

**LICHEN SURVEY OF MOUNT EVERETT SUMMIT,  
SOUTHWEST BERKSHIRE COUNTY, MASSACHUSETTS**

by Philip F. May  
42 Stults Road  
Belmont, MA 02478-3431  
(617) 484-1914  
PFMay@aol.com

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**REVISED SUMMARY**

A survey of the lichens on the summit of Mount Everett, Massachusetts, yielded 112 species in 50 genera. Of these 43 were found on rock, 57 on bark or wood, and 17 on soil or duff. Forty-seven species grew on deciduous trees and shrubs, whereas 21 species grew on conifers. A few lichen species were found on more than one substrate. Lichen coverage was moderately high on rock outcrops, low to moderate on trees, and relatively low on soil. Taller trees away from the summit tower had higher coverage and diversity of corticolous lichens than those nearer the tower. With several notable exceptions, the lichens on the summit are a subset of typical lichen communities elsewhere in southern New England. Strong similarities exist to the lichen communities of upland and lowland pitch pine forests, of dry mid-elevation hardwood forest, and of upland siliceous rock outcrops.

Two rock-dwelling species merit special concern, one of which is globally rare, the other rare in eastern North America. Three more rock lichens are at least uncommon in Massachusetts and may merit concern when more is learned of their distribution.

One lichen species growing on pitch pines is new to North America; presently only three North American populations are known. A second tree-dwelling lichen is probably new to science, and two others are reported for the first time from Massachusetts. No assertion is made regarding their regional abundances.

Fire is a major danger for all lichen communities on the summit. Steps should be taken to reduce the danger of accidental hot fires. Cutting trees and removing dead wood by hand should be seriously considered as a substitute for managed burns in controlling the invasion of the deciduous forest into pitch pine areas and preventing accidental hot fires. Managed fires, if any, need to be planned with their impact on rare lichens in mind.

Off-trail traffic by hikers threaten rare rock-dwelling lichens. Rock-dwelling lichens could also be damaged by activity associated with proposed tower reconstruction, but this damage might be avoided through careful planning and execution of construction activities. The tree-dwelling lichen community should be safe unless the trees on the summit are burned, bulldozed, sprayed with herbicides, or lost to forest succession.

## SUMMARY OF CHANGES SINCE THE 1999 REPORT

Forty-eight additional lichen species have identified from the summit area. The increased species count is primarily due to more complete surveys of the summit deciduous forest, of rock ledges, and of sterile sorediate crusts in all communities. Among the species being newly reported are a handful meriting conservation concern and another handful that may merit protection once more is known regarding their distribution and abundance in New England. Accordingly, this revised report proposes more management of the summit area, particularly with regard to preventing fire.

## INTRODUCTION

The lichens on the summit of Mount Everett were surveyed for 12 hours in late autumn, 1999, and for an additional 34 hours in the summer and autumn of 2000. The principal purpose of the survey was to assess the diversity and abundance of lichens growing on the summit and to see if any unusual lichens were present. Emphasis was placed on the dwarf pitch pine/bear oak/birch community, but the mixed hardwood forest, the grass/heath community, and rock ledges were thoroughly surveyed as well.

The survey area was delimited ecologically by the area beyond which stands of pitch pine could not be found. These limits are obvious to the east, south and southwest of the summit tower. An area of deciduous forest covers the summit north of the tower, but a few pitch pines can be found just before the slope steepens. On the west and northwest sides, a few stands of pitch pines are growing a hundred meters or so downslope after an interval of deciduous forest. These pines formed the western limits of the survey. Since pitch pines extend much farther downslope to the west of the summit tower than to the east, the survey area was asymmetrical.

Standard non-randomized survey methods were used. A reconnaissance was made for major habitats and sub-habitats. Within each subhabitat, detailed searches were made for various microhabitats and for concentrations of lichens, and within these, for lichen species not previously recorded at the site. The survey included lichens growing on trees, on rocks, and on the ground. Lichens on man-made substrates, such as concrete, were excluded.

In order to assess the lichens' relative abundances and substrate preferences, detailed field counts of lichens were made on a few individuals of each tree species. For saxicolous and terricolous lichens some field counts were made, but a heavier reliance was placed on collections when estimating their abundances.

A specimen of each lichen species was collected as a voucher specimen. The identity of each species was later confirmed in the laboratory using microscopy and standard chemical tests, including, in some cases, thin-layer chromatography (TLC). A special effort was made to collect and identify normally sterile species, as these lichens often are important members of the community. A few specimens were sent to specialists for confirmation or identification. Labeled voucher specimens will be placed at the Farlow Herbarium of Harvard University.

## LIMITATIONS

Surveys of total lichen diversity are rather sensitive to the amount of time spent in the field and the size and uniformity of the study area. Field time is important because many lichen species are present only as widely scattered individuals. Finding them is partially a matter of chance. This problem is exacerbated by the small size of certain taxa, which requires close inspection of the substrate. Size of the study area influences results in two ways. A larger area usually provides more types of habitats and microhabitats. Within any habitat, a larger area give more opportunities for widely scattered individuals to occur.

In the case of Mount Everett, the total area covered during the survey was of modest size, so that most types of habitats and microhabitats were probably found and examined during the course of the survey. A sufficient amount of time was spent in the field to characterized the summit area fairly thoroughly. However, results should be compared with caution to larger sites with more diverse habitats.

## RESULTS

### COVERAGE BY LICHENS:

Coverage was not measured, so the following are field impressions. Overall coverage within the study area depended on substrate. The highest coverage was found on the schist ledges, many of which were almost completely covered with lichens.

Coverage of trees was modest and spotty, with some individuals almost devoid of lichens and others having, say, 30%-50% coverage over portions of their trunks. Coverage seemed to be highest (but still modest) on red oaks, followed by pitch pine, low for bear oak and *Vaccinium*, and almost non-existent on birch and mountain laurel. Larger trees generally had higher percentage cover than smaller trees of the same species. Coverage seems to be higher near the periphery of the community and on the north slope, but, if true, this may be due to larger tree sizes. Trunks and low branches had most of the lichen coverage, with relatively low twig coverage.

Copious leaf litter over most of the study area apparently inhibits the growth of ground lichens. Overall coverage was low and patchy, with occasional lichen mats on elevated patches of soil associated with rock ledges. A disturbed soil/pebble lichen community exists on the trampled gravel area surrounding the summit tower.

### SPECIES DIVERSITY:

One hundred twelve species in 50 genera were found in the study area. Of these 43 were found on rock, 57 on bark or wood, and 17 on soil or duff. A few species were found on more than one substrate. Forty-seven species of lichens grew on deciduous trees and shrubs, whereas only 21 species grew on conifers. Again, a few species grew on both. An annotated list of species is attached at the end of the report.

For comparison, here are some species counts for some other New England sites. As mentioned above, caution should be used in interpreting this data, since in all cases the sites are much larger and mostly more diverse in habitat than Mount Everett.

Table 1. Comparison of total lichen diversity at selected regional sites

Site	Size in acres	Field days	Species
Mount Everett, MA (this report)	ca. 15	4.5	112
Shawangunk Mountains, NY, summit areas <sup>1</sup>	ca. 20,000	>10	>125 <sup>9</sup>
Mount Greylock, MA (ridge summit areas) <sup>2</sup>	ca. 250	>5	>125 <sup>10</sup>
Bartholomew's Cobble, MA <sup>3</sup>	277	0.5	110
Wachusett Mountain, MA (old growth area) <sup>4</sup>	130	11	151
Cape Cod Canal, MA <sup>5</sup>	1,100	20	145
Westover Air Reserve Base, MA <sup>6</sup>	1,500	18	121
Devens Reserve Forces Training Area, MA <sup>7</sup>	4,200	14	173
Katama Plains Conservation Area <sup>8</sup>	129 <sup>11</sup>	6	75

<sup>1</sup>Dirig, 1994, and personal communications; <sup>2</sup>May, P., unpublished data; <sup>3</sup>Harris, R.C., unpublished data; <sup>4</sup>May, 1998; <sup>5</sup>Lay et al., 1995; <sup>6</sup>Kneiper et al., 1995a; <sup>7</sup>May et al., 1998; <sup>8</sup>Kneiper et al., 1995b

<sup>9</sup>based on a formal study and on a partially reported species count from a field workshop

<sup>10</sup>partially reported species count from a field workshop

<sup>11</sup>most of the study area was periodically burned

Lichenologists studying old-growth forests in northern New England have counted in four field days 100-120 species growing on living and dead trees only (Selva 1994, 1996). These numbers exclude lichens growing on rocks or on the ground. This compares to 57 on found on trees at Mount Everett.

A total species counts for a site is only one measure of diversity. Species seen per unit time or per unit area would be other measures. By these measures, Mount Everett would be probably be average for a habitat mixed conifer/hardwood forest and open ledges of comparable elevation in Southern New England.

NOTEWORTHY SPECIES :

*Diploschistes badius* has been found on schist outcrops southwest and southeast of the summit tower. The identification has been confirmed by Dr. H. Thorsten Lumbsch of Essen, who is the world expert on the genus. *D. badius* is a rare species, previously known only from southeast Arizona and Costa Rica (Lumbsch, 1989; Lumbsch and Elix, 1989). It was segregated from *D. aeneus* mainly on the basis of its different chemistry. (*D. aeneus* is also rare, with known specimens from South Carolina, California, Sonora, and the West Indies.) *D. badius* is neither small nor inconspicuous, so it probably represents an example of a true rarity, rather than of undercollecting. The three individuals have been noted so far on the summit of Mount Everett in a few hours of surveying ledges. Evidently there is a modest population at the site.

*Fuscidea pusilla*--a sorediate species usually found sterile--is here reported for the first time from Massachusetts. Several specimens from Mount Everett and one from Fort Devens were identified by Tønsberg, who originally described the species. It has previously been reported for New York. This lichen is undoubtedly undercollected and is probably at least occasional in Massachusetts..

*Fuscidea* aff. *mollis* is the designation I am using for *Fuscidea recens* auctores North America--a non-sorediate species containing divaricatic acid. The real *Fuscidea recens* is a sorediate species. According to Alan Fryday at Michigan State University, unless someone can match our taxon with an African or Asian species, it will need a new name. In southern New England the species is locally common on rocky outcrops in the uplands.

*Lecanora ramulicola* (previously referred to by me as "biatoroid-lecanoroid species #1" and originally described as *Lecidea saepincola* var. *ramulicola*) is gray fertile crustose lichen containing atranorin and usually also usnic acid. On Mount Everett it commonly grows on pitch pine bark and wood, and on red spruce. Occasionally it may be found on mountain laurel and shadbush when these are growing next to pitch pine. Although rather common on the summit of Mount Everett, the taxon has never been reported for North America and is not represented in the Farlow Herbarium's collections. The author recently found the taxon growing on jack pines on the exposed rocky summit of Welch Mountain, near Waterville Valley, New Hampshire. The altitude and habitat of the latter site is quite similar to that of the summit of Mount Everett. The taxon also grows in scattered sites in Europe, usually on pine, and is also known from Newfoundland. Because the taxon is distinctive but similar to *Lecanora symmicta*, Dr. Christian Printzen and I are in the process of describing it as a new *Lecanora* species.

A possible sterile specimen of *Lecanora caesiorubella* Chemotype I (virensic acid and atranorin) was found once on red oak. The identification by Dr. H. Thorsten Lumbsch of Essen, world authority in this group, is based on chemistry alone and is tentative. No other presently described lichen has the combination of virensic acid and atranorin. However, the thallus structure is unusual for *L. caesiorubella*, and we know of no similar large sterile specimens of this normally copiously fertile taxon.

A *Lecidea* species in the *L. auriculata* group was found a few times on schist. Since neither I nor R. C. Harris of the New York Botanical Garden can identify it, a couple of specimens have been sent to Hans Hertel, the world expert on this genus. It may be years before he has a chance to examine the specimens. It will undoubtedly prove rare in eastern North America.

*Lecidea tessellata* is reported for the first time from Massachusetts. It is also known from the Catskills, the White Mountains, coastal Maine, and Canada. This northern species is at least uncommon and possibly rare in Massachusetts. A sizeable population exists on the summit.

*Lepraria borealis* is here reported for the first time from New England. The specimen was identified by Tor Tønsberg of the University of Bergen, who recently described the species. No inferences should be made as to its regional abundance as *Lepraria* (a genus whose species are always sterile) is poorly collected and poorly studied in North America. I have collected several

specimens in Massachusetts with chemical constituents similar to those of *Lepraria borealis*, but I have not yet compared their morphology to the present specimen. In addition, some experts assert that *L. borealis* merely represents a chemotype of other species in the genus

Several *Lepraria* specimens were sent to Tønsberg for identification or verification. Four taxa (Nos. 1-4 in the list) were returned with statement that that, in his opinion, they were not conspecific with well-known European taxa, and they might represent undescribed species. Two of these taxa are quite common in southern New England, even though undescribed, and the status of the other two is unknown. In addition, two specimens containing alectorialic acid were found on hemlock. These seem to have a different thallus structure than *Lepraria* species No. 3 but have been lumped together on the list because of similar chemistry.

*Rhizocarpon* aff. *anaperum* is a presently undescribed species with a blue exciple and epihymenium (apothecial structures only seen using a compound microscope). The species is presently known from one Michigan specimen and two more from New England. *Rhizocarpon* in eastern North America has not been studied recently. I suspect that at least a few herbarium collections will turn out to be this taxon.

*Rhizocarpon* cf. *rubescens* lacks the KOH+ purple pigment found in apothecia of *Rh. rubescens* s. str. Alan Fryday--a *Rhizocarpon* specialist--is unsure at present whether specimens lacking the pigment represent a new species or merely a variant. He knows of one other similar specimen from eastern North America. Most New England specimens containing norstictic acid have historically placed in *Rh. plicatile*. This name has recently been abandoned and the taxon has been divided into a species with small spores (*Rh. reductum*) and a species with large spores (*Rh. rubescens*). Existing collections will have to be re-examined to see if they have large spores and if so, whether or not the KOH+ purple pigment is present.

*Rinodina efflorescens* is newly reported here for Massachusetts and possibly for New England. It has previously been reported for eastern Canada, but is not on the New York state list. Tønsberg identified specimens from Mount Everett and from Wachusett Mountain. This species is small, brown, sorediate, and normally sterile and so is hard to find. It is probably occasional in Massachusetts, but undercollected.

Sterile species No. 1 is almost certainly new to science. It is a corticolous sorediate species containing norstictic acid. Unless it is found fertile, it will require DNA-sequencing to determine its generic placement. Probably also on Wachusett Mountain.

Sterile species Nos. 2-5 are taxa that could not be identified due to their sterile condition, but are distinct from other species on the annotated list. Nothing can be said about their regional abundance.

#### LICHEN GROUPS NOT REPRESENTED ON THE SUMMIT:

No lichens containing a cyanobacterium as photobiont (e.g., lichens in the genera *Leptogium*, *Collema*, *Peltigera*) were found on Mount Everett, even on the base of trees on shaded north and east sides of the summit. This lack may be interpreted as indicating either an extremely dry site

or a site polluted by acid rain or both. Cyanolichens have also been reported as absent from the summits of Mount Greylock, Mount Monadnock, and Wachusett Mountain, although they are represented on lichen lists from the Shawangunks and the Catskills.

Only two tiny specimens of epiphytic fruticose genera (*Usnea*, *Evernia*, *Ramalina*, *Bryoria*) were found on the summit of Mount Everett. (However, a few specimens of the subfruticose genus *Pseudevernia* were found.) This lack may be interpreted as indicating either an extremely dry site or a site polluted by dry or wet SO<sub>2</sub> deposition or both. Fruticose epiphytic lichens are also missing from the species lists of Mount Greylock, Mount Monadnock, and Wachusett Mountain, but present on those from the Catskills and Shawangunks.

No single specimen of "stubble" lichens (Caliciales and Mycocaliciaceae) was found on the summit. This lack might be interpreted to indicate a lack of forest ecological continuity on the scale of centuries. However, even the weedy species normally found in second growth forest were not encountered, so a better interpretation may be that the summit is too dry or polluted for them to grow. This relative lack is reflected also in lists from Mount Monadnock and the Shawangunks (possibly no one searched for them), but a number of calicioid lichen species have been reported from Wachusett Mountain, Mount Greylock and the Catskills

Only one species was found on Mount Everett that also appears on Selva's (1994) list of 15 non-calicioid lichen species associated with ancient coniferous forests in northern New England. However, Selva's study covered only hemlock and spruce/fir forests, not the much drier pitch pine forest, so the lichen communities cannot be meaningfully compared.

## DISCUSSION

From a lichenological perspective, the summit of Mount Everett may be characterized as a relatively dry, mixed conifer/hardwood forest with many open ledges and small areas of open ground. As a whole the lichen community is unremarkable; however several unusual taxa were encountered. Of the corticolous species *Lecanora ramulicola* is being reported as new to North America, *Rinodina efflorescens* as new to New England, *Fuscidea pusilla* as new to Massachusetts. A sterile form of *Lecanora caesiorubella* Chemotype I is certainly rare, and Sterile species No. 1 is probably new to science. Of these, four of five taxa were identified from sterile collections. Of the saxicolous species, *Diploschistes badius* is globally rare, *Lecidea* species (*L. auriculata* group) is rare in eastern North America, *Lecidea tessellata* is probably rare in Massachusetts, *Lepraria borealis* is being reported as new to New England, and *Rhizocarpon* aff. *anaperum* is undescribed and probably uncommon in Massachusetts.

Epiphytic lichens on the pitch pines represent a subset of those found in the much larger pitch pine forests located in the high elevations of the Shawangunk Mountains of New York and the coastal plain of southern New England. The lichens on deciduous trees and shrubs represent a subset of those found in similar dry upland forest throughout southern New England. At least three of the five notable corticolous lichens found on Mount Everett will probably be found in similar habitats once they are searched for. However, sterile species are ignored by most lichenologists.

The lichens on the rocks at Mount Everett summit are a typical subset of those found on siliceous outcrops of similar elevation throughout Massachusetts, with the exceptions noted above. A few common saxicolous macrolichens are missing from Mount Everett, for example species in *Arctoparmelia* and *Umbilicaria*. The relatively small area of the summit may account for the missing species.

The diversity of ground lichens is lower than expected, undoubtedly due in part to a lack of suitable habitat. Bare ground is rare on the summit, except in high traffic areas. Patches of duff on or next to rock outcrops are the major substrate for ground lichens. Under the forest canopy, ground lichens mostly get shaded out by leaf litter, and possibly also by the dense shrub layer occurring in parts of the study area.

The diversity of lichens in forest communities depends on a number of factors. These include the variety of substrates available, the variety of habitats and microhabitats available, the wetness and humidity of the local climate, the amount and type of airborne pollutants, the size of the stand, the history of habitat disturbance, and the ecological continuity of the forest.

In the case of Mount Everett summit, lichen diversity may be limited by the size and diversity of the forest, by historically high levels of SO<sub>2</sub> air pollution (both from out of state and from the industrial making and burning of charcoal locally), by lack of fog and rainfall compared to higher and lower elevations, by low retained soil moisture, by a history of major and minor fires, and by the lack of old deciduous trees. However, these explanations are necessarily somewhat speculative.

## MANAGEMENT RECOMMENDATIONS

### PROTECTING RARE ROCK-DWELLING LICHENS

Some thought should be given to protecting the rare lichens on Mount Everett summit. *Diploschistes badius* is a globally rare rock lichen whose only other North American localities are in Arizona. The rock lichen referred to as "*Lecidea* species" is also undoubtedly rare in eastern North America. The rock lichens *Lecidea tessellata* and two *Rhizocarpon* species are probably at least uncommon and possibly rare in New England.

How might these species be protected? Scattered individuals of *D. badius* and also of each of the *Lecidea* species have now been found. This implies that thinly distributed populations of these three species exist on the summit ledges. Whether local populations of the two *Rhizocarpon* species exist is unknown but cannot be ruled out. Because it is difficult to identify these rare crustose species in the field and because of their likely scattered distribution on the summit, the only real alternative, is to protect the rock lichen community as a whole.

The principal natural threat to the rock lichen community is fire. This threat is discussed in the next section. The main human threat to rock lichens is from physical abrasion.

If construction is planned, then construction activity needs to be limited as much as possible to the already disturbed areas within ten meters outside of the tower fence and to the existing paths. Off-trail foot traffic also will abrade rock lichens. Bored workmen will probably want to wander around the summit during breaks or lunch. DEM should restrict workmen to the main trails and the construction area and enforce this restriction. Use of the summit as a restroom should likewise be restricted.

If no construction is planned (or following any construction activity), rare rock lichens would be best protected by passively encouraging hikers to remain on the trail and within presently disturbed areas near the tower. One method of accomplishing this would be to place lines of rock rubble placed along the edges of trails and any permitted sitting areas. These have been successfully used high-traffic areas of the White Mountains to protect fragile summit vegetation.. They could be built by local volunteers under DEM supervision. The danger to the rock lichen community by wandering hikers should not be underestimated, especially if the volume of hikers increases over time.

#### PROTECTING TREE-DWELLING LICHENS

Presently only three populations of the bark lichen *Lecanora ramulicola* are known in North America. Our limited knowledge of the two New England populations suggests that the species is restricted to pine forests on exposed mountain ridges. Populations may therefore turn out to be uncommon. However, no special management steps need to be taken to protect the lichens, aside from protecting and maintaining the summit pitch pine forest itself and aside from preventing catastrophic hot fires.

There has been informal discussion among researchers regarding the potential need for managed burns in order to maintain the pitch pine forest in the face of invasion by the deciduous forest. From the standpoint of rare lichens, cutting down invading trees and removing woody debris (to prevent accidental hot fires) would be far preferable to burning. Fire is the enemy of both tree and rock lichens. Cutting and removing might be more expensive in time and labor than burning, but the summit area is not large, and so the practice appears feasible. Care would need to be taken not to trample rock lichens in the process of managing the forest.

In the event that burns are planned, they should be conducted on a small scale and the effect on tree lichen and rock lichen communities monitored. Sufficient time between burns must be allowed to permit recolonization from undamaged trees and rocks. Since recolonization times of the lichens and the details of normal succession are unknown, it would be essential to leave large patches of pitch pine forest and adjacent rock ledges unburned for many decades and perhaps centuries.

#### PROTECTION OF SOIL-DWELLING LICHENS NOT NEEDED

The soil-dwelling lichen community requires no special concern. If given a choice, it is better (from a rare lichen standpoint) for visitors to the summit to walk on bare ground, on grassy areas, or on low shrubs than to walk or sit on the rock ledges. However, this observation should not be considered in isolation. There are plants and non-lichenized fungi to be considered. In addition,

once off the trail, visitors to the summit will not likely distinguish between walking on soil and on rock ledges. Therefore, visitors to the summit should be encouraged to remain on the major trails or in the presently disturbed area near the tower.

#### NON-USE OF HERBICIDES, PESTICIDES, AND FERTILIZERS

Herbicides, pesticides, and fertilizers should be used only with great caution in the summit area as all of these are known to adversely affect lichens.

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ANNOTATED SPECIES LIST (Revised 20 April 2001)

My comments on abundances are (1) relative to other lichens and (2) estimates based on limited data. The format is: species name and authority -- comments, abundance and substrates for Mount Everett [abundance in Massachusetts]

- Acarospora fuscata** (Nyl.) Arnold -- abundant on sunny schist ledges, [common in MA on siliceous rock]
- Allocetraria oakesiana** (Tuck.) Radlane & Thell -- fairly common on hardwoods in closed canopy forest [fairly common in MA on hardwoods and sometimes conifers]
- Amandinea punctata** (Hoffm.) Coppins & Scheid. -- found once on hobblebush [occasional in MA]
- Aspicilia cinerea** (L.) Körber, s. lat. -- common on schist and gneiss [fairly common in MA on siliceous rock]
- Aspicilia verrucigera** Hue -- occasional on schist and gneiss [occasional in MA on siliceous rock]
- Biatora longispora** (Degel.) Printzen ined -- the correct name for *B. helvola* auctores eastern N. America; occasional on hardwoods [occasional on hardwoods]
- Buellia turgescens** Tuck. -- found once on gneiss [uncommon in MA]
- Candelariella efflorescens** R. C. Harris & Buck -- occasional on red oak, locally common on red maple [fairly common in MA on hardwoods]
- Candelariella vitellina** (Hoffm.) Müll. Arg. -- infrequent on schist ledges [occasional in MA on siliceous rock]
- Cetraria arenaria** Kärnef. -- occasional on soil or duff [locally common on sandy soils]
- Cladina rangiferina** (L.) Nyl. -- occasional on soil [locally common in MA on sunny upland soils]
- Cladina stellaris** (Opiz) Brodo -- occasional on soil [occasional in MA on sunny upland soils]
- Cladina subtenuis** (des Abb.) Hale & Culb. -- found once on soil [locally common in MA]
- Cladonia atlantica** A. Evans -- found once on soil [infrequent, usually found on the sandplain]
- Cladonia coniocraea** (Flörke) Sprengel -- very common on bark of deciduous trees, on rotted wood, and on duff over ledges [common in MA]
- Cladonia didyma** (Fée) Vainio -- found once on schist [infrequent in MA]
- Cladonia floerkeana** (Fr.) Flörke -- two very scrappy specimens on duff over schist [occasional in MA]
- Cladonia grayi** G. K Merr. *ex* Sandst. -- fairly common on duff and soil; once on mountain laurel [common in MA]
- Cladonia macilenta** Hoffm. -- found once on red maple [occasional in MA]
- Cladonia macilenta var. bacillaris** (Genth) Schaerer -- fairly frequent on pitch pine bark, mountain laurel, duff, and decaying wood [common in MA]
- Cladonia ochrochlora** Flörke -- found once on moss and once on soil with moss [common in MA]
- Cladonia pleurota** (Flörke) Schaerer -- occasional on moss, soil, and duff [common in MA]
- Cladonia pyxidata** (L.) Hoffm. -- occasional on duff [occasional in MA]
- Cladonia squamosa** (Scop.) Hoffm. -- fairly common on shaded rock, soil, and duff [locally common in MA]

**Cladonia strepsilis** (Ach.) Vainio -- abundant (but usually sterile) on soil between and over ledges [occasional in MA]

**Cladonia uncialis** (L.) Weber *ex* Wigg. -- common on soil in partial sun [fairly common in MA]

**Dimelaena oreina** (Ach.) Norman -- abundant, prefers the light-colored (usually quartz) part of gneiss outcrops in full sun [common in MA]

**Diploschistes actinostomus** (Ach.) Zahlbr. -- found once on schist [infrequent in MA]

**Diploschistes badius** Lumbsch & Elix -- occasional on schist [rare world-wide, on rock (see discussion in text)]

**Diploschistes scruposus** (Schreber) Norman -- occasional on schist [occasional in MA]

**Evernia mesomorpha** Nyl. -- found once on red oak [occasional in MA, locally common]

**Flavoparmelia caperata** (L.) Hale -- fairly common on hardwoods in closed canopy areas [abundant in MA]

**Fuscidea arboricola** Coppins & Tønberg -- a sterile crust fairly common on both conifers and deciduous trees and shrubs [fairly common in MA but rarely reported]

**Fuscidea pusilla** Tønberg -- a sterile crust, occasional on pitch pine and laurel [first report from New England, although known from Fort Devens; probably at least occasional]

**Fuscidea sp. (aff. F mollis)** -- fairly common on shaded faces of schist ledges; found once on red oak; apparently undescribed [occasional in MA, locally common on upland siliceous outcrops, uncommon on bark]

**Graphis scripta** (L.) Ach. -- common on smooth bark of deciduous trees [fairly common in MA; locally abundant]

**Hypocenomyce scalaris** (Ach. *ex* Liljeblad) M. Choisy -- common on pitch pine and spruce [common on conifers in MA]

**Hypogymnia physodes** (L.) Nyl. -- common pitch pine and spruce [common in MA]

**Imshaugia aleurites** (Ach.) S. F. Meyer -- abundant on pitch pine, occasional on deciduous trees and shrubs [locally common in MA]

**Lasallia papulosa** (Ach.) Llano -- occasional colonies on schist ledges [common in MA on siliceous boulders and outcrops]

**Lasallia pennsylvanica** (Hoffm.) Llano -- occasional large colonies on schist ledges [infrequent in MA on siliceous boulders and outcrops; locally common due to its colonial habit]

**Lecanora caesiorubella** Ach. Chemotype I (virensic acid and atranorin) -- apparently a sterile form of this species, since no other taxon is known to have this chemistry; found once on red oak [possibly the first reported example of this form]

**Lecanora hybocarpa** (Tuck.) Brodo -- found once on birch [occasional in MA]

**Lecanora minutella** Nyl. -- occasional on weathered cones of pitch pine [rarely collected but fairly common in MA]

**Lecanora polytropa** (Hoffm.) Rabenh. -- found once on schist [occasional in MA]

**Lecanora ramulicola** (H. Magn.) Printzen & P. May ined -- common on pitch pine and spruce, infrequent on mountain laurel and oak (newly transferred to *Lecanora*; see text) [not previously reported in N. America but also now known from a locality in New Hampshire; probably uncommon in MA]

**Lecanora pulcaris** (Pers.) Ach. -- abundant on deciduous trees and shrubs [in MA occasional, locally common]

**Lecanora stobilina** (Sprengel) Kieffer -- found once on dead branch of an oak [in MA occasional on hardwoods]

**Lecanora symmicta** (Ach.) Ach. -- fairly frequent on young branches of deciduous trees and shrubs [common in MA]

**Lecidea species** -- in the *L. auriculata* group; occasional on schist; see note in text [probably unknown in New England]

**Lecidea tessellata** Flörke -- fairly common on gneiss, usually on the darker (mafic) areas [not previously reported for MA; possibly rare]

**Lepraria borealis** Lohtander & Tønsberg -- found once on schist in shaded cavity [first report for New England, but probably at least occasional]

**Lepraria caesioalba** (de Lesd.) J. R. Laundon -- found once on schist and once on one red oak; this specimen was found in the shade instead of full sun but otherwise matches the species [uncommon in MA]

**Lepraria lobificans** Nyl. -- found once on duff over schist [fairly common in MA]

**Lepraria neglecta** (Nyl.) Lettau -- abundant on sunny schist ledges, occasional on red oaks [common in MA, locally abundant]

**Lepraria species No. 1** -- with stictic acid and atranorin; found once on shaded schist, possibly undescribed according to Tønsberg [status in MA unknown]

**Lepraria species No. 2** -- with atranorin, zeorin, roccellic and an unidentified fatty acid; found once on shaded schist; probably undescribed according to Tønsberg [probably the same species as one containing atranorin, zeorin, and rangiformic acid; if so, common in MA ]

**Lepraria species No. 3** -- with atranorin, alectorialic acid, and rangiformic acid; found once on shaded schist; probably undescribed according to Tønsberg; two specimens on hemlock may fall here, may be *L neglecta*, or may represent a second undescribed taxon containing alectorialic acid [probably fairly common in MA in shaded microhabitats]

**Lepraria species No. 4** -- with atranorin, zeorin, and an unidentified fatty acid; found twice on hemlock; probably undescribed according to Tønsberg [occasional in MA on hemlock]

**Melanelia subaurifera** (Nyl.) Essl. -- found once on red oak [fairly common in MA]

**Micarea erratica** (Körber) Hertel, Rambold, & Pietschmann -- fairly frequent on pebbles, but hard to see [common in MA]

**Micarea melaena** (Nyl.) Hedl. -- fairly frequent on wood of dead pine trees [occasional on trees and rocks]

**Micarea peliocarpa** (Anzi) Coppins & R. Sant. -- found once on schist [occasional on rocks]

**Mycoblastus fucatus** (Stirton) Zahlbr. -- a sterile crust, fairly frequent on pitch pine and mountain laurel [in MA, rarely reported, but occasional]

**Mycoblastus sanguinarius** (L.) Norman -- found once on wood of a dead pitch pine and once on schist [normally a species of the boreal forest, for example, fairly common on Mount Greylock summit]

**Ochrolechia androgyna** (Hoffm) Arnold -- found once on white birch [infrequent in MA]

**Ochrolechia arborea** (Kreyer) Almb. -- common on red oak and scrub oak [in MA common on hardwoods, occasional on conifers]

**Ochrolechia pseudopallescens** Brodo -- occasional on conifers and hardwoods [in MA infrequent on conifers]

**Parmelia saxatilis** (L.) Ach. -- infrequent, on shaded schist and on oaks [occasional in MA on siliceous rock and trees]

**Parmelia squarrosa** Hale -- occasional on hardwoods [fairly common in MA on hardwoods]

**Parmelia sulcata** Taylor -- occasional on hardwoods [abundant in MA on hardwoods]

**Parmeliopsis capitata** R. C. Harris -- abundant on conifers, fairly frequent on deciduous trees and shrubs [locally common in MA, otherwise occasional]

**Pertusaria trachythallina** Erichsen -- occasional on hardwoods [occasional in MA on hardwoods]

**Pertusaria velata** (Turner) Nyl. -- occasional on hardwoods [occasional in MA on hardwoods]

**Phaeophyscia rubropulchra** (Degel.) Essl. -- locally common on scattered red maples [common on hardwoods in MA]

**Physcia millegrana** Degel. -- occasional, common on red maples [common in MA on hardwoods]

**Physcia stellaris** (L.) Nyl. -- found twice on hardwoods [common in MA]

**Porpidia albocaerulescens** (Wulfen) Hertel & Knoph -- occasional on shaded faces of schist ledges [common in MA, locally abundant]

**Porpidia herteliana** Gowan -- fairly common, on siliceous rock [occasional in MA]

**Pseudevernia consocians** (Vainio) Hale & Culb.-- infrequent on pitch pine [a species of boreal forests, known from Mount Greylock]

**Punctelia rudecta** (Ach.) Krog -- common on hardwoods [common in MA on hardwoods]

**Punctelia subrudecta** (Nyl.) Krog -- found once on red oak [occasional in MA on hardwoods]

**Pycnothelia papillaria** Dufour -- frequent on open soil between ledges [occasional in MA, locally common on disturbed soils]

**Rhizocarpon aff. anaperum** -- found once on schist [uncommon? in MA]

**Rhizocarpon grande** (Flörke *ex* Flowtow) Arnold -- occasional, on siliceous rock [occasional in MA, locally common]

**Rhizocarpon cf. rubescens** -- found once on schist (see text) [status in MA unknown]

**Rhizoplaca subdiscrepans** (Nyl.) R. Sant. -- fairly frequent on schist [occasional in MA]

**Rinodina efflorescens** Malme -- occasional on hardwoods [first report for MA, but also known from Wachusett Mountain; probably occasional]

**Ropalospora chlorantha** (Tuck.) S. Ekman -- found once on red oak [occasional in MA on hardwoods]

**Ropalospora viridis** (Tønsberg) Tønsberg -- fairly common on hardwoods, found once on spruce [fairly common in MA, but rarely reported]

**Sarcogyne clavus** (DC.) Kremp. -- one scant specimen found on schist [uncommon in MA]

**Scoliciosporum chlorococcum** -- (Graewe *ex* Stenh.) Vezda -- abundant on conifers, common on deciduous trees and shrubs [abundant in MA]

**Stereocaulon glaucescens** Tuck. -- abundant on schist [occasional in MA, locally common]

**Stereocaulon saxatile** H. Magn. -- occasional on schist [occasional in MA, locally common]

**Trapelia coarctata** (Sm.) M. Choisy -- found once on shaded schist [occasional in MA on rock]

**Trapelia involuta** (Taylor) Hertel -- frequent on pebbles, occasional on shaded faces of schist ledges [common in MA, on pebbles]

**Trapelia placodioides** Coppins & P. James -- occasional, on siliceous rock [occasional in MA on rock and pebbles]

**Trapeliopsis flexuosa** Coppins & P. James -- occasional, on wood and pitch pine bark [occasional in MA on wood]

**Trapeliopsis granulosa** (Hoffm.) Lumbsch -- found twice on soil and duff [occasional in MA, on wood or soil]

**Tuckermannopsis fendleri** (Nyl.) Hale -- infrequent on pitch pines [occasional in MA on conifers]

- Umbilicaria muehlenbergii** (Ach.) Tuck. -- abundant on schist ledges [occasional in MA]
- Usnea strigosa** (Ach.) A. Eaton -- found once on red oak [occasional, on hardwoods and conifers]
- Vulpicida pinastri** (Scop.) J.-E. Mattsson & M. J. Lai -- found once on pitch pine [occasional in MA]
- Xanthoparmelia angustiphylla** (Gyelnik) Hale -- found once on siliceous rock [occasional in MA on rocks]
- Xanthoparmelia conspersa** (Ehrh. *ex* Ach.) Hale -- abundant on siliceous rocks [common in MA on siliceous rocks]
- Xanthoparmelia cumberlandia** (Gyelnik) Hale -- occasional, on schist [occasional in MA on siliceous rocks]
- Xanthoparmelia plittii** (Gyelnik) Hale -- found once on schist [occasional in MA on siliceous rocks]
- Xanthoparmelia somloensis** (Gyelnik) Hale-- found once on schist [occasional in MA on siliceous rocks]
- Sterile species No. 1** -- a sorediate crust with discrete soralia and norstictic and connorstictic acids, it is not *Phlyctis argena*; found once on pitch pine, and twice on hardwoods; apparently an undescribed species; unless it is found fertile, it will require a genetic study to determine the genus [recently found in an ancient pitch pine stand at Wachusett Mountain]
- Sterile species No. 2** -- a sorediate crust containing atranorin only; found once red oak [MA abundance unknown]
- Sterile species No. 3** -- a sorediate crust containing atranorin and perlatolic acid; found once on pitch pine [MA abundance unknown]
- Sterile species No. 4** -- a sorediate crust containing the stictic acid complex; found once on schist [MA abundance unknown]
- Sterile species No. 5** -- a thin but extensive leprose crust containing usnic acid only; found once on scrub oak [MA abundance unknown]