

LICHENS

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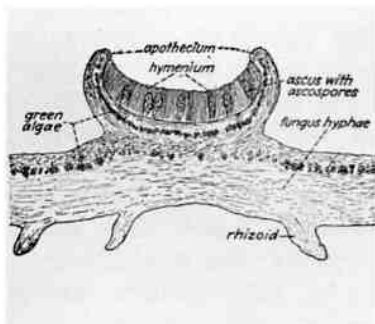


Fig 1



Fig 2



Fig 3



Fig 4

Lichens are unusual plants composed of an alga and a fungus (fig. 1), coexisting as a single plant symbiotically or in a delicate state of balanced parasitism (1, 2, 3, 4, 5). They are rather unobtrusive and comparatively little understood, despite the fact that they possess a very extensive ecological range. Their habitats occur throughout the world and include some of the harshest and most forbidding environments on earth, occupying ecological niches where nothing else will survive. Lichens are found in such diverse habitats as on outcroppings in arctic and antarctic regions, from beaches to the rocks just below the line of perpetual snow on the highest mountains, on sun-baked rocks in the deserts, as well as on tree trunks, stumps, fences, soil, rocks, etc., in areas of the tropics and subtropics (2, 3, 4, 5, 6). Thus they are considered pioneer plants or 'colonizers.'

In the symbiotic coexistence the fungus entity supplies inorganic substances for growth and protection for the alga against desiccation, excessive light, and mechanical injury, whereas the alga supplies the organic nutrients through the process of photosynthesis (1, 2, 3, 5). Lichen evolution appears to be of relatively recent origin (5), and they grow very slowly, an average 0.1 mm to 4 mm in radius per year (3). A mature lichen can be from 200 to 2000 years old (3, 5). They are extremely hardy plants, capable of withstanding excessive heat, prolonged cold, and desiccation (3, 5).

Lichens are generally gray-green in color, having no roots, stems or leaves (6) and occur as 3 major morphological types: foliose or leaf-like (fig. 2); crustose or flat, tenaciously attached to the substrate (fig. 3); and fruticose or branched, usually upright or hanging (fig. 4). Taxonomically, lichens are designated according to the fungus component (2, 3), and the number of species are variously reported as 7400 (2) to as many as 15,000 (6). Though lichens are capable of reproducing sexually via fungus ascospores or basidiospores, the principal method appears to be by asexual or vegetative means, which is accomplished by fragmentation or dislodging of outgrowths (protuberances) of the lichen thallus containing both fungal and algal components. The dispersal of thallic fragments is brought about by wind, rain, alternating drying and wetting, man, animals, etc. (2, 3, 5).

The importance of lichens has been reported to be as follows: 1) a food source for snails, mites and many other invertebrates, for reindeer and caribou in the subarctic regions when the preferred food sources of willows and sedges are wanting, for sheep herds of the Berber tribesmen in the Lybian deserts, for man in times of famine, such as when Washington's troops at Valley Forge used lichens as a soup thickener, and in Europe as a supplemental source of starch in 'lichen bread'; 2) an important source of dyes from 1300 to 1800, but now almost entirely replaced by coal tar dyes, however, the noted Harris tweeds of Scotland are still made with lichen dyes; 3) a nesting site for warblers in the North; 4) a continued source of lichen oils used in perfumes and scenting of soaps in France and Yugoslavia, and 5) as an important source of dye still used in the preparation of litmus paper. Medicinally, lichens have been shown to possess impressive antibiotic activity (5). Lichens are also recognized as fairly reliable indicators of environmental pollution as noted by their almost complete absence in most large cities. Susceptibility is attributed to air pollutants, sulfur fumes from coal, ozonated hydrocarbons from cooking gas and auto exhausts, greater desiccation from high heat in cities, the prevention of dew formation by heat convection, and by the ready absorption of toxic substances in rainwater, the main source of moisture for lichens (3).

Some of the destructive effects of lichens include the overgrowing and parasitizing of mosses, occurrence on the surface of leaves of evergreen hardwood trees, on trunks of fruit trees wherein penetration to the cambial layer has been noted, thus retarding growth, and its establishment on stained glass windows of European cathedrals, causing a disfiguring etching of the glass (3).

The detrimental effect of lichens appears to be indirect by interfering with gaseous exchange on stems and to some degree with light, particularly if lichens occur on leaves. Should the presence of lichens be too unsightly on garden shrubs or landscape trees or too abundant for good plant health, they can be controlled with copper sprays or can be scraped off the bark with a wire brush (7).

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