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## Aphanorhegma Patens in Iowa

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APHANORHEGMA PATENS IN IOWA

ROBERTA O'HARRA

In the autumn of 1939, our Botany class went on a field trip to the Iowa River Valley in Tama County near Montour. We went especially for the purpose of gathering mosses and liverworts. Upon our return, we began an examination of our specimens, and I discovered a species of the genus *Aphanorhegma* in my collection. It had been growing on the mud of the river bank by Kronk's bluff. There are only two known species of *Aphanorhegma*; one of which is *patens*, and the other *serratum*. In Iowa, the only reported species to date is the latter, *serratum*. The most distinguishing characteristic of *serratum* is that the exothecial cells of the capsule are collenchymatous. By the word "collenchymatous" we mean that definite thickenings are present on the cell walls, usually at the corners. As a matter of routine, I mounted a portion of the capsule to make observations of the cells. I found that they were thin-walled and not in the slightest manner collenchymatous. Further observations proved that my species at hand was *patens*.

The majority of our specimens of *Aphanorhegma* had been collected in the woods near Moore, and some of them had come from other parts of Iowa. However, we found that all of the specimens previously collected at the Iowa River Valley proved to be of the same species, namely another *patens*. Upon a thorough investigation of the two species, a great many differences are noticeable between them. They are slight to be sure, but obvious.

As a key and authority to begin with, I used Volume II, Part 2 of the Moss Flora of North America by A. J. Grout. Grout's key says, "Exothecial cells strongly collenchymatous; line of dehiscence clearly marked" for *Aphanorhegma serratum*, and for *Aphanorhegma patens* it says, "Exothecial cells thin-walled, not collenchymatous; line of dehiscence not clearly marked as a rule."

I have previously stated that I observed, in accordance with Grout, that the cells of *serratum* were collenchymatous, and that those of *patens* were not. I proceeded to make drawings of the cells in each with the aid of the camera lucida, using the high power magnification. When the drawings were completed, I discovered that the cells of *Aphanorhegma patens* had a diameter twice as great as that of the *serratum* cells. The average *serratum* cell is

1/10 mm. in diameter. This distinction is not recorded by Grout. (Figs. 1, 2, 3.)

There is also a great difference in the size of the beaks at the tips of the capsules, that of serratum being much longer and more blunt than that of patens. Figure four gives a simple outline of the serratum beak drawn by means of the camera lucida from low power, while figure five is drawn from high power and gives an outline of the cells of the beak. Figures 6 and 7 are corresponding drawings of patens.

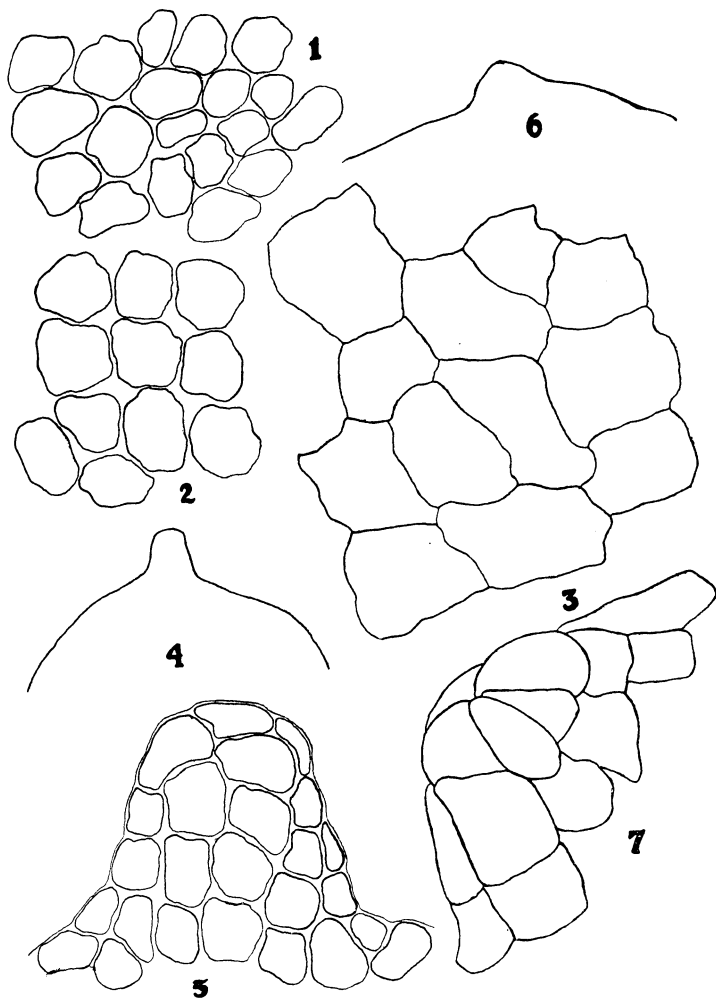
Probably the next most important step in the classification is the matter of the line of dehiscence. There is a definite line of dehiscence in serratum. (Fig. 8 and 9) There is a thin row of cells running around the circumference of the capsule which breaks in the center, thus giving a definite operculum. (According to Grout, a double row of small cells is present in some capsules, and in this case the breakage occurs between the two rows.) When the capsule of patens dehisces, however, the split is apt to occur anywhere on the capsule; vertically, horizontally, or diagonally. (Fig. 10) Therefore, I do not believe that we can lay claim to the existence of an operculum in the capsule of patens. Brotherus says, "Deckel nicht differenziert"; that is, "capsule not differentiated." Figure eleven shows the outline of the dehisced capsule of patens after it has been flattened under a cover glass, and figure twelve shows the same of serratum.

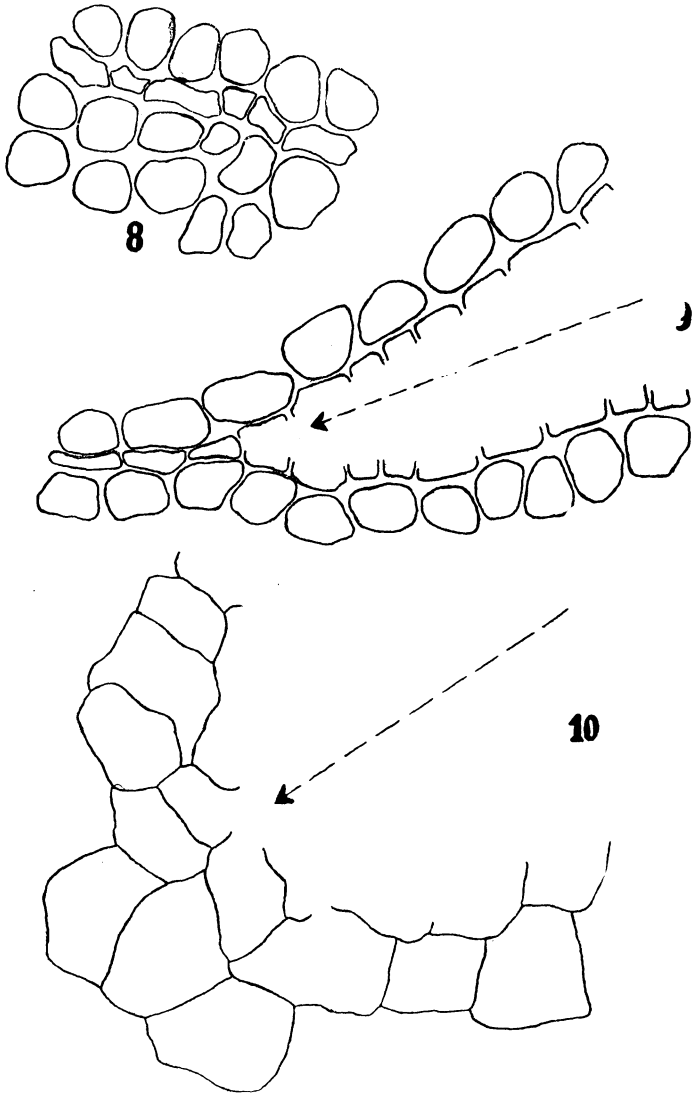
The outline of the seta and foot of each of the two species are

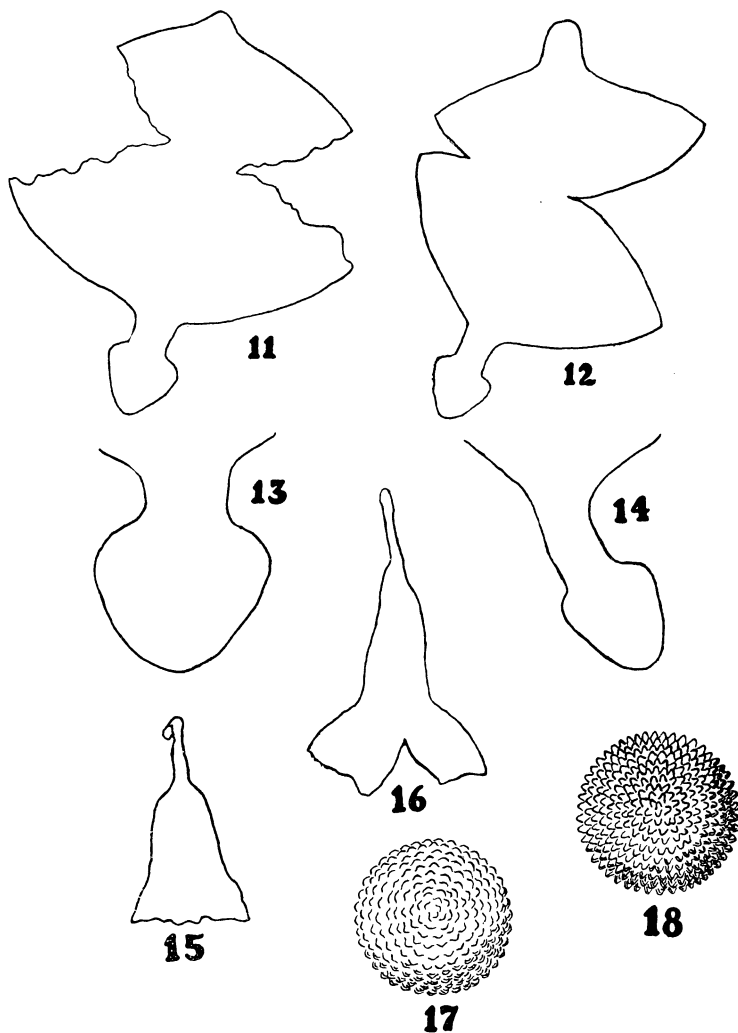
#### EXPLANATION OF PLATES

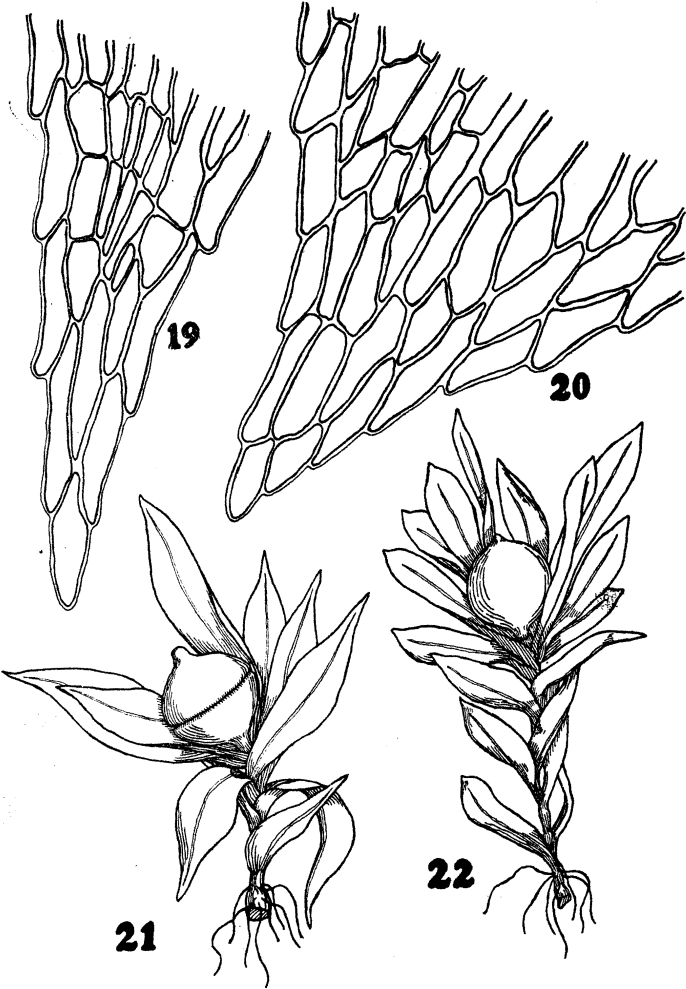
All drawings have been done with the aid of the camera lucida unless designated "freehand."

1 and 2, two groups of exothecial cells from the capsule of serratum (high power); 3, a group of cells from patens (high power); 4, outline of beak of serratum (low power); 5, beak of serratum showing cells (high power); 6, outline of beak of patens (low power); 7, beak of patens showing cells (high power); 8, a group of cells from serratum showing single row of small cells which split in center to dehisce the capsule (high power); 9, same after dehiscence; 10, a group of cells from patens showing irregular manner of dehiscence (high power); 11, outline of patens capsule after dehiscence (freehand); 12, outline of serratum capsule after dehiscence (freehand); 13, outline of foot of patens (low power); 14, outline of foot of serratum (low power); 15, outline of calyptra of patens (low power); 16, outline of calyptra of serratum (low power); 17, spore of patens (freehand); 18, spore of serratum (freehand); 19, leaf tip of serratum (high power); 20, leaf tip of patens (high power); 21, entire plant of serratum (freehand); 22, entire plant of patens (freehand).









shown in figures thirteen and fourteen. The seta of serratum according to our specimens is much longer and narrower than that of patens.

There is not much difference in the length of the calyptras on the two capsules, but I find that the basal portion of the one on serratum covers a great deal more of the area surrounding the beak of the capsule.

As to the variations in the spores (Fig. 17, 18) I find that the spore of patens is papillose, while that of serratum is so extremely papillose that it might well be called spinose. The spore of patens is at least ten microns larger in diameter than that of serratum, the former being thirty-five microns and the latter being only twenty-five microns.

The variations in the leaves are very slight, the most obvious being the shapes of the tips. (Fig. 19, 20) Both species have acuminate leaves. The leaf of patens, however, is much more shortly acuminate than that of serratum which tapers considerably. The shape of the serratum leaf as a whole may be called elliptical-lanceolate, while the shape of the patens leaf is oblanceolate; that is, with the wide portion nearer the apex. The marginal cells of serratum project more strongly as teeth than those of patens, and the alar cells of both are similar. Neither has the costa extending quite to the apex.

By using a 20x hand lens, I believe it is possible to distinguish serratum from patens, provided the plants are fruiting. The method is probably not too accurate, yet it is reasonably successful. Since the seta of patens is shorter, it is more or less buried in the leaves, and although the capsule of serratum is surrounded by leaves, it protrudes more obviously. If the capsules are at the stage of breaking open, the type of dehiscence line can be clearly distinguished. If by chance the calyptra has been removed, the type of beak may also be distinguished. However, when the calyptra is present, the margins of it are visible and one may see whether the top of the capsule is well covered and if the margin of the calyptra is slit as in serratum, or whether only the beak is covered as in patens.

Of the two species under discussion, patens is the only one found in Europe, and was originally given the genus name of *Phascum* by Hedwig in 1787. It was renamed *Physcomitrella* by Bruch and Schimper in 1849 because of the similarity of its exterior appearance to *Physcomitrium*, the name, *Physcomitrella*, being the diminutive of *Physcomitrium*. In 1864 Lindberg placed it in the genus *Aphanorhegma* (originally created by Sullivant for serratum)



because of the extreme similarity displayed by the two species. In spite of this similarity, a great many authorities, particularly Europeans, still retain the genus name of *Physcomitrella* for *patens* because its manner of dehiscence is utterly unlike that of *serratum*.

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