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Lois H. Tiffany
Iowa State University

George Knaphus
Iowa State University

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The Fungi, Lichens, and Myxomycetes of Iowa: A Literature Review and Evaluation

LOIS H. TIFFANY and GEORGE KNAPHUS

Department of Botany, Iowa State University, Ames Iowa 50011-1020

The fungi have been, and continue to be, a poorly documented portion of Iowa's biological inheritance. Although many are perennially present in soil and plant debris and are crucially involved in the release and recycling of materials from organic residues or are partners with plant roots as mycorrhizae, they are not obvious until they produce fruiting structures such as mushrooms, boletes, brackets, puffballs, etc. The fungi causing plant disease are more obvious because of the reactions of their host plants; thus the earliest records of Iowa fungi are of ones causing plant diseases commonly referred to as mildews, rusts, and blights.

It seems appropriate to discuss the fungi in two groups: 1) those that are the saprobes, mycorrhizal associates, and plant disease fungi outlined in the previous paragraph, and 2) fungi associated with green algae or blue-green cyanobacteria to form a lichen. A third group, the slime molds or myxomycetes, have traditionally been studied by mycologists, and are discussed here even though they are a separate group of microorganisms unrelated to the fungi.

The fungal population of Iowa, estimated from the information in the literature, includes at least 3000 species. The recent foliose and soil lichen population estimate of 104 species does not include the fruticose lichens. An older estimate (Malone and Tiffany 1978) of 263 lichen species in Iowa was based both on available voucher specimens and on literature reports that could not be evaluated. A myxomycete population of 81 species has been reported for northwestern Iowa. A comprehensive, but not necessarily exhaustive, list of references is presented for each group.

The success and survival of members of all three groups is interwoven with, and dependent upon, the continued availability of their native habitats and plant associates.

INDEX DESCRIPTORS: Iowa mycology, fungi, slime molds, lichens, myxomycetes, rusts, smuts.

I. THE FUNGI OF IOWA

The fungi are an omnipresent but often less than obvious component of the biological world. The vegetative portion of most fungi is composed of microscopic filaments called mycelium or hyphae growing in and decomposing dead organic material, or establishing some kind of feeding relationship with living plants, occasionally with living animals. The presence of fungi may become obvious only when macroscopic fruiting structures on or in which spores are produced develop, or when host plants die or develop obvious abnormal structures.

Thus, it is not surprising that the earliest records of fungi in Iowa are those in which "rots" or "blights" of horticultural or crop plants were noticed by the settlers of the 1850s. By 1850, farming was becoming increasingly important in eastern Iowa, and in 1854 the Iowa State Agricultural Society was organized. In 1856, the Records and Proceedings of the society reported that in Johnson County, Spanish wheat rusted badly with a resulting low yield and that potatoes were of excellent quality, "there being lately no complaint of the much dreaded rot".

Probably the first paper concerned specifically with Iowa fungi was a report by C.E. Bessey in the Seventh Biennial Report of the Iowa Agricultural College for 1876-77 titled "On Injurious Fungi—the Bights (Erysiphei)," in which 61 species of powdery mildews, a group of plant parasites, were described with comments on their occurrence in Iowa. The unique fruiting bodies were illustrated with a few line drawings.

In November, 1884, in the Bulletin of the Iowa Agricultural College issued by the Department of Botany, Bessey (1884a, 1884b, 1884c) wrote:

The following pages are issued in order to give the people of this State an idea of the nature of the observations which are made and the study carried on in the Department of Botany of the College. For convenience the matter is divided into two parts. In Part I, popular descriptions of some of the harmful...
plants, which are so abundant, are given. It is hoped that by the aid of the illustrations given, it will not be difficult for any one to recognize them. The text has purposely been made non-technical, so that it may easily be understood by all.

In Part II, I have brought together what is known as the lower forms of vegetation growing in this immediate flora, taking in an area covered by a radius of twenty miles. I trust that my non-botanical friends will not regard this portion of this bulletin as useless, for it is by such work that we lay a foundation for those studies which eventually lead to beneficial practical suggestions as to remedies against the harmful fungi, means for checking and avoiding them etc., etc. Of the most harmful order of fungi, viz. the Rusts and the Smuts, as complete lists as possible of those in the whole state have been made out at my request by Professor J.C. Arthur, formerly an instructor in this college.

The popular descriptions of Part I of Bessey's report include the stinking smut and black smut of wheat, the smut of Indian corn, the molds, insect fungi the Carpophytes with 218 fungus species from the Ames area in summarizing fungi the common morel, as edible but not always safe, two species of emented: considered the wood-inhabiting parasites, which have no interest apart from the fact that they exist. They response in one way or other to the demands of the environment, taking in an area covered by a radius of twenty miles. I trust that my non-botanical friends will not regard this portion of this bulletin as useless, for it is by such work that we lay a foundation for those studies which eventually lead to beneficial practical suggestions as to remedies against the harmful fungi, means for checking and avoiding them etc., etc. Of the most harmful order of fungi, viz. the Rusts and the Smuts, as complete lists as possible of those in the whole state have been made out at my request by Professor J.C. Arthur, formerly an instructor in this college.

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The popular descriptions of Part I of Bessey's report include the stinking smut and black smut of wheat, the smut of Indian corn, and the ergot of rye and other grasses. Part II presents what he called the Ames flora (the fungi then were considered to be part of the Plant Kingdom); the Protophytes with a variety of microorganisms and 18 species of slime molds, the Oophytes with green algae, water molds, insect fungi (Entomophthora spp.) and 16 downy mildews, and the Carpophytes with 218 fungus species from the Ames area including 24 lichens plus the 51 rusts and 16 smuts reported from the Ames area and from other areas in Iowa.

In 1888, Macbride of the University of Iowa presented two papers summarizing "The Saprophytic Fungi of Eastern Iowa" in which only two mushroom genera, Agaricus and Coprinus, were recognized with 57 species in the 21 subgenera, most of which are now recognized as genera. In a 1890 paper, Macbride discussed as common edible fungi the common morel, Morchella esculenta, a false morel reckoned as edible but not always safe, two species of Agaricus, and several large and small species of Lycoperdon, the puffballs. In 1895 he considered the wood-inhabiting Polyporaceae, followed in 1896 by a list of puffballs reported by Macbride and Allen.

In a paper (1912b) on the Iowa saprophytic fungi, Macbride commented:

The saprophytic fungi of Iowa have been very slightly studied. Owing to their high economic importance, parasitic forms have claimed almost exclusively the attention of mycologists. Pure science however, must not be neglected. Without it applied science is impossible and no study of natural objects is more praiseworthy than that which seeks to know these for them­selves alone.

Accordingly, I venture to present a few plants this morning, which have no interest apart from the fact that they exist. They are forms in which life finds expression; that is all. But, like every other such form these, too, represent accomplishment, a response in one way or other to the demands of the environment. That so many different answers can be given to apparently identical problems is sufficiently interesting.

These fungi presented in Macbride's papers on the saprophytic fungi of eastern Iowa, fungi commonly known as mushrooms, boletes, polyopes, coral fungi, toothed fungi, puffballs, earth stars, stink horns, etc., are now known to be significant for more than themselves alone, for they are either involved in the decomposition of organic residues with the recycling of materials tied up on such residues or as mycorrhizal associates in the roots of living plants. The mycorrhizal associates are significant in the absorption of mineral ions, and perhaps water, into the associated plants.

In papers published between 1891 and 1927, Pammel and his associates at Iowa State College discussed a variety of plant parasitic fungi on both introduced agronomic plants and native plants. Often the discussions considered destructiveness of the fungal parasites, host range, distribution in Iowa, and control methods.

Shimek, best known for his work with the flowering plants of Iowa, made many collections of fungi that he often did not identify, leaving further interpretation for a later group of students at the University of Iowa. Shimek's interesting paper in 1915 on plant geography of the Lake Okoboji region lists fungi that had been collected in the various habitats either by himself or by others more interested in the plant disease fungi of that area.

Studies such as Hume's list of smuts (Ustilaginaceae) of Iowa (1902), Hess and Vandivert's comments on basidiomycetes of central Iowa (1900), Wilson's papers on the Polyporaceae of Fayette County, Iowa (1910), and the parasitic fungi of Fayette County (1911), Arthur's detailed listing of the rusts of Iowa (1926), and Paige's summary of the fleshy fungi of Webster County (1927) contributed to information on species and distribution of Iowa fungi. In 1925 the first of Martin's papers of the series titled "Notes on Iowa Fungi" published in the Proceedings of the Iowa Academy of Science was concerned with a mushroom genus, Amanita, known for its poisonous species. This series of Martin papers (Martin 1925, 1926, 1928, 1928a, 1928b, 1929, 1930, 1931, 1938, 1940, 1943, 1944a, 1952b, 1954, 1960) continued through 1960, recording species previously unreported in the state and commenting on interesting items on other species.

In 1929, Gilman and Archer presented a documented list of fungi parasitic on plants of Iowa, complete with a host index. Listed are 916 fungal species parasitic on 1019 host plants. This paper, updated by supplements (Gilman 1932, 1949), is an invaluable reference concerning the plant parasitic fungi of Iowa. Fungi associated with problems of woody hosts, particularly those involved with development of tree cankers, were investigated later (Gilman et al. 1935, Gilman and McNew 1940).

From the mid 1920s through the 1940s, students in Martin's laboratory at the University of Iowa studied and presented papers on several groups of larger fungi: Fennell on the Polyporaceae of Iowa (1925), Emmons the Thelephoraceae of Iowa (1927), Miller the Hydnaceae of Iowa (1933, 1934a, 1934b, 1935), Miller and Boyle on the Hydnaceae of Iowa (1943), Kambly and Lee on the Gasteromyces of Iowa (1936), and Fitzgerald on the Hydnaceae of Iowa (1949). Individual genera, Thelephora by Lenz (1943), Russula by Winter (1926), Lycoperdon by Lohman (1927), and Geaster by Longneck (1927), were also studied. Martin (1934a, 1934b, 1944b, 1952a) and students (Rogers 1933, Rogers 1935, Lentz 1947, Martin 1934, Martin 1944b, Martin 1952a) contributed information about a group of basidiomycetes commonly labeled the "jelly" fungi and also discussed a diverse group of inconspicuous downed wood-inhabiting basidiomycetes.

Gilman (1941, 1942, 1943a, 1943b, 1944, 1945, 1946, 1947, 1948) authored a series of illustrated discussions of the common fleshy fungi of Iowa. A series of papers by Howe and coworkers (Howe et al. 1963, 1964, 1965; Randell et al. 1967; Woodward et al. 1970; Miller et al. 1971) reported the mushroom species new to Iowa collected each year for ten years in six white oak forest sites in eastern and central Iowa, sites of a research project concerned with white oak mycorrhizae.

The only comprehensive listing of the fleshy Basidiomycetes is of those with one-celled basidia, the group then known as the Homobasidiomycetes, which was compiled by Gardner (1947). This included the basidiomycetes commonly known as the mushrooms, boletes, chantharellas, coral fungi, pore fungi, smooth fungi, puffballs, hard puffballs, stink horns, bird's nest fungi, and earth stars. All species recorded in the literature prior to 1947, with corrections of nomenclature, were included with the degree of occurrence indicated.
as very common, common, not common, rare, and very rare. In some cases no literature reports existed, but specimens in the mycological herbarium at the University of Iowa documented the species' presence in Iowa. These specimens are now housed in the Ada Hayden Herbarium in the Department of Botany of Iowa State University.

While the fleshy Basidiomycetes include many of our common and conspicuous well-known fungi, they do not include the Discomycetes (the cup fungi), the group that includes the interesting morel and false morel fungi. Gardner's 1947 report of 935 species in 131 genera of Homobasidiomycetes has not been revised or supplemented. A field guide to the larger fungi of Iowa, including the common fungi with persistent or fleshy fruiting bodies, compiled by Huffman et al. (1988), does include some of the fungi of the Gardner 1947 report in addition to other macrofungi.

A minimum working estimate of the number of fungi known to occur in Iowa, 2524 species, can be obtained from the following information: 1057 species of plant parasitic fungi recorded in Gilman and Archer (1929) and including those in the two Gilman supplements (1932, 1949), 935 Basidiomycetes listed by Gardner (1947), 483 Prairie soil fungi identified by Shearer (1988), and 40 Discospora spp. recorded by Seaver (1911).

Unfortunately, mycologists have not usually been concerned with generating checklists of fungi or recording country fungus floras. Also, unlike many other groups of living organisms, the fungi are still being documented as new species are discovered and described from a variety of habitats. Increasing our knowledge of the presence of species and of their distribution usually involves investigations of particular habitats with special techniques for observing and perhaps isolating the fungi, such as the studies of specific groups of aquatic fungi by Dyko (1972), Betancourt (1981), and Klink (Klink and Tiffany 1985) in lakes, rivers, and streams. Sometimes awareness may depend upon the isolation of the fungi from soil by dilution techniques and special media (Shearer 1988, Kitz and Embree 1979).

The plant disease fungi of particular habitats, such as those on plants of the Iowa tall grass prairies, have been studied (Tiffany and Knaphus 1990, Tiffany et al. 1985, 1990) or, with a different orientation, species of a particular order of plant parasites such as the rusts, Uredinales, (Tiffany and Knaphus 1984, 1985) have been recorded. Determining the presence of a fungus species can be complicated by several factors. The perennial mycelium of the saprobe and mycorrhizal fungi survives indefinitely (Frankland et al., 1982), removing the necessity of the production of a fruiting body with spores each year. For example, in early May 1974, a spectacular fruiting of Volvariella sp. (Fr.) Sing., occurred in a recently planted, rain-soaked cornfield north of Ames. The white mushrooms occurred throughout the field, thousands of them, breaking through the crust soil. They decomposed quickly, and a week later there was no evidence of their presence. There was no record of their presence before, and although one of the authors drives past this field every day, this mushroom has not been observed there since.

The ephemeral nature of most mushrooms and other fleshy fungi is a complicating factor. Even a fungus that can potentially develop at any time during the growing season may emerge and then decay quickly. If an observer is not present during those few days, there is no evidence of the presence of that fungus species. For example, a large, handsome mushroom, Agaricus augustus Fr., given the common name "the Prince" by amateur mushroom collectors, has been observed in Iowa twice, on 8 August 1990 and 28 July 1992 at one site in Ft. Defiance State Park in northwest Iowa. Although the field mycology class from Iowa Lakeside Laboratory had collected regularly in the park, A. augustus had not been observed prior to the 1990 sighting and has not been seen elsewhere in Iowa. It is not on Gardner's list, but it is such an impressive mushroom that it would certainly have been noticed if it occurred.

Field sightings of fungi may also be affected by the very restricted fruiting period of some fungi. Morels and false morels are present only in the spring for a four to five week "window" from mid-April to mid-May (Knaphus et al. 1994, Tiffany et al. 1998). Chantharellus (Cantharellus cibarius Fr.: Fr.) fruit in Iowa in July into early August, mycorrhizal with oak in the upland woods. Only if an observer is present during those times would these fungi be noted. If a species exhibits both a seasonality and an irregular annual fruiting pattern, it might even more easily escape notice. Although morel hunters in Linn County have known for years that a different morel occurred in the woods there some years during morel season, the black morel (Morchella angusticeps Pk.) was not recorded as an Iowa species until an intensive state morel survey conducted from 1984-1993 provided distribution data for this species (Knaphus et al. 1994, Tiffany et al. 1998).

Gardner's information does give a basis for interpreting the status of species included on her 1947 list. For example, Fistulina hepatica Schaeff., Fr., a large fleshy edible bracket fungus, was listed by Gardner as rare and known only from western Iowa. There are two collections in the Ada Hayden Herbarium from living oaks at Lake Okoboji, one collected in August 1919, the other in August 1933. In August 1979, F. hepatica was observed on a living oak at Iowa Lakeside Laboratory on Lake West Okoboji. The tree was checked every summer but another fruiting did not develop until August 1988. Also in August 1988 another collection was made from an oak in Fort Defiance State Park in Emmet County in northwestern Iowa. Although this species has not yet been reported to occur from any other site in Iowa, it persists with a very limited known distribution in northwestern Iowa.

A different situation seems to exist for Myconiastrum corium (Guers.) Desv., one of the large puffballs with a very tough peridium that occurs in grasslands. Gardner (1947) lists this species as common. Shimek (1915) noted its presence in a prairie at the head of Lake West Okoboji, while Martin (1928b) commented that it was abundant in Dickinson County in 1925. It has not been seen by the authors, although this species has been sought in prairies and pastures in northwestern Iowa. The apparent absence of M. corium from an area where it was known to be common illustrates a situation potentially shared by other fungus species whose presence and/or fate is not known.

An additional complication to be considered when discussing the Iowa fungal flora is the introduction of non-native fungi with plant materials or living plants brought into the state. These fungi may not be noticed unless they are plant parasitic fungi with an adverse effect on native or cultivated host plants. McNabb and Shurtleff (1957) record two cases of introductions of rust fungi on seedling pine plants. In one situation the alternate plant host necessary for the rust to complete its life cycle does not occur in Iowa and the rust fungus could not become established. The other introduced pine rust was one in which spor transfer from diseased pines to other pines could result in disease development. However, diseased plants were destroyed and neither rust survived. Diseased nursery stock introduced from other states or other countries is always a possible source of fungi alien to Iowa.

Unfortunately, another pine rust fungus, Cronartium ribicola J.C. Fisch., which entered the United States on diseased white pines from European nurseries in the 1890s and early 1900s, soon became a serious problem for the white pine lumber industry in the eastern United States and Great Lakes areas (Spaulding 1922). By the 1920s it was present in the white pine stands in northeastern Iowa (Spaulding 1922, Gilman and Archer 1929).

The introduced fungus that has had the most significant impact on the Iowa flora is an Ascomycete, Ophiostoma ulmi (Buism.) Nannf. Introduced from Europe into North America on elm veneer logs
produced into an elm tree at feeding sites of the beetles, spreads in the xylem where it plugs the xylem elements resulting in the wilting of leaves and ultimately in death of the tree. American elms (Ulmus americana L.) were almost uniformly susceptible and have been eliminated as a favorite landscape tree and as a native woodland and river floodplain tree. The elm wilt fungus was first reported in Iowa in 1957, first at Ft. Madison on the Mississippi River, later that summer north of Davenport (McNabb 1960, Sinclair 1978). It spread quickly across the state, reducing the American elm population to a very few surviving older trees and seedling elms along fence rows and in river bottoms. The fungus and the beetles that carry it are still present, and as young elm seedlings become tall enough to be good beetle feeding sites, they become infected and die.

As habitats are destroyed or modified, the indigenous fungal species of these habitats may be severely limited or eliminated. Mycologists have generally not voiced their concern, perhaps for a variety of reasons. North American conservationists interested in habitat preservation have given little attention to the fungi, perhaps because of lack of knowledge of the fungi and the assumption that special consideration for them was not necessary. In contrast, in Europe information on drastic changes in fungal species diversity in general and in decreasing populations of saprofitic fungi in grasslands and ectomycorrhizal fungi in forests is deeply disturbing to scientists and conservationists (Arnolds 1991). Comparable field data do not exist for other areas in the world. Arnolds (1991) commented that some habitats that are not important for vascular plants and animals may be very significant for fungi, for example coniferous and deciduous forests on very poor soils.

Although we do not now have information to document specific changes in the fungal flora of Iowa forests and prairies, no doubt changes have occurred and are occurring at an unknown rate. Obviously the fate of plant parasitic fungi is linked with the survival of host plants. The fungal population of Iowa, estimated from the information in the literature, includes at least 3000 species. It seems appropriate to emphasize the crucial roles that many fungi have in the maintenance of all life. Probably most important is their role in recycling nitrogen, phosphorus, and other crucial nutrients. The fungi can also digest the cellulose in plant debris. Without these activities there would be a build up of plant debris and a backup of nutrients crucial to all life. In a relatively short time, most plant and animal life would cease.

The mycorrhizal functions of fungi are also very important. Loss of the fungi involved in these root-fungus associations would seriously impair the normal growth of many plant associates. Conversely, food producers would welcome a world without the fungal plant pathogens that are responsible for the majority of plant disease—until the problems of unavailable plant nutrients stopped plant growth. The impact of the fungi cannot be lightly dismissed. The concerns of European scientists about declining fungal populations there should serve as a warning to us.

II. IOWA LICHENS

The lichens, distinctive dual organisms composed of a fungus and a single-celled green alga or blue-green cyanobacteria, have traditionally been collected and studied by specialists in lichens (licheneologists) or by bryologists. Only relatively recently, when the interpretation of the International Rules of Botanical Nomenclature mandated that the technical names of lichens were also the names of the fungal partners, have the lichens been considered by mycologists and incorporated into textbooks and taxonomic discussions of non-lichen fungi. The earliest record of lichens in Iowa was made by Bessey in his 1884 paper presenting lists of cryptogamic plants identified within a 20 mile radius of Ames. Under the Order Lichenes he lists 24 lichens, but does not include information about their habitats, such as whether they grew on trunk bark of trees, rocks, or soil.

The first publications concentrating on Iowa lichens were authored by Fink (1893, 1895) who taught at Upper Iowa University inayette beginning in 1888 and at Grinnell College in Grinnell from 1903–1906. Fink much later compiled information on lichens of the United States and presented it in Lichen Flora of the United States (1935) published after his death.

In the 1895 paper, Fink commented that there had been no enumeration of Iowa lichens since the brief 1884 list by Bessey. Fink had intensively collected lichens in Fayette County for two years and had made excursions into Bremer, Winneshiek, and Clayton Counties. He had also received lichen collections from Shelby, Johnson, Story, Linn, Muscatine, Floyd, Dickinson, Lee, Emmet, and Winneshiek Counties. In his introduction he commented:

It seems that lichens have been neglected somewhat in Iowa up to the present time. This becomes apparent when we consider that there are quite as many species of lichens as most other kinds of cryptogams, and that not more than 24 species have thus far been listed for the state. Surely the lichens are no more obscure than most other cryptogams. The trees are covered with them the State over, giving them a most beautiful appearance, especially after a rain. The writer has counted 20 species of lichens on a single tree. The rocks too are in some instances so completely over-run with them that the rock itself can scarcely be seen, and here they display even greater beauty of form and color than on the trees.

Fink reported 196 species of lichens, with 180 species from Fayette County. Of these, 92 species were on wood only (mostly on bark of living trees), 57 species on rocks only, 26 species on soil only, 15 species on wood and rocks, two species on wood and soil, and three species on rocks and soil.

Shimek (1904) included the lichens in his observations on the flora of the St. Peter sandstone in Winneshiek County, reporting six species on hard exposed rock surfaces and three species in more protected sites. In his discussions of the plant geography of the Lake Okoboji region (Shimek 1915), he listed 15 lichen species on prairie woods, three on old fence posts, 36 species on trees in groves bordering the lake, and two species on soil. Shimek commented that the abundance of lichens on the trees had decreased in recent years and attributed the decrease to pasturing of the groves.

Other than Miller’s paper (1903) on the lichens of the Ledges in Boone County and Wolden’s lists of lichens in Emmet County (1919, 1935), there are few lichen records until the 1960s when Juhl (1961), Juhl and Tiffany (1963, 1965), and Tiffany and Juhl (1964) reported on lichens of central Iowa and of Dickinson and Emmet Counties. An annotated listing of Iowa lichens was compiled by Malone and Tiffany (1978) and a checklist of Iowa foliose lichens by Dunlap and Tiffany (1980). Roosa included lichens in the Iowa foray report from Fremont County in 1978. Schutte (1979) studied the foliose and fruticose lichens of Linn County. Oard and Tiffany (1985) investigated the soil lichens of the Iowa Loess Hills prairies.

While earlier researchers have implied declines in lichen populations, the incomplete information on Iowa lichens is not an adequate base for evaluating decreases in specific species populations or in identifying extirpated species. Shimek’s comments (1915) indicate a decrease in the lichens on bark of living trees in groves in the Lake Okoboji region even at that time. Malone and Tiffany (1978) commented that while there are early records of lichen collections, spe-
specific sites were not usually recorded. One exception is the Shimke report (1896) on the flora on the Sior Quartzite outcrops in what is now in Gitchie Manitou State Preserve. Malone and Tiffany (1978) reported finding all of the species that Shimke considered to be common on those outcrops, but did not find three species he reported as rare. They did find three species not included in Shimke's report.

In the checklist of Iowa foliose lichens compiled by Dunlap and Tiffany (1980), 91 species of foliose lichens are reported based on herbarium material from 49 Iowa counties and Dunlap collections from 22 counties. Although 263 species of lichens were discussed in the annotated listing compiled by Malone and Tiffany (1978), the Dunlap and Tiffany (1980) information is more accurate for the foliose species as all specimens were studied and nomenclatural changes incorporated. Voucher specimens were not available for all species included in the Malone and Tiffany listing, although identifications were confirmed where possible. Oord and Tiffany (1985) discussed 13 species of fruticose and crustose lichens from Iowa prairies.

Lichens in general are quite susceptible to airborne pollutants (Ferry et al. 1973, Gnes 1996). While there may be some local industrial sites where lichen species have suffered deterioration or elimination, such losses due to industrialization are not obvious throughout most of the state. A somewhat unusual situation exists for Caloplaca ulmorum (Fr.). Fk., a lichen that commonly grows on the trunk bark of living elms and only rarely on bark of oaks, junipers, and other trees. Mature elm habitat has become quite rare since the advent of elm wilt and the death of most of the older elms in the state. The introduced fungus causing the decrease, Ophiostoma ulmi, has persisted in Iowa and continues to kill young elm trees. It seems inevitable that this reduction of habitat will at least severely limit the distribution of C. ulmorum.

III. SLIME MOLDS (MYXOMYCETES) OF IOWA

The myxomycetes or slime molds, although traditionally collected, investigated, and discussed by mycologists and plant pathologists, have not been considered to be related to the fungi with walled single celled or filamentous vegetative structures. The slime molds have a plasmodium, a multinucleate naked mass of cytoplasm vegetative stage, that ultimately develops into 1) hundreds or thousands of small, but macroscopic, fruiting structures containing spores or into 2) a few larger fruiting structures a centimeter or more in diameter (Martin and Aplexopoulos 1969). In Bessey’s 1884 paper presenting a preliminary list of cryptogams collected within a 20 mile radius of Ames, 18 species of slime molds occurring on decaying bark and wood, on horse dung and on dead and living leaves were listed. However, T.H. Macbride at the University of Iowa was the person for whom the slime molds held a special fascination. His 1892 paper “The Myxomycetes of Eastern Iowa”, presented information on 66 species and was followed in 1893 by “The Myxomycetes of Eastern Iowa (continued)” detailing nine additional species.

In the preface to his book The North American Slime Moulds, published in 1899, Macbride wrote “The present work has grown out of a monograph entitled The Myxomycetes of Eastern Iowa published by the present author about eight years ago. The original work was intended chiefly for the use of the author’s own pupils; but interest in the subject proved much wider than had been supposed, and a rather large edition of that little work was speedily exhausted.” In the preface to the second edition of The North American Slime Moulds published in 1922, Macbride comments, “The first edition of this little book having been exhausted long ago, the writer in this second issue takes opportunity to correct sundry errata, typographical and other, and at the same time to incorporate such new information in reference to individual species and to the subject entire as the researches of more recent years may afford.”

While both editions of this book include the general information, keys, distribution, habitat, and technical descriptions one expects from a taxonomic presentation, they also include comments revealing Macbride’s enthusiasm and fascination with these organisms. For example, following the technical description of Fuligo septica (L.) Wiggers he wrote:

“Under this name may be placed our most common form. Rising with an abundant yellowish creamy plasmodium from masses of decaying vegetation, lumber, sawdust, half buried logs, it creeps about with energy unsurpassed, coming to rest only in some position specially exposed, as the top of a log or stump, the face of a stone or post, or even the high clods of a cultivated field———More than thirty fruiticulations have appeared at one time, varying in size from one to twenty cm, in a field of potatoes, well tilled, and less than an acre in extent! Such is life’s perennial exuberance on this time-worn old world of ours!”

Unfortunately, when Macbride and Martin collaborated on the next myxomycete book, The Myxomycetes, scientific details remained but the personal comments did not survive. George Martin had joined the staff of the botany department at the University of Iowa in 1923, becoming associated with Macbride and increasingly interested in the myxomycetes, later also in the Tremellales and the supinate taxa of the Homobasidiomycetes. Martin’s continuing interest in the myxomycetes resulted in publication of The North American Flora Myxomycetes in 1949 and in the definitive world-wide treatise of the myxomycetes, The Myxomycetes by Martin and Aplexopoulos (1969).

Macbride’s papers published in 1892 and 1893, the only reports concerned specifically with general Iowa myxomycetes, list 75 species. Field mycology classes at Iowa Lakeside Laboratory in northwestern Iowa have collected 81 species (Tiffany, unpublished data) during summer classes from 1970 to 1996. Two papers (Gilbert and Martin 1933, Gilbert 1934) discuss myxomycetes found developing in a specialized habitat, the bark of living trees, and detail techniques for obtaining and working with these special slime molds.

Although little documentation is available concerning the distribution and survival of slime molds in Iowa, it is highly unlikely that they are in danger. The vegetative stage, the plasmodium, feeds in moist well rotted logs, in the moist organic litter near the soil surface in wooded areas, in mulched plantings, even in lawns with a layer of grass clippings. As long as such habitats are available, the versatile common slime molds will survive. The more specialized slime molds that colonize the bark of living trees may be more vulnerable, but no information is available concerning their populations.

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III. IOWA SLIME MOLDS (MYXOMYCETES)


