A NATURAL HISTORY STUDY OF THE VASCULAR FLORA OF CEDAR BOG, CHAMPAIGN COUNTY, OHIO

CLARA MAY FREDERICK
Division of Science-Mathematics, Urbana College, Urbana, Ohio 43078

ABSTRACT
Cedar Bog Nature Preserve is a relict boreal bog situated in the Mad River valley in Champaign County, west-central Ohio. Originating following the retreat of the Wisconsin glacier, it has been maintained by the combination of a usually cool moist microclimate and a uniform flow of cool ground water. Microclimatic data recorded from 1963 through 1969 demonstrate that Cedar Bog has cooler temperatures and a shorter frost-free period than do adjoining areas. These two factors have resulted in the survival of plants unique to this part of Ohio.

Within the Bog area, six major plant associations have been identified—the bog meadow, marl meadow, arbor vitae, swamp forest, hardwood forest, and shrub associations. The marl meadow (the wettest area) lies in the northeast section, with the bog meadow and arbor vitae associations south of it, the swamp forest occurring adjacent to the arbor vitae, on the west and the hardwood forest lying beyond the swamp forest.

A total of 546 taxa of vascular plants was identified in the Bog; this list is presented, together with information on occurrence, abundance, and whether or not the species has been reported earlier. Of these taxa, 173 were previously unreported for Cedar Bog, whereas 21 with earlier documented occurrences are now apparently extinct in the Bog.

INTRODUCTION
Cedar Bog Nature Preserve, under the supervision of the Ohio Historical Society, is located in sections 31 and 32, Urbana Township, Champaign County, Ohio, on the Saint Paris topographic quadrangle (fig. 1). The preserve lies both north and south of Woodburn Road and just west of the Erie and New York Central railroads.

The first name given to the area was the Dallas Arbor Vitae Bog. In 1941, the state of Ohio purchased approximately 98 acres and named the area Cedar Swamp Nature Sanctuary. In 1967, the name was officially changed to Cedar Bog Nature Preserve. In the same year, the area was designated a Natural Landmark by the United States Department of Interior. In 1969, The Nature Conservancy purchased an additional 100 acres adjacent to the original area. This vegetational study, however, is concerned primarily with the original 98 acres.

Cedar Bog is unique in Ohio, a northern arbor vitae bog in which are found plant species ordinarily native only to the bogs of northern Michigan. Some species in the Bog, however, are normally associated with the wet prairies of the central areas of the United States. Although Cedar Bog is indeed unique, no comprehensive study has previously been made of the vegetation of the area.

The objective of this study was to survey in detail the vascular flora of Cedar Bog. Essential to this study were (1) a review of the vegetational history of the

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area, (2) a survey of the microclimatic factors which maintain the Bog, and (3) identification of the vegetational associations present in the Bog. The results of each are included in this report. Preparation of the list of vascular plants observed in the Bog during 1963–1970, the list making up the major part of this report, also permitted comparison of the present flora with that of earlier reports.

**Figure 1.** Aerial photograph of the entire Cedar Bog area, with location grid. North is up on the photo. Woodburn Road extends east-west through the middle of the picture, and Dallas Road extends east-west half a mile south, across the bottom of the picture. Cedar Run is the eastern stream approximately following vertical row D north of Woodburn Road, and the western unnamed stream, here called West Branch, similarly follows vertical row F.
VEGETATIONAL HISTORY

The initial history of the vegetation in Champaign County is recorded in the data of Goldthwait (1958 and 1959), Williams (1957), Kapp and Gooding (1964), and Ogden (1966). Just prior to the Wisconsin glaciation, the area must have resembled the forest regions of north-central Ontario today (Goldthwait, 1958; Ogden, 1966). The dominant trees were probably black spruce (*Picea mariana*), white spruce (*P. glauca*), hemlock (*Tsuga canadensis*), and possibly balsam fir (*Abies balsamea*). With the advance of the glacier, about 23,000 years ago, all vegetation was destroyed, but the glacier lasted only about 8-9,000 years here (Goldthwait, 1958).

The first plants, immediately following glaciation, were probably sedges and grasses, rapidly replaced by spruce, fir, balsam, and poplar (Ogden, 1966). In Medway Bog in Clark County, Williams (1957) found that northern coniferous forests were the dominant vegetation for a long period following deglaciation, but were gradually displaced by trees of the lake forest or hemlock-hardwood formations. These, in turn, were replaced by deciduous forest communities, particularly oak-hickory.

Finally, this area became predominantly grassland, indicating the warmer dryer conditions of the Xerothermic period. Prairie species probably became established in the area during this warmer period. Ogden's (1966) pollen studies in Silver Lake, about 20 miles north of Cedar Bog, indicated that, about 9,800 years ago, the boreal forest was generally replaced by oaks. Grassland vegetation later replaced the oaks during the Xerothermic period, which he dated at 3,600±212 years ago.

Although these same changes apparently occurred in Champaign County, Cedar Bog remained cooler and wetter than the adjoining areas during this warmer period because many boreal species remain. No doubt Cedar Bog was then at the water-table level, as it is today, with a constant supply of cool ground water maintaining a reasonably cool microclimate, allowing relict boreal plants to persist in Cedar Bog since early postglacial times.

Wet prairies of the Mad River valley covered a vastly larger area than they do today, extending from Kings Creek to Springfield as late as the early 1800's (Dobbins, 1937). These wet “prairies” were comparable to the present bog meadow areas in Cedar Bog, with arbor vitae growing in or at the edges of the prairies as it does today.

Atwater (1838) described Ohio, when it was first settled, as “a great grassy country ... along our rivers and in our prairies and barrens.” He described, too, how in December 1814 good peat was found “from near to Springfield, Clark County, almost all the way to Dayton.” Atwater also told of peat in a “wet prairie” east of Urbana, yet he made no mention of Cedar Bog. Perhaps even as late as 1814, these swampy areas were so wet that investigation of them was not possible. Atwater (1838) believed that many of the wet prairies were one “thick forests of white cedar” (arbor vitae) because of old logs “in different stages of decay” four feet below the surface.
Further examples of swamps and wet prairies were given by Roberts (in Antrim, 1872), who described the disappearance of one lake and its surrounding bog. Rushcreek Lake was connected to a swamp, as he called it, about 6 or 7 miles long and ¾ mile wide. Roberts reported, "I can . . . attest that all around the margin of the lake, as also in the bed of Rushcreek, so far as the swamp extends, a person attempting to wade would sink beneath the mire as quick as in the water. . . . The whole area has evidently once been a lake connecting Mad River and Rushcreek, the former running South, and the latter North." The lake, itself, ". . . is much smaller now . . . and scarce one hundredth part as large as it originally was. The swamp connected with it is much more firm now than forty years ago. . . . The tallest corn is now grown in some places where cattle would not then dare venture." Based on what is known of its history, a similar description probably could also have been written of the Cedar Bog region during the 1800's.

In Antrim's book (1872), several pioneers are reported as recalling their youth during the early settlement in and around Urbana. The plants that they mentioned are the same as those found today: beech, white oak, bur oak, hickory, honey locust, chestnut, ash, ironwood, dogwood, hawthorn, maple, poplar, and walnut, as well as wild grape, hazelnut, plum, and rose-of-sharon. This colorful description is given of the stream margins.

The old settlers say that the margins of the streams, near which the first settlements were generally made, were thickly covered with a low, matted growth of small timber, while nearer to the water was a rank growth of long grass, interlaced with morning-glory and wild pea vines, among which funereal willows and clustering alders stood like sentinels on the outpost of civilization.

Although many lakes, swamps, and wet prairies long since gone are described (Antrim, 1872), no one mentioned the Cedar Bog area. But the bog area and the arbor vitae must have been present, for *Thuja* trees in the Bog today are that old or older. Again, perhaps the area was too wet and too dangerous to investigate. Or, because it was not suitable for farming, it may have been simply ignored.

The greatest changes in the Bog and adjoining areas were manmade and occurred in the 20th century. The area of the bog habitat was drastically reduced. Probably the one most significant operation reducing the bog area was the dredging and deepening of the Mad River. Dredging was first completed in 1912, and then had to be repeated in 1915 following the 1913 flood (Middleton, 1917). Much of the wet prairie in northern Clark County, south of Cedar Bog, was drained by diverting the mouth of Cedar Run a mile to the north. Evans (1944) cited the following newspaper item, but does not indicate the paper from which it was taken.

Urbana, July 13 (1929). The death knell of the famous Cedar swamps and the 2,000 acres of other swamp land along Mad River near the junction of both Clark and Champaign Counties was sounded Thursday when the county commissioners, surveyors and land owners of both met and determined to abandon a mile of Cedar Creek, running the mouth into Mad River north of the county line bridge. With the dredging of this river will follow a further invasion of the swamps, which are eventually to be eliminated throughout the valley. The bridge will allow extra water of Cedar Creek to flow under it with a 30-foot lowering of the bed by the proposed dredging, engineers stated. The group of officials are shown in the picture standing on an island in a beautiful bend of Cedar Creek that will be abandoned. This creek is the only one in Ohio with waters cold and clear enough for the raising of brook trout, though some of these were caught in Mad River this spring after they had gone down stream.

Since 1929, continued and expanded ditching and dredging have reduced the Cedar Bog habitat to only about 98 acres. Today, perhaps the richest farm land
Nature of the Cedar Bog Habitat

Two physical conditions help to maintain the Bog—a cool microclimate and springs of cool ground water. Undoubtedly these two conditions are interrelated, but, in order to avoid confusion, they will be discussed separately.

Microclimatic Influences

A microclimate similar to that found in northern Michigan bogs exists in Cedar Bog and must have existed from the retreat of glaciation to the present, for otherwise the Cedar Bog boreal flora would not have survived here. Records of air, water, and soil temperatures made over the past five years provide evidence that such a microclimate does exist.

Temperature Stations

During a previous study (Frederick, 1964), weekly maximum and minimum air temperatures, taken 12 inches above the soil surface, were recorded for the marl meadow about a quarter of a mile north of Woodburn Road, from February through September 1964. During the same period, maximum and minimum readings were also recorded from a thermometer located under the water surface in Cedar Run. During the last three months of 1964 and all of 1965, temperature data, including air temperatures approximately 12 inches above the soil and water temperatures in Cedar Run, were recorded for a station just south of Woodburn Road.

On December 31, 1965, a weather station, similar to the weather shelters of the U. S. Weather Bureau, was erected in the bog meadow south of Woodburn Road. Maximum-minimum thermometers, model #110, were placed at 5 feet above the soil surface inside the shelter and at 12 inches above the soil outside the shelter. In addition, a soil thermometer (not a maximum-minimum type) was set 6 inches under the soil surface beneath the shelter. A similar set of thermometers was placed in an arbor vitae stand west of Cedar Run, and a set in the swamp forest area south of Woodburn Road. In addition, a maximum-minimum thermometer was set with the sensor below the surface of the water in Cedar Run, approximately 400 feet south of Woodburn Road.

During 1966, temperature data were taken at least once a week at all stations. Official readings taken from the Urbana Weather Station's monthly summary (Climatological Data, Ohio) were used in the same manner; i.e., the only temperatures used were maximum and minimum values for the periods exactly coinciding with periods between readings at the Bog. Complete and detailed data were reported by Frederick (1967).

Soil Temperatures

Mean soil temperatures from Cedar Bog are given in table 1, where they are compared with similar data from the Coshocton Agricultural Experiment Station (Clim. Data, Ohio, 1966), the only station in Ohio from which such information is available. The data thus presented may not be exactly comparable, but they do indicate that soil temperatures in Cedar Bog are significantly lower during the warm summer months than are soil temperatures elsewhere in Ohio.

The soil temperature never went below 32°F in the bog meadow and swamp forest areas. In contrast, during 17 weeks in 1966 and 1967, the soil in the arbor vitae tract was at or below freezing. During the six warmest months, however, soil temperatures in the bog meadow averaged 3.1°F higher, and in the swamp forest 2.2°F higher, than those in the arbor vitae stand. One factor in maintaining a boreal habitat may be the effect on soil temperature resulting from the presence of arbor vitae in the area.
Because water is near the surface in Cedar Bog, the water temperature undoubtedly influences soil temperatures, particularly minimum readings in the bog meadow and swamp forest regions during the winter, when insolation is at a minimum. However, changes in minimum soil temperatures lagged behind changes in water temperature by about one week. The minimum water temperature was recorded on January 29, 1966; the lowest soil temperatures in both the bog meadow and the swamp forest were recorded on February 5, 1966. These results were expected, because during winter months ground-water temperature has a greater influence on soil temperature than does insolation.

**Table 1**

*Comparison of soil temperatures (°F) at 6 inches depth in Cedar Bog and at the Coshocton Agricultural Experiment Station for 1966.*

<table>
<thead>
<tr>
<th>Annual average monthly maximum temperatures</th>
<th>Cedar Bog</th>
<th>Annual average monthly minimum temperatures</th>
<th>Cedar Bog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coshocton Agric. Expt. Station</td>
<td>64.1</td>
<td>Bog meadow</td>
<td>53.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arbor vitae stand</td>
<td>51.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swamp Forest</td>
<td>53.8</td>
</tr>
<tr>
<td>Average maximum temperatures for 6 warmest months</td>
<td>75.8</td>
<td></td>
<td>64.1</td>
</tr>
<tr>
<td>Average minimum temperatures for 6 warmest months</td>
<td>59.3</td>
<td></td>
<td>57.3</td>
</tr>
<tr>
<td>Average maximum temperatures for 6 coolest months</td>
<td>52.5</td>
<td></td>
<td>43.3</td>
</tr>
<tr>
<td>Average minimum temperatures for 6 coolest months</td>
<td>37.2</td>
<td></td>
<td>36.3</td>
</tr>
<tr>
<td>Highest temperature recorded</td>
<td>82.0</td>
<td></td>
<td>32.2</td>
</tr>
<tr>
<td>Lowest temperature recorded</td>
<td>34.0</td>
<td></td>
<td>28.0</td>
</tr>
</tbody>
</table>


The reverse was true of summer soil and water temperatures; the soil reached its maximum temperature before the water, the maximum water temperature occurring after a lag of two weeks or more. The highest soil temperatures in the bog meadow and the swamp forest were recorded on July 2, 1966, but the highest water temperature was recorded on July 16 (and again on July 23). This, too, would be expected, for higher soil temperatures as a result of insolation would eventually affect the temperature of the ground water as well.

The average monthly temperature of the water in Cedar Run varied from a low of 38.6°F in January to a high of 63.3°F in August. Monthly deviation was greatest from August to September, with a drop in the monthly average of 8.7°F. However, deviation from month to month through the remainder of the year averaged only 3.6°F. The highest water temperature recorded during 1966 was 73.0°F in July and the lowest was 26.0°F in January.

**Air Temperatures**

Air temperatures, average annual temperatures, and average maximum and minimum temperatures, were also recorded for 1966, and were compared with values measured at the Urbana weather station. Higher maximum temperatures occurred at the 5-foot level in the bog meadow than at the Urbana weather station, but minimum temperatures were lower than those at the weather station. With few exceptions, this was true for each weekly period throughout the year. Averag-
ing just the differences between the temperature at Cedar Bog and that at the Urbana weather station, the bog meadow temperatures at the 5-foot height averaged 3.1°F higher for the maximum temperatures and 3.3°F lower for the minimum temperatures in 1966.

The extremes at the 12-inch level in the bog meadow were even greater. The minimums were lower than at both the Urbana and the Bog weather stations every month except August, and the maximums were higher than at both stations eight months of the year.

The arbor vitae areas had less extreme more constant air temperatures than did any other area of the Bog. Temperatures were always lower here during the summer, both at 5 feet and at 12 inches, than at either the bog meadow or Urbana weather stations. Temperatures at 12 inches were lower than those at 5 feet. But, more important, during the winter months, minimum temperatures were higher and, in the summer, maximum temperatures were lower in the arbor vitae association than in the bog meadow.

Temperatures in the swamp forest showed greater variation than did those in the arbor vitae area, but were less extreme than those in the bog meadow. In general, temperatures were cooler at the 12-inch level than at 5 feet.

Some annual comparisons can be made of temperatures in different areas of Cedar Bog by averaging the degrees departure of temperatures in Cedar Bog from those at the Urbana weather station. In 1964, temperatures were recorded at 12 inches above the soil in the marl meadow association. Compared to official weather bureau temperatures taken at Urbana, the maximum temperatures in the marl meadow averaged 3.5°F higher and minimum temperatures 5.4°F lower than the weather station values.

During 1965, temperatures were recorded at 12 inches above the soil in the bog meadow near the east bank of Cedar Run. Because it was near the stream, which never freezes, temperatures should have been modified by the water. However, the maximum temperatures were 3.48°F higher and the minimum temperatures 6.74°F lower than those at the Urbana weather station.

In 1966, temperatures averaged 3.5°F higher and the minimums 7.0°F lower 12 inches above the soil at the weather station in Cedar Bog. This weather station stands in an exposed area about 5 feet higher than the surface of Cedar Run. Despite this, during the winter, the soil in the area of the Bog weather station was not frozen at a depth of 6 inches. Seepage areas continued to run throughout the winter, although a hard crust of ice sometimes formed at the surface. Cedar Run never froze, except for an occasional very thin sheet of ice close to the bank. During very cold weather, Cedar Run appeared to "steam," because of the great differences in air and water temperatures. As a result, then, even when air temperatures at 5.4 to 7.0°F lower, plant roots are not frozen, and water is present in and on the soil at all times of the year.

Perhaps the most dramatic evidence for a cold microclimate in Cedar Bog concerns the absolute temperature extremes and the length of the frost-free period. During the winter of 1964–65, a low of −25°F was recorded in the marl meadow, although the Urbana weather station reported −10°F as the lowest temperature for that period. A temperature of −26°F on January 16, 1873 (Alexander, 1923), is the lowest ever recorded officially in Champaign County. In 1964 the highest temperature recorded in Cedar Bog was 101°F between August 2 and 9; the temperature fell to 31°F the following week. The extremes at the Urbana weather station for the same period were 95°F and 38°F.

A comparison of the frost-free period for Cedar Bog with that recorded at the Urbana weather station, assuming that the minimum temperature recorded in the Bog during any one period occurred on the same day as the minimum for that same period at the Urbana weather station, is quite revealing (table 2). No complete data are available for 1968, but, based on previous temperature differentials, the
frost-free period at the 5-foot level was about 97 days and at the 12-inch level, 84 days, in contrast to the 152 frost-free days reported at the Urbana weather station.

Values for 1966 may not be typical. With regard to this year, the state climatologist noted that, on May 9, “overnight lows were in the twenties in all cooperative temperature recording stations except Ashtabula. Mean surface temperatures on the 10th were 15° to 22° below normal.” Record low temperatures were observed throughout the state, with stations recording the lowest ever reported in May (Clim. Data, Ohio, May, 1966). In addition, September was unseasonably cool; on September 16, frost was reported in some areas of Ohio (Clim. Data, Ohio, September, 1966). From these reports, data from 1964, 1965, and 1969 probably are more typical for Cedar Bog. The frost-free period in Cedar Bog, based on data from the years listed above, is approximately two to two and one-half months shorter than in the surrounding countryside. July is the only month that has been frost-free throughout the period of this study. Cedar Bog is down in a valley, with low hills on either side, and low air-temperatures result, at least in part, from flowage of cold air downslope to the Bog site.

There can be no question that the microclimate in Cedar Bog is much more severe than in adjoining areas. Surely this microclimate has been an important factor in the survival of a boreal bog in this part of Ohio.

### Water Supply and Source

Another important factor in the survival and maintenance of the Cedar Bog habitat is the constant, relatively cool water supply. Not only does this cool water influence the habitat directly, but it undoubtedly also plays a role in creating the unusual and essential microclimate described earlier.

The maximum water temperature in Cedar Run during 1964 was 78°F and the minimum was 22°F, the mean temperature for the year was 49.7°F. In 1965 the average temperature was 48.2°F, with a high reading of 78°F and a low reading

<table>
<thead>
<tr>
<th>Year</th>
<th>Last frost in spring</th>
<th>First frost in fall</th>
<th>No. frost-free days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>Urbana weather station</td>
<td>4/11 29</td>
<td>9/13 32</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 12-inch level</td>
<td>5/30 28</td>
<td>8/15 31</td>
</tr>
<tr>
<td>1965</td>
<td>Urbana weather station</td>
<td>4/19 31</td>
<td>10/4 32</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 12-inch level</td>
<td>5/28 31</td>
<td>8/3 30</td>
</tr>
<tr>
<td>1966</td>
<td>Urbana weather station</td>
<td>5/10 25</td>
<td>10/2 30</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 5-foot level</td>
<td>6/2 32</td>
<td>9/16 31</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 12-inch level</td>
<td>6/11 32</td>
<td>9/16 27</td>
</tr>
<tr>
<td>1967</td>
<td>Urbana weather station</td>
<td>5/10 32</td>
<td>9/23 31</td>
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<td></td>
<td>Cedar Bog, 5-foot level</td>
<td>5/23 32</td>
<td>9/1 28</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 12-inch level</td>
<td>5/23 27</td>
<td>9/1 26</td>
</tr>
<tr>
<td>1969</td>
<td>Urbana weather station</td>
<td>5/1 32</td>
<td>10/15 27</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 5-foot level</td>
<td>6/10 32</td>
<td>10/9 30</td>
</tr>
<tr>
<td></td>
<td>Cedar Bog, 12-inch level</td>
<td>6/16 31</td>
<td>9/10 32</td>
</tr>
</tbody>
</table>
of 22°F. In 1966 the maximum temperature recorded was 73°F and the minimum 26°F, with an annual average temperature of 48.9°F. At no time did the water in Cedar Run freeze, even at 22°F. Large quantities of calcium carbonate and other salts (Frederick, 1964) and the constant motion of the water are responsible for the continuing flow. In addition, the temperature extremes apparently occur for only a very short period of time (Frederick, 1964).

The Mad River and its tributaries have been noted as a constant water source from pioneer times. Morgan (in Antrim, 1872) said of the Mad River, Kings Creek, and Mac-O-Chee Creek, “all these are permanent, never-failing streams of pure, clear water. They have never been known to go dry in summer, and always furnish an ample supply of water for milling purposes throughout the year.” Howe (1889) described the Mad River at Springfield in 1846 as “unequalled for fine mill seats, its current very rapid and the water never so low in the driest season as to interfere with the mills now upon it.”

Today the Mad River valley in Champaign and Clark Counties is noted for the abundant water available to cities and industry. In discussing the water resources of Clark County, Cross (in Norris et al., 1952) cited the high sustained stream flow even during droughts as the outstanding characteristic of the Mad River. He also established that this even flow is sustained because a major percentage of the total runoff is from ground water, rather than from surface runoff. Goldthwait (Norris et al., 1952) pointed out that the best places for large ground-water development are adjacent to streams with valley-train deposits, because rain water, as well as water from the stream, infiltrates and recharges these deposits. Such valley-train deposits are very extensive in the Mad River valley (Goldthwait, personal communication, 1966, and Norris et al., 1952), so the amount of water held in the ground here is very great. In addition, ground water evaporates only very slowly, so little of the water is lost, and the water emerges as continuously flowing springs wherever a low place is present at the surface. This, then, accounts for the relatively high rate of flow of the Mad River and its tributaries during periods of brought, as well as for the reasonably constant flow during rainy periods. These same factors also account for the constant water level in Cedar Bog, because ground water from the valley train feeds the low area of the Bog, just as it does the Mad River. Also, because the water is underground, it does not become sun-warmed, and so, during the summer (the growing season), it emerges cooler than surface waters.

The water level in Cedar Bog does not vary more than a few inches, even when the water table is lowered three or four feet near Urbana. This constant supply of relatively cool ground water is, and doubtless has been throughout the centuries since glacial times, an important factor in the formation and survival of the bog habitat in Cedar Bog. Indeed, most of the critical microclimatic conditions described earlier owe their existence to the continued emergence of this cool ground water.

In summary, Cedar Bog originated as a result of its geologic history and has survived because of the constant cool water supply and the existing cool microclimate. The future of the Bog is, therefore, dependent upon continued maintenance of the water supply. If the assumptions made above are correct, either of the following events, if they should occur, would destroy the habitat. (1) The addition of sun-warmed surface drainage into the Bog could so change the character of the water, as well as the movement of water in the area, as to change completely the present habitat and to destroy most of the flora. (2) If the level of the water table in the valley-train deposits were lowered enough so that seepage from the ground water did not occur, all swampiness could cease, the critical local microclimate would be lost, and the Bog flora would be destroyed.

Although new factories have been developed both north and south of Cedar Bog, and a new municipal well has been dug for the city of Urbana, Ohio, the
Figure 2. Vegetation map of study area of Cedar Bog north of Woodburn Road, with location grid. Symbols as in figure 3.
water in the Bog has not lowered appreciably. In fact, the water level during the summers of 1969 and 1970 appeared to be somewhat higher than it had been in 1965 and 1966 (a pattern in ground-water levels that was also observed elsewhere in the state—J. L. Forsyth, personal communication, 1973). Admittedly, eight years is a short period in which to observe the conditions maintaining the Bog. Nonetheless, significant lowering in level of the water table in the Mad River valley could destroy Cedar Bog in the future.

**PLANT ASSOCIATIONS IN CEDAR BOG**

Establishment of the basic plant associations in the Bog was essential in order to give an overview of the flora and to provide a method for describing habitats and locations of plant species. Six basic associations, which are described briefly below (and for which detailed information may be found in Frederick, 1964 and 1967), were defined. The term “association” here is used to indicate a major category of vegetation, influenced more or less uniformly throughout by water level and microclimatic characteristics, as well as by the kinds of plants found there.

Plant associations were mapped only within the main part of Cedar bog (figs. 2 and 3). Mapping was not carried east of the low escarpment near the railroad embankments nor far west of the unnamed stream in the west (referred to here as West Branch), except for the southwest corner, where there is a broad westward extension of swamp forest (referred to here as the “western extension”).

The plant associations identified (figs. 2 and 3) are:

1. the bog meadow association, found along Cedar Run in the eastern part of the Bog;
2. the marl meadow association, found in the wetter parts of the Bog, where marl is present;
3. the arbor vitae association, found around the margins of the bog meadow and marl meadow;
4. the swamp forest association, found generally west of the arbor vitae;
5. the hardwood forest association, occurring west of the swamp forest; and
6. the shrub communities, occurring through much of the bog, but mapped separately, as an association, only where shrubs dominate the vegetation, along the boundaries between the marl meadow and arbor vitae associations.

Several of these main plant associations are subdivided into separate segregates, or local variations in vegetational type, within the association.

Although listing of these categories suggests that they are delimited by sharp boundaries, no clear-cut change occurs between most of these vegetational types in the Bog; boundaries are generally gradational or ecotonal in character. In addition, even though a species is named as a dominant in one association, that does not mean that it is absent in other associations, even though it is not included in the list of most characteristic species for them. For example, spicebush (*Lindera benzoin*) is found in most of the associations, but is mentioned as dominant only in the shrub association. Measurements of trees are given as inches DBH (diameter at breast height) and were measured, unless otherwise stated, approximately 4½ feet above the ground.

**The Bog Meadow Association**

The bog meadow is located east of Cedar Run (fig. 4), both north and south of Woodburn Road, and also northwest of the northern reaches of Cedar Run. Water is found abundantly throughout this area at or near the surface: in Cedar
EXPLANATION OF FIGURE 3

FIGURE 3. Vegetation map of study area of Cedar Bog south of Woodburn Road, with location grid. Symbols identify plant associations in figures 2 and 3: fine dots, marl meadow association; heavier dots, bog meadow association; splotched pattern, arbor vitae association; horizontal lines, swamp forest association (elm-ash-maple); vertical crisscross lines, swamp forest association (maple-ash-basswood); diagonal lines, swamp forest association (young silver maple); heavier diagonally arranged dots, swamp forest association (tuliptree stands); diagonal crisscross lines, hardwood forest association (beech-maple); pattern of dotted x's and o's, hardwood forest association (oak-maple); and vertical lines, shrub communities.

FIGURE 4. Cedar Run, with bog meadow around it, hemmed in by arbor vitae and, in the distance, other swamp-forest species. Photo courtesy of John F. Gallagher.
Run (fig. 4), in small tributaries to Cedar Run, and in standing water at the surface. The soil is a mixture of peat and marl, which, because of its saturation, tends to quake.

Here in the bog meadow are found a greater number of different plant species than occur in any other areas of the Bog. The bog meadow is characterized by many species of sedges and grasses, which form raised hummocks, and by shrubby cinquefoil (*Potentilla fruticosa*), ninebark (*Physocarpus opulifolius*), dogwood (*Cornus* spp.), and swamp birch (*Betula pumila*). Cedar Bog marks the southernmost occurrence of this last species, a species seldom found south of the bogs of central Michigan. Small arbor vitae (*Thuja occidentalis*) trees are found growing on many of the slightly higher, larger hummocks near the margins of the meadow.

Many herbaceous species are also found in the bog meadow; the fringed gentian (*Gentiana crinita*), the marsh fern (*Thelypteris palustris*), Kalm's lobelia (*Lobelia kalmii*), grass-of-parnassus (*Parnassia glauca*), marsh violet (*Viola cucullata*), lousewort (*Pedicularis canadensis*), nodding onion (*Allium cernuum*), swamp candle (*Sanguisorba canadensis*), queen-of-the-prairie (*Filipendula rubra*), and many composites, including eupatoriums, goldenrods, asters, sunflowers, and rudbeckias.

Near the eastern margin of the bog meadow, just north of Woodburn Road, even though the soil is similar, the water level is lower, making the substrate slightly better drained, so some deciduous trees have become established. The main deciduous species are: tuliptree (*Liriodendron tulipifera*), prickly ash (*Xanthoxylum americanum*), dogwood (*Cornus alternifolia*), and several species of *Rubus*. Herbaceous plants in this area include wild columbine (*Aquilegia canadensis*), iron weed (*Vernonia missourica*), bull thistle (*Cirsium vulgar e*), horse mint (*Monarda fistulosa*), and several species of asters, goldenrods, and eupatoriums.

At the present time, many small arbor vitae are beginning to become established on the hummocks in the bog meadow. In the future, especially if the water table is allowed to become lowered, these bog meadow tracts may become well-developed arbor vitae forest areas, resulting in the loss of both the bog meadow and its unique species.

**The Marl Meadow Association**

The marl meadow is located along Cedar Run about one-quarter mile north of Woodburn Road and covers an area of approximately four acres (fig. 5). It is flat, with marl at the surface throughout the entire tract. Water is always at or above the soil surface, creating extensive areas of standing water. The marl is no doubt what local residents mean when they speak of “quicksand” in Cedar Bog. Demonstrating the extremely porous nature of the area, a one-inch rod or stick can easily be pushed into the ground to a depth of three or four feet.

Plant life in the marl meadow presents a different aspect during each season of the year. In early spring, *Triglochin maritima* is dominant, with flowering scapes appearing in every section of the tract. In May and June, sedges (*Carex* spp. and *Eleocharis* spp.) and *Juncus* spp. are dominant, with species of *Eriophorum* on slightly higher parts of the meadow and *Utricularia cornutum* in areas of standing water. In June *Calopogon pulchellus* flowers throughout the marl meadow and *Cacalia tuberosa* and *Krigia biflora* are also in bloom.

In July the white camass (*Zigadenus glaucus*), false asphodel (*Tofieldia glutinosa*), *Campanula aparinodes*, and blazing star (*Liatris spicata*) are found in abundance throughout the marl meadow. In August, *Potentilla fruticosa*, *Silphium* spp., *Rudbeckia* spp., *Bidens* spp., *Cirsium muticum*, and *Solidago* spp. are in bloom, particularly on the margins of and on slightly higher hummocks within the marl meadow. In September, *Helenium autumnale*, white snakeroot (*Eupatorium rugosum*), and many species of asters and goldenrods are in bloom, and fringed gentians (*Gentiana crinita*) are found in abundance on hummocks.
FIGURE 5. View of four of the plant associations in Cedar Bog, looking west. Marl meadow is in foreground, with bog meadow just beyond, arbor vitae still farther beyond, and the canopy of the swamp forest rising above the arbor vitae in the distance. Photo courtesy of John F. Gallagher.
Two factors influence plant survival in the marl meadow. First, although air temperatures in the marl meadow (and also in the bog meadow) show great extremes, soil temperatures are uniformly cool at the root level. Second, the wet cool marly environment is not easily invaded by other species, so that northern species have survived because of little or no "competition." If the level and coolness of the water are maintained, the present vegetation should remain much as it is now; if the water table should lower, however, arbor vitae trees would invade the marl meadow and many of these unique herbaceous species would disappear.

**The Arbor Vitae Association**

Arbor vitae (*Thuja occidentalis*) trees are present outside the bog meadow on either side of Cedar Run (figs. 4, 5, and 6), though the relative density of *Thuja* in the stands east of the run is higher than in those to the west, where some deciduous trees, such as tuliptree and ash, also occur. The presence and character of the herbaceous layer also differ in different arbor vitae stands, depending on the age and density of the trees and the water level in the particular area. Soils are formed by the accumulation of peaty organic materials on top of *Thuja* roots. Where these peaty materials are thicker, the substrate is slightly higher and less wet.

Some of the largest and oldest arbor vitae trees are found east of Cedar Run and north of Woodburn Road (D-7). Although some trees are smaller, the ma-
jority measure 8\(\frac{3}{4}\) to 17\(\frac{1}{2}\) inches DBH. In this area, which is low and wet, there is practically no ground cover except for liverworts (Conocephalum spp.) and some depauperate deciduous tree seedlings, none of which seem to survive. In slightly less wet stands of arbor vitae, on ground only a few inches higher, the herbaceous species may include Canada mayflower (Maianthemum canadense), partridgeberry (Mitchella repens), a few jack-in-the-pulpits (Arisaema atrorubens), and an occasional spikenard (Aralia racemosa). Where the ground is slightly higher yet, more herbaceous plants occur: the bulblet fern (Cystopteris bulbifera), violets of several species (Viola spp.), Maianthemum canadense, Trientalis americana, Habenaria clavellata, and many mosses and lichens, with the swamp thistle (Cirsium muticum) and swamp milkweed (Asclepias incarnata) around the margins of the stand. In younger, more dense stands of arbor vitae farther upstream and bordering the mali meadow on the northeast, the soil is still drier and only the litter of fallen arbor vitae foliage covers the ground; not even Conocephalum is present.

West of Cedar Run, arbor vitae stands have a great many more associated plants. The plants found here (E-8, D-7) include Habenaria clavellata, H. pseudodes, Spiranthes ovalis, Cypripedium calceolus var. parviflorum, Rubus pubescens, Anemontella thalicroides, Hepatica americana, Viola spp., Equisetum arvense, Cystopteris bulbifera, Mitella diphylla, and occasionally M. nuda. Few shrubs occur here, except for Hydrangea arborescens and Lindera benzoin. One plant of Osmunda regalis was found in this area (D-7), as was one group each of Polypondium virginianum and Camptosorus rhizophyllus, growing on downed Thuja logs. West of West Branch (G-6, 7), there is also one small area of arbor vitae, where the trees, widely separated, are apparently remnants of a once-larger stand, occurring in two swales, or low seepage areas, that drain into West Branch.

South of Woodburn Road, the arbor vitae trees are generally smaller than are those to the north. In some places here, the arbor vitae form solid stands; elsewhere, many herbaceous plants grow under the trees: swamp thistle (Cirsium muticum), wingstem (Actinomeris alternifolius), bulblet fern (Cystopteris bulbifera), horsetail (Equisetum arvense), and grass-of-parnassus (Parnassia glauca). On the west bank of Cedar Run, ninebark (Physocarpus opulifolius) leans out over the stream. This bank is drier than land away from the stream, probably as a result of the past dredging of Cedar Run to the south. Some of the more unusual plants found here are the orchid Habenaria clavellata, partridgeberry (Mitchella repens), and sundew (Drosera rotundifolia) (fig. 7). Although sundew is not rare in Cedar Bog, one colony, six to eight inches across, was seen, flowering abundantly, growing on the base of an arbor vitae tree here, beside a seepage area.

Far to the south (in E-11), the trees are especially young and are commonly interspersed with deciduous shrubs, such as dwarf birch (Betula pumila), alder (Alnus rugosa), shrubby cinquefoil (Potentilla fruticosa), and several species of dogwood (Cornus spp.), or with small patches of bog meadow plants. Eventually the arbor vitae will probably overtop the deciduous shrubs, and this area, too, may become a pure stand of arbor vitae.

There is evidence in this area (E-9) that large arbor vitae trees were cut. Several stumps remain, and one, although partially destroyed, has a diameter of approximately 15 inches. In addition, some genera (Clintonia, Gautheria, and Hexastylis) have been planted here, on the raised area over the roots of an arbor vitae, by some overzealous naturalists, probably with the mistaken view that, because these plants are normally found in this habitat, they should be planted and preserved in Cedar Bog (Carl Horst, personal communication, 1964).

To the south, along Cedar Run, the trees are so close together and cathedral-like that it is difficult to walk through the stand. It is in this region that many of the trees were toppled by strong winds (worst damage in northeast F-10, southeast F-11, and eastern F-12). In the tangled thicket which resulted, some arbor
vitaee are still living, but blackberry, ninebark, dogwood, and even giant blue-stem grass have come in among the downed trees. As a result of the wind damage, trees south of Woodburn Road are generally smaller than are those to the north, but trees of 12, 13, and 14 1/2 inches DBH were measured here. One large downed arbor vitae log measured 25 inches at a distance of 4 1/2 feet from the base. Three new trees have developed from the branches of the fallen tree, the largest having a DBH of 10 1/4 inches. New trees frequently develop from branches of downed logs of arbor vitae, some of considerable size (11 1/2 inches DBH). Many trees of this species in the Bog have originated in this way.

The _Thuja_ stands once occupied a much larger area in the Mad River valley (Dachnowski, 1910), but, aside from the stands in the Cedar Bog Nature Preserve, very few arbor vitae trees now remain. Where arbor vitae once extended southward along Cedar Run as far as its mouth into the Mad River in Clark County (Evans, 1944), none occurs south of about a mile south of Dallas Road today.

![Figure 7. Close-up of sundew (Drosera rotundifolia) in Cedar Bog. Photo courtesy of John F. Gallagher.](image)

**Swamp Forest Association**

Swamp forest occupies by far the greatest area in Cedar Bog (figs. 2 and 3). There are at least five distinct segregates and considerable variation from area to area within the association. All areas of swamp forest lie west of Cedar Run. Elms, which once dominated most of the swamp forest, have largely been eliminated by the Dutch elm disease, though their gaunt remains are still evident in the more open stands.

Just north of Woodburn Road, the swamp forest association, here represented by a maple-ash-basswood stand, occupies the large central area of the Cedar Bog Nature Preserve west of the bog meadow and arbor vitae areas. Ash, basswood (_Tilia americana_), and musclewood or blue beech (_Carpinus caroliniana_) are numerous through the area, as elm must have been once, judging from the many large elm stumps. On the west margin are tuliptrees (_Liriodendron tulipifera_),
swamp white oak (*Quercus bicolor*), some relatively large butternut trees (*Juglans cinerea*), a few mature wild cherries (*Prunus serotina*), and, toward the north end, some large red maples (*Acer rubrum*). Some tuliptrees were measured from 31 to 34 1/2 inches DBH and one swamp white oak at 26 inches DBH. In one place on the east bank of West Branch, six tuliptrees, one quite large, grow so close together that, although no evidence remains, all must have originated from the same single ancient stump.

Shrubs in this section are mainly spicebush, elderberry, and dogwood, although a few shrubs of *Prunus* and *Crataegus* are scattered throughout. Herbs include *Hepatica*, *Allaria*, species of *Thalictrum*, a few lilies (*Lilium michiganense*), species of *Desmodium*, and wild yam (*Dioscorea villosa*). In the slightly drier and more open areas are many composites: *Helianthus giganteus*, *Eupatorium rugosum*, *Rudbeckia laciniata*, *Senecio aureus*, *Erigeron spp.* and *Actionomeris alternifolius*.

North of this stand is an elm-maple stand (*D*-, *E*-, *F*-, and *G*-1, 2, 3, and 4), once dominated by elms, now mostly dead, and presently characterized mostly by thickets of *Cornus* and *Rubus* and six-foot-tall stinging nettles, over which species of *Galium* clamber, making the area almost impassable. Relatively large red maples are widely scattered throughout the area, as well as one large sycamore and a few mature tuliptrees, but no seedlings of these trees are now evident. On the west margin are several butternut seedlings and a few oak trees, *Quercus imbricaria* and *Q. muehlenbergii*, and on the north are one large old red elm, several relatively large ash trees, and some *Prunus*.

South of Woodburn Road an area (G-11 and 12) of swamp forest called elm-ash-maple is composed of red and silver maple (*Acer rubrum* and *A. saccharinum*) and black and green ash (*Fraxinus nigra* and *F. pennsylvanica* var. *subintegra*), with many large tuliptrees (*Liriodendron tulipifera*) along the eastern edge. Shrubs found in this area are mainly blackberry, spicebush, and some Canadian taxus. Head-high stinging nettles are present, as are ferns—*Dryopteris*, silvery glade fern (*Althyrium thelypteroides*), and many large beautiful cinnamon ferns (*Osmunda cinnamomea*), some with fronds five feet long or more. Evans (1944) reported that, in 1924, florists paid local residents to dig up these handsome plants for commercial use.

Just west of this area (in *H*—and *I*-10, 11, and 12), the big elms are now dead, but in the late summer of 1962, the elms were alive and appeared vigorous; there was no shrub understory at that time, except for one area of spicebush (*H*-10 and 11) and a few herbaceous plants: ebony spleenwort (*Asplenium platyneuron*), several species of *Dryopteris*, and a few asters and goldenrods. Only three years later, in the summer of 1965, this same region was an almost-impenetrable thicket of nettles, blackberries, spicebush, shrubby dogwoods, and *Actionomeris*. Ferns had become rare and the elms were dead, with some blown over, their places taken by scattered sycamores and silver and red maples. Probably within 20 or 25 years these new trees will overtop the shrubs and herbs, and the area will again become mature swamp forest.

The young-silver-and-red-maple segregate, which also lies south of Woodburn Road (*F*—and *G*-9), represents an early successional stage in the swamp forest association. When I visited Cedar Bog in the late 1940’s, there were no woody plants in this tract, except for one large cottonwood and one stand of silky dogwood (*Cornus obliqua*), and the area was dominated by tall grasses and horseweed. Now there are mainly young maple trees here, trees no more than 20 years old, which will ultimately form the mature forest canopy. There is no shrub understory, but some ferns are present. Several different herbaceous species occur here, primarily violets (*Viola* spp.), garlic mustard (*Allaria officinalis*), several Umbelliferae (*Thaspium, Sanicula, and Osmorhiza*), Greek valerian (*Polemonium reptans*), and colonies of wood anemone (*Anemone quinquefolia*). In every somewhat-open area, touch-me-not (*Impatiens capensis*) is waist-high from mid-summer until
frost. One large sycamore occurs at the margin of the area along Woodburn Road.

Two stands dominated by tuliptrees occur in the Bog. In the tuliptree community south of Woodburn Road (F-9) the soil is largely peat and remains wet or damp throughout the year. Even though I have never seen ponded water here, skunk cabbage (Symlocarpus foetidus) grows everywhere. Other herbaceous species abundant in this community are: Hepatica americana, Anemonella thalictroides, Viola spp., Oxypolis rigidior, and Eupatorium rugosum. The principal shrubs are spicebush and elderberry, with extremely large vigorous stalks of poison ivy (Rhus radicans) growing up many large (24 to 30 inches DBH) trunks of tuliptrees. Nannyberry (Viburnum lentago), Hypericum spathulatum, and Cornus spp. are also present, with grape vines (Vitis ripariis), virgin's bower clematis (Clematis virginiana), and wild yam (Dioscorea villosa) clambering over all.

The tuliptrees in the stand farther south and to the east (F-10 and 11) are also old; one ancient trunk measures 34½ inches DBH. In this area, there is a mixture of tree species: maple, ash, and a few arbor vitae, but the largest trees are the tuliptrees. Also present are ferns, Eupatorium spp., mosses, a few goldenrods and asters, Oxypolis, and dwarf raspberry.

The Hardwood Forest Association

There are two distinctly different hardwood forest segregates in Cedar Bog (figs. 2 and 3), differing both in species and in aspect. The largest trees and the greatest diversity are found in the beech-maple segregate, which occurs south of Woodburn Road at the west end of the western extension. The other hardwood forest is composed of slightly younger (though mature) trees of oak and maple, and occurs north of Woodburn Road along the west bank of West Branch.

The beech-maple segregate is composed of a number of hardwood species—beech (Fagus grandifolia), sugar maple (Acer saccharum), and several species of hickory and oak. Though a number of large beech trees are present, there are no young trees, except for small root sprouts; in contrast, maple reproduction is well established. Hickories present are shagbark (Carya ovata), sweet pignut (C. glabra and C. ovalis), and one specimen of mockernut (C. tomentosa). Identification of hickory species in Cedar Bog has not been easy; Dr. A. B. Ream, of Mechanicsburg, Ohio, whose hobby is cultivating nut trees, believes that hybridization and introgression have resulted in practically every hickory tree having some characteristics of at least two species (Dr. A. B. Ream, personal communication, 1964). The most common species of oak present is swamp white oak (Quercus bicolor), but chinquapin oak (Q. muehlenbergii) and several trees identified as Schumard's red oak (Q. schumardii) are also present. No typical red oak (Q. borealis var. maxima) is found in this part of the Bog, but some specimens appear to be hybrids of the northern red oak. Other tree species present in this area are red maple (Acer rubrum), elm (mostly red elm, Ulmus rubra), hackberry (Celtis occidentalis), some small Ohio buckeyes (Aesculus glabra), several hawthorns (Crataegus spp.), and one honey locust (Gleditsia triacanthos).

Many of the individual trees of all species composing the canopy are very large. Examples of maximum diameters measured are:

<table>
<thead>
<tr>
<th>Species</th>
<th>inches DBH</th>
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<tr>
<td>beech</td>
<td>33½</td>
</tr>
<tr>
<td>sugar maple</td>
<td>46½ and 40</td>
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<tr>
<td>shagbark hickory</td>
<td>25½ and 27</td>
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<tr>
<td>swamp white oak</td>
<td>34</td>
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<tr>
<td>Shumard's red oak</td>
<td>32, 34½, and 41</td>
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<tr>
<td>red elm</td>
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<td>buckeye</td>
<td>7</td>
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A shrub understory is not common, but where present, is composed of spice-bush, prickly ash, dogwood, and, in a few places, blackberry. Herbaceous plants, which thickly cover the ground under the deciduous trees, are mainly violets, garlic mustard (*Allaria officinalis*), wake robin (*Trillium sessile*), phlox (*Phlox divaricata*), running strawberry vine (*Euonymus obovatus*), myrtle (*Vinca minor*), a few sedges, and many grasses and mosses. In late fall, asters (particularly *Aster simplex*), a few goldenrods (*Solidago* spp.) and clammy leafcup (*Polymnia canadensis*) are in flower. Vines are frequent, the most common being *Smilax rotundifolia*, *Polygonum scandens*, *Rhus radicans*, and two species of *Vitis*. Wild leek (*Allium tricoccum*) is abundant, and one colony of the orchid *Aplectrum hyemale* was found.

The other hardwood forest, the oak-maple segregate, occurring north of Woodburn Road and west of West Branch (F- and G-2 through 8), is composed of several species of oak and maple. These trees are widely separated, much smaller, and obviously younger (though nonetheless mature) than those in the beech-maple stand south of Woodburn Road and have a denser shrub understory and fewer flowering plants on the forest floor. Characteristic tree species present are chinquapin oak, swamp white oak, at least one clearly identifiable red oak, and both silver and red maple.

Far to the north (F-2 and 3), there is shingle oak (*Quercus imbricaria*), Shumard’s red oak, and one tree that very closely resembles swamp chestnut oak (*Q. michauxii*). In addition, there are here: one black walnut tree (7 inches DBH) (F-5 and 6) with several seedling walnuts, butternut seedlings (*Juglans cinerea*), wild cherry (*Prunus serotina*), red and black ash (*Fraxinus pennsylvanica* var. *subintegerrima* and *F. nigra*), blue beech (*Carpinus caroliniana*), and one hop hornbeam (*Ostrya virginiana*) (in G-5).

Identification of some of the oaks is difficult, because of the presence of hybrids. One example is an oak tree growing on the west bank of West Branch. The bark and growth habit resemble those of swamp white oak (*Q. bicolor*) (O. A. Alderman, personal communication, 1966), but the leaves look most like those of post oak (*Q. stellata*), and the acorns have the characteristics of those of bur oak (*Q. macrocarpa*). One less extreme example is an oak which is growing near Woodburn Road at the west edge of the forested area and which has the aspect of pin oak (*Q. palustris*), the leaves and winter buds of black oak (*Q. velutina*), though the inner bark is not orange, and acorns resembling those of red oak (*Q. borealis* var. *maxima*).

There is a dense shrub understory in many parts of this hardwood forest. The species include dogwood (*Cornus* spp.), prickly ash (*Xanthoxylum americanum*), berries (*Rubus* spp.), wild roses (mostly *Rosa palustris*, *R. caroliniana*, and *R. virginiana*, with some hybrids), blueberries (*Physocarpus opulifolius*), and nanny-berry (*Viburnum lentago*). St. John’s wort (*Hypericum spathulatum*) also grows along the road, as do cattails (*Typha latifolia*). Herbaceous plants present include a stand of Christmas fern (*Polystichum acrostichoides*), scattered ferns (*Dryopteris*), violets, and some sedges and grasses. Skunk cabbage (*Symplocarpus foetidus*) is found in seepage areas and *Iris virginica* on the stream bank.

The existence of a hardwood forest in this site (F-4–8) is puzzling, because of the presence of hybrids. One example is an oak tree growing on the west bank of West Branch. The bark and growth habit resemble those of swamp white oak (*Q. bicolor*) (O. A. Alderman, personal communication, 1966), but the leaves look most like those of post oak (*Q. stellata*), and the acorns have the characteristics of those of bur oak (*Q. macrocarpa*). One less extreme example is an oak which is growing near Woodburn Road at the west edge of the forested area and which has the aspect of pin oak (*Q. palustris*), the leaves and winter buds of black oak (*Q. velutina*), though the inner bark is not orange, and acorns resembling those of red oak (*Q. borealis* var. *maxima*).

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ridge parallel to the stream, along the west bank. Perhaps the accumulation of these dredgings, plus their effect on the drainage of the land to the west, may account for the better drainage and the hardwood forest stand found in this area.

**Shrub Communities**

Shrubs are present throughout many of the forest stands, but they dominate, forming an intermediate community, between the forest (arbor vitae and deciduous) and the meadow (bog and marl) associations. One shrub community, associated with the swamp forest, occurs on the far east side of the state-owned property (D- and C-9 and E-10 and 11). This community is now in a successional stage, probably having begun as a coarse shrub community, followed by a community dominated by American elm. The elms are almost gone now, and only a few silver maples are present; mostly this is an area of brambles and coarse annuals, and it is therefore designated as a shrub tract.

North of Woodburn Road and east of Cedar Run (C- and D-7 and 8) is a shrub community associated with the swamp forest and consisting of poison sumac (Rhus vernix), prairie rose (Rosa setigera), dogwood (Cornus spp.), prickly ash (Xanthoxylum americanum), black locust (Robinia pseudo-acacia), and hop tree (Ptelea trifoliata). Although the last three species named are generally small trees, they are only slightly taller than the speckled alder and poison sumac and are considered to be members of the shrub community here.

The shrub community at the north end of the swamp forest (F-1 and 2) is a veritable jungle of berry briars. Raspberry plants grow all along the path beside West Branch, but seldom bear abundant fruit, probably because of the dense shade.

The most common shrubs found with the arbor vitae association are Alnus rugosa, Cornus alternifolia, Rhamnus alnifolia, and several species of Salix, in addition to spicebush, cinquefoil, ninebark, and dwarf birch. The most common shrubs here (D- and E-5 and 6) are willows, birch, and Rhamnus alnifolia. A large colony of blackberry, Rubus allegheniensis, occurs in E-5, but both blackberries and raspberries are scattered throughout the shrub communities and beyond the arbor vitae into the adjoining swamp forest.

Several species of shrubs occur adjacent to the Thuja. One such shrub, the black huckleberry (Gaylussacia baccata), grows under the arbor vitae along the association boundaries and is found in isolated arbor vitae clumps in the bog and marl meadows, especially where arbor vitae foliage is sparse and sunlight reaches the ground. This shrub grows on the elevated root areas at the bases of Thuja trees. Poison sumac is common on the margins of almost every arbor vitae stand. Spicebush (Lindera benzoin), elderberry (Sambucus canadensis), and species of Cornus also occur along the margins of the arbor vitae association, as well as in most of the forest associations in Cedar Bog. Cinquefoil and dwarf birch grow along the arbor vitae margins, as well as being abundant throughout the bog meadow.

A unique, stable shrub community lies south of Woodburn Road on the west bank of Cedar Run. Here, in a dense herbaceous layer, mostly grasses, which almost conceals the many seepage areas and treacherous sink holes, grow swamp rose (Rosa palustris), poison sumac, ninebark (Physocarpus opulifolius), Alnus rugosa, Cornus alternifolia, and several species of Salix.

**ANNOTATED PLANT LIST**

In the annotated plant list below, the following information is given for each species: frequency and occurrence, whether or not species was reported by Kellerman (Kellerman and Werner, 1893; Kellerman and Wilcox, 1895), whether or not this constitutes a new record for the species, either in Cedar Bog or in the whole county, and observed flowering time. The frequency of a species is designated
by one of the following terms: rare, occasional, frequent, common, or abundant, use of which terms were my judgments, based on how often a particular species was observed throughout the Bog. The occurrence of a species or of a collection is noted by reference either to the quadrat system indicated in figure 1 and or to the plant associations in which the species were found (Frederick, 1967).

Those species also reported by Kellerman (Kellerman and Werner, 1893; Kellerman and Wilcox, 1895) are indicated by a symbol following each species name. Of the species listed in these two publications, not all are supported by voucher specimens. Therefore two different symbols are used to identify species reported by him:

- \(Kv\)—reported by Kellerman and Werner (1893) or by Kellerman and Wilcox (1895), and with voucher specimens in The Ohio State University Herbarium, and
- \(Kn\)—reported by Kellerman and Werner (1893) or by Kellerman and Wilcox (1895), but with no voucher specimens in The Ohio State University Herbarium.

Two other symbols are also used in this list to identify:

- \(UB\)—previously unreported from Cedar Bog, but collected from other areas of Champaign County, and
- \(UC\)—previously unreported from Champaign County, Ohio.

To identify those species previously reported either from Cedar Bog or from Champaign County, information was drawn both from the literature and from herbarium specimens. Publications consulted were Braun (1961 and 1967), Dachnowski (1912), Franks (1931), Stuckey (1966), and Hicks (undated), in addition to the Kellerman lists (Kellerman and Werner, 1893; Kellerman and Wilcox, 1895). Most herbarium specimens studied were in The Ohio State University Herbarium; no comprehensive attempt was made to search for Kellerman, Werner, or Wilcox specimens in other herbaria. Two other botanists, B. Jane Spence and W. J. Biddlecombe, both of Springfield, Ohio, also collected plants in Cedar Bog, working prior to 1859, and contributed their specimens to The Ohio State University.

Also noted in this list are specimens collected in Cedar Bog that are preserved in a small but interesting collection of plants at Urbana College. Most of these specimens were collected in the 1800's by Milo G. Williams, though some were provided by W. S. Sullivant and John Samples. Unless otherwise indicated, however, all herbarium specimens studied were in the Herbarium of The Ohio State University.

Plants in the list generally considered to be boreal species are so indicated. Prairie species commonly considered to originate in prairies are so noted when that information is known, but a clear delineation of prairie species is not now available. A few species appear to be more common on the eastern coastal plain and in the Mississippi embayment, and these are so identified in the list.

The estimated age of trees has been calculated from information given by Fowells (1965). These are purely estimates, based on the average or most common annual increment in diameter of the species described, in order to give a general idea of the age of different forest stands in Cedar Bog.

Nomenclature of all woody plants and monocots follows that of Braun (1961 and 1967); nomenclature of herbaceous flowering plants follows that of Fernald (1950), although additional works, particularly monographs, have also been consulted. Nomenclature of ferns and other pteridophytes follows Wagner (1962, 1963, and 1965), Wherry (1961), and Blasdell (1963).

Voucher specimens for all species given in this list were collected in this study and are deposited in The Ohio State University Herbarium, together with a copy of the quadrat map. Duplicates, where available, are deposited in the herbarium at Urbana College, Urbana, Ohio.
Ruellia strepens L. UC  
Rare. Collected once in I-11.

ACANTHACEAE

Acer negundo L. Boxelder. Kn  
Infrequent in the swamp forest association. In G-10 and small trees in F-3.

Acer nigrum Michx. f. Black maple  
Only two specimens collected seem typical of the species, based on presence of stipules. Several are intermediate and appear to be hybrids of A. nigrum and A. saccharum.

Acer rubrum L. Red maple  
Very common; usually associated with silver maple in moderately wet areas of the swamp forest. One large tree in H-11 measured 40 inches DBH; average annual growth in diameter (Fowells, 1965) indicates this tree may be well over 100 years old.

Acer saccharinum L. Sugar maple. Kn  
The most abundant maple in the Bog. In almost all forest regions of the Bog, especially in wet areas in the center of region north of Woodburn Road and in swamp forest of western extension.

Acer saccharum Marsh. Sugar maple  
One specimen collected by Kellerman, but no location given. In west end of hardwood forest. Some very large trees in J and I at boundary of 10 and 11. One tree, 30½ inches DBH, is possibly 150 years old (Fowells, 1965). Three specimens appear to be hybrids with A. nigrum.

ALISMATACEAE

Alisma subcordatum Pursh. Eastern water plantain. UB  
Occasional in F-10 at convergence of streams and in F-8, West Branch, just north of Woodburn Road.

Alisma trivale Pursh. Kn  
Rare. In F-8 in West Branch just north of Woodburn Road. Flowers, late August.

Sagittaria latifolia Willd. Kv  
Rare. At edge of West Branch, in F-8.

AMARYLLIDACEAE

Hypoxis hirsuta (L.) Coville. Yellow star grass. Kn  
Rare. In D-7 in the arbor vitae association. Flowers, mid-May to early June.

ANACARDIACEAE

Rhus radicans L. Poison ivy. Kn  
Not collected. Abundant in swamp forest. Many large fruit-bearing vines.

Rhus vernix L. Poison sumac. Kn  
Common along Cedar Run both north and south of Woodburn Road. Not collected.

APOCYNACEAE

Apocynum cannabinum L. UC  
Observed only once, in E-9.

Apocynum sibiricum Jacq. Indian hemp. UC  
Occasional. In E-9 on roadside west of east bridge.

Vinca minor L. Myrtle. UC  

ARALIACEAE

Aralia racemosa L. Spikenard. Kn  
Common in arbor vitae association, D-7, and in swamp forest, F-10 and 11. Flowers, mid-June.
ARISTOLOCHIACEAE

*Asarum canadense* L. Wild ginger. UB

Frequent in hardwood forest in western extension. Also common in woods elsewhere throughout the county.

*Hexastylis virginica* (L.) Small?

Identification not certain because the plant has not been seen in flower. This species was planted in Cedar Bog by Carl Horst of Dayton, as confirmed to me by Mr. Horst (personal communication, 1966). One plant in arbor vitae stand, E-8.

ASCLEPIADACEAE

*Asclepias exaltata* L. UC

Observed only once, G-8.

*Asclepias incarnata* L. Swamp milkweed. Kn

In bog meadow and arbor vitae associations. Frequent. Flowers, mid-July to early August.

There are two distinctly different subspecies in Cedar Bog, but neither completely fits Woodson's subspecies (Woodson, 1954). Specimens #1144 (D-8) and #207 (E-9) are somewhat like *A. incarnata* L. subsp. *incarnata*, but are conspicuously pubescent. Stems repeatedly branched. Leaves leathery with truncate bases. Specimens #525 (D-6) and #552 (D-7) are most nearly like subsp. *pulchra*. Unbranched (#525) or a single branch. Corollas completely purplish (#525) or pinkish purple with cream at very base (#552). Leaves thin, not leathery.

Woodson (1954) considers var. *pulchra* as "advective in Ohio, . . . watersides and moist soil, frequently in somewhat brackish tidal marshes." The alkaline soil in Cedar Bog and the water heavily charged with calcium carbonate would provide a somewhat similar habitat.

*Asclepias syriaca* L. Common milkweed. Kn

Occasional along roadsides through the Bog in sunny areas. Flowers, July.

BALSAMINACEAE

*Impatiens capensis* Meerb. Spotted touch-me-not

Abundant throughout all the swamp forest.

*Impatiens pallida* Nutt. Pale touch-me-not

Common in only one area, G-11. Reported by Hicks, but no specimen from Champaign County.

BERBERIDACEAE

*Berberis thunbergii* DC. Japanese barberry. UB

An adventive. Rare, in F-7.

*Caulophyllum thalictroides* (L.) Michx. Blue cohosh

Frequent in swamp forest associations of Cedar Bog and occasional in hardwood forest. Flowers, late April.

*Podophyllum peltatum* L. May apple

Common in young maple stand, F-9, south of Woodburn Road, and in western extension hardwood forest.

CAMPANULACEAE

*Campanula americana* L. Tall bellflower

Common on roadsides, E-8 and F-8. Flowers, August. Specimen #1237 appears to be *C. americana* L. var. *illinoensis* (Fresn.) Farw. Collected once in arbor vitae stand, E-10. Leaves are broadly ovate, not long tapering as is characteristic in the species, and petioles are distinct, not winged.

*Campanula aparinoides* Pursh. Kv

Abundant throughout bog meadow. Flowers, mid-July through September. Boreal species.

*Lobelia kalmii* L. Kv

Abundant in bog meadow. Flowers, August and September. Relict boreal species.

*Lobelia puberula* Michx. Downy lobelia. UC

Specimens #172, #615, and #897, all found in D-8, most closely resemble this species. Specimens #1247 from E-7 may be a hybrid of this species with *L. siphilitica*; sepals are auricled, but plant is pubescent. Flowers, late August and September.

*Lobelia siphilitica* L. Great blue lobelia. Kn

Common in arbor vitae and swamp forest associations.

Great variation exists in this species in Cedar Bog: corolla may be deep blue, definitely lavender with no blue color, or blue with conspicuous white protuberance and lip; leaves may be petiolate or not, glabrous to even hirsute. These plants may be examples of introgressive hybridization between *L. puberula* and *L. siphilitica* in a disturbed habitat. Practically every specimen collected has some characteristics of both species. Flowers, late August and September.
CANNABINACEAE

_Humulus lupulus_ L. Common hop. Kn
Occasional, in swamp forest, E-4 and 5. Also in E-9.

CAPRIFOLIACEAE

_Lonicera dioica_ L. Honeysuckle. Kn
Occasional in F-4, 6, and 8, in the swamp forest association. The specimens from Cedar Bog are atypical and grade toward _L. prolifera_ (Kirchn.) Rehd., or _L. flavida_ Cockerell, the latter reported as a possible hybrid between _L. dioica_ and _L. prolifera_ (Braun, 1961). _L. prolifera_ has been collected in Champaign County, but not _L. dioica._

_Lonicera maackii_ Maxim. UC
Occasional in J-11 and I-11.

_Sambucus canadensis_ L. Elderberry. Kn
Common in swamp forest north of Woodburn Road; occasional along roadside, south.

_Viburnum lentago_ L. Nannyberry. Kv
Frequent in swamp forest and hardwood forest associations, E- and F-9; also in J-10.
Flowers, mid-June.

_Viburnum prunifolium_ L. Blackhaw. UB
In deciduous forest, J-10. Flowers, late May.

CARYOPHYLLACEAE

_Saponaria officinalis_ L. Bouncing bet. UC
Along roadsides, E-8 and 9; also in F-9. Flowers, July.

CELASTRACEAE

_Euonymus atropurpureus_ Jacq. Wahoo bush. Kn
Occasional on the banks of West Branch, F-4 and 6, and in the swamp forest, E-6 and 8.
Also, rarely in western extension, I-11.

_Euonymus obovatus_ Nutt. Running strawberry bush
Infrequent on stream bank, F-6, and frequent in deciduous forest, I-11.

_Celastrus scandens_ L. Bittersweet
Never observed in flower in Cedar Bog proper, probably as a result of dense shade. In fence rows east of the Bog, it both flowers and fruits. Occasional in swamp forests, F-6 and G-11.

CHENOPODIACEAE

_Chenopodium hybridum_ L. Goosefoot. UC
A common weed throughout the area. In F-8.

COMPOSITAE

_Actinomeris alternifolius_ (L.) Britt. Wingstem. Kn
Reported by Kellerman as _Verbena_. Very common along roadside and along West Branch. Flowers, August.

_Ambrosia artemisiifolia_ L. Roman ragweed. Kn
Frequent on roadsides.

_Ambrosia trifida_ L. Greater ragweed. Kn
Very common on roadsides, especially in sunny, wet areas.

_Arctium minus_ (Hill) Bernh. Burdock
In semishaded areas, F-8, 9, and 10. Frequent.

_Aster_ spp.
Frequently intergrading specimens are found and some hybridization has probably occurred. With one exception, Speer (1958) is followed here.
A majority of the asters listed here have not been reported from Champaign County. Doubtless this is due to the small number of collections made in the county.

_Aster cordifolius_ L.

_Aster dumosus_ L. UC
Frequent in shade of swamp forest and arbor vitae associations, F-9, and E-5 and 9.
Three specimens assigned to this species, #626, #643, and #1267, may be hybrids. They were collected during the last week of August and the first week of September, whereas all the others were collected in October.

_Aster laevis_ L. Smooth aster. UB
Occasional in bog meadow, F-9, and on stream bank, E-9. Flowers, late September and October.
Aster lateriflorus (L.) Britt. Kn
Common in bog meadow, secondary swamp forest, F-9, and even in open areas in arbor vitae association, but always in wet situations. Flowers, late August into October.

Aster tournefortii Porter. UC
Rare in bog meadow, D-8. Flowers, late September.

Aster novae-angliae L. New England aster. Kn

Aster pilosus Willd. Kn
Only one plant observed, on bank of West Branch, north of Woodburn Road. Reported by Kellerman as A. ericoides pilosus (Willd.) Porter. Flowers, early October.

Aster prenanthoides Muhl. Kn
In arbor vitae stands west of Cedar Run, D-7 and in bog meadow, D-8. Flowers, late September and early October.

Aster punicus L. Kn
Abundant in bog meadow areas, D-6, 7, and 8 and also in arbor vitae, E-7 and 9. Flowers, mid to late September.

Aster punicus L. var. laceifolius (Gray) Fern. UC
Occasional in the bog meadow, E-9 and D-8. This variety is not recognized by Speer, but it seems to be distinctive. Flowers, late September.

Aster simplex Willd. var. interior (Wig.) Cronq.

Aster simplex Willd. var. ramosissimus (T. & G.) Cronq. UC
Occasional in marl meadow, D-6 and E-6. Flowers, September and October.

Aster simplex Willd. var. simplex. Kv
Frequent in swamp forest and arbor vitae associations; D-5 and 8, F-7 and 10, and G-10. Flowers, September and October.

Aster umbellatus Mill. Kv
Frequent at edge of arbor vitae stands, E-9, D-9 and D-5, and in swamp forest, F-10. Flowers, September and early October.

Bidens aristosa (Michx.) Britt. Kv
In bog meadow, D-6 and E-9. Flowers, September.

Bidens cernua L.

Bidens connata Muhl. UC
Common. Aquatic in West Branch, P-7 and 9. Flowers, late August and early September.

Bidens coronata (L.) Britt. Kn
Occasional in marl meadow, D-4 and 7. Reported by Kellerman as B. trichosperma (Michx.) Britt. One specimen collected in E-9 is probably var. tenuiloba (Gray) Sherff. or an extreme ecotype of B. aristosa. Flowers, late September.

Bidens, laevis (L.) BSP. Kv
Only one specimen collected, in F-5 along West Branch, and this is not typical. The plant looks very similar to B. cernua, but the chaff is red-tipped, so the specimen is thus judged to be B. laevis, or a hybrid of that species. Flowers, mid-September.

Cacalia suaveolens L. Kn
Rare. In swamp forest zone, F-4. Flowers, October.

Cacalia tuberosa Nutt. Indian plantain. Kv
Common in the bog meadow regions, D-6 and 8, E-9. Flowers, July and August.

Cichorium intybus L. Chicory. UC
Frequent along roadsides. Flowers, July.

Cirsium muticatum Michx. Swamp thistle. Kn
Common in bog meadow and at margin of arbor vitae stands, D-6 and 7, and E-4. Flowers, August.

Cirsium vulgare (Savi.) Tenore. Bull thistle. Kn
In drier areas east side of Bog, D-7 and 8, along roadside, E-9, and at deciduous forest margin, J-12. Flowers, early September.

Coreopsis tripteris (L.) Raf. Kn
Common in the bog meadow regions, D-6 and 8, and E-9. Flowers, July and August.

Coreopsis tripteris L. UC
Common in marl and bog meadows, D-5 and 6, and E-5. Flowers, August.

Erechtites hieracifolia (L.) Raf. Kn
Rare in roadside ditch, F-8. Specimen collected is var. intermedia Fern. Flowers, late August.

Erigeron annuus (L.) Pers. Kn
Occasional on roadsides, D-7 and E-8, and at margins of deciduous forest in field, J-10. Flowers, July to early August.

Erigeron philadelphicus L. UB
Frequent along path beside West Branch. Flowers, May and June.

Erigeron strigosus Muhl. Daisy fleabane. Kn
Reported as E. ramosus (Walt.) BSP by Kellerman. Occasional along west path, F-7 and 8, and on east side in swamp forest, D-8. Flowers, July and August.

Eupatorium fistulosum Barrett. UC
Rare. East side of Bog, C-8. Flowers, late August.
**Eupatorium maculatum** L.  Spotted Joe-pye-weed  
Occasional in drier areas on far east side of Bog, D-7, and on roadside, F-8. Not previously collected from Cedar Bog, although reported by Hicks (undated). Flowers, late August.

**Eupatorium perfoliatum** L.  Common boneset.  Kn  
Occasional in bog meadow, D-7. Flowers, late August and early September.

**Eupatorium purpureum** L.  Joe-pye-weed.  Kn  
Occasional, in marl meadow, D-6. Flowers, early August.

**Eupatorium rugosum** Houtt.  White snakeroot.  Kn  
Abundant in swamp forest, D-7, E-9, and F-10 from north end of Bog south to Woodburn Road. Reported by Kellerman as *E. ageratoides* L. Flowers, September to early October.

**Galinsoga ciliata** (Raf.) Blake.  UC  
Along roadside, E-9.

**Helenium autumnale** L.  Sneezeweed  
Common in the bog meadow and marl meadow associations. Not recorded in Kellerman’s publications, although a specimen was collected by him in 1894. Flowers, late August and throughout September.

**Helianthus** spp.  
The majority of sunflower species listed here can be considered prairie species, introduced into the area during the Xerothermic period.

**Helianthus decapetalus** L.  UC  
Observed only once, in F-8.

**Helianthus giganteus** L.  Kv  
Common in bog meadow, D-5, 7, 8, and 9, and E-7, 8, and 9, as well as in swamp forest, F-10. Flowers, late August and early September.

**Helianthus grosseserratus** Martens.  UC  
Frequent in drier areas of swamp forest, E-4 and 9, and F-8. Flowers, July to September.

**Helianthus hirsutus** Raf.  UC  
Occasional in bog meadow, D-9, E-9, and F-11. Flowers, late August and early September.

**Helianthus maximiliani** Schrad.  

**Helianthus strumosus** L.  UC  
Observed only once, H-9.

**Heliopsis helianthoides** (L.) Sweet.  Oxeye.  Kn  
Common along the path paralleling the West Branch, F-6, 7, and 8. Flowers, July and August. Possibly a prairie species.

**Krigia biflora** (Walt.) Blake.  UC  

**Lactuca biennis** (Moench.) Fern.  UC  
Found only once in deciduous forest, western extension, H-10. Flowers, October.

**Lactuca canadensis** L. var. latifolia Ktze.  Wild lettuce.  Kv  
Occasional on roadsides. Werner’s specimen is annotated var. *longifolia* (Michx.) Farw. Flowers, mid-July to mid-August.

**Lactuca scariola** L.  Kv  
Found only once near east bridge on roadside, E-9. Flowers, mid-August.

**Liatris spicata** (L.) Wildl.  Blazing star.  Kv  
Common in bog meadow north of Woodburn Road, D-4 and 6, and E-4. Reported by Kellerman as *Lacinaria spicata* (L.) Kuntze. Flowers, mid-July through August. Relict prairie species (Braun, 1928).

**Polymnia condensata** L.  Clammy leafcup.  Kv  
Abundant throughout swamp forest. Begins flowering in late July and continues until first hard freeze, usually in late October.

**Prenanthes altissima** L.  
Occasional in arbor vitae stand, E-9, south of Woodburn Road. Unreported by Kellerman, although he collected a specimen in 1894, labeled *Nabalus altissimus* Hook. Flowers, mid-September.

**Prenanthes racemosa** Michx.  

**Rudbeckia hirta** L.  Black-eyed susan.  Kv  
(Including *R. serotina* Nutt.)  
Combination of these two as one species is based on an unpublished study of the rudbeckias in Ohio by Frederick in 1964. There are only small morphological differences among specimens collected in Ohio.

**Rudbeckia** spp.  
Common in the bog meadow, D-5 and 6, and F-11. Flowers from late June until near the end of August.  Prairie species (Slife et al., 1960).
Rudbeckia fulgida Ait. Kn
(Including R. speciosa Wend, and its varieties; R. tenax Boynt., & Bead.)
Occasional at margins of arbor vitae stands in D-7 and 8. Rudbeckia speciosa and R. tenax are included in R. fulgida, based on morphological similarity. One distinct variety is recognized below. Kellerman's specimen labeled Helianthus helianthoides has been properly identified as a Rudbeckia. Flowers, early August.

Rudbeckia fulgida Ait. var. umbrosa (Boynt., & Bead) Cronq. UC
The most common taxon of this species. In the marl and bog meadow associations, D-5 and 8, and E-6. Flowers, August.

Rudbeckia laciniata L. Kn
Common along the path beside West Branch, F-6, 7, 8, and 10, and also in D-7. Flowers mid- to late August. Prairie species (Sife et al., 1960).

Senecio aureus L. Golden ragwort. Kn
Abundant in swamp forest, E-8, and F-6, 7, and 8. Flowers, May to mid-June.

Senecio aureus X. ? UC
One specimen (#100) has no basal tuft of leaves at anthesis. Three-pinnate leaves, near base of stem; lobes distant, deeply serrate, not rounded as in S. aureus. Blooms mid-June. Could be an ecotype of S. aureus.

Silphium terebinthinaceum Jacq. Prairie dock. Kn
Abundant at margins of arbor vitae stands and bog meadow along Cedar Run, both north and south of Woodburn Road. Flowers, late July through August. Prairie species (Braun, 1928).

Solidago spp.
Despite the fact that there are many species of Solidago growing in the Cedar Bog area, no evidence of hybridization or intergradation exists between species.

Solidago altissima L. UC
Rare at edge of swamp forest, F-9. Flowers, October.

Solidago bicolor L. UC
One specimen collected at arbor vitae-swamp forest margin, F-9. Flowers, early October. Dr. T. R. Fisher noted that this specimen is not typical of the species (personal communication, 1960).

Solidago caesia L. Blue-stem goldenrod
Observed only one, F-9. Reported by Hicks (undated).

Solidago canadensis L. Common along margins of both the swamp forest and bog meadow, E-6 and 8, in somewhat drier areas. Flowers late August to mid-September.

Solidago erecta Pursh. UC
Common in the marl and bog meadow, D-6 and 7, and E-9. Flowers, mid-September to mid-October. May be a prairie species.

Solidago flexicaulis L.
Found only once near West Branch, F-5. Flowers, mid-October.

Solidago hispida Muhl. UC
Observed at only one location, in field, J-10 and 11.

Solidago nemoralis Ait.
Occasional along path beside West Branch, F-6 and 8. Flowers, mid-September to mid-October.

Solidago ohiensis Riddell. Ohio goldenrod. Kn
Abundant in bog meadow, E-5, 6, and 9; E-8 and 9; and F-11. Begins flowering in July and continues until killing freeze in October.

Solidago patula Muhl. Kv
Only one rather poor specimen collected, E-9, south bog meadow. Dr. Clara Weishaupt also collected a specimen from Cedar Bog October, 1960. Flowers, late August through September.

Solidago riddellii Frank. Kn
Common in bog meadows, D-8 and 9, and E-9. Flowers, mid-September until killing freeze.

Solidago rugosa Mill. var. rugosa. Kv
Common in bog meadow, E-9 and D-7. Flowers, late August and early September.

Solidago rugosa Mill. var. aspera (Ait.) Fern. UC
One specimen, #650, collected September 8, 1964, in marl meadow, D-5.

Solidago speciosa Nutt. UB
Collected only once in late September in E-8 among arbor vitae east of Cedar Run.

Solidago uliginosa Nutt. Bog goldenrod
Common in bog meadow, D-5 and 6, E-9, and F-9. Flowers, late August to late September.
Solidago ulmifolia
Muhl. UC
Common in bog meadows, D-6, 8, and 9. Flowers, late September to mid-October.

Sonchus asper (L.) Hill. Sow thistle
Common along road through Bog.

Taraxacum officinale Weber. Dandelion. Kn
On roadsides and occasional in bog meadow.

Tragopogon pratensis L. Goat's-beard
Found only once on roadside west of swamp forest.

Vernonia altissima Nutt. Ironweed. Kn
Most of the ironweeds in Cedar Bog are found on the east side, actually not on state-owned property, in C- and D-6, 7, and 8. A few are found in the open areas in H-7, F-11, and G-10. This species is by far the most common and is very colorful in late August and early September. Prairie species (Siife et al., 1960).

Vernonia fasciculata Michx. UC
Only one specimen out of a dozen ironweed inflorescences, collected (#882) on August 28, 1965, from the quadrats east of the Bog, was of this species, but it has relatively typical flowers.

In the collection mentioned above (#882) is one specimen that is an intermediate between the two species, suggesting an F₁ hybrid. Another specimen also suggests this hybrid, but seems somewhat more similar to V. altissima. These specimens may represent another example of introgressive hybridization.

CONVOLVULACEAE

Convolvulus septum L. var. septum L.
Common along roadsides in sunny areas. This is the most common variety in Cedar Bog.

Convolvulus septum L. var. fraterniflorus Mackenz. & Bush. UC
Occasional.

Convolvulus septum L. var. repens (L.) Gray.
On roadside near east bridge, E-9.

Cuscuta gronovii Willd. Dodder. Kv
Found once growing on Impatiens capensis Meerb. August.

Ipomoea purpurea (L.) Roth. UC
Along south side of Woodburn Road in swamp forest, F-9. Flowers, mid-August.

CORNACEAE

Cornus alternifolia L. Pagoda dogwood. Kv
The most common dogwood in the Bog. Along roadsides and in swamp forest; occasional along margin of bog meadow and in shrub communities. Flowers, late May. Probably a boreal species.

Cornus amomum Mill. Kn
A hybrid, C. amomum x obliqua, has been collected in Logan County. This specimen is not typical and may be a hybrid rather than true C. amomum. Specimen #88 collected in F-8.

Cornus X arnoldiana Rehd. (C. obliqua x racemosa)
First collected in Cedar Bog by McFarland in 1937 (specimen in The Ohio State University Herbarium). My collection from E-4 in swamp forest, near West Branch. Specimen #374.

Cornus drummondii Meyer. Roughleaf dogwood. Kv
Occasional, in hardwood forest, H-10 and I-11. Werner's specimen, collected in 1892, is labeled C. asperifolia Michx.

Cornus florida L. Flowering dogwood
One tree in F-12. Flowers, early May.

Cornus obliqua Raf. Silky dogwood. Kv
Common in swamp forest, especially along west path, and also beside West Branch south of the road. F-8 and 9. Kellerman's specimen, collected in 1893, was labeled C. amonum (sic), but this species is not listed in Kellerman's publications.

Cornus racemosa Lam. Gray dogwood
Occasional in swamp forest, E-7.

Cornus stolonifera Michx. Red-osier dogwood. Kn
Occasional in shrub communities south of road, E-9 and also in D-4 and F-5. Specimens are typical of this species with white pith and red branchlets. Flowers, June. Relict boreal species.

CORYLACEAE

Alnus rugosa (Du Roi) Spreng. Speckled alder. Kn
Common throughout the wet shrub communities, E-6 and 9 and F-10. Boreal species. One specimen, #804, appears to be var. americana (Regel) Fern.

Betula pumila L. Swamp or dwarf birch. Kv
Abundant throughout all parts of the bog meadow. Generally considered to be a northern bog shrub (Braun, 1961), with Cedar Bog the southernmost extension of the species. Known also under the names of B. glandulifera Butler and B. pumila L. var. glandulifera.
Carpinus caroliniana Walt. Ironwood, musclewood, blue beech
Abundant in all swamp forest areas as a subcanopy small tree.

Corylus americana Walt. Hazelnut. Kn
Abundant in wet portions of swamp forest north of Woodburn Road, E- and F-7 and 8. Occasional in E-6 and 9.

Ostrya virginiana (Mill.) K. Koch Hop hornbeam. UC
Noted only once. Relatively large tree, F-6, in oak-maple forest west of West Branch.

**CRUCIFERAE**

Alliaria officinalis Andr. Garlic mustard
Abundant in all swamp forest association areas. Common in hardwood forests. Flowers, early May.

Brassica haber (DC) L. C. Wheeler. UC
In F-8, on north side of Woodburn Road, near west edge of Cedar Bog.

Cardamine bulbosa (Schreb.) BSP. Spring cress
Common in all swamp forest areas; abundant in D-7, and E-6 and 8. Flowers, May.

Cardamine douglasii (Torr.) Britt. Purple bittercress
Frequent in hardwood forest, E-8, F-9, and G-10. Flowers, late April and early May.

Lepidium campestre (L.) R. Br. UB
On roadsides, E- and F-8 and 9.

Nasturtium officinale R. Br. Watercress. Kv
Abundant in all swamp forest areas. Common in hardwood forests. Flowers, early May.

Rorippa palustris (L.) Bess. var. farnaldiana. (Butt. & Able) Stuckey. UB
Observed one plant, growing with R. sylvestris, in H- and I-8.

Rorippa sylvestris (L.) Bess. UC
Observed only once, H- and I-8, in standing water.

**CUCURBITACEAE**

Echinocystis lobata (Michx.) T. & G. Wild balsam apple. Kn
One specimen, G-11. Reported as Micrampelis lobata (Michx.) Greene by Kellerman. Flowers, mid-August.

**CYPERACEAE**

Carex annaeaps Bickn. UC
Collected in fruit once along roadside, E-9. This area is usually mowed several times during the growing season. One collection indicates only that it was not seen in fruit at any other time. Plants are common.

Carex bromoides Schkuhr.
Frequent in open areas in swamp forest, E-4 and I-11. Not reported by Kellerman, but specimen collected by Werner, 1893.

Carex buxbaumii Wahlenb.
Frequent in marl and bog meadows, D-7 and E-5. Not reported by Kellerman, but Werner's specimen, 1893, is extant.

Carex cephalantha (Bailey) Bickn. UC
Collected once in E-5.

Carex cryptolepis Mackenz. UC
Observed only once, in E-8.

Carex flava Mackenzie var. flava
Frequent in marl meadow, D-6 and E-8. Not reported by Kellerman, but specimen exists, collected by Werner, 1893. Also a specimen at Urbana College, collected by W. S. Sullivant.

Carex flava Mackenzie var. fertilis Peck. UC
Common in marl meadows, D-5 and 6, and E-5.

Carex gracilima Schwein.
Occasional in bog meadow, E- and F-9. Not reported by Kellerman, but Werner's specimen, 1893, is extant. Boreal species.

Carex grayyi Carey. Kv
Collected once in deciduous forest, J-11. Reported as C. Asa-Grayi Bailey, by Kellerman; Werner specimen, 1893, also labeled C. Asa-Grayi.

Carex hyalinolepis Steud.
Collected once on north side of Woodburn Road, in arbor vitae stand, E-8. May be more common, but fruiting specimens were unavailable as a result of roadside mowing. Unreported by Kellerman, probably because Werner's specimen of this species was originally labeled C. lacustris.

Carex interior Bailey. UC
Occasional in bog and marl meadows, D-6 and E-9.

Carex lacustris Willd. UC
Collected once in bog meadow, D-7. Reported by Kellerman, but specimen identified as C. hyalinolepis; thus this species unreported from Champaign County.

Carex lanuginosa Michx. UB
Occasional, marl meadow, E-5.
Carex laxiflora Lam.  UC
  Observed once in marl meadow, D-6.  Relict boreal species.

Carex lurida Wahlenb.  UC
  Observed once, D-6.

Carex pensylvanica Lam.
  Occasionally in arbor vitae association, D-6 and 7, and E-9.

Carex radiata (Wahlenb.) Dew.  UC
  Observed once in the bog meadow, E-9, but specimen is young and identification is not certain.

Carex rosea Schkuhr.  UC
  Observed once in hardwood forest, J-10.

Carex seabrata Schwein.  UC
  Frequent in bog and marl meadow, D-6 and E-9.

Carex sterilis Willd.  Kv
  Occasional, in marl meadow, D-6.  Reported by Kellerman as C. sterilis excelsior Bailey.

Carex stipata Muhl.  UB
  Frequent in bog and marl meadows, E-4 and 5, and F-8.

Cladium mariscoides (Muhl.) Torry.  Kv
  Common in marl meadow, D-5, 6, 7, and 8.  Specimen also present at Urbana College, collected by William S. Sullivant, no date.

Cyperus striigosus L.
  Common in marl meadow, D-5 and 8.

Eleocharis erythropoda Steud.  (E. calva Torr.)
  Frequent in marl meadow, D-8.

  There is some question about the identification of this specimen, #97, from E-4.

Eleocharis pauciflora (Light.) Link
  Abundant in pools in marl meadow, D-6.  A boreal species (Brann, 1967).

Eleocharis rostellata Torr.
  Abundant in marl meadow, E-3, 6, and 8, H-9.  Forms solid mats and apparently reproduces primarily by rooting of the tips of the vegetative culms (La Rue, 1935). Not reported by Kellerman, but Werner specimen, 1892, labeled E. palustris, has been determined to be E. rostellata.

Eriophorum viridi-carinatum (Engelm.) Fern.
  Cotton sedge
  Occasional in bog meadow, D-6.  Relict boreal species.

Rhynchospora alba (L.) Vahl.  Kv
  Abundant in bog meadow, D-6 and E-9.  Specimen at Urbana College may have been collected by Milo G. Williams, no date.  Boreal species.

Rhynchospora capillacea Torr.  Kv
  Common in wet marl seepage areas, E-6, 7, and 8, and E-9.  Boreal species.

Scirpus acutus Muhl.  UC
  Hard-stem bulrush
  Observed only once in the marl meadow, D-6.

Scirpus americanus Pers.
  Frequent in bog meadow, D-6 and 8, and E-4.

Scirpus atrovirens Willd.  UB
  Great river bulrush
  Common in D-7, E-8 and 9, and F-8 and 9.

Scirpus fluviatilis (Torr.) Gray.  UB
  Observed once in D-8.

Scirpus validus Vahl.  Great bulrush
  Frequent in bog meadows, D-6 and 8, and E-9.

Scleria verticillata Muhl.  Kv
  Occasional in marl meadow, D-6.

DIOSCOREACEAE

Dioscorea villosa L.  Wild yam.
  Abundant in swamp forest association.

DROSERACEAE

Drosera rotundifolia L.  Round-leaf sundew.
  Abundant on hummocks in marl meadow, D-4, 5, 6, and 7.  One colony in arbor vitae stand, E-9.  Relict boreal species.

EQUISETACEAE

Equisetum arvense L.  Field horsetail.
  Common in arbor vitae stands.

Equisetum hyemale L. var. intermedium A. A. Eat.  UC
  One observed in bog meadow, E-9.
No. 2 VASCULAR FLORA OF CEDAR BOG, OHIO

ERICACEAE

Gaultheria procumbens L. Wintergreen

Gaylussacia baccata (Want.) K. Koch. Black huckleberry
Frequent in arbor vitae stands, D-4 and 6, and occasional in E-9. Not reported by Kellerman, but specimen collected by B. Jane Spence from Cedar Bog in 1879 is labeled G. resinosa T. & G. Two specimens at Urbana College are labeled Vaccinium dumosum Curt.-Cand. (sic).

EUPHORBIACEAE

Euphorbia serpyllifolia Pers. UC
Observed only once in open field, north of Woodburn Road, H-8.

Euphorbia vermiculata Raf. UC
Along roadside in sunny dry areas. Occasional.

FAGACEAE

Fagus grandifolia Ehrh. American beech. Kn
Several very large trees in I- and J-10 and 11. The largest measures 33 1/4 inches DBH, and must be well over 250—possibly as much as 400—years old (Fowells, 1965). Reported by Kellerman as F. atropunicea (Marsh.) Sudw.

Quercus spp.
The oaks in Cedar Bog are difficult to identify. The majority of the trees are variants that have characteristics of several different species.

Recalling the history of the area, particularly that of the oak-maple segregate (Frederick, 1967), it is not surprising that hybrids are found here—not only among the oaks, but other taxa as well. Stebbins (1950) pointed out that hybrids are most common in changing environments, in “disturbed” areas. Because of manmade environmental changes, hybrids should be expected in some areas of Cedar Bog.

Quercus bicolor Willd. Swamp white oak. Kn
Common in swamp forest, oak-hickory, and oak-maple segregates, in F-6, 7, and 8, and in the entire western extension. The most common oak in the Bog; 16 specimens collected were determined to be this species, although not every one was “typical.”

Quercus bicolor X muhlenbergii. UC
Two specimens appear to be Q. bicolor hybrids.

Specimen #1399. A young tree ca. 20-25 feet high on west bank of West Branch, F-5. No acorns, probably because tree is too young. Leaves resemble Q. bicolor in overall appearance. Stellate hairs on the undersides of leaves, but definitely not densely pubescent. Terminal winter buds acute, not rounded as in Q. bicolor.

Specimen #1401, collected in the same general area, F-5, is probably also this hybrid. Overall, it appears to be Q. bicolor X imbricaria, but because a hybrid between different subgenera is unlikely, I have judged it to be the same as #1399. Leaf margins commonly undulate, not lobed; stellate hairs below, but not densely pubescent. Both stellate and adpressed hairs along the leaf margin visible on upper surface of the leaf. One-year-old twigs gray-brown rather than the reddish-brown characteristic of Q. bicolor.

Quercus borealis var. maxima (Marsh) Ashe. Red oak. Kn
(Q. rubra L. of many authors)
Only one tree (actually, four trunks) is unquestionably red oak. The separate boles arise from one large trunk approximately two feet above the soil surface, and measure from 10 to 18 inches DBH each. In F-6.

Quercus borealis var. maxima X shumardii. UC
This hybrid may be represented by two trees, one in F-11 (northeast corner of quadrat), from which were taken two collections (#1508 and #1032), and a second tree in I-11, which yielded a single collection (#1389). The first tree has acorns like Q. borealis, but winter buds like Q. shumardii, and heavy tufts of hair at vein axes on undersides of leaves. The second has winter buds and acorns similar to Q. shumardii, but lacks the heavy tufts of hair at vein axes. Petioles are red.

Quercus borealis var. maxima X velutina. UC
One specimen, #1421, from G-10, appears to be this hybrid.

Quercus imbricaria Michx. f. var. maxima (Marsh) Ashe. Red oak. Kn

Quercus macrocarpa Michx. Bur oak. UB
One relatively large tree on west bank of West Branch, F-4, and few small ones east of stream, F-4 and 5.

Quercus macrocarpa Michx. Bur oak. Kn
Identification of this tree (two specimens, #1445 and 1507) is based on the acorns, about which there should be no question; these acorns are certainly like bur oak acorns. The bark characteristics and growth habit are those of Q. bicolor (O. A. Alderman, personal communication); so it may be hybrid of Q. macrocarpa and not the species.

Quercus micahausii Nutt. (or in Q. micahausii-Q. montana Willd. complex). Swamp chestnut oak. UC
Four specimens (#324, #1119, #1269, and #1396) belong in this group, no representatives of which have heretofore been reported from Champaign County. Each is from a different area in Cedar Bog. I believe that these are all representatives of Quercus prinus L. of many authors. Specimens #1396 (F-3) and #1119 key directly to Quercus michauxii; #1269 (F-7) key to Quercus montana in Braun's (1961) key. No acorns were found with any of these specimens, so it is possible that these are all extreme variants of the hybrid Quercus bicolor and Quercus muehlenbergii.

Quercus muehlenbergii Engel. Chinquapin or yellow oak. Kn

Frequent west of West Branch in F-8, 4, 7, and 8, and south of Woodburn Road in F-10, 1-10 and 11, and J-11. There are 11 specimens which seem to be Quercus muehlenbergii, although not all are "typical."

Quercus palustris Muenchh. Pin oak

Only one specimen, #1400, collected in F-5, seems to be this species.

Quercus palustris X borealis var. maxima. UC

One large tree, in F-8, just north of Woodburn Road apparently represents this hybrid. The growth habit is characteristic of pin oak; twigs are greenish black; winter buds are similar to Quercus palustris, but acorns, leaves, and bark are more like Quercus borealis var. maxima.

Quercus shumardii Buckl. Shumard red oak. UC

Specimens from three trees are most nearly like this species. All are mature trees; all are so similar as to be almost indistinguishable. Acorns have been collected from each tree, so it seems improbable that these are hybrid oaks. The largest tree, 40 inches DBH, is in J-11; another measuring 32 inches DBH in I-12; the third is in G-10. The first two are interpreted to be 100 to 125 years old (Powells, 1965).

Species originating in the southeast and gulf coastal plain, and in the Mississippi embayment (Powells, 1965).

Quercus stellata Wang. Post oak

This species has been reported from Cedar Bog (Hicks, undated), but no specimens from Champaign County have been recorded (Braun, 1961). Specimen #1009 most nearly resembles this species and was collected in J-10, the oak-hickory segregate of the deciduous forest (Frederick, 1967). Acorns have been collected from each tree, so it seems improbable that these are hybrid oaks. The largest tree, 40 inches DBH, is in J-11; another measuring 32 inches DBH in I-12; the third is in G-10. The first two are interpreted to be 100 to 125 years old (Powells, 1965).

Species originating in the southeast and gulf coastal plain, and in the Mississippi embayment (Frederick, 1967).

Quercus velutina, Lam. is not being reported here. Although several specimens looked like black oak, none showed the characteristic orange inner bark. Therefore, all must be hybrids.

GENTIANACEAE

Gentiana andrewsii Griseb. Bottle gentian. Kv

Occasional on the banks of West Branch, F-8 and 9. Flowers, late September and early October.

Gentiana crinita Froel. Fringed gentian. Kv

Abundant in the bog meadow, D-5 and 6. Frequent south of Woodburn Road, E-9. Flowers, late September into November.

GERANIACEAE

Geranium maculatum L. Wild geranium. UC

Common along west path and in swamp forest association. Flowers, late April and May.

GRAMINEAE

Several grass specimens in The Ohio State University Herbarium were collected by Kellerman and Werner in the early 1890's, but were not reported by Kellerman in his publications.

Agrostis alba L. Kn

Occasional in drier section of D-8.

Andropogon gerardii Vitman. Giant blue-stem. Kv

Frequent in bog meadow, D-4, and E-9 and 4. Also one colony in opening in arbor vitae stand, F-10. Considered by Tolstead (1942) to be a mesophytic prairie species.

Andropogon scoparius Michx. Little blue stem. Kv

Occasional in bog meadow, D-4. With western dune grasses (Tolstead, 1942).

Bromus ciliatus L.

Only one specimen, #495, is of this species, collected in D-8. Not reported by Kellerman, but Werner's specimen collected in 1893.
Bromus latiglumis (Shear.) Hitchc. UC
Common along west path, F-3, 4, 6, and 7.

Calamagrostis canadensis (Michx.) Nutt. UB
Occasional in D-8. Probably a boreal species.

Cinna arundinacea L. Wood reed-grass
Common along west path, F-5, 6, and 8; and in open areas of arbor vitae stands, E-8 and 9, and F-10. Not reported by Kellerman, but his specimen was collected in Cedar Bog in 1894.

Dactylis glomerata L. Orchard grass. UB
Along roadside and in secondary maple zone, F-9.

Deschampsia caespitosa (L.) Breauv. Kv
Frequent in marl and bog meadows, usually on the banks of Cedar Run. In D-6 and 7, and E-9. Specimen at Urbana College and labeled Aira caespitosa L. was collected by W. S. Sullivant in “Cedar Swamp near Springfield.” Relict boreal species.

Elymus riparius Wieg.
Frequent along Woodburn Road, F-8 and 9. Specimen labeled E. canadensis L. collected by Kellerman, 1894, but not in his published lists.

Glyceria striata (Lam.) Hitchc. Fowl meadow grass. Kn
Frequent in bog meadow zones, E-3 and 9, and also along west path, F-7 and 8. Reported by Kellerman as Panicularia nervata (Willd.) Kuntze.

Hystrix patula Moench. Bottlebrush grass. UB
Common along west path, F-6, 7, and 8.

Leersia virginica Willd. Cutgrass. Kn
Occasional along Cedar Run in openings in arbor vitae stand, F-10. Reported by Kellerman as Homalocenchrus virginicus (Willd.) Britt.

Muhlenbergia glomerata (Willd.) Trin. Kv
Common in bog meadow, D-8, and E-8 and 9. Reported by Kellerman as M. racemosa (Michx.) BSP.

Muhlenbergia mexicana (L.) Trin. Kv
Occasional in bog meadow, D-8.

Muhlenbergia sylvatica Torr. Dropseed. Kv
Occasional along west path, F-4 and 6.

Panicum clandestinum L. UC
Observed once, in F-8.

Panicum flexile (Gatt.) Scribn.
Occasional in marl meadow, D-6. Not reported by Kellerman but a specimen collected by him in 1894.

Panicum lanuginosum Ell. UC

Panicum latifolium L. Kv
Common in bog meadow, D-6 and 8, and E-9. Reported by Kellerman, his specimen labeled P. macrocarpon Le Conte.

Phragmites communis Trin.
One large stand in bog meadow, E-3.

Poa palustris L. UC
Occasional in swamp forest, E-6.

Poa sylvestris Gray. UC
Occasional in swamp forest, G-11.

Setaria viridis (L.) Beauv. Green foxtail grass
Occasional along roadsides, D-8 and E-9.

Sorghastrum nutans (L.) Nash. Indian grass
Abundant in bog meadow, E-9 and D-6. This may be the species Kellerman reported as Andropogon nutans avenaceus (Michx.) Hack. There is no specimen to check. Considered a mesophytic grass by Tolstead (1942).

Sporobolus heterolepis Gray. Northern dropseed. Kv
Occasional, growing in Cedar Run, E-9, although Fernald (1950) gives distribution as “dry trap, limestone or serpentine . . . rocks and prairies.”

GUTTIFERAЕ

Hypericum boreale (Britt.) Bickn. UC
One location in swamp forest association and shrub communities, D-8. Flowers, early September.

Hypericum nudiflorum Michx. UC
Previously unreported in Ohio and identification not yet verified. Found growing in Cedar Run, F-11. A coastal plain species.

Hypericum punctatum L. Kn
Common along west path, F-7 and 8. This may be the species reported by Kellerman as H. maculatum Walt. but there is no specimen. Flowers, late July into September.
Hypericum spathulatum (Spach.) Steud. Shrubby St. John's wort. Kv
Common in roadside ditches and along Cedar Run. Werner's specimen is this species, although labeled H. perforatum L. Flowers, late July and early August.

HIPPOCASTANACEAE

Aesculus glabra L. Ohio buckeye. UB
Many small trees, J-10 and 11, and I-11. Largest tree observed was only 7½ inches DBH.

HYDROPHYLLACEAE

Hydrophyllum appendiculatum Michx. Waterleaf. UC
Large colony in H-10. Flowers, late May.

IRIDACEAE

Iris virginica L. Blue flag. Kn
Present in two locations, by pool in swamp forest, E-7, and along West Branch, F-6. Kellerman reported I. versicolor L., but his plant was probably I. virginica.

JUNCACEAE

Juncus acuminatus Michx.
Occasional in marl meadow, D-6 and F-9. Not reported by Kellerman, despite Werner's specimen, collected in 1893.

Juncus balticus Willd.
Frequent in marl meadow, D-6 and E-9.

Juncus brachycephalus (Engelm.) Buchenau. Kv
Frequent, growing in Cedar Run, E-9, and in marl meadow, D-6 and 7.

Juncus breviligulatus (Engelm.) Fern. UC
Frequent in Cedar Run, E-8, in marl meadow, D-7 and 4, and E-4. Previously unreported in Ohio (Braun, 1967). Relict boreal species.

Juncus dudleyi Wieg. UB
Observed once, in marl meadow, D-5.

Juncus effusus L. var. decipiens Buchenau. UC
Growing in Cedar Run, D-6.

Juncus nodosus L. UB
Abundant two locations, growing in Cedar Run, D-6 and E-8.

JUNCAGINACEAE

Triglochin maritimum L. Kn
(T. maritima of most authors) Abundant. An aspect dominant in the marl meadow, D-5 and 6, in late April. Reported by Kellerman, but his specimen, 1894, is labeled T. palustris L.

Triglochin palustre L. UB
(T. palustris of most authors)
Frequent, growing in Cedar Run, D-4 and 6, and E-8 and 9.

JUGLANDACEAE

Carya glabra (Mill.) Sweet. Pignut hickory. UC
One specimen from G-11.

Carya ovalis (Want.) Sarg. Sweet pignut. UC
Two specimens from I-11 and J-10.

Carya ovata (Mill.) K. Koch. Shagbark hickory. Kn
Occasional in F-6, one tree in I-11 measures 25½ inches DBH and is probably ca. 80 years old (Fowells, 1965).

Carya tomentosa Nutt. Mockernut hickory. UC
One specimen from G-10.

Juglans cinerea L. Butternut. Kn
Common in E-6 and 8, where one large tree is 24 inches DBH; many seedlings in F-4 and 5.

Juglans nigra L. Black walnut. UC
Occasional in Cedar Bog. One tree ca. 7 inches DBH and few seedlings in F-6. Large tree on roadside just east of the state-owned property. This species is previously unreported from Champaign County, but surely just overlooked, for it is common throughout the county.

LABIATAE

Blephilia hirsuta (Pursh.) Benth. Kn
Locally abundant in H-11, and I-10 and 11. This may be the species Kellerman reported as B. ciliata (L.) Raf.

Glechoma hederacea L. Kn
Frequent in arbor vitae stands and swamp forest, F-9 and J-11.

Lamium purpureum L. UC
Common in hardwood forest.
Lycopus americanus Muhl. Kn
Collected only once, along the path paralleling West Branch, F-4. Flowers, late July.

Lycopus rubellus Moench. UC
Frequent in swamp forest, F-7 and 8, and D-7 and 8. Flowers, late August and early September.

Lycopus uniflorus Michx.
Occasional in arbor vitae zones, D-7 and F-9. Werner's specimen, 1892, labeled L. virginicus L., is probably this species. Flowers, mid- to late August.

Mentha arvensis L.
Observed once in E-8, in early August.

Mentha cardiana Baker. UC

Mentha piperita L.
Observed once in D-8 in open bog meadow. Flowers, early August.

Monarda fistulosa L. var. mollis L. Wild bergamot. UB
Occasional, bog meadow, D-8. Also along Cedar Run, south toward Mad River. Flowers, early August.

Nepeta cataria L. Catnip. Kn
Observed once in bog meadow, D-8. Flowers, late August.

Physostegia virginiana (L.) Benth. False dragonhead, obedience plant. Kn
One large colony at the edge of bog meadow, E-4. Flowers, mid-August.

Prunella vulgaris L.
Abundant throughout arbor vitae and swamp forest associations. Pycnanthemum virginianum (L.) Durand and Jackson. Mountain mint.
Frequent in bog meadow, E-9. Unreported by Kellerman, but his specimen, 1894, and Werner's, 1893, are extant. Both are labeled Koellia virginiana (L.) McM. Flowers, August and early September.

Scutellaria epilobiifolia A. Hamilton. UC
Frequent in bog meadow, D-6 and 8. Flowers, July to early August.

Scutellaria lateriflora L. Mad-dog skullcap. Kn
Frequent in swamp forest, D-7, E-4, and F-6 and 11. Flowers, August.

Stachys tenuifolia Willd. Kv

Teucrium canadense L. American germander. Kn
Common in hardwood forest, I-10 and J-11. Flowers, July.

LAURACEAE

Lindera benzoin (L.) Blume. Spicebush. Kv
Abundant in swamp forest association and shrub communities. One specimen collected by Spence, 1870. Flowers, April.

LEGUMINOSAE

Amphicarpa bracteata (L.) Fern. var. bracteata. Hog peanut
Common in swamp forest and along west path, F-6, 7, and 8, and E-7 and 8. Flowers, August.

Amphicarpa bracteata (L.) Fern. var. comosa (L.) Fern. Hog peanut. Kv

Apios americana Medic. Groundnut. Kn
Abundant in swamp forest north of Woodburn Road.

Cercis canadensis L. Redbud. Kn
Occasional in swamp forest, F-6.

Desmodium canadense (L.) DC. Kn

Desmodium paniculatum (L.) DC. UB
Frequent along west path, E-4, 6, and 8. Flowers, August.

Gleditsia triacanthos L. Honeylocust
One tree is hardwood forest association, J-11.

Lathyrus palustris L.
Occasional in shrub communities, F-10 and D-8.

Medicago lupulina L. Hop, black medic. UB
Occasional on roadside, E-8. Flowers, late August.

Melilotus alba Desr. White sweet clover. UB

Robinia pseudo-acacia L. Black locust. Kn
Occasional in swamp forest, E-6.

Phaseolus coccineus L. UC

LEMNACEAE

Lemna minor L. Two locations in West Branch, F-4 and 6.

LENTIBULARIACEAE

Utricularia cornuta Michx. Bladderwort. Kv Frequent in marl meadow, D-6. Werner's specimen, 1893, labeled U. intermedia Hayne, has been determined to be U. cornuta. Flowers, June to early August.

Utricularia intermedia Hayne. Kn Occasional in marl meadow, D-6 and 6. Kellerman reported this species, but his voucher specimen is determined to be U. cornuta. Flowers, May to mid-October.

Utricularia minor L. Rare in marl meadow, D-6. Flowers collected in early May and late July.

Utricularia vulgaris L. UB Collected once in marl meadow, D-6. Flowers, mid-May. Collected by Hicks (undated) at County Line Bog, 1933.

LILIACEAE

Allium cernuum Roth. Nodding wild onion Abundant in all bog meadow areas and in open areas of arbor vitae stands, D-7 and 8, and E-9. Unreported by Kellerman, but a specimen collected by Werner in 1893 is extant. Flowers, July and August.

Allium tricoccum Ait. Wild leek Abundant in swamp forest, F-6 and 7, and E-8; occasional in deciduous forest, I-10. Flowers, mid-June to early July.


Lilium michiganense Farw. Michigan lily Frequent in swamp forest and along West Branch north of Woodburn Road, F-6, 7, and 8. Flowers, early July.

Maianthemum camadense Desf. False lily-of-the-valley, Canada mayflower Abundant in arbor vitae stands, D-7 and 8, and E-7, 8, and 9. Two specimens at Urbana College. Flowers, May. Relict boreal species.

Polygonatum commutatum (Schultes f.) A. Dietr. Large solomon's seal Observed only one, in F-4. Reported by Hicks, (undated), but no specimen available.

Polygonatum pubescens (Willd.) Pursh. Solomon's seal. Kn Frequent in swamp forest, F-6. Reported by Kellerman as P. biflorum (Walt.) Ell. Flowers, June.


Smilax rotundifolia L. Occasional in deciduous forest, J-11. Identification based on leaf shape and erose irregularly thickened leaf margins. Not seen in flower or fruit.

Smilax tamnoides L. var. hispida (Muhl.) Fern. Cat's-brier. Kv Frequent along west path, F-6, 7, and 8, and in swamp forest, E- and F-9. Kellerman's specimen labeled S. hispida Muhl.


Trillium flexipes Raf. Nodding trillium. Kn Abundant in all swamp forest zones. No specimen reported by Kellerman from Cedar Bog, unless possibly this is the specimen he labelled T. erectum L. Flowers, late April and early May.

Trillium grandiflorum (Michx.) Salisb. Large-flowered trillium. Kn Abundant in arbor vitae and swamp forest associations. Flowers, May.

Trillium sessile L. Toad trillium Frequent in deciduous forest area, I- and J-11.

Uvularia grandiflora Sm. Giant bellwort. UB Common in swamp forest, F-7 and 8. Flowers, late April and May.

LYCOPODIACEAE

Lycopodium lucidulum Michx. Shining clubmoss
Occasional in arbor vitae stands, F-7, 11, and 12. Unreported by Kellerman, but specimen of this species was collected by W. J. Biddlecombe in 1875. Boreal species.

LYTHRACEAE

Lythrum dacotanum Nieuw. Loosestrife. Kn
(L. alatum Pursh. of most authors)
Occasional in bog meadow, D-6. Flowers, late August.
Lythrum hyssopifolia L. Gayfeather. UC
Occasional, in D-7. petals are longer than expected but sepals are shorter than appendages. One specimen at Urbana College. Flowers, late July.

MAGNOLIACEAE

Liriodendron tulipifera L. Tuliptree. Kn
Dominant in tuliptree zones and common in other swamp forest areas.

MENISPERMACEAE

Menispermum canadense L. Moosseed. Kn
Occasional in swamp forest, F-6 and 8.

MORACEAE

Morus alba L. White mulberry. UB
Rare, in deciduous forest, G-12.

OLEACEAE

Fraxinus americana L. var. americana. White ash Kn
Common in swamp forest, F-7 and 10, and H-11.
Fraxinus americana L. var. biltmoreana (Beadle) J. Wright. UB
Observed once, F-9.
Fraxinus nigra Marsh. Black ash
Most abundant ash in Bog, in swamp forest, E-8, F-1 through 8, and G- and H-10 and 11.
Fraxinus pennsylvanica Marsh var. pennsylvanica. Red ash. UC
Observed and collected once in F-9.
Fraxinus pennsylvanica Marsh. var. subintegerrima (Vahl) Fern. Green ash. UB
The second most common ash in the Bog, found in swamp forest, E-1, 5, and 7; F-7, 9, and 11; and G-10.

ONAGRACEAE

Circaea quadrisulcata (Maxim.) French & Sav. Enchanter's nightshade. Kn
Common in swamp forest, E-6, F-7, and G-11.
Epilobium coloratum Biehler. Ky
Occasional in bog meadow, D-6 and 8. Flowers, mid-August.
Epilobium glandulosum Lehmn. var. adenocaulon (Haussk.) Fern.
Rare, on margin of West Branch, F-7. Flowers, late August. Probably a relict boreal species.
Epilobium leptophyllum Raf.
One collection from bog meadow, D-6. Flowers, late August.
Oenothera biennis L. Evening primrose. Kn
Occasional along roadside and in bog meadow, D-8 and E-9. Flowers, August and September.

OPHIOGLOSSACEAE

Botrychium multifidum J. G. Gmel. UC
In deciduous forest, J-11. Collected and observed only once.
Botrychium virginianum (L.) Sw.
Frequent in swamp forest, F-3, 6, and 10.

ORCHIDACEAE

Aplectrum hyemale (Muhl.) Torr. Puttyroot. UB
One colony, in deciduous forest, J-11. Flowers, June.
Calopogon pulchellus (Salisb.) R. Br. Grass-pink orchid
Common in marl and bog meadows, D-6 and 7, and E-9. Flowers, mid-June and July.
Cypripedium calceolus L. var. parviflorus (Salisb.) Fern. Small yellow ladyslipper. Ky
Rare at margin of bog meadow and arbor vitae, D-7 and E-8. Wiers' specimen, 1894, labeled C. kirsutum Mill. One specimen at Urbana College collected by M. G. Williams. Flowers, late May and June. Boreal species.
Cypripedium reginae Walt. Showy ladyslipper. Kv
Frequent in arbor vitae and bog meadow zones, D-6 and 7, and E-5. Flowers, mid- to late June. Boreal species.
Goodyera pubescens (Willd.) R. Br. Rattlesnake plainain
Rare in two locations in E-9. Flowers, late July. *G. tesselata* Lodd. may also be in this
quadrat. One plant planted by Carl Horst (C. Horst, personal communication, 1966), but it
has never been observed in flower.
Habenaria clavellata (Michx.) Spreng. Green wood orchis. Kv
Common in drier parts of arbor vitae stands, D-7, and E-8 and 9. Flowers, mid-July to
early August.
Habenaria psycodes (L.) Spreng. Small purple fringed orchid
Liparis loeselii (L.) Richards. Bog twayblade
Two colonies in arbor vitae stands, E- and F-9. Kellerman did not report this species,
but Werner's specimen, 1893, is labeled *Leptorchis loeselii* (L.) MacM.
Spiranthes ovalis Lindl. Small flowered ladies'-tresses. UC
Frequent in swamp forest, E-8 and 9. Flowers, September and October. Southern in
range (Braun, 1967).

**OSMUNDACEAE**

Osmunda cinnamomea L. Cinnamon fern. Kv
Common, in F- and G-11 and 12. Three specimens from Cedar Swamp in The Ohio State
University Herbarium: Spence, 1877; Biddlecombe, 1878; and Werner, 1893.

Osmunda regalis L. Royal fern
One small group of plants in arbor vitae, E-9.

**OXALIDACEAE**

Oxalis europaea Jord. UC
Observed once, in F-7.

Sanguinaria canadenis L. Bloodroot
Swamp forest, D-7.

**PHYRMACEAE**

Phryma leptostachya L. Lopseed
Common in swamp forest, E-9, F-8 and 9, and J-11.

**PHYTOLACCACEAE**

Phytolacca americana L. Pokeweed. Kn
Occasional in hardwood forest, H-11. Reported by Kellerman as *P. decandra* L.

**PINACEAE**

Thuja occidentalis L. Arbor vitae. Kv
Dominant coniferous evergreen in Cedar Bog. Relict boreal species.

**PLANTAGINACEAE**

Plantago lanceolata L. English plantain. UC
Occasional along roadsides, E-9.

Plantago rugelii Dene. Rugel's plantain. Kv
Occasional in bog meadow, D-6.

**PLATANACEAE**

Platanus occidentalis L. Sycamore. Kn
Common throughout all swamp forest. Largest tree, 44 inches DBH.

**POLEMONIACEAE**

Phlox divaricata L. Blue phlox
Frequent in the hardwood forest, I-11. Flowers, late April and May.

Phlox maculata L. Wild sweet william. Kv
Common in bog meadow and along West Branch, D-6, 7, and 8; E-9; and F-8. Flowers,
mid-June to mid-July.

Phlox paniculata L. Fall phlox. UC
Occasional, E-10 and F-7. Flowers, late August and early September.

**POLYGONACEAE**

Polygonum hydropiperoides Michx. Kn
Occasional in swamp forest, D-6 and F-7.

Polygonum orientale L. Prince's feather. Kn
Occasional in arbor vitae stand, E-8.

Polygonum pensylvanicum L. Kn
Occasional in arbor vitae stand, D-7.
Polygonum persicaria L. Kn
Rare. One collection in deciduous forest, J—11.

Polygonum punctatum L. Dotted smartweed. Kv
Common in arbor vitae stand and along west path, D-7 and 8, and F-6.

Polygonum scandens L. UC
Occasional on fence, in D-8, and in hardwood forest, G-10 and J-10.

Rumex crispus L. Curled dock. Kn
In shallow water, H- and I-8.

Rumex orbiculatus Gray. Great water dock. UB
Observed only once, in E-9.

Rumex verticillatus L. Swamp dock. UB
Occasional, in roadside ditches, D-8 and E-9.

Tovara virginiana (L.) Raf. Virginia knotweed. Kn
Common in swamp forest, D-8, E-6, and F-8. Reported by Kellerman as Polygonum virginianum L.

POLYPODIACEAE

Adiantum pedatum L. Maidenhair fern. Kn
Frequent in swamp forest, E-7, 8, and 9.

Asplenium platyneuron Oakes. Ebony spleenwort, UC
Occasional in arbor vitae stand, D-7, and in swamp forest, F-10 and G-11. Specimen collected by M. G. Williams at Urbana College.

Athyrium pycnocarpon Tidestrom. Glade fern
One colony in swamp forest, E-7. Fronds frequently 4 feet tall.

Athyrium thelypteroides Desv. Silvery glade fern. Kn
Abundant in swamp forest, F- and G-11 and 12.

Camptosorus rhizophyllus (L.) Link. Walking fern. Kv
One small colony on a fallen arbor vitae log lying across Cedar Run, D-7, and another on base of tree in G-12. Specimens collected by Spence in 1878 and 1886 and by Werner in 1892.

Cystopteris spp.
This is the most abundant fern in Cedar Bog, found throughout the arbor vitae association and in some areas of the swamp forest. There is great variation among the plants in the Bog. Identification of species and hybrids follows Blasdell (1963).

Cystopteris bulbifera (L.) Bernh. Bulblet fern. Kv

Typically, this species has long slender tapered fronds. Stipe only 1/2 to 3/4 or less the length of blade. Rachis and rachillae not winged. Indusia usually truncate. Unicellular and multicellular, glandular hairs throughout. Veins end in the sinuses of the margin.

Cystopteris bulbifera Hybrids
Seven specimens collected during this study are, I believe, hybrids of C. bulbifera with C. fragilis (L.) Bernh. Although I have not collected specimens of C. fragilis in Cedar Bog, it is found in many wooded areas elsewhere in Champaign County. Almost without exception, the putative hybrids bear bulblets, but morphological characters are different, as noted below.

Cystopteris x laurentiana (Weath.) Blasdell (C. bulbifera × C. fragilis). UC
Specimens #1244 and #1121-B. Overall appearance of C. fragilis; tripinnate, pinnae close, most overlapping, especially at base of blade. Indusia with scattered glands and lacerate apex. Bulblets borne on rachis and rachillae. Some specimens glabrous throughout.

Cystopteris x tennesseensis Shaver. UC
Specimens #1121-A and 1160. Blade deltoid in overall appearance. Stipe half or more the length of the blade. Mostly bipinnate with only few lower pinnae thrice cut. Veins ending in sinuses, rarely in teeth. Bulblets on rachis and rachillae; sometimes covered with hairs.

Cystopteris x ?
Three specimens do not fit Blasdell’s descriptions of hybrids. They are #406-A, 482-A, and 1121-C. Not typical C. bulbifera, although most bear bulblets. Veins often end in the teeth, instead of in emerginations. Some blades have no sori or abortive sori. Indusia, when present, are frequently shallowly lobed, not truncate.

Dryopteris campyloptera Clarkson (D. dilatata Gray). UC
One specimen (#1353) collected in F-10 during this study and three collected in 1962 most nearly resemble this species. Following the death of the elms, the area is sunny and overgrown with stinging nettles and briers, so a search for additional specimens was unsuccessful.

Dryopteris clintoniana Dowell. Clinton’s wood fern. Kn
Occasional in swamp forest, D-4 and P-9.

Dryopteris cristata Gray. Crested fern
Large colonies in D-7, P-6, and G-12. Not reported by Kellerman, but specimens exist collected by Biddlecombe, 1877, and Spence, 1892.
Dryopteris intermedia Gray. Evergreen wood fern
Occasional in swamp forest, E-6, and F-10 and 11.

Dryopteris spinulosa (O. H. Muell.) Watt. Spinulose wood fern
Common in swamp forest bordering arbor vitae, D-7, E-7 and 8, and F-7 and 11. The most common Dryopteris in the swamp.

Onoclea sensibilis L. Sensitive fern. Kn
Frequent in E-7 and 8, and in F-5 and 6.

Polypodium virginianum L. Rock polypody. UC
One location only—on a downed arbor vitae log along Cedar Run, E-7.

Polystichum acrostichoides Schott. Christmas fern. Kn
Only two small plants observed in the Bog, in F-7, west of West Branch, and in I-11. Reported by Kellerman as *Dryopteris acrostichoides* (Michx.) Kuntze.

Thelypteris palustris Schott. var. pubescens Fern. Marsh fern. Kn
Common in bog meadow, and in arbor vitae stand along Cedar Run, D-7 and 8, and E-7, 8, and 9. Reported by Kellerman as *Dryopteris thelypteris* (L.) Gray.

PORTULACACEAE

Claytonia virginica L. Spring beauty
Occasional in deciduous forest, H-10 and I-11. Flowers, late April.

PRIMULACEAE

Dodecatheon meadia L. Shooting star
One large colony, in E-5. Flowers, mid-May.

Lysimachia ciliata L. Loosestrife

Lysimachia quadriflora Sims. Linear-leaf loosestrife. Kv
Common in bog and marl meadows, D-5 and 7, and E-6. Reported by Kellerman as *Steironema radicans* (Hook.) A. Gray. Flowers, July and August.

Trientalis borealis Raf. Starflower. Kv
Frequent in arbor vitae stands, D-7, and E-8 and 9. Three specimens at The Ohio State University from Cedar Bog, collected by Spence, 1892, and by Werner and Wilcox, 1893. Also specimens are present at Urbana College, collected by M. G. Williams. Flowers, mid-May.

RANUNCULACEAE

Actaea pachypoda Ell. White baneberry. Kn
Common in arbor vitae and swamp forest associations, D-7, and F-8, 10, and 11. Flowers, mid-May.

Anemone quinqufolia L. Wood anemone. Kv
Frequent in swamp forest association and occasional in hardwood forest. My specimen, #717, and perhaps another, #259, are var. *interior* Fern. Spence collection, 1891, is also var. *interior* Fern.

Anemone virginiana L. Thimbleweed
Frequent along Woodburn Road and west path, F-8 and 9. Flowers, July into early August.

Anemonella thalictroides (L.) Spach. Rue anemone. UC
Abundant in arbor vitae and swamp forest associations, E-7 and 8, and F-9 and 10. Flowers, mid-April to mid-May.

Aquilegia canadensis L. Wild columbine. Kn
Frequent at margins of arbor vitae stands, E-6 and F-7. Flowers, May.

Caltha palustris L. Marsh marigold. Kn
Abundant in swamp forest, D-7, and F-6 and 8, and on the margins of West Branch. Flowers, May. Probably a boreal species.

Clematis virginiana L. Virgin's bower. Kv
Occasional at edge of swamp forest, E-5 and 8, and E-9. Flowers, August.

Hepatica americana (DC) Ker. Liverleaf.
Abundant in arbor vitae association and at edge of swamp forest, E-6, 7, 8, and 9, and F-7. Flowers, April to early May.

Hydrastis canadensis L. Golden seal
Reported by Hicks (undated) as common in Cedar Bog, but collected only once, in F-7. Apparently almost extinct.

Ranunculus abortivus L. Kidney-leaf buttercup. Kn

Ranunculus recurvatus Poir.

Ranunculus repens L. Creeping buttercup. UC
Frequent in hardwood forest, H- and I-10 and 11, and G-11. Flowers, April.

Ranunculus septentrionalis Poir. Swamp buttercup.
Frequent in swamp forest, E-7, and F-7 and 10. Flowers, late April to mid-May.
Thalictrum dasycarpum Fisch. and Lall. Purple meadow rue. Kn
Frequent in bog meadow, D-6, E-8, and F-11. Flowers, early June.

Thalictrum dioicum L. Early meadow rue
Occasional in swamp forest, E-7. Flowers, late April.

Thalictrum polygamum Muhl. UC
Abundant in swamp forest, F-5, 7, and 11; H-11; and I-11. Flowers, June and early July.

Thalictrum revolutum DC. UC
Occasional in swamp forest, F-8 and 9. Specimen #1838. Flowers, June.

RHAMNACEAE

Rhamnus alnifolia L’Her. Kv
Common in shrub communities at margin of bog and marl meadows, D-6, and E-5 and 9.

Rhamnus lanceolata Pursh. Lance-leaf buckthorn
Occasional in shrub zone surrounding marl meadow areas, E-5 and 6. Reported by Hicks (undated), but no specimen.

ROSACEAE

Agrimonia gryposepala Wallr. Agrimony
Frequent in swamp forests, E-7 and 8, and F-6. Flowers, July.

Agrimonia parviflora Ait. Occasional in D-5 and 7, and in F-10. Flowers, late August.

Agrimonia pubescens Wallr. UC Observed twice, at same location, F-7.

Amelanchier laevis Wieg. UC
Previously unreported from Champaign County, but at least one specimen labeled A. canadensis (L.) Medic, collected by M. G. Williams at Urbana College, appears to be this species. Flowers, late April.

Crataegus crus-galli L. Cockspur thorn. Kn Occasional in deciduous and swamp forests, F-7 and J-11.

Crataegus punctata Jacq. Dotted hawthorn. Kn
Collected once in deciduous forest, J-11.

Filipendula rubra (Hill) Robins. Queen-of-the-prairie. Kn
Frequent in bog meadow, E- and F-9. Reported by Kellerman as Ulmaria rubra Hill. Flowers, July and August.

Geum canadense Jacq. Avens
Frequent in hardwood and swamp forests, E-7 and 9, H-11, and J-10. Flowers, July to early August.

Geum vernum (Rafl.) T. & G. Occasional in F-7. Flowers, mid-May.

Geum virginianum L. Collected once in deciduous forest, I-10. Flowers, July.

Physocarpus opulifolius (L.) Maxim. Ninebark. Kv
Abundant in shrub zones along Cedar Run and West Branch, D-5 and 6, F-6 and 7, and E-9. Flowers, mid-June.

Potentilla fruticosa L. Shrubby cinquefoil. Kv
Abundant in bog meadow, E-8 and 9. Flowers, June to late September. Relict boreal species.

Prunus americana Marsh. Wild plum
Collected once at margin of marl meadow, D-5.

Prunus serotina Ehrh. Wild black cherry. Kn
Common in parts of swamp forest, E-2, 3, 4, and 5, and F-7.

Psychotria melanoarpa (Michx.) Willd. Black chokeberry
Frequent in swamp forest, D-7, and F-5 and 9. Unreported by Kellerman, but three specimens collected by him and labeled Rhamnus cathartica L. have been correctly identified as P. melanoarpa, as is Werner’s specimen labeled Aronia nigra. Also, specimens occur in Urbana College collection. Flowers, mid- to late May.

Rosa carolina L. Kn Collected once, in D-4. Flowers, early July.

Rosa carolina x polystis. UC Two plants appear to be this hybrid, though they may be R. virginiana Mill. (see below), specimen #473 from F-8 and #1136 from F-9. Plants larger than R. carolina; prickles straight; leaf rachis villous; and flowers, deep pink. Previously unreported from Bog or county. Flowers mid- to late July.
**Rosa palustris** Marsh. Swamp rose. UB
Most common rose in Bog; in swamp forest, D-8, E-9, and F-8 and 10. Flowers, July.

*Rosa setigera* Michx. Prairie rose. Kn
Frequent in drier parts of bog meadow, E-8 and F-9. Flowers, July.

*Rosa virginiana* Mill. UC
Despite Gleason (1952) and Braun (1961), I believe this is the correct designation for my specimens #642 and #988. Both were collected in fruit.
Erlanson (1934) states that the hybrid *R. palustris* x *Carolina*, which specimens #642 and #988 resemble, is highly sterile. In *R. palustris*, 2n=14; in *R. carolina*, 2n=28; and in *R. virginiana*, 2n=28 (Erlanson, 1929). My specimens have well-developed apparently normal achenes, which I believe would not be true if they represented hybrids. Specimens #473 and #1136 (reported as hybrids, above under *R. carolina* x *palustris*) were collected from the same quadrats and may also be this species. Unfortunately, the problem was not anticipated and the plants were not marked when in flower. The species was previously unreported in Ohio (Braun, 1961).

*Rubus allegheniensis* Port. Sow-teat blackberry. UC
One large colony in swamp forest, E-5. Fruits, early August.

*Rubus frondosus* Bigel. UC
Observed once, in F-8. Flowers, late May.

*Rubus occidentalis* L. Black raspberry. Kn
Frequent along west path, in F-7 and 8, and also in F-9. Flowers, late May.

*Rubus pensilvanicus* Poir. UC
Occasional along west path, F-5 and 6, and D-8. Fruits, early August.

*Rubus pubescens* Raf. Kn
Abundant as ground cover in arbor vitae stands. In E-6 and 8, and F-6, 7, 9, 10, 11, and 12. Specimen collected by Spence, labeled *R. trisorus* Richards, in 1880. Three specimens collected by Williams at Urbana College. Flowers, late April, early May; fruits, early July. Boreal species.

*Sanguisorba canadensis* L. American burnet. Kv
Common in bog meadows, E-9 and F-10. Flowers, late August.

**RUBIACEAE**

*Cephalanthus occidentalis* L. Kn
One colony in H-11. Flowers, mid- to late July.

*Galium aparine* L. Bedstraw. Kn
Common in swamp forest, D-7, E-6 and 7, and G-11.

*Galium asprellum* Michx.
Observed once, in D-8.

*Galium concinnum* T & G. Shining bedstraw. Kn
Occasional in bog meadow, D-8.

*Galium obtusum* Bigel. UB
Occasional in swamp forest, E-6.

*Galium pilosum* Ait. UC
Rare. In F-7.

*Galium trifidum* L. UC
Occasional in swamp forest zone, G-11.

*Galium triflorum* Michx. Sweet-scented bedstraw
Abundant in swamp forest, D-7; E-5, 6, 9, and 10; and I-10 and 11.

*Mitchella repens* L. Partridgeberry. Kv
Common in drier arbor vitae zones, D-7, E-9, and F-10 and 11. Specimens also collected by Spence, 1877 and 1892. Flowers, May.

**RUTACEAE**

*Ptelea trifoliata* L. Hop tree, wafer ash. Kn
Occasional in swamp forest, D-8 and F-7. Southeast coastal plain and Mississippi embayment species (Bailey, 1962).

*Xanthoxylum americanum* Mill. Prickly ash. Kn
Occasional in D-8; common in F-6, 7, and 8, H-10 and I-10.

**SALICACEAE**

*Populus deltoides* Bart. Cottonwood. Kn
Occasional in F-7. Reported by Kellerman as *P. monilifera* Ait. One large tree 37 inches DBH in F-9.

*Populus deltoides* x *tremuloides*. UC
Specimen #1104 is intermediate between the two species and Dr. Ronald L. Stuckey (personal communication, 1970) has suggested that the specimen represents such a hybrid. The habitat would lend credence to this suggestion, for the plant was observed only once, in I-9, at the margin of the western extension forest and an open field.

*Populus tremuloides* Michx. Quaking aspen
Occasional, in E-10 and F-11.
Salix discolor Muhl. Pussy willow. Kv
Common on margins of marl meadow, in shrub zone, D-6.

Salix glaucocephaloides Fern. Blueleaf willow. UC
Rare, in E-8 and F-11.

Salix nigra Marsh. Black willow. Kn
Two large trees joined at the base on west bank of Cedar Run, F-11, measure 19½ and 20½ inches DBH.

Salix rigidula Muhl. UB
One shrub on north side of Woodburn Road, in E-8.

Salix sericea Marsh. UB
Occasional along margins of marl meadow, D-6, and on banks of Cedar Run, E-9, and F-9 and 10.

Salix X subsericea (Andersss.) Schneid. UB
Rare. East bank of Cedar Run, F-10.

Sarracenia purpurea L. Pitcher plant
One plant in D-6. Planted in Cedar Bog, perhaps several times. Evans (1944) states that he set plants in Cedar Bog in two places in 1925. The one plant present today is not vigorous.

Saxifragaceae

Heuchera americana L.
Frequent in swamp forest, E-4. Flowers, early June.

Hydrangea arborescens L. Hydrangea. Kv

Mitella diphylloides L. Bishop's cap. Kn
Abundant in arbor vitae stands, E-7, 8, and 9, and F-10 and 11. Flowers, late April to mid-May.

Mitella nuda L. Miterwort. Kv
Rare in arbor vitae association, E-6 and 7. Specimen at Urbana College collected by M. G. Williams in Cedar Bog is labeled Mitella nuda cordifolia Lamark. with a note added, "Very rare, John H. Schaffner." Flowers, mid-May.

Parnassia glauca Raf. Grass-of-Parnassus, bog stars. Kv
Common in bog meadow and arbor vitae associations, D-6 and 7, and E-8 and 9. Flowers, late August and September.

Ribes americanum Mill. Wild black currant. Kn
Occasional in swamp forest, E-7, F-9, and E-6 and 9. Flowers, June.

Ribes cynosbati L. Prickly gooseberry. Kn

Ribes hirtellum Michx. Smooth gooseberry
Rare in F-7 and 8. Not reported by Kellerman, but Werner specimen labeled R. oxycandria L. has been identified as R. hirtellum. Flowers, June.

Scrophulariaceae

Chelone glabra L. var. glabra. Turtlehead. UB
Occasional in bog meadow, D-6 and 8. Flowers, late August and early September.

Chelone glabra L. var. limifolia Coleman. Kv
Rare, in D-8. Kellerman’s specimen is labeled simply C. glabra L. Flowers, late August and early September.

Geranium parviflorum L.
Frequent in marl meadows, D-6 and E-5. Unreported by Kellerman, but his specimen collected in 1894. Flowers, late August and early September.

Mimulus rigens L. Monkey flower. Kn
Rare. In E-9, on margin of Cedar Run. Flowers, mid-August.

Pedicularis canadensis L. Lousewort. Kn

Pedicularis lanceolata Michx. Wood betony. Kv
Common in swamp forest, D-6 and 8, E-9, and F-9. Flowers, late August and early September.

Scrophularia marilandica L. Kn
Frequent, in swamp forest, G-11.

Verbascum thapsus L. Mullein. Kn

Veronica anagallis-aquatica L. UC
Aquatic, in Cedar Run, E-10, at convergence of streams. Reported by Kellerman, but his specimen, 1894, is not this species, but V. comosa Richter, so this species was previously unreported from Champaign County.

Veronica comosa Richter. Kv
Common in Cedar Run, in West Branch, and in seepage areas at edge of arbor vitae stand. Flowers, mid-August.
Veronica scutellata L. UC
  Observed once, in F-11. Flowers, mid-June.

Solanaceae
Physalis longifolia var. subglobata (Mackenzie & Bush) Cronq.
  Occasional, in E-9 and F-9. Unreported by Kellerman, but Werner’s specimen, 1893, labeled *P. lanceolata* Michx., has been determined to be this species. Flowers, August.

Solanum americanum Mill. UC
  Observed once, in F-10.

Solanum dulcamara L. Nightshade. Kn
  Occasional, in E-6 and 8.

Solanum nigrum L. Black nightshade. Kn
  Occasional, in E-8. This and *S. americanum* may be one species.

Sparganiaceae

*Sparganium chlorocarpum* Rydb. Bur reed. UB
  In Cedar Run, F-10, at the convergence of the stream. Also abundant in Cedar Run near Mad River. Probably boreal species.

Taxaceae

*Taxus canadensis* Marsh. Canadian yew. Kv
  Common in arbor vitae association, F- and G-11 and 12. Three specimens collected by M. G. Williams are at Urbana College. Relict boreal species.

Tiliaceae

*Tilia americana* L. Basswood, linden. Kv
  Common in swamp forest, E-6, 8, and 9, and F-5, 6, 7, and 8.

Typhaceae

*Typha latifolia* L. Cattail. Kn
  Occasional in roadside ditch, F-8 and along West Branch, F-6.

Ulmaceae

*Celtis occidentalis* L. Hackberry. Kn
  Common throughout all areas of swamp forest.

*Ulmus americana* L. American elm. Kn
  Once abundant in swamp forests, in F-3 through 10, and G-, H-, and I-10 and 11. No large trees remain, but some smaller ones are still present.

*Ulmus rubra* Muhl. Red or slippery elm. Kn
  Common in swamp forests, E-6, F-7 and 8, and G-, H-, and I-10. One large tree in E-2.

*Ulmus thomasi* Sarg. Rock elm. UC
  Observed and collected once in hardwood association, G-11.

Umbelliferae

*Angelica atropurpurea* L.
  Common along Woodburn Road, F-9. Flowers, late May.

*Chaerophyllum procumbens* (L.) Crantz. Spreading chervil. UB
  Occasional in swamp forest, G-11. Flowers, late May.

*Cicuta maculata* L. Spotted water hemlock

*Cryptotaenia canadensis* (L.) DC. Wild chervil
  Common in swamp forest, D-7, and F-7, 8, and 9. Flowers, late May to late June.

*Daucus carota* L. Wild carrot

*Osmorhiza claytonii* (Michx.) C. B. Clarke

*Osmorhiza longistylis* (Torr.) DC. Anise root
  Common in swamp forest, F-7, 8, and 9. Flowers, early to mid-May.

*Oxypolis rigidior* (L.) C. & R. Combs
  Abundant throughout swamp forest, D-7, E-9, and F-9. An extremely variable species. Not reported by Kellerman, but Werner has specimen collected in 1892. Flowers, August to mid-September.

*Pastinaca sativa* L. Wild parsnip. Kn

*Sanicula canadensis* L. Black snakeroot
  Occasional, south side of Woodburn Road, F-9, and along west path, F-7. Flowers, early July.

*Sanicula gregaria* Bickn.
Sanicula marilandica L.  Kn
Occasional in swamp forest, F-9.

Sanicula trifoliata Bidc.  Black snakeroot.  UB
Occasional, in F-6 and E-7.

Thaspium barbinode (Michx.) Nutt.  Ky
Common in swamp forest, E-8, and F-6, 7, 8, and 9.  Flowers, late May and early June.

Thaspium trifoliatum (L.) Gray.  UC
Observed once, in F-9.

Zizia aurea (L.) W. D. J. Koch.  Golden alexander
Frequent in swamp forest, F-8 and E-8.

URTICACEAE

Boehmeria cylindrica (L.) SW.  False nettle.  Kn
Frequent, swamp forests, F-4 and 9, and E-8.

Laportea canadensis (L.) Wedd.  Wood nettle.  Kn
Abundant in all open areas of swamp forest.

Parietaria pensylvanica Muhl.  UB
Collected once, in bog meadow, E-4.

Pilea pumila (L.) Gray.  Clearweed.  Kn
Abundant in arbor vitae stands, D-8, E-9, and F-6 and 9.

Urtica dioica L.  Stinging nettle
Occurs throughout open swamp forest.

Urtica procera Muhl.  Kn
Abundant both in swamp forest association and in arbor vitae stands.  Possibly reported by Kellerman as U. gracilis Ait.

VALERIANACEAE

Valeriana ciliata T. & G.  Ky
Frequent in marl meadow, D-5, and E-4 and 5.  Reported by Kellerman as V. edulis Nutt.
Flowers mid-May.

Specimen at Urbana College dated 1839 with a notation by Milo G. Williams, “not known in works of botany.” There is no published report of this specimen, although Cedar Bog is the type locality for this species. For a discussion of the history of this interesting species at Cedar Bog, see Stuckey (1966, p. 8-9; 37-38).

Valerianella intermedia Dyal.  UC
Large patches in E-5 and along Woodburn Road, E-8, and G- and H-8.  Flowers, late May and June.

VERBENACEAE

Verbena hastata L.  Blue vervain.  Kn
Frequent only in bog meadow, D-8.  Flowers, late August.

Verbena urticifolia L.  White vervain
Rare.  Collected once, in F-10.  Flowers, late July.

VIOLACEAE

Kellerman did not report a single violet species from Cedar Bog, although one species had been collected by E. Jane Spence in 1877. It is possible that the Spence collection was not obtained by The Ohio State University until later. It seems highly improbable that Werner, who collected in Cedar Bog for two or more years, did not see any violets. The only logical explanation seems to be that this plant family was inadvertently omitted from the published lists. On the other hand, Werner deposited no violet specimens in The Ohio State University Herbarium.

Nomenclature and keys used in identification of the violets follow Russell (1965).

Viola affinis Le Conte.  Common violet.  UC
(V. papilionacea Pursh. of most authors)
Frequent, in E-5 and F-7.  White-flowered form collected in F-7 is specimen #21. One specimen, #1025, was collected in flower in early October.  Flowers, usually late April and May.

Viola blanda Wild.
Two colonies on partially decayed logs in arbor vitae association, F-10 and 11.  Specimen collected by Spence in 1877.  Also a specimen collected by Williams at Urbana College.

Viola conspersa Reichenb.  American dog violet
Common in arbor vitae and swamp forest associations, D-6, E-4, and F-7 and 9.  Flowers, late April and May.

Viola cucullata Ait.  Marsh blue violet.  UB
Common in bog meadow and occasional in swamp forest, D-7, E-6 and 9, and H-10.

Viola macloskeyi Lloyd sep. pallens (Banks) M. S. Baker.  UB
(V. pallens (Banks) Brainerd)
Frequent in arbor vitae and swamp forest, E-6 and F-7.  Flowers, late April through May.  Probably boreal species.
Viola nephrophylla Greene. UC
(V. papilionacea Pursh., in part)
Most common violet in Cedar Bog. Abundant in arbor vitae and swamp forest associations, D-5 and 7, and F-7 and 8. Distinguished from V. affinis by beard on spurred petal. Flowers, late April through May.

Viola pubescens Ait. var. pubescens. Downy yellow violet. UB
Rare, in swamp forest, F-7. Flowers, late April and early May.

Viola pubescens Ait. var. eriocarpa (Schwein.) Russell. UB
(V. pensylvanica Michx.)
Frequent in swamp forest, E-6 and F-9. Flowers, mid-April to May.

Viola rostrata Pursh. Long-spurred violet. UC
Common in oak-maple segregate, F-4 through 8. Specimens collected do not have as long a spur as might be expected, but still most nearly resemble this species. Flowers, late April and early May.

Viola sororia Willd. UB
Observed once, in the hardwood forest, 1-10. Flowers, late April.

Viola walteri House. UC
Frequent in only one location, E-6. Flowers, mid- to late April. Distribution map (Russell, 1965) shows this species to be most common to southeastern United States.

VITACEAE
Parthenocissus quinquefolia (L.) Planch. Virginia creeper. Kn
Occasional, in D-7.

Vitis riparia Michx. Wild grape
Occasional, in E-9 and F-5. Not reported by Kellerman, but one of his specimens collected in 1894, labeled V. vulpina L., has been determined to be this species.

Vitis vulpina L. Frost grape. Kv
Occasional, in D-4.

COMPARISON OF PAST AND PRESENT LISTS OF SPECIES FROM CEDAR BOG
Some species reported by Kellerman (Kellerman and Werner, 1893, and Kellerman and Wilcox, 1895) from Cedar Bog have not been observed or collected during my studies of the past seven years (1963–1970). In addition, there are some species that were not reported by Kellerman, but for which documented evidence exists (mostly in the form of voucher specimens in the herbaria of The Ohio State University or of Urbana College), that were also not found by me. These species are considered to have become extinct during the intervening time, and are given in the two lists that follow.

Of the species listed by Kellerman (Kellerman and Werner, 1893, and Kellerman and Wilcox, 1895) and not found by me, some are questioned and are therefore not included in the list of extinct species. All of these species, which represent 72 taxa in 28 families, have been rejected for one of the following reasons.

1. There is no voucher specimen to substantiate Kellerman’s report of the species nor is there in The Ohio State University Herbarium any specimen that has been collected in Cedar Bog either before or since Kellerman’s report.

2. Voucher specimens of species reported by Kellerman have been determined to be a species different from that reported.

3. Notation with the specimen shows that the plant was not collected in Cedar Bog.

In addition, 19 families and 25 species that were reported by Kellerman are now listed as “questionable” species. They have either been reported from Champaign County (but not Cedar Bog) since Kellerman’s publications, or are cosmopolitan weeds which might be expected in any habitat. None of these have been collected in Cedar Bog, either before or since Kellerman’s publications, and none were observed during the time of this study. Mimeographed copies of these two lists are available from the author.
The following list records all species reported by Kellerman (Kellerman and Werner, 1893; Kellerman and Wilcox, 1895) and collected at some time in the past in Cedar Bog, but which were not observed during the present study. Voucher specimens of these species are in The Ohio State University Herbarium.

Two different reasons may account for the lack of collections of these species during the 1963–1970 study.

1. The species reported earlier are indeed extinct in Cedar Bog as a result of environmental changes. No additional collections have been made since the original ones.

2. The species may or may not actually be extinct, but their frequency has been so greatly reduced and have become so rare that observation is difficult or unlikely, as indicated by collections made at least once since 1900, though they were not observed during the present study.

For each of the species listed below, the one of these two reasons that seems best to apply is indicated in parentheses by the number of the reason, as listed above.

**CAMPANULACEAE**

*Lobelia cardinalis* L. (1)

**CARYOPHYLLACEAE**

*Arenaria serpyllifolia* L. (2)

**COMPOSITAE**

*Eclipta alba* (L.) Haussk. (1)

**CRUCIFERAE**

*Lepidium virginicum* L. (1)

**CYPERACEAE**

*Carex inflexus* Muhl. (*C. aristatus* Rott.) (1)
*Carex tuckermanii* Dew. (1)
*Carex woodii* Dew. (*C. tetanica woodii* (Dew.) Bailey) (1)
*Scirpus cyperinus* (L.) Kunth. (1)

**EUPHORBIACEAE**

*Euphorbia humistrata* Engelm (1)

**GRAMINEAE**

*Echinochloa pungens* (Poir.) Rydb. (1)
*Muhlenbergia schreberi* Gmel. (*M. diffusa* Schreb.) (2)

**LABIATAE**

*Lycopus virginicus* L. (1)

**LEGUMINOSAE**

*Trifolium repens* L. (2)

**POLYGONACEAE**

*Polygonum hydropiper* L. (1)
*Polygonum punctatum* Ell. (1)

**PRIMULACEAE**

*Samolus parviflorus* Raf. (1)

**ROSACEAE**

*Amelanchier canadensis* (L.) Medic. (1)
*Geum rivale* L. (1)

**SOLANACEAE**

*Nicandra physalodes* (L.) Pers. (1)

**THYMELAEACEAE**

*Dirca palustris* L. (2)

**UMBELLIFERAE**

*Sium suave* Walt. (1)

Species listed below are those unreported by Kellerman, but for which, with two exceptions, voucher specimens collected by others are preserved at The Ohio State University or Urbana College. None of these species was observed during this study, nor are any represented by voucher specimens taken from Cedar Bog since deposition of the original ones (at The Ohio State University and at Urbana College). Therefore, these species are also considered to be now extinct in Cedar Bog. In some cases, it is possible that the original collection was made outside the limits of the present Bog, and therefore should not be compared with the 1970 list.
**AMARANTHACEAE**

*Acrida altissima* Riddell
Specimen collected by Kellerman in 1894.

**COMPOSITAE**

*Prenanthes crepidinea* Michx.
Specimen collected by Kellerman in 1894.

**CYPERACEAE**

*Carex leptalea* Wahl.
Collected by Spence in 1877; originally labeled *C. polytrichoides* Muhl. ex Schkuhr. This species is not listed for Ohio by Fernald (1950).

*C. viridula* Michx.
Three specimens collected by Werner in 1893. One labeled *C. flava* var. *graminis*; two labeled *C. viridula* and also *C. ordin* Ritz. Species collected by Thomas in 1933, from Kennard Bog. Specimen, labeled *C. oederi* Schart., at Urbana College; collected by W. S. Sullivant in 1899.

*Cyperus rivularis* Kunth.
Kellerman’s specimen, labeled *C. diandrus* Torr., collected in 1894. Schaffner and Jennings also collected this species from Brush Lake in 1902.

**GRAMINAE**

*Eragrostis frankii* Steud.
Specimen collected by Werner in 1892.

**ORCHIDACEAE**

*Cypripedium candidum* Muhl.
Specimen collected by M. G. Williams at Urbana College.

*Medeola virginiana* L.
Werner’s specimen collected in 1893; also a specimen at Urbana College labeled *Gyromitra virginica* Nutt.

*Pogonia ophioglossoides* (L.) Ker.
Specimen at Urbana College collected by M. G. Williams but not dated. Also specimen collected by Samples at The University of Michigan (Stuckey, 1966).

In summary, 546 taxa are reported from Cedar Bog in the present study (1963–1970). Of these, 225 were reported by Kellerman (Kellerman and Werner, 1893; Kellerman and Wilcox, 1895), 141 were reported by others (based on herbarium specimens), 173 were previously unreported from Cedar Bog, 4 were planted in the Bog, and 3 are unnamed fern hybrids. Twenty-one of the species reported by Kellerman are apparently extinct, as are 9 species reported by others.

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