

## T10.11 LICHENS

Lichens are marvellous examples of symbiosis, a mutualistic partnership between ascomycete or basidiomycete fungi and green algae (mainly *Trebouxia*) or, less often, blue-green algae (various spp.). The fungal component (mycobiont) absorbs nutrients and provides structural support, while the algal partner (photobiont) produces carbohydrates by photosynthesis.<sup>1</sup> Lichens can be conveniently referred to by their gross structural forms: crustose (flat crusts), foliose (leafy), fruticose (shrubby or filamentous).<sup>2</sup> The term “macrolichen” is applied mainly to non-crustose species having large thalli (i.e. *Lobaria*, *Parmelia*). Corticolous lichens colonize tree bark; saxicolous species occupy rocks and boulders; terricolous lichens occur on soil.<sup>2</sup> The reproduction of lichens is achieved in several ways: by vegetative dispersal (thallus fragments, isidia, soredia); sexually (apothecia) or asexually (aplanospores).<sup>1,2</sup> Although no complete list has yet been compiled, there are approximately 550 different species recorded from the province. (Enlargements or reductions in the diagrams are approximate.)

### DISTRIBUTION

Lichens colonize a variety of natural substrates (bark, rock, soil, mosses and other lichens)<sup>1,2</sup> and occasionally man-made surfaces (concrete, metal).<sup>3</sup> Conspicuous organisms in Nova Scotia, lichens are common in many habitats: bogs, barrens, cliffs, forest, rocky shore, talus slope. Abundant lichens such as corticolous *Hypogymnia*, saxicolous *Porpidia*, and corticolous and saxicolous *Xanthoria* are common in all regions. In disturbed

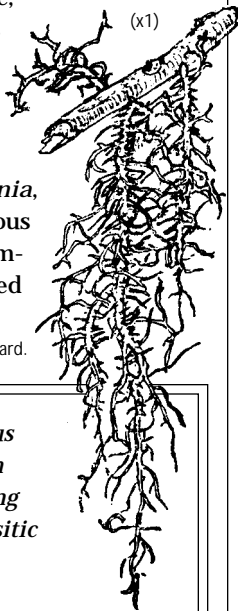


Figure T10.11.1: Old Man's Beard.

*One of the most conspicuous of the corticolous lichens is Old Man's Beard, Usnea spp. which colonizes mostly coniferous trees. This hanging lichen is often mistakenly thought of as parasitic due to its habit of colonizing already dead or decaying trees.*

habitats (e.g., along highways), characteristic species include *Baeomyces fungoides* on graded slopes and *Stereocaulon* spp. on exposed rock and fill.<sup>3</sup>

### CORTICOLOUS LICHENS

Corticolous lichens form distinct successions of species on tree bark and dead wood, paralleling the successional developments of the forest itself.<sup>1,2</sup> Hardwood and softwood trees in dry, mesic and wet sites support moderate to abundant lichen growth.<sup>4</sup> On mountain slopes of the Atlantic Interior (Region 400) and Avalon Uplands (Region 300), corticolous macrolichens grow among numerous microlichens on the trunks of shade-tolerant hardwood trees.<sup>3</sup> Typical of the moist pioneer forest are *Alectoria*, *Bryoria*, *Fistulariella*, *Graphis*, *Platismatia* and *Tuckermanopsis*.<sup>5,6,7</sup> In the climax forest, *Flavopunctelia*, *Heterodermia*, *Lobaria*,



Plate T10.11.1: The *Usnea* spp. are commonly known as Old Man's Beard, shown here in a typical spruce forest near Stewiacke in sub-Unit 511a. Photo: P. Blades

*Parmotrema*, *Pseudocyphellaria* and *Sticta* colonize beech, birch, maple and oak on mesic and dry slopes.<sup>5,6,7</sup> Cool temperatures and abundant precipitation, typical of the climax forest along the Atlantic and Fundy coasts, support rare North American boreal species such as *Cavenularia hultenii*, *Erioderma mollissimum*, and *E. pedicellatum*.

Fir and spruce are often draped with dark strands of *Alectoria sarmentosa*, greyish-green *Bryoria*



Figure T10.11.2: *Hypogymnia physodes*, commonly known as Puffed Lichen, is a corticolous species most frequently found growing on trees and shrubs; however, it has been known to colonize sand on Sable Island.

*trichodes* and yellow-green *Usnea filipendula*<sup>8,9</sup> (see Figure T10.11.1 and Plate T10.11.1). These filamentous lichens are also common on slopes and ridges of the Atlantic Interior<sup>5</sup> (Region 400) and the coastal/stony and wet/clay plains of the Carboniferous Lowlands (Region 500)<sup>3</sup>.

#### SAXICOLOUS LICHENS

Basalt and conglomerate cliffs along the Fundy coasts (Districts 620, 720) are lichenized by saxicolous *Acarospora*, *Caloplaca*, *Candellariella* and *Collema*.<sup>3,6</sup> Quartzite headlands of the Atlantic Coast (Region 800) support umbilicate genera such as *Actinogyra*, *Dermatocarpon*, *Lasallia* and *Umbilicaria*.<sup>10,11</sup>

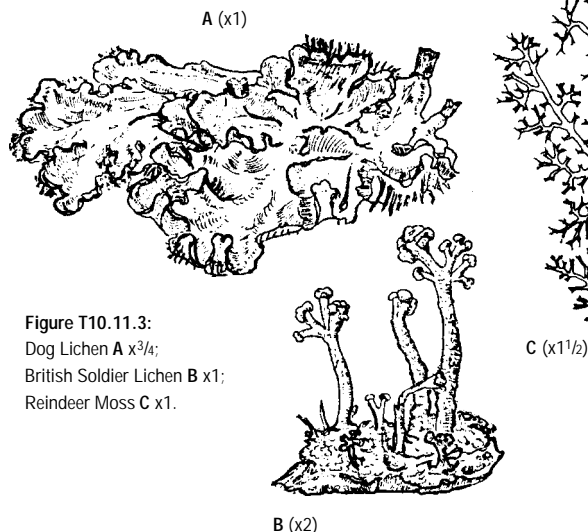


Figure T10.11.3:  
Dog Lichen A x<sup>3</sup>/<sub>4</sub>;  
British Soldier Lichen B x2;  
Reindeer Moss C x1.

*Reindeer Mosses* are commonly mistaken for moss, but are in fact soil-inhabiting lichens. These species are common winter food for deer, who also browse on tree lichens. Browse lines in forest stands are a common sight in Nova Scotia after a harsh winter.



Plate T10.11.2: A saxicolous lichen, *Actinogyra muehlenbergii*, on a granite boulder. Photo: T. Casselman

#### TERRICOLOUS LICHENS

Terricolous *Cladina* and *Cladonia* colonize mossy sites characteristic of bogs, hummocks and exposed bedrock, especially in the Plateau-Taiga (Region 100) and Granite Barrens (District 440) and other areas throughout the province.<sup>5,6,12</sup>

The tiny pink mushroom-like *Baeomyces fungoides* is common across the province along roadcuts, where it functions as a pioneer species on the poorer, disturbed soils.

Lichens found on Sable Island (District 890), where flora and habitats are subject to severe ecological conditions, grow atypically.<sup>13</sup> Here the corticolous macrolichen *Lobaria pulmonaria* (see Plate T10.11.3) was found growing on Crowberry.<sup>12</sup> Blueberries, Heather and Sheep-laurel support corticolous species such as *Cetraria ciliaris* and *Hypogymnia physodes* (see Figure T10.11.2), but thalli are smaller and less vigorous than those in mainland habitats.<sup>3</sup> *Ramalina* and *Usnea* species on fenceposts and telegraph poles are typically stunted; however, in the island's heaths, terricolous *Cladonia* and *Cladina* spp. are abundant<sup>12,13</sup> and more typical in form. Corticolous and/or saxicolous *Physcia* and *Xanthoria* colonize concrete and metal on Sable Island<sup>3</sup> and have been found on horse skulls and bones.<sup>14</sup>



Plate T10.11.3: *Lobaria pulmonaria* a foliose, corticolous macrolichen characteristic of old-growth deciduous forest. Photo: A. Wilson

## TOLERANCE

Some lichens can tolerate high levels of desiccation and illumination while others depend on high humidity and shade.<sup>1</sup> *Parmelia sulcata* is common<sup>5,7,12</sup> on hardwoods and conifers in the open forests and fields of the rolling uplands/hills and valleys of the Carboniferous Lowlands (Region 500) and the hardwood plateaus of the Avalon Uplands (Region 300). *Parmotrema crinitum*, on the other hand, colonizes shaded bark and mossy rocks<sup>5,7,12</sup> within the same regions. Saxicolous *Lasallia papulosa* prefers sloping or vertical surfaces of granite<sup>2,4,11</sup> near lakes and waterways, whereas *Xanthoparmelia conspersa* and *X. cumberlandia* flourish on cemetery stones,<sup>10</sup> outcrops and boulders.<sup>11</sup>

## CULTURAL FACTORS

Humans have used lichens as food, fodder, medicine, dyes, cosmetics, litmus and pollution monitors for at least three thousand years.<sup>4,10</sup> Mammals (e.g., white-tailed deer) forage on lichens, and birds (the Northern Parula Warbler) use filamentous species like *Bryoria* and *Usnea* to build nests.<sup>4</sup>

## Indicators

Lichens obtain much of their nutrient requirement from rainwater and thus are highly sensitive to airborne pollutants.<sup>15,16</sup> The abundance of pollution-tolerant species is indicative of deteriorating air quality; consequently, lichens are used in many studies to monitor pollution.<sup>15,16</sup> Trees in urban areas of the Granite Uplands (Unit 451) are increasingly colonized by pollution-tolerant *Hypogymnia physodes*, *Lecanora conizaeoides*, *Parmelia sulcata* and *Physcia adscendens*.<sup>3,15</sup>

Humans represent the greatest threat to lichens today.<sup>15,16</sup> The dangers are pollution, agriculture and loss of habitat.<sup>4,8,9,10,15,16</sup> Habitat destruction (highway construction, logging, residential development) and recreational land use (all-terrain vehicles) in many upland, highland and interior areas of the province pose a hazard to lichen communities that were previously inaccessible. Removal of granitic bedrock and boulders has seriously depleted suitable substrate for saxicolous lichens.<sup>4,10</sup> Clear cutting affects those few locations known to support documented rarities such as *Erioderma* and *Sticta*.<sup>8,9</sup> The removal of bog vegetation (peat moss production) poses a future risk, as does the continuing problem created by pollution levels that indicate deteriorating air quality.<sup>15,16</sup>



**Associated Topics**

T9.1 Soil-forming Factors, T10.4 Plant Communities, T10.6 Trees, T10.8 Bryophytes, T10.9 Algae, T10.10 Fungi

**Associated Habitats**

H5 Terrestrial Unforested, H6 Forests

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**Additional Reading**

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