

FRIENDS OF FOREST HILL PARK



The Forest Hill Park Post



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www.friendsofforesthillpark.org

Moss

Ernest Wilson

The grayness of a winter walk in Forest Hill Park is partially compensated by the greenness of the mosses which line the pathways in the park. Moss grows on tree trunks, rocks, even sidewalks. It cannot live if buried by dead leaves or overgrown by grasses but any place that is free of these can have moss growing on it.

Moss grows from spores released by the sporophyte phase of the plant. There are billions of these in the air. The spores germinate easily if there is light and water.

At first a green thread called the protonema is produced. It resembles a filamentous green alga. After a time the protonema produces buds from which the mature moss plants are produced. In most mosses the protonema dies and is replaced by a collection of mature moss plants. A cluster of moss plants is thus produced from one spore.



Entodon seductrix growing on rocks—a familiar sight in Forest Hill Park.

Moss plants differ from familiar plants in several ways. First they are much smaller. Each cell of the plant has only one set of chromosomes. Most plants have two sets in their cells. Moss plants lack roots and are attached to their substrate by short hair-like rhizoids. These rhizoids anchor the moss to substrate but do not take up water or minerals.

The stems and leaves of moss lack the waxy cuticles which cover most plants and prevent direct absorption of moisture. This simple structure allows rain to be absorbed directly by moss plants. In between rains, the moss dries out without killing the plant. Internally the cytoplasm of moss lack the large water filled vacuoles that

most plants have. So drying does not produce the injury that the loss of the vacuoles would cause.

Moss grows in one of two ways. It grows upward above the substrate or along the substrate. This is one of the most important characters to notice in trying to identify the species of moss.

After a time the moss plant will produce sex organs to reproduce. Each plant is either male or female. The male plant produces an antheridium which appears as a protuberance at the top of the plant if it grows upright or on the side of the creeping plant where there are no leaves.

When rain drops hit the antheridium it releases swimming sperm. The drop will bounce off the male plant and be caught by the leaves of the surrounding plants.

If these are female there will be sex organs called archegonia among the leaves. Archegonia are shaped like small beer bottles with long thin necks. They are less than an inch tall, however. The egg cell is in the middle of the enlarged bottom of the structure.

The sperm in the rain drop are attracted to the neck of the archegonium, which has an opening in the center through which the sperm can swim down to the egg at the bottom. The male and female plants are the green perennial plants. They are called gametophytes because they reproduce by forming sex cells, the gametes.

When the sperm meets the egg the embryo will grow out and form a long column at the end of which a sporangium forms. This is the sporophyte because it produces spores. It has two sets of chromosomes in each cell. It is therefore a different plant. It is limited in growth and usually turns brown and dies when the spores form. It always remains attached to the gametophyte. Dead brown sporophytes are often seen attached to the green gametophytes.

Young spore cases are often covered by the top of the archegonium or egg canal which is broken by the growth of the sporophyte. This is the calyptera. It falls off as the sporangium matures. The morphology of the calyptera and sporangium are important characteristics in identifying moss. Unfortunately they are not always present on plants.

The spores within the sporangium form by a cell division process called meiosis which, unlike regular cell division, forms cells with half the number of chromosomes of the mother cell.

The spore and the gametophyte which it forms will have half the number of chromosome of a sporophyte cell. The entire life cycle of a moss thus involves a gametophyte with one set of chromosomes and a sporophyte with double the number of chromosomes of the gametophyte. Division of the reproductive cells in the sporangium will keep the chromosome numbers in check. Otherwise sexual reproduction would constantly double the number of chromosomes in a cell leading to a cell with only chromosomes. This cell would not be able to live.

To complicate matters, the gametophyte can often produce offsets called gemmae which break off and spread, thus producing new gametophytes without producing sporophytes. Most moss produce both gametophyte and sporophytes.

The identification of moss species is more difficult than identification of trees or wildflowers. The plants are much smaller and require the use of a hand lens or a stereomicroscope or even a compound microscope such as high school biology students use.

Many of the plants look alike and further study is often necessary to identify them.

Furthermore there are no generally available field guides although there are now some on line guides accessible. At the end of the article I will give references to these.



Plagiomnium cuspidatum, another Forest Hill Park native moss. This moss is often seen growing with entodon seductrix.

There are no generally accepted common names for most mosses. Therefore, the scientific name is usually used. These can be difficult to remember and pronounce.

For instance a rock on the walk leading from the picnic shelters to the lake has at least three species of moss: 1) *Plagiomnium cuspidatum* (*baby tooth moss*), 2) *Entodon seductrix* (*cord glaze moss*) and 3) *Atrichum angustatum* (*slender starburst moss*). (There may be more on this rock but these are the ones I could identify.) You see that remembering these names can be tricky. The references at the end of the article offer common names. The common names in parenthesis are from the first reference. These names seem to me somewhat silly. What the heck is a cord glaze?



Plagiomnium cuspidatum with sporophytes, calyptro cover the sporangium.

Because the plants are so small, it is possible to have several species growing close together in a small area. A walk through Forest Hill will often acquaint you will dozens of mosses. You can see them everywhere.

It is likely that liverworts which are considered relatives of mosses were the first true plants to colonize land. Their algal ancestors evolved in fresh water 500-600 million years ago. It is likely that there was a well established liverwort flora, which is a flowerless, spore producing plant, during the Ordovician at least 472 million years ago- well before the establishment of the first vascular land plants. Recently, a group of scientists who used molecular clock methods to estimate how long ago the liverwort group evolved estimated an age of 500 million years for this group. This makes them almost as old as animal groups such as trilobites and brachiopods that are well represented in the fossil record.

I have not found any liverworts in Forest Hill Park. Thallose liverworts are present on rocks in James River Park nearby, however.

Here are the references I promised:

K.B. McKnight, J.R. Rohrer, K. M. Ward, and W. J. Perdrizt. 2013. Princeton University Press, Princeton, N.J.

Breil, D.A. 2003. Common and occasional Bryophytes of the Piedmont of Virginia. *Banisteria*. Vol. 21: pp. 3-27. Available on line.

Photos of common Ohio Mosses on line googol Mosses of Ohio.

Key to the Mosses of Illinois. googol Mosses of Illinois.

Park Champions

More English ivy departed Forest Hill Park during February thanks to some dedicated volunteers who are unwavering in their intent to remove non-native plants. The pictured pile of ivy in front of the volunteers had been smothering hardwood seedlings such as sassafras, oak, hickory and beech. Thanks to the efforts of these volunteers, the young trees will have more sun, water and nutrients without competition from ivy vines.



The Virginia Department of Forestry grows native trees each year and makes them available for purchase to those who wish to help reforest Virginia. Friends of Forest Hill Park ordered seedlings last fall, which were available for planting during March. Seventy-five little trees arrived on March 12th and seven volunteers worked on March 18th to put them in the ground.

There were 15 Allegheny chinkapins, 10 southern red oaks, 20 silky dogwoods, 15 chestnut oaks, and 15 hazelnuts. These trees will provide habitat and food for the creatures that make the park their home. The silky dogwoods are also particularly notable for preventing soil erosion.

The site chosen for planting is northeast of the lake on a steep slope where many of the mature trees are nearing life's end. The young trees will help replenish the hardwood stock in the park as well as create a more verdant area for everyone to enjoy.



Park Champions

Returning back downhill to either walk or drive home, the seedling planters stopped just long enough for a group photo. They looked happy because they knew 75 trees will be in the park for years to come because of their efforts that day.



Packed House for Conservation Landscaping Workshop

The March 10th workshop was filled to capacity plus one and some of the attendees said it was the quickest three hours they could remember. Bill Shanabruich packed the time with do's and don't's for improving our environment and water quality by planting native flora. Native trees have the greatest impact, but native shrubs and perennial flowers all serve a valuable purpose keeping the environment healthy. His accompanying slide show was fascinating and instructive about plant recognition, habitat, and benefits to our surroundings.

A portion of the workshop took place in



Forest Hill Park where correct planting methods were demonstrated and invasive plant identification and removal were discussed.

Bill owns Reedy Creek Environmental, where a wide range of native species is cultivated. Everyone who attended the workshop received a complimentary native plant of their choosing from Reedy Creek Environmental.

WHERE IS THIS PROPERTY?

SUNDAY, APRIL 27, 1913.

Forest Hill Hotel-Sanitarium Co., Inc. Forest Hill Park, - - Virginia

Rapid progress is being made with this enterprise. But there is no reason why we should not progress rapidly, as there are many features pertaining to this institution that would strongly recommend it to the well-informed, conservative business man and investor. The readers of The Times-Dispatch possibly read in last Sunday's issue the exceptionally strong recommendations and assurances of co-operation from the leading physicians and surgeons of the city. Others have come to us since that time. Some of the leading business men of the city have also become identified with us. This we also reported in last Sunday's paper, but here is one thing we did not report, as we did not know it positively ourselves, that is "THAT THE SPRING ON THE PROPERTY KNOWN AS THE RADIUM SPRINGS IS MOST MARKEDLY RADIO ACTIVE." It is so strongly "RADIO ACTIVE" it will pass the Pure Food and Drug Act of the Agricultural Department, U. S. A., and in all probability be classed as one of the highest standing springs of its kind in the entire world. With this water to drink and use in the Turkish, Roman and Steam Baths, this will soon place this Hotel-Sanitarium in a class to be Nationally known.



Forest Hill Hotel-Sanitarium Co., Inc., (from a 1913 issue of *The Richmond Times Dispatch*)

FOREST HILL PARK, VA.

This corporation having acquired the property of Dr. L. A. Pusey, situated at Forest Hill Park, all of the property known as the "Club Property" and one-half of the property known as the "Radium Lithia Springs," making a total of about nine acres in all. The purchase price of the entire property, embracing the "Radium Lithia Springs," is fifteen thousand dollars (\$15,000), payable ten thousand dollars (\$10,000) in cash and five thousand dollars (\$5,000) in the preferred stock of the company, the preferred stock carrying a bonus of \$5,000 of common stock. In view of the magnificent view, the splendid trees, the unusual scenic beauty, the most valuable springs and the general environments of this property, it is a most valuable asset, and certainly worth the purchase price, and in a line of constant advancement in value. Leading from this property is a boulevard (88 1-2) eighty eight and a half feet wide, with asphalt gutters, curb and sidewalks; down the centre of this boulevard is a grass plot about (12 1-2) twelve and a half feet wide (on the order of Monument Avenue), making a most beautiful approach to the property.

On this property it is the corporation's intention to erect one of the most modern of Hotel-Sanitariums of the age. Its office will be to care for tourist and for the recuperating station of convalescents. It is conceded by the best physicians and surgeons of the day that one of the things most conductive to the speedy recovery of a patient, most especially one who has but recently undergone an operation, is to remove him, or her, as quickly as possible from strictly hospital environments, particularly where the patient can get a plenty of good, fresh air, PURE NATURAL WATER, and away from the bustle and noise of a city.

Come along with us April 14th on our next **Walking History Tour** and you will learn the location of the "radio active radium springs" and the 88 1/2 foot wide boulevard resembling Monument Avenue. Details at www.friendsofforesthillpark.org.