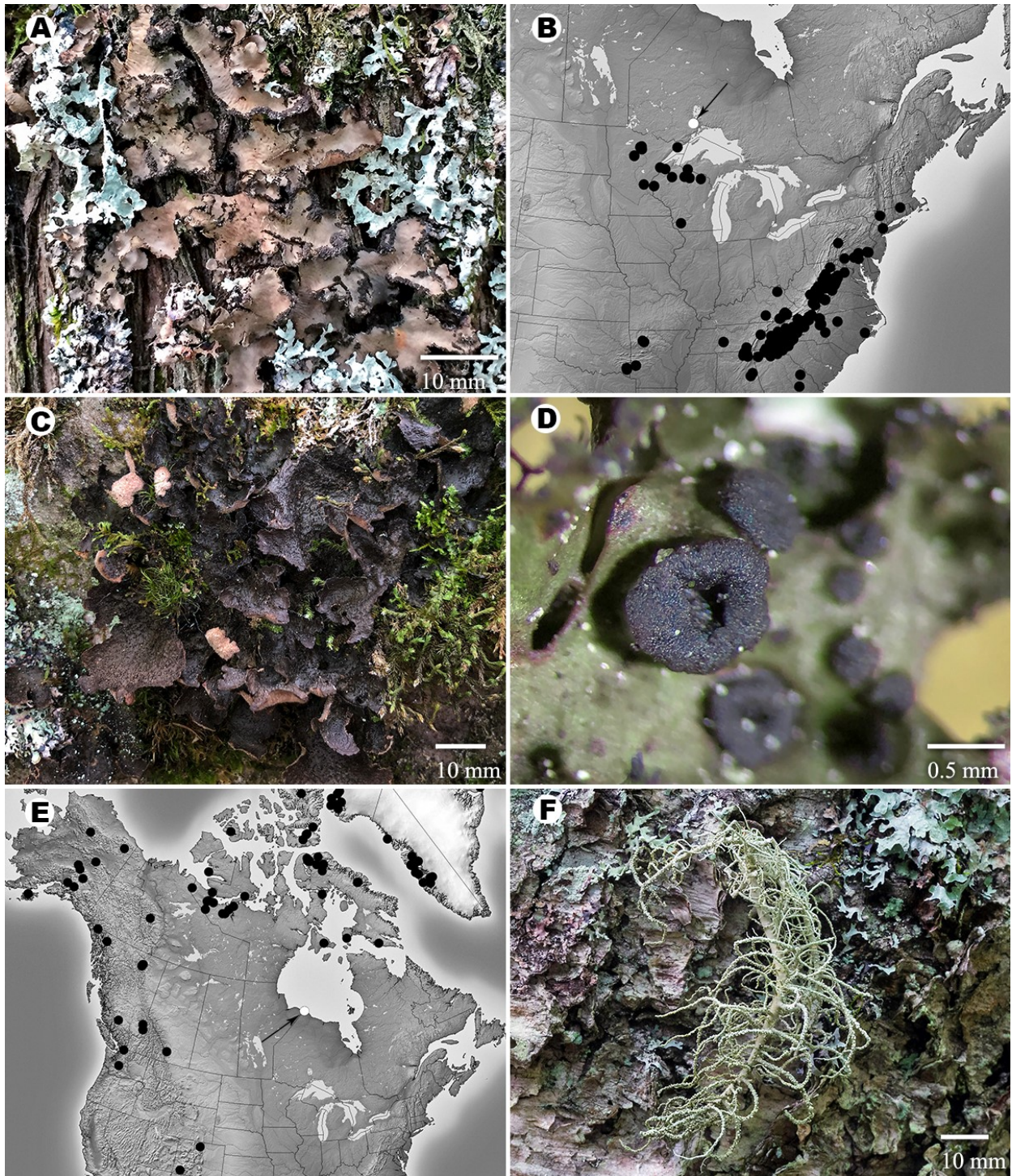


Figure 17. Photographs and distribution maps of lichens and allied fungi new to Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Sticta beauvoisii* (photo taken in situ, Brinker 5069). **B**, distribution of *S. beauvoisii* in eastern North America. **C**, *S. fuliginosa* (photo taken in situ, Brinker 6179). **D**, *Tremella cetrariicola* galls with distinctive central depression lichenicolous on thallus of *Tuckermanopsis* (Brinker 5533). **E**, distribution of *Umbilicaria lyngei* in North America. **F**, *Usnea ceratina* (photo taken in situ, Brinker 4943).

***Xanthomendoza fulva* (Hoffm.) Søchting, Kärnefelt & S.Y. Kondr.**

FIGURE 18A.

NOTES. – *Xanthomendoza fulva* ranges widely in boreal and temperate portions of continental North America from the Mississippi Valley west to the Rocky Mountains (Lindblom 2006). It reaches its eastern distributional limit in the Upper Great Lakes Basin and this represents the first report from Ontario. It is mainly corticolous, occurring on basic bark or acidic bark affected by nutrient enrichment in open to semi-open habitats (Lindblom 1997, Lindblom et al. 2019). It differs from *X. weberi* (S.Y. Kondr. & Kärnefelt) L. Lindblom, which is an uncommon species found in southwestern Ontario, by its abundant rhizines, non-dichotomously branched lobes and its darker orange thallus (Brodo 2016).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Sleeping Giant Provincial Park, SE tip of Sibley Peninsula at Middlebrun Bay on Lake Superior, mixed woods with *Populus tremuloides*, *Picea glauca*, and *Abies balsamea*, 28.viii.2018, corticolous on *P. tremuloides*, S.R. Brinker 6890 (NY; conf. J.C. Lendemer).

***Xylographa opegraphella* Nyl. ex Rothr.**

FIGURE 18B.

NOTES. – *Xylographa opegraphella* is a maritime species of driftwood or old wooden structures in northern coastal areas of North America, although inland records from the Apostle Islands in Wisconsin are also known (Spribille et al. 2015). These are the first published records from Ontario which includes coastal sites from Lake Superior and Hudson Bay. It can be recognized by its yellow-brown lirellae that are partially sunken and often branched once (Y-shaped), and its ascospores which average $9.4\text{--}11.3 \times 3.4\text{--}3.9 \mu\text{m}$ (Brodo 2016, Spribille et al. 2014). Two other species of *Xylographa* occur in Ontario, *X. parallela* (Ach.:Fr.) Behlen & Desberg, and *X. vitiligo* (Ach.) J. R. Laundon (Brodo et al. 2013, Newmaster et al. 1998). *Xylographa vitiligo* differs in having a sorediate thallus, and *X. parallela* differs in having narrowly ellipsoid lirellae with one blunt end and one pointed end (the growing tip), and larger ascospores than *X. opegraphella*, averaging $11.3\text{--}14.5 \times 5.9\text{--}7.6$ (Spribille et al. 2014).

Specimens examined. – **CANADA. ONTARIO.** KENORA DIST. 68 km NW of Fort Severn, 2.7 km W of Mukaysee Creek mouth, 500 m S of Hudson Bay coast, shrubby tundra with *Salix arctica*, *Arctous* spp., and *Dryas integrifolia*, 21.vi.2014, on lignum, S.R. Brinker 3545B (CANL); West Pen Island, 123 km NW of Fort Severn, 7.6 km NW of Oosteguanako Creek mouth, Hudson Bay, moist, hummocky *Rhododendron lapponicum* - *Vaccinium uliginosum* dwarf shrub tundra, 26.vi.2014, on lignum, S.R. Brinker 3761B (CANL). THUNDER BAY DIST.: E side of Little Pic River mouth, edge of coniferous woods in clearing around day-use area near sandy coast, 27.vii.2019, on decaying log, S.R. Brinker 7954 (hb. Brinker).

ADDITIONAL INTERESTING OR SIGNIFICANT RECORDS

This section includes 73 lichens and 12 lichenicolous fungi that are included on the Ontario lichen checklist (Newmaster et al. 1998) but have rarely been reported from the province, have only recently been reported from the province, are known from scant records, or are particularly noteworthy because of their high provincial or federal conservation status rank or at-risk status.

***Acarospora bullata* Anzi**

FIGURE 18C.

NOTES. – This species was recently confirmed from North America after it was initially determined that previously published material from California and the Sonoran Desert Region (e.g. Knudsen 2007) was conspecific with *A. rosulata* (Th. Fr.) H. Magn. (Brinker & Knudsen 2019). *Acarospora bullata* is recognized by its determinate thallus with fan-shaped lobes, KC+ pinkish red cortex in thin section (gyrophoric acid), rugulose apothecial discs, and occurrence on non-calcareous rock (Brinker & Knudsen 2019). *Acarospora rosulata* differs from *A. bullata* by lacking a large determinate thallus with fan-shaped lobes and rugulose apothecial discs (Brinker & Knudsen 2019). The specimens reported here extend the range of *A. bullata* north to the Lake Superior Region where it occurs on exposed coastal rock outcrops.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: N shore of Lake Superior, Worthington Bay, 4 km N of Schreiber, sheltered rocky bay along coast with adjacent boreal mixed forest, 26.vii.2019, on volcanic rock, S.R. Brinker 7942 (CANL, NY, hb. Brinker); N shore of Lake Superior, Schreiber Beach area, 2 km SW of Schreiber, exposed rocky coastline and adjacent boreal mixed forest, 12.ix.2019, on volcanic rock, S.R. Brinker 8246 (CANL).

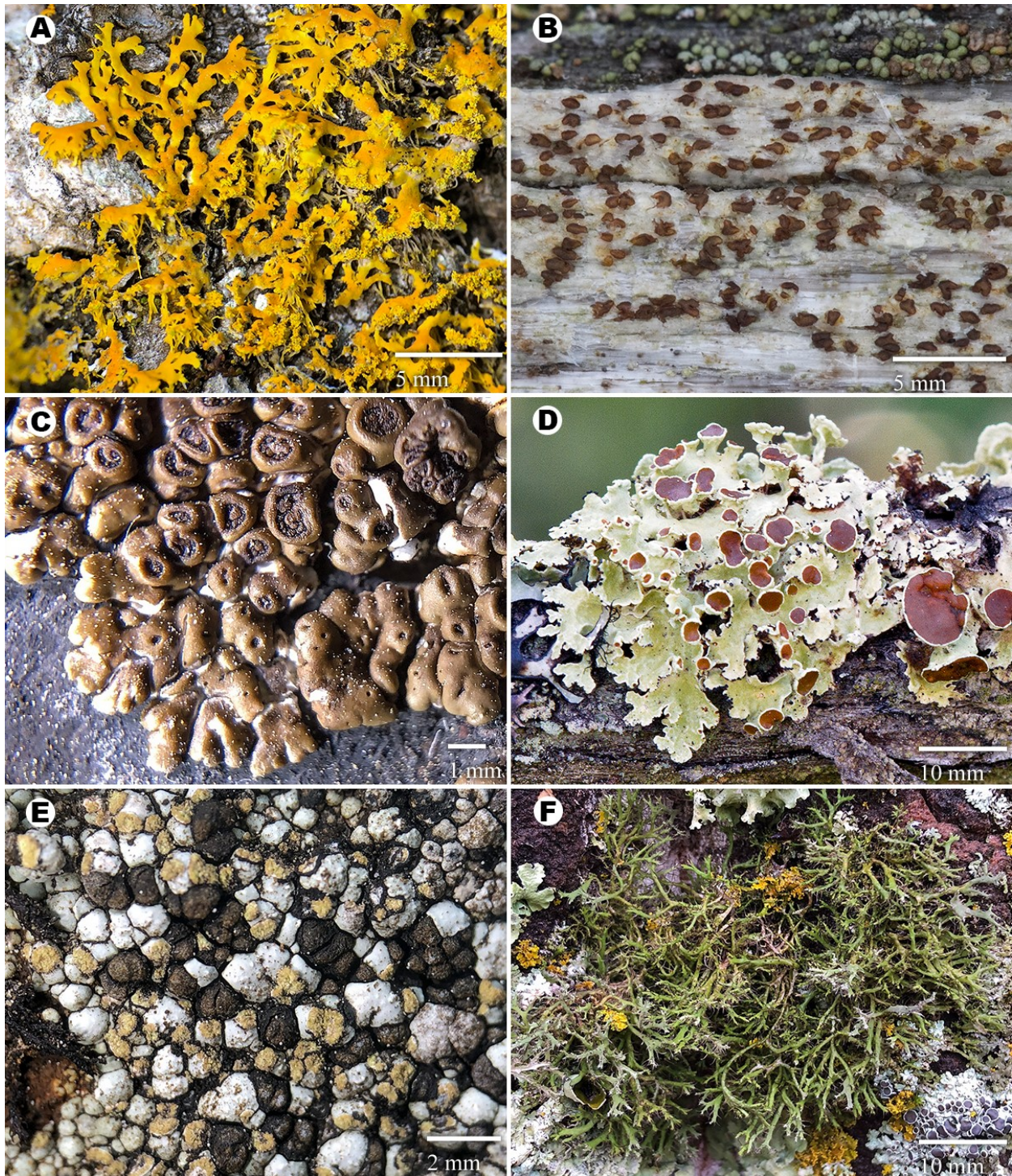


Figure 18. Photographs of lichens new to, rare in, or otherwise rarely reported from Ontario. **A**, *Xanthomendoza fulva* (photo taken in situ, Brinker 6890). **B**, *Xylographa opegraphella* (Brinker 7954). **C**, *Acarospora bullata* (Brinker 7942). **D**, *Ahtiana aurescens* (photo taken in situ, Brinker 4968). **E**, *Amygdalaria panaeola* (photo taken in situ, Brinker 7934). **F**, saturated thallus of *Anaptychia crinalis* (photo taken in situ, Brinker 7365).

Ahtiana aurescens (Tuck.) Thell & Randlane

FIGURE 18D.

NOTES. – These are the first published collections of *Ahtiana aurescens* from Ontario since a 1967 specimen was reported by Crowe (1994; *I.M. Brodo 5984*, CANL, cited as *Tuckermanopsis aurescens* (Tuck.) Hale) from the Thunder Bay District. Thell et al. (1995) reported several earlier historical records from the Nipissing District in Algonquin Park and near Lake Nipissing but the species has not been rediscovered this far south in the study area. It is endemic to eastern North America and reportedly rare in the northern portion of its range where it has declined due to loss of old-growth forest habitat from logging activities (Wetmore 1981, Wong & Brodo 1992). It is most frequently reported on conifers in the Great Lakes Basin, especially cedar, and often in swampy habitat with high humidity (Hinds & Hinds 2007, Thomson 2003, Wetmore 2002a). The collections cited below expand its range in the province west to the Rainy River and Kenora Districts and demonstrate it is more widespread than previously thought. It should be looked for elsewhere in northern portions of the Great Lakes-St. Lawrence Forest and southern Boreal Forest Regions in well-lit, humid conifer swamps with a *Thuja* component.

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: 35 km NE of Batchewana Bay, 5 km SW of Mekatina, N-facing conifer-dominated slope with *T. occidentalis*, *A. balsamea*, *B. papyrifera*, 15.vii.2019, on twig of *T. occidentalis*, S.R. Brinker 7674 (CANL). KENORA DIST.: E of Witch Bay Camp Rd. 27 km SE of Kenora, 475 m W of Hook Lake, border of lowland conifer woods and conifer swamp with *T. occidentalis*, *A. balsamea*, *B. papyrifera*, *A. incana* ssp. *rugosa*, 14.ix.2017, on twig of *A. balsamea*, S.R. Brinker 6162 (CANL). RAINY RIVER DIST.: Quetico Provincial Park, between Plough Lake and Ottertrack Lake, 1 km N of Knife Lake, mature conifer swamp with *T. occidentalis*, *A. balsamea* and *P. mariana*, 18.viii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5252 (CANL). THUNDER BAY DIST.: W side of Rd. 801, 21 km NE of Beardmore, 3 km N of Nezhah, rich conifer-dominated treed fen with *Thuja occidentalis*, *Larix laricina*, *Picea mariana* and *Alnus alnobetula* ssp. *crispa*, 12.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 4968 (CANL); Lake Nipigon Conservation Reserve, 2.2 km W of Macdiarmid on W side of Orient Bay, mixed boreal forest with *T. occidentalis*, *Betula papyrifera* and *Populus tremuloides*, 13.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 4982 (CANL); 11 km W of Nipigon, 1 km E of Moseau Lake, mature, open conifer swamp with *T. occidentalis*, *Picea glauca* and *A. balsamea*, 14.vii.2016, on twigs of young *A. balsamea*, S.R. Brinker 5000 (CANL); S side of Mawn Rd., 45 km WNW of Nipigon, 1 km S of Sturge Lake, open conifer swamp with *T. occidentalis* and *A. balsamea*, 16.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5049 (CANL); Albert Lake Mesa Provincial Nature Reserve, 53 km WNW of Nipigon, just W of Albert Lake, old-growth mixed boreal forest with *T. occidentalis*, *A. balsamea*, *Acer spicatum*, *Taxus canadensis*, and *B. papyrifera*, 16.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5070 (CANL); 37 km SW of Thunder Bay, 3.2 km W of Cloud Lake, 1 km E of the Pine River, successional open conifer swamp with *T. occidentalis*, *L. laricina*, and *Salix bebbiana*, 17.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5085 (CANL); Sleeping Giant Provincial Park, 7.5 km S of Pass Lake, Upper Sibley Peninsula near North Kay Lake, open conifer swamp with *A. balsamea*, *T. occidentalis*, and *A. incana* ssp. *rugosa*, 22.vii.2016, on twigs of *T. occidentalis*, S.R. Brinker 5168 (CANL); Windigo Bay Provincial Park, 20.4 km SE of Armstrong, 1 km from Lake Nipigon, *P. mariana* peatland with *Rubus chamaemorus*, 23.vii.2016, on twig of *T. occidentalis* along small stream through bog, S.R. Brinker 5185 (CANL); Castle Creek Provincial Nature Reserve, 41 km SW of Kakabeka Falls, 3.3 km SSW of Mackies, open conifer swamp with *T. occidentalis*, *P. mariana*, and *A. balsamea*, 25.viii.2016., on twigs of *T. occidentalis*, S.R. Brinker 5402 (CANL); Lake Superior, E side of Pine Bay, Memory Rd., 39 km SW of Thunder Bay, remnant *Thuja*-dominated conifer swamp bordering previously logged forest block, 22.vii.2017, on twigs of *T. occidentalis*, S.R. Brinker 5930 (CANL); 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old *T. occidentalis* swamp with *A. balsamea* and *A. incana* ssp. *rugosa*, 25.vii.2017, on twigs of *T. occidentalis*, S.R. Brinker 5986 (CANL); Obonga-Ottertotooth Provincial Park, Obonga Lake, bay N of Cooney Lake, 50 km SW of Armstrong Station, mixed boreal forest with *B. papyrifera*, *A. balsamea* and *P. glauca*, 3.viii.2018, on twigs of *A. balsamea*, S.R. Brinker 6967 (CANL).

Amygdalaria panaeola (Ach.) Hertel & Brodo

FIGURE 18E.

NOTES. – *Amygdalaria panaeola* was previously reported from Ontario based on a single collection from the Slate Islands in Lake Superior (Crow 1994). This is only the second report from the province. It is a rarely reported circumpolar arctic-alpine species found on exposed siliceous rock (Thomson 1997). The genus is morphologically similar to *Porpidia* Körb. but differs in having a more well-developed thallus with cephalodia (McCune 2017). The species is characterized by a thickly areolate, sorediate thallus that is KC⁺ orange, and the presence of confluent acid (Brodo & Hertel 1987).

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Kama Hills, 22 km NE of Nipigon, N-facing talus slope below cliff in mixed boreal forest of *Betula papyrifera*, *Abies balsamea* and *Picea mariana*, 26.vii.2019, on large gabbro boulder, S.R. Brinker 7934 (CANL, hb Brinker).

***Anaptychia crinalis* (Schleich.) Vezda**

FIGURE 18F.

NOTES. – *Anaptychia crinalis* occurs on bark or calcareous rock in humid microhabitats, and has an Appalachian Great-Lakes distribution (Brodo et al. 2001, as *A. setifera* Räsänen). It was reported as a rare lichen in southern Ontario by Wong & Brodo (1992) as well as New England (Hinds & Hinds 2007) based on historical collections from coniferous trees and calcareous rock outcrops. While it has since been found to be locally frequent on limestone cliffs and talus on Georgian Bay as well as on diabase cliffs in the Thunder Bay District (Brinker unpublished data, Brodo et al. 2013), no recent corticolous collections from south of the Canadian Shield have been reported since it was last observed on tree bark by R. Olszewski at Sandbanks Provincial Park, sometime between 1978–1994 (McMullin & Lewis 2014). During the present study it was rediscovered at Sandbanks Provincial Park in coastal treed sand dune habitat along Lake Ontario where it was corticolous on *Populus deltoides*. It is also reported here from similar habitat on Lake Erie where it was corticolous on *Quercus muehlenbergii*, extending its range in the study area south to the Carolinian Zone in southwestern Ontario.

Specimens examined. – CANADA. ONTARIO. NORFOLK CO.: Long Point National Wildlife Area, 22 km SE of Port Rowan, 14 km W of lighthouse, coastal *Quercus rubra*-*Q. muehlenbergii* savanna, 3.x.2013, corticolous on *Q. rubra*, S.R. Brinker 3280 & S. Dodsworth (CANL). PRINCE EDWARD CO.: Sandbanks Provincial Park, S shore of West Lake near Dunes Beach Day Use Area, edge of remnant deciduous woods and coastal treed sand dune, 2.xi.2018, on bark of *Populus deltoides*, S.R. Brinker 7365 (CANL).

***Arctoparmelia incurva* (Pers.) Hale**

FIGURE 19A & 19B.

NOTES. – *Arctoparmelia incurva* was mapped from Ontario by Thomson (1984) from a single site at Old Woman Bay on Lake Superior in Algoma District, but the species does not seem to have been formally reported. These are the first published records of this species and extend its range north to the Thunder Bay District. It is a circumpolar arctic-alpine species occurring on non-calcareous rock or exsiccated wood (Hale 1986, Hinds & Hinds 2007). It is disjunct in the Lake Superior Region by several hundred kilometres from its more continuous range to the north (Fig. 18B). The species was found to be both saxicolous on boulders on steep talus slopes as well as lignicolous on driftwood in coastal areas of Lake Superior.

SPECIMENS EXAMINED. – CANADA. ONTARIO. ALGOMA DIST.: N side of Old Woman Bay, Lake Superior Prov. Park, rocky shoreline, 29.vi.1975, rotten wood on shore, A.K. Weise 12-vii-01 (MSC). THUNDER BAY DIST.: Ouimet Canyon Provincial Park, 8 km W of Dorion, 1.9 km N of Gulch Lake, canyon floor among mossy talus with scattered stunted *Picea mariana*, *Betula papyrifera*, and *Alnus alnobetula* ssp. *crispa*, 27.vii.2017, on gabbro, S.R. Brinker 6029 & C. Terwissen (CANL); Obonga-Ottertooth Provincial Park 49 km SW of Armstrong, NE portion of Obonga Lake, N-facing talus slope along lakeshore below cliff, 3.viii.2018, on mafic rock, S.R. Brinker 6977 & C. Terwissen (LKHD); N shore of Lake Superior, Bowman Island S of St. Ignace Island, open fossil shingle beach surrounded by conifer woods, 19.vii.2019, on decorticated log, S.R. Brinker 7760 (CANL); The Pinnacles, 5.5 km NW of Dorion, 1 km N of Miner Lake, E-facing talus slope below cliff, 12.ix.2019, on mafic rock, S.R. Brinker 8240 (CANL).

***Arthonia diffusella* Fink**

FIGURE 19C.

NOTES. – *Arthonia diffusella* was reported by Wong & Brodo (1990) as a rare species from two southern Ontario counties (Lanark, Renfrew) where it was confined to *Thuja occidentalis*. The additional records cited below extend its range in the province north to the Lake Superior Basin where it was found in mature, mixed forests in areas with ecological continuity on the bark of old *Betula alleghaniensis*. It can be recognized by its conspicuous thallus containing *Trentepohlia*, strongly tapered, mostly 4-celled ascospores measuring 12–15 × 3.5–4 µm (Brodo 2016, Harris 2015). It is most likely to be confused with *A. diffusa* Nyl. which has slightly tapered, 2(–3)-celled ascospores, measuring 10–13 × 4–5 µm (Harris & Ladd 2005).

Specimens examined. – CANADA. ONTARIO. ALGOMA DIST.: 10 km N of Batchawana Bay, 1.3 km E of Mamainse Lake, mature mixed forest on N-facing slope with *Betula alleghaniensis*, *Thuja occidentalis*, *Abies balsamea*, and *Acer saccharum*, 4.iv.2019, on *B. alleghaniensis*, S.R. Brinker 8024 (CANL). PARRY SOUND DIS-

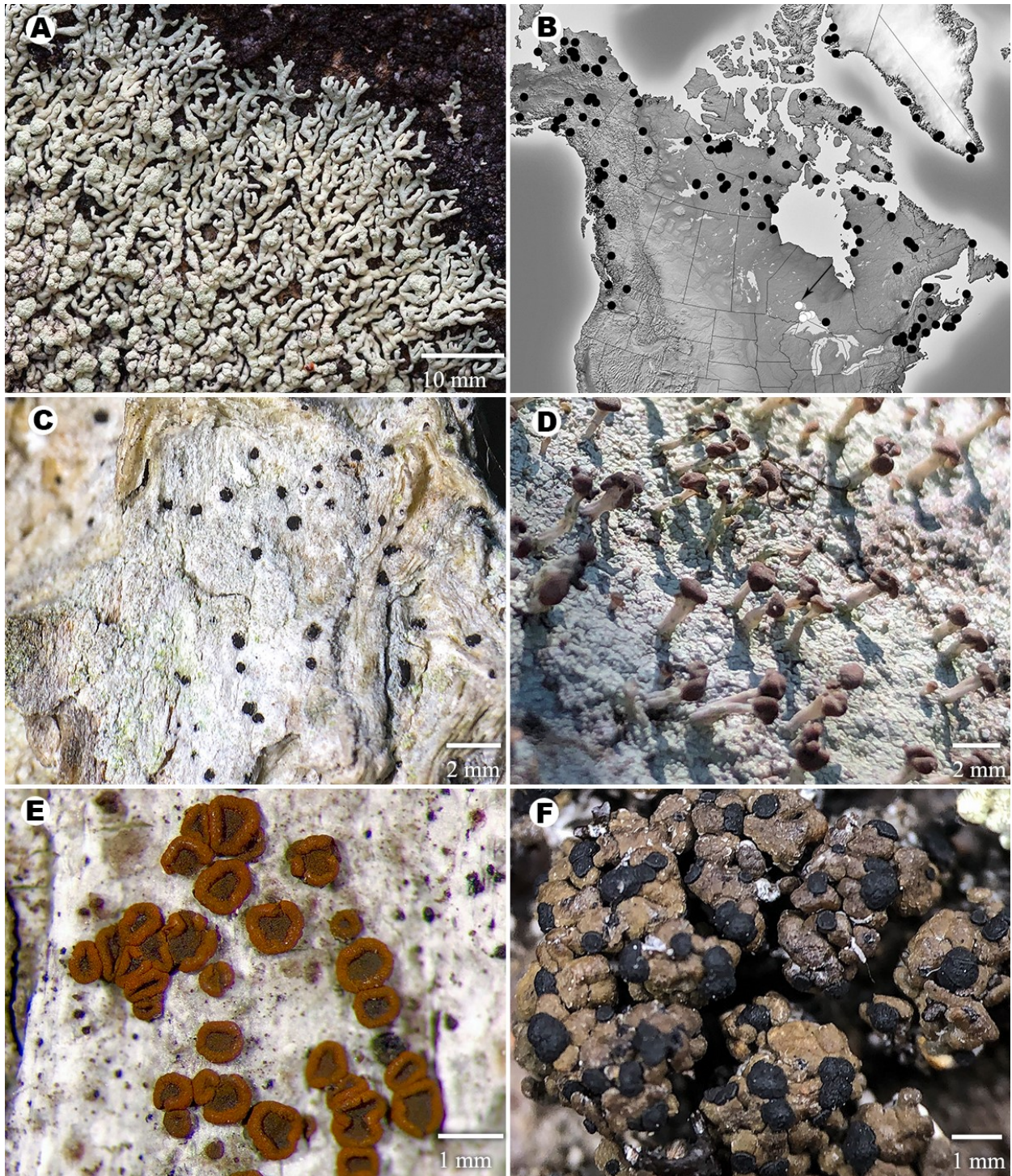


Figure 19. Photographs and distribution map of rare or otherwise rarely reported lichens in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Arctoparmelia incurva* (photo taken in situ, Brinker 6029). **B**, distribution of *A. incurva* in North America. **C**, *Arthonia diffusella* (Brinker 8024). **D**, *Baeomyces carneus* (photo taken in situ, Brinker 7804). **E**, *Blastenia ferruginea* (Brinker 8361). **F**, *Buellia badia* (photo taken in situ, Brinker 7321).

-T.: Deer Lake, SW shore, 14.2 km W of South River, mature mixed forest on E-facing slope with *A. saccharum*, *B. alleghaniensis* and *Tsuga canadensis*, 24.vi.2017, on bark of *B. alleghaniensis*, S.R. Brinker 5668 (CANL).

***Baeomyces carneus* Flörke**

FIGURE 19D.

NOTES. – Previous reports of this species from Ontario include single records from Lake Nipigon (Thomson 1967) and the Slate Islands (Crowe 1994). It differs from the similar and much more widespread and common *B. rufus* (Hudson) Rebert. by its K⁺ yellow turning to red reaction (presence of norstictic acid) and its larger squamule size, ranging up to 2 mm broad (Thomson 1967). *Baeomyces rufus* contains stictic acid (K⁺ yellow) and possesses squamules less than 1 mm broad (Thomson 1967). *Baeomyces carneus* grows on soils with high clay content as well as on non-calcareous rock (Thomson 1967). Despite being rather conspicuous, the number of provincial records is small and the species may be uncommon.

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, E side of Lamb Island, edge of coniferous forest and exposed rocky shoreline, 20.vii.2019, on sheltered rock, S.R. Brinker 7804 (CANL, hb. Brinker).

***Blastenia ferruginea* (Huds.) A. Massal.**

FIGURE 19E.

NOTES. – *Blastenia ferruginea* has been widely collected from portions of Europe and North America on well-lit neutral to basic bark of conifers and broad-leaved trees, as well as on lignum (Fletcher & Laundon 2009, as *Caloplaca ferruginea* (Hudson) Th. Fr.; McCune 2017). It has reportedly declined through much of England and central Europe (Fletcher & Laundon 2009), and is represented by scant historical collections from Ontario. The specimen cited below is the first modern report of *B. ferruginea* from the study area reconfirming its presence. It can be distinguished by its ecology, its dark, rusty brown to dirty red-brown or blackish apothecial discs, and ascospores measuring 12–18(–20) × 6–10(–11) μm (Brodo et al. 2001, as *C. ferruginea*; McCune 2017).

Specimen examined. – **CANADA. ONTARIO.** NORTHUMBERLAND CO.: Crowe Bridge Conservation Area 13 km SW of Marmora, edge of rocky coniferous woods with *Juniperus virginiana*, *T. occidentalis* and *J. communis*, 9.iv.2020, on bark of *J. virginiana*, S.R. Brinker 8361 (CANL).

***Buellia badia* (Fr.) A. Massal.**

FIGURE 19F.

NOTES. – *Buellia badia* ranges through portions of Europe, Northern Africa and North America (Bungartz & Nash 2004). It was reported by Wong & Brodo (1992, as *B. turgescens* Tuck.) as a rare lichen of open granitic boulders from three southern Ontario counties. It is initially parasitic on a variety of foliose and crustose lichens but with age becomes independent where it continues to grow over rock or decorticated wood (Bungartz & Nash 2004). It closely resembles *Amandinea punctata* (Hoffm.) Coppins & Scheid. which can be common on nutrient enriched bark, wood, and rock (Scheidegger 2009). *Buellia badia* has a brown crustose areolate thallus that can become subsquamulose to squamulose, simple bacilliform conidia measuring 4–5 μm in length, and oblong to ellipsoid straight ascospores (Bungartz & Nash 2004, Coppins et al. 2009). *Amandinea punctata* has flattened areoles when developed, with much longer, curved, thread-like conidia averaging 14–20 μm long (Scheidegger 2009). These additional records are the first for their respective regions and extend its range north to the Thunder Bay District in Ontario where no previous records were reported (Ahti 1964, Crowe 1994).

Specimens examined. – **CANADA. ONTARIO.** FRONTENAC CO.: Bon Echo Provincial Park, ca. 9.8 km N of Cloyne, E side of Mazinaw Lake, exposed W-facing granite/gabbro cliff along shore of lake, 27.ix.2018, on vertical rockface in epilittoral zone, S.R. Brinker 7321 (hb. Brinker). THUNDER BAY DIST.: Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, partially shaded E-facing shale outcrop at base of cliff with open canopy of *Betula papyrifera* and *Abies balsamea*, 19.vii.2017, on shale, S.R. Brinker 5814 (O, hb. Brinker).

***Calicium abietinum* Pers.**

NOTES. – *Calicium abietinum* is a widespread temperate calicioid lichen ranging in portions of Asia, Australasia, Central America, Europe, North America and South America (Tibell 1998). It occurs on lignum, bark or twigs of various conifers in well-lit situations, such as forests edges or open woods (Selva 2014). It was reported from a single site in southern Ontario by Wong and Brodo (1992) who considered it very rare. Elsewhere in the Great Lakes Basin it was reported to be a rare taxon by Harris (2015) from the Straits Counties of Michigan. In the Acadian Forest Region, it was not commonly encountered by Selva (2014). Here it was lignicolous on *Pinus rigida* in an extensive bedrock-controlled granite barren. It is characterized by its epruinose, mid-sized apothecia (0.6–0.9

mm tall) that are l-, brownish to olivaceous stalks, cylindrical asci, and large, 1-septate ascospores averaging 9–15 × 5–7 µm with papillate surfaces (Selva 1988, Tibell 1998). *Calicium glaucellum* Ach. is very similar but it differs from *C. abietinum* in having a white pruina on the lower side of the capitulum and smaller ascomata and ascospores (Tibell 1999).

Specimen examined. – **CANADA. ONTARIO. LEEDS & GRENVILLE CO.:** Charleston Lake Provincial Park, Blue Mountain, 9.3 km WNW of Mallorytown, summit of granite ridge in treed rock barren with *Pinus rigida*, *P. strobus* and *Quercus rubra*, 24.viii.2018, on large scar on trunk of *P. rigida*, S.R. Brinker 7217 & M. Burrell (CANL; det. S. Selva).

***Caloplaca saxicola* (Hoffm.) Nordin**

FIGURE 20A.

NOTES. – *Caloplaca saxicola* is a widespread crustose lichen found mainly through the interior portions of central and western North America (Wetmore & Kärnefelt 1998). It was first reported from Ontario by Brodo et al. (2013) on calcareous rocks of the upper Bruce Peninsula. These additional records extend its range north and west to the Thunder Bay and Rainy River Districts. It is a rare species in Ontario, confined to sheltered, but well-lit, base-rich rock, frequently found near water. It can be recognized by its small, roundish, orange, lobate thallus with narrow (1–2 × 0.3–1 mm), convex lobes that lack soredia and isidia, and produce apothecia near the lobe tips (Wetmore 2007b). The reports cited here extend the range of the species in the province north to the Thunder Bay District and west to the Rainy River District.

Specimens examined. – **CANADA. ONTARIO. BRUCE CO.:** Fathom Five National Marine Conservation Area, SE side of Echo Island, Georgian Bay, sheltered limestone cliff and talus slope with *Thuja occidentalis*, 19.vi.2019, on limestone, S.R. Brinker 7623 (CANL). **RAINY RIVER DIST.:** Quetico Provincial Park, 75 km SE of Atikokan, S shore of Emerald Lake near NE end, sheltered underhang of steep N-facing rockface along lake, 19.viii.2016, on exposed metamorphic (greenstone) rock, S.R. Brinker 5287 & P. Scott (CANL). **THUNDER BAY DIST.:** Lake Superior National Marine Conservation Area, N end of Brodeur Island, 51 km S of Nipigon, base of E-facing cliff among rocky talus with scattered *Betula papyrifera* and *Abies balsamea*, 25.vii.2019, on rock S.R. Brinker 6836B (CANL); E shore of Wolf Lake, 13.5 km NW of Dorion, sheltered W-facing underhang of rockface along shore, 1.viii.2018, on sandstone, S.R. Brinker 6902 (CANL).

***Cetraria aculeata* (Schreber) Fr.**

FIGURE 20B.

NOTES. – *Cetraria aculeata* is a widespread boreal-arctic species often found in maritime-influenced regions (Sinigla et al. 2014, Thell & Kärnefelt 2011). In North America it occurs mainly in arctic and alpine regions from Alaska south to California, and historically as far south as the Appalachian Mountains in the east (Thomson 1984). It has a wide ecological amplitude found in acidic or basic heathlands, coastal sand dunes, calcareous steppes, or mossy areas around frost boils in tundra (Thell & Kärnefelt 2011, Thomson 1984). Ahti (1964) first mentioned its presence in Ontario from the Sutton Narrows and the species was included in a checklist of Ontario lichens by Newmaster et al. (1998) but it has never been formally reported. During the present study it was collected from dwarf heath maritime tundra along Hudson Bay where it grew among mosses over calcareous sand. It is characterized by its fruticose thallus that grows up to 4 cm high with the main branches becoming flattened (up to 1 mm wide) with short and spinescent branchlets, deeply concave and elongate whitish pseudocyphellae, and C-medulla (containing protolichesterinic acid) (Duke & Purvis 2009, Thomson 1984).

Specimen examined. – **CANADA. ONTARIO. KENORA DIST.:** West Pen Island, 123 km NW of Fort Severn, 7.6 km NW of Oosteguanako Creek mouth, Hudson Bay, moist *Rhododendron lapponicum-Vaccinium uliginosum* dwarf shrub tundra, 26.vi.2014, on sand among mosses, S.R. Brinker 3763 (CANL).

***Chaenotheca stemonea* (Ach.) Müll.Arg.**

FIGURE 20C.

NOTES. – *Chaenotheca stemonea* is widely distributed in temperate regions of eastern and western North America where it is corticolous or lignicolous on a variety of conifers and hardwoods (Selva 2014, Tibell 1999). Here it was collected on the lower bark of *Pinus strobus* L. It was previously reported in Ontario by Crowe (1994) from the Thunder Bay District and by Brodo et al. (2013) from Bruce Peninsula National Park. This report extends its range in the province west to the Lake of the Woods region in Kenora District. It is characterized by the thin, farinose, glaucous-green thallus that is P+ yellow-red (containing barbatic and obtusatic acid) with a *Stichococcus* photobiont, and the brown capitulum that has a contrasting collection of paler, brown ascospores that have been caught in what is left of the excipulum (Selva 2014, Tibell 1998).

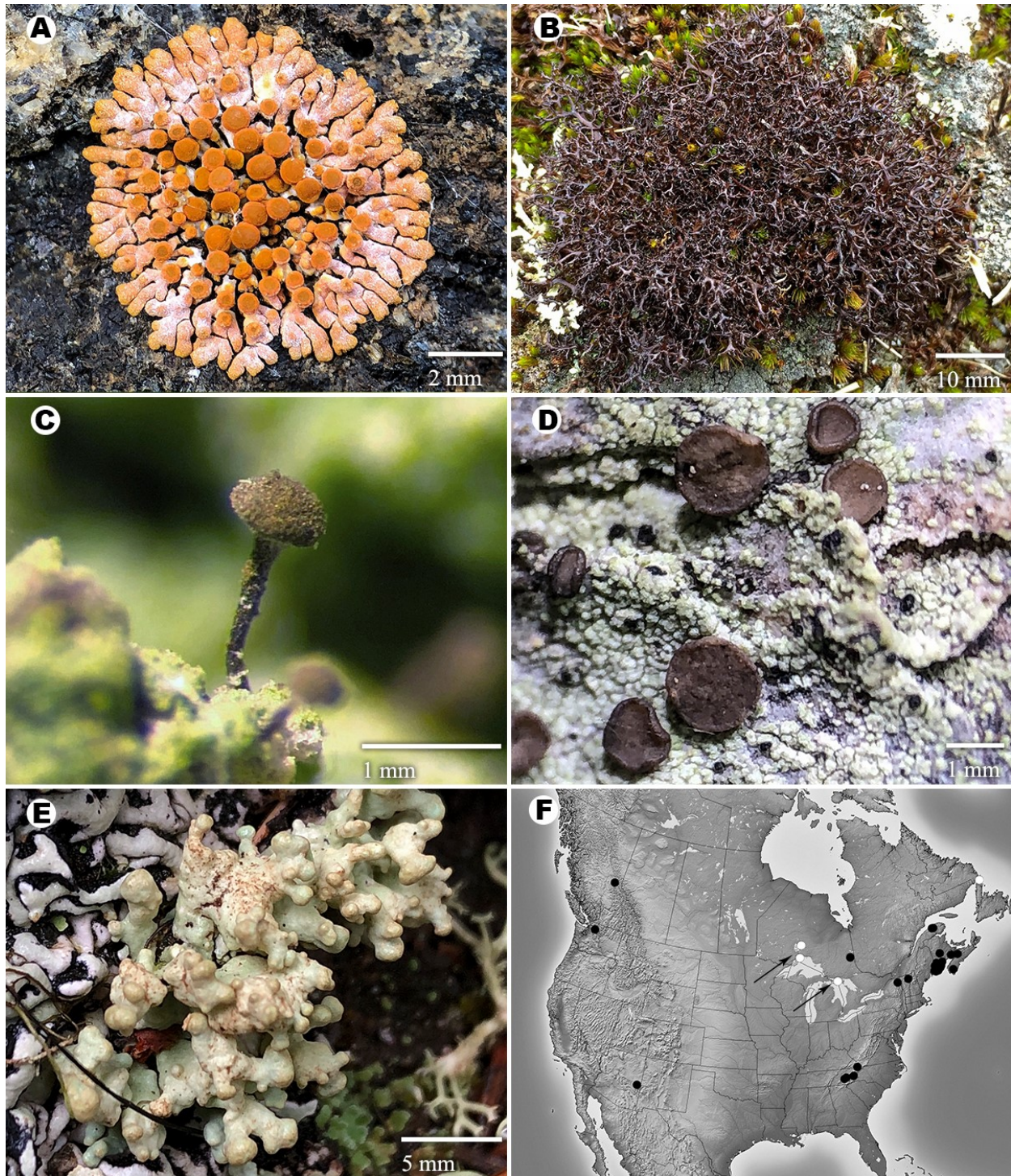


Figure 20. Photographs and distribution map of rare or otherwise rarely reported lichens and allied fungi in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Caloplaca saxicola* (photo taken in situ). **B**, *Cetraria aculeata* (photo taken in situ). **C**, *Chaenotheca stemonea* (Brinker 6124). **D**, *Cliostomum griffithii* (Brinker 6835). **E**, galls of the lichenicolous heterobasidiomycete *Cyphobasidium hypogymniicola* on *Hypogymnia incurvoides* (photo taken in situ, Brinker 7057). **F**, distribution of *C. hypogymniicola* in North America.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Shoal Lake, Drum Island, 37 km SW of Kenora, old-growth conifer woods with *Pinus strobus*, *Abies balsamea* and *Betula papyrifera*, 12.ix.2017, on bark of old *P. strobus*, S.R. Brinker 6124 (CANL).

†*Chaenothecopsis perforata* Rikkinen & Tuovila

NOTES. – *Chaenothecopsis perforata* was recently reported from a number of locations in North America including three Ontario counties where it occurred on the exudate of *Rhus typhina* L. (Gockman et al. 2019). The following specimens are from additional regions of Ontario, extending its range south to Norfolk County in the Carolinian Zone where it was likewise resinicolous on *R. typhina*. The species is probably common in the study area considering the abundance and distribution of its host which extends north to at least the Nipissing District (Soper & Heimburger 1982).

Specimens examined. – CANADA. ONTARIO. LEEDS & GRENVILLE CO.: Thousand Islands National Park, S side of Grenadier Islands along St. Lawrence River, mixed woods on S-facing rocky slope with *Quercus rubra*, *Prunus serotina*, *Pinus strobus* and *Juniperus virginiana*, 14.v.2019, on *R. typhina*, S.R. Brinker 7489 (CANL). NORFOLK CO.: Vittoria Baptist Cemetery, 4.5 km NW of Port Ryerse, scrubby fencerow bordering deciduous forest, 17.ii.2020, on *R. typhina*, S.R. Brinker 8312 (CANL); Linwood Trail, Port Dover, 1.6 km N of Lake Erie, shrub thicket with scattered deciduous trees, 20.ii.2020, on *R. typhina*, S.R. Brinker 8321 (hb. Brinker).

Cliostomum griffithii (Sm.) Coppins

FIGURE 20D.

NOTES. – *Cliostomum griffithii* occurs on decorticated wood and acidic bark of conifers in coastal forests of oceanic regions in eastern and western North America (Brodo et al. 2001). It is disjunct in the southern Appalachian Mountains (Lendemer et al. 2013) and the Great Lakes Basin (Crowe 1994, Harris 2015). The specimens cited below are the only recent records of this species from the study area where it occurred in coastal boreal forest habitat of Lake Superior. It is extremely variable with a thin or thick, continuous, areolate or granular thallus that is whitish, pale-grey to yellow-grey, with flat, to strongly convex, weakly pruinose apothecia ranging in colour from pale yellow, pink, to black. It has narrowly ellipsoid to baciliform 1-septate ascospores, and black pycnidia 0.1–0.2 mm in diameter that have purplish brown and K+ purple walls (Ekman 1997, Gowan 1990).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: N shore of Lake Superior, NE side of Brodeur Island, 50 km S of Nipigon, coastal mixed conifer woods with *Picea mariana*, *Abies balsamea*, and *Betula papyrifera*, 25.vii.2018, on bark of *P. mariana*, S.R. Brinker 6835 (CANL); Lake Superior National Marine Conservation Area, Cebina Island between St. Ignace and Simpson Islands, open conifer woods with *Picea glauca*, *Picea mariana* and *Betula papyrifera*, 21.vii.2019, on bark of *P. glauca*, S.R. Brinker 7838 (CANL).

†*Cyphobasidium hypogymniicola* (Diederich & Ahti) Millanes, Diederich & Wedin

FIGURE 20E & 20F.

NOTES. – *Cyphobasidium hypogymniicola* is a lichenicolous heterobasidiomycete that induces the formation of irregular, bullate galls with constricted bases which are initially concolourous with the host thallus and become more brownish with age (Diederich 1996). Reported hosts include: *Hypogymnia imshaugii* Krog, *H. physodes* (L.) Nyl., *H. vittata* (Ach.) Parrique and *Cavernularia hultenii* (Degel.) Krog (Diederich 2007). Here it is reported from *H. incurvoides* Rass. and *H. physodes*. Given the locations of collections made in North America (CNALH 2010), the species seems limited to more distinctly humid boreal and high elevation forests of the Rocky Mountains in the west, high elevation forests of the Appalachian Mountains, and coastal areas of New England and the Canadian Maritimes in the east (Fig. 20F). Two previous reports from Ontario are known including a 1958 collection from Lake Nipigon (Diederich 1996, as *Cystobasidium hypogymniicola*) and a 1959 collection from near Kirkland Lake (Diederich 2003, as *C. hypogymniicola*). The specimens cited here are the first reports in over 50 years and extend its range south to the Lake Huron Basin. Its conspicuous deformed and inflated galls on host species of *Hypogymnia* are easily recognizable in the field, and it should be looked for elsewhere on its hosts in humid forests of the Great Lakes-St. Lawrence and Boreal Forest regions.

Specimens examined. – CANADA. ONTARIO. MANITOULIN DIST.: Manitoulin Island, 300 metres inland of Lake Huron, between Portage Bay and Murphy Harbour, 2.5 km SE of Lorne Lake, open alvar with *Juniperus horizontalis*, *Dasiphora fruticosa*, *Juniperus virginiana* and *Pinus banksiana*, 02.vi.2014, on *Hypogymnia physodes* on dead conifer branches, S.R. Brinker 3426 (CANL). THUNDER BAY DIST.: 43 km NW of Jellicoe, 6 km E of Lake Nipigon, managed mixed boreal forest with localized rock outcrops, 6.vii.2018, on *Hypogymnia incurvoides*, S.R. Brinker 7057 (NY); Lake Superior, St. Ignace Island, 41 km SE of Nipigon, humid *Abies balsamea*

– *Betula papyrifera* – *Picea glauca* mixed boreal forest, 18.vii.2019, on *H. physodes* on conifer twigs, S.R. Brinker 7718 (NY, hb. Brinker; conf. J.C. Lendemer).

***Dermatocarpon dolomiticum* Amtoft**

FIGURE 21A.

NOTES. – *Dermatocarpon dolomiticum* is a species confined to calcareous rock, particularly on unbroken exposures or fragments of dolostone. It is widely distributed in eastern North America, reported from Oklahoma, Iowa, Massachusetts, Missouri, New York, Ohio and Wisconsin (Amtoft et al. 2008, Showman 2019). It was reported from Canada from Silurian dolomitic outcrops of the Niagara Escarpment on the upper Bruce Peninsula (Brodo et al. 2013). The additional records cited here extend its range north to the Manitoulin Island, a northerly extension of Niagara Escarpment, and south to the Hastings County on Ordovician exposures where it occurred in alvars associated with the Napanee Plain. The species closely resembles *D. muhlenbergii* (Ach.) Müll.Arg., and both can grow in the same habitat, though the thallus lobes of that species are more often entire rather than deeply dissected, the thallus is usually brown to blue-green not brown-black, and with larger perithecia ($420\text{--}600 \times 355\text{--}565 \mu\text{m}$ vs. $162\text{--}320 \times 130\text{--}360 \mu\text{m}$ in *D. dolomiticum*; fide Amtoft et al. 2008). *Dermatocarpon dolomiticum* also has a much narrower ecological amplitude, restricted to dolomitic limestone in alvars and cedar glades (Amtoft et al. 2008) whereas *D. muhlenbergii* grows in a wide variety of habitats on both calcareous and acidic rock (Amtoft et al. 2008). In Canada, it is a candidate species considered possibly at risk pending a federal status assessment due to its restriction to globally rare alvar habitat (COSEWIC 2019a).

Specimens examined. – **CANADA. ONTARIO. BRUCE CO.:** Fathom Five National Marine Park, SW corner of Bear's Rump Island, Georgian Bay, moist alvar grassland pavement with *Carex scirpoidea* ssp. *convoluta*, *S. scoparium*, *Eleocharis compressa* and *S. heterolepis*, 13.vi.2017, on exposed limestone pavement, S.R. Brinker 5588 (CANL). **HASTINGS CO.:** Bend Bay Alvar, S side of the Moira River, 7 km SW of Madoc, 600 m E of Bend Bay, open *Quercus macrocarpa* alvar grassland with *Rhus aromatica* and *Danthonia spicata*, 12.vii.2017, on exposed limestone, S.R. Brinker 5683 & W. Bakowsky (CANL); 3.5 km W of Marysville, 17 km E of Belleville, opening in *Juniperus virginiana*-dominated alvar pavement, 15.v.2019, on limestone fragment, S.R. Brinker 7523 & M. Burrell (hb. Brinker). **MANITOULIN DIST.:** Manitoulin Island, Queen Elizabeth The Queen Mother M'Nidoo M'Nissing Provincial Park, between East and West Belanger Bay, 400 m from shoreline, extensive shrubby alvar pavement with scattered *Pinus banksiana*, *Juniperus horizontalis* and *Dasiphora fruticosa*, 14.vi.2014, on limestone cobbles, S.R. Brinker 3366 (CANL); Misery Bay Alvar, 26 km SW of Gore Bay, Manitoulin Island, open alvar with *Schizachyrium scoparium*, *Danthonia spicata*, and *Sporobolus heterolepis*, 16.ix.2015, on exposed limestone pavement, S.R. Brinker 4710 & S. Dodsworth (CANL).

***Dibaeis baeomyces* (L. f.) Rambold & Hertel**

FIGURE 21B.

NOTES. – These appear to be the only recent records of *Dibaeis baeomyces* from Ontario since it was reported by Wong and Brodo (1992) based on a 19th century collection from Chatham-Kent (in extreme southwestern Ontario) and a historical collection from Haliburton County. The Chatham-Kent specimen is suspect. It was collected in 1875 by James Fowler, who lived in New Brunswick where he was an ordained Presbyterian minister. Fowler didn't arrive in Ontario until he left the ministry to embark on a teaching career as a lecturer in natural science at Queen's University in Kingston, in 1880 (Richards 2017). Fowler made other collections in 1875 from the Bass River area in Kent County, New Brunswick, and since there is no Bass River in Chatham-Kent Ontario, the reported location in Wong and Brodo (1992) is presumably in error and therefore the collection was not made in Ontario. Across its core eastern North American range, *D. baeomyces* occurs on disturbed or eroded soils often dispersing along trails or roads, though can also occur on decaying wood or shallow soil over rock (Thomson 1967, Tripp & Lendemer 2020a). The specimens collected during the present study were from rocky, silty soil in recently disturbed areas.

Specimens examined. – **CANADA. ONTARIO. NIPISSING DIST.:** E side of Hay Lake, 13 km S of Whitney, eroding, open N-facing slope at edge of mixed forest with invading *Pinus strobus* and *Abies balsamea*, 13.x.2019, on disturbed silty-stony soil, S.R. Brinker 8282 & T. Steeves (CANL). **SUDBURY DIST.:** Trans-Canada Highway 17, 13 km W of Sudbury, just E of Northwest Bypass, rocky outcrop along highway median, 13.iv.2019, terricolous on shallow silty soil over granite, S.R. Brinker 8258 (CANL, NY, hb. Brinker).

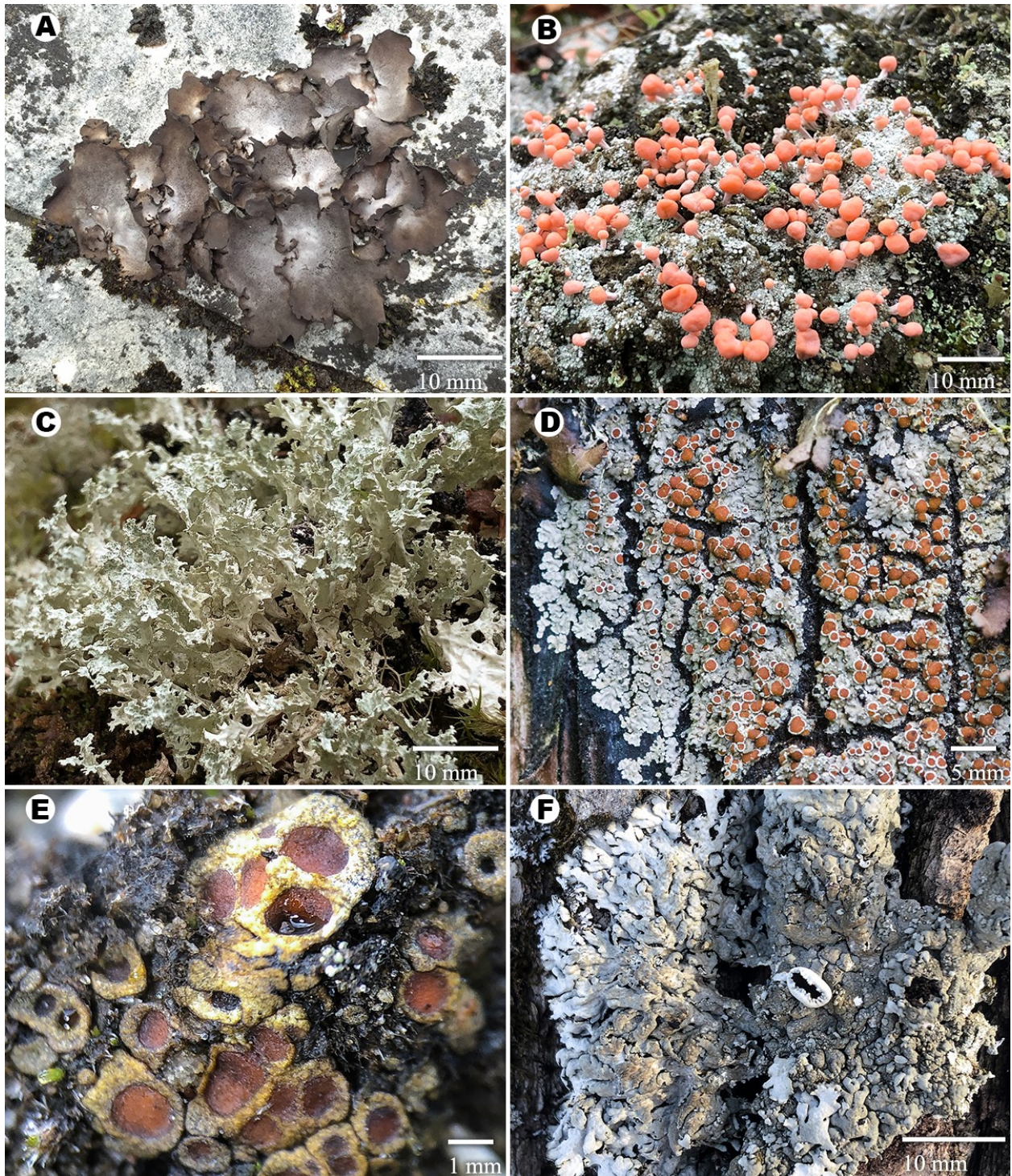


Figure 21. Photographs of rare or otherwise rarely reported lichens in Ontario. **A**, *Dermatocarpon dolomiticum* (photo taken in situ, Brinker 5683). **B**, *Dibaeis baeomyces* terricolous on acidic soil over granitic bedrock (photo taken in situ, Brinker 8258). **C**, *Flavocetraria nivalis* (photo taken in situ, Brinker 7722). **D**, *Fuscopannaria leucosticta* (photo taken in situ, Brinker 5744). **E**, *Heppia adglutinata* (photo taken in situ, Brinker 7506). **F**, *Heterodermia hypoleuca* (photo taken in situ, Brinker 7397).

***Flavocetraria nivalis* (L.) Kärnefelt & Thell**

FIGURE 21C.

NOTES. – *Flavocetraria nivalis* is a common and characteristic lichen of arctic and alpine environs in North America, ranging south with decreasing frequency in alpine areas in the east to New England and in the west to New Mexico (Thomson 1984). In the Great Lakes Basin, it was reported by Ahti (1964) from a single isolated island on Lake Superior separated from the nearest populations in the Hudson Bay Lowland by over 700 kilometers. These additional records reconfirm its presence in the Great Lakes Basin where it is a very rare arctic-alpine disjunct.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior, St. Ignace Island, 39.5 km SSE of Nipigon, mixed boreal forest with *Picea mariana*, *Abies balsamea* and *Betula papyrifera*, 18.vii.2019, among bryophytes on moist shaded rockface, S.R. Brinker 7722 (CANL); Lake Superior National Marine Conservation Area, E side of Bowman Island, exposed shoreline with cobblestone beaches and rock outcrops, 21.vii.2019, on dry ledge of exposed rockface, S.R. Brinker 7826 (CANL).

***Fuscopannaria leucosticta* (Tuck.) P.M. Jørg.**

FIGURE 21D.

NOTES. – *Fuscopannaria leucosticta* was once widespread in temperate forests of eastern North America but has declined throughout much of its former range like a number of other cyanolichens due to human-induced habitat alteration combined with the known sensitivity of cyanolichens to acidic precipitation (Richardson & Cameron 2004, Tripp & Lendemer 2020a). In the northeast, *F. leucosticta* is a corticolous species of softwoods restricted to old wet forests which are increasingly being harvested for pulpwood (COSEWIC 2019b). Recently, the species was recommended to be a nationally Threatened species by the Committee on the Status of Endangered Wildlife in Canada over concerns of declines in numbers of mature individuals due to logging of host trees, as well as changes in habitat quality and availability throughout its Canadian range (COSEWIC 2019b, ECCC 2019). The species is very rare in Ontario and these are the first reports from the Thunder Bay District and the first for Rainy River District in over a century, where it was last collected in 1901 by Bruce Fink (Jørgensen 2000). Here, it is restricted to mature cedar-dominated swamps with open canopies, where it typically occupies trunks of leaning cedar trees. *Fuscopannaria leucosticta* can be recognized by its distinct prothallus consisting of a blue-black fibrous mat extending beyond the closely appressed, overlapping greyish squamules typically producing abundant brownish to red apothecia with distinct thalline margins with white rims, and colourless, elliptical spores 19–23 × 9–11 μm including a clear gelatinous perispore that is smooth and usually tapered to a point at both ends (Jørgensen 2000). In Ontario, it is most likely to be confused with *Protopannaria pezizoides* (Weber) P. M. Jørg. & S. Ekman and *Vahlia leucophaea* (Vahl) P.M. Jørg. *Protopannaria pezizoides* has ascospores that are slightly larger, 25–30 × 9–12 μm with a perispore that has a distinct warty surface and blunt tips (Jørgensen 2000). *Vahlia leucophaea* is typically saxicolous and produces darker brown to black apothecia that often lack a thalline margin and has smaller ascospores, averaging 13–15 × 5–6 μm (Jørgensen 2000, as *F. leucophaea* (Tuck.) P.M. Jørg.).

Specimens examined. – CANADA. ONTARIO. RAINY RIVER DIST.: Quetico Provincial Park, 74 km SE of Atikokan, 100 N of NE corner of Emerald Lake, conifer swamp in valley with *Thuja occidentalis*, *Abies balsamea*, *Picea glauca*, and *Alnus incana* ssp. *rugosa*, on bark of *T. occidentalis*, 21.viii.2016, S.R. Brinker 5330 & P. Scott (CANL). THUNDER BAY DIST.: Albert Lake Mesa Provincial Nature Reserve, 53 km WNW of Nipigon, just W of Albert Lake, old-growth mixed boreal forest with *T. occidentalis*, *A. balsamea*, *Acer spicatum*, *Taxus canadensis*, and *Betula papyrifera*, 16.vii.2016, on *T. occidentalis*, S.R. Brinker 5072 (CANL); 55 km WNW of Nipigon, 1.9 km SSW of Disraeli Lake, *T. occidentalis* dominated swamp with *A. balsamea*, and *A. spicatum*, 17.vii.2017, on *T. occidentalis*, S.R. Brinker 5744 & C. Terwissen (CANL); S of Lankinen Rd., 12 km W of Cloud Lake, 21 km SE of Whitefish Lake, open conifer swamp with *T. occidentalis*, *Fraxinus nigra*, *A. incana* ssp. *rugosa*, and *A. balsamea*, 24.vii.2017, on leaning *T. occidentalis*, S.R. Brinker 5955 & C. Terwissen (CANL); 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old-growth *T. occidentalis* swamp with *A. balsamea* and *A. incana* ssp. *rugosa*, 25.vii.2017, on *T. occidentalis*, S.R. Brinker 5976 & C. Terwissen (CANL); 43 km W of Nipigon, 5.6 km S of Moraine Lake, old-growth *T. occidentalis*-dominated swamp with *F. nigra*, *Salix bebbiana*, and *Rhamnus alnifolia*, 26.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 6021 & C. Terwissen (CANL).

***Heppia adglutinata* (Krempelh.) A. Massal.**

FIGURE 21E.

NOTES. – *Heppia adglutinata* is a species of arid and temperate regions found in portions of Europe, Macaronesia and North America where it grows on calcareous soil (Henssen 1994). It was recently reported from globally rare alvars in Ontario (Brodo et al. 2013, Lewis & Brinker 2017), and listed as a national mid-priority

candidate species considered possibly at risk in Canada (COSEWIC 2019a). This additional record is the first for the Frontenac Axis where it grew over calcareous sand in an abandoned gravel pit. *Heppia adglutinata* can be identified by its gelatinous, olivaceous-brown, squamulate-to-peltate lobes (sometimes with raised margins) and distinctly delimited lower cortex with enlarged cells appressed to the substrata, with immersed reddish-brown apothecia (Henssen 1994). In the study area, *H. adglutinata* could be confused with species of *Peltula*, although members of that genus typically grow directly on rock, are connected to the substrate by a central umbilicus and lack the periclinally-oriented rhizoid hyphal attachments of *H. adglutinata* (Jørgensen 2012b).

Specimen examined. – **CANADA. ONTARIO.** LEEDS & GRENVILLE CO.: St. Lawrence Islands National Park, St. Lawrence River, S side of Hill Island, large abandoned gravel pit with extensive *Cladonia* spp. mats, 14.v.2019, on calcareous sand among bryophytes, *S.R. Brinker 7506 & M. Burrell* (CANL).

***Heterodermia hypoleuca* (Ach.) Trevis.**

FIGURE 21F.

NOTES. – *Heterodermia hypoleuca* is a widespread temperate eastern North American species that is corticolous on the bark of hardwoods (Brodo et al. 2001). It is the only non-sorediate species in the genus without marginal cilia that commonly produces apothecia in Ontario. It was recently reported from several mature deciduous swamps in Ontario by Lewis & Brinker (2017) after not having been found in the study area for over 70 years. It was also listed as a high priority candidate at-risk species due to concerns over declines in abundance, loss of habitat and climate change (COSEWIC 2019a) and is currently the subject of a federal status assessment to determine its Canadian at-risk status. Recent collections of this species are primarily from ash (*Fraxinus* spp.) with most collections from *Fraxinus pennsylvanica* in remnant, mature deciduous swamps. Emerald Ash Borer (*Agrilus planipennis*), an exotic wood-boring beetle from eastern Asia is a major threat killing ash trees in the province, and has raised concerns over the future of many ash species including *F. pennsylvanica* in North America (Cappaert et al. 2005) threatening species dependant on ash. Ash dieback in Europe has been highlighted as a major threat to a number of rare epiphytic lichens found mainly on *Fraxinus excelsior* that lack alternative host trees (Łubek et al. 2019). Here, *H. hypoleuca* is additionally reported from the bark of *Quercus macrocarpa*.

Specimens examined. – **CANADA. ONTARIO.** PETERBOROUGH CO.: Crowe River Conservation Reserve, mature deciduous swamp with *Acer saccharinum*, *Fraxinus* spp., and *Quercus macrocarpa*, 20.xii.2017, on bark of *F. pennsylvanica*, *S.R. Brinker 6304* (CANL); Otonabee River, 20 km S of Peterborough, deciduous swamp and levee forest with *Fraxinus* spp., *Acer ×freemanii* and *Quercus macrocarpa*, 28.ii.2019, on bark of *F. pennsylvanica*, *S.R. Brinker 7397* (CANL); Belmont Lake, W shore, 7 km NE of Havelock, mature rocky deciduous forest, 9.iv.2020, on bark of *Q. macrocarpa*, *S.R. Brinker 8369* (hb. Brinker).

***Heterodermia obscurata* (Nyl.) Trevisan**

FIGURE 22A.

NOTES. – *Heterodermia obscurata* is a widespread temperate eastern North American lichen of humid, lightly shaded, intact woodlands (Fryday & Wetmore 2002, Lendemer 2009a). Until recently, the few known Canadian occurrences were historical and the species was listed as nationally rare (Goward et al. 1998) with recent records from only Sandbanks Provincial Park (McMullin & Lewis 2014). These additional records of this provincially rare species expand its range in Ontario south to the Carolinian Zone.

Specimens examined. – **CANADA. ONTARIO.** NORFOLK CO.: 14 km SW of Port Dover, Turkey Point Provincial Park, edge of deciduous woods with *Quercus velutina*, *Q. alba*, and *Pinus strobus*, 12.ix.2018, on bark of *Q. velutina*, *S.R. Brinker 7287* (CANL). PETERBOROUGH CO.: Otonabee River, 11 km S of Peterborough, edge of lowland deciduous forest and *Acer ×freemanii* deciduous swamp, 19.iii.2019, on bark of *F. americana*, *S.R. Brinker 7403* (CANL).

***Hyperphyscia syncolla* (Tuck. ex Nyl.) Kalb**

FIGURE 22B.

NOTES. – *Hyperphyscia syncolla* reaches its northern limit in Ontario where it has been reported from several protected natural areas along Lake Ontario in Prince Edward County (Lewis & Brinker 2017, McMullin & Lewis 2014). The additional records cited below extend its range in the province west to Lake Huron and south to Lake Erie. In the study area, it is considered a rare species restricted to coastal areas of the lower Great Lakes where it is corticolous on basic, well-lit bark of a variety of hardwoods including *Populus deltoides*, *Juniperus virginiana*, *Celtis occidentalis* and *Acer nigrum*. It should be looked for elsewhere in open woods of the Carolinian Zone, especially in humid locations near shorelines or extensive wetlands.

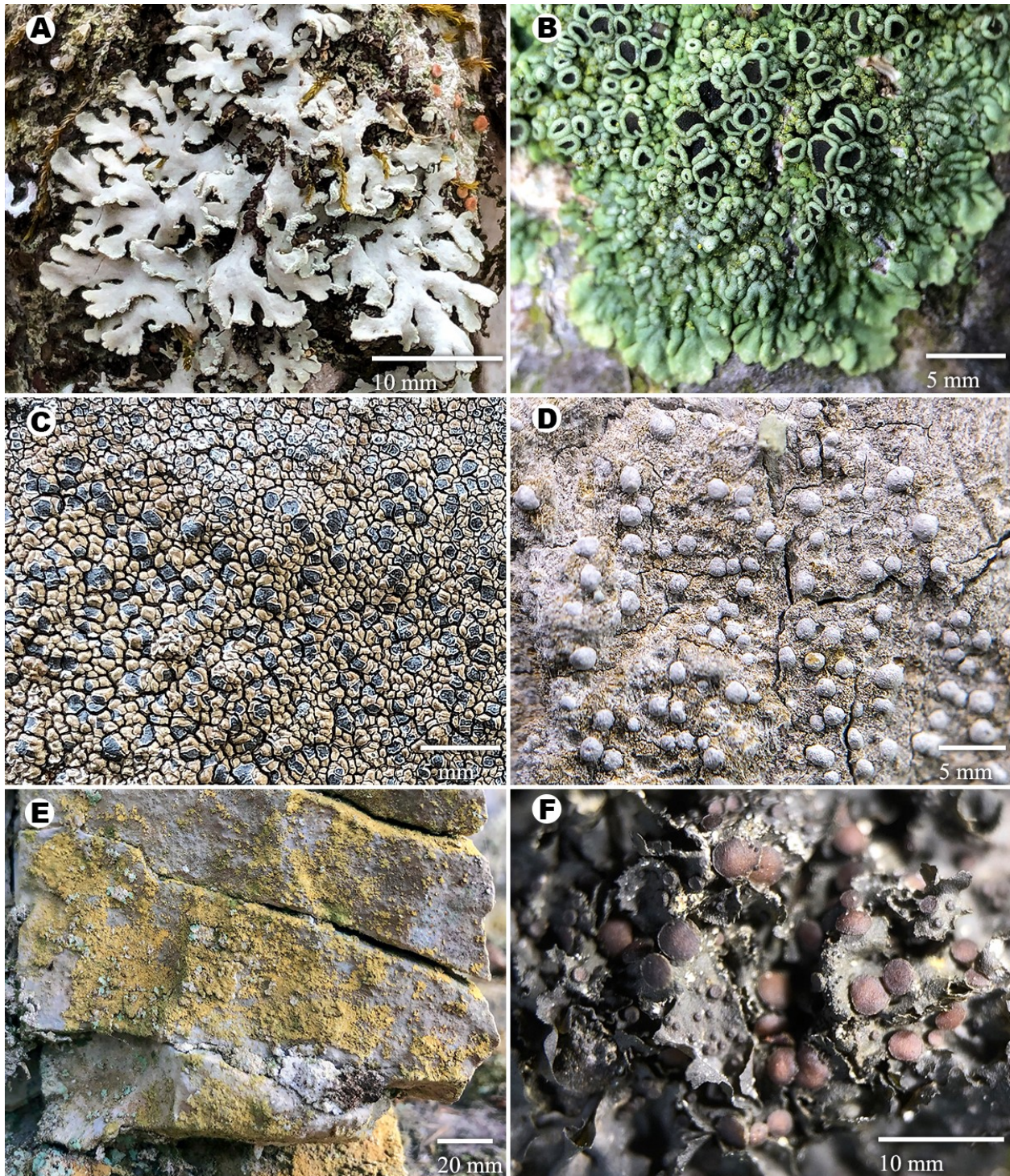


Figure 22. Photographs of rare or otherwise rarely reported lichens in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Heterodermia obscurata* (photo taken in situ, Brinker 7403). **B**, saturated thallus of *Hyperphyscia syncolla* (photo taken in situ, Brinker 7532). **C**, *Immersaria athroocarpa* (Brinker 7140). **D**, *Inoderma byssaceum* (Brinker 8368). **E**, *Leptoplaca chrysodeta* on vertical dolostone outcrop (Brinker 8372). **F**, *Leptogium rivulare* (Brinker 6966).

Specimens examined. – **CANADA. ONTARIO.** ESSEX CO.: Point Pelee National Park, Lake Erie, Northwest Beach, edge of mature sandy deciduous forest, 28.v.2019, on bark of *Celtis occidentalis*, S.R. Brinker 7532 (CANL, hb. Brinker). LAMBTON CO.: Pinery Provincial Park, Lake Huron, Day Use area N of The Dunes, coastal foredune with *Populus deltoides*, *Juniperus virginiana* and *Ammophila breviligulata*, 1.x.2013, on bark of *P. deltoides*, S.R. Brinker 3265A (CANL). PRINCE EDWARD CO.: St. Lawrence Islands National Park, Lake Ontario, N shore of Yorkshire Island, *Acer nigrum* – *Carya ovata* deciduous forest, 6.v.2019, on bark of *A. nigrum*, S.R. Brinker 7554 (CANL).

***Hypogymnia vittata* (Ach.) Parr**

NOTES. – *Hypogymnia vittata* is widespread in humid, oceanic boreal forests on both the east and west coasts of North America, extending locally to interior regions in mature coniferous forests and bogs where it is epiphytic on conifer bark and twigs, or shaded mossy vertical rocks in high elevation areas (Brodo et al. 2001, Gowan & Brodo 1988, Goward 1994, Hinds & Hinds 2007, Lendemer et al. 2013, Selva 1989). This is only the second confirmed report of *H. vittata* from Ontario and the first in over 40 years. Crowe (1994) previously cited a single 1977 Clifford Wetmore specimen from the Slate Islands. In Ontario, its apparent restriction to humid coastal boreal forests on islands in Lake Superior suggests it is a very rare species in the Great Lakes Basin where it is disjunct from its mainly maritime-boreal and montane distribution. It can resemble *H. physodes* but differs in having narrower, almost linear lobes from 1–2.5 mm wide (vs. 4 mm wide in *H. physodes*) with short marginal lobules at right angles, a dark medullary ceiling (vs. white in *H. physodes*), and a medulla that is P- (vs. P+ red in *H. physodes*) (Brodo 2016, Hinds & Hinds 2007). Here it occurred on a sheltered mossy rockface on the coast of Lake Superior.

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, N side of Talbot Island, sheltered N-facing cliff several metres above high-water mark, 19.vii.2019, among bryophytes on vertical rockface, S.R. Brinker 7750 & D. Tate (CANL).

***Immersaria athroocarpa* (Ach.) Rambold & Piet**

FIGURE 22C.

NOTES. – *Immersaria athroocarpa* is a widespread saxicolous species of metal-rich or mafic rock in arctic and alpine zones in portions of Asia, Australia Europe, North America, and the Sub Antarctic Islands (Hertel 2001, McCune 2017). Three previous historical collections were reported from Ontario by Hertel (2001) along the north shore of Lake Superior from Sault St. Marie north to Rossport. The additional specimens cited here extend its range west of Thunder Bay and inland north to Ouimet Canyon where it is saxicolous on mafic rock. It is characterized by the distinctly deeply-cracked brown angular areolate thallus with a cortex containing brown pigments and a distinct epinecral layer, immersed lecideine apothecia with I+ blue-violet medulla, and halonate ascospores averaging 15–24 × 8–12 µm (Fletcher et al. 2009b). It is most likely to be confused with *Lecidea atrobrunnea* (Raymond ex Lam. & DC.) Schaer., though the spores of that species are smaller (6.5–12 × 3.2–5 µm) and it has *Lecidea*-type asci (vs. *Porpidia*-type in *I. athroocarpa*) (McCune 2017).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior Provincial Park, Old Woman Bay, 26 km SW of Wawa, exposed rocky coastline, 10.viii.2018, on volcanic rock, S.R. Brinker 7140 (CANL). THUNDER BAY DIST.: E shore of Patterson Island, 700 m E of Two Bog Lake, Lake Superior, sheltered rocky cliff along coast, 16.viii.2014, on rock, S.R. Brinker 3985 (CANL), S.R. Brinker 7140 (CANL); S end of Ouimet Canyon, 60 km NE of Thunder Bay, steep S-facing open rocky talus slope below cliff, 4.viii.2015, on basalt, S.R. Brinker 4690 (hb. Brinker); Lake Superior, Big Trout Bay, 16 km S of Neebing, sheltered but open, E-facing rocky shoreline above highwater mark, 20.vii.2017, on large boulders, S.R. Brinker 5856 (CANL).

***Inoderma byssaceum* (Weigel) Gray**

FIGURE 22D.

NOTES. – *Inoderma byssaceum* was reported as rare in southern Ontario by Wong & Brodo (1992, as *Arthonia byssacea* (Weigel) Almq.), with collections from Renfrew County and the Ottawa area. It was also reported by McMullin and Lendemer (2013, as *A. byssacea*) from Simcoe County. Here it is reported from four additional counties and districts north to the Thunder Bay District where no previous records exist (Crowe 1994). *Inoderma* is characterized within Arthoniaceae by immersed to adnate, white pruinose apothecia with a well-developed hypothecium, hyaline transversely pluriseptate ascospores and conspicuous elevated, white pruinose pycnidia (Frisch et al. 2015). *Inoderma byssaceum* is characterized by its 4 to 6-celled ascospores that average 12–16 × 4.5–6 µm, with a slightly enlarged apical cell and emergent pycnidia, ranging in size from 0.15–0.4 mm in diameter, covered by a thick whitish pruina, with a 0.1–0.35 mm wide pore with pale fawn conidial masses commonly protruding from the pore (Brodo 2016, Frisch et al. 2015). It is an uncommon northern/boreal species in

North America (Lendemer et al. 2013, as *A. byssacea*) restricted to the trunks of old hardwood trees with deeply fissured or thick, corky flaking bark. The species is restricted to productive mature to old-growth forests or singular mature trees in locally humid situations and has experienced large declines throughout its range and is red-listed in many European countries (Frisch et al. 2015). In the study area it was recorded on the bark of old *Acer saccharum*, *Betula alleghaniensis*, *Quercus macrocarpa* and *Thuja occidentalis* in remnant mature, primarily hardwood forests.

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior Provincial Park, Sand River, upstream from mouth at Lake Superior, mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Thuja occidentalis* and *Acer spicatum*, on bark of old *B. alleghaniensis*, 28.vii.2019, S.R. Brinker 7974 (CANL). HASTINGS CO.: 40 km S of Bancroft, 1.5 km S of Tangamong Lake, conifer swamp with *T. occidentalis*, *A. balsamea*, *Picea mariana* and *Ulmus americana*, on bark of *T. occidentalis*, 9.v.2019, S.R. Brinker 7459a (CANL). PARRY SOUND DIST.: Raganooter Lake Conservation Reserve, 31.5 km W of South River, 13 km WNW of Bummer's Roost, deciduous forest with *Acer saccharum*, *Tsuga canadensis*, *B. alleghaniensis* and *Viburnum lantanoides*, on bark of mature *A. saccharum*, 30.ix.2016, S.R. Brinker 5450 & J. Rouse (CANL); N-side of Bray Lake, 9.4 km SE of Commanda, mature mixed forest with *A. saccharum*, *T. canadensis* and *B. alleghaniensis*, on bark of *A. saccharum*, 18.vi.2020, S.R. Brinker 8417 (CANL); SE side of Spring Lake, 16 km N of Magnetawan, mature deciduous hardwoods with *A. saccharum* and *Tilia americana*, 20.vi.2020, S.R. Brinker 8429 (CANL). PETERBOROUGH CO.: Crowe River Conservation Reserve, N-side of Rd. 504, 3.9 km ENE of Lasswade, mature deciduous swamp with *Acer saccharinum*, *Fraxinus* spp., and *Quercus macrocarpa*, on bark of *Q. macrocarpa*, 20.xii.2017, S.R. Brinker 6321 (CANL); Belmont Lake, W shore, 7 km NE of Havelock, mature rocky deciduous forest, 9.iv.2020, on bark of *Q. macrocarpa*, S.R. Brinker 8368 (hb. Brinker); Brookwood Conservation Area 9 km N of Norwood, edge of lowland mixed forest and deciduous swamp with *T. occidentalis*, *A. balsamea*, *F. nigra* and *Populus tremuloides*, 20.vii.2020, on bark of *T. occidentalis*, S.R. Brinker 8489 (hb. Brinker). THUNDER BAY DIST.: Michipicoten Island Provincial Park, 600 m E of Schafer Bay, Lake Superior, old-growth *A. saccharum* deciduous forest on N-facing slope with *Taxus canadensis* and *Acer spicatum*, 28.vii.2016, on bark of *A. saccharum*, S.R. Brinker 4539 (CANL).

***Lecanora epanora* (Ach.) Ach.**

NOTES. – *Lecanora epanora* was previously reported by Lewis and Brinker (2017) as a rare component of metallophyte lichen communities in the Thunder Bay and Nipissing Districts. The specimens cited here extend its range south to the Frontenac Axis in southeastern Ontario where it was found on several intrusive mafic rock outcrops along sheltered, but well-lit lakeshores. It is a small sorediate crustose lichen of rock rich in heavy metals with a yellow to yellow-green thallus, rounded, areolate lobes that are UV+ bright orange (rhizocarpic acid), and yellow to yellow-green C- and K- soredia that form on the surface of the areoles (Edwards et al. 2009). Apothecia have not observed on material from the study area.

Specimens examined. – **CANADA. ONTARIO.** FRONTENAC CO.: Bon Echo Provincial Park, E shore of Lower Mazinaw Lake, W-facing cliff along lakeshore, 30.v.2018, on exposed and sheltered rockface, S.R. Brinker 6483 (CANL); Frontenac Provincial Park, S shore of Birch Lake, N-facing rock outcrop along lakeshore, 27.ix.2018, in sheltered rock underhang in epilittoral zone, S.R. Brinker 7306 (CANL). LEEDS & GRENVILLE CO.: Thousand Islands National Park, Fitzsimmons Mountain, 10 km ENE of Brockville, base of S-facing forested cliff, 13.v.2019, on talus and lower portion of cliff face, S.R. Brinker 7473 (CANL).

***Lepraria cryophila* Lendemer**

NOTES. – *Lepraria cryophila* is a sterile leprose lichen found throughout portions of eastern North America, particularly at higher elevations in the Appalachian Mountains and in the Ozark Ecoregion, with scattered records north to Nova Scotia and Québec (Lendemer 2013). It occurs on non-calcareous rock in particularly humid microhabitats often with other uncommon species (Lendemer 2013). It was previously reported from Algonquin Provincial Park by Lendemer (2013). This is only the second report from Ontario and extends its range north to the Thunder Bay District. It can readily be recognized by its UV+ blue-white and KC+ red thallus (due to divaricatic and nordivaricatic acids) and *cryophila*-type placodioid thallus (Lendemer 2013, Lendemer et al. 2013).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Michipicoten Island Provincial Park, 600 metres E of Schafer Bay, Lake Superior, shaded cliff with large talus boulders in mixed woods, 28.vii.2015, at base of cliff on mafic rock, S.R. Brinker 4544 (NY; det. J.C. Lendemer).

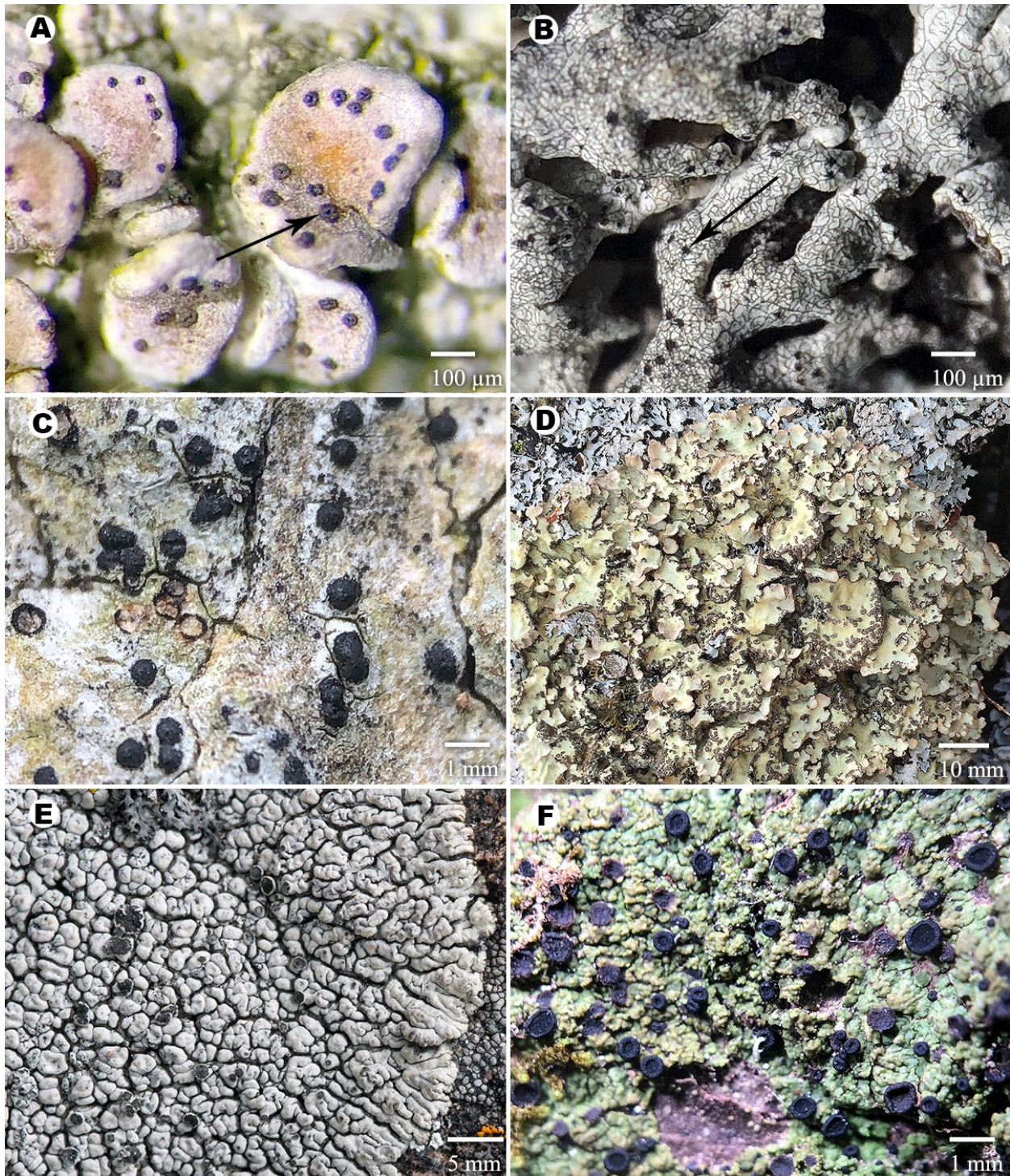


Figure 23. Photographs of rare or otherwise rarely reported lichens and allied fungi in Ontario. **A**, arrows indicating *Lichenodiplis lecanorae* ascomata lichenicolous on *Lecanora* apothecia (Brinker 8304). **B**, arrow indicating *Lichenostigma cosmopolites* ascomata and fungal hyphae lichenicolous on thallus of *Xanthoparmelia viriduloumbrina* (Brinker 6479). **C**, *Lithothelium hyalosporum* perithecia (Brinker 7562). **D**, *Lobaria scrobiculata* (photo taken in situ, Brinker 5019). **E**, *Lobotallia alphoplaca* (photo taken in situ, Brinker 7784). **F**, *Lopadium disciforme* (Brinker 8422).

***Leproplaca chrysodeta* (Vain.) J. R. Laundon ex Ahti**

FIGURE 22E.

NOTES. – *Leproplaca chrysodeta* is a sterile leprose lichen reported from scattered locations in southwestern, central, and eastern North America (Lendemer et al. 2013, Wetmore 2001, as *Caloplaca chrysodeta* (Vain. ex Räsänen) Dombr.). It is restricted to calcareous rocks where it grows in humid, sheltered situations, such as rock underhangs, cliffs or cave entrances (Wetmore 2001, as *C. chrysodeta*). It was previously reported from Ontario from the upper Bruce Peninsula (Brodo et al. 2013, Wetmore 2001, as *C. chrysodeta*). These additional published records are the first for their respective regions. It resembles a yellow *Chrysothrix*, but it can be distinguished by its K⁺ purple reaction due to the presence of anthraquinones, its more orange (vs. yellow) colouration, and its restriction to calcareous substrates (Laundon 1974, Lendemer et al. 2013, as *C. chrysodeta*).

Specimens examined. – **CANADA. ONTARIO.** HASTINGS CO.: Crowe River, Callaghan's Rapids Conservation Area, 3.5 km S of Marmora, mixed forest with *T. occidentalis*, *Ostrya virginiana* and *Tilia americana* with limestone outcrops, 24.v.2020, on limestone in dry sheltered underhang, *S.R. Brinker 8389* (CANL). KENORA DIST.: E of Witch Bay Camp Rd., 27 km SE of Kenora, 50 metres W of Hook Lake, rocky coniferous forest with *Thuja occidentalis* and *Abies balsamea*, 14.ix.2017, on greenstone in sheltered overhang, *S.R. Brinker 6171A* (CANL). PETERBOROUGH CO.: Warsaw Caves Conservation Area 12 km E of Lakefield, *T. occidentalis*-dominated coniferous forest with limestone outcrops, 5.v.2020, on limestone in sheltered underhang, *S.R. Brinker 8372* (hb. Brinker).

***Leptogium rivulare* (Ach.) Mont.**

FIGURE 22F.

NOTES. – *Leptogium rivulare* is a boreal-temperate cyanolichen found primarily in glaciated portions of eastern North America and eastern, central and western Europe, mainly between the 45°N and 60°N parallels. It grows on partially shaded basic bark or rock that experiences seasonal flooding along edges of alkaline water bodies (ponds, lakes, rivers vernal pools) that both fluctuate seasonally, and overlie calcareous bedrock or drain calcareous parent materials (COSEWIC 2015). In Ontario, it occurs in two distinct regions. The first is along the southern limit of the Canadian Shield in central Ontario from the Kawartha Lakes region east to the Ottawa River and in northwestern Ontario in the Boundary Waters Canoe Area Wilderness. The second is along several large river systems draining into Hudson Bay in the Boreal Forest Region within the glacial Lake Agassiz basin (Brinker & Scott 2017, COSEWIC 2015). This is the first report from the Thunder Bay District.

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Obonga-Ottertotooth Provincial Park, Obonga Lake, bay N of Cooney Lake, 50 km SW of Armstrong Station, small thicket swamp bordering lake with *Salix lucida*, *S. pellita* and *Fraxinus nigra*, 3.viii.2018, on seasonally flooded bark of *S. pellita*, *S.R. Brinker 6966* (CANL).

†*Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw.

FIGURE 23A.

NOTES. – *Lichenodiplis lecanorae* is a widespread conidial lichenicolous fungus in North America reported from a wide variety of hosts, but especially on apothecia of species of *Caloplaca* and *Lecanora* (Diederich 2004). A previous report is known from Bruce Peninsula National Park (Brodo et al. 2013). This is only the second report from Ontario, but is surely overlooked and likely common considering the abundance and distribution of known hosts.

Specimen examined. – **CANADA. ONTARIO.** PETERBOROUGH CO.: Warsaw Caves Conservation Area off Limestone Plains Trail, 12 km E of Lakefield, edge of *Thuja occidentalis*-dominated coniferous forest and alvar woodland, 3.xi.2019, on apothecia of *Lecanora* on twigs of *T. occidentalis*, *S.R. Brinker 8304* (CANL, hb. Etayo; det. J. Etayo).

†*Lichenostigma cosmopolites* Hafellner & Calatayud

FIGURE 23B.

NOTES. – *Lichenostigma cosmopolites* is a widespread lichenicolous fungus found on all continents except Antarctica, in lowland temperate regions and mid elevations of tropical regions, on species of *Xanthoparmelia* (Hafellner & Calatayud 1999). It produces vegetative hyphae that spread over the host thallus, visible as dark brown, septate, net-like single strands that connect to the ascomata (Hafellner & Calatayud 1999). The ascomata are subglobose to ellipsoid, dark brown to black, measuring 60–100 µm wide, with hyaline, subglobose, 8-spored asci and hyaline ascospores averaging 8–10 × 3–4 µm (Hafellner & Calatayud 1999). *Lichenostigma cosmopolites* was previously reported from the Cochrane District in Ontario based on a specimen collected in 1976 (Hafellner &

Calatayud 1999). This is only the second report for Ontario where it was lichenicolous on *X. viriduloumbrina* (Gyelnik) Lendemer. It is no doubt overlooked given the abundance of its hosts and extent of available habitat and should turn out to be more common with additional search effort.

Specimens examined. – **CANADA. ONTARIO.** FRONTENAC CO.: Bon Echo Provincial Park, E shore of Lower Mazinaw Lake, exposed W-facing rock outcrop below cliff along shoreline with *Juniperus communis* and *Woodsia ilvensis*, 30.v.2018, on *Xanthoparmelia viriduloumbrina* over granite, *S.R. Brinker 6479 & M. Burrell* (NY). THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, E side of Bowman Island directly S of St. Ignace Island, 38 km SSE of Nipigon, NE-facing rocky slope along coast with scattered *Betula papyrifera*, *Abies balsamea* and *Sorbus decora*, 19.vii.2019, on *Xanthoparmelia* on rock, *S.R. Brinker 7753* (CANL, hb. Etayo; det. J. Etayo).

***Lithothelium hyalosporum* (Nyl.) Aptroot**

FIGURE 23C.

NOTES. – *Lithothelium hyalosporum* is a small pyrenocarpous lichen that ranges from the Great Lakes Basin east to New England and south to North Carolina where it grows on a variety of hardwoods (Harris 1973, as *Plagiocarpa hyalospora* (Nyl.) R.C. Harris). According to Harris (1973) it is one of the most common pyrenolichens in the Great Lakes Region. However, all the Ontario material he examined was collected prior to 1960, with most being collected prior to 1920. Wong and Brodo (1992) listed the species as infrequent in southern Ontario, also based on these historical collections. It is surely overlooked, yet perhaps noteworthy that it was only collected here once from the bark of a very large, old oak in relatively undisturbed habitat. *Lithothelium hyalosporum* can be distinguished from other species in the genus by its IKI+ blue hymenium and colourless, hyaline, 3-septate ascospores averaging $18\text{--}27 \times 7\text{--}10 \mu\text{m}$ (Harris 1973).

Specimen examined. – **CANADA. ONTARIO.** PRINCE EDWARD CO.: Thousand Islands National Park, central portion of Yorkshire Island, Lake Ontario, rich deciduous woods with *Quercus rubra*, *Acer nigrum*, *Carya ovata* and *Ostrya virginiana*, 6.vi.2019, on bark of old *Q. macrocarpa*, *S.R. Brinker 7562* (CANL).

***Lobaria scrobiculata* (Scop.) DC**

FIGURE 23D.

NOTES. – These are the only recent collections *Lobaria scrobiculata* from Ontario. It was mapped from the Sibley Peninsula by Thomson (1984) and reported from the Thunder Bay District by Crowe (1994), but both were based on the same material collected by Irwin Brodo in 1968. The collections cited here are the first for the study area in over 50 years and extend its range north to the Hudson Bay Lowland where it was not reported by Ahti (1964). During the present study, the species was only found to occur on sheltered, well-lit cliffs, despite attempts to relocate the species at the previous collecting location made by Irwin Brodo 50 years ago, where it occurred on birch along the Gardner Lake Trail in Sleeping Giant Provincial Park. The lack of any recent epiphytic collections of this large and easily identified species in the Thunder Bay District strongly suggest declines have occurred, likely resulting from a combination of tree bark acidification and the reduction of mature forest cover through intensifying industrial logging practices which has been documented elsewhere (e.g., Gauslaa 1995). Suitable calcareous cliffs in the region surrounded by forest cover are most protected from acidic deposition and modern forestry practices and appear to be important local refugia for rare taxa such as *L. scrobiculata* and other declining cyanolichens in the region (S. Brinker, published data). Elsewhere in the Northeast, *L. scrobiculata* grows in mature humid forests where it is declining particularly away from coastal areas in New England (Hinds & Hinds 2007) and at high elevations in the southern Appalachian Mountains (Lendemer et al. 2013).

SPECIMENS EXAMINED. – **CANADA. ONTARIO.** COCHRANE DIST.: at the mouth of the Moose River, NE of Moosonee, along a NW-SE transect from shore over old strand lines, with *Picea glauca* on the ridges and *Alnus rugosa* – *Salix* spp. and finally *Larix laricina* in the depressions, 3.vii.1969, on willow logs and trunks at edge of *P. glauca*, *I.M. Brodo 14733 & J. Fabiszewski* (CANL). KENORA DIST.: Hawley Lake, Sutton Narrows, Sutton Lake, vi.1970, on rocks, *K.A. Kershaw 046* (CANL; conf. I.M. Brodo). THUNDER BAY DIST.: Sibley Peninsula, Trail to Gardner Lake just S of Pickerel Lake, mixed *Abies* – *Thuja* – *Pinus resinosa* stand, 13.vi.1968, on *Betula papyrifera*, *I.M. Brodo 13803* (CANL); Lake Nipigon, 46 km SE of Armstrong, W shore at Undercliff Mountain, humid, sheltered N-facing cliff above high water, 15.vii.2016, on diabase, *S.R. Brinker 5019 & A. Case* (CANL); Lake Superior National Marine Conservation Area, Brodeur Island, sheltered NE-facing rockface in coastal boreal forest with *Betula papyrifera*, *Abies balsamea* and *Acer spicatum*, 25.vii.2018, among bryophytes on rock, *S.R. Brinker 6840* (CANL); Sibley Peninsula, Sleeping Giant Provincial Park, Thunder Bay Lookout area, W-facing cliff under open canopy of *Betula papyrifera*, *Abies balsamea*, *Picea glauca* and *Thuja occidentalis*, 25.vii.2019, on sandstone, *S.R. Brinker 7915* (CANL, NY).

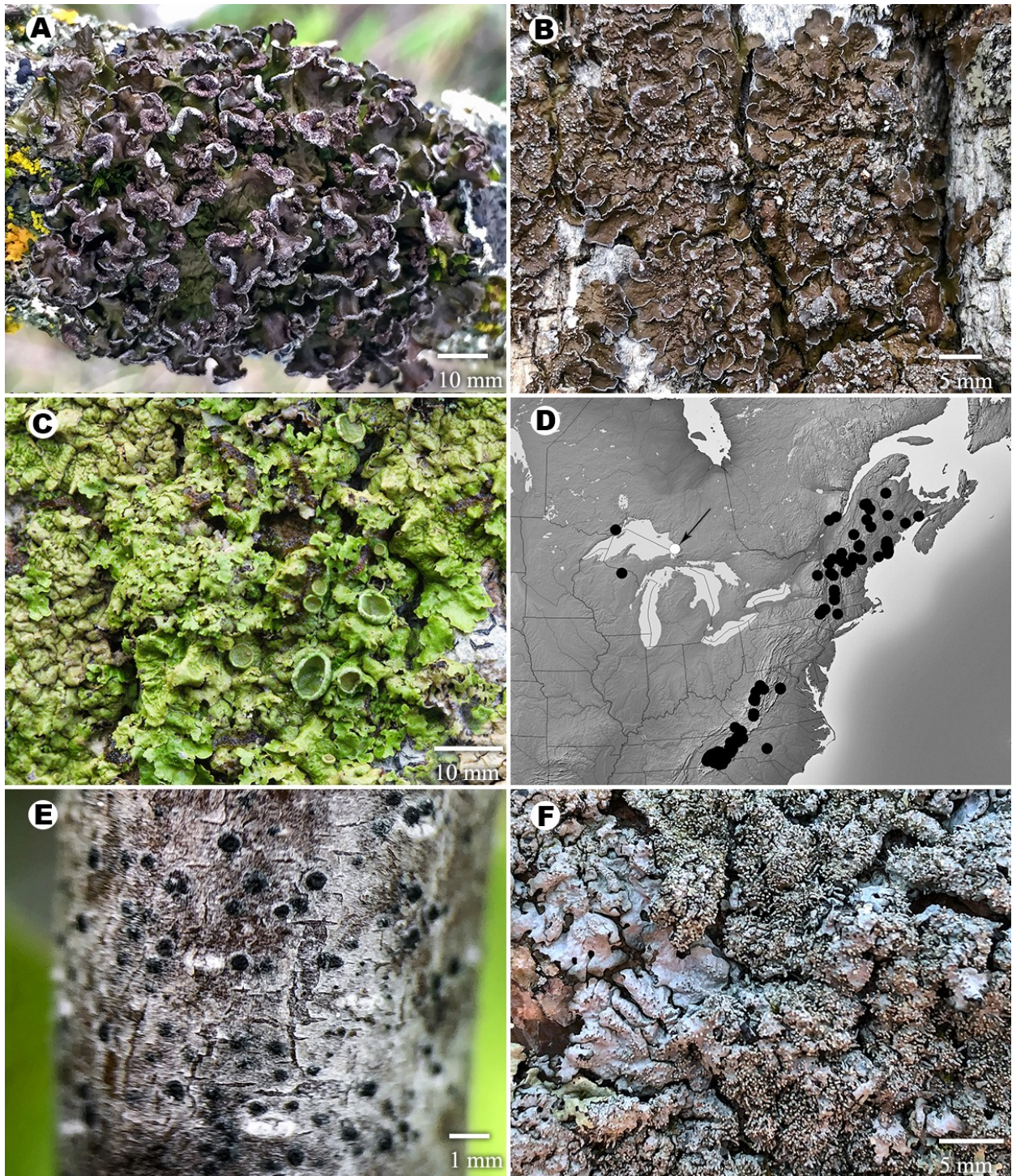


Figure 24. Photographs and distribution map of rare or otherwise rarely reported lichens in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Melanelixia albertana* (photo taken in situ, Brinker 6230). **B**, *Melanelixia subargentifera* (photo taken in situ, Brinker 8345). **C**, saturated thallus of *Melanohalea halei* (photo taken in situ, Brinker 6735). **D**, distribution of *M. halei* in North America. **E**, *Mycoglaena myricae* perithecia (Brinker 7888). **F**, close-up of *Myelochroa obsessa* showing isidia (photo taken in situ, Brinker 6370).

***Lobothallia alphoplaca* (Wahlenb.) Hafellner**

FIGURE 23E.

NOTES. – *Lobothallia alphoplaca* was first reported from Ontario by Crowe (1994) from Mount McKay in the Thunder Bay District. These additional records extend its range west to the Boundary Waters Canoe Area Wilderness in Rainy River District, and to the eastern shore of Lake Superior in Algoma District. It is a circumpolar species of arid regions as well as arctic and alpine zones where it occurs on weakly or non-calcareous rocks (McCune 2017, Thomson 1997). It is characterized by a thallus that is loosely attached to the substratum with strongly convex to almost cylindrical lobes that are whitish grey to light shades of brown, central areoles with strongly swollen tips and constricted bases, and ascospores averaging $11\text{--}16 \times 5\text{--}8 \mu\text{m}$ (McCune 2017, Paukov et al. 2019).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior coast, 1 km S of Deadman's Cove, 600 m N of Rousseau Island, sheltered bay with rock outcrops and adjacent upland rocky coniferous woods, 13.ix.2019, on basalt, *S.R. Brinker 8252* (CANL). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SSE of Atikokan, N shore of small unnamed lake between That Man Lake and Emerald Lake, edge of conifer forest on S-facing calcareous cliff along lake several metres above water, 20.viii.2016, on metamorphic (greenstone) rock, *S.R. Brinker 5314* (CANL). THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, S side of Talbot Island, Lake Superior, extensive exposed coastal rocky shoreline with splash pools, 20.vii.2019, on volcanic rock, *S.R. Brinker 7784* (CANL, O; det. E. Timdal).

***Lopadium disciforme* (Flotow) Kullhem**

FIGURE 23F.

NOTES. – *Lopadium disciforme* is a common and characteristic lichen of cool, humid, often sub-oceanic coniferous forests of eastern and western North America, as well as high elevation forests of the southern Appalachian Mountains where it occurs on acidic bark of conifers in spruce-dominated stands (Cameron 2002, Gowan & Brodo 1988, Lendemer et al. 2013, McCune 2017). Reports from the Great Lakes Basin are from the northern Lower and Upper Peninsula of Michigan (Harris 2015) with additional collections from Minnesota (CNALH 2010). While mapped from a small portion of Lake Superior by Brodo et al. (2001), these appear to be the first cited specimens from the study area, extending its range south to the Lake Ontario basin in southern Ontario where it was corticolous on the bark of *Thuja occidentalis* and *Tsuga canadensis*. It can be identified by its sparsely granular, olive brown thallus on bark and strongly muriform ascospores averaging $70\text{--}115 \times 23\text{--}45 \mu\text{m}$ (Gilbert & Purvis 2009). *Lopadium disciforme* was previously treated as a variety of *L. pezizoideum* (Ach.) Körb. which is very similar, but has a more brown true exciple and grows on moss and decaying vegetation in arctic and alpine habitats (Brodo et al. 2001, Stenroos et al. 2016).

Specimens examined. – **CANADA. ONTARIO.** PARRY SOUND DIST.: E side of Hwy. 11, 3 km N of Sundridge, conifer swamp with *Picea mariana*, *T. occidentalis*, *A. balsamea* and *Viburnum cassinoides*, 24.vi.2019, on bark of *T. occidentalis*, *S.R. Brinker 7658* (CANL); Eagle Lake, 10 km W of South River, mature mixed forest with *Tsuga canadensis*, *Betula alleghaniensis*, and *Acer rubrum*, on bark of *T. canadensis*, 15.vi.2020, *S.R. Brinker 8393* (CANL, hb. Brinker); N-side of Bray Lake, 9.4 km SE of Commanda, mature mixed forest on N-facing slope with *T. canadensis*, *B. alleghaniensis*, *T. occidentalis* and *A. rubrum*, 18.vi.2020, *S.R. Brinker 8422* (CANL). THUNDER BAY DIST.: 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, *Thuja occidentalis*-dominated conifer swamp with *Abies balsamea*, and *Alnus incana* ssp. *rugosa*, 25.vii.2017, on bark of *T. occidentalis*, *S.R. Brinker 5981* (CANL). HASTINGS CO.: 27 km N of Marmora, 1 km S of Tangamong Lake, conifer swamp with *T. occidentalis*, *A. balsamea* and *Ulmus americana*, 6.v.2019, on bark of *T. occidentalis*, *S.R. Brinker 7461* (CANL).

***Melanelixia albertana* (Ahti) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch**

FIGURE 24A.

NOTES. – *Melanelixia albertana* is a midwestern species ranging through the Great Plains north to the Aspen Parkland of southern Manitoba in North America (Brodo et al. 2001, as *Melanelia albertana* (Ahti) Essl.; Ahti 1969, as *Parmelia albertana* Ahti). It is mainly corticolous on deciduous trees and shrubs, especially *Salix* and *Populus* (Ahti 1969, as *P. albertana*). It reaches its eastern limit in extreme northwestern Ontario where the climate is warmer and drier than farther east in northern Ontario due to the influence of dry continental air masses from the prairies (Crins et al. 2009). *Melanelixia albertana* is characterized by marginal and strongly labriform soralia which distinguishes it from all other *Melanelixia* species (Brodo 2016).

Specimens examined. – **CANADA. ONTARIO.** KENORA DIST.: S side of Sugar Island, Severn River, 4.1 km WSW of Fort Severn, mixed forest of *Picea mariana* and *Populus balsamifera* on raised terrace, 25.vi.2014,

on bark of *P. balsamifera*, S.R. Brinker 3731 (CANL). RAINY RIVER DIST.: N bank of Rainy River, 250 m W of Cameron Creek mouth, *Crataegus*-dominated thicket along crest of slope of river with *Celastrus scandens*, 17.ix.2017, on branches of *Crataegus* spp., S.R. Brinker 6230 (CANL).

***Melanelixia subargentifera* (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch**

FIGURE 24B.

NOTES. – *Melanelixia subargentifera* is a mainly western taxon in North America, avoiding oceanic regions, attaining highest frequencies in mid-continental areas from Minnesota west to the Dakotas and south to Oklahoma and Arizona (Brodo et al. 2001, as *Melanelia subargentifera* (Nyl.) Essl.). It grows on a variety of basic deciduous and coniferous tree bark, as well as occasionally on rock (Otte et al. 2005, as *Melanelia subargentifera*). It was noted as being very rare in southern Ontario by Wong and Brodo (1992) who reported it only from a single early 20th century collection from Grey County, and it was not reported from the Thunder Bay District by Crowe (1994). Here, *M. subargentifera* is reported from five new southern and northwestern Ontario counties and districts where it was corticolous on well-lit, mature, open grown *Quercus* spp. and *Fraxinus* spp., as well as saxicolous on a sheltered rockface. Noted elsewhere as benefitting from the influence of increases in nitrophytes in open landscapes from road dust and agriculture (e.g. Otte et al. 2005), it may be increasing in southern Ontario owing to similar influences. The combination of marginal and laminal (arising from pustules) soralia, along with tiny hyaline hairs on the lobe tips distinguish *M. subargentifera* from other members of the genus in the study area (Hinds & Hinds 2007, as *Melanelia subargentifera*).

Specimens examined. – CANADA. ONTARIO. FRONTENAC CO.: Bon Echo Provincial Park, E shore of Upper Mazinaw Lake, W-facing cliff along lakeshore, 30.v.2018, on rock, S.R. Brinker 6510 (CANL). LENNOX & ADDINGTON CO.: 22 km N of Napanee, 4 km W of Marlbank, open-grown roadside tree, 6.vi.2018, on bark of *Q. macrocarpa*, S.R. Brinker 6520 (CANL). NORTHUMBERLAND CO.: Alderville, 2.5 km SE of Rice Lake, 21.v.2018, on bark of open-grown *Q. velutina*, S.R. Brinker 6447 (CANL). PETERBOROUGH CO.: Otonabee Gravel Pit Conservation Area, 11 km E of Fraserville, mature deciduous swamp with *Acer ×freemanii*, *Fraxinus pennsylvanica*, and *Ulmus Americana*, 12.iii.2020, on bark of *F. pennsylvanica*, S.R. Brinker 8345 (hb. Brinker). RAINY RIVER DIST.: SE shore of Lake of the Woods, between Budreau’s Beach and Rocky Point, remnant mature trees near shore of lake, 17.ix.2017, on bark of *Quercus macrocarpa*, S.R. Brinker 6220 (CANL). THUNDER BAY DIST.: Pigeon River Provincial Park, 50 km SW of Thunder Bay, 3 km W of Pigeon Bay, low-lying deciduous floodplain woods with *Fraxinus nigra*, *Salix* spp., and *Ulmus americana*, 18.vii.2016, on bark of *F. nigra*, S.R. Brinker 5101 (CANL); Kakabeka Falls Provincial Park, 26 km W of Thunder Bay, W side of Kaministiquia River, previously cleared lowland forest with remnant mature deciduous trees, 4.viii.2018, on *F. pennsylvanica*, S.R. Brinker 6993 (CANL).

***Melanohalea halei* (Ahti) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch**

FIGURE 24C & 24D.

NOTES. – *Melanohalea halei* is endemic to eastern North America and has an Appalachian-Great Lakes distribution where it is found in temperate forests on bark (Ahti 1966, as *Parmelia halei* Ahti, Hinds & Hinds 2007, as *Melanelia halei* (Ahti) Essl.). While its core distribution was mapped by Ahti (1966) from Nova Scotia and New Brunswick south through Maine to North Carolina, he also mapped it from a single location on the east shore of Lake Superior based on a 1958 collection by Henry Imshaug. The specimen cited below is the only the second published report for this species from Ontario and the first in over 60 years, reconfirming its presence in the Algoma District (Fig. 24D). *Melanohalea halei* is characterized by a closely appressed thallus that is pale brown and produces tiny lateral lobules centrally, medulla that reacts K⁺ yellow and P⁺ red (due to fumarprotocetraric acid), and its large ascospores averaging 15–20 × 8–12.5 μm (Ahti 1966, Hinds & Hinds 2007).

Specimen examined. – CANADA. ONTARIO. ALGOMA DIST.: 10 km S of Batchewana Bay, 1 km W of Mamainse Lake, mixed forest with *Thuja occidentalis*, *Acer saccharum*, and *Betula alleghaniensis*, 22.vii.2018, on *A. saccharum* and *B. alleghaniensis*, S.R. Brinker 6735 (CANL).

***Melanohalea subolivacea* O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch**

NOTES. – *Melanohalea subolivacea* is a western taxon commonly found on coniferous and deciduous trees in open, arid forests of the continental interior, though it does come close to the coast in California (Ahti 1966, as *Parmelia subolivacea* Nyl., Otte et al. 2005, as *Melanelia subolivacea* (Nyl.) Essl.). It was listed for Ontario by Newmaster et al. (1998, as *Melanelia subolivacea*) but was not mapped from the province by Ahti (1966) or Brodo et al. (2001). The presence of the species in the Hudson Bay Lowland is perhaps not surprising given the post-glacial migration of many western vascular plant species into the region from glacial refugia (Riley 2003), and the

prevalence of open, boreal spruce-lichen dominated conifer taiga in the region (S. Brinker, unpublished data). It is characterized by its non-sorediate and non-isidiate thallus with few or no pseudocyphellae, an absence of lichen substances (C-, K-, KC-, P-), abundant rhizines on the lower surface of the lobes, and its 8-spored asci (Brodo et al. 2001, as *Melanelia subolivacea*).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: E bank of Black Duck River, 700 m E of Manitoba border, 8 km S of Hudson Bay, ice-scoured clay floodplain along river with *Salix* spp. and *Populus balsamifera*, 6.vi.2014, on bark of *P. balsamifera*, S.R. Brinker 3758 (CANL; det. R.T. McMullin).

†***Muellerella erratica* (A. Massal.) Hafellner & V. John**

NOTES. – *Muellerella erratica* is a perithecioid lichenicolous fungus found on a wide range of lichens growing on calcareous and siliceous rock (Triebel 1989). It was previously reported from Ontario from the upper Bruce Peninsula where it was lichenicolous on *Protoblastenia rupestris* (Scop.) J. Steiner (Brodo et al. 2013). These are the first report from the Thunder Bay District.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior, Michipicoten Island Provincial Park, S shore of Channel Lake, 400 metres W of trail from Quebec Harbour, rocky base of N-facing cliff with scattered canopy of *Thuja occidentalis* and *Abies balsamea*, 29.vii.2015, on rock, S.R. Brinker 4597 (CANL, hb. Etayo; det. J. Etayo); Lake Superior National Marine Conservation Area, S-side of Talbot Island, Lake Superior, exposed coastal rocky shoreline with splash pools, on *Acarospora* on volcanic rock, 20.vii.2019, S.R. Brinker 7787B (hb. Brinker).

***Mycoblastus alpinus* (Fr.) Th. Fr.**

NOTES. – *Mycoblastus alpinus* was first reported from North America from Nova Scotia (Tønsberg 1993). It differs from the similar *M. affinis* (Schaer.) Schauer in being sorediate and producing both atranorin and usnic acid (Tønsberg 1993) giving the soralia a greenish-yellow appearance, vs. producing just atranorin (in *M. affinis*). A single published record exists for Ontario from Lake Nipigon (Crowe 1994). This is only the second report from Ontario. It is a circumpolar boreal-arctic species inhabiting plant remains, lignum, and soil (Tønsberg 1993).

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: 106 km NW of Fort Severn, E side of Mintiagan Creek, 7 km S of Hudson Bay coast, dry tundra beach ridge with *Rhododendron lapponicum*, *Empetrum nigrum*, *Vaccinium uliginosum*, *Astragalus alpinus*, and *Dryas integrifolia*, 27.vi.2014, on humus, S.R. Brinker 3776 (NY; det. J.C. Lendemer).

†***Mycoglaena myrica* (Nyl.) R.C. Harris**

FIGURE 24E.

NOTES. – *Mycoglaena myrica* is known from portions of Europe and North America on woody stems of *Alnus*, *Betula*, *Myrica*, and *Sorbus*. (Coppins 2009b). It was only recently reported from Ontario by Brodo et al. (2013) on *Myrica gale*. These are additional records and the first from their respective regions in the province. It is probably common and should be looked for elsewhere within the range of *M. gale* which extends from the Lake Ontario basin north to Hudson Bay where it grows along shorelines of lakes and rivers, as well as in conifer swamps and peatlands (Soper & Heimburger 1982). *Mycoglaena myrica* is characterized by its flattened perithecia that have green to greenish-brown or greenish-black pigments in the walls, 8-spored asci, and 3-septate ascospores averaging 18–23 × 6–8 µm (Harris 1973).

Specimens examined. – CANADA. ONTARIO. PARRY SOUND DIST.: W shore of Eagle Lake, 9.8 km W of South River, N side of Eagle Lake Rd., shrub-dominated rocky shoreline with *Alnus incana* spp. *rugosa*, *Ilex verticillata*, and *Ilex mucronata*, 26.vi.2018, on *Myrica gale*, S.R. Brinker 6656 (CANL). THUNDER BAY DIST.: mouth of Nipigon River, 2.5 km SE of Nipigon, poor fen with *Carex oligosperma*, *Rhynchospora alba* and *Xyris montana*, 23.vii.2019, on *M. gale*, S.R. Brinker 7888 (CANL).

***Myelochroa obsessa* (Ach.) Elix & Hale**

FIGURE 24F.

NOTES. – *Myelochroa obsessa* is endemic to eastern North America where it ranges through portions of Minnesota, Wisconsin and Ontario, east to the Piedmont Region of the U.S. and south to the Ozarks and Texas (Brodo et al. 2001, Harris & Ladd 2005). It is characteristic of lightly shaded siliceous rock outcrops in intact woodlands (Hale 1976, as *Parmelina obsessa* (Ach.) Hale), though it can rarely occur on the lower boles of hardwoods in similar habitats (Harris & Ladd 2005). Despite being considered common elsewhere in its range, *M. obsessa* was not reported from southern Ontario by Wong and Brodo (1992), and only recently reported from a single location in Renfrew County (McMullin & Lewis 2013). Here, *Myelochroa obsessa* is reported from two

additional southern Ontario counties where it was encountered on siliceous boulders in rocky deciduous woods and a sheltered, vertical rockface. It is characterized by its isidiate thallus with a pale-yellow medulla, lobe tips that are less than 2 mm broad, and a black lower cortex with short, simple marginal rhizines (Harris & Ladd 2005).

Specimens examined. – **CANADA. ONTARIO.** FRONTENAC CO.: Bon Echo Provincial Park, 27.5 km N of Kaladar, E shore of Lower Mazinaw Lake, W-facing cliff along lake, 30.v.2018, on rock, *S.R. Brinker 6502* (CANL). LENNOX & ADDINGTON CO.: 10 km S of Kaladar, W of Little Mellon Lake, N of Round Lake, S-facing rocky slope with *Pinus strobus*, *Quercus rubra*, *Tilia americana* and *Juniperus communis*, 28.iv.2017, on siliceous rock, *S.R. Brinker 5511* (CANL); 10 km SW of Kaladar, 8 km W of Mellon Lake, *Acer rubrum-Q. rubra-Ostrya virginiana* deciduous woods with rock outcrops, 30.iv.2018, on granite, *S.R. Brinker 6370* (CANL).

†*Ovicuculispora parmeliae* (Berk. & M. A. Curtis) Etayo

FIGURE 25A.

NOTES. – This lichenicolous fungus produces pink to orangish perithecia that develop over a loose network of white hyphae on a wide variety of foliose and fruticose host lichens (Hawksworth 1981). It is known from portions of Europe, North America and South America, and previously reported in Canada from Nova Scotia and Ontario (Brodo et al. 2013, Diederich 2003, Flakus et al. 2006, Maloles et al. 2018). Here it is reported from two additional regions where the species infected thalli of *Parmelia sulcata* Taylor and *Hypogymnia physodes*. It is characterized by 1(–3)-septate ascospores of two sizes: macroascospores averaging $34\text{--}50 \times 12\text{--}18 \mu\text{m}$ and microascospores averaging $8\text{--}17 \times 3.5\text{--}7 \mu\text{m}$ (Hawksworth 1981).

Specimens examined. – **CANADA. ONTARIO.** PETERBOROUGH CO.: Otonabee River, 10 km S of Peterborough, mature *Acer ×freemanii* deciduous swamp, 28.ii.2019, on *Parmelia sulcata* on bark of *A. ×freemanii*, *S.R. Brinker 7398* (CANL). THUNDER BAY DIST.: Obonga-Ottertooth Provincial Park 47 km SW of Armstrong, NE portion of Obonga Lake, mixed old-growth forest with *Thuja occidentalis*, *Populus balsamifera*, *Abies balsamea* and *Acer spicatum*, 3.viii.2018, on *Parmelia sulcata* and *Hypogymnia physodes* on twigs of *T. occidentalis*, *S.R. Brinker 6988* (CANL, NY; conf. J.C. Lendemer).

Pannaria tavaresii P.M. Jørg

FIGURE 25B & 25C.

NOTES. – Only one previous report of *Pannaria tavaresii* exists for Ontario, an Aino Henssen collection from southeast of Marathon along Lake Superior (Jørgensen 2000). Elsewhere in North America it occurs throughout temperate portions of the eastern Appalachians and Atlantic Coastal Plain, as well as western montane areas of Colorado south to Mexico (Jørgensen 2000; Fig. 25C herein). It is mainly corticolous in the southern portion of its range, while occurring mostly on rocks at high elevations (Jørgensen 2000). In Ontario, it is a rare cyanolichen and when encountered is typically saxicolous. It was listed as a national mid-priority candidate species considered possibly at risk in Canada (COSEWIC 2019a).

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: S end of Ouimet Canyon, 60 km NE of Thunder Bay, moist rocky conifer woods at bottom of canyon, 4.viii.2015, on sheltered vertical rockface, *S.R. Brinker 4668* (CANL; det. R.T. McMullin); Sleeping Giant Provincial Park, 28 km E of Thunder Bay, 1 km S of Sawyer Bay, second-growth mixed woods at base of N-facing cliff with *Betula papyrifera*, *Picea glauca*, and *Abies balsamea*, 26.viii.2016, on talus boulders, *S.R. Brinker 5423* (CANL); 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old *Thuja occidentalis* swamp with *Abies balsamea* and *Alnus incana* ssp. *rugosa*, 25.vii.2017, on bark of *T. occidentalis*, *S.R. Brinker 5977* (CANL); Obonga-Ottertooth Provincial Park, Ottertooth Canyon, 52 km SW of Armstrong, N-facing cliff with stunted *T. occidentalis*, 2.viii.2018, on lower rockface above lake, *S.R. Brinker 6949* (CANL); Lake Nipigon Conservation Reserve, 3.5 km S of Pine Portage, open coniferous forest with rock outcrops and localized cliffs, 8.viii.2018, on sheltered rockface, *S.R. Brinker 7092* (CANL, hb. Brinker); Ruby Lake Provincial Park, 3 km SE of Nipigon, 1.4 km NW of Ruby Lake, treed-portion of N-facing talus slope below cliff of Nor'Wester with scattered *Picea mariana* and *Betula papyrifera* surrounded by boreal forest, 23.vii.2019, on shaded rock outcrop, *S.R. Brinker 7879* (LKHD).

Parmotrema hypotropum (Nyl.) Hale

NOTES. – *Parmotrema hypotropum* was recently reported from near-coastal areas of Lake Erie in the Carolinian Zone of southwestern Ontario by Lewis & Brinker (2017). This additional record extends its range northeast to the Frontenac Axis along the St. Lawrence River. In Ontario, it is corticolous on sub-neutral to neutral bark and twigs in open woodlands or edges of woods. Elsewhere in its North American range it is can be common to locally abundant on trees (rarely rocks) in a wide variety of upland and lowland situations, usually in relatively well-lit environs (e.g. Lendemer & Noell 2018).

Specimen examined. – CANADA. ONTARIO. LEEDS & GRENVILLE CO.: Thousand Islands National Park, St. Lawrence River, SE shore of Grenadier Island, open *Juniperus virginiana* – *Quercus rubra* mixed rocky woods, 14.v.2019, on twigs of *J. virginiana*, S.R. Brinker 7502 (CANL).

***Parmotrema reticulatum* (Taylor) M. Choisy**

FIGURE 25D.

NOTES. – *Parmotrema reticulatum* has a widespread temperate eastern North America distribution where it occurs on well-lit trees and rocks in open woods (Brodo et al. 2001), but can also occur in anthropogenic-influenced habitat such as urban parks and suburbs of cities more so in the centre of its range (e.g. Harris & Ladd 2005). It reaches its northern limit in the Great Lakes Basin and New England where it is reportedly rare (e.g. Harris 2015, Hinds & Hinds 2007). A single previous Ontario report exists from the Niagara Region (Olszewski 2010). Here, *P. reticulatum* is reported from three additional, widely separate regions including Essex County in extreme southwestern Ontario, the upper Bruce Peninsula on Lake Huron, and the Boundary Waters Canoe Area Wilderness in Rainy River District. The specimens cited here include both corticolous and saxicolous material. The species is likely more common than current collections indicate, particularly given its ability to persist in urban areas.

Specimens examined. – CANADA. ONTARIO. BRUCE CO.: Bruce Peninsula National Park, ca. 1 km SW of Scugog Lake, open conifer woods with *Thuja occidentalis* and *Abies balsamea*, 13.vi.2018, on twigs of *T. occidentalis*, S.R. Brinker 6593 (NY; conf. J.C. Lendemer). ESSEX CO.: Wheatley Provincial Park, N shore of Lake Erie, 2 km S of Wheatley, open manicured parkland with mature trees along shoreline, 17.vii.2018, on bark of *Quercus rubra*, S.R. Brinker 6687 (NY; conf. J.C. Lendemer). RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, NE shore of Emerald Lake, mature open conifer woods with *Pinus resinosa*, *Pinus strobus* and *T. occidentalis*, 22.viii.2016, in sheltered crevice of two large boulders, S.R. Brinker 5356 (NY, hb. Brinker; conf. J.C. Lendemer).

***Parmotrema stuppeum* (Taylor) Hale**

FIGURE 25E.

NOTES. – *Parmotrema stuppeum* is not likely to be confused with any other northeastern *Parmotrema* species, differing morphologically by its narrow, linear soralia (Fig. 25E) on revolute lobe margins, with a medulla containing salazinic acid (Hinds & Hinds 2007). It is mainly distributed throughout the Appalachian Mountains with disjunct occurrences in Minnesota and Michigan (Brodo et al 2001, Wetmore 2005), where it is corticolous on horizontal branches or on bark of tree trunks (Hinds & Hinds 2007). It was found in the study area only once growing on *Betula alleghaniensis* and *Thuja occidentalis* in an undisturbed old forest stand near Lake Superior. While this paper was in press, a historical collection from 1957 made by H.A. Sierk was reported by McMullin (2019). The specimen cited here is the only modern collection of *P. stuppeum* from Ontario.

Specimen examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park, Sand River, 1.3 km upstream from mouth at Lake Superior, mature mixed forest with *Betula alleghaniensis*, *Abies balsamea*, *Betula papyrifera*, *Thuja occidentalis* and *Acer spicatum*, 11.vii.2016, on trunk of *B. alleghaniensis* and branches of *T. occidentalis*, S.R. Brinker 4946 (CANL, hb. Brinker).

***Peltigera venosa* (L.) Hoffm.**

FIGURE 25F.

NOTES. – *Peltigera venosa* is a widespread circumpolar species of boreal-arctic regions found in upland areas on moist, calcareous soil or among moss, especially on cliffs with ledges and on talus slopes (Thomson 1950, Vitikainen 2012). It was first reported from Ontario from the Gull River in Victoria County and along the Kaministiquia River at Thunder Bay (Macoun 1902). Ahti (1964) also reported it from rocks and alluvial soil on river banks in Sudbury District. Records reported here include additional locations from the Thunder Bay District north to Lake Nipigon where it was terricolous on sheltered rock ledges among moss on larger vertical rock faces in mixed boreal forests where typically only a few thalli were present. It is easily distinguished from all other Ontario species of *Peltigera* by its small thallus consisting of small, discrete or overlapping fan-shaped lobes (up to 2 cm in diameter) that are non-rhizinate and dark-veined on the lower surface, and its horizontal, round apothecia (Thomson 1950).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Nipigon, 26.5 km NW of Macdiarmid, N side of Hat Mountain Island, exposed, N-facing talus slope, 13.vii.2016, on siliceous rock, S.R. Brinker 4975 (CANL); Albert Lake Mesa Provincial Nature Reserve, 53 km WNW of Nipigon, just W of Albert La-

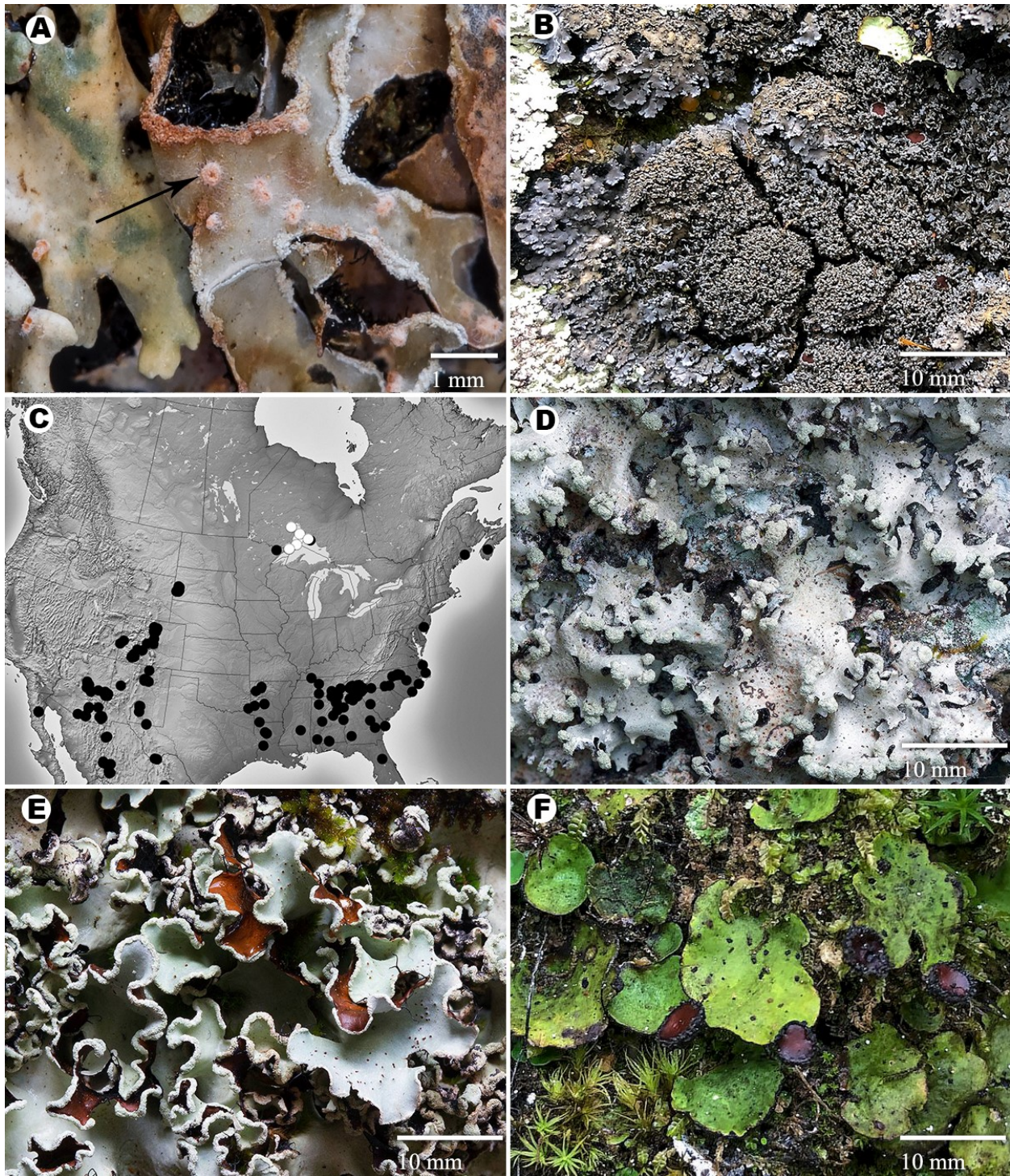


Figure 25. Photographs and distribution map of rare or otherwise rarely reported lichens and allied fungi in Ontario (white = newly reported Ontario records, black = previous collections). **A**, arrow indicating *Ovicuculispora parmeliae* perithecia lichenicolous on thallus of *Parmelia sulcata* (Brinker 6988). **B**, *Pannaria tavaresii* (photo taken in situ, Brinker 7092). **C**, distribution of *P. tavaresii* in North America. **D**, *Parmotrema reticulatum* (photo taken in situ, Brinker 5356). **E**, *Parmotrema stuppeum* (photo taken in situ, Brinker 4946). **F**, *Peltigera venosa* (photo taken in situ, Brinker 5123).

-ke, shaded rock outcrop under *Thuja occidentalis*, *Abies balsamea* and *Betula papyrifera*, 16.vii.2016, on mossy sedimentary (shale) rock, S.R. Brinker 5065 (CANL); La Verendrye Provincial Park, 20.5 km S of Silver Mountain, 0.5 km W of North Fowl Lake, N-facing shaded cliff face under open canopy of *Acer spicatum*, *B. papyrifera* with *Dryopteris fragrans*, *Heuchera richardsonii*, and *Campanula rotundifolia*, 18.vii.2016, on rock, S.R. Brinker 5123 (CANL); Cavern Lake Provincial Nature Reserve, S shore of Cavern Lake, 60 km NE of Thunder Bay, sheltered canyon with localized pockets of persistent ice among talus with scattered *Picea mariana* and *Alnus alnobetula* ssp. *crispa*, 21.vii.2016, on mossy rock ledge, S.R. Brinker 5163 (CANL); 1.7 km E of Armstrong, Former Canadian Forces Station Armstrong, shaded rockface with *Cryptogramma stelleri* and *A. spicatum*, 23.vi.2016, on mossy rock, S.R. Brinker 5191 (CANL); Mink Harbour, Lake Superior, E side of tunnel on N side of railway tracks, steep exposed flushed rockface with *Dasiphora fruticosa*, *Achillea millefolium*, and *Solidago ptarmicoides*, 16.vii.2017, in crevices of moist, near-vertical rockface, S.R. Brinker 5710 & C. Terwissen (CANL); 27 km S of Kakabeka Falls, 6 km NE of Cloud Lake, base of Nor'Wester with *Sorbus americana*, *Solidago hispida*, *Dryopteris fragrans* and *Poa glauca*, 31.vii.2018, on sheltered ledge of rockface, S.R. Brinker 6934 (CANL).

***Pertusaria superiana* Lendemer & E.Tripp**

FIGURE 26A.

NOTES. – *Pertusaria superiana* was recently described as the non-isidiate, fertile counterpart of *P. globularis* (Ach.) Tuck., which is isidiate and rarely fertile (Tripp & Lendemer 2019). It is characterized by its continuous, warty thallus that is UV+ dull orange, its medulla that is K- and P-, and its 4-spored asci (Tripp & Lendemer 2020a). The species occurs primarily on the bark of hardwood trees, especially bases, and more rarely on conifers (Tripp & Lendemer 2019) and usually in mature forests (Clayden 2014, as *P. globularis* (Ach.) Tuck.). In Ontario, it was corticolous on *Thuja occidentalis* and *Acer saccharum* in mature, lowland mixed and conifer-dominated forests. It has an Appalachian-Great Lakes distribution and was reported from a single site in eastern Ontario in Lanark County (Tripp & Lendemer 2019). Here it is reported from three additional southern Ontario counties.

Specimens examined. – CANADA. ONTARIO. NIPISSING DIST.: Algonquin Provincial Park, N of Hwy. 60 corridor between Canisbay and Cache Lake, mature forest with *Tsuga canadensis*, *Betula alleghaniensis* and *Acer saccharum*, 24.x.2018, on bryophytes over bark of *A. saccharum*, S.R. Brinker 7353 (CANL, NY; det. J.C. Lendemer). PARRY SOUND DIST.: N-side of Bray Lake, 9.4 km SE of Commanda, mature mixed forest on N-facing slope with *T. canadensis*, *B. alleghaniensis*, *T. occidentalis* and *A. rubrum*, 18.vi.2020, S.R. Brinker 8424 (CANL). PETERBOROUGH CO.: Wolf Island Provincial Park, 3.6 km W of Burleigh Falls, lowland conifer forest with *Thuja occidentalis* and *Abies balsamea*, 12.xi.2018, on bark of *T. occidentalis*, S.R. Brinker 7371 (hb. Brinker).

†***Phacopsis oxyspora* var. *oxyspora* (Tul.) Triebel & Rambold**

FIGURE 26B & 26C.

NOTES. – *Phacopsis oxyspora* is a lichenicolous ascomycete occurring on several Parmeliaceae hosts such as *Parmelia fraudans* (Nyl.) Nyl., *P. saxatilis* (L.) Ach., *P. sulcata*, *Platismatia glauca* (L.) Culb. & C. Culb. and *Punctelia rudecta* (Ach.) Krog (Triebel et al. 1995). It is distributed throughout North America, Greenland, Europe and Asia and has been reported elsewhere in Canada from British Columbia (Noble et al. 1987). It was included in the first lichen list for Ontario (Newmaster et al. 1998) but these appear to be the first published record from the province.

Specimens examined. – CANADA. ONTARIO. PETERBOROUGH CO.: Warsaw Caves Conservation Area off Limestone Plains Trail, 12 km E of Lakefield, limestone coniferous forest with *Thuja occidentalis* and *Abies balsamea*, 3.xi.2019, on *Punctelia rudecta* on twig of *T. occidentalis*, S.R. Brinker 8301 (CANL, hb. Etayo; conf. J. Etayo). THUNDER BAY DIST.: Aguasabon Gorge near mouth of Aguasabon River, 1 km W of Terrace Bay, rock outcrop near river mouth at edge of mixed boreal wood in sheltered valley at Lake Superior, 17.vii.2019, on *Parmelia saxatilis* over rock, S.R. Brinker 7713 (CANL, hb. Etayo; conf. J. Etayo).

***Physcia americana* G. Merr.**

FIGURE 26D.

NOTES. – This species was included in a list of lichens that were considered possibly extirpated from southern Ontario due to a lack of post 1930's records (Wong & Brodo 1992). It has since been rediscovered in several counties in protected natural areas with remnant mature forest cover (Lewis & Brinker 2017, Brodo et al. 2013). The specimens reported here represent additional records of this provincially rare species from several new regions. It was also observed but not collected since only a single thallus was observed on a base-rich rockface in Charleston Lake Provincial Park in Leeds & Grenville County. It is an eastern temperate species occurring on the

bark of hardwoods and calcareous rock and reaches its northern limit here (Brodo et al. 2001). It can be distinguished from other species of *Physcia* in Ontario by its adnate lobes with white maculae on the surface that lack long marginal cilia, and its large, rounded, laminal soralia (Hinds & Hinds 2007).

Specimens examined. – **CANADA. ONTARIO.** HASTINGS CO.: Crowe Bridge Conservation Area 13 km SW of Marmora, mixed forest with *T. americana*, *A. saccharum*, *Q. rubra* and *T. occidentalis*, 9.iv.2020, on bark of *Q. rubra*, S.R. Brinker 8366 (CANL). PETERBOROUGH CO.: Otonabee River, 20 km S of Peterborough, deciduous swamp and levee forest with *Fraxinus* spp., *Acer ×freemanii* and *Quercus macrocarpa*, 28.ii.2019, on bark of *F. pennsylvanica*, S.R. Brinker 7396 (CANL). PRINCE EDWARD CO.: Sandbanks Provincial Park, S shore of West Lake near Dunes Beach Day Use Area, remnant deciduous forest with *Quercus rubra*, *Acer saccharum* and *Tilia americana*, 2.xi.2018, on bark of *Q. rubra*, S.R. Brinker 7367 (CANL, hb. Brinker).

***Physcia tenella* (Scop.) DC.**

NOTES. – This cosmopolitan species is found in temperate regions often in areas of high humidity, usually on bark and twigs, but also rock, in well-lit situations (Edwards & Coppins 2009, Moberg 2002). In North America it is generally restricted to coastal regions of both seaboards, and is otherwise rare in the continental interior (Brodo et al. 2001, Wong & Brodo 1992). It was reported as doubtfully occurring in southern Ontario based on a 19th century John Macoun collection believed to have been mislabeled, as both Wong & Brodo (1992) and others who have examined Macoun's collections (e.g. Godfrey 1977) noted inconsistencies with Macoun's label data in his series of Canadian Lichens (Macoun 1902). The species was later reported from the Thunder Bay District by Ahti and Crowe (1995). Ahti (pers. comm.) recently verified the specimen (*Ahti 3962*, H) which he collected in 1958 from Bell Island, Lake Nipigon, on a thin twig of *Picea glauca*, though advised it is a poor specimen and is mixed with *P. adscendens* (Fr.) H. Olivier. The specimen cited here appears to be the only other verified collection from Ontario. It is noteworthy that both collections are from islands in cool, humid coastal boreal forest of Lakes Nipigon and Superior. Elsewhere in the Great Lakes Basin *P. tenella* is a rare species, with reports from Isle Royale and Cheboygan County, Michigan (Harris 2015, Thomson 1951).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, N end of Brodeur Island, 51 km S of Nipigon, base of E-facing cliff among rocky talus with scattered *Betula papyrifera* and *Abies balsamea* 25.vii.2018, on volcanic rock, S.R. Brinker 6837 (NY; conf. J.C. Lendemer).

***Physconia grumosa* Kashiw. & Poelt**

FIGURE 26E.

NOTES. – *Physconia grumosa* was reported from North America by Esslinger and Dillman (2010) from the Rocky Mountains, New England, and the Great Lakes Basin. They reported three collections from Ontario, though one was over a century old, the other over 40 years old. The additional records published below add to our knowledge of its distribution in the province and demonstrate it is much more common and widespread than previously thought. *Physconia grumosa* is typically corticolous, but can also be saxicolous in particularly humid areas (Esslinger & Dillman 2010). In the study area it was most commonly encountered in humid, mixed or coniferous swamps, usually with a cedar component, but also in mature upland deciduous and mixed forests where it was corticolous on basic bark of hardwoods. It is distinctive among Ontario representatives of the genus in having granular, branched to coralloid-stacked isidia as well as narrow dorsiventral lobules that often initiate horizontally before becoming ascending (Esslinger & Dillman 2010).

Specimens examined. – **CANADA. ONTARIO.** HALIBURTON CO.: 25 km SW of Bancroft, 1 km N of Eels Lake, mature *Acer saccharum*-dominated deciduous forest, 23.iv.2018, on bark of *F. americana*, S.R. Brinker 6355 (CANL). HASTINGS CO.: Rawdon Block, 5 km SE of Marmora, 3.5 km N of Bonarlaw, deciduous swamp with *Fraxinus pennsylvanica*, *Acer ×freemanii*, and *Ulmus americana*, 13.v.2016, on bark of *F. pennsylvanica*, S.R. Brinker 4847 (CANL). MANITOULIN DIST.: Cockburn Island, Lake Huron, along 15th Rd. at Culvert, edge of deciduous forest and large vernal pool with *Carex utriculata*, *Cornus sericea* and *Onoclea sensibilis*, 31.v.2014, on bark of *Fraxinus pennsylvanica*, S.R. Brinker 3352 (CANL). PARRY SOUND DIST.: mature deciduous forest on E-facing slope with *Acer saccharum* and *Ostrya virginiana*, 8.v.2018, on *O. virginiana*, S.R. Brinker 6396B (NY; conf. J.C. Lendemer). RAINY RIVER DIST.: Quetico Provincial Park, 74 km SE of Atikokan, 100 N of NE corner of Emerald Lake, cool conifer swamp in valley with *T. occidentalis*, *A. balsamea* and *Picea glauca*, 21.viii.2016, on bark of *T. occidentalis*, S.R. Brinker 5333 (CANL). KENORA DIST.: W side of Clytie Bay Rd. between Crowduck Lake and Rush Bay, Lake of the Woods, 35 Km SW of Kenora, *Thuja* dominated conifer swamp with *A. balsamea* and *Alnus incana* ssp. *rugosa*, 13.ix.2017, on bark of *T. occidentalis*, S.R. Brinker 6149 (CANL). THUNDER BAY DIST.: 53 km WNW of Nipigon near Albert Lake, N side of Mawn Lake Rd., old-growth *Thuja occidentalis*

dominated forest with *Abies balsamea* and *Acer spicatum*, 17.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5741 (CANL); Lake Superior, E side of Pine Bay, Memory Rd., 39 km SW of Thunder Bay, remnant *Thuja*-dominated conifer swamp bordering previously logged forest block, 22.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5933 (CANL); 60 km SW of Thunder Bay, 28 km S of Silver Mountain, 2 km N of Pigeon River, old *T. occidentalis* swamp with *A. balsamea* and *Alnus incana* spp. *rugosa*, 25.vii.2017, on *T. occidentalis*, S.R. Brinker 6000 (CANL).

***Placidium arboreum* (Schw. ex Tuck.) Lendemer**

NOTES. – *Placidium arboreum* is endemic to North America, occurring mainly in temperate portions of the east as well as portions of the southwestern U.S. north to California (Brodo 2016, as *P. tuckermanii* (Mont.) Breuss; Hinds & Hinds 2007). It was first reported from Canada by Lewis and Brinker (2017) from the Boundary Waters Canoe Wilderness Area and the Ottawa Valley. The records cited below are from additional regions of the province where it occurred on near-vertical exposures of metasedimentary bedrock along shorelines of alkaline lakes. While described as being the only corticolous species of *Placidium* in the northeast (e.g. Brodo 2016, Hinds & Hinds 2007), all Ontario reports are saxicolous from base-rich rock outcrops. The species can be distinguished from other species of *Placidium* by the conspicuous, dark, brush-like bundles of rhizohyphae that slightly elevate the squamules from the substrate, its overlapping lobes which range from 4–10 mm wide, and its substrate preference which includes tree bark and rock, versus soil (Breuss 2010).

Specimens examined. – CANADA. ONTARIO. FRONTENAC CO.: 10 km ENE of Plevna, N shore of Palmerston Lake, S-facing rock outcrop along lakeshore, 10.vii.2018, on marble, S.R. Brinker 6671 (CANL); Frontenac Provincial Park, N shore of Birch Lake, shaded S-facing rock outcrop along lakeshore, 19.ix.2018, on marble, S.R. Brinker 7311 (CANL).

***Polychidium muscicola* (Sw.) Gray**

NOTES. – *Polychidium muscicola* is a recent addition to the provincial lichen flora where it was reported from Michipicoten Island on Lake Superior (Lewis & Brinker 2017). These are additional collections of this provincially rare species and the first from the mainland. It is a circumpolar northern boreal and arctic-alpine species found on moist, often mossy, acidic rock or rarely the bases of old trees (Hinds & Hinds 2007, Jørgensen 2012d). Ontario collections are saxicolous, from moist, non-calcareous rock in sheltered situations or on exposed coastal rock outcrops along Lake Superior. The species has an erect, fruticose thallus with dichotomously branched filaments forming mounded tufts, with 2-celled fusiform ascospores, averaging 15–17 × 7–11 μm (Jørgensen 2012d). Additional taxa that could be mistaken for *P. muscicola* in the study area include several small fruticose members of *Scytinium* (Ach.) Gray, particularly *S. tenuissimum* (Dickson) Otálora, P.M. Jørg. & Wedin, *S. teretiusculum* (Wallr.) Otálora, P. M. Jørg. & Wedin, and *S. lichenoides* (L.) Otálora, P.M. Jørg. & Wedin. They can be distinguished from *P. muscicola* by their thalli that are usually initially composed of wrinkled lobes that are either fimbriately torn along their margins or are isidioid, and their muriform ascospores (Jørgensen 2012a). A specimen reported by Lewis and Brinker (2017) as *S. teretiusculum* (S.R. Brinker 4610) is in fact this species.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Ouimet Canyon Provincial Park, 8 km W of Dorion, 1.9 km N of Gulch Lake, in sheltered canyon with scattered stunted *Picea mariana*, *Betula papyrifera*, and *Alnus alnobetula* ssp. *crispa*, 27.vii.2017, on gabbro among moss near cool air vents, S.R. Brinker 6034 & *C. Terwissen* (CANL); Michipicoten Island Provincial Park, Lake Superior, E side of Green Island, exposed rock along coast, 28.vii.2015, in crevices of moist bedrock, S.R. Brinker 4562 (CANL); Davieaux Island, E side, S of Michipicoten Island, Lake Superior, exposed rocky shoreline with splash pools, 31.vii.2015, on siliceous bedrock, S.R. Brinker 4610 (CANL).

***Porina scabrida* R.C. Harris**

FIGURE 26F.

NOTES. – *Porina scabrida* is a widespread and common crustose lichen found throughout southeastern North America and the Ozarks, though can be easily overlooked because it is usually sterile, and its appearance in the field is akin to alga (Harris 1995, Lendemer & Noell 2018). It is an epiphytic lichen with a richly isidiate, pale-olive to orangish thallus, with cylindrical isidia consisting mostly of the photobiont with an external unicellular fungal layer (Harris 1995). During the present study it was collected from the bark of *Thuja occidentalis* and *Betula papyrifera* in relatively undisturbed, humid, mixed to conifer-dominated forest stands. While this paper was in press, it was reported from the Thunder Bay District of Ontario by McMullin (2019). The specimens cited here extend its range in the study area south to the Carolinian Zone in southwestern Ontario. All of the Ontario populations of this lichen appear to be sterile.

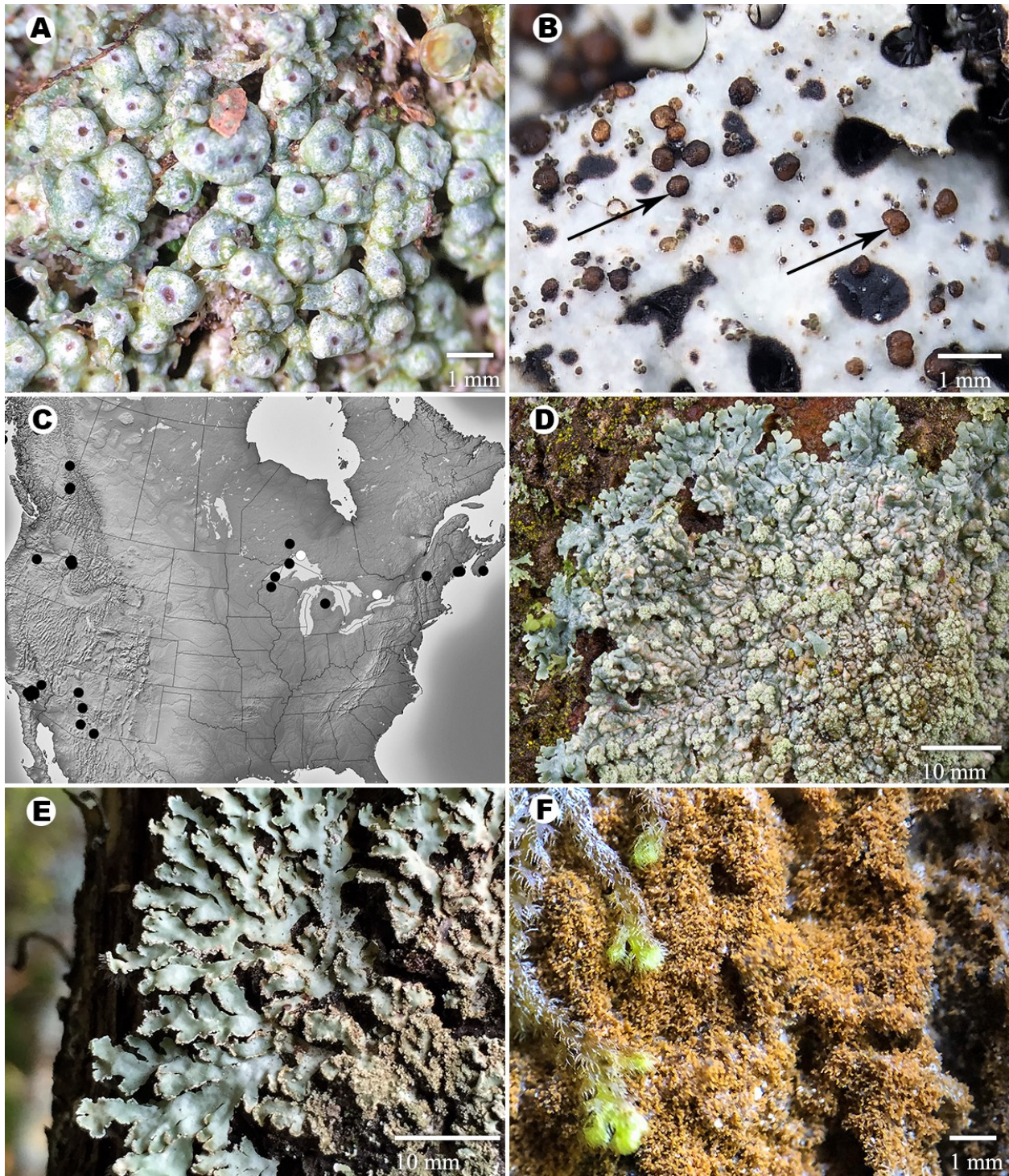


Figure 26. Photographs and distribution map of rare or otherwise rarely reported lichens and allied fungi in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Pertusaria superiana* (Brinker 7353). **B**, arrow indicating *Phacopsis oxyspora* var. *oxyspora* ascomata lichenicolous on thallus of *Parmelia saxatilis* (Brinker 7713). **C**, distribution of *P. oxyspora* var. *oxyspora* in North America. **D**, *Physcia americana* (photo taken in situ, Brinker 7367). **E**, *Physconia grumosa* (photo taken in situ, Brinker 6149). **F**, *Porina scabrada* (photo taken in situ, Brinker 7956).

Specimens examined. – **CANADA. ONTARIO.** ALGOMA DIST.: Lake Superior Provincial Park, Old Woman Bay area, E side of Hwy. 11/17 off Nokomis Trail, old-growth *Thuja occidentalis*-dominated conifer forest on slope with *Picea mariana*, *Abies balsamea*, *Acer spicatum*, and *Lonicera canadensis*, 16.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5700B (CANL); 32 km N of Wawa, 1.2 km NE of Princess Lake, old *T. occidentalis*-dominated conifer swamp, 27.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7956 (CANL). NORFOLK CO.: Spooky Hollow, 12 km S of Simcoe, lowland conifer forest and swamp with *Tsuga canadensis* and *T. occidentalis*, 21.ii.2020, on bark of *T. occidentalis* and *B. papyrifera*, S.R. Brinker 8330 (CANL). THUNDER BAY DIST.: S of Lankinen Rd., 12 km W of Cloud Lake, 21 km SE of Whitefish Lake, open conifer swamp with *T. occidentalis*, *Fraxinus nigra*, *Alnus incana* ssp. *rugosa* and *A. balsamea*, 24.vii.2017, on bark of *T. occidentalis*, S.R. Brinker 5956C (NY; conf. J.C. Lendemer); 8.7 km NW of Dorion, 1.6 km S of Wolf Lake, conifer swamp with *T. occidentalis*, *A. balsamea* and *F. nigra*, 22.vii.2019, on bark of *T. occidentalis*, S.R. Brinker 7848 (CANL).

***Porpidia degelii* (H. Magn.) Lendemer**

FIGURE 27A.

NOTES. – *Porpidia degelii* is endemic to eastern North America where it has an Appalachian-Great Lakes distribution, and is mostly restricted to rocks rich in iron or copper (Lendemer & Harris 2014). It was previously considered to be the sorediate morphotype of *P. albocaerulescens* (Wulfen) Hertel & Knoph (e.g. Gowan 1989, Fryday et al. 2007) but was found to be distinct based on a combination of morphological, ecological and chemical characters and confirmed by a molecular phylogenetic analysis of sorediate and esorediate *P. albocaerulescens* populations (Lendemer & Harris 2014). *Porpidia degelii* can be readily distinguished from *P. albocaerulescens* by the presence of round soralia. It may also be confused with *P. soredizodes* (Lamy) J.R. Laundon and *P. tuberculosa* (Sm.) Hertel & Knopf, as both have sorediate thalli. *Porpidia soredizodes* differs from *P. degelii* in not occurring on metal-rich rock, having a smooth, thin, continuous thallus (vs. a thicker, more uneven thallus in *P. degelii*) and in having apothecia with epruinose discs (Lendemer & Harris 2014). *Porpidia degelii* differs from *P. tuberculosa* in having a medulla that is K+ yellow and P+ orange (stictic acid), whereas the medulla of *P. tuberculosa* reacts K- and P- (confluent acid) and (Brodo 2016, Fryday et al. 2007). A single previous report of *Porpidia degelii* is known from the study area from the Nipissing District (Lendemer & Harris 2014). This additional record extends its range north to the Thunder Bay District. Here it was growing at the base of a moist shaded cliff on mafic rock in open mixed boreal forest with *Acarospora sinopica*.

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: N shore of Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, base of moist shaded cliff under open canopy of *Betula papyrifera* and *Abies balsamea*, 19.vii.2017, on mafic rock, S.R. Brinker 5835 (CANL).

***Pseudocyphellaria holarctica* McCune, Lucking & Moncada**

FIGURE 27B.

NOTES. – A recent phylogenetic revision of the *Pseudocyphellaria crocata* (L.) Vain. complex in the Americas showed that what was previously considered *P. crocata* actually represented a monophyletic group of 13 distinct species (Lucking et al. 2017). Previous identifications of Great Lakes Basin (including Ontario) material of *P. crocata* are actually *P. holarctica*, a temperate to boreal species known from portions of North America and Far Eastern Russia, found in humid coniferous and mixed forests (Lucking et al. 2017). It was first reported from Ontario from Thunder Bay and Lake Nipigon (Macoun 1902, as *Sticta crocata* (Hoffm.) DC.) and later from Patterson Island (Ahti 1964, as *P. crocata*) and remains a very rare species in the Great Lakes Basin (Brodo et al. 2001, Coffin & Pfannmuller 1988, Fryday & Wetmore 2002, Thomson 2003, as *P. crocata*). This is a highly charismatic species due to its conspicuous, colourful, reddish-brown thallus and bright yellow medulla and soralia. For a current description of the taxon refer to Lucking et al. (2017). Specimens reported here are from humid coastal areas of Lake Superior where it is a very rare saxicolous or corticolous species. Other collections from the region (Brodo 13801, Thorn GT81/251 CANL) were epiphytic on *Thuja occidentalis* and *Betula papyrifera*. *Pseudocyphellaria holarctica* has reportedly declined elsewhere in the northeast due to loss of mature forest and reductions in air quality (Hinds & Hinds 2007, Wetmore 2002b, as *P. crocata*) and has likely suffered declines here as well.

Specimens examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Sleeping Giant Provincial Park, 27 km E of Thunder Bay lower Sibley Peninsula 1 km S of Sawyer Bay, shaded talus below large cliff with *Acer spicatum*, *Betula papyrifera*, *Abies balsamea*, and *Polypodium virginianum*, 20.vii.2016, among bryophytes on sedimentary rock, S.R. Brinker 5147 (CANL), 25.vii.2019, on vertical rockface, S.R. Brinker 7919 (CANL); Lake Superior National Marine Conservation Area, Brodeur Island, 50 km S of Nipigon, sheltered NE-facing rockface in

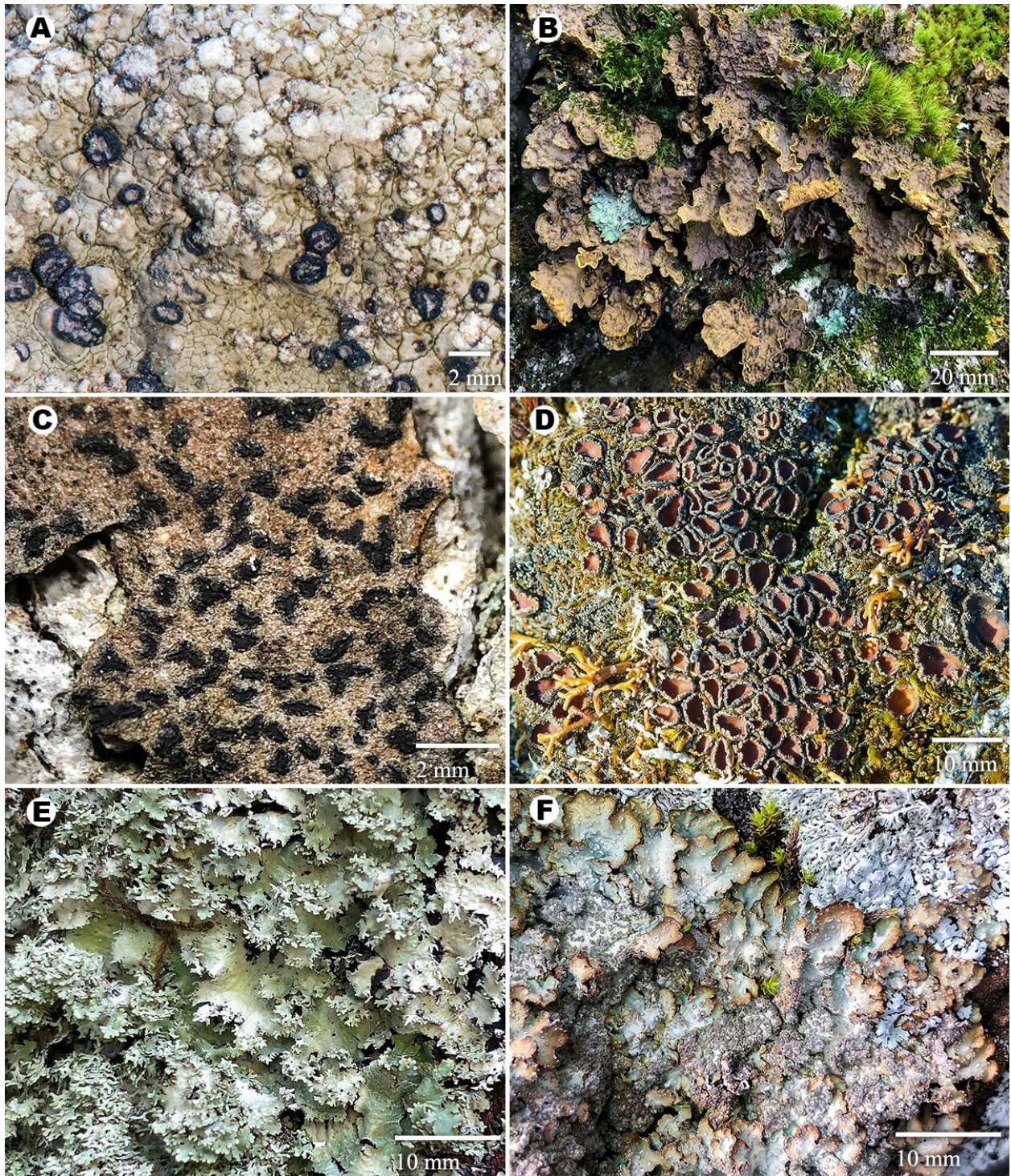


Figure 27. Photographs of rare or otherwise rarely reported lichens in Ontario. **A**, *Porpidia degelii* with soredia and apothecia (Brinker 5835). **B**, *Pseudocyphellaria holarctica* (photo taken in situ, Brinker 7919). **C**, *Pseudoschimatomma rufescens* (Brinker 7381). **D**, *Psoroma hypnorum* (photo taken in situ, Brinker 3563). **E**, *Punctelia appalachensis* (photo taken in situ, Brinker 8029). **F**, *Punctelia stictica* (photo taken in situ, Brinker 7768).

coastal boreal forest with *Betula papyrifera*, *Abies balsamea* and *Acer spicatum*, 25.vii.2018, on mossy rockface, S.R. Brinker 6844 (CANL).

***Pseudoschismatomma rufescens* (Pers.) Ertz & Tehler**

FIGURE 27C.

NOTES. – *Pseudoschismatomma rufescens* is a rarely reported taxon in North America with collections from British Columbia, New Jersey, Missouri and New York (Brodo et al. 2013, Harris 2004; as *Opegrapha rufescens* Pers.). In Ontario, it was previously known from Bruce, Hastings and Halton Regions (Brodo et al. 2013, Lewis & Brinker 2017, Maloles et al. 2018). These additional records improve our understanding of its distribution in the study area and extend its range south to Norfolk County. It is characterized by its reddish to brownish thallus with immersed, frequently branched lirelliform apothecia, a distinct brown true exciple, and slightly curved 3-septate ascospores averaging $16\text{--}27 \times 3\text{--}5 \mu\text{m}$ (Ertz et al. 2014). *Pseudoschismatomma rufescens* can be separated from species of *Opegrapha* by ascospores that lack a gelatinous sheath and a thick, carbonized hypothecium (Ertz et al. 2014). During the present study it was found in a variety of rich, humid forests where it occurred on smooth, basic bark of both immature and mature deciduous and coniferous trees, and is likely more common than current records suggest given the diversity of substrates and habitats reported here.

Specimens examined. – **CANADA. ONTARIO.** BRUCE CO.: Fathom Five National Marine Conservation Area, N-side of Echo Island, Georgian Bay, open rocky conifer woods over limestone with *Thuja occidentalis*, *Abies balsamea*, *Acer spicatum* and *Taxus canadensis*, 19.vi.2019, on bark of *Populus tremuloides*, S.R. Brinker 7617 (CANL). HASTINGS CO.: Crowe Bridge Conservation Area 13 km SW of Marmora, second growth mixed forest with *Tilia americana*, *Quercus macrocarpa* and *T. occidentalis*, 9.iv.2020, on bark of *Q. macrocarpa*, S.R. Brinker 8363 (CANL). NORFOLK CO.: Long Point Provincial Park, N shore of Lake Erie, edge of conifer plantation and *Populus deltoides* treed sand dune, 23.ii.2020, on *P. deltoides* and *Picea glauca*, S.R. Brinker 8335 (CANL). PETERBOROUGH CO.: Squirrel Creek Conservation Area, along Squirrel Creek, 10 km S of Peterborough, deciduous floodplain swamp with *Fraxinus pennsylvanica*, *Acer ×freemanii* and *Rhamnus cathartica*, 22.ii.2019, on bark of *Quercus macrocarpa*, S.R. Brinker 7381 (CANL); Belmont Lake, W shore, 7 km NE of Havelock, mature rocky deciduous forest, 9.iv.2020, on bark of *Juglans cinerea*, S.R. Brinker 8367 (hb. Brinker).

***Psoroma hypnorum* (Vahl) Gray**

FIGURE 27D.

NOTES. – *Psoroma hypnorum* is an arctic-boreal species that typically grows among bryophytes, on soil, or occasionally on the bases of woody plants where decaying vegetation has accumulated (Thompson 1984). Ahti (1964) mentioned it from timber-line woodlands east of Fort Severn where it was noted as “not common,” and Thompson (1984) mapped it from two locations west of Fort Severn along Hudson Bay near the Manitoba border. The records presented here add to the known distribution of this underreported species in Ontario. It differs from the superficially similar *Protopannaria pezizoides* (Weber) P. M. Jørg. & S. Ekman by its concave apothecia with irregularly squamulose thalline margins, asci with amyloid apical structures, and its green photobiont (with interspersed darker squamules containing cyanobacteria; Jørgensen 2000).

Specimens examined. – **CANADA. ONTARIO.** KENORA DIST.: 56 km NW of Fort Severn, 11 km E of Niskibi River mouth, 25 km NW of Blackcurrant River mouth, low, tundra ridge with *Empetrum nigrum*, *Hedysarum boreale* ssp. *mackenziei*, *Dryas integrifolia* and *Salix reticulata*, 19.vi.2014, among moss, S.R. Brinker 3430 (CANL); 60 km NW of Fort Severn, W side of Niskibi River, 6.5 km S of Niskibi River mouth, hummocky tundra ridge with *Rhododendron lapponicum*, *Tofieldia pusilla* and *Salix calcicola* var. *calcicola*, 19.vi.2014, among moss, S.R. Brinker 3456; S side of Donovan Lake, 300 m E of Manitoba border, 163 km W of Fort Severn, open mossy ericaceous scrub in 20 year old burn near shore of lake, 20.vi.2014, among mosses, S.R. Brinker 3471 (CANL); Niskibi Cape, 53 km NW of Fort Severn, 8.3 km E of Niskibi River, 8 km S of Hudson Bay coast, tundra ridge with *Rhododendron lapponicum*, *Vaccinium vitis-idaea*, *Empetrum nigrum* and *Dryas integrifolia*, 22.vi.2014, among moss, S.R. Brinker 3563 (CANL); 105 km NW of Fort Severn, 8.7 km SW of East Pen Island, 1.5 km E of Mintiagan Creek, sandy blowout along tundra beach ridge with *Carex glacialis*, 27.vi.2014, among moss over soil, S.R. Brinker 3800 (CANL).

***Punctelia appalachensis* (W.L. Culb.) Krog**

FIGURE 27E.

NOTES. – *Punctelia appalachensis* represents another disjunct Appalachian element in the Great Lakes Basin. It reaches its northern distributional limit here (Brodo et al. 2001) where it occurs in temperate and transitional, mature to old-growth hardwood stands with *Acer saccharum*, *Betula alleghaniensis* or *Thuja*

occidentalis. Elsewhere in Canada, it has been found in near-coastal or high-elevation areas in the Acadian Forest Region of the east where it occurs with other rare, primarily Appalachian species (COSEWIC 2013). Here it is reported from several additional regions including the first records from Bruce and Hastings Counties, where it was both corticolous on basic bark of a variety of coniferous and broad-leaved trees and saxicolous on dolostone. It can be differentiated from all other species of *Punctelia* Krog in Ontario in having a black undersurface and a lobulate thallus (Lendemer & Hodkinson 2010).

Specimens examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park Addition S of Montreal River Harbour, 500 metres W of Gamma Lake, mature deciduous forest with *Acer saccharum*, *Betula alleghaniensis* and *Thuja occidentalis*, 04.ix.2019, on bark of *T. occidentalis* and *B. alleghaniensis*, S.R. Brinker 8029 (CANL). BRUCE CO.: Fathom Five National Marine Park, N side of Bear's Rump Island, Georgian Bay, N-facing *T. occidentalis*-dominated talus slope with *Sorbus decora* and *Abies balsamea*, 12.vi.2018, among bryophytes on dolostone, S.R. Brinker 6577 & T. Miller (CANL). GREY CO.: Eugenia Falls Conservation Area W of Eugenia Lake, edge of mixed forest with *Acer saccharum*, *T. occidentalis* and *Tilia americana*, 15.vi.2018, on bark of *T. americana* and *A. saccharum*, S.R. Brinker 6637 (CANL). HASTINGS CO.: Crowe Bridge Conservation Area 13 km SW of Marmora, edge of rocky coniferous woods with *Juniperus virginiana*, *T. occidentalis* and *Zanthoxylum americanum*, 9.iv.2020, on twig of *J. virginiana*, S.R. Brinker 8364 (CANL).

***Punctelia stictica* (Duby) Krog**

FIGURE 27F.

NOTES. – *Punctelia stictica* was first mentioned from Sleeping Giant Provincial Park by Brodo (1993) and these are the only additional published records since that singular collection made by Irwin Brodo was reported by Crowe (1994). In North America, it is a mainly western taxon with several scattered disjunct occurrences in the Midwest and the Great Lakes Basin (Brodo et al. 2001) and is generally considered rare (Lendemer & Hodkinson 2010). In the study area, *P. stictica* is largely restricted to stable, neutral-to-slightly calcareous rockfaces along Lake Superior and Lake Nipigon, as well as locally inland on Nor'Wester Mountains which are a group of igneous rock formations known botanically for their disjunct arctic-alpine and Western Cordilleran vascular flora (e.g., Bakowsky 1997, 2002; Butters & Abbe 1953). The specimens cited here extend the range of the species in the study area west to the Boundary Waters Canoe Area Wilderness in Rainy River District. It is the only saxicolous species of *Punctelia* with a black lower surface, distinct laminal pseudocyphellae, and a medulla that contains gyrophoric acid (C+ pink; Aptroot 2003a).

Specimens examined. – CANADA. ONTARIO. RAINY RIVER DIST.: Quetico Provincial Park, 75 km SE of Atikokan, NW shore of Ottertrack Lake, 1.5 km E of Plough Lake, edge of conifer forest on exposed S-facing cliff above high watermark of lake, 18.viii.2016, on shaded rock outcrop along lakeshore, S.R. Brinker 5235 (CANL; conf. I.M. Brodo). THUNDER BAY DIST.: S end of Ouimet Canyon, 60 km NE of Thunder Bay, steep S-facing open talus slope below cliff, 4.viii.2015, on rock, S.R. Brinker 4693 (CANL); Mink Harbour, Lake Superior, E side of tunnel on N-side of railway tracks, exposed S-facing cliff with *Rusavskia elegans*, *Umbilicaria americana* and *Anaptychia crinalis*, 16.vii.2017, on vertical rockface along coast, S.R. Brinker 5707 (CANL); Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, sheltered E-facing diabase cliff along shoreline, 18.vii.2017, on diabase rock, S.R. Brinker 5810 (CANL); Nor'Wester S of Lankinen Rd., 28 km S of Kakabeka Falls, 12 km W of Cloud Lake, sheltered moist N-facing cliff with *Saxifraga paniculata*, *Draba arabisans*, and *Campanula rotundifolia*, 24.vii.2017, on shaded vertical rockface, S.R. Brinker 5967 & C. Terwissen (CANL); Lake Superior National Marine Conservation Area, N end of Brodeur Island, 51 km S of Nipigon, exposed rocky coastline above splash zone bordering mixed boreal forest, 25.vii.2018, on volcanic rock, S.R. Brinker 6825 (CANL); Nipigon Palisades Conservation Reserve, Lake Nipigon, Pijitawabik Bay, 8 km S of Macdiarmid, E-facing cliff along shoreline with *Solidago hispida*, *Artemisia campestris*, and *Woodsia ilvensis*, 8.viii.2018, on diabase, S.R. Brinker 7087 & C. Terwissen (CANL); Lake Superior National Marine Conservation Area, SE side of Talbot Island, Lake Superior, sparsely vegetated exposed volcanic bedrock coastline bordered by upland boreal forest, 20.vii.2019, on volcanic rock, S.R. Brinker 7768 (CANL); The Pinnacles, 5.5 km NW of Dorion, 1 km N of Miner Lake, ledge of E-facing cliff, 12.ix.2019, on diabase, S.R. Brinker 8238 (CANL).

***Rhizocarpon eupetraeum* (Nyl.) Arnold**

FIGURE 28A.

NOTES. – *Rhizocarpon eupetraeum* is a circumpolar arctic-alpine species with disjunct occurrences in the Great Lakes Basin in Michigan and Minnesota where it occurs on exposed acidic rock (Thomson 1997). Here it was encountered on loose rock fragments of a raised fossil shoreline several metres above the current Lake Superior coastline. It is distinguished by its grey, strongly convex, verruculose or areolate thallus (often with a black

hypothallus) that is K+ yellow turning red, C-, KC- (norstictic acid), its reddish brown epithecium, and its dark muriform ascospores averaging $22\text{--}42 \times 10\text{--}18 \mu\text{m}$ (Matwiejuk 2008, McCune 2017).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, E side of Bowman Island, S of St. Ignace Island, open fossil beach above Lake Superior shoreline, 19.vii.2019, on cobbles, *S.R. Brinker 7763* (CANL, O).

***Rinodina pachysperma* H. Magn.**

FIGURE 28B.

NOTES. – *Rinodina pachysperma* is endemic to North America with scattered occurrences ranging from North Dakota south to Kansas, and east through the Great Lakes Basin to New England where it is corticolous on a wide variety of hardwoods (Sheard 2010). It was mapped from Ontario by Sheard (2010) based on two 19th century collections from Carleton and Hastings Counties, and more recently reported from Renfrew County by McMullin and Lewis (2013). This is the only other modern record from Ontario and the first from Peterborough County where it occurred on the lower boles of deciduous trees in a mature deciduous floodplain forest.

Specimen examined. – CANADA. ONTARIO. PETERBOROUGH CO.: 6.5 km S of Peterborough Airport, 150 m N of 4th Line, deciduous floodplain forest with *Acer ×freemanii*, *Fraxinus pennsylvanica* and *Ulmus americana*, 19.i.2013, on bark of *A. ×freemanii*, *S.R. Brinker 2800* (CANL; det. J. Sheard).

†***Sarea difformis* (Fr.) Fr.**

FIGURE 28C.

NOTES. – *Sarea difformis* is a non-lichenized fungus that is resinicolous on older, typically black, resinous exudae of various conifers in north temperate areas (Hawksworth & Sherwood 1981). It often occurs along with its congener *S. resinae* (Fr.) Kuntze which is more often reported and easily recognized by its orange apothecia and polysporous asci with small globose hyaline ascospores (Lendemer 2012b). *Sarea difformis* differs in having smaller, black apothecia, and is therefore considerably more inconspicuous than *S. resinae* (Fr.) Kuntze. The species was first reported from Ontario from the Bruce Peninsula (Brodo et al. 2013). Here it is reported from five additional regions extending its range in the study area north to the Thunder Bay District and east to the Thousand Islands region where it was resinicolous around old branch scars on trunks of several conifers including *Abies balsamea*, *Picea glauca* and *P. rubens*. It is expected to be much more common than current collections indicate given the diversity of substrates and habitats reported in this study.

Specimens examined. – CANADA. ONTARIO. GREY CO.: Eugenia Falls Conservation Area W of Eugenia Lake, mixed forest with *A. saccharum*, *Thuja occidentalis* and *Tilia americana*, 15.vi.2018, on resin of *P. glauca* and *A. balsamea*, *S.R. Brinker 6636* (CANL). LEEDS & GRENVILLE CO.: Thousand Islands National Park, N-side of St. Lawrence River, Jones Creek Trails W of Jones Creek, young mixed forest with rock outcrops, 15.v.2019, on resin of *A. balsamea*, *S.R. Brinker 7510* (CANL). NIPISSING DIST.: Algonquin Provincial Park, just N of Smoke Lake along Hardwood Lookout Trail, mature coniferous forest with *Tsuga canadensis*, *Picea mariana* and *Abies balsamea*, 25.x.2018, on resin of *P. rubens*, *S.R. Brinker 7356* (CANL). PARRY SOUND DIST.: Mikisew Provincial Park, 11 km W of South River, mixed upland forest with *Acer saccharum*, *Tsuga canadensis*, and *Betula alleghaniensis*, 25.vi.2018, on resin of *Abies balsamea*, *S.R. Brinker 6653* (CANL). THUNDER BAY DIST.: Sleeping Giant Provincial Park, 200 m N of Silver Islet, open mixed boreal forest with *A. balsamea*, *Picea glauca* and *Betula papyrifera*, 28.vii.2018, on resin of *P. glauca*, *S.R. Brinker 6885* (CANL).

***Scytinium gelatinosum* (With.) Otálora, P. M. Jørg. & Wedin**

FIGURE 28D & 28E.

NOTES. – *Scytinium gelatinosum* is widely distributed in Europe (López de Silanes et al. 2012, as *Leptogium gelatinosum*) and in North America is primarily a western-montane species, ranging from Arizona north to Alaska (Brodo et al. 2001, as *L. gelatinosum*) with scattered records in the east (Fig. 28E). While mentioned from the Great Lakes Basin by Sierk (1964, as *L. sinuatum*), he did not examine any specimens from the region and it was not mapped from here by Brodo et al. (2001). Therefore these appear to be the first reports from Ontario. During the current study, *S. gelatinosum* was found in humid boreal forest with rock outcrops where it was saxicolous on mossy rocks, though elsewhere it also occurs on soil and bark (Sierk 1964, as *L. sinuatum*). It is characterized by compact, overlapping, often erect lobes forming small tufts with entire or crenate margins, 60–135 μm thick, with 8-spored asci and muriform ascospores with 7–9 transverse septa averaging $25\text{--}35 \times 12\text{--}14 \mu\text{m}$ (Jørgenson 2012a, as *L. gelatinosum*; Sierk 1964, as *L. sinuatum*).

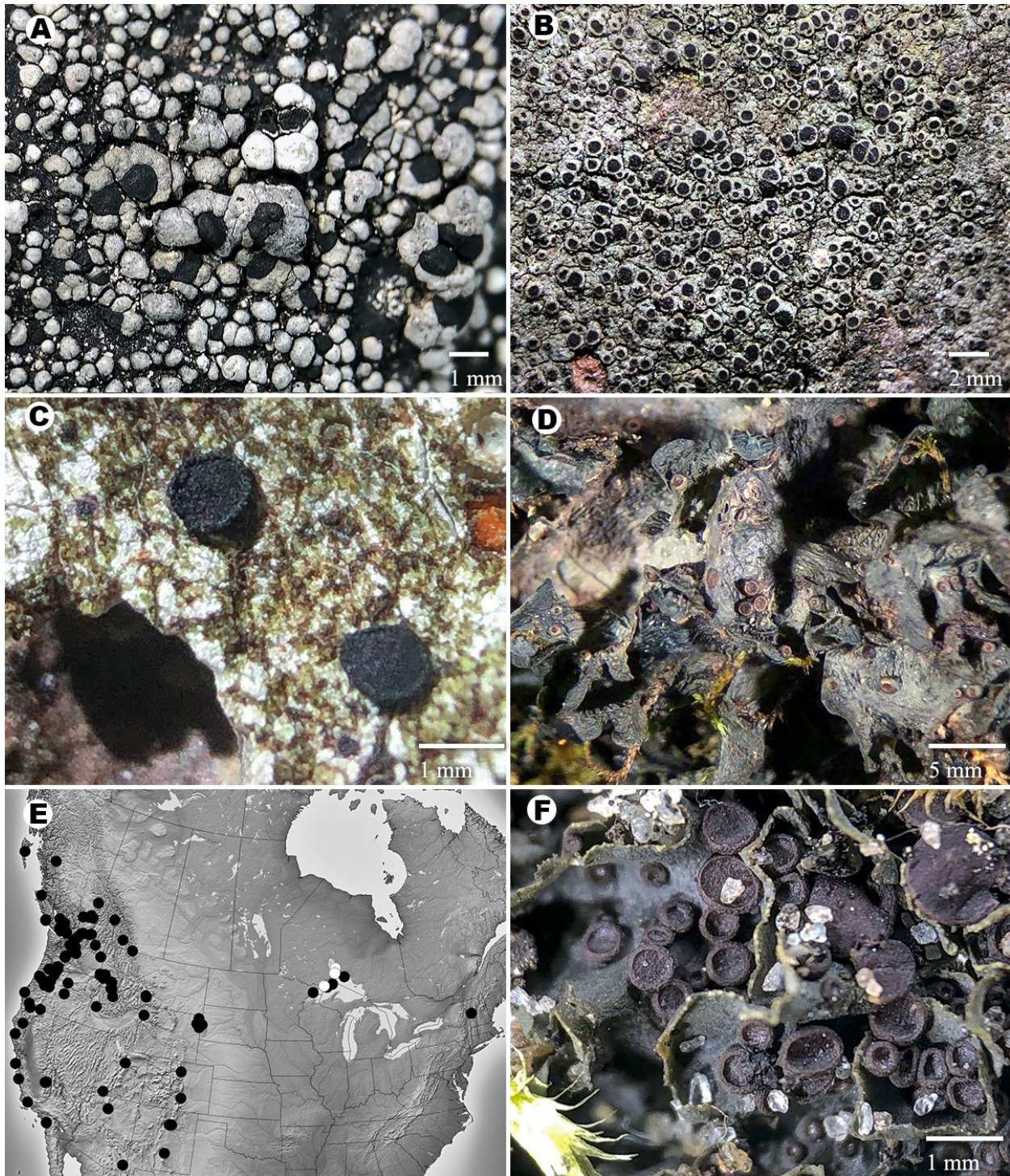


Figure 28. Photographs and distribution map of rare or otherwise rarely reported lichens in Ontario (white = newly reported Ontario records, black = previous collections). **A**, *Rhizocarpon eupetraeum* (Brinker 7763). **B**, *Rinodina pachysperma* (Brinker 2800). **C**, close-up of *Sarea difformis* apothecia (Brinker 7510). **D**, *Scytinium gelatinosum* (Brinker 5044). **E**, distribution of *S. gelatinosum* in North America. **F**, *Scytinium intermedium* (Brinker 7530).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Nipigon, 1.7 km S of Macdiarmid, E side of Orient Bay, steep rocky slope below diabase cliff under open canopy of *Thuja occidentalis*, 15.vii.2016, among bryophytes on vertical rockface, *S.R. Brinker 5044* (CANL); Pigeon River Provincial Park, 50 km SW of Thunder Bay, 3 km W of Pigeon Bay at Middle Falls, Pigeon River, sheltered rockface shaded by dense thicket of *Acer spicatum*, 18.vii.2016, among bryophytes on diabase, *S.R. Brinker 5106A* (CANL); Ruby Lake Provincial Park, 3 km SE of Nipigon, N-facing talus slope under open canopy of *A. balsamea*, *B. papyrifera* and *Populus tremuloides*, 23.vii.2019, among bryophytes on volcanic rock, *S.R. Brinker 7882* (hb. Brinker).

***Scytinium intermedium* (Arnold) Otálora, P.M. Jørg. & Wedin**

FIGURE 28F.

NOTES. – *Scytinium intermedium* is reported from only the second location from the study area, extending its range south to the Carolinian Zone of southwestern Ontario. A previous report exists from Bruce Peninsula National Park (Brodo et al. 2013, as *Leptogium intermedium* (Arnold) Arnold). It is a rarely collected taxon represented by scattered specimens from northern North America, from Baffin Island west to Alaska and south to Colorado (Sierk 1964, as *L. minutissimum* (Flörke) Fr.). The species typically occurs on calcareous soil or moss in partial shade in continental to suboceanic climates (McCune & Rosentreter 2007, Otálora et al. 2008). Here it was found in a small, open sand barren growing amongst bryophytes over calcareous sand. *Scytinium intermedium* could be confused with small forms of *S. gelatinosum* but is distinguished by several morphological and anatomical features. *Scytinium gelatinosum* has a shiny thallus with pronounced surface wrinkles and wider, rougher apothecial margins than *S. intermedium*, which has a dull, overall relatively smooth thallus appearance and smooth thinner apothecial margins (Jørgensen 2012a, as *L. intermedium*). The medulla of *S. intermedium* is composed of densely interwoven hyphae whereas that of *S. gelatinosum* is looser, thus appearing more open (Jørgensen 2012a, as *L. intermedium*). Both taxa have eight-spored asci with submuriform to muriform ellipsoid ascospores, though the ascospores of *S. intermedium* tend to be slightly smaller ($23.3\text{--}31.6 \times 9.2\text{--}12.3 \mu\text{m}$ *vide* Jørgensen 2012a) than those of *S. gelatinosum* ($26.1\text{--}36.7 \times 10.9\text{--}14.8 \mu\text{m}$ *vide* Jørgensen 2012a, as *L. intermedium*).

Specimen examined. – CANADA. ONTARIO. ESSEX CO.: Point Pelee National Park, Redbud Trail area S of visitor centre, 13.5 km SE of Leamington, small sand barren in *Juniperus virginiana* woodland, 28.v.2019, among bryophytes over calcareous sand, *S.R. Brinker 7530* & *M.J. Oldham* (CANL).

***Sphaerophorus fragilis* (L.) Pers.**

FIGURE 29A.

NOTES. – This is only the second report of *Sphaerophorus fragilis* from Ontario. It was previously collected by Mike Oldham from a rock outcrop along the Winisk River in the Hudson Bay Lowland (McMullin 2018). Here it is reported from the Sutton Ridges, part of a massive Precambrian inlier forming a cuesta which stands in stark contrast to the otherwise flat Paleozoic and Mesozoic bedrock-dominated lowlands which are in turn covered by deep deposits of poorly-drained, post-glacial marine clays and organic soils (Riley 2003). This saxicolous, circumpolar arctic-alpine species occurs in northeastern North America as far south as New England (Hinds & Hinds 2007, Thomson 1984). In the study area, it is likely a very rare species restricted to a limited area of occupancy in the Hudson Bay Lowland where isolated exposures of suitable upland bedrock outcrops occur.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: Sutton Ridges, 98 km SE of Peawanuck airport, 4.3 km E of Aquatuk Lake, cryptogram-dominated open talus slope at base of W-facing cliff, 6.viii.2014, on sheltered siliceous boulder, *S.R. Brinker 4121* (hb. Brinker).

***Sphaerophorus globosus* (Hudson) Vain.**

FIGURE 29B.

NOTES. – *Sphaerophorus globosus* was previously mentioned from tundra heaths and hummocks in palsa bogs in the northern portion of the Hudson Bay Lowland by Ahti (1964), and mapped from four locations in the same region by Thomson (1984). However, no specimens have ever been formally reported from the study area and these appear to be the first. Unlike *S. fragilis*, the species is not restricted to rock outcrops, and during the current study was observed to be widespread and locally common in maritime tundra near the coasts of Hudson Bay and northern James Bay. While it is often reported as corticolous on conifers in old-growth forests in eastern Canada (e.g. Cameron & Bondrup-Nielsen 2012), here *S. globosus* was terricolous on raised tundra beach ridges where it frequently grew among bryophytes on decaying tundra vegetation.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: 56 km NW of Fort Severn, 11 km E of Niskibi River mouth, 25 km NW of Blackcurrant River mouth, low beach ridge with *Empetrum nigrum*, *Hedysarum boreale* ssp. *mackenziei*, *Dryas integrifolia* and *Salix reticulata*, 19.v.2014, on tundra heath among moss, *S.R.*

Brinker 3434 (CANL); Niskibi Cape, 53 km NW of Fort Severn, 8.3 km E of Niskibi River, 8 km S of Hudson Bay coast, low open ridge with *Rhododendron lapponicum*, *Vaccinium vitis-idaea*, *E. nigrum* and *D. integrifolia*, 22.v.2014, on tundra heath among moss, *S.R. Brinker 3567* (CANL); 123 km NW of Fort Severn, 7.7 km SW of West Pen Island, 4.6 km E of Manitoba border, moist, hummocky dwarf shrub-sedge tundra, 26.v.2014, on tundra heath among moss, *S.R. Brinker 3744* (CANL); 118 km NW of Fort Severn, 6 km S of West Pen Island, 400 m N of Oostenguanako Creek, raised tundra ridge with *R. lapponicum*, *E. nigrum* and *Salix brachycarpa*, 11.viii.2014, on tundra heath among moss, *S.R. Brinker 4291* (CANL); James Bay, 3 km NW of Hook Point, 21 km S of Cape Henrietta Maria, raised tundra ridge with *R. lapponicum*, *E. nigrum* and *S. brachycarpa*, 12.viii.2014, on tundra heath among moss, *S.R. Brinker 4355* (CANL); Cape Henrietta Maria, 204 km E of Peawanuck, 24 km N of Hook Point, sparsely vegetated calcareous shingle beach ridge with *D. integrifolia*, *E. nigrum* and *Saxifraga tricuspidata*, 12.viii.2014, on tundra heath among moss, *S.R. Brinker 4387* (CANL).

†*Stictis radiata* (L.) Pers.

FIGURE 29C.

NOTES. – Species in the genus *Stictis* represent lichenized and non-lichenized fungi most commonly encountered in coastal areas in moist humid forests, with many having the ability to live in either state depending on the substrate (Wedin et al. 2004, 2006). The genus is characterized by having deeply sunken, orbicular ascoma that open via a pore, a margin lined by periphysoids that extend the length of the margin, a hymenium that splits away from the margin and filiform, thin-walled, multiseptate ascospores and a non-parasitic niche (Sherwood 1977, Wedin et al. 2006). *Stictis radiata* can be recognized by its pruinose fruiting bodies entirely encrusted in crystals, ca. 0.3–0.7 mm in diameter, lacking pigmentation in ascoma sections (Wedin et al. 2006). It can grow on a variety of substrata including bark and wood, as well as herbaceous stems and conifer needles in particularly humid regions (Sherwood 1997). It has a Holarctic distribution ranging through portions of Europe, Asia, New Zealand, and North America (Johnston 1983, Konoreva et al. 2016). The first report of *S. radiata* from Canada was from the upper Bruce Peninsula where it grew on *Thuja occidentalis* and *Populus* (Brodo et al. 2013). These additional records extend the known range of *S. radiata* in the Great Lakes Basin north to Lake Superior where it grew on *T. occidentalis* and *Populus balsamifera* L. An additional specimen collected during this study from the Hudson Bay Lowland was from young twigs of *Picea glauca* at the tree-line, and appears to be the most northerly North American report.

Specimens examined. – CANADA. ONTARIO. ALGOMA DIST.: Lake Superior Provincial Park, 3.5 km E of Agawa Bay, mature deciduous forest with *Betula papyrifera*, *Acer saccharum*, *Abies balsamea* and *Acer spicatum* 16.vii.2019, on *Thuja occidentalis*, *S.R. Brinker 7696* (CANL). BRUCE CO.: W shore of Georgian Bay, Cabot Head, below bluff, 29 km N of Lion's Head, *T. occidentalis*-dominated limestone talus forest with *A. spicatum* and *B. papyrifera* 14.vi.2018, on *T. occidentalis*, *S.R. Brinker 6605* & *T. Miller* (CANL). KENORA DIST.: 123 km NW of Fort Severn, 7.7 km SW of West Pen Island, 4.6 km E of Manitoba border, low tundra beach ridge with *Salix vestita*, *Empetrum nigrum*, *Vaccinium vitis-idaea*, and *Hedysarum boreale* ssp. *mackenziei*, 26.vi.2014, on green twigs of stunted *Picea glauca*, *S.R. Brinker 3749o* (CANL). THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, Cebina Island, between St. Ignace and Simpson Island, 17 km W of Rosspport, open conifer woods with *P. glauca*, *Picea mariana* and *B. papyrifera*, 21.vii.2019, on *T. occidentalis*, *S.R. Brinker 7844* (CANL); Gravel River Provincial Nature Reserve, 19.5 km NW of Rosspport, open mixed woods with *P. glauca*, *A. balsamea*, *A. spicatum* and *B. papyrifera*, 24.vii.2019, on *T. occidentalis*, *S.R. Brinker 7896* & *H. Dorval* (CANL).

Synalissa ramulosa (Bernh.) Körb.

FIGURE 29D.

NOTES. – *Synalissa ramulosa* is a widespread but rarely reported cyanolichen found scattered mainly throughout the Northern Hemisphere (Jørgensen 2012c). It can resemble other small subfruticose species such as *Lempholemma* which contain *Nostoc* but is readily distinguished by its *Gloeocapsa* photobiont. This species was previously reported from single locations in the Thunder Bay and Kenora Districts (Crowe 1994, Lewis 2014; as *S. symphorea* (Ach.) Nyl.). These additional records extend its range in the province south to Frontenac County. Both collections reported here were from near-vertical base-rich rock outcrops along lakeshores, where it occurred along moist seepage tracks.

Specimens examined. – CANADA. ONTARIO. FRONTENAC CO.: Frontenac Provincial Park, Birch Lake, sheltered S-facing cliff along lakeshore, 19.ix.2018, on vertical metasedimentary rockface, *S.R. Brinker 7313* (CANL, HBG). THUNDER BAY DIST.: N shore of Lake Superior, Worthington Bay, 4 km S of Schreiber, edge of conifer forest and rocky shoreline, 26.vii.2019, in seepage tracks on near-vertical rockface, *S.R. Brinker 7947* (CANL, hb. Brinker).

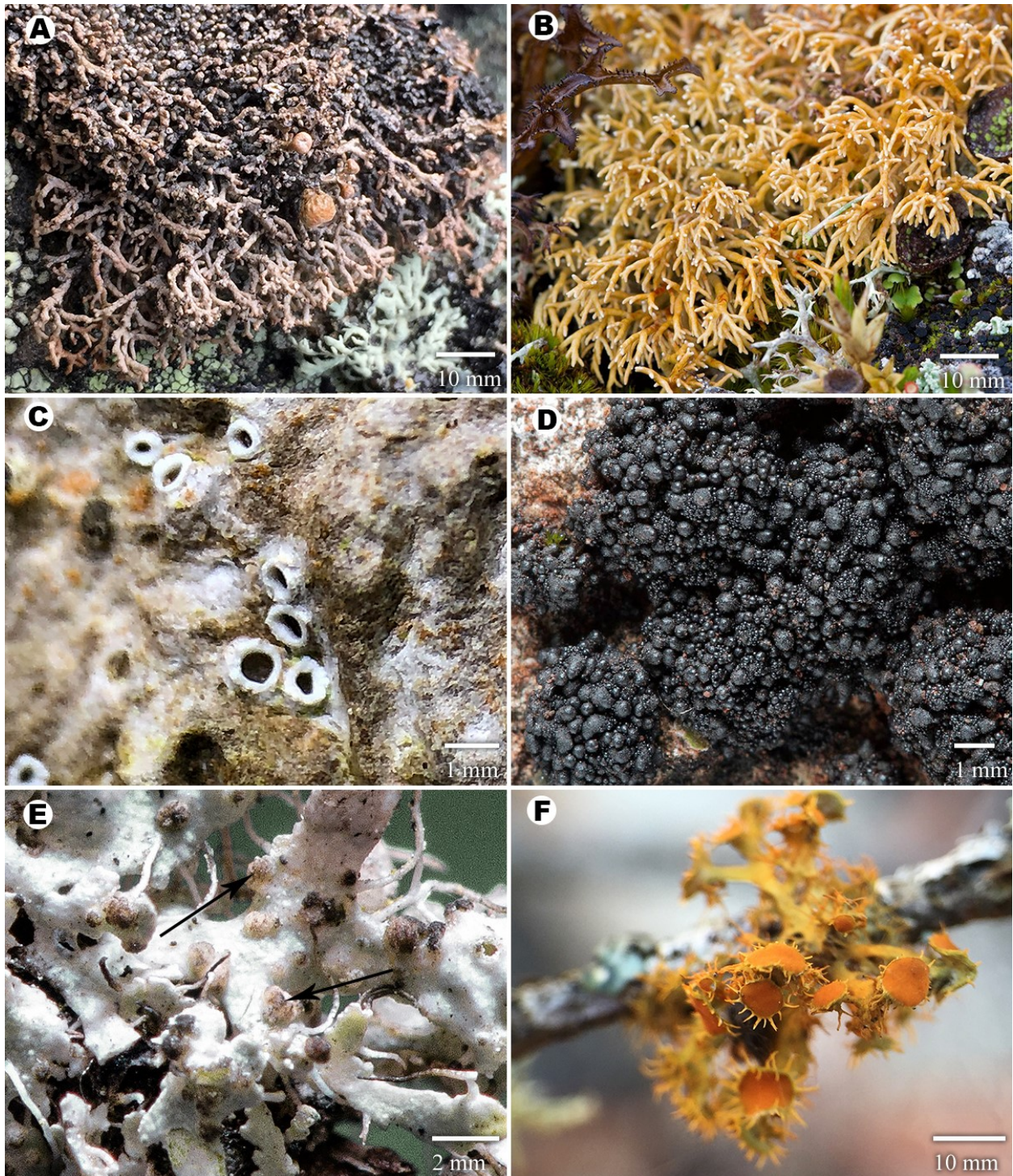


Figure 29. Photographs of rare or otherwise rarely reported lichens and allied fungi in Ontario. **A**, *Sphaerophorus fragilis* (photo taken in situ). **B**, *Sphaerophorus globosus* (photo taken in situ). **C**, sunken apothecia of *Stictis radiata* on bark of *Thuja occidentalis* (Brinker 7696). **D**, *Synalissa ramulosa* (Brinker 7313). **E**, arrows indicating galls of *Syzygospora physciacearum* lichenicolous on thallus of *Physcia adscendens* (Brinker 6209). **F**, *Teloschistes chrysophthalmus* (photo taken in situ, Brinker 6089).

†*Syzygospora physciacearum* Diederich

FIGURE 29E.

NOTES. – *Syzygospora physciacearum* is a widely distributed, rarely reported lichenicolous heterobasidiomycete that forms pinkish to pale brown, convex galls on members of the Physciaceae (Diederich 1996). It was previously reported from a single Canadian site from the Cochrane District on *Physcia aipolia* (Ehrh. ex Humb.) Furrn. (Diederich 1996). These are the only other reports of the species from Canada, where it was lichenicolous on *Physcia adscendens* (Fr.) H. Olivier. It is likely common in the study area considering the abundance and distribution of its known hosts and the ease of which it was found with targeted searches.

Specimens examined. – CANADA. ONTARIO. HASTINGS CO.: Crowe River, Callaghan's Rapids Conservation Area, 3.5 km S of Marmora, edge of coniferous forest along riverbank, on *P. adscendens* on twigs of *Abies balsamea*, 24.v.2020, S.R. Brinker 8378 (CANL, hb. Brinker). KENORA DIST.: SE basin of Lake of the Woods, 2.4 km SW of Harris Hill along Kreger Rd, edge of mixed rocky woods with *Populus tremuloides*, *Picea glauca*, *Rhus typhina* and *Vaccinium angustifolium*, 16.ix.2017, on *Physcia adscendens* on twigs of *P. glauca*, S.R. Brinker 6209 (CANL, hb. Etayo; conf. J. Etayo). OTTAWA: Stony Swamp 3 km S of Bells Corners, mesic *Thuja occidentalis*-dominated woods with *Picea glauca* and *Populus tremuloides*, 12.vii.2020, on *P. adscendens* on twigs of *P. glauca*, S.R. Brinker 8481 (CANL). PETERBOROUGH CO.: Brookwood Conservation Area, 8.5 km N of Norwood, edge of conifer swamp with *Thuja occidentalis*, *A. balsamea* and *Ulmus americana*, 20.vii.2020, on *P. adscendens* on twigs of *Larix laricina*, S.R. Brinker 8487 (CANL).

Teloschistes chrysophthalmus (L.) Th. Fr.

FIGURE 29F.

NOTES. – The majority of North American collections of *Teloschistes chrysophthalmus* are from the interior of the continent, extending the length of the Great Plains from southern Manitoba and Minnesota south to Texas in areas with semi-arid and continental climates (COSEWIC 2016). It also occurs in regions with more temperate and Mediterranean climates on both the east and west coasts, the Great Lakes Basin, as well as portions of the Sonoran Desert in southern California and Mexico (Howe 1915, Brodo et al. 2001). It was recently reported from the boreal forest – prairie ecotone of northwestern Ontario on Lake of the Woods and Rainy Lake by Lewis and Brinker (2017) where it occurred mainly on conifer twigs in areas of thin, discontinuous deposits of sandy till, overlying base-rich andesitic bedrock (Goebel et al. 1995). This additional record extends its range in the province northeast to Wabigoon Lake. It is a federally listed species in Canada represented by two distinct populations (COSEWIC 2016), with this new record falling within the Prairie/Boreal population which has a status of Special Concern.

Specimen examined. – CANADA. ONTARIO. KENORA DIST.: NW portion of Wabigoon Lake near Grenville Island, at end of McIntyre Dr. on S side of point, edge of mixed forest along lakeshore with *Thuja occidentalis*, *Picea glauca*, *Betula papyrifera*, *Abies balsamea* and *Populus tremuloides*, 10.iv.2017, on twigs of *A. balsamea*, S.R. Brinker 6089 (CANL).

Thyrea confusa Henssen

FIGURE 30A.

NOTES. – This rare cyanolichen was recently reported from globally rare alvars in southern Ontario by Lewis and Brinker (2017). These additional provincial records are the first for their respective counties (see Brodo et al. 2013, Wong & Brodo 1973). Its elongate, strap-like lobes that form umbilicate rosettes that are typically pruinose are distinct (Jørgensen 2012c). It is widespread in the Northern Hemisphere having a strong affinity for moist calcareous rocks or vertical rock-faces moistened by calcareous leaching (Schultz & Moon 2011). The specimens cited here were from shallow depressions in exposed limestone pavement that pool seasonal runoff as well as along drainage tracks of near-vertical marble rockfaces. *Thyrea confusa* is most likely to be confused with *Lichinella nigritella* (Lettau) P.P. Moreno & Egea in the study area. *Thyrea confusa* has lobes that are often blueish-grey due to the presence of white pruina, with a medulla up to 250 µm thick (Jørgensen 2012c). *Lichinella nigritella* has rougher, granular to isidiate lobe surfaces that rarely have pruina and are often shiny along the margins, and a thicker medulla, up to 400 µm (Jørgensen 2012c).

Specimens examined. – CANADA. ONTARIO. BRUCE CO.: Bruce Peninsula National Park and Fathom Five National Marine Conservation Area, Georgian Bay, SW corner of Bear's Rump Island, open shoreline alvar with *Carex scirpoidea* ssp. *convoluta*, *Carex crawei* and *Dasiphora fruticosa*, 13.vi.2017, on seasonally flooded limestone pavement, S.R. Brinker 5586 (CANL). FRONTENAC CO.: N shore of Palmerston Lake, S of Ompah, S-facing marble cliff with *Thuja occidentalis*, *Cornus rugosa* and *Diervilla lonicera*, 10.vii.2018, along seepage tracks of marble rockface, S.R. Brinker 6677 (CANL); Frontenac Provincial Park, N shore of Birch Lake, sheltered S-facing marble cliff along lakeshore, 19.ix.2018, saxicolous on vertical marble rockface in seepage track, S.R.

Brinker 7312 (HBG). NORTHUMBERLAND CO.: Trent River, Healey Falls, 10 km SE of Havelock, flood-scoured limestone pavement along river adjacent to wooded ravine, 6.iv.2019, saxicolous on limestone, *S.R. Brinker 7426* (CANL).

***Toninia aromatica* (Sm.) Kistenich, Timdal, Bendiksy & S. Ekman**

FIGURE 30B.

NOTES. – *Toninia aromatica* is widely distributed in North America, represented by scattered records mainly from arctic and alpine regions, as well as records from the Great Plains, the Sonoran Desert region and the Great Lakes Basin, including a single Ontario location on Lake Superior (Timdal 1991). It is parasitic (at least when young) on a wide range of crustose lichens and is found on calcareous soil and rock in open areas (Timdal 1991). The collections reported here were found among bryophytes on exposed rock ledges in the splash-zone of Lake Superior with the cyanolichen *Spilonema revertens* Nyl. It is a highly variable taxon likely representing a complex of several distinct species (E. Timdal pers. comm. 2019), currently distinguished by its squamulose thallus, dark brown to bright green hypothecium that is N+ violet, bacilliform to ellipsoid, and 1–3-septate ascospores averaging 12–22.5 × 4–5.5 μm (Timdal 1991).

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, S shore of Perley Island, exposed coastal rocky headland, 23.vii.2018, on volcanic rock, *S.R. Brinker 6767* (CANL, O; det. E. Timdal); Lake Superior National Marine Conservation Area, E shore of Agate Island, exposed coastal rock outcrop, 19.vii.2019, among bryophytes on ledge of volcanic rock, *S.R. Brinker 7737* (CANL, O; det. E. Timdal).

†***Tremella everniae* Diederich**

FIGURE 30C.

NOTES. – *Tremella everniae* is a lichenicolous heterobasidiomycete that induces the formation of large bullate galls (up to 15 mm in diameter) on *Evernia mesomorpha* Nyl. and *E. prunastri* (L.) Ach. (Brackel & Puntillo 2016, Diederich 1996). It is known from scattered reports in Asia, the Mediterranean and North America (Brackel & Puntillo 2016, Diederich 1996). It was previously reported from Ontario from the Hudson Bay Lowland by Diederich (1996). This is the first report from the Thunder Bay District. It is likely common and widespread in the study area considering the abundance and distribution of its known host.

Specimens examined. – CANADA. ONTARIO. KENORA DIST.: W bank of Goose Creek, 7.6 km from Hudson Bay coast, 15 km ESE of Fort Severn, mature *Picea glauca*-*Populus balsamifera* boreal forest stand along small river, 24.vi.2014, on *Evernia mesomorpha* on conifer twigs, *S.R. Brinker 3697L* (CANL, MA). THUNDER BAY DIST.: Kakabeka Falls Provincial Park, W side of Kaministiquia River, 25 km W of Thunder Bay, immature conifer forest with *Abies balsamea*, *P. glauca*, *Betula papyrifera* and *Populus tremuloides*, 4.viii.2018, on *E. mesomorpha* on *A. balsamea* twig, *S.R. Brinker 6995B* (NY; conf. J.C. Lendemer).

***Umbilicaria arctica* (Ach.) Nyl.**

NOTES. – *Umbilicaria arctica* was reported from a single location in Ontario from Pukaskwa National Park (Crowe 1994), although it was not mapped from the study area by Thomson (1984) who considered it a species of higher arctic-alpine environs. This is only the second Ontario report of this disjunct species that is very rare in the Great Lakes Basin, not having been reported from adjacent U.S. jurisdictions. It is characterized by an umbilicate, monophyllous thallus that is strongly verrucose on the upper surface, gyrose apothecia, and lower surfaces with a distinct black pigmented area around the umbilicus becoming tan to dove-grey towards the margins (Thomson 1984).

Specimen examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Ouimet Canyon Provincial Park, 8 km W of Dorion, 1.9 km N of Gulch Lake, canyon floor among mossy talus with scattered stunted *Picea mariana*, *Betula papyrifera*, and *Alnus alnobetula* ssp. *crispa*, 27.vii.2017, on mafic rock, *S.R. Brinker 6036* & *C. Terwissen* (CANL; conf. R.T. McMullin).

***Umbilicaria hirsuta* (Sw. ex Westr.) Hoffm.**

FIGURE 30D.

NOTES. – *Umbilicaria hirsuta* is reportedly rare throughout its mainly northeastern North American range where it grows on non-calcareous rock, often in seepage channels (Brodo et al. 2001, Hinds & Hinds 2007, Thomson 1984). It was mapped by Thomson (1984) from a single location in Ontario at Manitoulin Island. This appears to be the first cited collection from Ontario, extending its range here north to the Thunder Bay District. It is the only *Umbilicaria* species in the study area that reproduces primarily by soredia, and can easily be distinguished

from other species by the combination of the presence of marginal soredia and a brown lower cortex with pale rhizines (Hinds & Hinds 2007).

Specimen examined. – **CANADA. ONTARIO.** THUNDER BAY DIST.: Lake Superior, S shore of Little Trout Bay, 13.5 km S of Neebing, partially shaded E-facing shale outcrop at base of cliff with open canopy of *Betula papyrifera* and *Abies balsamea*, 19.vii.2017, on shale, *S.R. Brinker 5817A* (CANL; conf. I.M. Brodo).

***Umbilicaria proboscidea* (L.) Schrader**

FIGURE 30E.

NOTES. – *Umbilicaria proboscidea* is a widespread species of exposed rocks in arctic-alpine regions of North America (Brodo et al. 2001). It was mapped from a single location in Ontario by Thomson (1984) from Cape Henrietta Maria but no records appear to have been formally reported from the study area. Here it is reported from two additional locations in the Hudson Bay Lowland. It can be recognized by its pruinose upper and lower surface (at least along the margin of the undersurface) which lacks rhizines, and its adnate apothecia composed of concentric ridges of sterile tissue (Brodo et al. 2001).

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** 97 km NW of Fort Severn, 9.4 km S of East Pen Island, 2.1 km S of Mintiagan Creek mouth, moist hummocky low-shrub and graminoid tundra, 22.vi.2014, on siliceous boulder, *S.R. Brinker 3590* (CANL); Sutton Ridges, 98 km SE of Peawanuck airport, 4.3 km E of Aquatuk Lake, cryptogram-dominated open talus slope at base of W-facing cliff, 6.viii.2014, on siliceous rock, *S.R. Brinker 4124* (CANL, hb. Brinker).

***Umbilicaria torrefacta* (Lightf.) Schrader**

FIGURE 30F.

NOTES. – *Umbilicaria torrefacta* is a circumpolar arctic-alpine species that grows on non-calcareous rocks in exposed areas and is widespread throughout the Canadian Arctic extending southward in western and eastern alpine zones (Thomson 1984). In the east, it ranges as far south as New England and is disjunct in the Great Lakes Basin in Michigan (Harris 2015, Hinds & Hinds 2007). These additional records are the first for the Thunder Bay and Kenora Districts. *Umbilicaria torrefacta* is considered rare elsewhere in the Great Lakes Basin (Fryday & Wetmore 2002, MDNR 2018). It can be distinguished from other species of *Umbilicaria* in Ontario by the combination of its non-pruinose umbilicate, monophyllous thallus with margins that are finely dissected to perforate, that coalesce into deep grooves giving it vernacular names such as ‘punctured rocktripe’ or ‘perforated rocktripe’, and a light or dark brown lower surface with distinct trabeculae, lamellae radiating from the umbilicus, and scattered or dense rhizinomorphs (Hestmark 2017, Hinds & Hinds 2007).

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** Cape Henrietta Maria, Hudson Bay, 204 km E of Peawanuck, 24 km N of Hook Point, sparsely vegetated calcareous shingle beach ridge with *Dryas integrifolia*, *Empetrum nigrum*, and *Saxifraga tricuspidata*, 12.viii.2014, on rock, *S.R. Brinker 4392* (CANL). **THUNDER BAY DIST.:** Obonga-Ottertooth Provincial Park 49 km SW of Armstrong, NE portion of Obonga Lake, exposed, N-facing talus slope along lakeshore, 3.viii.2018, on rock, *S.R. Brinker 6978* & *C. Terwissen* (CANL); The Pinnacles, 5.5 km NW of Dorion, 1 km N of Miner Lake, E-facing talus slope below cliff with scattered *Thuja occidentalis*, *Betula papyrifera* and *Picea glauca* 12.iv.2019, saxicolous on mafic boulders, *S.R. Brinker 8242* (hb. Brinker).

***Usnea glabrescens* (Nyl. ex Vain.) Vain.**

NOTES. – *Usnea glabrescens* is a shrubby to subpendulous lichen with a discontinuous circumpolar northern-boreal and temperate distribution where it occurs in humid, open, mixed forests and alpine zones (Halonen et al. 1999, Hinds & Hinds 2007). It was previously mentioned from Ontario by Ahti (1964) in humid boreal forest habitat on islands of Lake Nipigon but not included in a checklist of lichens of the Thunder Bay District (Crowe 1994) or Ontario (Newmaster et al. 1998). These appear to be the first reports from the study area where it was found on twigs of *Picea glauca* along rivers (Fig. 3B) in the Hudson Bay Lowland, which has a notably cool and humid climate compared to other regions of the province (Crins et al. 2009). It is characterized by its thallus with black-pigmented basal attachment, circular soralia lacking isidiomorphs that often become fully excavate, and a usual K+ yellow (stictic acid complex) or K+ red reaction (norstictic acid) in the medulla (Brodo 2016, Clerc 2011). It is most likely to be confused with the much more abundant *U. subfloridana* Stirton, although that species always possesses numerous and conspicuous isidiomorphs, and has more irregularly rounded soralia with coarse granular soredia (Brodo 2016, James et al. 2009).

Specimens examined. – **CANADA. ONTARIO. KENORA DIST.:** W side of Severn River, 100 km SW of Fort Severn, 18 km S of confluence with the Fawn River, S-facing steep clay riverbank with scattered *Juniperus co-*

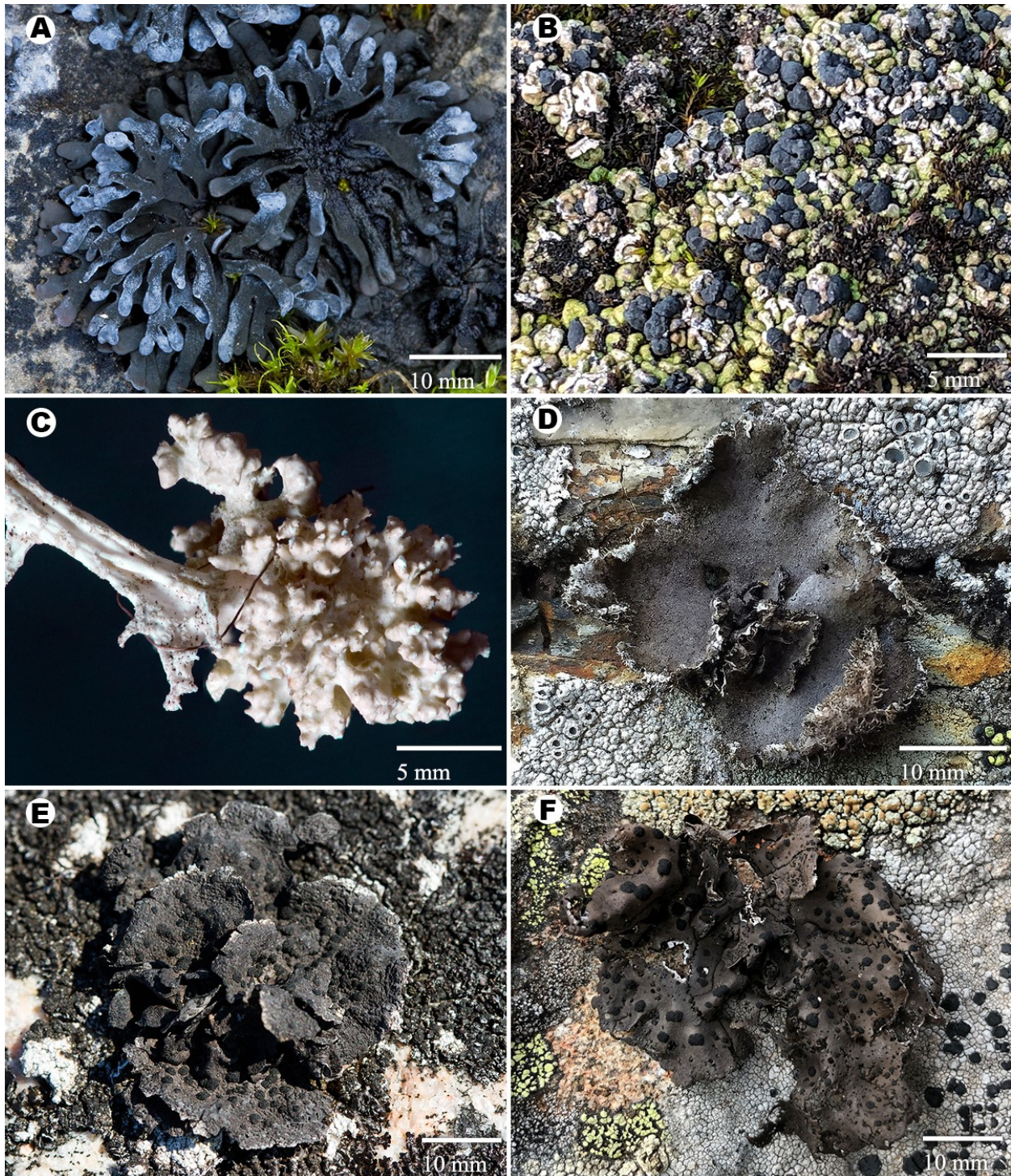


Figure 30. Photographs of rare or otherwise rarely reported lichens and allied fungi in Ontario **A**, *Thyrea confusa* (photo taken in situ, *Brinker 7426*). **B**, saturated thallus of *Toninia aromatica* (photo taken in situ, *Brinker 7737*). **C**, galls of the lichenicolous heterobasidiomycete *Tremella everniae* on thallus of *Evernia mesomorpha* (*Brinker 3697L*). **D**, *Umbilicaria hirsuta* (photo taken in situ, *Brinker 5817A*). **E**, *U. proboscidea* (photo taken in situ, *Brinker 3590*). **F**, *U. torrefacta* (photo taken in situ, *Brinker 8242*).

-*mmunis*, 23.vi.2014, on twigs of *Picea glauca*, S.R. Brinker 3628F (CANL; det. R.T. McMullin); W bank of Goose Creek, 7.6 km from Hudson Bay coast, 15 km ESE of Fort Severn, mature *P. glauca*-*Populus balsamifera* stand along small river, 24.vi.2014, on twigs of mature *P. glauca*, S.R. Brinker 3697C (CANL; det. R.T. McMullin).

Xanthoparmelia angustiphyllo (Gyelnik) Hale

NOTES. – *Xanthoparmelia angustiphyllo* is widespread but scattered in eastern North America (Hale 1990), though it can be locally frequent where areas of exposed sandstone occur (e.g. Harris & Ladd 2005). It was previously reported from Simcoe County where it grew on exposed rock along a river (McMullin & Lendemer 2013). It is distinct among eastern North American *Xanthoparmelia* in having very narrow lobes lacking isidia, with black lower surfaces, and a K⁺ yellow or orangish medulla (due to stictic acid) (Harris 2015). In the northeast it is considered uncommon in New England and rare in adjacent Michigan (Elix & Thell 2011, Harris 2015). These are the first published records for the Thunder Bay District.

Specimens examined. – CANADA. ONTARIO. THUNDER BAY DIST.: Lake Superior National Marine Conservation Area, Bowman Island S of St. Ignace Island, open fossil shingle beach below conifer woods, 21.vii.2019, on shale above current shoreline, S.R. Brinker 7831 (CANL); 5 km NW of Dorion, 500 metres N of Miner Lake, edge of rocky boreal forest with *Pinus banksiana*, *Betula papyrifera*, *Juniperus communis* and *Abies balsamea*, 5.ix.2019, on siliceous rock, S.R. Brinker 8034 (CANL).

DISCUSSION

This work serves to improve our knowledge of the lichen biota of Ontario through targeted and opportunistic fieldwork of critical lichen habitat mostly in understudied areas of the province. It highlights the need for additional and more focused work since many of the species reported here were documented during other, routine floristic work not specifically targeted for lichens. Nevertheless, these findings contribute to a larger body of knowledge regarding global distributions of some rarer taxa reported from relatively few localities. *Lecanora gisleriana*, *Rhizocarpon ridescens* and *Sclerococcum griseisporodochium* were previously known from scant records mostly in Western and Central Europe or portions of Scandinavia and are red-listed in several jurisdictions (e.g. Henriksen & Hilmo 2015, Schnittler et al. 1994, Woods & Coppins 2012). These new records increase the distributional range of these species significantly, and suggest they may not have been searched for where suitable habitat exists outside of their previously reported ranges.

A few lichens reported here are rather conspicuous, so their ability to go undetected until now is surprising (e.g. *Heterodermia neglecta*, *Hypotrachyna revoluta*, *Sticta beauvoisii*, *S. fuliginosa*). Less surprising are the continuous discoveries of more cryptic crustose species and lichenicolous fungi that are much less conspicuous and often require more focused and specialized surveys (e.g. *Agonimia opuntiella*, *Inoderma byssaceum*, *Toninia tecta*). Ecologically, the species reported here are diverse: some are ephemeral crusts of disturbance-maintained ecosystems (e.g. *Absconditella trivialis*, *Tetramelas papillatus*), some are restricted to globally rare ecosystems such as alvars (e.g. *Dermatocarpon dolomiticum*, *Placynthium petersii*). Others are species of open woodlands and have likely benefitted from the increase in ecotones created by habitat conversion and appear to be expanding their range (e.g. *Melanelixia subargentifera*, *Parmotrema reticulatum*, *P. hypotropum*). In contrast, some are restricted to old forests that lack recent human disturbance and have experienced declines due to loss of suitable habitat (e.g. *Fuscopannaria leucosticta*, *Sclerophora farinacea*, *Sticta fuliginosa*).

Newly or rarely reported macrolichens from areas with long forest continuity along the southeastern shore of Lake Superior highlight the ecological importance of this specific region that receives relatively high annual precipitation compared to other areas of the province, and demonstrates a substantial knowledge gap exists there. A single briefly examined forest stand in Lake Superior Provincial Park contained an astonishing four macrolichens not previously reported from Ontario (*Heterodermia neglecta*, *Hypotrachyna afrorevoluta*, *H. revoluta*, *Usnea ceratina*) and an additional two known previously from single historical collections (*Melanohalea halei*, *Parmotrema stuppeum*). These taxa, along with other rare species that occurred there, such as *Porina scabrada* and *Punctelia appalachensis*, illustrate the unique Appalachian floristic affinities of the Great Lakes Basin. Lichen communities in the region likely had a more continuous range, but are now disjunct from their main centres of distribution to the southeast due in large part to loss of mature, productive forest habitat (Lendemer et al. 2013, 2014).

The lichen flora of Ontario is of great phylogeographic interest because it includes species with very different distributions including: Appalachian species more characteristic of humid, high elevation forests with high annual rainfall further to the southeast (e.g. *Hypotrachyna afrorevoluta*, *Melanohalea halei*, *Pertusaria superiana*, *Porpidia degelii*), disjunct northern species with arctic-alpine affinities (e.g. *Baeomyces placophyllus*, *Ophioparma*



Figure 31. Metal-rich vertical rock outcrops like the one depicted here provide habitat for numerous provincially rare metallophyte lichen taxa, including *Rhizocarpon ridescens* and *Lecanora gisleriana* which were unknown in North America until their discovery during the present study in the Thunder Bay District of northwestern Ontario.

lapponica, *Porpidia flavicunda*), distinctly boreal species (e.g. *Psoroma hypnorum*), sub-oceanic-maritime species that are disjunct from boreal coastal areas of eastern and western North America (e.g. *Cliostomum griffithii*, *Hypogymnia vittata*, *Lecanora orae-frigidiae*, *Lopadium disciforme*), and species more typical of western-montane regions (e.g. *Endocarpon pulvinatum*, *Leptogium gelatinosum*, *Peltula bolanderi*, *Punctelia stictica*).

Information published here will be used to inform the provincial conservation status of the species reported. Some of the newly reported species will undoubtedly have high conservation status ranks assigned to them given their restriction to rare habitats and reported rarity elsewhere. For example, *Rhizocarpon ridescens* and *Lecanora gisleriana* are restricted to metal-rich vertical rock outcrops (Fig. 31) and are associated with other rare metallophyte taxa. This study also recognizes the existence of six underexplored lichen habitats that harbor a wealth of undocumented biodiversity, and underscores the importance of continued and more focused lichenological research, particularly in regions where considerable knowledge gaps still occur.

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