Novel hepatic and lichen assemblage on *Phragmites* stubble in a Florida freshwater swamp

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Abstract. Common reed (*Phragmites*) interacts with a large suite of other organisms including cryptogams attached to live or dead culm bases. We report an unusual observation of at least ten taxa of lichens and hepatics attached to persistent reed stubble on the swampy bank of freshwater Cypress Creek north of Tampa, Hillsborough County, Florida. This bryoid material included the minute, leafy hepatics *Microlejeunea globosa*, *Microlejeunea cf. ulicina*, *Myriocoleopsis minutissima*, and *Frullania cf. inflata*; and the lichens *Arthonia subdiffusa*, *Chrysothrix xanthina*, *Opegrapha viridis*, *Phaeographis* sp., *Physcia* sp., and an unidentified species of Parmeliaceae. These generally corticolous or epiphyllous taxa have not previously been reported from common reed, and suggest unrecognized complexity in both cryptogamic microhabitats and reed epiphytes.

Key words. Epiphytes, hepatics, lichens, wetland.

INTRODUCTION

Cryptogamic colonization of nonwoody or slightly woody grass culms is not well-reported. Common reed (*Phragmites australis* (Cav.) Trin. ex Steud. s.l.) is a giant grass (Poaceae) with complex genetic and morphological variation in North America that includes native and nonnative lineages. It is best known as an invasive, nonnative weed in the eastern U.S.; however, numerous haplotypes of native common reed have been described (Saltonstall 2016) and native reed is more frequent as one travels westward across the country. There are several entities within this species in the Gulf Coast states, some of which are hybrids (Lambertini et al. 2012). The genetic relationships of *Phragmites* in Florida are poorly known. However, both “Gulf Coast” reed (*Phragmites australis* ssp. *berlandieri*) and Old World reed (*Phragmites australis* ssp. *australis*, also called haplotype M) have been reported in Florida (Williams et al. 2012, Overholt et al. 2014), with the latter evidently rare.

Although many organisms have been reported in association with common reed, bryophytes and lichens are among the least-known of those (Kiviat 2013, 2019, pers. obs.). Because reed stands are frequent and extensive in some areas, are often a target of management, and because classical biological control is being developed for nonnative reed with potential impacts on native reed (Kiviat et al. 2019), documentation of the large and small organisms associated with reedbeds is timely.

RESULTS

On 29 December 2016, guided by SD, EK was examining a ca 50 m², sparse stand of common reed in the Cypress Creek Nature Preserve, west-central peninsular Florida, when he noticed what appeared macroscopically to be a thin algal crust and small lichen thalli on old
stubble of a few reed culms (Figure 1). Low and high power microscope examination of specimens revealed that this crust contained both lichens and minute hepatics. Specimens were submitted to PGD for identification of the hepatics and to RCH for identification of the lichens. Table 1 shows the taxa determined; insufficient material (as well as the juvenile state of some specimens) prevented species-level identification of certain taxa. **Microlejeunea globosa** was the most abundant bryoid on the stubble. Stubble segments collected were ca. 15 mm in diameter and ca. 15-22 cm long from approximately soil level. Specimens have been deposited in the Bard College Field Station – Hudsonia Herbarium (Table 1).

The exact collection locality was:
**U.S.A. FLORIDA. HILLSBOROUGH CO.:** Cypress Creek Nature Preserve, Cypress Creek ca. 80 m W of Interstate-75, elevation ca. 16 m, UTM 17R 3115886 N, 362995 E, 29 December 2016.

*Phragmites* on the creek bank was sparse and mingled with other herbs, lianas, shrubs, and trees. The stubble was in ca. 50% sunlight on the northwest bank of the creek. The culm stubble supporting the cryptogams was in the portion of the reed stand that was at a higher location on the creek bank, with another portion of the reed stand extending down the bank into the streambed. Vascular plants associated with the common reed included the trees *Liquidambar styraciflua* and *Quercus* sp.; the shrubs *Serenoa repens*, *Callicarpa americana*, *Ludwigia peruviana*, and *Urena lobata*; the woody vines *Smilax bona-nox* and *Ampelopsis arborea*; the herbaceous vines *Apios americana* and *Mikania* sp.; and the herbs *Pteridium aquilinum*, *Eichhornia crassipes* and an unidentified Poaceae (Figure 2). Although dead reed culms and their stubble typically stand for a year or two, the stubble at Cypress Creek may have persisted longer as indicated by the lush development of small bryoids.
Table 1. Taxa of hepatics and lichens on *Phragmites* (common reed) stubble from Cypress Creek Nature Preserve, Hillsborough County, Florida. The cryptogam assemblage also included a free-living alga (possibly *Trentepohlia*) and a fungus (unidentified).

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Typical substrate¹</th>
<th>Specimen accession #²</th>
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</thead>
<tbody>
<tr>
<td><strong>Hepatics</strong></td>
<td></td>
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<tr>
<td><em>Microlejeunea globosa</em> (Spruce) Steph. (=Lejeunea cardoti in Schuster [1980])</td>
<td>Bark, lignum, <em>Sabal palmetto</em> leaf, sandstone</td>
<td>BCFS LW-090</td>
</tr>
<tr>
<td><em>Microlejeunea cf. ulicina</em> (Taylor) Steph.</td>
<td>Tree and shrub bark, rock</td>
<td>BCFS LW-091</td>
</tr>
<tr>
<td><em>Myricoleopsis minutissima</em> (Sm.) R.L. Zhu, Y. Yu et Pocs (=Cololejeunea minutissima)</td>
<td>Tree and shrub bark, twigs, lignum, leaves, <em>Sabal palmetto</em> leaf bases</td>
<td>BCFS LW-092</td>
</tr>
<tr>
<td><em>Frullania</em> cf. <em>inflata</em> Gottsche</td>
<td>Tree bark, lignum, rock</td>
<td>BCFS LW-093</td>
</tr>
<tr>
<td><strong>Lichens</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Arthonia subdiffusa</em> Willey</td>
<td><em>Sabal palmetto</em> petiole (live and dead)</td>
<td>BCFS L-320</td>
</tr>
<tr>
<td><em>Chrysothrix xanthina</em> (Vain.) Kalb</td>
<td>Tree and shrub bark, twigs, “<em>Sabal</em> petiole,” “trunk of palmetto” (probably dead petiole bases), lignum, quartzite, “rock”</td>
<td>BCFS L-318</td>
</tr>
<tr>
<td><em>Opegrapha viridis</em> (Ach.) Behlen &amp; Desberger</td>
<td>Tree bark</td>
<td>BCFS L-319</td>
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<tr>
<td><em>Phaeographis</em> sp.</td>
<td></td>
<td>BCFS L-321</td>
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<td><em>Physcia</em> sp.</td>
<td></td>
<td>BCFS L-322</td>
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<tr>
<td>Parmeliaceae sp.</td>
<td></td>
<td>BCFS L-323</td>
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</table>

¹Substrate information from Schuster (1980; hepatics), P.G. Davison (pers. obs.; hepatics), and New York Botanical Garden’s C.V. Starr Virtual Herbarium 2020 (hepatics and lichens).

²BCFS = Bard College Field Station – Hudsonia Herbarium, Annandale, New York.
DISCUSSION

Here we report four hepatic taxa and six lichen taxa from persistent, apparently multiyear-old stubble of common reed in a small reed stand mixed with woody and herbaceous tracheophytes on the bank of a freshwater subtropical stream in Florida. The *Phragmites* taxon is probably *P. australis* ssp. *berlandieri* (Williams et al. 2012), i.e. the “Gulf Coast” *Phragmites* or haplotype I of Saltonstall et al. (2004), although Ward (2010) identified it morphologically as *Phragmites karka*. It is not known if Gulf Coast reed is native or nonnative in Florida. We have deposited a voucher specimen of the reed in the herbarium of the University of South Florida at Tampa (*Dickman 1150, collected 27 January 2016; USF*). At the collection locality, Cypress Creek may have been channelized long ago, judging from the straight and incised appearance of this reach; however, there were no signs of recent disturbance.
The lichens collected from the reed stubble are species that occur on tree bark and live or dead cabbage palm (*Sabal palmetto*) petioles. For example, *Arthonia subdiffusa* may be a cabbage palm specialist (specimen data, C.V. Starr Virtual Herbarium 2020). Lichens on *Phragmites* are usually fast-growing, epiphyllous species (R.G. Harris, pers. obs.); the species noted here suggest the stubble was several years old. Three of the four hepatics are Lejeunaceae; members of this family are commonly epiphyllous in the subtropics and tropics (Bates 2000). The hepatic species are known to colonize bark, wood, and rock substrates (Table 1); *M. globosa* appears restricted to sandstone in north Alabama, Tennessee, and northwest Georgia (P.G. Davison, pers. obs.). One specimen of *Chrysothrix xanthina* was collected from quartzite (C.V. Starr Virtual Herbarium 2020). *Phragmites* culm epidermis is very siliceous (e.g., Schaller et al. 2013), and the abundance of silicon dioxide shared by *Phragmites* with sandstone and quartzite substrates may be relevant here. Silica crystals (phytoliths) and amorphous silica occur in wood and bark of some trees (Fullagar 1991, Collura and Neumann 2017) as well. Many lichens exhibit an affinity for either siliceous (e.g., sandstone, granite) or non-siliceous (e.g., limestone) rock substrates (e.g., Wirth et al. 2018); it is not known if silica content affects substrate affinities in bryoids from rock compared to non-rock substrates. The species identity of *Chrysothrix* was confirmed with thin-layer chromatography showing only pinastric acid which is diagnostic for *C. xanthina* (Scott LaGreca, Duke University, pers. comm.).

Several other *Phragmites* reed stands visited in Florida in 2016 and 2018 seemed to lack bryoid assemblages on culm stubble (E. Kiviat, pers. obs). Our Cypress Creek collection may represent an unusual habitat combination of freshwater, soil moisture, flooding, humidity, and sunlight, as well as age of attached *Phragmites* detritus. Field biologists and naturalists should investigate this microhabitat to assess the distribution and diversity of culm-associated bryoid assemblages.

Many animals (Kiviat 2013, 2019), plants, lichens (Laundon 2003; R.G. Harris, pers. obs.), and non-lichenized fungi (e.g., van Ryckegem and Verbeken 2005) have been reported associated with *Phragmites* in the U.S. and elsewhere. Bryophytes sometimes colonize live and dead *Phragmites* culm bases (E. Kiviat, pers. obs.) but the minute species we report here have not previously been collected from this substrate. Lichens also colonize *Phragmites* (Laundon 2003), usually fast-growing epiphyllous species rather than the species we found (R.C. Harris, pers. obs.). An assemblage of bryoids on *Phragmites* as diverse as that described here (at least ten species) has not been reported previously. Our findings suggest unrecognized complexity of both the reedbed biota as well as the microhabitats of bryoids.

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**REFERENCES**


