BIO414 (CRYPTOGAMIC BOTANY II)

WEEK 8

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THE ECONOMIC AND MEDICINAL IMPORTANCE OF BRYOPHYTES

Funding and the resources of research institutions are generally directed to studies that have a likelihood of yielding financial rewards.

Bryophytes are neglected largely because they have little direct commercial significance. However, peat is an exception, and has been exploited commercially for more than 150 years both as a fuel source and as a soil additive.

The use of peat for fuel has increased in many countries, and it is now cheaper to exploit homegrown peat than to import other expensive raw fuel material.

Ireland is a prime example of this, where peatlands have been exploited on a large scale and peatland habitat has been dramatically reduced in area.

Sphagnum has been used as an effective filtering and absorption agent for the treatment of waste water and effluents from factories with acid and toxic discharges containing heavy metals, organic substances such as oils, detergents, dyes and microorganisms.

Peat can also be used as an absorbing agent for oil spills and as a filtering agent for oily waste water in vegetable oil factories.

Because Sphagnum is soft in texture it is useful as a packing material when shipping products such as fresh vegetables and flowers. Other, more minor but relatively well-documented, uses of bryophytes include the use of Sphagnum in babies´ nappies (because of its absorptive properties), hair-moss (Polytrichum) in home-made besoms, moss as a stuffing in pillows, and moss as decoration, particularly in the ceremonial costumes of indigenous peoples.

Mosses are also often used as a topdressing for flowerpots to prevent desiccation of the underlying soil.

In the Philippines, eggs in crocodile farms are placed in an incubator covered with Sphagnum moss as it is believed that peat moss is an effective material in ensuring that the eggs remain at the required temperature.

Potentially more important is the use of bryophytes in medicine. North American Indians have used various bryophytes as herbal medicines , and the Chinese still use some species for the treatment of cardiovascular diseases, boils, eczema, cuts, bites, wounds, and burns.

Chemical analysis has revealed that most bryophytes, including Sphagnum, have antibiotic properties.

Extracts of many species of mosses and liverworts contain phenolic compounds that inhibit growth of pathogenic fungi and bacteria.

Dried Sphagnum is, therefore, an excellent surgical dressing because of its absorptive qualities (absorbing more liquid than cotton pads and its ability to prevent infection.

Because of these properties, it was used extensively during World War I.

Pesticides

Bryophytes may contain natural pesticides. In fact, the liverwort Plagiochila contains the sesquiterpene hemiacetyl plagiochiline A, a poison extremely potent in mice and it inhibits the feeding go an African army worm. The exploration of antiherbivory compounds in bryophytes could prove quite profitable.

Household Uses

Mosses are widely used for decoration in store windows and displays, Christmas tree and toy train yards, floral arrangements, and Christmas ornaments. For Christmas tree yards and nativity scenes, mosses are collected in sheets. In Mexico, Hypnum and Thuidium are used as carpets for nativity scenes; in the U.S.A., Hypnum cupressiforme and Ptilium crista-castrensis are common choices. Sheet moss is collected at any time, but preferably in summer.

Clothing

In Germany, Sphagnum is used to line hiking boots, where it absorbs moisture and odor. Several cultures have used Sphagnum and Dicranum scoparium for lining diapers. Michigan's Chippewa Indians used Sphagnum for this purpose to keep babies clean and warm. Even modern diapers in the U.S.A. and Canada can have Sphagnum liners.

Household Goods and Furnishings

The absorbent properties of Sphagnum make it the most used moss of all the bryophytes. It serves as an insulator, pillow, mattress, and furniture stuffing, to keep milk warm or cool, to stuff into footmats to clean shoes, to weave welcome mats, and in Lapland to line baby cradles, keeping the infant clean, dry, and warm. The durability and elasticity of mosses may well have contributed to Japanese stuffing balls and dolls with Hypnum.

Packing

Long before the discovery of secondary compounds in bryophytes, Himalayans used them as insect repellents when storing food. They were dried, made into a coarse powder, and sprinkled over grains and other containerized goods. A wad of bryophytes also plugged the container.

Graves

The preservation in bogs of men with their associated hats and hanging ropes is well known. The action of peaty waters in tanning hides preserved these bodies for centuries. Both Alaskans and Japanese have been known to use a bed of moss for burial of the dead and a wooden coffin about 1300 years old was found to contain Aerobryopsis subdivergens and other mosses at Ohira-cho, Tochigi-ken, Japan.

Food Sources

Most ecologists consider bryophytes to be unimportant as food sources for animals.

On Mount Washington in New Hampshire, mosses had the lowest caloric values of any plants analyzed.

Occasionally ungulates ingest mosses.

For example, Alaskan reindeer occasionally graze on Aulacomnium turgidum, Hylocomium splendens, and Polytrichum.

CLASSIFICATION OF BRYOPHYTES

Traditionally, all living land plants without vascular tissues were classified in a single taxonomic group, often a division (or phylum).

More recently, phylogenetic research has questioned whether the bryophytes form a monophyletic group and thus whether they should form a single taxon.

Although a 2005 study supported the traditional view that the bryophytes form a monophyletic group, by 2010 a broad consensus had emerged among systematists that bryophytes as a whole are not a natural group, although each of the three extant (living) groups is monophyletic.

The three bryophyte clades are the Marchantiophyta (liverworts), Bryophyta (mosses) and Anthocerotophyta (hornworts).

The vascular plants or tracheophytes form a fourth, unranked clade of land plants called the "Polysporangiophyta". In this analysis, hornworts are sister to vascular plants and liverworts are sister to all other land plants, including the hornworts and mosses, Phylogenetic studies continue to produce conflicting results.

In particular those based on gene sequences suggest the bryophytes are paraphyletic, whereas those based on the amino acid translations of the same genes suggest they are monophyletic.

Clasification of Division Bryophyta

Division: Bryophyta

Class: Takakiopsida

Order: Takakiales

Class: Sphagnopsida

Order: Sphagnales

Order: Ambuchananiales

Class: Andreaeopsida

Order: Andreaeales

Class: Andreaeobryopsida

Order: Andreaeobryales

Class: Oedipodiopsida

Order: Oedipodiales

Class: Polytrichopsida

Order: Polytrichales

Class: Tetraphidopsida

Order: Tetraphidales

Class: Bryopsida
Order: Buxbaumiales
Order: Diphysciales
Order: Timmiales
Order: Gigaspermales
Order: Encalyptales
Order: Funariales
Order: Scouleriales
Order: Bryoxiphiales
Order: Grimmiales
Order: Dicranales

Order: Pottiales

Order: Splachnales

Order: Bryales

Order: Bartramiales

Order: Orthotrichales

Order: Hedwigiales

Order: Hypnodendrales

Order: Ptychomniales

Order: Hookeriales

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Url1. https://blogs.ubc.ca/biology“Introduction to Bryophytes”

Url2. http://bryophytes.plant.siu.edu/class.html