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The Lichen Flora of Rocky Branch Nature Preserve, Clark County, Illinois

James E. Wiedman
Eastern Illinois University

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THE LICHEN FLORA OF ROCKY BRANCH NATURE PRESERVE, CLARK COUNTY, ILLINOIS

(TITLE)

BY

JAMES E. WIEDMAN

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THESIS

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INTRODUCTION

This is a taxonomic and ecological study of the lichens of Rocky Branch Nature Preserve in east-central Illinois. Previous studies of the lichen flora of Illinois have been few, and none have been devoted to the east-central portion of the state. Rocky Branch was selected because of its diversity of habitats for lichen growth.

Rocky Branch Nature Preserve is located in Clark County (Section 29 and 30, T12N, R12W) six miles northwest of Marshall, Illinois. This 130 acre tract, which was purchased by the Illinois Chapter of the Nature Conservancy and placed under the trusteeship of Eastern Illinois University, is maintained as a natural area for instructional and research purposes. A unique feature of Rocky Branch are the many exposed rock outcroppings. Some hillsides have sheer cliff faces of sandstone which are covered with mosses, liverworts, and lichens in a mottled arrangement. The exposed regions of orange and reddish sandstone contrast markedly with the green vegetation of summer, making this area very picturesque.

The preserve is unequally bisected by Rocky Branch Creek and delineated on part of its northern boundary by the West Fork of Big Creek (note map p. 79). The action of these streams has scoured and notched the bordering sandstone cliffs, producing a number of large cavern-like depressions. These areas are generally moist and abound with liverworts and mosses, along with some lichens. Many natural springs, as well as several tributaries, contribute to these two major

streams. These natural springs result in areas on the adjoining hillsides that are constantly wet. Certain bryophytes, such as sphagnum moss, as well as several lichens, are restricted to this unusual habitat.

Adding significance to Rocky Branch are many plant species which are uncommon in Illinois. Found in the preserve are such woody plants as beech (Fagus grandifolia Ehrh.), tulip tree (Liriodendron tulipifera L.), red maple (Acer rubrum L.), black gum (Nyssa sylvatica Marsh.), maple-leaved viburnum (Viburnum acerifolium L.), arrowwood viburnum (Viburnum recognitum Fern.), and running wahoo (Euonymus obovatus Nutt.). Herbaceous plants unique to the area include three species of sphagnum moss (Sphagnum palustre L., Sphagnum tenerum Sull. & Lesq., and Sphagnum squarrosum Crome), walking fern (Camptosorus rhizophyllus (L.) Link.), interrupted fern (Osmunda claytoniana L.), partridge-berry (Mitchella repens L.), beech drops (Epifagus virginiana (L.) Bart.), bishop's cap (Mitella diphylla L.), bluets (Houstonia caerula L.), yellow trout lily (Erythronium americanum Ker), valerian (Valeriana pauciflora Michx.), rattlesnake plantain (Goodyera pubescens (Willd.) R. Br.), and shining club moss (Lycopodium lucidulum Michx.), the latter now probably exterminated as a result of overcollecting.

The topography of Rocky Branch is diversified. The lowland areas bordering the streams, which are often shaded by sandstone cliffs, vary in their vegetation, exposure to sunlight, and moisture content. Those areas with moderate moisture levels that receive maximum sunlight support a number of grasses, while very moist and shaded areas are populated primarily by trees, shrubs, mosses and liverworts, and herbs other than grasses. The blue beech tree (Carpinus caroliniana Walt.) is found

abundantly on the moist sandy soil bordering the streams. Lichens are restricted primarily to those species that grow on trees or rocks.

Adjacent to the lowlands areas and with distinctive vegetation are the rolling hillsides. Where the hillside is sloped steeply, shaded and dry, mats of mosses and lichens predominate; near the base of the hill where there is shade and abundant moisture sugar maple (Acer saccharum Marsh.) and blue beech trees are prominent. Higher levels support white oak (Quercus alba L.), black oak (Quercus velutina Lam.), beech (Fagus grandifolia Ehrh.), shagbark hickory (Carya ovata (Mill.) K. Koch), bitternut hickory (Carya cordiformis (Wang.) K. Koch), pignut hickory (Carya glabra (Mill.) Sweet), ironwood (Ostrya virginiana (Mill.) K. Koch), black gum (Nyssa sylvatica Marsh.), dogwood (Cornus florida L.), and other species.

Contiguous to the hillsides are abandoned fields in various stages of plant succession with such plants as blackberry, small hickory trees, and little bluestem being especially common. Where fertility is low lichens are abundant, primarily species of Cladonia. The stream-valleys, the wooded hillsides, and the abandoned upland fields are the three major habitats that occur at Rocky Branch. Each of these habitats have certain characteristic lichens or lichen associations.

The lichen thallus is an association of a fungus and an alga united in one growth form that resembles neither of the components. The algal cells found in the lichen thallus are almost always either green algae (Chlorophyceae) or blue-green algae (Cyanophyceae). Purple photosynthetic bacteria (Rhodobacteriineae) and yellow-green algae (Xanthophyceae) are the photosynthetic components of a few lichen species. The fungus filaments, which usually comprise most of the plant

body of the lichen, belong to the Ascomycetes or more rarely to the Basidiomycetes. Lichens producing spores on basidia are placed in the subclass Hymenolichenes, while those producing spores in sacs or asci are placed in the subclass Ascolichenes. In a few lichens the fungus produces no spores, thus preventing the proper classification of such a lichen and these are considered as Lichenes Imperfecti (Fink, 1935). Most lichens of the United States and all known British lichens, according to Smith (1963), reproduce by means of asci and ascospores, and are placed in the Ascolichenes.

The fungus and alga association in lichens has been described as symbiotic with both plant components benefiting, while others have designated this unique association as a form of fungus parasitism on an algal host. Bold (1957) and Smith (1963) discuss the various viewpoints held by botanists on this subject. Historically the relationship was first regarded as parasitism. Reinke, as reported by Smith, was one of the first to point out that each member of the joint thallus might be regarded as the "consort" of the other. He further suggested that the alga grows with greater vigor in the lichen thallus, probably because of contact with the fungus or the presence of such conditions as increased moisture, supply of inorganic salts, and shelter. He indicated that the fungus withdraws necessary carbohydrates from the alga and may occasionally ravage the alga cells, but that "any theory of lichens as merely parasitic fungi is incompatible with the continuous healthy development of the lichen plant".

The parasitic nature of the fungus, in the viewpoint of Bold (1957), is supported by those lichens with fungal hyphae connected to algal cells by appressoria or haustoria. That the fungus component of a

number of lichens can be grown successfully in artificial culture media is evidence that this supposed parasitism is not obligate or highly specialized. Algal cells growing and multiplying for long periods in the lichen thallus without damage from the fungus give additional support to this idea. Bold questions the relationship in lichens as symbiotic, even though he acknowledges that most investigators interpret the fungus hyphae functions as absorbing structures for water and other organic compounds. In moist conditions, he points out, the alga grows adequately without the fungus and that the fungus probably shades the alga, inhibiting its photosynthetic action. In xeric habitats, however, the alga does not exist alone, although in association with a fungus forming a lichen it may grow in such a location.

Lichens demonstrate three distinctive growth forms: foliose (leaf-like), fruticose (shrubby or hair-like), and crustose (crust-like). In addition, a fourth form, squamulose, is sometimes recognized.

Foliose lichens are flattened, leaf-like or scale-like structures with the upper surface differing markedly from the lower surface. The thallus or plant body of the lichen grows outward from the center, resulting in a rosette-like structure. Hale (1969) assigns foliose lichens into three categories based on their size, and indicates they have definite maximum diameters. He designates as small those with a thallus 1-2 cm. in diameter, as medium those 3-12 cm., and as large those 13-30 cm. The thallus of the foliose lichen is usually attached to its substrate by holdfasts, called rhizines, which cover much of its lower surface. Most rhizines are black or dark but in some species they are white. Some foliose lichens adhere closely to their substrate, while others are loosely attached.

The flat papery thallus of foliose lichens is generally branched, forming lobes of a characteristic width. The margin of these lobes, according to the species, may be entire while others may have dissected or finely divided borders. In some species cilia, which are hair-like structures, occur on the margins of the lobes. The upper surface of the thallus will vary in its degree of wrinkling, ridging, and markings; it may be continuous and smooth, or it may be distinctly cracked, white spotted, or with irregular white markings (Hale, 1969). The upper surface may also vary markedly in colors, the color when the specimen is dry being most important taxonomically. In the moist or wet state most lichens will turn a uniform green color.

The lower surface of foliose lichens varies in degrees of color, ranging from solid black to shades of brown to white depending on the species. Both the upper and the lower surfaces may have pits. In the upper surface these pits protrude through the cortex and are called pseudocyphellae, while on the lower surface these pores are called cyphellae and differ in their greater length and cortical layer.

The internal structure of the foliose thallus is typically differentiated into four layers. The first layer, the upper cortex, consists of compressed cells. Just below is the second layer, the algal layer, comprised of the algal component mixed with fungus hyphae. The third layer, the medulla, occurs beneath the algal layer and contains loosely woven hyphal strands. The fourth or bottom layer, which may not always be present, is known as the lower cortex. A lichen having these distinct regions present is referred to as stratified. In contrast, in unstratified lichens the medulla and algal layer are intermingled. Some characteristic genera of foliose lichens are: Parmelia, Physcia, Cetraria, Dermatocarpon, and Peltigera.

The fruticose lichens are shrub-like, hair-like, or club-like with only a basal attachment or no attachment at all. Those with an erect posture achieve a height of several centimeters. The only common fruticose genus in Illinois is Cladonia. In this genus, the lower cortex and its characteristic rhizines are lacking. The upright portion of the thallus, known as the podetium, or secondary thallus, possesses a more or less radial structure with a central medulla area surrounded by an algal layer, which may or may not be covered by an outer cortex. In this genus, a basal thallus, known as the primary thallus, is present, but in many species it may disappear as the lichen ages. Depending also on the species, the podetia may be branched and shrub-like, simple and unbranched, pointed, club shaped, or having the shape of cups. The tips of these podetia bear the apothecia, which are some shade of brown or red in color.

Squamulose lichens consist of flat lobed structures that have an upper cortex, an algal layer, and a medulla, but lack a lower cortex and rhizines. The primary thallus of Cladonia is regarded as squamulose.

A typical crustose lichen consists of an upper cortex covering an algal layer, which in turn overlies the medulla. Crustose lichens adhere so closely that the substrate must be collected along with the lichen specimen. True crust lichens may have a rather thick thallus that can be smooth, cracked, or fissured in various ways. In some species only the ascocarps are evident, with the vegetative portion of the lichen embedded in the substrate.

Unique to the lichens are the soredia and isidia, structures which provide for vegetative propagation of lichens. Soredia, which arise from the medulla and appear powdery, become readily detached from the

lichen thallus and usually are produced abundantly. Each soredium consists of one to a few algal cells surrounded by some fungus hyphae. Soredia may group together in large powdery masses called soralia, which may occupy various positions on the lichen thallus.

The isidia are not powdery but instead are firm cylindrical growths arising from the upper cortex. They are not readily detached and their removal usually results in a scar. As with soredia, they consist of algal cells and fungus hyphae, but unlike soredia, they are covered by a cortex.

As indicated previously the majority of known lichens are members of the subclass Ascolichenes. These produce ascospores in fruits, apothecia or perithecia, somewhat similar to those of the Ascomycetes. The apothecium is a cup-shaped, saucer-shaped, disk-shaped, or lumpy fruiting body occurring on the upper surface of the thallus and occasionally along its margins or, in Cladonia, on the tips of podetia. These open fruits have a more or less exposed disk composed of asci and sterile threads, the paraphyses. The asci and paraphyses together compose the hymenium. The paraphyses usually project beyond the asci forming the epithecium, while the layer of tissue on which the hymenium rests is designated as the hypothecium. When the hypothecium grows up and around the hymenium it is called the parathecium or "proper margin". If an outer wall bordering the parathecium and formed from the tissue of the thallus is present, it is called the amphithecium or "thalline margin". The apothecial disk may be a variety of colors ranging from black to brown, to red, yellow, orange, or white, with most species having the darker colors. Apothecia also vary greatly in size, ranging from 0.25 to 10 mm. or more in diameter.

The perithecium is a closed fruiting body opening to the outside by a small pore, the ostiole. The perithecium is generally surrounded by a perithecial wall, but this wall may be absent or greatly reduced, according to Smith (1963). Perithecia are usually embedded in the lichen thallus and appear at the surface as small black protrusions. The internal structure of the perithecium contains typical paraphyses, asci, and ascospores.

Most lichens have one to eight ascospores in the ascus, but some genera are characterized by asci containing a large number of spores. Important diagnostically are the number of crosswalls the ascospores possess, their color, whether hyaline or dark, their form, size, and placement in the ascus. Ascospores may be non-septate or have one or more transverse crosswalls, forming two or more primary cells in the spore. In addition to transverse walls, a few genera may also have divisions occurring along the long axis of the spore, subdividing the primary cells and giving rise to a muriform spore. Spore form ranges from oval to needle-shaped. In size, spores may be anywhere from a few microns up to a length of 350 microns, depending on the species. In the ascus, the spores may be seriate, parallel, or irregulary placed.

The upper surface of the thallus of many lichens also contains flask-shaped structures called pycnidia. In external appearance they are similar to perithecia, but are very different in their internal structure. The pycnidia give rise to spore-like structures generally regarded as spermatia.

In most lichens, reproduction is probably largely vegetative by means of soredia, isidia, and fragmentation. Fink (1935) and Hale (1969) discuss the possibility of reproduction by ascospores but

indicate that the formation of a new lichen thallus by this means has not been proved to occur in nature. Not only must the lichen ascospore come in contact with its specific algal component, but also the environment must be favorable for germination of the spore, subsequent growth of the mycelium, and eventually association with the algal constituent. On the other hand, some species of lichens lack soredia and isidia and have little or no potentiality for fragmentation and it seems probable, in these species at least, that the ascospores play an important role in lichen reproduction.

LITERATURE REVIEW

Previous work on the lichens of Illinois has not been extensive and much of it dates to the previous century. No reports of lichen collections from Clark County have been encountered in the literature.

The first treatment of the lichens of Illinois was by Willey (1877) who recorded a collection of lichens from Fulton County assembled by Mr. J. Wolf. A total of 111 species were listed. The next year (1878) Willey published 61 additional species collected from Southern Illinois. In that same year (1878) Wolf and Hall compiled a listing of 220 lichen species collected from Menard, Fulton, Johnson, Union, and Jackson Counties.

Brendel (1887) studied the lichen flora and other vegetation types found within a radius of ten to twelve miles of the city of Peoria, Peoria County, and recorded 35 species of lichens.

Calkin's (1896) treatment of lichens covered Cook County, DuPage County, nine townships in the northwest part of Will County, and a portion of Lake County, Indiana. He noted 125 species from 12 different families. He felt that the lack of diversity in habitats within the area precluded a large number of lichen species. The absence of forests and rock outcroppings, as well as the environmental conditions created by the city of Chicago, were all regarded by him as unfavorable for the development of lichens. His paper also included a treatment on lichen characteristics, classification, and economic uses.

Fink was active in the study of lichens in the midwest, and in addition compiled information reported by others. In 1899 he recorded

a total of 248 species of lichens for Illinois. This number compares with 348 for Minnesota, 226 for Iowa, 180 for Ohio, 30 for Indiana, 29 for Wisconsin, and 9 for Missouri. The next year (1900) he reported on new lichen records for several midwestern states, adding only one species to the Illinois lichen flora, Endocarpon pusillum Hedw. var. Garovaglii Kph., from Kane County. In 1906 he published a study on the two lichen societies found on Bald Mound, an Illinois esker, and Johnson Mound, occurring on nearby rounded hills in Kane and Kendall Counties. Twelve species of lichens were found. He indicated that comparable habitats in Iowa and Minnesota supported a greater number of species of lichens which he believed to be the result of less pasturing and more xerophytic conditions.

Miss Hedrick (1933) gave new records of lichens from the herbarium of Bruce Fink that had not been previously published. Arthonia Willeyi Tuck. found on trees near Athens, Illinois, Menard County, was the only new lichen recorded for Illinois.

In a study of the lichens of Hicks Dome, Sparks Hill, and Union School regions of Hardin County, Hartline (1938) found 31 species of lichens from 9 families.

In another more recent study from southern Illinois, Skorepa and Snider (1967) recorded 16 species from Lusk Creek Canyon, Pope County. They called attention to the floristic elements of this area which are unique for southern Illinois. In the most recent publication on the lichens of Illinois, Skorepa (1970) reported 51 species from central and northern Illinois.

Floristic studies of several groups of plants have been made for the Rocky Branch Nature Preserve, but these have dealt primarily with

vascular plants and bryophytes. In the first such paper, Stover (1930) compiled a checklist of vascular plants and briefly described some of the more prominent plant associations.

Vaughan (1941) collected and identified bryophytes from a limited area of Rocky Branch, while an additional study on the bryophytes was carried out by Arzeni (1947), who reported many additional bryophyte species and listed some corrections of previously misidentified bryophyte specimens from this area.

Ebinger and Parker (1969) published on the woody vegetation of the western portion of Rocky Branch, reporting a total of 35 woody species, with white oak comprising half of the basal area and nearly one-third of the total individuals present. Other important woody species given were black oak, red oak, shagbark hickory, sugar maple, red maple, mockernut hickory, butternut hickory, tulip, black gum, and beech.

A floristic study by Ebinger and Hellinga (1970) indicated that a total of 445 species of vascular plants in 97 families are present in the preserve. Of these 16 are fern or fern allies, 97 monocots, and 332 are dicots. Of the dicots 80 are trees, shrubs, or woody vines, while 252 are herbaceous.

Recently, Ebinger and Hughes (1971) studied the woody vegetation of the eastern portion of Rocky Branch, listing a total of 62 woody species, of which 40 were canopy trees, 5 understory trees, and 17 shrubs or vines. Again white oak was the dominant species.

MATERIALS AND METHODS

Initial research on lichens began July 1, 1968, in Effingham County, Illinois, and was later expanded to include Clark and Coles Counties. A total of nine collecting trips were undertaken in these counties before selecting the Rocky Branch Nature Preserve, Clark County, for detailed study. Preliminary observations indicated that the Rocky Branch Nature Preserve contained not only a greater variety of habitats favorable to lichen growth but also probably a greater number of species of lichens, especially of the macrolichens, than most other locations in east-central Illinois.

In Effingham County collections were made in the vicinity of Lake Sara on July 1, 1968, and at Rattlesnake Hollow on August 15, 1969, both sites lying near the western edges of the county; in the wooded areas bordering the Teutopolis-Elliotstown road on October 12, 1968, this region being in the eastern portion of the county; and several locations in the vicinity of Green Creek on August 11 and 15, 1968, and October 12, 1969, these occurring in the west-central and northern portions of the county. In addition a few lichens were collected within the city of Effingham.

In Coles County, several collecting trips were made to Lakeview Park which overlooks Lake Charleston, the principal ones being in November, 1968, and February, 1969, in addition to collections made along Walkers Ford Road, south of Charleston. One visit was made to the Lincoln Log Cabin State Park, also south of Charleston, in February,

1969. In Clark County the only collections made, except for those at Rocky Branch, were at Rocky Hollow, south of Martinsville, on June 17, 1969.

A total of 14 collection and study trips were made to Rocky Branch at all seasons of the year to observe the varying conditions of this woodland and its related lichen flora. Trips were made on April 12, 1970; July 2, 1970; July 16, 1970; July 24, 1970; August 20, 1970; September 7, 1970; September 19, 1970; October 17, 1970; November 1, 1970; December 30, 1970; January 23, 1971; April 11, 1971; June 16, 1971; and July 12, 1971.

Collected specimens were placed in small paper bags which had previously been numbered. A knife, hammer, and small garden trowel comprised the tools needed for collecting the lichen specimens. Lichens growing on the bark of trees were generally removed with a knife; usually it was necessary to cut off a segment of the bark, since most species, such as Physcia millegrana, Candelaria concolor, and Graphis scripta, adhere very tightly. Many rock-inhabiting lichens are small and inconspicuous, sometimes partly embedded, and virtually impossible to remove from the substratum. A hammer was often used to chip off portions of the rock on which they grew. For lichens growing on soil or among mosses, such as species of Cladonia, a garden trowel was used to prevent damage to the lichen specimen.

At the time of collection the type of substratum and the position of the lichen on the substratum was recorded. Some tree lichens, for example, grow mainly on the basal part of the trunk, while other species occupy all heights of the trunk, sometimes occurring even on the branches and limbs of the canopy. The light exposure seems to

influence the placement of lichens on the substratum. Many species are favored by an abundance of sunlight, some by shaded locations, but in others the amount of light exposure seems not to be important. Compass and light meter readings were taken for certain species of lichens which grow on trees in an effort to determine if the direction and quantity of light exposure is a determining factor in their placement on the tree.

Fourteen locations in the Rocky Branch Nature Preserve were selected as representative of the diverse habitats found within the preserve. Each location is characterized by a distinctive lichen species or association of lichen species, and will be referred to as a habitat. The position of each habitat is indicated on a map of the preserve (p. 79). The map was originally prepared by Dr. John E. Ebinger in connection with a survey of the vascular plants. Stakes remaining from this study were used in plotting locations on the map. In addition, three locations selected for long-range growth studies of lichens are recorded on the map. These locations, which support distinctive lichen species growing on sandstone, are identified by numbered aluminum tags nailed into the rock.

Photographs were taken on December 29, 1970, by Mr. L. Crofutt of the habitats and some of the lichens present in them. The camera used was a Honeywell Pentax with black and white Triax film.

For each habitat a study was made of the physical characteristics, light conditions, and associated vascular plants and bryophytes. Physical features noted were the topography; the nature of the substratum, whether soil or rock, and the type of soil or rock; and the moisture content and extent of drainage. Direction of exposure to light was determined by a Hunter pocket compass and light intensity was measured by use of a Weston Illumination light meter (Model 756) with quartz filter

that measures light intensities ranging from 0 to 10,000 foot candles. Light meter readings were recorded in foot candles. For each habitat readings were taken in both winter (January 23, 1971) with no leaf cover and summer (June 16, 1971) with leaf cover present. These duplicate readings were taken at the same location in each habitat. On every occasion when the light meter was employed, a reading was obtained in an area free of cover in order to determine the maximum availability of light to be used as the standard. Maximum light readings taken in full sunshine are placed in parentheses following each habitat reading. All readings were taken at central standard time.

In the study of the associated vascular plants and bryophytes for each lichen habitat, the trees were identified in the field through use of Trees and Shrubs of the Campus and East Central Illinois by H. F. Thut (1961) and Trees of North America by C. F. Brockman (1968). Specimens of herbaceous vascular plants and bryophytes were collected. The herbaceous vascular plants were identified by using The Flora of Illinois by G. N. Jones (1963) and The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada by H. A. Gleason (1952). The Stover Herbarium of Eastern Illinois University was used in verifying the identification of certain of these plants. Most of the grasses and sedges, as well as, some of the other herbacious vascular plants were identified by Dr. John Ebinger. Identification of bryophytes was by Dr. Charles Arzeni and Miss Linda Spessard.

Several manuals were used in the identification of the lichens. The most important of these were: G. G. Nearing's (1962) The Lichen Book, Dr. Mason Hale's (1969) How to Know the Lichens, Dr. Bruce Fink's (1935) The Lichen Flora of the United States, and Dr. John W. Thompson's (1967) The Lichen Genus Cladonia in North America. The identification of the

following lichens was confirmed by Dr. Mason E. Hale of the Smithsonian Institute: Cladonia subtenuis (Abb.) Evans, C. chlorophaea (Flk.) Spreng, Racodium rupestre Per., and Buellia vernicoma (Tuck.) Tuck.

A concentrated solution of potassium hydroxide (KOH) was employed as a chemical indicator since some species turn a vivid red or yellow color when treated with this solution. According to Hale (1969) some of the lichen substances that show this response to potassium hydroxide are parietin, rhodophyscin, solorinic acid. Two other commonly used indicators, calcium hypochlorite and paraphenylenediamine were not employed in this study, nor were crystal tests, chromatography, or fluorescence analysis.

A Bausch and Lomb stereobinocular microscope belonging to East Richland High School, Olney, Illinois, was used to examine such morphological features as soredia, isidia, rhizoids, and other surface characteristics. Spore size, spore color, spore morphology, arrangement of paraphyses, and other microscopic details were determined with a low powered EME compound microscope belonging to East Richland High School, Olney, Illinois. A Zeiss compound microscope equipped with an optical micrometer, belonging to the Botany Department of Eastern Illinois University, was used to make spore measurements. The determination of spore characteristics is particularly important in the identification of crustose lichens.

With the exception of a few rare lichens, adequate material was placed in the Stover Herbarium of the Botany Department of Eastern Illinois University. The specimens were placed in 49x white slide containers and labeled.

DESCRIPTION OF HABITATS

The 14 locations that were chosen in Rocky Branch Nature Preserve to typify the major habitats either supporting an abundance of lichens or distinctive lichen species are listed numerically. The discussion of each habitat includes a recording of the lichens, associated plants, and the light meter readings obtained in the habitat.

I. CALOPLACA CERINA-ENDOCARPON PUSILLUM HABITAT

Location #1, map coordinates 8, 3.5; figs. 1 & 2. On a concrete well covering shaded by a nearby abandoned house, the crustose lichens, Caloplaca cerina (Ehrh.) T. Fries, with its lemon yellow fruit disks, and Endocarpon pusillum Hedw., with its brownish-black thallus of minute chips or flakes, occurs sparingly. Since the concrete well covering contains calcium carbonate, it harbors species characteristic of limestone. A similar habitat, a concrete bridge abutment near the entrance to Rocky Branch Nature Preserve, was also examined for lichens. In addition to Bacidia inundata (E. Fries) Koerb., growing on it were Lecanora hageni Ach., and a foliose form, Physcia orbicularis (Neck.) Poetsch f. albociliata (Bouly de Lesd.) Thoms. Both of these concrete formations are rather xeric and are restricted largely to crustose species. None of the above lichens were found in any of the other locations checked; however, areas having limestone outcroppings or aged concrete structures will undoubtedly harbor many of the above species.

Maximum light readings taken in full sunshine are placed in parentheses after habitat readings. The light meter readings on January 23, 1971, were 170 foot candles (500) at 8:30 a.m., 540 (5000) at 12:00 p.m., and 400 (770) at 3:30 p.m. On June 16, 1971, the light meter readings were 210 foot candles (5500) at 8:30 a.m., 350 shade, 850 sun (10,000+) at 12:00 p.m. and 170 shade, 660 sun (7500) at 3:30 p.m. The concrete well covering is normally quite shaded due to the close proximity of the abandoned house and the nearby trees, and only occasionally receives some direct sunlight.

Associated plants around the well covering were the grasses (Phleum pratense L., Agrostis alba L., Poa compressa L.), white avens (Geum canadense Jacq.), burdock (Arctium minus (Hill.) Bernh.), smooth sumac (Rhus glabra L.), riverbank grape (Vitis riparia Michx.), and black walnut (Juglans nigra L.). The abundant black walnut trees were, in large part, responsible for the shaded condition of the well top.

Associated plants around the bridge abutment were grasses (Bromus commutatus L., Agrostis alba L.), black-eyed susan (Rudbeckia hirta L.), horsetail milkweed (Asclepias verticillata L.), wood sage (Teucrium canadense L.), common cinquefoil (Potentilla simplex Michx.), and virginia creeper (Parthenocissus quinquefolia (L.) Planch.).

II. GRAPHIS SCRIPTA-TRYPETHELIUM VIRENS HABITAT

Location #II, map coordinates 4, 4; figs. 3 & 4. The blue beech (Carpinus caroliniana Walt.), a characteristic understory tree in East-Central Illinois, is abundant along Rocky Branch. The tree is conspicuous because of its smooth and ridged gray bark. The lichens Graphis scripta, Arthonia impolita, and Trypethelium virens predominate on the trunk and branches of this species. Additional lichens found less abundantly on

this tree are several small foliose lichens, Physcia millegrana, P. stellaris, P. orbicularis, Candelaria concolor, and two crustose species, Pertusaria pertusa, and Lepraria aeruginosa.

Of the twenty-five blue beech trees examined at random, only three were found not to have any lichen growth on the trunk. For a particular lichen species the abundance, placement, and colony size was quite variable, although generally, there was a greater abundance of lichens on portions of the trees where direct sunlight was absent from the trunk and branches. The lichens which predominate on the blue beech tree are crustose species. The light colored thalli of Graphis scripta and Arthonia impolita, along with the dark green thallus of Trypethelium virens make these crustose species rather conspicuous on the gray bark of this tree. Several smaller foliose species are found occasionally, but the larger foliose species, as well as the fruticose types, seem to be totally absent, a condition probably brought about by the very smooth bark of Carpinus. It is possible that the chemical makeup of the bark also may have significance as to the lichen species present.

Light meter readings for this habitat were taken at the blue beech tree in the photograph (fig. 3), close to the branches bearing lichens. The light meter readings for this habitat on January 23, 1971 were 170 foot candles (500) at 8:30 a.m., 310 (5000) at 12:00 p.m., and 200 (770) at 3:30 p.m. On June 16, 1971 they were 150 foot candles (5500) at 8:30 a.m., 140 (10,000+) at 12:00 p.m., and 58 (7500) at 3:30 p.m. These light readings indicate that the lichens at this location are quite shaded in winter and in summer.

A comparison of the lichen flora of blue beech was made with beech (Fagus grandifolia Ehrh.), a tree that also has a smooth gray bark. Beech is a much larger tree than the blue beech and tends to occur more frequently in open areas of the forest, a condition that may account for the less abundant growth of lichens on beech than on blue beech. Graphis scripta and Trypethelium virens, the crustose lichens, were again the most commonly noted lichens on the beech. Additional species observed less frequently on this tree are: the crustose lichens Pertusaria pertusa and Lepraria aeruginosa, and the foliose lichens Parmelia caperata and Physcia orbicularis f. rubropulchra. In general, these lichens were found on the shaded side of the beech trees, although occasional colonies grow in exposed areas of certain beech trees with more direct sunlight.

It is perhaps worth noting that Trypethelium virens was noted growing only on the trunk and branches of blue beech and beech trees and only at Rocky Branch. On the other hand, Graphis scripta is fairly frequent on shagbark hickory and occasional on other trees such as white oak, while Arthonia impolita appears to be common on a number of species of trees. Both of these lichen species appear to be common in east-central Illinois.

Plants associated with blue beech at the selected habitat are several mosses (Aulocomnium heterostichum (Hedw.), Brachythecium salebrosum (W. & M.), Lophocolea heterophylla (Schrad.) Dumort.), a liverwort (Conocephalum conicum (L.) Wiggers), the christmas fern (Polystichum acrosticoides (Michx.) Schott.), white grass (Leersia

virginica Willd.), several herbaceous dicotyledons (Glecoma hederacea L., Aster lateriflorus (L.) Britt., Geum canadense Jacq., and Sanicula gregaria Bichn.), white oak (Quercus alba L.), flowering dogwood (Cornus florida L.), elm (Ulmus americana L.), sassafras (Sassafras albidum (Nutt.) Nees), and poison-ivy (Rhus radicans L.).

III. LEPRARIA AERUGINOSA-RACODIUM RUPESTRE HABITAT

Location #III, map coordinates 3, 4.5; figs. 5 & 6. A large sandstone cliff on the south side of Rocky Branch Creek which faces a northwesterly direction harbors the unique lichen association of Lepraria aeruginosa (Wigg.) Sm. and Racodium rupestre Pers. These lichens are quite abundant and cover an area extending approximately 60 yards in length. The whitish powdery gray crustose thallus of Lepraria contrasts markedly with the black filamentous appearance of Racodium, causing a mottled design on the cliff face. It is perhaps worth noting that Racodium is one of the few lichens in which the form of the lichen is provided by the alga. The inclined angle of the cliff plus the canopy formed by the surrounding trees results in a fairly heavily shaded location.

Racodium is found in two other shaded locations in Rocky Branch Nature Preserve, but this one has the greatest concentration of this species. In contrast, Lepraria is found abundantly throughout the preserve occupying a variety of habitats such as old wood, tree trunks, mosses, soil, and sandstone. Lepraria is found frequently on blue beech (Carpinus caroliniana Walt.) in association with Graphis scripta (L.) Ach., Arthonia impolita (Ehrh.) Borr., and Trypethelium virens Tuck., and on white oak (Quercus alba L.) with Candelaria concolor (Dicks.) Arn., Physcia Ach. and Parmelia Ach. species. It appears to be

less frequent on dogwood and other trees. On sandstone Lepraria can be found growing with walking fern (Camptosorus rhizophyllus (L.) Link.), various mosses, and such lichens as Cladonia chlorophaea (Flörke) Spreng., Cladonia coniocraea (Flk.) Spreng., Lecidea albocaerulescens (Wulf.) Ach., and Baeomyces absolutus Tuck.

On this cliff face selected as the typical habitat for the associates of Lepraria and Racodium, Lepraria is present in both shaded and sunny locations, although it appears to be most abundant in shade. Racodium, in contrast, seems to be restricted primarily to shaded locations.

The light meter readings for this habitat were taken adjacent to an abundant growth of Racodium on January 23, 1971 were 60 foot candles (500) at 8:30 a.m., 100 (5000) at 12:00 p.m., and 100 (770) at 3:30 p.m. On June 16, 1971 the light readings were 23 foot candles (5500) at 8:30 a.m., 26 (10,000+) at 12:00 p.m., and 35 (7500) at 3:30 p.m. These readings indicate this location is densely shaded most of the time.

Associated plants for this habitat include the bryophytes (Ditrichum pallidum (Hedw.) Hampe, Dicranum scoparium Hedw., Leucobryun glaucum (Hedw.) Schimp., Tetraphis pellucida Hedw., and Cephaloziella byssacea (Roth) Warnst.), Christmas fern (Polystichum acrostichoides (Michx.) Schott.), and the herbaceous plants (Solidago caesia L., and Mitchella repens L.). Woody plant species present are red maple (Acer rubrum L.), blue beech (Carpinus caroliniana Walt.), tulip tree (Liriodendron tulipifera L.), pignut hickory (Carya glabra (Mill.) Sweet, and black oak (Quercus velutina Lam.).

IV. BAEOMYCES ABSOLUTUS HABITAT

Location #IV, map coordinates 2,3.5; figs. 7 & 8. Only a small area of the sandstone cliffs bordering Rocky Branch Creek possess the unique association of Baeomyces absolutus Tuck., the pink mushroom lichen, and bog moss (Sphagnum palustre, L.). Two additional species of bog moss have been recorded from this location, Sphagnum tenerum Sull. & Lesq., and S. squarrosum Crome. This lichen, as well as the bog moss, is unique for this portion of Illinois, and they dominate a very moist and well shaded cliff face, in company with other mosses and liverworts.

Baeomyces, with its light pink apothecia, is quite noticeable on the dark orange-brown sandstone next to the green mosses. The colony photographed at this location measured 55 cm. long and 45 cm. wide, with a very large number of apothecia present. This colony faces a northerly direction and is shaded by beech and blue beech trees. Baeomyces occurs at various levels on the cliff face. Near the base of the cliff it grows in association with algae (predominantly unicellular members of the Cyanophyceae and Chlorophyceae), higher up with liverworts, and still higher it is associated with Sphagnum and other mosses suggesting that Baeomyces has a wider range of moisture and shade tolerance than its other plant associates.

On January 23, 1971 the light meter readings for this habitat were 140 foot candles (500) at 8:30 a.m., 210 (5000) at 12:00 p.m., and 200 (770) at 3:30 p.m.; on June 16, 1971 150 foot candles (5500) at 8:30 a.m., 140 (10,000+) at 12:00 p.m., and 140 (7500) at 3:30 p.m. These readings indicate that this colony of Baeomyces absolutus is growing in a heavily shaded location.

Associated plants include unicellular green and blue-green algae; mosses (Ditrichum pallidum (Hedw.) Hampe, Atrichum augustatum (Brid.)

Bry. Eur., Tetraphis pellucida Hedw., Sphagnum palustre L.); liverworts (Pellia epiphylla (L.) Corda, Conocephalum conicum (L.) Wiggers, Plagiochila asplenioides (L.) Dumort.), christmas fern (Polysticum acrostichoides (Michx.) Schott.), rattlesnake-root (Prenanthes altissima L.), Wild Hydrangea (Hydrangea arborescens L.), American basswood (Tilia americana L.), blue beech (Carpinus caroliniana Walt.), and beech (Fagus grandifolia Ehrh.).

Baeomyces absolutus is found sporadically on sandstone outcroppings of cliff faces throughout the western portion of Rocky Branch Nature Preserve, although nowhere else is Sphagnum associated with it. Most of these colonies are growing in drier and less shaded locations than at the typical habitat selected for this lichen and tend to have a smaller colony size and less abundant apothecia. It is only at Rocky Branch that Baeomyces absolutus was observed. The reported geographic range of this unusual lichen, regarded by Fink (1935) as rare, is rather limited, from West Virginia to eastern Missouri, southward to northern Alabama. The population at Rocky Branch is at or certainly near the northern edge of its range.

V. CLADONIS SUBTENUIS-CLADONIA FURCATA HABITAT

Location #V, map coordinates 3,5; fig. 9. On a hilltop above the Lepraria-Racodium Habitat on the south side of Rocky Branch Creek, large mats of two reindeer mosses, Cladonia subtenuis (Abb.) Evans and C. furcata (Huds.) Schrad. var. furcata Vain., can be found abundantly. Cladonia subtenuis with its whitish-gray color, lack of squamules, and delicate branching of the podetia contrasts with the dark green color, the presence of squamules, and the thicker and more robust podetia of Cladonia furcata.

There is an aggregation of these 2 species on the hilltop measuring approximately 25 yards long and 15 yards wide; they occur primarily where the hilltop slopes downward and less frequently in level areas where grasses and trees predominate. Although these lichens occur frequently elsewhere in Rocky Branch, few areas demonstrate as well the growth potential of these Cladonia species.

The light meter readings for this habitat on January 23, 1971 were 340 foot candles (500) at 8:30 a.m., 4100 (5000) at 12:00 p.m., and 750 (770) at 3:30 p.m. On January 16, 1971 the light readings were 2000 foot candles (5500) at 8:30 a.m., 7300 (10,000+) at 12:00p.m., and 650 (7500) at 3:30 p.m. These readings indicate this area receives near maximum sunlight at various times of the day, although at times it is partly shaded by the surrounding trees.

This hilltop area is bordered by a few beech (Fagus grandifolia Ehrh.) and white oak (Quercus alba L.), and interspersed with pignut hickory (Carya glabra (Mill.) Sweet), tulip tree seedlings (Liriodendron tulipifera L.), and other tree species. Among the lichens can be found dense mats of mosses, notably the wind swept moss (Dicranum scoparium Hedw.), and herbaceous vegetation. Additional lichen species found in this habitat are Cladonia cristatella Tuck. and C. chlorophaea (Flörke) Spreng. Associated plants of this area include the bryophytes (Leucobryum glaucum (Hedw.) Schimp., Dicranum scoparium Hedw., Polytrichum ohioense R. & C.), the herbaceous plants (Solidago nemoralis Ait., Liatris aspera Michx., Antennaria plantaginifolia (L.) Hook., Potentilla simplex Michx.), and the grasses (Andropogon scoparius Michx., Agrostis hyemalis (Walt.) BSP., Panicum huachucae Ashe). The tree species found are blue beech (Carpinus caroliniana Walt.), beech (Fagus grandifolia Ehrh.), tulip tree (Liriodendron tulipifera L.), sassafras

(Sassafras albidum (Nutt.) Neis.), pignut hickory (Carya glabra (Mill.) Sweet), white oak (Quercus alba L.), black oak (Quercus imbricaria Michx.), and ironwood (Ostrya virginiana (Mill.) K. Koch.).

VI. CLADONIA VERTICILLATA HABITAT

Location #VI, map coordinates 2,5; figs. 10 & 11. Only a few small plants of Cladonia verticillata (Hoffm.) Schaer., the ladder lichen, were found on a sparsely vegetated hilltop, on the south side of Rocky Branck Creek. The cup-shaped podetia of this species can be easily recognized because additional smaller cups proliferate from the center of the larger lower cups. Other species with cup-shaped podetia have instead branches arising from the rim of the cup or lack altogether branching of the podetia.

This is perhaps the rarest of the larger lichens in the preserve, since only five small colonies of this easily recognized species were found at this location, in addition to one colony being observed on the north side of Rocky Branch Creek in the habitat selected as typical for Cladonia cristatella (#XI).

The light meter readings for this habitat on January 23, 1971 were 380 foot candles (500) at 8:30 a.m., and 4500 (5000) at 12:00 p.m., and 690 (750) at 3:30 p.m. On June 16, 1971 the readings were 5000 foot candles (5500) at 8:30 a.m., 9300 (10,000+) at 12:00 p.m., and 6800 (7500) at 3:30 p.m. These readings indicate this location receives nearly the maximum sunlight available at all times of the day.

Associated plants in this location are several mosses (Bryum caespiticium Hedw., Leucobryum glaucum (Hedw.) Schimp), sedges (Carex hirsutella Mack., Carex artitecta Mack.), grasses (Aristida dichotoma Michx., Andropogon scoparius Michx., and Danthonia spicata (L.) Beauv.),

and other herbaceous plants (Aster pilosus Willd., Solidago nemoralis Ait., Solidago juncea Ait., Potentilla simplex Michx., Antennaria plantaginifolia (L.) Hook., Liatris aspera Michx., Hypericum punctatum Lam., Cirsium vulgare (Savi) Tenore, and Lespedeza virginica (L.) Britt.). Nearby woody plants of the habitat were blue beech (Carpinus caroliniana Walt.), beech (Fagus grandifolia Ehrh.), black oak (Quercus velutina Lam.), and white oak (Quercus alba L.).

Other species of Cladonia observed in this habitat are C. bacillaris (Ach.) Myl., C. chlorophaea (Flk.) Spreng., C. cristatella Tuck., C. capitata (Michx.) Spreng., C. furcata (Huds.) Schrad., and C. polycarpoides Nyl.

VII. PARMELIA-PHYSCIA HABITAT

Location #VII, map coordinates C, 3; fig. 12. The oak and hickory wooded hilltop on the south side of Rocky Branch Creek selected for this habitat contains an abundance of foliose lichens. This hilltop slopes downward, faces a northerly direction, and is shaded but rather open, the ground being covered sporadically with mats of mosses and lichens, and some herbaceous plants. Foliose lichens with their characteristic rosette-like growth pattern are usually quite noticeable against the darker hued bark of their tree host. Parmelia caperata (L.) Ach., a sizable yellowish-green foliose lichen, occurs in large masses on the basal areas of many trees and is readily observed. Parmelia rudecta Ach., a bluish-gray foliose form, grows in smaller rosettes and usually is more versatile in the heights of the tree trunk it occupies. These two foliose forms are common on many tree species in this habitat but seem to produce the largest colonies and to be of greatest frequency on the rough barked oaks. The smaller more finely branched foliose lichens,

such as species of Physcia, are also abundant on trees, but, in this location, are more difficult to see. Physcia millegrana Degel. and Physcia stellaris (L.) Nyl., two very common lichens in this habitat, usually appear as very small rosettes having a bluish or whitish gray color. In contrast, the small foliose species, Candelaria concolor (Dicks.) Stein., is a bright yellowish-green color and is rather noticeable.

A quadrant measuring 90 feet long and 39 feet wide was set up on this hilltop and the number of trees occurring in this quadrant were counted and surveyed for lichen growth. It contained 85 trees, all of which had lichens growing on them and most of them had foliose species. The trees in this quadrant included several species of oak, several hickories, and sugar maple; understory trees were dogwood and ironwood. White oak was the most abundant with 25 of the trees being this species.

The foliose lichens occurring in this habitat on the trunk and branches of trees are Parmelia aurulenta Tuck., P. caperata (L.) Ach., P. rudecta Ach., Physcia aipolia (Ehrh.) Hampe, P. millegrana Degel., P. orbicularis (Neck.) Poetsch., P. stellaris (L.) Nyl., P. tribacoides Nyl., Anaptychia speciosa (Wulf.) Mass., Pyxine sorediata (Ach.) Mont., and Candelaria concolor (Dicks.) Stein. Crustose lichens include Graphis scripta (L.) Ach., Pertusaria pustulata (Ach.) Duby, and Lepraria aeruginosa (Wigg.) Sm. Lichens occurring on soil in this habitat are Cladonia cristatella Tuck., and C. polycarpoides Nyl.

For this habitat the light meter readings were taken near two trees, one containing Parmelia caperata at the base, and the other tree containing P. rudecta a few feet above the ground level. The tree containing Parmelia caperata had the lichen on all sides of its base, consequently light meter readings were taken on all sides of the tree. In contrast Parmelia rudecta occurred as rosettes a few feet above the

ground, and on only one position for a light reading. The light meter readings for Parmelia caperata on January 23, 1971 were north 240 foot candles (500), east 420, south 340, and west 240 at 8:30 a.m.; north 400 (5000), east 4300, south 3500, and west 600 at 12:00 p.m.; north 330 (770), east 710, south 670, and west 620 at 3:30 p.m. On June 16, 1971 the readings for Parmelia caperata were north 360 foot candles (5500), east 650, south 2800, and west 250 at 8:30 a.m.; north 450 (10,000+), east 340, south 470, and west 1800 at 12:00 p.m.; north 1200 (7500), east 160, south 1700, and west 1600 at 3:30 p.m. For Parmelia rudecta the light meter readings on January 23, 1971 were 220 (500) at 8:30 a.m., 400 (5000) at 12:00 p.m., and 450 (770) at 3:30 p.m. On June 16, 1971 the light readings were 200 foot candles (5500) at 8:30 a.m., 310 (10,000+) at 12:00 p.m., and 550 (7500) at 3:30 p.m. The readings for Parmelia caperata are quite variable suggesting that this species grows well in both shaded and sunny conditions, since the appearance of the lichen was similar in both conditions. For Parmelia rudecta, however, the readings indicate a more shaded condition.

Associated plants found in this habitat are several bryophytes (Dicranum scoparium Hedw., Leucobryum glaucum (Hedw.) Schimp., Polytrichum ohioense R. & C., Atrichum angustatum (Brid.) Bry. Eur.) and herbaceous plants (Solidago nemoralis Ait., Antennaria plantaginifolia (L.) Hook., Luzula bulbosa (Wood) Rydb., Panicum huachucae Ashe, and Krigia biflora (Walt.) Blake). The woody plants found associated here are blue beech (Carpinus caroliniana Walt.), beech (Fagus grandifolia Ehrh.), sugar maple (Acer saccharum Marsh.), sassafras (Sassafras albidum (Nutt.) Neis.), dogwood (Cornus florida L.), ironwood (Ostrya virginiana (Mill.) K. Koch., pignut hickory (Carya glabra (Mill.) Sweet), shagbark hickory

(Carya ovata (Mill.) K. Koch), mockernut hickory (Carya tomentosa (Poir.) Nutt., black oak (Quercus velutina Lam.,), red oak (Quercus rubra L.), and white oak (Quercus alba L.).

VIII. LECIDEA ALBOCAERULESCENS HABITAT

Location #VIII, map coordinates 2.5, C. A large wedge of sandstone approximately 5 feet long and 3 feet wide, almost completely covered with Lecidea albocaerulescens (Wulf.) Ach., the pearl-button lichen, located on the east side of Rocky Branch Creek was selected for the typical habitat of this conspicuous crustose lichen. This west-facing rock lies a few feet above the creek. It occupies a moist situation and is shaded, except at midday, by the surrounding hillside and by sugar maple and blue beech trees. The pale greenish-gray crust of Lecidea albocaerulescens with its black apothecia frosted whitish is quite noticeable against the dark shaded rocks. Colonies of the lichen are scattered throughout Rocky Branch on shaded rocks, but this colony is probably the largest of this species in the preserve.

The light meter readings for this habitat on January 23, 1971 were 220 foot candles (500) at 8:30 a.m., 1900 (5000) at 12:00 p.m., and 410 (770) at 3:30 p.m. On June 16, 1971 the light readings were 85 candles (5500) at 8:30 a.m., 150 (10,000+) at 12:00 p.m., and 180 (7500) at 3:30 p.m. These readings indicate this habitat is well shaded for most of the day, especially in summer.

Growing also on this rock are several mosses (Brachythecium oxycladon (Brid.) J. & S., Brachythecium salebrosum (W. & M.) Bry. Eur., Hypnum curvifolium Hedw., Bartramia pomiformis Hedw., Plagiothecium mullerianum Schimp). Nearby are sugar maple (Acer saccharum Marsh.), and blue beech (Carpinus caroliniana Walt.), as well as the common tickle grass (Agrostis hyemalis (Walt.) BSP.).

Although this noticeable lichen is described as very common in New England and other parts of eastern U.S., locally it has been noted in only one other location in addition to Rocky Branch, a rocky woodland approximately two miles north-west of Rocky Branch (SE ¼, Sect. 24 R13W, T12N).

IX. DERMATOCARPON MINIATUM HABITAT

Location #IX, map coordinates 8, E; figs. 13 & 14. On the west side of Rocky Branch Creek Dermatocarpon miniatum (L.) Mann., the cliff wafer, is found abundantly on a sandstone ledge protruding from an east facing hillside. The pale brownish-gray color of this foliose lichen tends to blend with the sandstone but contrasts markedly with the green color of the mosses present. At this location the sandstone ledge is kept rather moist by natural springs. This species is found sporadically in Rocky Branch on rock outcroppings, most commonly in shaded ravines.

The light meter readings for this habitat on January 23, 1971 were 180 foot candles (500) at 8:30 a.m., 4500 (5000) at 12:00 p.m., and 260 (770) at 3:30 p.m. On June 16, 1971 the light readings were 35 foot candles (7000) at 8:30 a.m., 430 (10,000+) at 12:00 p.m., and 14 (7500) at 3:30 p.m. The summer readings indicate this location is quite shaded all day, although in winter there is considerable sunlight.

Associated plants found in this habitat are the bryophytes (Plagiochila asplenioides (L.) Dumort., Brachythecium salebrosum (W. & M.) Bry. Eur., Eurhynchium serrulatum Hedw.) Kindb., Plagiothecium mullerianum Schimp., Porella platyphylloidea (Schwein.) Lindb.), and the christmas fern (Polystichum acrostichoides (Michx.) Schott). The

tree species present were sugar maple (Acer saccharum Marsh.), American bladdernut (Staphylea trifolia L.), blue beech (Carpinus caroliniana Walt.), and black oak (Quercus velutina Lam.).

Of all locations examined in the various counties, only Rattlesnake Hollow of Effingham County and a rocky location in Coles County contained this lichen. At Rattlesnake Hollow only a small area of it was observed on one outcropping.

X. LEPRARIA AERUGINOSA-CLADONIA CHLOROPHAEA HABITAT

Location #X, map coordinates 1, 2; fig. 15. On a south-facing sandstone cliff that receives varying amounts of sunshine and moisture Lepraria aeruginosa (Wigg.) Sm. and Cladonia chlorophaea (Flk.) Spreng. predominate, accompanied by smaller quantities of Baeomyces absolutus Tuck., Lecidea albocaerulescens (Wulf.) Ach., and Dermatocarpon miniatum (L.) Mann. This cliff face is approximately eighty yards long and borders the north side of Rocky Branch Creek. This sandstone cliff, as with so many others in Rocky Branch, has been notched and grooved by stream action and portions of it are shaded by trees. Dermatocarpon miniatum, Baeomyces absolutus, and Lecidea albocaerulescens grow on the shaded and damper areas of the exposed sandstone rock, while Lepraria aeruginosa and Cladonia chlorophaea occur where there is more sun and less moisture. Lepraria, with its sterile powdery gray crust, is the most abundant lichen on the cliff face with the remaining species occurring more sparingly than in the other more favorable locations they inhabit at Rocky Branch. Cladonia chlorophaea typically grows on soil and it might be expected that its growth on rock would not be as luxuriant. Dermatocarpon miniatum, Baeomyces absolutus, and Lecidea albocaerulescens are restricted to rocks, and undoubtedly the

drier conditions at this habitat account for the restricted growth of these species.

Many portions of this habitat receive continuous sunlight, while others are partly shaded or completely shaded. Since the light conditions in this habitat are extremely variable three locations were selected for light meter readings, shaded, partially shaded, and sunny. The light meter readings on January 23, 1971 were 130 shade, 240 part. shade, 850 sun foot candles (550) at 8:30 a.m.; 1600 shade, 2500 part. shade, 6000 sun (5000) at 12:00 p.m.; 220 shade, 550 part. shade, and 770 sun (770) at 3:30 p.m. On June 16, 1971 the light meter readings were 70 shade, 150 part. shade, 800 sun (5500) at 8:30 a.m.; 130 shade, 200 part. shade, 1200 sun (10,000+) at 12:00 p.m.; 24 shade, 100 part. shade, 120 sun (7500) at 3:30 p.m. The winter light readings indicate this location receives abundant sunlight, while summer light readings indicate the area, even at midday, is quite shaded.

Associated plants found in this habitat are mosses (Leucobryum glaucum (Hedw.) Schimp., Polytrichum piliferum Hedw., Platygyrium repens (Brid.) Bry. Eur., Brachythecium salebrosum (W. & M.) Bry. Eur.) and a liverwort (Porella pinnata L.). The tree species shading this location are red maple (Acer rubrum L.), sugar maple (Acer saccharum Marsh.), tulip tree (Liriodendron tulipifera L.), blue beech (Carpinus caroliniana Walt.), beech (Fagus grandifolia Ehrh.), ironwood (Ostrya virginiana (Mill.) K. Koch.), black oak (Quercus velutina Lam.), and white oak (Quercus alba L.).

XI. CLADONIA CRISTATELLA HABITAT

Location #XI, map coordinates 5, 3; figs. 16 & 17. Cladonia cristatella Tuck., the red cap or British soldiers lichen, is very abundant in this upland field region located on the north side of

Rocky Branch Creek. This is the most common Cladonia having club-shaped podetia with red apothecia collected in Rocky Branch. This species abounds in exposed areas where the vegetation is sparse; where other plant forms become abundant, such as, grass, it disappears. Although it grows under shaded conditions of the nearby forest it occurs less frequently. Cladonia cristatella is perhaps the most widespread lichen in Rocky Branch, occurring on a variety of substrates in addition to soil, such as wood or rock,and under varied environmental conditions. However, it is definitely most prolific where competing vegetation is reduced and maximum exposure to sunlight is available.

The light meter readings for this habitat on January 23, 1971, were 440 foot candles (500) at 8:30 a.m., 5000 (5000) at 12:00 p.m., and 710 (770) at 3:30 p.m. On June 16, 1971 the light meter readings were 6200 (5500) at 8:30 a.m., 10,000+ (10,000+) at 12:00 p.m., and 6,600 (7500) at 3:30 p.m. These readings indicate this is an exposed location that receives maximum sunlight most of the day.

Associated plants include mosses (Cephalozia media (Lindb., Ditrichum pallidum (Hedw.) Hampe, Atrichum angustatum (Brid.) Bry. Eur.), and several species of herbs (Andropogon scoparius Michx., Solidago nemoralis Ait., Danthonia spicata (L.) Beauv., Antennaria plantaginifolia (L.) Hook., Erigeron pulchellus Michx., Potentilla simplex Michx.). Seedlings of shingle oak (Quercus imbricaria Michx.) and black oak (Quercus velutina Lam.) were present.

XII. CYPHELIUM TIGILLARE-CANDELARIA CONCOLOR-PHYSCIA MILLEGRANA HABITAT

Location #XII, map coordinates 6, 3; fig. 18. Two crustose lichens Cyphelium tigillare Ach., the post lichen, and Candelaria concolor (Dicks.) Stein., the lemon tree lichen, and a small foliose lichen,

Physcia millegrana Degel., are representative of the abundant foliose-crustose lichens growing on a large red oak tree growing in an upland field on the north side of Rocky Branch Creek. The tree is quite isolated and receives abundant sunlight, being partly shaded only when the sun is behind the nearby forest trees. Parmelia rudecta Ach. and P. caperata (L.) Ach., two foliose species commonly forming large rosettes on oak trees, are present only as small rosettes near the base of the tree, perhaps the result of their exposure to abundant sunlight. It is interesting to note that Arthonia impolita (Ehrh.) Borr., a crustose species, is found only on the north side of the tree up to a height of five feet where lower light intensities predominate, while Candelaria concolor and Physcia stellaris (L.) Nyl. are found on all sides of the tree trunk. Physcia stellaris occupies varying heights of the tree, being found as high as fifteen feet from the ground, with P. millegrana occurring in close association with it.

The light meter readings for this habitat are reported for all sides of the tree in order to give some idea of the varying light conditions present around the trunk as light intensities change throughout the day. On January 23, 1971, the light readings were 280 foot candles (550) north, 440 east, 400 south, 250 west at 8:30 a.m.; 500 (6000) north, 6000 east, 5000 south, 3000 west at 12:00 p.m.; and 310 (770) north, 520 east, 620 south, 800 west at 3:30 p.m. On June 16, 1971, the light meter readings were 4500 north, 7000 east, 3500 south, 850 west (7000) at 8:30 a.m.; 1600 north, 2000 east, 2000 south, 2000 west (10,000+) at 12:00 p.m.; and 1100 north, 840 east, 1200 south, 1500 west (7500) at 3:30 p.m. These readings indicate the tree trunk is exposed to abundant sunlight on almost every side of the tree throughout the day.

Associated plants for this habitat were little bluestem (Andropogon scoparius Michx.), flowering spurge (Euphorbia corollata L.), milkwort (Polygala sanguinea L.), mountain mint (Pycnanthemum flexuosum (Walt.) BSP.), yarrow (Achillea millefolium L.), smooth sumac (Rhus glabra L.), apple tree (Malus pumila Mill.), pignut hickory (Carya glabra (Mill.) Sweet), and red oak (Quercus rubra L.).

XIII. CLADONIA CHLOROPHAEA HABITAT

Location #XIII, map coordinates 4, 3; fig. 19. On the north side of Rocky Branch a shaded and sparsely vegetated south-facing slope was selected as the typical habitat for Cladonia chlorophaea (Flk.) Spreng., one of the pyxie-cup lichens, a very common species with cup-shaped podetia. Cladonia chlorophaea occurs with the greatest frequency on soil in shaded locations, disappearing gradually as it spreads outward into the exposed areas of nearby upland fields. When this lichen occurs on sandstone or on the basal portion of tree trunks, however, usually only a few of the cup-shaped podetia are present.

Cladonia conista (Ach.) Robb., a related lichen with cup-shaped podetia, has finely grained powdery soredia rather than the coarse granular soredia of Cladonia chlorophaea. Cladonia conista was not found in this habitat but does occur sparingly on a hilltop near the entrance to the preserve. It is also probable that additional related forms with cup-shaped podetia exist in the preserve, but many of these forms require microchemical crystal tests to determine the species. Hale (1969) considers these chemical variants as races of Cladonia chlorophaea and no attempt was made by the author to separate or identify these chemical races. Consequently, cup forms resembling Cladonia chlorophaea are placed under that scientific name.

Additional lichens found in this habitat are Cladonia cristatella, C. polycarpoides, and C. coniocraea, the powder horn lichen. It is perhaps worth noting that in this shaded habitat Cladonia cristatella occurs very sparsely in contrast to the dense growth observed in the open upland field (Habitat #XI). Cladonia chlorophaea is found throughout Rocky Branch on a variety of substrates and in association with a number of other lichens. Cladonia furcata, a soil inhabiting lichen, is a common associate in many locations, and Parmelia caperata and Physcia orbicularis are frequent on the trunks of nearby trees.

The light meter readings for this habitat on January 23, 1971 were 340 foot candles (500) at 8:30 a.m., 5000 (5000) at 12:00 p.m., and 510 (770) at 3:30 p.m. On June 16, 1971 the light meter readings were 630 foot candles (5500) at 8:30 a.m., 1400 (10,000+) at 12:00 p.m., and 310 (7500) at 3:30 p.m. These readings indicate a shaded condition in the summer with considerable sunlight available in the winter.

The forest floor of this habitat is quite open and rather sparsely vegetated. Associated plants include mosses (Ditrichum pallidum (Hedw.) Hampe, Atrichum angustatum (Brid.) Bry. Eur., Bryum caespiticium Hedw.), two grasses (Panicum dichotomum L., Panicum microcarpon Muhl.), and herbaceous composites (Solidago nemoralis Ait., Erigeron pulchellus Michx.). The trees found sheltering this habitat include sassafrass (Sassafras albidum (Nutt.) Nees.), pignut hickory (Carya glabra (Mill.) Sweet), shingle oak (Quercus imbricaria Michx.), black oak (Quercus velutina Lam.), and white oak (Quercus alba L.).

Cladonia chlorophaea is abundant and widely distributed in this area occurring in almost all of the locations checked by the author.

XIV. PARMELIA CONSPERSA HABITAT

Location #XIV and a, map coordinates 7, 3. Parmelia conspersa (Ach.) Ach., with its yellowish foliose thallus and numerous brown apothecia, can be found on a large sandstone outcropping several yards northeast of the Caloplaca cerina-Endocarpon pusillum Habitat (#1). The large yellowish-green rosettes of this lichen were not observed elsewhere in Rocky Branch. This location is very exposed to sunlight, which this lichen seems to prefer for growth, although a few trees border this outcropping.

The light meter readings for this habitat on January 23, 1971 were 285 foot candles (500) at 8:30 a.m., 3500 (5000) at 12:00 p.m., and 770 (770) at 3:30 p.m. On June 16, 1971 the light readings were 1100 (7000) at 8:30 a.m., 10,000+ (10,000+) at 12:00 p.m., and 4200 (7500) at 3:30 p.m. These light readings indicate this lichen is present in a location receiving nearly maximum sunlight all day.

Additional lichens growing on the same rock outcropping with Parmelia conspersa are Physcia orbicularis (Neck.) Poetsch., Rinodina sophodes (Ach.) Mass., Cladonia chlorophaea (Flörke) Spreng., and C. coniocraea (Flk.) Spreng. Associated mosses of this rock are Platygyrium repens (Brid.) Bry. Eur., Atrichum angustatum (Brid.) Bry. Eus., Cephalozia media Lindb. Nearby trees include sassafras (Sassafras albidum (Nutt.) Nees.), shingle oak (Quercus imbricaria Michx.), and black oak (Quercus velutina Lam.).

DESCRIPTION OF GROWTH STUDY HABITATS

Three locations were selected for long range growth studies. Each location supports a distinctive lichen species growing on sandstone and can be identified by a numbered aluminum tag nailed to the rock. On the map of Rocky Branch these growth study habitats are designated by a lower case letter.

a. PARMELIA CONSPERSA GROWTH STUDY HABITAT

Location a, map coordinates 7, 3; fig. 20. On the sandstone outcropping described under the Parmelia conspersa habitat (XIV) is a Parmelia conspersa colony used for the long term growth study of this lichen. The colony chosen at random is typical of this foliose lichen and has an aluminum tag with the number 333 and date September, 1970 placed near it (fig. 20). The colony is composed of two rosettes, the largest measuring 9.5 cm. by 8.5 cm. and the smaller rosette measuring 5.5 cm. by 4 cm.

b. BAEOMYCES ABSOLUTUS GROWTH STUDY HABITAT

Location b, map coordinates 1.7, 3.5; figs. 21 & 22. The Baeomyces absolutus Tuck. colony selected for a long term growth study is located just east of the Baeomyces absolutus habitat (#IV) and identified by an aluminum tag, attached on September 19, 1970, with the number 222. The colony measures 27 cm. in length and 25 cm. in width, with a large number of apothecia present. The sandstone cliff on which the colony is located faces north, is very moist, and is well shaded.

The light meter readings for this habitat on January 23, 1971, were 120 foot candles (550) at 8:30 a.m., 220 (5000) at 12:00 p.m., and 210 (770) at 3:30 p.m.; on June 16, 1971 were 260 foot candles (5500) at 8:30 a.m., 310 (10,000+) at 12:00 p.m., and 220 (7500) at 3:30 p.m. These readings indicate this colony is growing in a very well-shaded location.

Other plants associated with this colony are a number of mosses (Leucobryum glaucum (Hedw.) Schimp., Tetraphis pellucida Hedw., Thuidium recognitum (Hedw.) Lindb., Calliergonella schreberi (Brid.) Grout., Scapania nemorsa (L.) Dumort., Ditrichum pallidum (Hedw.) Hampe.), several liverworts (Cephalozia media Lindb., and Pellia epiphylla (L.) Corda), christmas fern (Polystichum acrostichoides (Michx.) Schott,, lady fern (Athyrium angustum Willd.) Presl.) lousewort (Pedicularis canadensis L., partridge-berry (Mitchella repens L.), and blue beech (Carpinus caroliniana Walt.).

c. LECIDEA ALBOCAERULESCENS GROWTH STUDY HABITAT

Location c, map coordinates 4, 5; fig. 23. The colony of Lecidea albocaerulescens (Wulf.) Ach. used for this growth study is located at a height of approximately 5 feet on a cliff face adjacent to the Lepraria-Racodium Habitat (Habitat #3). The colony is labeled with an aluminum tag having the number 444 and the date of September, 1970. This colony of Lecidea albocaerulescens is circular in form, measuring 16 cm. long and 14.5 cm. wide, with a large number of apothecia present. The colony faces southwest and receives considerable sunlight in the afternoon hours. The location is partially shaded by white oak, blue beech, and flowering dogwood trees. This location was chosen because of its remoteness and the probability of its not being disturbed.

The light meter readings for this habitat on January 23, 1971, were 180 foot candles (500) at 8:30 a.m., 3300 (5000) at 12:00 p.m., and 700 (770) at 3:30 p.m. On June 16, 1971 the light readings were 60 foot candles (5500) at 8:30 a.m., 170 (10,000+) at 12:00 p.m., and 250 (7500) at 3:30 p.m. These readings indicate the habitat is well shaded in the summer, but receives abundant sunlight in winter when the foliage is off the nearby trees.

Other lichens in addition to Lecidea albocaerulescens present on this rock outcropping are Lepraria aeruginosa (Wigg.) Sm. and Baeomyces absolutus Tuck. Associated plants around this colony are mosses (Leucobryum glaucum (Hedw.) Schimp., Dicranum scoparium (Hedw.), Ditrichum pallidum (Hedw.), Hampe, Plagiochila asplenioides (L.) Dumort., Polytrichum ohioense R. & C.), christmas fern (Polystichum acrostichoides (Michx.) Schott.), and flowering dogwood (Cornus florida L.), blue beech (Carpinus caroliniana Walt.), and white oak (Quercus alba L.).

LIST OF LICHENS COLLECTED

The lichens in this list are arranged according to Hale and Culberson (1966). This list includes the lichens collected in Rocky Branch and the six other locations visited by the author. The area, county, and date of collection follows the name. Those lichens collected at Rocky Branch are listed under Clark County with the area of collection not indicated. Any lichen not collected in Rocky Branch is preceded by an asterisk (*).

Order Sphaeriales

Family Verrucariaceae

*1. Verrucaria muralis Ach. Clark Co.: Rocky Hollow, June 17, 1969. On sandstone.

2. Verrucaria viridula (Schrad.) Ach. Clark Co.: Apr. 11, 1971. Identified by W. Whiteside. On concrete well covering.

3. Dermatocarpon miniatum (L.) Mann. Clark Co.: Sept. 7, 1970. Effingham Co.: Rattlesnake Hollow, Aug. 15, 1969. On sandstone outcropping.

4. Endocarpon pusillum Hedw. Clark Co.: Apr. 11, 1971. Identified by W. Whiteside. On concrete well covering.

Order Pleosporales

Family Arthopyreniaceae

5. Trypethelium virens Tuck. Clark Co.: July 9, 1970. On Carpinus and Fagus.

Order Caliciales

Family Caliciaceae

6. Calicium albonigrum Nyl. Clark Co.: July 2, 1970. On Carpinus with Arthonia impolita.

Family Cypheliaceae

7. Cyphelium tigillare Ach. Clark Co.: July 16, 1970. On dead limb of Quercus.

Order Myrangiales

Family Arthoniaceae

8. Arthonia impolita (Ehrh.) Borr. Clark Co.: July 2, 1970; July 16, 1970; July 24, 1970; and Nov. 1, 1970. Coles Co.: Nov. 1968. On Carpinus and other tree species.

Order Lecanorales

Family Graphidaceae

9. Graphis scripta (L.) Ach. Clark Co.: July 24, 1970; Aug. 20, 1970; Nov. 1, 1970. Coles Co.: Nov. 1968. On Carpinus, Fagus, and Carya.

Family Collemaceae

10. Collema subfurvum (Müll. Arg.) Degel. Clark Co.: May 22, 1971. Collected and identified by W. Whiteside.

Family Peltigeraceae

11. Peltigera canina (L.) Willd. Clark Co.: Apr. 12, 1970; July 24, 1970. Rocky Hollow, June 17, 1969. Coles Co.: Nov. 1968. On soil and over mosses.

Family Lecideaceae

12. Bacidia inundata (E. Fries) Koerb. Clark Co.: Apr. 11, 1970. On concrete bridge abutment.

*13. Catillaria chalybeia (Borr.) Mass. Clark Co.: Rocky Hollow, June 17, 1969. On sandstone.

14. Lecidea albocaerulescens (Wulf.) Ach. Clark Co.: Apr. 12, 1970. On sandstone.

15. Lecidea coarctata (J. E. Smith) Nyl. Clark Co.: July 24, 1970. On rock.

16. Lecidea macrocarpa (DC.) Steud. Clark Co.: July 16, 1970. On sandstone.

17. Lecidea sylvicola Flot. Clark Co.: July 2, 1970; July 24, 1970. On rocks.

Family Cladoniaceae

18. Baeomyces absolutus Tuck. Clark Co.: Aug. 20, 1970. On sandstone.

19. Cladonia bacillaris (Ach.) Nyl. Clark Co.: Oct. 17, 1970. On old wood.

20. Cladonia caespiticia (Pers.) Flk. Clark Co.: July 16, 1970; July 24, 1970; and Oct. 17, 1970. On soil.

21. Cladonia capitata (Michx.) Spreng. Clark Co.: July 24, 1970. Coles Co.: Lakeside Park, Nov. 1968. On soil.

22. Cladonia chlorophaea (Flk.) Spreng. Clark Co.: July 16, 1970; July 24, 1970; Sept. 19, 1970; Oct. 17, 1970; Jan. 23, 1971. Rocky Hollow, June 17, 1969. Coles Co.: Nov. 1968. On soil.

23. Cladonia coniocraea (Flk.) Spreng. Clark Co.: July 24, 1970; Oct. 17, 1970. Coles Co.: Lakeview Park, Nov. 1968. Effingham Co.: Teutopolis-Elliotstown Road, Oct. 12, 1968. On soil, wood, and sandstone.

24. Cladonia conista (Ach.) Robb. Clark Co.: Dec. 6, 1969. Identified and collected by W. Whiteside. July 24, 1970. On soil.

25. Cladonia cristatella Tuck. Clark Co.: June 30, 1970; July 16, 1970; July 24, 1970; Sept. 19, 1970; Oct. 17, 1970. Coles Co.: Lakeview Park, Nov. 1968. On soil and wood.

26. Cladonia cylindrica (Evans) Evans. Clark Co.: On sandstone.

27. Cladonia furcata (Huds.) Schrad. Clark Co.: July 24, 1970; Oct. 17, 1970; Sept. 19, 1970. Rocky Hollow, June 17, 1969. Coles Co.: Lakeview Park, Now., 1968. On soil.

28. Cladonia piedmontensis Merr. Clark Co.: July 16, 1970. On soil.

29. Cladonia pleurota (Flk.) Schaer. Clark Co.: July 16, 1970; Jan 23, 1971. Rocky Hollow, June 17, 1969. On soil.

30. Cladonia polycarpoides Nyl. Clark Co.: July 16, 1970; July 24, 1970; Sept. 19, 1970; and Oct. 17, 1970. Rocky Hollow, June 17, 1969. Coles Co.: Lakeview Park, Nov. 1968. On soil.

31. Cladonia verticillata (Hoffm.) Schaer. Clark Co.: Dec. 6, 1969; July 16, 1970. On soil.

32. Cladonia subtenuis (Abb.) Evans. Clark Co.: July 24, 1970; Sept. 19, 1970. Rocky Hollow, June 17, 1969. On soil.

Family Pertusariaceae

33. Pertusaria multipuncta (Turn.) Nyl. Clark Co.: July 24, 1970. On tree bark.

34. Pertusaria pertusa (L.) Tuck. Clark Co.: Aug. 20, 1970; Apr. 11, 1971. On Carpinus and Fagus.

35. Pertusaria pustulata (Ach.) Duby. Clark Co.: July 16, 1970; Nov. 1, 1970. Rocky Hollow, June 17, 1969. Coles Co.: Lakeview Park, Nov. 1968. On Carya.

36. Pertusaria velata (Turn.) Nyl. Clark Co.: July 2, 1970; July 24, 1970; May 22, 1971, Identified by W. Whiteside. On tree bark.

Family Acarosporaceae

37. Sarcogyne clavus (Ram.) Kremp. Clark Co.: July 24, 1970. Rocky Hollow, June 17, 1969. On sandstone.

*38. Sarcogyne simplex (Dav.) Nyl. Clark Co.: Rocky Hollow, June 17, 1969. On sandstone.

Family Lecanoraceae

39. Lecanora hageni Ach. Clark Co.: July 16, 1970. On concrete bridge abutment.

40. Lecanora subfusca (L.) Ach. var. argentata Ach. Clark Co.: Nov. 1, 1970. On Carya.

41. Lecanora varia (Ehrh.) Ach. Clark Co.: Oct. 17, 1970. On Quercus.

Family Teloschistaceae

42. Caloplaca cerina (Ehrh.) T. Fries. Clark Co.: Apr. 11, 1970. Identified by W. Whiteside. Rocky Hollow, June 17, 1969. On concrete and rocks.

*43. Xanthoria fallax (Hepp.) Arn. Coles Co.: east of Charleston, Ill., Dec. 28, 1970; Charleston, July 15, 1971. On tree bark.

Family Physciaceae

44. Anaptychia obscurata (Nyl.) Vain. Clark Co.: July 24, 1970; Oct. 17, 1970; and June 16, 1971. Effingham Co.: Green Creek, Aug. 15, 1968. On Quercus.

45. Anaptychia speciosa (Wulf.) Mass. Clark Co.: Oct. 17, 1970; June 16, 1971. Effingham Co.: Green Creek, Aug. 15, 1968; Teutopolis-Elliotstown Road, Oct. 12, 1968; Rattlesnake Hollow, Aug. 15, 1969. On tree bark.

*46. Buellia punctata (Hoffm.) Mass. Coles Co.: Lakeview Park, Nov. 1968. On tree bark.

*47. Buellia spuria (Schaer.) Anzi. Clark Co.: Rocky Hollow, June 17, 1969. On sandstone.

48. Buellia vernicoma (Tuck.) Tuck. Clark Co.: April 12, 1970. On sandstone.

49. Rinodina milliaria Tuck. Clark Co.: July 16, 1970. On tree bark.

50. Rinodina ocellata (Hoffm.) Arn. Clark Co.: Apr. 3, 1967, identified by W. Whiteside; July 16, 1970. On sandstone.

51. Pyxine caesiopruinosa (Nyl.) Imsh. Clark Co.: July 2, 1970; July 16, 1970; and Nov. 1, 1970. On Quercus and Carya.

52. Pyxine sorediata (Ach.) Mont. Clark Co.: July 16, 1970; July 24, 1970. Effingham Co.: Lake Sara, July 1, 1968. On Carya.

53. Physcia aipolia (Ehrh.) Hampe. Clark Co.: July 24, 1970; June 16, 1971. On Quercus and other tree species.

54. Physcia millegrana Degel. Clark Co.: July 16, 1970; July 24, 1970; Oct. 17, 1970; Nov. 1, 1970; and June 16, 1971. Rocky Hollow, June 17, 1969. Coles Co.: Lakeview Park, Nov. 1968. Effingham Co.: Lake Sara, July 1, 1968; Green Creek, Aug. 15, 1968. On Carya, Quercus, and other tree species.

55. Physcia orbicularis (Neck.) Poetsch. Clark Co.: July 16, 1970; Oct. 17, 1970; and June 16, 1971. On Carya, and on sandstone with Parmelia conspersa.

56. Physcia orbicularis (Neck.) Poetsch. f. albociliata (Bouly de Lesd.) Thoms. Clark Co.: July 16, 1970; Aug. 20, 1970. Identified by W. Whiteside. On concrete abutment.

57. Physcia orbicularis (Neck.) Poetsch. f. rubropulchra. Degel. Clark Co.: July 2, 1970; July 16, 1970. Effingham Co.: Lake Sara, July 1, 1968. On Carya.

58. Physcia stellaris (L.) Nyl. Clark Co.: July 16, 1970; July 24, 1970; Aug. 20, 1970; and June 16, 1971. Coles Co.: Lakeview Park, Nov. 1968. Effingham Co.: Green Creek, Aug. 15, 1968. On Quercus, Carpinus, and other tree species.

59. Physcia tribacoides Nyl. Clark Co.: July 24, 1970; June 16, 1971. On Quercus.

Family Parmeliaceae

60. Candelaria concolor (Dicks.) Stein. Clark Co.: July 24, 1970; Aug. 20, 1970. Coles Co.: Lakeview Park, Nov. 1968. Effingham Co.: Lake Sara, July 1, 1968; Teutopolis-Elliotstown Road, Oct. 12, 1968; Lake Sara, July 1, 1968. On Quercus, Carpinus and other tree species.

61. Candelaria concolor (Dicks.) Stein. var. effusa (Tuck.) Merrill and Burnh. Clark Co.: July 24, 1970. On tree bark.

62. Parmelia aurulenta Tuck. Clark Co.: July 16, 1970; June 16, 1971. Effingham Co.: Green Creek, Aug. 15, 1968; Teutopolis-Elliotstown Road, Oct. 12, 1968. On Quercus and soil.

63. Parmelia bolliana Müll. Arg. Clark Co.: July 16, 1970. On tree bark.

64. Parmelia caperata (L.) Ach. Clark Co.: July 16, 1971; July 24, 1970; and Nov. 1, 1970. Rocky Hollow, June 17, 1969. Effingham Co.: Lake Sara, July 1, 1968. On Fagus and Quercus spp.

65. Parmelia conspersa (Ach.) Ach. Clark Co.: July 16, 1970. On sandstone.

66. Parmelia hypotropa Nyl. Clark Co.: Oct. 17, 1970, July 12, 1971. On Carya and Quercus.

67. Parmelia rudecta Ach. Clark Co.: July 24, 1970; Oct. 17, 1970; and June 16, 1971. Rocky Hollow, June 17, 1969. Coles Co.: Lakeview Park, Nov. 1968. Effingham Co.: Lake Sara, July 1, 1968; Green Creek, Aug. 15, 1968; Teutopolis-Elliotstown Road, Oct. 12, 1968. On Quercus and other tree species.

68. Parmelia subtinctoria Zahlbr. Clark Co.: July 16, 1970. On Quercus.

Class Fungi Imperfecti

69. Lepraria aeruginosa (Wigg.) Sm. Clark Co.: July 24, 1970; Oct. 17, 1970; and June 16, 1971. Effingham Co.: Green Creek, Aug. 15, 1968. On Quercus, other tree species, and sandstone.

70. Racodium rupestre Pers. Clark Co.: July 2, 1970. On sandstone cliff face with Lepraria aeruginosa.

KEY TO THE LICHENS OF ROCKY BRANCH

A few lichens not collected in Rocky Branch but likely occurring there are also included in this key.

1a. Thallus foliose; lobes flattened, with a distinct upper and lower surface.....2

1b. Thallus not foliose.....3

2a. Thallus stratified (layered), with a white or brightly colored medulla and a thin green algal layer..... .....I. Stratified Foliose Lichens (p. 53).

2b. Thallus without internal layers, the medulla dark or black.....II. Gelatinous Lichens (p. 55).

3a. Thallus umbilicate, round in outline and attached by a single cord below.....III. Umbilicate Lichens (p. 55).

3b. Thallus fruticose; lobes round or somewhat flattened in cross section, without a distinct upper and lower surface..... .....IV. Fruticose Lichens (p. 55).

3c. Thallus crustose, closely attached to substrate.....4

4a. Crust sterile, whitish to greenish powdery granules..... .....Lepraria aeruginosa.

4b. Crust not sterile.....5

5a. Hymenium produced in a closed structure opening by a minute pore (perithecium).....V. Crustose Pyrenulales (p. 57).

5b. Hymenium produced in an open disklike structure (apothecium).....6

6a. Asci disintegrating and the spores forming a mazaedium..... .....VI. Caliciales (p. 57).

6b. Asci persistent, no mazaedium formed.....7

7a. Thallus rudimentary to rarely well developed; apothecia irregular, linear, or oblong.....VII. Hysteriales (p. 57).

7b. Thallus commonly well developed; apothecia more or less round or cuplike.....VIII. Crustose Lecanorales (p. 57).

I. Stratified Foliose Lichens

1a. Lower surface with veins, thallus usually collected on soil or mosses.....*Peltigera canina*.

1b. Lower surface without veins usually on trees or rocks.....2

2a. Thallus sorediate.....3

2b. Thallus isidiate.....15

2c. Thallus without soredia or isidia.....17

3a. Thallus deep orange..... *Xanthoria fallax*.

3b. Thallus pale lemon yellow, light green or greenish-yellow.....4

3c. Thallus not yellow or green (when dry).....5

4a. Lobes of thallus quite broad and apically rotund, having laminal soredia, black lower surface and white medulla.... ..... *Parmelia caperata*.

4b. Lobes narrow, 0.1-0.5 mm. wide, soredia scattered..... .....*Candelaria concolor*. (var. *effusa* exists only as aggregations of soredia)

5a. Lobes narrow, 0.1-3.0 mm. wide, linear.....6

5b. Lobes broader, 4-20 mm. wide.....14

6a. Lobes finely branched, 0.25-0.5 mm. wide, thallus whitish-gray..... *Physcia millegrana*.

6b. Lobes not finely branched, broader, more than 0.5 mm. wide 7

7a. Lower surface uniformly white to tan or light brown (orange in *Anaptychia obscurata*).....8

7b. Lower surface black (sometimes brown in a narrow zone along the margin.....10

8a. Soredia mostly laminal in orbicular soredia; on bark, white spots lacking; thallus whitish-gray..*Physcia tribacoides*.

8b. Soredia in apical cresent-shaped soralia (may appear on upper and lower surface); usually collected on bark, but sometimes on rock.....9

9a. Lower surface orange.....*Anaptychia obscurata*.

9b. Lower surface white.....*Anaptychia speciosa*.

10a. Medulla salmon orange or yellow.....11

10b. Medulla white (except orange-red in some forms of Physcia orbicularis).....13

11a. Soredia in large diffuse soralia; lobes irregular, 2-5 mm. wide; thallus greenish mineral gray; white short cilia..... .....Parmelia aurulenta.

11b. Soredia in distinct laminal or marginal soralia; lobes narrower, 1-2 mm. wide, linear.....12

12a. Soredia marginal and in part laminal; edges of lobes white, split, and only lightly pruinose.....Pyxine sorediata.

12b. Soredia all laminal or in part marginal; edges of lobes not white or split, but distinctly pruinose..... .....Pyxine caesiopruinosa.

13a. Soredia laminal, lobes 1-4 mm. wide; margins with very short cilia; thallus greenish-gray.....Parmelia aurulenta.

13b. Soredia laminal and orbicular; no cilia; thallus mineral to brownish or dark greenish-gray.....Physcia orbicularis. (f. albociliata has fine hairs on upper surface. The form with a red medulla, f. rubropulchra, is often attacked by snails and slugs, leaving colored medulla exposed.)

14a. Lower surface tan or brown, upper surface with white pores.....Parmelia subrudecta.

14b. Lower surface black with conspicuous white rim; long black cilia on lobe margin.....Parmelia hypotropa.

15a. Thallus yellow to yellowish-green; lower surface black; brown apothecia abundant; isidia sparse to dense; on rock..... .....Parmelia conspersa.

15b. Thallus not yellow (when dry), but greenish to bluish mineral gray..16

16a. Lobes narrow, 0.5-4.0 mm. wide; tips of lobes with small white pores.....Parmelia rudecta.

16b. Lobes broad, 4-20 mm. wide, usually apically rounded; margins with black cilia; no pores...Parmelia subtinctoria.

Foliose Lichens Without Soredia or Isidia

17a. Lobes narrow, 0.5-4.0 mm. wide, linear; lower surface white; thallus whitish to mineral gray; no pores.....18

17b. Lobes broader, 4-20 mm. wide; lower surface tan; thallus greenish mineral gray; has inconspicuous white pores....Parmelia bolliana.

18a. Rhizines uniformly whitish; medulla K-, cortex K+; dark apothecia common.....Physcia stellaris.

18b. Rhizines darkening; upper surface strongly white spotted; medulla and cortex K+, dark apothecia common..... .....Physcia aipolia.

II. Gelatinous Lichens

Thallus olive brown to olive black; isidia dense, globose lower surface bare, light olive brown; apothecia rare..... ..... Collema subfurvum.

III. Umbilicate Lichens

Thallus pale brown with numerous black dots (perithecia), lower surface smooth densely brown, attached to the substratum by a single cord; thallus may be composed of crowded lobes..... ..... Dermatocarpon miniatum.

IV. Fruticose Lichens

1a. Thallus black and filamentous, taking its form from that of the algal host; on rocks.....Racodium rupestre.

1b. Thallus solid, thin greenish and crustose-like, lacking squamules; pseudopodetia while with light pink apothecia..Baeomyces absolutus.

1c. Thallus hollow and always round in cross section, usually brittle when dry; squamules often present.....2

2a. Podetia growing free on or among mosses; primary squamules always lacking.....3

2b. Podetia more or less attached to soil, bark, or rock; primary squamules generally present at base of podetia.....4

3a. Podetia finely branched; the outer cortex lacking and the surface dull, fibrous, and light greenish-gray, axils of branches closed... .....Cladonia subtenuis.

3b. Podetia more thickly branched; cortex present, the surface smooth, shiny, and a dark greenish-gray; has squamules (little flakes) on podetia.....Cladonia furcata.

4a. Podetia forming distinct cups.....5

4b. Podetia not cup-shaped but forming pointed or blunt clubs, often tipped with apothecia (if branched, irregular cups may be formed by the expanded axils.....9

5a. Apothecia and pycnidia bright red, cups short and stout, K+ purple.....Cladonia pleurota.

5b. Apothecia and pycnidia pale to dark brown, K- or K+ brown.....6

6a. Podetia covered with powdery or granular soredia.....7

6b. Podetia lacking soredia.....8

7a. Soredia ocarse and granular; cup generally stout; apothecia rare, dark brown.....*Cladonia chlorophaea.

7b. Soredia fine and powdery, cups appearing smoother and thinner.... .....Cladonia conista.

8a. Cups proliferating from the centers, apothecia common, dark brown.....Cladonia verticillata.

8b. Cups not proliferating, open and gaping; podetia finely and densely squamulose.....Cladonia squamosa.

9a. Apothecia (if present) and pcynidia red.....10

9b. Apothecia (if present) and pcynidia brown or black.....12

10a. Podetia and squamules lacking soredia; apothecia and pcynidia common; form quite variable..Cladonia cristatella.

10b. Podetia and/or squamules more or less covered with powdery soredia.....11

11a. Podetia whitish mineral gray; surface of podetia instantly K+ deep yellow; sparingly branched at apex.....Cladonia macilenta.

11b. Podetia colored as above, also sparingly branched at apex; K-... .....Cladonia bacillaris.

12a. Surface of podetia sorediate.....13

12b. Surface of podetia without soredia (or podetia finely squamulose or lacking).....14

13a. Podetia unbranched and pointed (not blunt), whitish green, 2-5 mm. long; no isidioid granules.....Cladonia coniocraea.

13b. Podetia unbranched, blunt or slightly expanded, ashy white; primary squamules small (less than 2 mm. long); has coarse isidioid granules.....Cladonia cylindrica.

14a. Podetia simple to branched, usually well developed.....15

14b. Podetia barely developed, very short, or apothecia sessile on finely divided squamules.....Cladonia caespiticia.

15a. Podetia and squamules with a yellowish cast; podetia squamulose capped with brown apothecia.....Cladonia piedmontensis.

15b. Podetia and squamules whitish to greenish mineral gray.....16

16a. Primary thallus of very small squamules; podetia twisted, with some bent down near the squamules, having large pale tan apothecia.....Cladonia capitata.

16b. Primary squamules large, 2-8 mm. long; podetia (not twisted or bent), with well developed apothecia.....17

17a. Podetia and squamules K-.....*Cladonia clavulifera*.

17b. Podetia and squamules K+ yellow, quickly turning red.....
.....*Cladonia polycarpoides*.

*(many chemical variants exist for *Cladonias* of this type and require microchemical crystal tests to determine the Chemical species).

V. Crustose Pyrenulales

1a. Thallus crustose.....*Verrucaria viridula*.

1b. Thallus minutely foliose or squamulose.....*Endocarpon pusillum*.

VI. Caliciales

1a. Thallus crustose; apothecia borne on stipes.....*Calicium albonigrum*.

1b. Thallus crustose, yellow; apothecia disk-like, not on stipes.....
.....*Cyphelium tigillare*.

VII. Hysteriales

1a. Apothecia somewhat spherical or angular, frosted bluish-gray; greenish granules.....*Arthonia impolita*.

1b. Apothecia black, straight to curved, longer than wide, often branched; crust fairly thick, rough to wrinkled, whitish-gray.....
.....*Graphis scripta*.

VIII. Crustose Lecanorales

1a. Apothecia with proper exciple.....2

1b. Apothecia with thalloid exciple.....7

2a. Spores hyaline, non-septate or septate with lenticular cells; apothecia yellowish to orange, on concrete....*Caloplaca cerina*.

2b. Spores hyaline or brownish (dark); apothecia usually not yellowish or orange.....3

3a. Spores brownish to dark colored, 3-septate.....*Buellia vernicoma*.

3b. Spores hyaline.....4

4a. Spores 1-3 or commonly more septate; apothecia black, thallus greenish-gray and granular.....*Bacidia inundata*.

4b. Spores non septate.....5

5a. Apothecial disk varying from pale flesh colored to red or black, thallus of greenish areoles, on rock.....Lecidia coarctata.

5b. Apothecia reddish brown or brown to black; crust not of areoles, instead thick, granular, or thin and scattered.....6

6a. Apothecia (0.4-1.5 mm.), black, usually whitish pruinose; crust smooth and continuous, whitish-gray; on rocks..... .....Lecidea albocaerulescens.

6b. Apothecia small to large (0.4-2.5 mm.); crust scattered and thin; spores 11-20 to 5-10 microns.....Lecidea macrocarpa.

6c. Apothecia minute to small (0.2-0.5 mm.), not pruniose; spores 5-9 to 2.5-4 microns; crust granulose, greenish-gray to darkening, sometimes disappearing; on rocks or rarely trees.....Lecidea sylvicola.

7a. Spores minute (4-6.5 to 2 microns), many in each ascus; thallus inconspicuous.....Sarcogyne clavus.

7b. Spores more than 8 microns in length.....8

8a. Spores dark, two (rarely more)-celled; apothecia black.....9

8b. Spores hyaline (light).....10

9a. Spores 9-15 to 5-8 microns; on trees and old wood..Rinodina milliaria.

9b. Spores 15-21 to 8-10 microns; on rocks.....Rinodina ocellata.

10a. Spores small to middle sized (7-15 to 4-8 microns), thin walled; apothecia disk-like not immersed in wart-like elevations of the crust.....11

10b. Spores very large (46-250 to 23-84 microns).....12

11a. Usually on rocks, especially concrete and limestone, disk pruinose; generally grows with Caloplaca cerina.....Lecanora hageni.

11b. On trees; disk not pruinose, apothecia brown..... .....Lecanora subfusca var. argentata.

11c. On trees; disk not pruinose, apothecia yellow or yellowish green.. .....Lecanora varia.

12a. 1 spore per ascus.....13

12b. 2 or 2-4 spores per ascus.....14

13a. Spores 150-250 to 42-84 microns.....Pertusaria velata.

13b. Spores 70-180 to 23-70 microns.....Pertusaria multipuncta.

14a. Spores 90-207 by 40-73 microns.....Pertusaria pertusa.

14b. Spores 46-136 to 24-56 microns.....Pertusaria pustulata.

DISCUSSION

In this study 70 lichen species were collected and identified from Clark, Coles, and Effingham Counties, with 65 of these species encountered in Rocky Branch Nature Preserve. Of these 70 lichen species the following are regarded as common.

Anaptychia speciosa	Parmelia caperata
Candelaria concolor	Parmelia rudecta
Cladonia chlorophaea	Peltigera canina
Cladonia coniocraea	Physcia millegrana
Cladonia cristatella	Physcia stellaris
Cladonia furcata	Lepraria aeruginosa

This list includes only one crustose lichen, the very evident Lepraria aeruginosa. Since most crustose species are quite inconspicuous, prolonged study would be required to determine those crustose species which are common. The foliose species Anaptychia speciosa, Candelaria concolor, Parmelia caperata, Parmelia rudecta, Physcia millegrana, and Physcia stellaris with their characteristic and evident rosettes of various colors and sizes are very common on trees, usually on the basal area and lower trunk, particularly on oak and hickory. Lepraria aeruginosa is also quite common on trees, but occurs most frequently and abundantly as large whitish-gray powdery masses on sandstone cliff faces. It also can rarely be found on soil. The Cladonia species listed usually occur on barren soil, and some may occasionally be found on trees, old wood, and sandstone. The species of Cladonia, with their large podetia, generally of distinctive form and sometimes with brightly colored apothecia, usually occur in dense clusters and mats and are among the most conspicuous lichens. The red fruited Cladonia cristatella is very evident in sparsely vegetated

areas, often covering large expanses of abandoned fields. Peltigera canina, also occurring on soil, but generally growing over mosses, is not as abundant as are the species of Cladonia.

The following lichens are considered rare for this east-central region of Illinois, because with two exceptions they were found only at Rocky Branch, although at this location some of these species were quite abundant.

Baeomyces absolutus
Calicium albonigrum
Cladonia bacillaris
Cladonia cylindrica
Cladonia piedmontensis
Cladonia pleurota
Cladonia verticillata
Dermatocarpon miniatum
Lecidea albocaerulescens
Parmelia conspersa
Parmelia bolliana
Parmelia hypotropa
Parmelia subtinctoria
Racodium rupestre
Trypethelium virens

Of the lichens listed above only Cladonia pleurota and Dermatocarpon miniatum were collected outside of Rocky Branch. Two very small collections of Cladonia pleurota were made in an area near the Parmelia conspersa habitat (#XIV), with one additional small collection from Rocky Hollow in Clark County. A few podetia of the very distinctive Cladonia verticillata were observed on five different occasions at the Cladonia verticillata habitat (#VI), with two small collections being made. In addition, several podetia were observed growing at the Cladonia cristatella habitat (#XI). For Cladonia bacillaris, C. cylindrica, and C. piedmontensis only one collection of each was recorded. In the preserve Lecidea albocaerulescens occupies many sandstone outcroppings, while Racodium rupestre also inhabiting sandstone, occurs only in several locations. It has been observed on two large outcroppings and a third smaller one, associated in all cases with Lepraria aeruginosa. Baeomyces absolutus, with its evident salmon-pink apothecia, is found on wet sandstone cliffs in widely separated locations along Rocky Branch Creek, although

the largest and most numerous colonies are in the vicinity of the Sphagnum moss. Dermatocarpon miniatum, a large brown-gray umbilicate lichen having embedded perithecia, has been observed on four areas of exposed sandstone in Rocky Branch. This very interesting lichen is known from two other locations, Rattlesnake Hollow in Effingham County and a rocky area near Charleston in Coles County. Parmelia conspersa, a noticeable foliose lichen with abundant apothecia, was encountered on only one sandstone outcropping at Rocky Branch with approximately twelve rosettes of this lichen present. Only one small collection each of Parmelia bolliana and P. subtinctoria were made, both from oak trees; while two collections of Parmelia hypotropa were made, one from oak and one from hickory. Trypethelium virens, a crustose lichen, occurs only on blue beech and beech but in considerable abundance, usually in association with Graphis scripta.

The time of year seems to have little effect on the condition of most lichens, since it is possible to collect specimens in good growth form in winter as readily as in summer. Fruiting structures in various stages of development are generally evident at any time of the year, probably due to the very slow growth rate of most lichens.

Most lichens seem to be specific for certain light conditions, some species seemingly growing best in shaded while others in well-lighted locations. Examples of lichens preferring abundant sunlight are the foliose lichen Parmelia conspersa, which occurs on sandstone, and the fruticose lichens Cladonia cristatella and C. verticillata, which grow on soil. Species favoring shaded locations are the fruticose lichens Cladonia chlorophaea and Racodium rupestre, the crustose lichen Lecidea albocaerulescens, and the umbilicate lichen Dermatocarpon miniatum. On

the other hand, a few lichens such as Lepraria aeruginosa, appear to grow well under almost any light condition.

Moisture content of the substrate appears to be an important factor for many species. Dermatocarpon miniatum and Baeomyces absolutus, for example, grow abundantly on shaded wet sandstone, although occasionally these species are found on slightly drier rocks but their growth is not as prolific. In contrast, Racodium rupestre does best on somewhat drier sandstone, always shaded, while the various species of Cladonia, such as C. chlorophaea, C. cristatella, C. furcata, and C. subtenuis, frequent barren dry soil.

The substrate for many lichens is rock or concrete, and certain of them are limited to a specific kind of rock. Physcia orbicularis f. albociliata, a very small foliose lichen, and the crustose lichens Bacidia inundata, Caloplaca cerina, Endocarpon pusillum and Lecanora hageni are characteristic of concrete. It is perhaps interesting to note that no fruticose lichens were observed on concrete. Parmelia conspersa, a large foliose lichen found on sandstone rock, and the crustose lichens Lecidea coarctata, L. sylvicola, L. albocaerulescens, and Rinodina ocellata are found on sandstone rock. Occasionally the fruticose lichens Cladonia chlorophaea and C. coniocraea grow on sandstone, but the podetia are smaller than when growing on other substrata. Although foliose and fruticose lichens can be found on rock or concrete, crustose species seem to predominate on this type of substratum.

Tree bark, old stumps, and old wood are also favorable substrates for many lichens, primarily foliose and crustose species. Foliose lichens tend to occur abundantly on rough-barked trees such as the oaks, although occasionally they may also be found on smooth-barked trees. These lichens include Parmelia caperata, P. rudecta, Anaptychia speciosa,

Physcia millegrana, P. orbicularis f. rubropulchra, P. aipolia, P. stellaris, Candelaria concolor, and Pyxine caesiopruinosa. On the other hand, crustose lichens predominate on smooth barked trees such as blue beech, beech, and the hickories. Examples of crustose species growing on smooth-barked trees are Graphis scripta, Arthonia impolita, Trypethelium virens, Pertusaria multipuncta, P. pertusa, P. pustulata, P. velata, and Cyphelium tigillare. It is perhaps interesting to note that most of the crust lichens mentioned above have a thallus lighter in color than the bark they inhabit. However, some of the crustose lichens found on bark, such as Calicium albonigrum, Rinodina milliaria, and Buellia punctata have a dark thallus, causing them to be quite inconspicuous and more difficult to collect. In this area fruticose lichens are not abundant on trees and are reduced in size. Some fruticose lichens can be found on the basal area of trees, such as Cladonia chlorophaea and C. coniocraea. The latter species, Cladonia coniocraea, as well as C. cristatella, may grow occasionally on old wood.

A checklist of the names used for Illinois lichens that were encountered in the literature follows the Summary. No attempt was made at this time to straighten out the synonymy occurring in the list by relating these lichen species to their currently accepted scientific names. Following each lichen species are the place or places of collection as recorded in the literature and the author or authors who reported it as occurring in Illinois. Most locations are abbreviated and each publication is numbered. A key to these abbreviations precedes the list of the 344 lichens reported for Illinois.

No record for Illinois of the following 25 species, one variety, and two forms, either under presently accepted names or their synonyms, has been encountered in the literature. These names were checked for synonymy

in a recent checklist of the lichens of the United States and Canada (Hale and Culberson, 1966). Of these 28 lichens, only one was not found in Rocky Branch (**), while 14 were restricted to Rocky Branch (*), not being observed in other locations visited.

Anaptychia obscurata (Nyl.) Vain.
Arthonia impolita (Ehrh.) Borr.
Buellia vernicoma (Tuck.) Tuck.
*Calicium albonigrum Nyl.
Caloplaca cerina (Ehrh.) Th. Fr.
Candelaria concolor (Dicks.) Stein. var. effusa (Tuck) Merrill & Burnh.
**Catillaria chalybeia (Borr.) Mass.
Cladonia bacillaris (Ach.) Nyl.
Cladonia chlorophaea (Flk.) Spreng.
Cladonia coniocraea (Flk.) Spreng.
*Cladonia conista (Ach.) Robb.
*Cladonia cylindrica (Evans) Evans
*Cladonia piedmontensis Merr.
Cladonia pleurota (Flk.) Spreng.
Cladonia polycarpoides Nyl.
*Collema subfurvum (Müll. Arg.) Degel.
*Lecidea macrocarpa (DC.) Steud.
*Lecidea sylvicola Flot.
Lepraria aeruginosa (Wigg.) Sm.
*Parmelia subtinctoria Zahlbr.
*Physcia orbicularis (Neck.) Poetsch. f. albociliata (Bouly de Lesd.) Thoms.
Physcia orbicularis (Neck.) Poetsch. f. rubropulchra Degel.
Pyxine caesiopruinosa (Nyl.) Imsh.
*Racodium rupestre Pers.
*Rinodina milliaria Tuck.
*Sarcogyne clavus (Ram.) Kremp.
*Trypethelium virens Tuck.

SUMMARY

The lichen flora of Illinois has been studied only sparingly in the past, perhaps in part because of the difficulty in determination of lichen species and probably because of the training and greater interest of taxonomists in vascular plants.

This study of lichens focused on the east-central Illinois counties of Clark, Coles, and Effingham, with Rocky Branch Nature Preserve in Clark County the major area of concentration. Fourteen habitats in Rocky Branch were selected to demonstrate the unique association of lichens, as well as the distinctive and rare species occurring there. During this study, fourteen collection and study trips were made to Rocky Branch at all seasons of the year. Ecological preferences, such as light conditions, available moisture, and type of substrate were considered. An evaluation was made to determine the species that might be considered rare, in addition to those commonly occurring.

A total of 70 lichen species were recorded during this study, with 64 of these being encountered in Rocky Branch. No record for 28 of these species was encountered in the literature of the lichens of Illinois. A checklist of the lichens having been recorded for Illinois is included, although some of these names are undoubtedly synonyms, as well as a key to the lichens occurring in Rocky Branch.

CHECKLIST OF ILLINOIS LICHENS

Abbreviations for Counties

Adams (A)
Bureau (B)
Calhoun (Ca)
Carroll (Cr)
Chicago Area (Chg)
Cook (Co)
DuPage (D)
Fayette (Fa)
Fulton (Fu)
Grundy (Gr)
Hardin (H)
Jersey (Je)
Jo Daviess (JD)
Johnson (Jh)
Kane (K)
Kendall (Kn)
Lake (L)
La Salle (LS)
Lee (Lee)
Macoupin (Ma)
Marshall (Mr)
Mason (Ms)
Menard (Mn)
Montgomery (Mo)
Ogle (O)
Peoria (Pr)
Pope (Po)
Sangamon (Sg)
Stephenson (St)
So. Ill. area (So. Ill.)
Union (U)
Will (Wl)
Winnebago (Wn)

Numbering of Publications

1. Brendel, F., 1887.
2. Willey, H., 1877.
3. Willey, H., 1878.
4. Calkins, W. W., 1896.
5. Fink, B., 1906.
6. Hartline, O., 1938.
7. Hedrick, J., 1933.
8. Skorepa, A. C. and J. A. Snider, 1967.
9. Wolf, J. and E. Hall, 1878.
10. Fink, B., 1900.
11. Skorepa, A. C., 1970.

Acolium
A. tigillare; Mn; 9

Alectoria
A. jubata; F; 9
_____ var. chalybeiformis; Fu; 2

Allarthonia
A. caesia; B, O, St; 11

Anaptychia
A. speciosa; H; 6

Anzi
A. colpodes; Po; 8

Arthonia
A. astroidea; Fu; 2
_____ var. epipasta; Fu, Mn; 9
A. diffusa; Wl; 4
A. dispersa; Fu, H; 2, 6
A. lapidicola; H; 6
A. lecideela; Chg, Fu, Mn; 2, 4, 9
A. patellulata; Fu; 2, 9
A. polymorpha; Fu; 9
A. punctiformis; Fu, Mn, So.Ill, U; 2, 3, 9
A. pyrrhula; Fu, Mn; 2, 9
A. pyrrhuliza; Wl; 4
A. radiata; Chg; 4
A. spectabilis; Chg, Fu, Mn; 2, 4, 9
A. taediosa; Chg, Fu, Mn, So.Ill; 3, 4, 9
A. willeyi; H; 6

Arthopyrenia
A. biformis; Je; 11

Bacidia
B. inundata; Je; 11

Baeomyces
B. absolutus; Po; 8

Biatora
B. atropurpurea; Fu; 2, 9
B. campestris; Fu, Mn, Pr; 1, 9
B. carnulenta; Fu; 9
B. chlorantha; Fu; 2, 9
B. chlorosticta; Jh, So.Ill; 3, 9
B. coarctata; Ck, Fu, Wl; 2, 4, 9
B. cyphalea; Chg, Fu, Mn; 2, 4, 9
B. exigua; Fu, Mn, So.Ill, U; 2, 3, 9
B. flexuosa; Fu, Pr; 1, 2, 9
B. fossarum; Fu, Mn; 2, 9
B. fuscorubella; Chg; 4

Biatora (cont.)
B. geophana; Fu; 2, 9
B. hypnophila; Fu, Mn; 9
B. inundata; Chg; 4
B. parvifolia; So.Ill; 3, 9
B. peliaspis; Fu; 2, 9
B. resinae; Fu, Mn; 2, 9
B. rubella; Chg, Fu, Mn, Pr, So.Ill, U; 1, 2, 3, 4, 9
_____ var. inundata; Fu; 9
_____ var. spadicea; Fu, Mn; 9
_____ var. suffusa; Fu, Mn; 9
B. rudis; Fu; 2, 9
B. rufonigra; So.Ill; 3, 9
B. russula; Fu; 2,9
B. sanguineoatra; Fu, Mn, Pr; 2, 2, 9
B. uliginosa; Fu, Mn; 2, 9
B. umbrina var. bacillifera f. muscorum; Fu; 9
B. varians; Chg; 4

Biatorella
B. (Lecanora) pruinosa; K, Kn; 5

Buellia
B. atroalba; So.Ill; 9
_____ var. chlorospora; So.Ill; 3
B. lactea; So.Ill; 3, 9
B. myriocarpa; Fu; 2, 9
B. parasema; Chg, Fu, Mn; 2, 4, 9
B. punctata; O, Wl; 11
B. schaereri; Gr, LS; 9

Calicium
C. curtum; Fu; 9
C. microcephalum; Fu; 9
C. populneum; So.Ill; 3, 9
C. roscidum; Fu; 9
_____ var. drosodes; Fu; 2, 9
_____ var. trabinulum; Fu; 2
C. subtile; Fu, Mn, Pr; 1, 2, 9
C. trachelinum; Fu, Mn; 2, 9
C. tubiforme; Jr, So.Ill; 3, 9
C. turbinatum; Fu; 9

Caloplaca
C. flavovirescens; Ca; 11
C. microphyllina; B, Fu, St; 11

Cetraria
C. aleurites; Chg; 4
C. ciliaris; Chg, Fu, H, Mn; 2, 4, 6, 9
C. juniperina; Po; 8

Cladonia
C. aleicornus; Jr, So.Ill; 3, 9
C. atlantica; Po; 8
C. caespiticia; Fu; 11

Cladonia (cont.)
C. cariosa; Fu; 9
C. cristatella; Chg, Fu, Mn, Wl; 2, 4, 9, 11
_____ var. ramosa; Fu, Mn; 9
C. decorticata; Wl; 11
C. delicata; Chg; 4
C. didyma; H; 6
C. fimbriata; Chg, Fu, H, Mn, Pr, U, So.Ill; 1, 3, 4, 9, 11
_____ var. adspersa; Fu, Mn; 9
_____ var. tubaeformis; Chg, Fu; 4, 9
C. furcata; Chg, Fu, Jh, LS, Mn, Pr, U, So.Ill; 1, 3, 4, 9, 11
_____ var crispata; Fu, Mn; 2, 9
_____ var. racemosa; Mn; 9
_____ var. subulata; Mn; 9
C. gracilis: Fu, H, Mn, Pr, Wl; 1, 2, 4, 6, 9
_____ var. dilacerata; H; 6
_____ var. verticillata; Fu, Mn, Wl; 4, 9
C. macilenta; Chg, Fu, Mn, Pr; 2, 4, 9
C. mitrula; Ck, Fu, H, Mn, Pr, Wl; 1, 2, 4, 6, 9
C. muscigena; Mn; 2, 9
C. pyxidata; Chg, Fa, Fu, H, Mn, O, Pr; 1, 2, 4, 6, 9, 11
_____ var. pocillum; Chg; 4
_____ var. symphycarpa; Mn; 9
C. rangiferina; Fu, Jh, Mn, Pr, So.Ill; 3, 9
_____ var. sylvatica; Chg; 4
C. robbinsii; O; 11
C. squamosa; Ch, Fu, Mn, Wl; 2, 4, 9
_____ var. caespiticia; Jh, So.Ill; 3, 9
_____ var. delicata; Fu, Mn; 9
C. subtenuis; Fa; 11
C. sylvatica; H; 6
C. turgida; Fu, Mn; 2, 9

Coccocarpia
C. cronia; Po; 8

Collema
C. arenosum; Mn; 9
C. cyrtaspis; Fu, Mn; 2, 9
C. flaccidum; Chg, Fu, Jh, So.Ill; 3, 4, 9
C. granosum; Wl; 4
C. leptaleum; Mn; 9
C. limosum; Chg, Fu, Mn; 2, 4, 9
C. microphyllum; Ck, Mn, So.Ill, U, Wl; 3, 4, 9
C. nigrescens; Fu, Mn, Pr; 1, 2, 9
C. pulposum; Fu, Jh, Mn, So.Ill; 2, 3, 9
_____ var. tenax; So.Ill; 9
C. pustulatum; Jh, So.Ill; 3, 9
C. pycnocarpum; Fu, Mn, Wl; 2, 4, 9
C. tenax; Chg; 4
C. verrneiforme; Mn; 9

Coniocybe
C. pallida; Mn; 9

Conotrema
C. urceolatum; Ck, Fu, Mn, Wl; 2, 4, 9

Cyphelium
C. tigillare; Je, Lee, Ma, Mo; 11

Dermatocarpon
D. miniatum; Ca, H; 6, 11
D. (Endocarpon) pusillum; K, Kn; 5

Endocarpon
E. arboreum; Fu, Mn; 2, 9
E. cinereum; Fu; 9
E. hepaticum; Chg, So.Ill, Wl; 3, 4, 9
E. miniatum; Chg, U; 4, 9
_____ var. complicatum; Chg; 4
_____ var. manitense; Jh, So.Ill; 3, 9
_____ var. muhlenbergii; Chg; 4
E. pusillum; Chg, Fu, Je, So.Ill; 4, 9, 11
_____ var. garovaglii; K; 10

Ephebe
E. pubescens; Mn; 9

Evernia
E. jubata; Pr; 4

Graphis
G. dendritica; Chg, Fu, Mn; 2, 4, 9
G. eulectra; H, Mn, Pr; 1, 6, 9
G. lineola; H; 6
G. scripta; Chg, Fa, Fu, H, Mn, So.Ill, U; 2, 3, 4, 6, 9, 11

Gyalecta
G. pineti; Fu, Mn; 2, 9
G. trivialis; Fu; 2, 9

Heppia
H. despreauxii; Chg, Fu, Mn; 2, 4, 9

Heterodermia
H. tremulans; LS; 11

Lecanora
L. calcarea; Chg; 4
_____ var. contorta; Chg, K, Kn; 4, 5
L. cervina; Ck, Wl; 4
_____ var eucarpa; So.Ill; 9
_____ var. pruinosa; Fu; 2, 9
_____ f. clavis; So.Ill; 3
L. cinerea; So.Ill; 3, 9
L. dispera; Ca, Ck, Wl; 11

Lecanora (cont.)
L. elatina var. ochrophaea; Fu; 2, 9
L. erysibe; Wl; 4
L. hageni; Chg; 4
_____ var. sambrici; Wl; 4
L. hypoptoides; Po; 8
L. minutella; Po; 8
L. muralis; So.Ill; 3, 9
L. pallida; Chg; 4
L. perproxima; Chg; 4
L. privigna; Chg; 4
_____ var. pruinosa; Chg; 4
L. rubina; O; 11
L. subfusca; Chg, Fu, Jh, Mn, Pr, So.Ill, U; 1, 2, 3, 4, 9
_____ var. allophora; Chg; 4
_____ var. argentata; Chg; 4
_____ var. discolor; Fu; 9
_____ var. distans; Chg; 4
L. symmicta; Wl; 11
L. tartarea; So.Ill; 3, 9
L. varia; Chg, Fu, Mn, Pr; 1, 2, 4, 9
_____ var. aitema; Fu; 9
_____ var. sarcopis; Fu; 9
_____ var. symmicta; Chg; 4

Lecidea
L. albocaerulescens; U; 9
L. enteroleuca; Jh, Mn, So.Ill, Wl; 3, 4, 9
L. flexuosa; Wl; 11
L. myriocarpoides; Fu; 2, 9
L. russellii; JD; 11
L. tessellina; So.Ill; 3, 9
L. uliginosa; Wl; 11

Leptogium
L. caesiellum; Fu, Mn; 9
L. chloromelum; Fu, Mn, Wl; 2, 4, 9
L. dactylinum; Fu; 9
L. lacerum; Fu, Mr, Wl; 4, 9
_____ var. bolacinum; Mn; 9
L. minutissinum; Mn, Po; 8, 9
L. myochroum; So.Ill, Wl; 4, 9
_____ var. saturnium; Jh, So.Ill; 3, 9
L. pulchellum; Ck, Fu, Jh, Mn, Pr, So.Ill, Wl; 1, 2, 3, 4, 9
L. tremelloides; Fu, Mn; 2, 9

Mycoporum
M. pycnocarpum; Fu, Mn, So.Ill, U; 2, 3, 9

Myriangium
M. duriaei; Chg; 4

Nephroma
N. laevigatum; Jh, So.Ill, U; 3, 9

Opegrapha
O. atra; Chg; 4
O. varia; Ck, Fu, Mn, Pr, Wl; 1, 2, 4, 9
O. vulgata; So.Ill, U; 3, 9

Pannaria
P. byssina; Fu, Mn; 2, 9
P. crossophylla; So.Ill; 3, 9
P. leucosticta; Jh, So.Ill, U; 3, 9
P. microphylla; Jh, So.Ill, U; 3, 9
P. molybdaea var. cronia; Fu, Jh, So.Ill; 2, 3, 9
P. nigra; Chg, Fu, Mn, So.Ill; 2, 3, 4, 9

Parmelia
P. aurulenta; Fa, Mn, O; 9, 11
P. bolliana; Lee, LS, Mr, O; 11
P. borreri; Chg, Fu, H, Mn; 2, 4, 6, 9
_____ var. rudecta; Chg, Ck, Mn; 4, 9
P. caperata; Chg, Fu, JD, Lee, LS, Mn, O, St, So.Ill; 2, 3, 4, 9, 11
P. caroliniana; Po; 8
P. cetrata; Chg; 4
P. colpodes; Chg, Mn; 4, 9
P. conspersa; Chg, H, Wl; 4, 6
_____ var. stenophylla; Mn; 9
P. crinita; Chg; 4
P. dierythra; O; 11
P. dilatata; Po; 8
P. hypoleucites; O; 11
P. laevigata; Mn; 9
P. madagascariacea; Po; 8
P. olivacea; Fu, Mn, Pr; 1, 2, 9
_____ var. aspidota; Mn; 9
P. perforata; Ck, Fu, H, Mn, Pr, Wl; 1, 4, 6, 9
_____ var. crinita; Fu, Mn; 2, 9
P. perlata; Chg, Fu, Mn, Pr; 1, 2, 4, 9
_____ var. olivetorum; Fu, Mn; 9
P. physodes; Chg, Ck, D, H; 4, 6
P. quercina; H; 6
P. rudecta; Fa, Fu, H, JD, Lee, LS, Ms, O, Wn; 6, 11
P. saxatilis; Chg, Fu, Jh, Mn, So.Ill; 2, 3, 4, 9
_____ var. sulcata; Wl; 4
_____ var. rosaeformis; Mn; 9
P. subrudecta; Ms, O; 11
P. sulcata; H, Lee, St; 6, 11
P. tiliacea; Chg, Fu, Mn; 2, 4, 9
_____ var. sulphurosa; Chg; 4
P. tinctorum; Po; 8

Peltigera
P. canina; Fa, Fu, H, LS, Mn, Pr; 1, 2, 6, 9, 11
P. polyductyla; Mn; 9
P. rufescens; Chg; 4
P. spuria; H; 6

Pertusaria
- P. communis; Chg; 4
- P. globularis; So.Ill; 3, 9
- P. leioplaca; Chg, Fu, Mn; 2, 4, 9
- P. multipuncta; Chg, H; 4, 6
- P. pertusa; H, Jh, Mn, So.Ill; 2, 3, 4
- P. pustulata; Chg, Fu, Mn; 2, 4, 9
- P. velata; Chg, Fu, H, Mn, Pr; 1, 2, 4, 6, 9
- P. wulfenii; Fu, Mn; 9

Phaeographis
- P. dendritica; H; 6

Physcia
- P. adglutinata; Ck, Wl; 4
- P. aipolia; Cr, JD, LS, O, Wn; 11
- P. aquila var. detonsa; So.Ill, U; 3, 9
- P. aulverulenta; Fu; 2
- P. caesia; Fu, Pr; 1, 9
- _____ var. stellata; Fu, Mn; 9
- P. ciliata; Ca, JD; 11
- P. elaeina; St; 11
- P. granulifera; Chg; 4
- P. grisea; JD, LS, O; 11
- P. lacinulata; JD; 11
- P. millegrana; B, C, Fa, Fu, Je, JD, LS, Lee, Mr, Ms, O, Sg, St, Wl, Wn; 11
- P. orbicularis; JD, O, St; 11
- P. obscura; Chg, Ck, Fu, Mn, Pr; 1, 4, 9
- _____ var. ciliata; Fu, Mn; 9
- _____ var. agglutinata; Fu, Mn; 9
- P. pulverulenta; Fu, H, Mn, Pr, So.Ill; 3, 6, 9
- P. speciosa; Chg, Fu, Mn, Pr, So.Ill; 1, 3, 4, 9
- _____ var. hypoleuca; Fu, Mn; 9
- P. stellaris; B, Ca, Chg, Fu, H, Je, JD, Lee, Mn, Pr, St, Wl; 1, 4, 6, 9, 11
- _____ var. aipolia; Chg; 4
- _____ var. tribacia; Fu, Mn; 9
- P. syncolla; Ca, JD, St, Wn; 11
- P. tribacia; Chg; 4
- P. tribacoides; Ca, Fa, JD; 11

Pyxine
- P. cocoes; Fu; 9
- _____ var. sorediate; Fu, Mn; 2, 9
- P. sorediata; Fa; 11

Placodium
- P. aurantiacum; Chg, Fu, Jh, Mn, Pr, So.Ill; 1, 2, 3, 4, 9
- P. camptidium; Fu, Mn; 2
- P. cerinum; Fu, Mn, Pr, So.Ill; 1, 2, 3, 9
- P. cinnabarinum; Chg; 4

Placodium (cont.)
P. ferrugineum; Chg, Fu, Mn, Pr, So.Ill; 1, 2, 3, 4, 9
_____ var. nigricans; Fu; 9
P. microphyllum; Chg, Wl; 4
P. sideritis; Fu; 2, 9
P. vitellinum; Chg, Fu, K, Kn, Mn; 2, 4, 5, 9

Placynthium
P. nigrum; Ca, Je; 11

Pyrenula
P. gemmata; Chg, Fu; 2, 4, 9
P. glabrata; Chg, Fu, So.Ill, U; 2, 3, 4, 9
P. lactea; Fu, Mn; 2, 9
P. leucoplaca; Fu, Mn; 2, 9
P. nitida; Chg, Fu, Mn; 2, 4, 9
P. punctiformis; Chg, Fu, Mn; 2, 4, 9
P. subcinerea; Fu; 9
P. thelena; Chg, Fu, Mn; 2, 4, 9
_____ var. micula; Fu; 9

Ramalina
R. calicaris; Chg, Fu, M, Pr, So.Ill, Wl; 1, 2, 3, 4, 9
_____ var. fraxinea; Chg, Fu, Mn; 4, 9
_____ var. fastigiata; Chg; 4
R. fastigiata; Po; 8
R. intermedia; Po; 8

Rinodina
R. alboatra; So.Ill; 2, 9
R. ascociscana; Fu, Mn; 2, 9
R. bischoffi; Chg, K, Kn; 4, 5
R. constans; Fu; 2, 9
R. oreina; O; 11
R. sophodes; Chg, Fu, Mn; 2, 4, 9
_____ var. confragosa; Fu, Jh, So.Ill; 3, 9

Sagedia
S. cestrensis; So.Ill; 3, 9
S. lactea; Fu; 2, 9
S. oxyspora; Chg; 4

Sarcogyne
S. simplex; O; 11

Segestria
S. lauveri; Fu, So.Ill; 3, 9

Staurothele
S. diffractella; So.Ill; 3, 9

Sticta
S. herbacea; Mn; 9

Synalissa
S. schaereri; Fu, Mn, So.Ill; 3, 9
S. phaeococca; Fu; 9

Theloschistes
T. chrysophthalmus; Chg, Ck, Wl; 4
T. concolor; Chg, Fu, Mn; 2, 4, 9
T. lychneus; Ck; 4
T. parietinus; Chg, Mr, Pr; 1, 2, 4, 9

Thelocarpon
T. (Segestria) Laureri; Fu; 2

Urceolaria
U. scruposa; Chg, Wl; 4

Usnea
U. barbata; Fu, H, Mn, Pr, So.Ill; 1, 3, 6, 9
_____ var. florida; Mn; 9
_____ var. strigosa; Fu; 9
_____ var. rubiginosa; M; 9
U. mutabilis; Po; 8

Verrucaria
V. epigaea; Fu, Mn; 2, 9
V. fuscella; Chg, K, Kn, So.Ill; 3, 4, 5, 9
V. muralis; A, Ck, Chg, K, Kn; 4, 5, 9
V, nigrescens; Chg, Fu, Kn Kn; 2, 4, 5, 9
V. prospersella; Chg; 4
V. pyrenophora; Chg, Fu; 4, 9
V. rupestris; Fu, K, Kn, So.Ill; 3, 4, 5, 9
V. viridula; Chg; 4

Xanthoria
X. fallax; Ca, Cr, JD, Wn; 11

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LEGEND

I. Caloplaca Cerina-Endocarpon Pusillum Habitat

II. Graphis Scripta-Trypethelium Virens Habitat

III. Lepraria Aeruginosa-Racodium Rupestre Habitat

IV. Baeomyces Absolutus Habitat

V. Cladonia Subtenuis-Cladonia Furcata Habitat

VI. Cladonia Verticillata Habitat

VII. Parmelia-Physcia Habitat

VIII. Lecidea Albocaerulescens Habitat

IX. Dermatocarpon Miniatum Habitat

X. Lepraria Aeruginosa-Cladonia Chlorophaea Habitat

XI. Cladonia Cristatella Habitat

XII. Cyphelium Tigillare-Candelaria Concolor-Physcia Millegrana Habitat

XIII. Cladonia Chlorophaea Habitat

XIV. Parmelia Conspersa Habitat

a. Parmelia Conspersa Growth Study Habitat

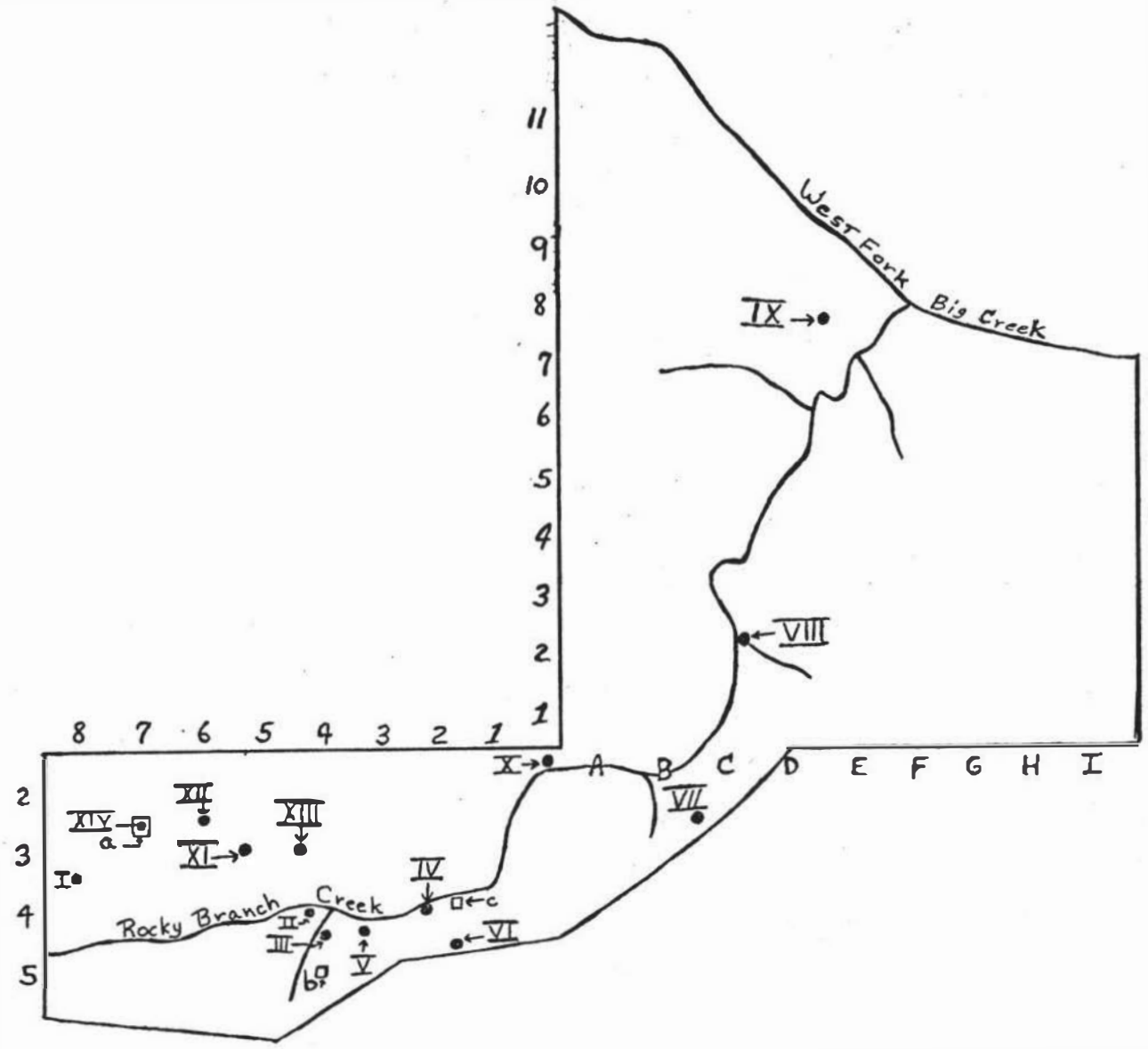
b. Baeomyces Absolutus Growth Study Habitat

c. Lecidea Albocaerulescens Growth Study Habitat

MAP OF THE WESTERN PORTION

OF

ROCKY BRANCH NATURE PRESERVE



● Habitat

□ Growth Study Habitat

⊡ Both of the above

I. *CALOPLACA CERINA-ENDOCARPON PUSILLUM* HABITAT

Fig. 1. Concrete well covering.

Fig. 2. Concrete bridge abutment.

Fig. 1.

Fig. 2.

II. GRAPHIS SCRIPTA-TRYPETHELIUM VIRENS HABITAT

Fig. 3. Blue beech tree used for habitat study.

Fig. 4. Close-up of branch showing the dark circular crust of Trypethelium virens accompanied by additional crust lichens.

Fig. 3.

Fig. 4.

III. LEPRARIA AERUGINOSA-RACODIUM RUPESTRE HABITAT

Fig. 5. Sandstone cliff used in this study. The diffuse dark areas in the center are Racodium rupestre. Lighter areas are Lepraria aeruginosa.

Fig. 6. Sandstone cliff with close-up of Lepraria aeruginosa.

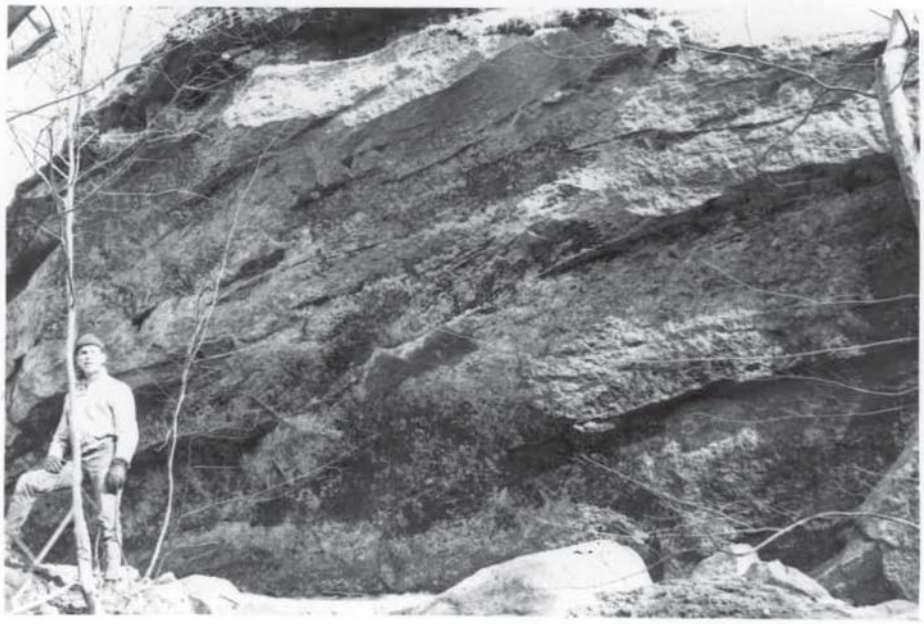


Fig. 5.

Fig. 6.

IV. BAEOMYCES ABSOLUTUS HABITAT

Fig. 7. Large Baeomyces absolutus colony on sandstone used for this study.

Fig. 8. Close-up showing individual pseudopodetia.

Fig. 7.

Fig. 8.

V. CLADONIA SUBTENUIS-CLADONIA FURCATA HABITAT

Fig. 9. Close-up of podetia of Cladonia furcata. Cladonia subtenuis has a similar appearance.

Fig. 9.

VI. CLADONIA VERTICILLATA HABITAT

Fig. 10. Podetia of Cladonia verticillata.

Fig. 11. Close-up of podetia.

Fig. 10.

Fig. 11.

VII. PARMELIA-PHYSCIA HABITAT

Fig. 12. Close-up of *Parmelia caperata* rosette.

Fig. 12.

IX. DERMATOCARPON MINIATUM HABITAT

Fig. 13. Sandstone outcropping used in this habitat study of Dermatocarpon miniatum. This photograph was taken in the winter and the white area in the lower left foreground is ice.

Fig. 14. Close-up of the umbilicate thalli of Dermatocarpon miniatum.

Fig. 13.

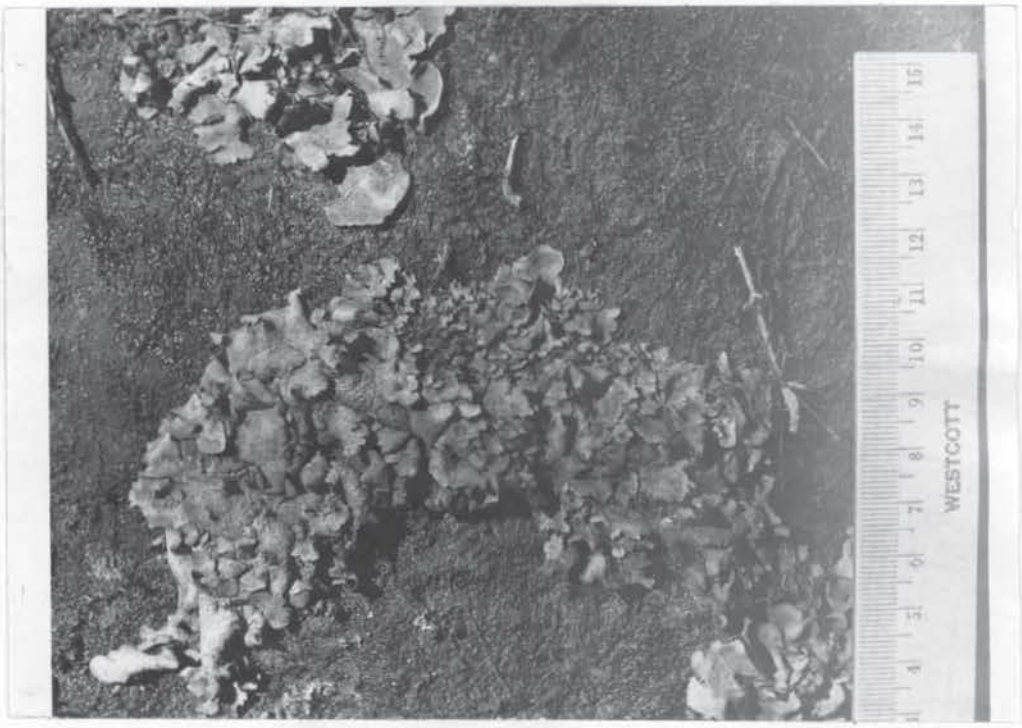


Fig. 14.

X. *LEPRARIA AERUGINOSA-CLADONIA CHLOROPHAEA* HABITAT

Fig. 15. South facing sandstone cliff used in this habitat study.

Fig. 15.

XI. CLADONIA CRISTATELLA HABITAT

Fig. 16. Sparsely vegetated upland field used in this habitat study.

Fig. 17. Close-up of podetia of Cladonia cristatella showing subglobose apothecia.

Fig. 16.

Fig. 17.

XII. CYPHELIUM TIGILLARE-CANDELARIA CONCOLOR-PHYSCIA MILLEGRANA HABITAT

Fig. 18. Close-up of trunk of red oak showing crustose and small foliose lichens.

Fig. 18.

XIII. CLADONIA CHLOROPHAEA HABITAT

Fig. 19. A few small cup-shaped podetia of Cladonia chlorophaea are evident.

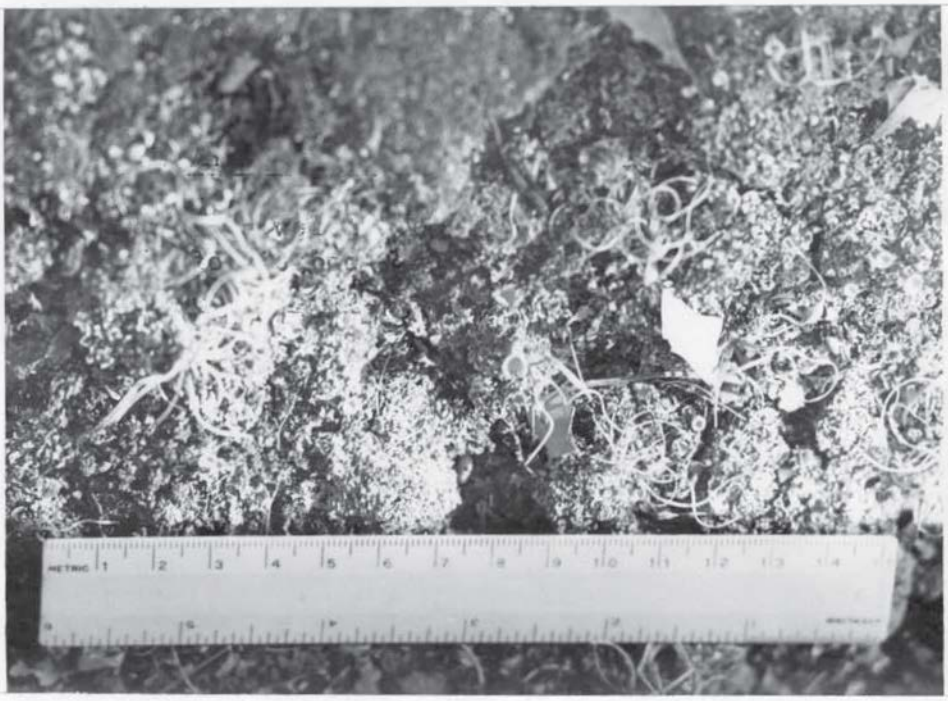


Fig. 19.

XIV. & a. PARMELIA CONSPERSA HABITAT AND GROWTH STUDY HABITAT

Fig. 20. A colony of the foliose Parmelia conspersa growing on rock. Note abundant apothecia in the center of the colony. The aluminum tag with the number 333 is at the left on the photograph.

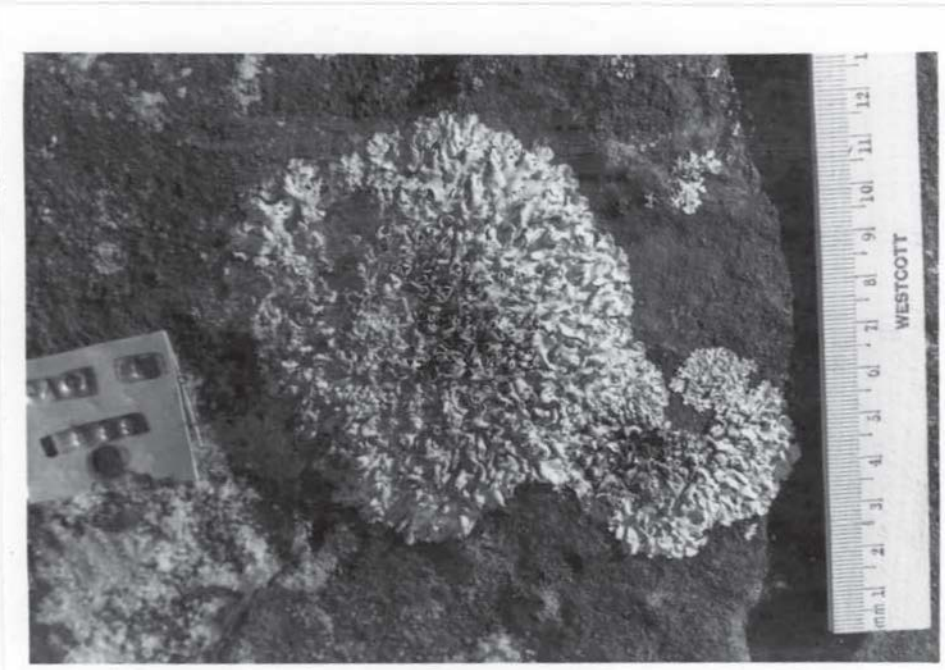


Fig. 20.

b. BAEOMYCES ABSOLUTUS GROWTH STUDY HABITAT

Fig. 21. Sandstone cliff with colony of Baeomyces absolutus used for the growth study habitat. The light area in the center of the photograph is the colony. Note the aluminum tag with the number 222 attached to the upper left of the colony.

Fig. 22. Close-up showing abundant pseudopodetia of this colony.

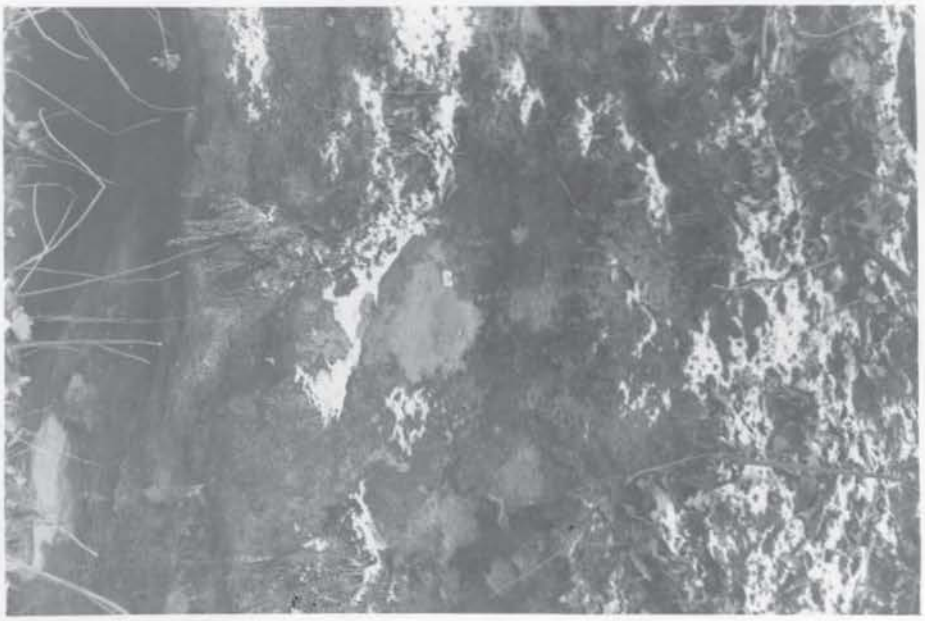


Fig. 21.

Fig. 22.

c. LECIDEA ALBOCAERULESCENS GROWTH STUDY HABITAT

Fig. 23. Sandstone outcropping with large circular colony of Lecidea albocaerulescens used for growth study habitat. The aluminum tag with the number 444 is attached to the right. The light area to the far left of the picture is Lepraria aeruginosa.

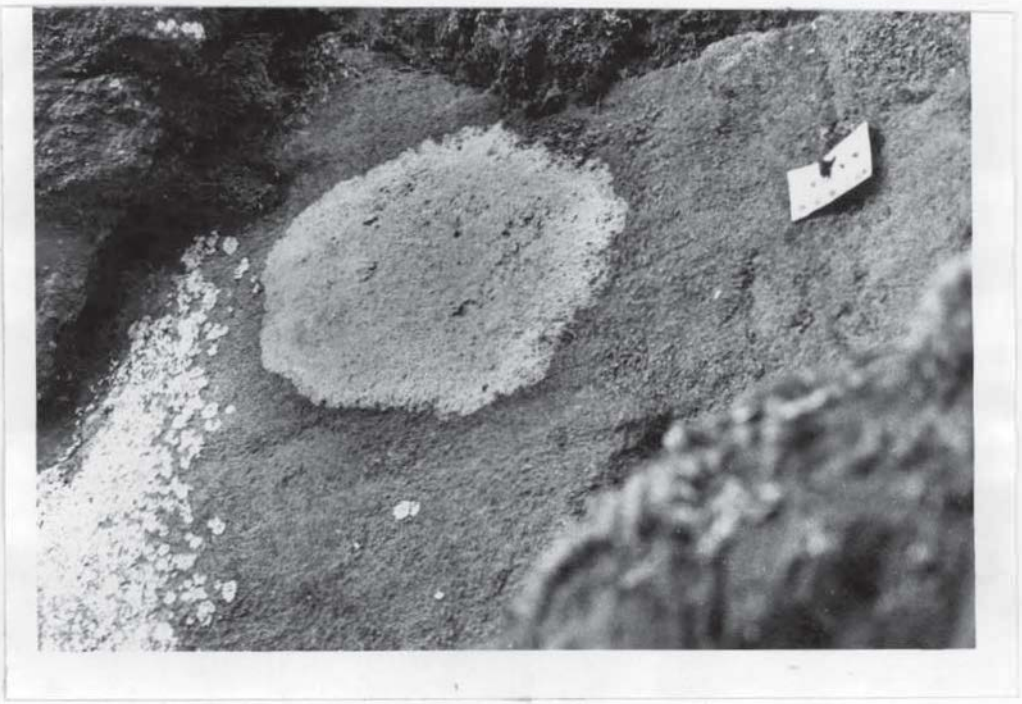


Fig. 23.