

A number of lectures were also given by Dr. Roderic Scott and Dr. Carl K. Seyfert. Motion pictures showing explosions on the sun and a technicolor movie, "The Story of Palomar," were also shown to the club members and their guests. The Barnard Astronomical Club, an affiliated society of the Tennessee Academy of Sciences, meets regularly on the second Thursday of each month from October through May. The present officers of the club are: Dr. Harvill Hite, President; Mr. Harold Walker, Vice-President; and Miss Julia Saffer, Secretary-Treasurer. Past presidents of the club have been: Mrs. Roberta Dillon Lyne, Dr. Roderic Scott, Dr. Carl K. Seyfert, and Mr. John H. DeWitt, Jr.

## THE HAYSCENTEDFERN IN TENNESSEE

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### HAYSCENTEDFERN

*Dennstaedtia punctilobula* (Michx.) Moore  
(*Dicksonia punctilobula* (Michx.) Gray, of *Gray's Manual*, 7th ed.)

The hayscentedfern is a very delicate, yellowish-green fern persisting throughout the summer season but often becoming somewhat ragged in the fall due to the dying of basal leaflets and the attacks of insects. It is a deciduous fern with both sterile and fertile leaves similar and twice pinnate with the pinnules sessile and cut into lobes which are often toothed. The veins end free. The sori are separate and marginal and each has an inferior cup-shaped indusium with an almost entire margin around it. The indusium opens towards the apex of the segment. While the indusium of *Woodsia* spp. is an inferior one surrounding the sorus, as in *Dennstaedtia*, it is variously cut into segments in sharp contrast to the entire or almost entire indusium of *Dennstaedtia*.

The above characteristics will usually be sufficient to identify the



hayscentedfern when well-developed sori are present. When sori are absent, identification is more difficult, for *Athyrium asplenoides*, *Dryopteris marginalis*, *D. intermedia*, *D. campyloptera*, *Cystopteris*



Fig. 184. A large mass of hayscentedfern in an opening on the side of Mt. LeConte, Smoky Mountains National Park, Sevier County, Tennessee. Photographed Sept., 1935.

*bulbifera*, *C. fragilis*, *C. tennesseensis*, *Woodsia obtusa*, and *W. scopulina*, have somewhat similar bipinnate leaves. This group, with the exception of *Cystopteris fragilis* (var. *protrusa*), has relatively short and thick rootstocks with numerous old petiole bases which contrast greatly with the horizontal and slender rootstocks of *Dennstaedtia punctilobula* with its isolated and few old leaf bases. It is true that *Cystopteris fragilis* var. *protrusa* has a slender horizontal rootstock somewhat like that of the hayscentedfern but the leaves of this *protrusa* variety are small, averaging only about 10-12 inches in length (for the blade plus the petiole), and rarely are as



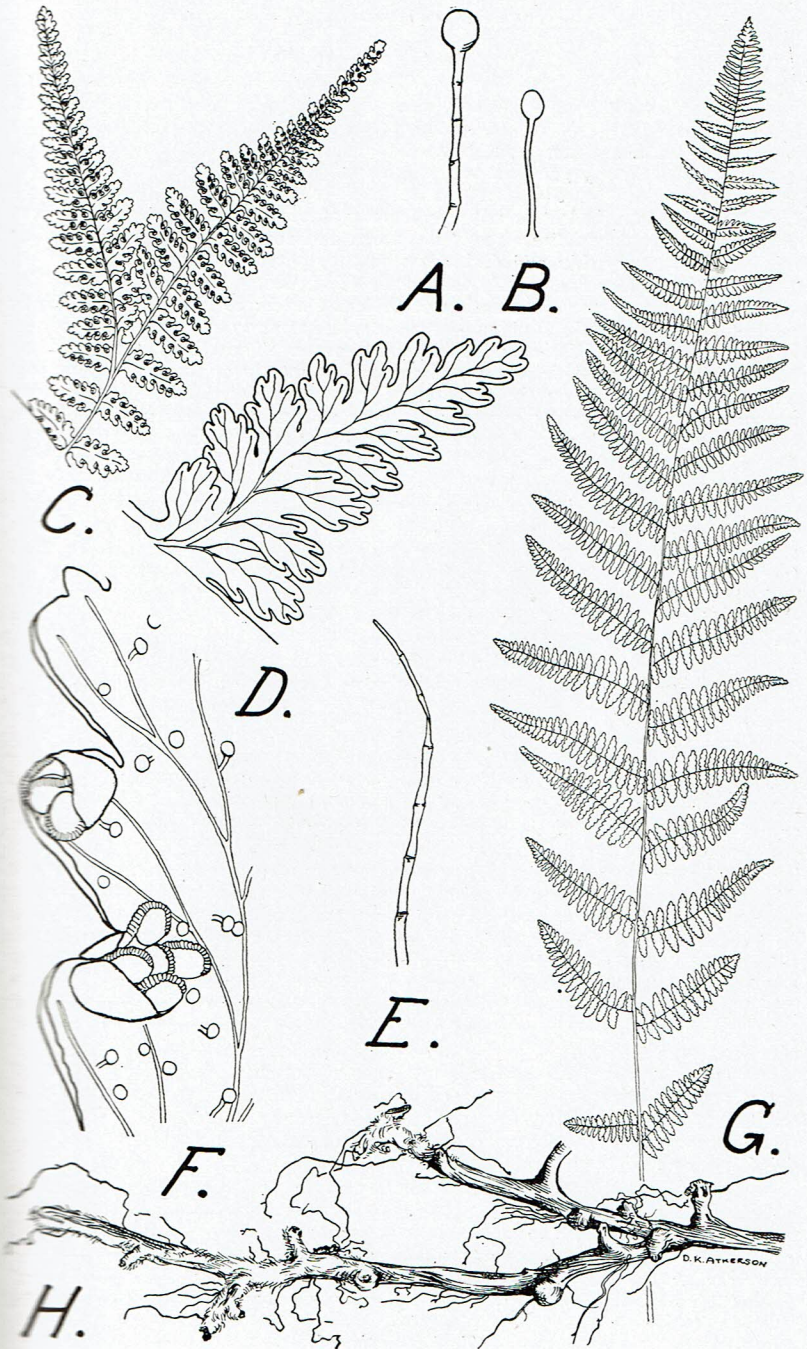
long as 15 inches (unlike the leaves of the hayscentedfern which are much longer on the average and may even be nearly a yard long). Hairs are practically absent on the rachis and under-leaf surfaces of all the plants mentioned above except the woodsias (*Woodsia obtusa* and *W. scopulina*) and the hayscentedfern. *Woodsia obtusa* actually has no hairs; it has scales and stalked capitate glands on the petiole, rachis, and under-leaf surfaces. *Woodsia scopulina* has long septate hairs very similar to those of *Dennstaedtia punctilobula* but this *Woodsia scopulina* is a small fern rarely as tall as 10 inches while *Dennstaedtia punctilobula* is a tall fern, as has already been pointed out.

*Description.* *Dennstaedtia punctilobula* is a tall, erect or arching, fern with the leaves arising singly or in groups of two or three along a slender horizontal rootstock (Fig. 185, *H*). The rootstock is 1/16-3/32 inch in diameter. The older parts are dark brown in color and are almost glabrous since they have only a few septate hairs, some old hair bases, and no scales. The younger portions are reddish-brown in color and have numerous septate hairs especially at the apices of the rootstocks and of the leaf spurs (leaf buds?). These leaf spurs are 1/4-3/8 inch in length and are not very numerous. The hairs are essentially similar to those found on the rachis and on the underside of the leaf except that they are somewhat longer and are often yellowish-brown in color instead of white. I do not think that they are scales. Britton and Brown (1936, p. 14) speak of the rootstock as being hairy but some authors speak (erroneously, I think), of it as being naked. These hairs on the rootstock are flattened, linear, septate, and up to 1/16 inch in length. They are white to tawny in color and are never topped with a capitate gland. Hairs elsewhere on the plant (upper petiole, rachis, the underside of the leaf blade) are similar in general makeup in that they are flat, septate, and whitish to tawny in color; they are dissimilar in size, being usually 1/32 inch or less in length, and their apices are occasionally topped with capitate glands. The vascular tissue as seen in a cross section of the rootstock has a concentric arrangement.

Leaf petioles are almost glabrous having only a few septate hairs at their base, a few near the leaf blade, and some occasionally elsewhere. However, the bases of the old fugacious hairs often may be found remaining. In color, the petiole is dark brown or almost black at its base, reddish-brown farther up, and a lighter reddish-brown next to the base of the leaf blade. Small (1938, p. 319) gives the petioles as "pale green" but this is not the case with my specimens. The upper surface of the petiole is deeply grooved almost but not quite to the rootstock but it is so rolled that it is essentially cylindrical above as well as below. Conard (1908, p. 23) says that the petioles are channelled only for 1/4 their length but Tennessee specimens seem to be channelled for 1/2 to 3/4 their length. The vascular tissue in the petiole is arranged in a yellowish-white V as seen in cross section. The average length of the petioles,

Fig. 185. (Opposite page.) Some details of the hayscentedfern, *Dennstaedtia punctilobula*. *A*, A fairly long, septate, glandular hair. *B*, A shorter, glandular hair of the usual type (if septate walls are present, they cannot readily be seen with a 20 X lens). *A* and *B*, no. 831, X about 50. *C*, A forked leaflet showing general shape of pinnules and position of the sori, no. 9743, X 1. *D*, A single pinnule to show lobes, teeth, and the forking of the veins which end before reaching the margin (the right side of this drawing is towards the apex of the leaflet), no. 831, X 5. *E*, One of the long, septate but nonglandular hairs so common on this plant, no. 831, X about 25. *F*, Margin of a fertile pinnule lobe showing cup-shaped, marginal indusia. Each indusium is attached to a small reflexed tooth on the apical side of a lobe, no. 9743, X 1. *G*, A single leaf, no. 831, X .25. *H*, A portion of a rootstock with the newer part towards the left, no. 8083, X 1.







based on the measurement of 65 petioles, was about 7 1/2 inches with a range from 3 inches (no. 4147) to 15 1/2 inches (no. 10030). The rachis is grooved from the grooved petiole almost to the apex of the blade. However, as the apex is neared, the groove flattens out to show at its center the white fibrovascular tissue bounded on each side by a narrow green wing. The rachis is cylindrical on the under side. In color, it is usually a light reddish-brown at the base of the blade, then greenish or stramineous mottled with reddish farther up, and finally greenish near the apex. Wherry (1942, p. 73) has the "rachis pale green" but Ogden (1948, p. 91) gives it as "light brown to stramineous" and this last is not far from that of Tennessee plants. On the rachis are the septate hairs already described and some capitate glands. Most leaf blades are very thin and deciduous but they persist throughout the season. In shape, the blades are usually lanceolate (Fig. 185, *G*) as indicated by the following results of the examination of 93 leaf blades: 59 lanceolate, 12 elliptic (widest at the middle), 7 oblong-lanceolate, 6 narrowly deltoid, 5 lanceolate-deltoid, 3 lanceolate-elliptic, and 1 lanceolate-ovate. The blades are acuminate to long acuminate at their apices and are widest mostly at the 3rd or 4th pair of leaflets. To check on the position of greatest width, 90 leaf blades were measured and these results secured: 26 were widest at the 4th pair, 13 at the 2nd pair, 11 at the 5th pair, 4 at the 1st pair, 4 at the 6th pair, 3 at the 7th pair, 2 at the 8th pair, and 1 at the 9th pair of leaflets. The leaf blades are twice pinnate (not thrice pinnate as Conard, 1908, p. 26, says) with the leaflets arranged in pairs. It is rare for the members of a pair to be placed exactly opposite each other. Measurements of the length of 94 leaf blades gave an average length of about 16 1/4 inches with a range from about 5 3/4 inches (no. 839) to about 34 3/4 inches (no. 10609). This would make an average leaf (blade plus petiole) about 23 3/4 inches long. Measurements were made of the widths of 93 leaf blades with the following results: Average width about 6 1/2 inches, range from 3 inches (no. 4140) to 10 1/2 inches (no. 10071). Conard (1908, p. 26) gives the length as 30-90 cm. (12-36 inches) and the width as 7-20 cm. (from less than 3 inches to 8 inches).

Leaflets have very short petiolules (1/32 inch or less in length) or are sessile near the leaf apex. Most leaflets are placed perpendicular to the rachis except towards the apex of the leaf. In some leaves, all leaflets may be ascending (Svenson no. 8737). The leaflets may be close together, which is the usual rule, or those pairs near the base of the blade may be distant. Usually leaflets are oblong or lanceolate in shape with acuminate or long acuminate apices, and are widest at the 3rd or 4th pair of pinnules (Fig. 185, *G*). The larger leaflets have the costa grooved on the upper side, the groove being continuous with the groove of the rachis. Small leaflets, and especially those towards the apex of the leaf, are not grooved at all. Instead, each has a small brown ridge on its upper side. On the underside of the leaflets may be numerous septate hairs (Fig. 185, *E*), which have already been described, and numerous stipitate and capitate glands (Fig. 185, *A* and *B*). Septate hairs are few and stipitate glands are absent on the upper surface of the leaflets and the hairs are smaller than those on the other parts of the plant. The hairs appear to be most abundant on the veins. There seems to be an inverse relation between the numbers of septate hairs and stipitate glands present. A leaf with a great many septate hairs may have few stipitate glands, and a leaf with many stipitate glands may have few septate hairs. Some authors have suggested that these glands produce a secretion which gives the characteristic odor to dried hayscentedfern.

Pinnules are long and obtuse, and are placed perpendicular to the costa, except near the leaflet apex where they ascend. The pinnules are broadly attached to the costa and are narrowly winged to it, the wings extending from pinnule to pinnule. The sinuses between adjacent pinnules are very variable in size; they may be so small that the pinnules actually overlap to a small degree, or they may be as large as one-half the width of adjacent pinnules.

(To be continued)