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Fungi of the Iowa Loess Hills

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From 1981 through 1983 biological surveys of the Loess Hills were sponsored by the Iowa State Preserves Advisory Board. Twenty-four sites in 7 counties were visited during the first week in June during these years. Collections were made of all macrofungi producing identifiable fruiting structures or represented by recognizable weathered fruiting structures developed the previous fall. Plant parasitic fungi and corticolous lichens were also recorded. Fungi of the Loess Hills of Iowa had been previously documented primarily by Gilman's and Gilman and Archer's reports of plant parasitic fungi.

This report includes 3 species of Oomycetes, 18 species of Myxomycetes, 67 species of Ascomycetes, 75 species of Basidiomycetes, 27 species of Fungi Imperfecti (Deuteromycetes) and 15 species of corticolous lichens.

INDEX DESCRIPTORS: Fungi, Loess Hills, lichens

The fungi of Iowa, particularly the macrofungi and the plant parasitic fungi, have been observed, collected and interpreted since the 1870s. However, much of this work was in the eastern and central portions of the state. Gilman and Archer's (1929) catalog of the plant parasitic fungi of Iowa does include some information on occurrence of these fungi in western Iowa. Also, G. W. Martin's students, working at the Iowa Lakeside Laboratory on Lake West Okoboji in Dickinson County, documented the local Myxomycetes and the Tremellales as part of their intensive taxonomic studies of these groups of fungi.

The Loess Hills of western Iowa are especially interesting for studies of fungal distribution. The eastern Iowa forests, with more rainfall and a more diverse vascular plant population, have a larger number of species of fungi than do the western Iowa forests. However, in the Loess Hills where remnants of the eastern deciduous forest occur in scattered stands and where western plant species are at the eastern edge of their ranges, what fungi are also successfully established? The Loess Hills forays provided an opportunity to obtain data about the fungi of this area.

This paper reports the Loess Hills fungi as we have observed and collected them, primarily for several days in early June, 1981 through 1983. These studies were part of biological surveys sponsored by the Iowa State Preserves Advisory Board. Data from incidental collections made by various people working in the area during the last few years have also been included. However, these collections are even less representative of other seasons and situations than our limited observations are of the early summer fungal population. We have also included the reports from this area of plant parasitic fungi of Gilman and Archer (1929), and of the larger Discomycetes by Jensen (1977).

During the surveys, we concentrated on the macrofungi, the plant parasites, and the lichens. However, the rusts (Uredinales) which are plant parasitic fungi and the soil-inhabiting lichens are discussed in separate papers. The plant parasites reported here include only those that could be identified from fungal fruiting structures already present on the diseased host at the time of collection, or from fruiting structures that developed during a 48 hour incubation in a moist chamber during the week following collection. Thus our observations are biased in that only the plant parasites that develop relatively early in the growing season are represented.

The macrofungi we identified probably include two different ecological groups of fungi: 1) the litter-dwelling and wood-inhabiting saprophytic fungi, and 2) the mycorrhizal fungi. Because both groups may produce their fruiting bodies on or through the ground litter, only an intensive study of fruiting bodies of a fungus species in the

immediate vicinity of a particular vascular plant species could give presumptive evidence for an ectomycorrhizal association. Endomycorrhizal fungi could be detected only by a detailed microscopic study.

Both the litter-dwelling species and the mycorrhizal fungi may be seasonal. Some species fruit only at specific times, the morels in spring, certain mushrooms in summer, other mushrooms and puffballs only in fall. Some fungal structures, such as sterile bases of larger puffballs or the perennial and annual brackets of wood inhabiting fungi, are persistent enough to be recognizable beyond the season in which they develop. Other species may not be limited, but can develop fruiting bodies throughout the growing season whenever environmental conditions are favorable. Some Ascomycetes, both plant parasitic and saprophytic species, produce ascocarps only an overwintering plant debris. These small fruiting structures are seldom obvious in the field.

Many fungi occur predominantly or exclusively in only one of the vegetational associations in the Loess Hills. We have, therefore, presented our observations in three lists: 1) those fungi encountered in the prairie sites or as parasites on the prairie plants (Table 2), 2) those fungi found in the wooded slopes and ravines of prairie areas and in the contiguous wooded areas and as parasites of the plants of these sites

Table 1. Collection sites in the Iowa Loess Hills region.

SITE	LEGAL DESCRIPTION	COUNTY
Banks Property	Sec. 20, T91N, R49W	Plymouth
Stone State Park	Sec. 2, T89N, R48W	Woodbury
Brown's Lake	Sec. 33, T87N, R47W	Woodbury
Joy Hollow Road	Sec. 24, T91N, R49W	Plymouth
Smithland Co. Park	Sec. 26-27, T86N, R44W	Woodbury
Preparation Canyon	Sec. 24, T82N, R44W	Monona
Boy Scout Camp	Sec. 28, T82N, R44W	Monona
Railroad track	T83N, R45W	Monona
Turin Wildlife Area	Sec. 33-34, T84N, R44W	Monona
Dahm Property	W½ Sec. 18, T85N, R44W	Monona
Raglan Property	E½ Sec. 21, T80N, R44W	Harrison
Roden Farm	NW¼ Sec. 23, T81N, R44W	Harrison
Deer Island	Sec. 21, T81N, R45W	Harrison
Tyson Bend Wildl. Area	NW Sec. 29, T79N, R45W	Harrison
Crescent Ski Area	Sec. 12, T76N, R44W	Pottawattamie
Seep	Sec. 11, T71N, R43W	Mills
Roadside Ditch	T73N, R43W	Mills
Wearin Prairie	Sec. 13, T72N, R41W	Mills
Flood Plain Prairie	Sec. 26, T67N, R43W	Fremont
Roadside Ditch	Sec. 25, T67N, R43W	Fremont
Thurman south	Sec. 13, T69N, R43W	Fremont
Knox Church Site	SE ¼, Sec. 32, T68N, R42W	Fremont
Possum Creek	Sec. 18, T69N, R42W	Fremont
Waubonsie State Park	Sec. 31, T67N, R42W	Fremont

Table 2. Fungi of the prairie areas of the Iowa Loess Hills.

<i>Fungus</i>	<i>County</i> ^a
Myxomycetes	
<i>Physarum vernum</i> Somm.	4
Oomycetes	
<i>Peronospora parasitica</i> Pers. ex Fr.	3,6
<i>Plasmopara pygmaea</i> (Unger) Schroter On <i>Anemone canadensis</i> L.	6
Ascomycetes	
Hemiascomycetes	
<i>Tapbrina potentillae</i> (Farlow) Johanson On <i>Potentilla</i> sp.	1
<i>Tapbrina pruni</i> Tul. On <i>Prunus americana</i> Marsh.	5
Pyrenomycetes	
<i>Claviceps purpurea</i> (Fr.) Tul. On <i>Phalaris arundinacea</i> L.	1,2,4
<i>Erysiphe polygona</i> DC. On <i>Oxytropis lamberti</i> Pursh.	3
<i>Gibberella pulicaris</i> (Fr.) Sacc. On <i>Morus</i> sp.	2,4
<i>Phyllachora luteomaculata</i> (Schwein.) Orton On <i>Andropogon gerardi</i> Vitm.	3,5,7
<i>Phyllachora boutelouae</i> Rehm On <i>Bouteloua</i> sp.	2
Loculoascomycetes	
<i>Elsinoe panici</i> Tiffany & Mathre On <i>Panicum virgatum</i> L.	2,3,7
Deuteromycetes	
<i>Ascochyta brachypodii</i> (Sydow) Sprague & A.G. Johnson On <i>Schizachyrium</i> <i>scoparium</i> (Mich. x.) Nash	4
<i>Botrytis cinerea</i> Pers. On <i>Lactuca sativa</i> L.	5
<i>Cercospora concentrica</i> Cooke & Ellis On <i>Yucca glauca</i> Nutt.	7
<i>Cladosporium astericola</i> Davis On <i>Aster sagittifolius</i> Weden.	4
<i>Collectotrichum graminicola</i> (Ces.) Wilson On <i>Schizachyrium scoparium</i> (Michx.) Nash	4,7
<i>Cylindrosporium angustifolium</i> Ellis & Kell. On <i>Yucca glauca</i> Nutt.	7
<i>Cylindrosporium hiemalis</i> Higgins On <i>Prunus virginiana</i> L.	3,4
<i>Cylindrosporium toxicodendri</i> (Curtis) Ellis & Eve. On <i>Rhus glabra</i> L.	1,2,3,4,7
<i>Kellermania yuccaegena</i> Ellis & Eve. On <i>Yucca glauca</i> L.	3
<i>Marsonnina potentiillae</i> (Desm.) Magnus On <i>Potentilla</i> sp.	3
<i>Septoria helianthi</i> Ellis & Kell. On <i>Helianthus</i> sp.	3,4
<i>Septoria verbenae</i> Rob. & Desm. On <i>Verbena stricta</i> Vent.	5
<i>Septoria secalis</i> Prill. & Del. On <i>Secale cereale</i> L.	4
<i>Stagonospora graminella</i> Sacc.	
Basidiomycetes	
Teliomycetes	
<i>Sphacelotheca occidentalis</i> (Seym.) Clinton On <i>Andropogon gerardi</i> Vitm.	1
Holobasidiomycetes	
Agaricales	
<i>Agaricus campestris</i> Fr.	3
<i>Hygrocybe conica</i> (Scop. ex Fr.) Kummer	3,4
<i>Hygrocybe punicea</i> (Fr.) Kummer	3,4,5,
<i>Lepiota naucina</i> (Fr.) Kummer	3
<i>Lepista saeva</i> (Fr.) Orton	3
<i>Stropharia coronilla</i> (Bull. ex Fr.) Quelet	3

Gasteromycetes

<i>Cyathus stercoreus</i> (Schwein.) de toni in Sacc.	2
<i>Disciseda candida</i> (Schwein.) Lloyd	1,3
<i>Geastrum mammosum</i> Chev.	4
<i>Geastrum minus</i> (Pers.) Fischer	3,4,6,7
<i>Lycoperdon ericetorum</i> Pers.	4
<i>Lycoperdon pusillum</i> Pers.	3,4
<i>Tulostoma brumale</i> Pers.	1,2,3,4
<i>Secotium agaricoides</i> (Czern.) Hollos	1

^a County symbols: 1 = Plymouth, 2 = Woodbury, 3 = Monona, 4 = Harrison, 5 = Pottawattamie, 6 = Mills, 7 = Fremont

(Table 3), and 3) saprophytic and plant parasitic fungi of the Missouri River flood plain at the western base of the Loess Hills bluffs (Table 4).

We recognize that somewhat different but interrelated wooded situations occur in group 2. One involves the eastern deciduous forest remnants in Stone State Park and Smithland County Park in the northern Loess Hills area, Preparation Canyon State Park in the central region, and Waubonsie State Park in the south. The other is the groups of scattered bur oaks restricted to the lower portions of protected loess slopes noted in early government land surveys. These have changed since settlement of the Loess Hills. Natural fires are rare, and the dense bur oak stands, with junipers and dogwood at the edges, now occupy many ravines throughout the Iowa Loess Hills.

The prairie vegetation, unlike that found in other remnant prairies in Iowa, includes species more typical of the central Great Plains. In the dry environment enhanced by the soils and steep slopes of the loess bluffs, some of these Great Plains plant species are at the eastern edge of their range. Occurring with the more typical Iowa prairie species, especially those more tolerant of dry growing conditions, these plants make the Loess Hills prairies an interesting mix of plants that support a different group of plant parasitic fungi and saprophytes. For example, *Kellermania yuccaegena* Ellis & Kellm., is a leaf parasite on *Yucca glauca* L., a western species which occurs naturally in Iowa only in the Loess Hills.

The flood plains areas investigated were those immediately adja-

Table 3. Fungi of the wooded areas of the Iowa Loess Hills

<i>Fungus</i>	<i>County</i> ^a
Myxomycetes	
<i>Arcyria cinerea</i> (Bull.) Pers.	2
<i>Arcyria denudata</i> G. Lister	3
<i>Ceratiomyxa fruticulosa</i> (Mull.) Macbr.	2
<i>Comatricha rubens</i> Lister	3
<i>Didymium iridis</i> (Ditmar) Fr.	3
<i>Didymium nigripes</i> (Link) Fr.	3
<i>Didymium squamulosum</i> (Alb. & Schwein.) Fr.	3
<i>Fuligo septica</i> (L.) Wigg.	2
<i>Hemitrichia stipitata</i> (Massee) Macbr.	2
<i>Lycogola epidendrum</i> (L.) Fr.	2
<i>Metatrichia vesparium</i> (Batsch) Nannf.-Brem.	2
<i>Mucilago crustacea</i> Wigg.	3
<i>Physarum cinereum</i> (Batsch) Pers.	3
<i>Physarum vernum</i> Somm. ex Fr.	3
<i>Stemonitis axifera</i> (Bull.) Macbr.	3
Ascomycetes	
Hemiascomycetes	
<i>Tapbrina coerulea</i> (Mont. & Desm.) Tul.	7
On <i>Quercus macrocarpa</i> Michx. leaves	
<i>Tapbrina potentillae</i> (Farlow) Johanson	1,3
On <i>Potentilla</i> sp. leaves	
<i>Tapbrina pruni</i> Tul. On <i>Prunus americana</i> Marsh. fruits	3

Pyrenomycetes

<i>Acrospermum compressum</i> Tode ex Fr.	7	<i>Rutstroemia longipes</i> (Cooke & Peck) White	7
On overwintered leaves of <i>Cercis canadensis</i> L.		<i>Rutstroemia macrospora</i> (Peck) Kan.	7
<i>Daldinia concentrica</i> (Bolton ex Fr.) de Not.	7	On overwintered petioles	
<i>Diatrype albopruinosa</i> (Schwein.) Cooke	7	<i>Sarcoscypha coccinea</i> (Scop.) Sacc.	5,7
On <i>Ostrya virginiana</i> (Mill.) K. Koch		<i>Sarcoscypha occidentalis</i> (Schwein.) Sacc.	2,4,5,7
<i>Diatrype stigma</i> (Hoffm.) de Not.	2	<i>Scutellinia scutellata</i> (L.) Lambotte	6
On <i>Quercus</i> branches		<i>Urnula craterium</i> (Schwein.) Fr.	5
<i>Erysiphe cichoracearum</i> DC. On <i>Galium</i> sp.	2	<i>Verpa conica</i> (Mull.) Swartz	5
<i>Erysiphe cichoracearum</i> DC.	2	Loculoascomycetes	
On <i>Hydrophyllum virginianum</i> L.		<i>Apiosporina morbosus</i> (Schwein.) Arx	3,7
<i>Erysiphe cichoracearum</i> DC.	2	On <i>Prunus virginiana</i> L.	
On <i>Cynoglossum officinale</i> L.		<i>Botryosphaeria quercuum</i> (Schwein.) Sacc.	2
<i>Eutypa ludibunda</i> Sacc.	1,6	On <i>Rhus typhina</i> L.	
On down <i>Ulmus americana</i> L. branches		<i>Hysterographium fraxini</i> (Pers. ex Fr.) de Not.	2,4
<i>Eutypa ludibunda</i> Sacc. On <i>Tilia americana</i> L.	2	On <i>Fraxinus</i> sp. branches	
<i>Gnomonia ostryae</i> de Not. On overwintered	7	<i>Hysterographium subrugosum</i> (Cooke & Ellis) Sacc.	2
leaves of <i>Ostrya virginiana</i>		Lichens	
(Mill.) K. Koch		<i>Caloplaca ulmorum</i> Fink	2
<i>Gnomonia setacea</i> (Pers. ex Fr.) Ces. & de Not.	2,3,6,7	<i>Candelaria concolor</i> (Dickson) B. Stein	2,6,7
On overwintered leaves of <i>Quercus alba</i> L.,		On <i>Quercus</i> sp. bark	
<i>Quercus macrocarpa</i> Michx., <i>Quercus rubra</i> L.		<i>Candelaria fibrosa</i> (Fr.) Mull. Arg.	2
<i>Hypomyces aurantius</i> (Pers.) Tul.	3	<i>Parmelia bolliana</i> Mull. Arg.	2
On <i>Polyporus varius</i> Pers., ex Fr.		<i>Physcia setosa</i> var. <i>virella</i> Bouly de Lesd.	6,7
<i>Hypoxylon mediterraneum</i> (de Not.) Miller	2	<i>Physcia stellaris</i> (L.) Nyl.	2,6,7
<i>Hypoxylon nummularium</i> Bull. ex Fr.	2	<i>Physcia syncolla</i> Tuck.	6,7
<i>Hypoxylon rubiginosum</i> Pers. ex Fr.	2	<i>Teloschistes chrysophthalmus</i> (L.) Th. Fr.	2
<i>Hypoxylon ustulatum</i> Bull. ex Kickx	6	<i>Xanthoria fallax</i> (Hepp.) Arn.	2,6,7
<i>Lasiosphaeria hirsuta</i> (Fr.) Ces. & de Not.	2	<i>Xanthoria polycarpa</i> (Ehrh.) Oliv.	2
<i>Microsphaera alni</i> DC. ex Winter	3	<i>Xanthoria candelaria</i> (L.) Th. Fr.	2
On <i>Quercus rubra</i> L.		Deuteromycetes	
<i>Nectria cinnabarina</i> (Tode ex Fr.) Fr.	3	<i>Cylindrosporium hiemalis</i> Higgins	3
<i>Nectria episphearia</i> (Tode ex Fr.) Fr.	3	On <i>Prunus virginiana</i> L.	
On <i>Diatrype stigma</i> (Hoffm.) de Not.		<i>Cylindrosporium toxicodendri</i> (Curtis) Ellis & Eve.	3,4
<i>Ophiognomonia melanostyla</i> (DC. ex Fr.) Sacc.	5	On <i>Rhus glabra</i> L.	
On overwintered leaves of <i>Tilia americana</i> L.		<i>Exosporium tiliae</i> Link ex Fr.	3
<i>Phyllactinia corylea</i> (Pers.) Karsten	2	On down branches of <i>Tilia americana</i> L.	
<i>Pocillum cerasti</i> (Mont.) de Not.	5,7	<i>Heterosporium allii</i> Ellis & G. Martin	6
On overwintered leaves of <i>Quercus</i> sp.		var. <i>alli-panii</i> Isec. & Berl.	
<i>Rosellinia aquila</i> (Fr.) de Not.	2,3	On <i>Allium</i> sp.	
<i>Rosellinia subiculata</i> (Schwein.) Sacc.	2	<i>Septoria cornicola</i> Desm. On leaves of <i>Cornus</i> sp.	3,4,7
<i>Stegophora ulmea</i> (Schw. ex Fr.) Sydow & Sydow	4	Basidiomycetes	
On overwintered leaves of <i>Ulmus</i> sp.		Phragmobasidiomycetes	
<i>Valsa fraxinina</i> Peck On <i>Fraxinus pennsylvanica</i>	3	<i>Auricularia auricula</i> (Hooker) Underw.	3
Marsh.		<i>Tremella mesenterica</i> Fr.	3
<i>Zignoella ovoidea</i> (Fr.) Sacc.	3	Holobasidiomycetes	
Discomycetes		Aphyllorphorales	
<i>Bisporella citrina</i> (Batsch ex Fr.)	7	<i>Byerkandera adusta</i> (Willd. ex Fr.) P. Karsten	2
Korf & Carpenter		<i>Cerrena unicolor</i> (Bull. ex Fr.) Murr.	2
<i>Coccomyces hiemalis</i> Higgins	4	<i>Coriolus hirsutus</i> (Wulf ex Fr.) Quelet	2,3
<i>Coccomyces prunophorae</i> Higgins	4	<i>Coriolus versicolor</i> (L. ex Fr.) Quelet	2,3
<i>Dasyscyphus virgineus</i> S.F. Gray	3	<i>Cyphella tiliae</i> Peck ex Cooke	2,3
On overwintered <i>Quercus</i> leaves		On down <i>Tilia americana</i> L. branches	
<i>Geopora sepulta</i> (Fr.) Korf & Burdsall	3	<i>Favolus alveolaris</i> (DC. ex Fr.) Quelet	2
<i>Gyromitra brunnea</i> Underw.	5	On down <i>Quercus</i> sp.	
<i>Helvella acetabulum</i> (L.) Quelet	4	<i>Funalia gallica</i> (Fr.) Bond.	2,3
<i>Helvella crispa</i> Fr.	4,5	<i>Ganoderma applanatum</i> (Pers. ex S.F. Gray) Pat.	2,3,5
<i>Helvella elastica</i> Fr.	7	<i>Gloeophyllum trabeum</i> (Pers. ex Fr.) Murr.	3
<i>Helvella villosa</i> (Hedwig) Diss. & Nannf.	7	<i>Gloeoporus dichrous</i> (Fr. ex Fr.) Bresad.	1
<i>Morchella esculenta</i> (L.) Pers.	2,4,5,7	<i>Hymenochaete tabacina</i> Sow. ex Lev.	2,3
<i>Morchella semilibra</i> (DC.) Fr.	7	On down <i>Quercus</i> sp. branches	
<i>Peziza varia</i> (Hedwig) Fr.	2	<i>Irpex lacteus</i> (Fr. ex Fr.) Fr.	3,7
<i>Psilopezia nummularia</i> Berk.	3	<i>Laetiporus sulphureus</i> (Bull. ex Fr.) Murr.	3
On very soggy wood		<i>Phellinus gilvus</i> (Schwein.) Pat.	2
<i>Pulvinula convexella</i> (P. Karsten) Pfister	3	<i>Polyporus arcularis</i> Batsch ex Fr.	6,7,2
		On down <i>Quercus</i> sp.	

<i>Polyporus mori</i> Pollini ex Fr.	2
On down <i>Quercus</i> branches	
<i>Polyporus varius</i> Pers. ex Fr.	6
<i>Polyporus squamosus</i> Hudson ex Fr.	2,3
<i>Poronidulus concifer</i> (Schwein.) Murr.	3
<i>Pycnoporus cinnabarinus</i> (Jacq. ex Fr.) Karsten	3
<i>Schizoplyllum commune</i> Fr.	1,3,4,6
<i>Truncospora ohioensis</i> (Berk.) Pilat	3
Agaricales	
<i>Agaricus placomyces</i> Peck	4
<i>Amanita vaginata</i> (Bull. ex Fr.) Vitt.	1
<i>Collybia dryophila</i> (Bull. ex Fr.) Kummer	2,4,3
<i>Clitocybe gibba</i> (Fr.) Kummer	2,4
<i>Coprinus micaceus</i> (Fr.) Fr.	1
<i>Coprinus atramentarius</i> (Fr.) Fr.	1,3
<i>Coprinus comatus</i> (Fr.) S.F. Gray	3
<i>Coprinus quadrifidus</i> Peck	2
<i>Crepidotus malachius</i> (B. & C.) Sacc.	3
<i>Flammulina velutipes</i> (Curtis ex Fr.) Karsten	3
[<i>Collybia velutipes</i> (Curtis ex Fr.) Kummer]	
<i>Hygrocybe conica</i> (Scop. ex Fr.) Kummer	3
(<i>Hygrophorus conicus</i> Fr.)	
<i>Hygrocybe punicea</i> (Fr.) Kummer	3,4
(<i>Hygrophorus puniceus</i> Fr.)	
<i>Inocybe asterophora</i> Quelet	3,4
<i>Lepiota clypeolaria</i> (Bull. ex Fr.) Kummer	3
<i>Lepiota cristata</i> Kummer	3
<i>Lepiota naucina</i> (Fr.) Kummer	3,4
[<i>Leucoagaricus naucinus</i> (Fr.) Singer]	
<i>Lepista irina</i> (Fr.) Bigelow [<i>Tricholoma irinum</i>	3
(Fr.) Kummer]	
<i>Lepista saeva</i> (Fr.) Orton [<i>Tricholoma personatum</i>	3,4
(Fr. ex Fr.) Kummer]	
<i>Marasmius siccus</i> (Schwein.) Fr.	3
<i>Marasmius glabellus</i> Peck	3
<i>Marasmius rotula</i> (Scop. ex Fr.) Fr.	3
<i>Mycena haematopus</i> (Fr.) Kummer	2
<i>Nolanea mammosa</i> (Fr.) Quelet	3
<i>Pholiota acericola</i> Peck	2
<i>Pholiota squarrosa</i> (Muller ex Fr.) Kummer	7
<i>Pleurotus ostreatus</i> (Jacq. ex Fr.) Kummer	1
<i>Psathyrella candolleana</i> (Fr.) Smith	3
<i>Tricholomopsis platyphylla</i> (Pers. ex Fr.) Singer	3
[<i>Collybia platyphylla</i> (Fr.) Kummer]	
<i>Tricholoma irinum</i> (Fr.) Kummer [<i>Lepista irina</i>	3
(Fr.) Bigelow]	
Gasteromycetes	
<i>Bovista plumbea</i> Pers.	4
<i>Calvatia craniiformis</i> (Schwein.) Fr.	3,4,5,6
<i>Crucibulum laeve</i> (Hudson ex Relhan) Kambly	3,4,5
<i>Cyathus striatus</i> (Hudson) ex Person.	4
<i>Geastrum mammosum</i> Chev.	3,4,6
<i>Lycoperdon obliquosporum</i> Berk & Curtis	3
<i>Phallus impudicus</i> Pers.	3,4
<i>Tulostoma brumale</i> Pers.	4

Taxonomic treatments used in identification are listed in the references.

Several Gasteromycetes collected in both the prairie sites and sandy areas of the flood plain are of particular interest. *Tulostoma brumale* Pers. was discussed by Kambly and Lee (1936) as a species of stalked puffball that probably occurred in Iowa but was not represented in the Iowa collections they had available. Macbride, in Kambly and Lee (1936), had reported a collection of *T. brumale* from sandy sites in eastern Iowa, but the only collections available to Kambly and Lee were *T. simulans* Lloyd. These two species were considered to be a single variable species by Cunningham (1979), but most workers, Kambly and Lee (1936), Coker and Couch (1928), Smith et al. (1981), consider them to be distinctly different.

Disciseda candida (Schwein.) Lloyd was considered by Kambly and Lee (1936) to be uncommon, but distributed throughout the state in pastures and grassy areas. During the survey, it was collected only on the top of the prairie ridges.

Geastrum minus (Pers.) Fischer is one of the small earth stars that also seems to have a wide distribution but is seldom common. It has usually been reported from sandy sites, but was collected from several prairie areas in the Loess Hills.

We will need more collections, taken at different times of the year under a broader variety of environmental conditions to complete our study of the macrofungi. Similarly, the plant parasitic fungus specimens were limited to early June collections. The reports of Gilman and Archer (1929) and Gilman (1949) supplement our collections but more study will be needed to produce a satisfactory evaluation of the plant parasitic fungi. Thus, our three-year study has added significant information, but a considerable amount of additional field work must be completed before an accurate interpretation of the fungi of the Loess Hills can be made.

Table 4. Fungi of the Missouri River floodplain adjacent to the Iowa Loess Hills.

<i>Fungus</i>	<i>County</i> ^a
Myxomycetes	
<i>Physarum cinereum</i> (Batsch) Pers.	4
Oomycetes	
<i>Peronospora parasitica</i> Pers. ex Fr.	7
On <i>Sisymbrium officinale</i> (L.) Scop.	
Ascomycetes	
Hemiascomycetes	
<i>Tapbrina pruni</i> Tul. On <i>Prunus americana</i> Marsh.	3
Pyrenomycetes	
<i>Acrospermum compressum</i> Tode On overwintered	4,7
<i>Panicum virgatum</i> L. stems	
<i>Claviceps purpurea</i> (Fr.) Tul.	5
On <i>Phalaris arundinacea</i> L.	
<i>Erysiphe cichoracearum</i> DC.	7
On <i>Cynoglossum officinale</i> L.	
<i>Erysiphe polygoni</i> DC.	1
On <i>Polygonum ramosissimum</i> Michx.	
<i>Microsphaera diffusa</i> Cooke & Peck	1
On <i>Desmodium</i> sp.	
Discomycetes	
<i>Helvella acetabulum</i> (L.) Quelet	4
Loculoascomycetes	
<i>Botryosphaeria quercuum</i> (Schwein.) Sacc.	2
On <i>Rhus typhina</i> L.	
<i>Elsinoe panici</i> Tiffany & Mathre	3,4,7
On <i>Panicum virgatum</i> L.	
<i>Hysterographium fraxini</i> (Pers. ex Fr.) de Not.	2,4
On <i>Fraxinus pennsylvanica</i> Marsh.	

^aCounty symbols: 1 = Plymouth, 2 = Woodbury, 3 = Monona, 4 = Harrison, 5 = Pottawattamie, 6 = Mills, 7 = Fremont

cent to the river. Typically they are highly disturbed, both by natural flooding and human activity.

Collecting sites are summarized in Table 1. Tables 2, 3, and 4 include fungi we have collected from 1981 through 1983, plant parasitic fungi of the area included in Gilman and Archer (1929) and Gilman (1949), and reports of larger discomycetes by Jensen (1977).

<i>Mycosphaerella populorum</i> G.E. Thompson	2,3
On <i>Populus deltoides</i> Bartr.	
<i>Mycosphaerella rubi</i> Roark On <i>Rubus</i> sp.	4
Lichens	
<i>Bacidia trisepta</i> (Naeg.) Zahlbr.	2,3
<i>Buellia parasema</i> (Ach.) de Not.	2,3
<i>Caloplaca citrina</i> (Hoffm.) Th. Fr.	2,3
<i>Caloplaca ulmorum</i> Fink	2,3
<i>Candelaria concolor</i> (Dickson) B. Stein	2,3
<i>Opegrapha lichenoides</i> Pers.	2,3
<i>Physcia setosa</i> v. <i>viridula</i> Bouly de Lesd.	2,3
<i>Physcia stellaris</i> (L.) Nyl.	2,3
<i>Physcia syncolla</i> Tuck.	2,3
Deuteromycetes	
<i>Cercospora althaeina</i> Sacc. On <i>Malva rotundifolia</i> L.	4
<i>Cercospora echinoclaoe</i> Davis	4
On <i>Echinochloa crusgalli</i> (L.) Beauv.	
<i>Cercospora rumicis</i> Ellis & Lengl.	6
On <i>Rumex crispus</i> L.	
<i>Colletotrichum graminicola</i> (Ces.) Wilson	4
On Poaceae	
<i>Cylindrosporium hiemalis</i> Higgins	4
On <i>Prunus virginiana</i> L.	
<i>Phaeoseptoria urvilleana</i> (Speg.) Sprague	4
On Poaceae	
<i>Phyllosticta vagans</i> Peck On <i>Smilacina</i> sp.	4
<i>Ramularia desmodii</i> Cooke On <i>Desmodium</i> sp.	4
<i>Septoria andropogonis</i> J. J. Davis	7
On <i>Schizachyrium scoparium</i> (Michx.) Nash	
<i>Septoria cornicola</i> Desm. On <i>Cornus</i> sp.	4
<i>Septoria elymi</i> Ellis & Eve. On <i>Elymus canadensis</i> L.	7
<i>Septoria populi</i> Desm. On <i>Populus deltoides</i> Marsh.	4
<i>Septoria oenotherae</i> West On <i>Oenothera biennis</i> L.	4
<i>Stagonospora simplicior</i> Sacc. & Berl.	4
On <i>Andropogon gerardi</i> Vitm.	
Basidiomycetes	
Teliomycetes	
<i>Sorosporium syntherismae</i> (Peck) Farlow	4
On <i>Panicum capillare</i> L.	
<i>Ustilago neglecta</i> Niessl On <i>Setaria glauca</i> (L.) Beauv.	3,4
Holobasidiomycetes	
Aphylophorales	
<i>Bjerkandera adusta</i> (Willd. ex Fr.) Karsten	2,3
<i>Coriolus versicolor</i> (L. ex Fr.) Quelet	3
<i>Funalia gallica</i> (Fr.) Bond.	2
<i>Gloeoporus dichrous</i> (Fr. ex Fr.) Bresad.	1
<i>Irpex lacteus</i> (Fr.) Fr.	2,7
<i>Laetiporus sulphureus</i> (Bull. ex Fr.) Murr.	3
<i>Phellinus gilvus</i> (Schwein.) Pat.	2,7
<i>Phellinus robiniae</i> (Murr.) A. Ames	2
<i>Poronidulus concifer</i> (Schwein.) Murr	2
<i>Pycnoporus cinnabarinus</i> (Jacq. ex Fr.) P. Karsten	2,3
<i>Schizophyllum commune</i> Fr.	1,3,4
<i>Truncospora ohioensis</i> (Berk.) Pilat	2,3
Agaricales	
<i>Inocybe fastigiata</i> Schaeffer ex Fr.) Quelet	4
<i>Marasmius siccus</i> (Schwein.) Fr.	4
Gasteromycetes	
<i>Bovista plumbea</i> Pers.	4
<i>Crucibulum laeve</i> (Hudson ex Relhan) Kambly	4
<i>Cyathus stercoreus</i> (Schwein.) de Toni	4
<i>Cyathus striatus</i> (Hudson) ex Pers.	4

<i>Geastrum fimbriatum</i> Fr.	4
<i>Geastrum minus</i> (Pers.) Fischer	3,4,6,7
<i>Tulostoma brumale</i> Pers.	1,3,4
<i>Tulostoma campestre</i> Morgan	7

*County symbols: 1 = Plymouth, 2 = Woodbury, 3 = Monona, 4 = Harrison, 5 = Pottawattamie, 6 = Mills, 7 = Fremont

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