Aquatic Ascomycetes from Lake Itasca, Minnesota

A. R. Cavaliere
Gettysburg College

Follow this and additional works at: http://cupola.gettysburg.edu/biofac

Part of the Biology Commons, Ecology and Evolutionary Biology Commons, Marine Biology Commons, and the Plant Sciences Commons

Share feedback about the accessibility of this item.

Aquatic Ascomycetes from Lake Itasca, Minnesota

Abstract
A preliminary report of the aquatic Ascomycetes of Lake Itasca, Minnesota. Included is an introduction, methods of harvesting and studying, a key, description, and illustrations of 19 common ascomycetous fungi inhabiting the study area.

Keywords
aquatic ascomycetes, fungi, Lake Itasca, Minnesota, freshwater mycoflora

Disciplines
Biology | Ecology and Evolutionary Biology | Marine Biology | Plant Sciences
AQUATIC ASCOMYCETES FROM LAKE ITASCA, MINNESOTA

A. R. CAVALIERE

ABSTRACT — A preliminary report of the aquatic Ascomycetes of Lake Itasca, Minnesota. Included is an introduction, methods of harvesting and studying, a key, descriptions, and illustrations of 19 common ascomyceteous fungi inhabiting the study area.

Other than the unpublished account of aquatic fungi of the Lake Itasca region (Johnson and Wagner, 1967), the freshwater mycoflora of this region is unknown. The aquatic Ascomycetes in this area are saprophytes or weak parasites infesting moribund species of aquatic phanerogams. The two most common hosts are bulrushes and cattails, Scirpus acutus Muhl. and Typha latifolia L. Other species of Scirpus and Typha harbor Ascomycetes as well (S. validus Vahl., S. subterminalis Torr., S. torreyi Olney, T. angustifolia L., et al.).

The aquatic fungi at Itasca display a seasonal variation. Spring and summer mycoflora differ markedly in kind and stages of development than do those occurring in fall.

Harvesting and examining fungal collections follow methods outlined in detail elsewhere (Cavaliere, 1973). Bulrushes and cattails afloat at the edge of the lake were gathered either from the shore or by rowboat; those still rooted to the lake bottom were collected by severing the culms with a probe.

With a dissecting scope, clusters of ascocarps were located and subsequently removed with a spearhead dissecting needle. Occasionally, culms heavily infested with algae had to be scraped before the underlying perithecia were exposed. Ascocarps were mounted in lactophenol, crushed and examined.

Although these fungi are not difficult to find, identifying them is often tedious and uncertain. With Ascomycetes there is presently much disagreement as to the taxonomic position of many species. Because this is a preliminary account of these fungi, no attempt is being made, beyond an occasional comment to discuss taxonomic positions of any of the organisms. Keys, descriptions and spore illustrations of the Ascomycete flora are reported as a means by which these organisms may be tentatively identified.

Facilities of the Lake Itasca Biology Station of the University of Minnesota were used and are here acknowledged.

KEY TO SPECIES OF OPHIOBOLUS

Spores under 200μ in length, 
6 septations .............................................. O. typha
12 septations .............................................. Ophiobolus sp.

3. Spores never more than 2-celled ................. 4
4. Spores clavate or attenuate, never more than 20μ long .............................................. Mycosphaerella
4. Spores oblong or bacillate, never attenuate, 40-50μ long .............................................. Hypoderma
5. Spores with transverse septa only ............. 6
5. Spores with transverse and longitudinal septa ......................................................... 7
6. Spores with a single septation ................. Didymosphaeria
7. Spores with 2-10 or more septations .......... Leptosphaeria
6. Spores with more than 7 transverse septa ........ Pleospora
7. Spores with less than 7 transverse septa ........ Pleospora
8. Spores flattened in one plane .................. Pyrenochaeta
8. Spores not flattened in one plane ................ Pyrenochaeta

KEY TO GENERA OF ASCOMYCETES IN LAKE ITASCA, MINNESOTA

1. Spores hyaline ........................................ 2
2. Spores pigmented ............................... 5
3. Spores usually more than 2-celled .......... 3
2. Spores not pigmented, many septations ....... Ophiobolus
2. Spores not pigmented, never more than 4 septations .................................................. 3
2. Spores not pigmented, more than 4 septations .................................................. 3

* A. R. CAVALIERE, associate professor of biology at Gettysburg College in Pennsylvania, received bachelor and master's degrees from Arizona State University and the Ph.D. in Morphology and Taxonomy of Marine Ascomycetes from Duke University in North Carolina. He was a plant pathologist at the University of Minnesota's Lake Itasca biology station in 1969.
spores are close to O. volkartii Müller (Muller, 1952) and O. stictosporus C. & E. Ellis & Everhart, 1892. A literature survey of several members of the genus Ophiobolus suggests that many of these organisms are being separated solely on the basis of spore length. This criteria may prove to be as untenable with members of this genus as was found with members of the genus Lulworthia (Cavaliere & Johnson, 1966).

On submerged culms of various species of Typha and Scirpus.

KEY TO SPECIES OF METASPHAERIA

Spores smaller than 50μ in length .................. M. junecina
Spores larger than 50μ in length .................. Metasphaeria sp.

Metasphaeria junecina Mourt. (Figure 3)
Ascorps, scattered, clustered or cespitose, inmate, occasionally slightly erumpent, globose to subglobose or pyriform, black, concolorous, subcarbonaceous to membranous, 100-125μ in diameter, neck papilliform, centric, ostiolar usually visible. Ascii 8-spored, thin-walled, broadly cylindrical to clavate, pedicellate, 116-180 x 11-20μ. Ascospores hyaline, broadly cylindrical to ellipsoidal, if cylindrical, widest at the center, straight or slightly curved, 4-celled, occasionally a 4th septum may form at tip, strictly constricted, irregularly uniseriate, 25-40 x 5-7μ.

All collections of this fungus at Itasca have larger spores than reported for the same organism elsewhere. In addition, with the material collected in this area, spore range is larger, 25-40μ in length as compared to 32-40μ in length, reported elsewhere (Wheemeyer, 1946).

On submerged culms of various species of Scirpus.

Metasphaeria sp. (Figure 4)
Ascorps, scattered or gregarious, but never cespitose, inmate, globose to subglobose, subcarbonaceous to membranous, black, concolorous, or black above, brown to hyaline below, diameter 150-250μ, neck papilliform, rising to surface of substrate. Ascii 8-spored, bitunicate, thick-walled, broadly cylindrical or clavate, cylindrical, short pedicellate, interthecal threads abundant, 150-200 x 30-40μ; Spores ellipsoidal to broad-ellipsoidal, occasionally slightly curved, biseriate, hyaline, 4-5 celled, primarily 4-celled, sheathed in cytoplasm for a short time after leaving ascus, not, or only slightly constricted at septa, 54-70 x 14.5-20μ.

The Metasphaeria-like character or these collections coupled with the large spore size makes the placing of this organism into any recognized species questionable.

On submerged culms of various species of Scirpus.

MYCOSPHAERELLA

Mycosphaerella typhae (Lasch.) Lindau (Figure 5)
Ascorps, small, scattered to densely cespitose, inmate or occasionally slightly erumpent, membraneous to subcarbonaceous when old, brown or black, 50-75μ in diameter, neck, if present, papilliform. Ascii 8-spored, oblong or broadly fusiform, occasionally narrow clavate, short pedicellate, 30-40 x 8-12μ. Ascospores clavate or attenuated, rounded at both ends, obliquely biseriate, 2-celled, hyaline or slightly yellowed with age, not constricted at septa, 10-14 x 4.5μ.

On submerged culms of Typha and Scirpus.

HYPODERMA

Hypoderma scirpae D.C. ex. Merat (Figure 6)
Ascorps, hysistereothallic, uniformly scattered along substrate, developing beneath epidermis and raising it into a black blister up to 0.5mm high and 2mm long. Dimidiate or subdimidiate, opening by a longitudinal slit along apex. Ascii abundant, clavate, cylindrical or fusoid, 8-spored, pedicellate, 110-123(140) x (10)15-18μ. Ascospores oblong, fusiform cylindrical or fusoid-baccilate, straight or curved, hyaline and single-celled at first, becoming yellowish and septate at maturity, 30-40 x 5-6 x 4.5-6μ.

On culms of Scirpus.

DIDYMOSPHAERIA

Didymosphaeria typhae Peck (Figure 7)
Ascorps, small, scattered, deeply innate, membraneous, globose to subglobose or oval, 40-75μ in diameter, neck present, short, centric or eccentric. Ascii 8-spored, cylindrical to fusiform, 50-70 x 7-8μ. Ascospores oblong or ellipsoidal, obliquely uniseriate, 2-celled, brown at maturity, not, or only slightly constricted at septum, 8-15 x 4.7μ.

On leaves and submerged culms of various species of Typha.

KEY TO SPECIES OF LEPTOSPHAERIA

1. Spores with 2-3 septations .................................. 2
2. Spores with 4-10 septations ................................. 5
3. Spores longer than 30μ .................................. 2
4. Spores shorter than 30μ .................................. 3
5. Spores more than twice as long as broad .............. L. typhae
6. Spores not more than twice as long as broad ......... 4
7. Spores narrow, usually less than 10μ .................. L. eustoma
8. Spores broad, usually more than 10μ .................. L. typharum
9. Spores with 7-10 septations .............................. L. acuta
10. Spores with 4-6 septations ............................... 6
11. Spores ellipsoidal, usually with 5 septations .......... L. scirpina
12. Spores subcylindrical, 5-6 septations, antepenultimate cell enlarged .......................... L. squamata

Leptosphaeria junecola Rehm apud Winter (Figure 8)
Ascorps, gregarious to scattered, inmate, subglobose to oval, subcarbonaceous to membranous, black or brown, concolorous, 100-250μ in diameter, neck absent. Ascii 8-spored, clavate-cylindrical or broadly clavate, thick-walled, slightly pedicellate, 60-90 x 10-20μ. Ascospores fusoid to broadly fusoid, straight or curved, hyaline when young, yellow to brown when mature, 4-celled, with constrictions at septa hoarding slightly enlarged penultimate cell, 32-48 (50) x 4-6.0 (10)μ.

On culms of Scirpus species.

Leptosphaeria typhae (Karst.) Saccardo (Figure 9)
Ascorps, gregarious, inmate, globose to subglobose, more or less carbonaceous, black concolorous, 150-160μ in diameter, neck absent, Ascii 8-spored, clavate to cylindrical, thin-walled, short pedicellate, 50-100 x 15-20μ. Ascospores fusiform, but more commonly narrowly clavate, slightly curved, 4-celled, brown or yellowish at maturity, not, or only

Journal of, Volume Forty-one, 1975
slightly constricted at septa, penultimate cell broadest, 15-24 x 3.5-5.0(5.5)μ.

This species is very close to both L. typharum and L. eustoma. It differs from the latter only by having extremely narrow spores, never exceeding width of 5.5μ.

Leptosphaeria typhae may be, in fact, merely a variant of L. eustoma.

On submerged culms of various Scirpus and Typha species.

Leptosphaeria eustoma (Fk.) Saccardo (Figure 10)
Ascocarps clustered or cepitose, deeply innate, entire or occasionally erumpent, globose to subglobose or pyriform, carbonaceous or subcarbonaceous, brown or black, 100-200μ in diameter, neck, if present, papilliform. Asci 8-spored, cylindrical to clavate-cylindrical, thin-walled, 75-105(120) x 15-20μ. Ascospores ellipsoidal or slightly clavate, slightly curved, slightly curved, slightly curved, usually irregularly arranged in asci, hyaline and 2-celled when young, 4-celled, yellowish to brown at maturity, scaretly or not at all constricted at septa, penultimate cell slightly enlarged, (13)18-33 x 4.5-10.5μ.

This species is very close to L. typharum, but differs in having slightly narrower spores with constricted septa.

On submerged culms of various Scirpus and Typha.

Leptosphaeria typharum (Desm.) Karsten (Figure 11)
Ascocarps scattered, globose to subglobose or oval to oblong, deeply innate, carbonaceous to submembranous, brown or black, concious, to 150μ high, 20μ long, many collections predominantly 150μ in diameter, neck absent. Asci 8-spored, clavate-cylindrical or oblong, short pedicellate, 60-100 x 16-25μ. Ascospores broadly ellipsoid to oblong, slightly curved, usually irregularly arranged in asci, hyaline and 2-celled when young, 4-celled, yellowish to brown at maturity, scarcely or not at all constricted at septa, penultimate cell broadest, 20-30(35) x 9-15μ.

On submerged culms of Typha.

Leptosphaeria acuta (Fries) Karsten (Figure 12)
Ascocarps gregarious or scattered, erumpent or commonly superficial, globose to subglobose, black, subcarbonaceous to membranous, 150-200μ in diameter, neck, if present, papilliform. Asci 8-spored, clavate to cylindrical, short pedicellate, thick-walled, 100-190 x 10-30μ. Ascospores fusiform, straight or curved, hyaline when young, becoming yellow or brown-
ish when mature, 8-10 celled, not or only slightly constricted at septa, 36-50(58) x 5-7μ.

On species of **Scirpus**.

**Leptosphaeria scirpina Winter (Figure 13)**

Ascocarps scattered, sparse, deeply innate, globose to subglobose, carbonaceous to subcarbonaceous, black, 125-250μ in diameter, neck absent. Ascii 8-spored, clavate to cylindrical, thin-walled, pedicellate, base of pedicel bulbous, 100-125(150) x 15-29μ. Ascospores fusoid to sub fusoid or ellipsoid, straight or slightly curved, obliquely uniseriate or overlapping, hyaline when young, yellow to brown at maturity, 5-6 celled, primarily 6-celled, not constricted at septa, (25)30-36 x (6)10-14μ.

On submerged culms of **Scirpus** species.

**Leptosphaeria sowerbyi** (Fki.) Saccardo (Figure 14)

Ascocarps gregarious or occasionally clustered, innate, globose to pyriform, subcarbonaceous to membranous, black or brown, 75-100μ in diameter, neck, if present, papilliform. Ascii 8-spored, cylindrical, short pedicellate, thin-walled, 60-75 x 16-20μ. Ascospores ellipsoid to subcylindrical, yellowish to brown, 7-celled, not constricted at septa, ante penultimate cell slightly enlarged, 42-50 x 5-6μ.

On submerged culms of various species of **Scirpus**.

**PLEOSPORA**

**Pleospora pulchra** Kirchst. (Figure 15)

Ascocarps gregarious, innate, globose to spherical, carbonaceous, black, concorluous, neck absent, 150-200μ in diameter. Ascii 8-spored, broadly clavate, thick-walled, short pedicellate, 130-150 x 25-35μ. Ascospores obliquely biseriate, broadly fusoid, to oblong ellipsoidal, tapered, constricted inequilaterally, brown, muriform, 8-12 transverse septations, 1 or 2 longitudinal septations in any or all cells, usually one or both terminal cells without longitudinal septa, 35-45 x 12-18μ.

On submerged culms of various species of **Scirpus** and **Typha**.

**KEY TO SPECIES OF **PLATYSPORA**

| Spores with 3 transverse septa | **P. permunda** |
| Spores with 5 transverse septa | **P. planispora** |

**Platyspora permunda** (Cke.) Wehmeyer (Figure 16)

Ascocarps scattered or gregarious, innate, globose to spherical or slightly flattened, subcarbonaceous, dark brown or black, concorluous, neck absent, 150-200μ in diameter. Ascii 8-spored, stout, clavate, thick-walled, base clavate, 50-65 x 16-24μ. Ascospores ellipsoid or clavate-ellipsoid, pigmented, usually straight, occasionally inequilateral, symmetric or tapered below, muriform, 3 transverse septations with a single longitudinal septum in each of the central cells, but none in the end cells, slightly flattened in edge view, 18-22 x 8-10μ.

On submerged and floating culms of various species of **Scirpus** and **Typha**.

**Platyspora planispora** (Ell.) Wehmeyer (Figure 17)

Ascocarps gregarious or scattered beneath host epidermis, globose, subspherical or pyriform, carbonaceous to subcarbonaceous, black, 100-200μ in diameter, neck, if present, papilliform. Ascii 8-spored, stout, clavate, thick-walled, short pedicellate 250-290 x 54-65μ. Ascospores broad, fusoid or fusoid-ellipsoid, hyaline when young, becoming pigmented with maturity, muriform, 5 transverse septations, usually equal, only 1 longitudinal septation per cell, none in end cells, slightly constricted at septa, straight or slightly curved, flattened in one plane, 40-58 x 21-25μ.

In Wehmeyer's (1961) treatment of **Pleospora** and its segregates, **Platyspora planispora** is reported to have asci and spores much smaller than those in the *Itasca* material (asci 75-125 x 17-25μ; spores 23-41 x 11-17μ). The present collection is being retained as **P. planispora** on the basis of spore shape and septation number.

On submerged and floating culms of various species of **Scirpus** and **Typha**.

**KEY TO SPECIES OF **PYRENOPHORA**

Spores with 3-4 transverse septa .......... **P. typhaceola**
Spores with 4-5 transverse septa .......... **P. scirpi**

**Pyrenophora typhaceola** (Cke.) Müll. (Figure 18)

Ascocarps scattered or gregarious, innate or slightly erumpent, globose, spherical or occasionally oval, carbonaceous to subcarbonaceous, black or brown, concorluous, 250-350μ in diameter, neck, if present, papilliform, centric. Ascii 8-spored, clavate, thick-walled, short pedicellate, 120-150 x 20-30μ. Ascospores oblong-ellipsoid to broadly ellipsoidal, slightly depressed, pigmented, usually 3, but occasionally 4 transverse septa, inequilateral, longitudinal septations in any or all cells, but usually only 2, constricted at all or only mid septum, rounded at both ends, irregularly biseriate, 25-50 x 12-16μ.

On submerged culms of various species of **Typha**.

**Pyrenophora scirpi** (Rab.) Wehmeyer (Figure 19)

Ascocarps scattered or clustered, more or less globose, innate or occasionally slightly erumpent, subcarbonaceous to membranous, black, concorluous, 250-300μ in diameter, minutely ostiolate. Ascii 8-spored, broadly cylindrical or clavate, thick-walled, provided with a short, claw-like base, 100-180 x 35-45μ. Ascospores irregularly biseriate, broadly fusoid or more commonly ellipsoid, brown muriform, 4-5 transverse septa, one longitudinal septum in any or all cells, guttulate or not, straight or slightly curved, slightly narrower in edge view, (36)40-54 x 15-22(25)μ.

On submerged culms of various species of **Scirpus**.

**References**


35