

Bryophytes and Lichens of Liberty; A pre-restoration baseline survey of cryptogams of Liberty State Park, New Jersey

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1- The New York State Museum; 2- Rutgers, the State University of NJ; 3- New Jersey Audubon's Scherman Hoffman Wildlife Sanctuary; 4- George Mason University

SITE HISTORY

The 1200-acre park was a former tidal marsh that had been filled in the mid 1800s with dredge, construction and demolition materials and converted into a large-scale industrial complex and railyard. After 1967 when the railyard was demolished, large parts of the area were capped and remediated as public parkland. However, within the park, a 235-acre brownfield with areas of metal-contaminated soil was fenced off and has been mostly undisturbed for almost 50 years. During that period, a biodiverse novel community of early-to-mid-successional plants and fungi, many of them pollution-tolerant, established spontaneously.



Amandinea polyspora
Jason Hollinger



Catillaria nigroclavata
Felix Schumm

METHODS

Survey: the 12 authors plus 2 friends walked into the restricted area to a spot where we'd noticed high lichen diversity during decades of exploring the area during Audubon Society Christmas Bird Count.

Analysis: we identified the mosses and lichens uses microscopy, chemical tests (K, C, KC, P, UV), and thin layer chromatography where necessary. We deposited the specimens in the Natural History Collections of Chrysler Herbarium and NY State Museum.



Candelaria concolor
Jason Hollinger



Entodon seductrix
Ohio Mosses and Lichens

RESULTS - OVERVIEW

We found 61 species: 12 mosses, a liverwort, 46 lichens, a lichen parasite, and a fungus (*Synnemasporella aculeans*). They were growing on picnic tables, trees, metal debris, and concrete.

The "Lapland" area where we spent most of our time, and where reindeer lichen was locally common, soils were mostly slag, suggesting it is inhospitable to many plants. This community was unusual in that crustose (flat) lichens were not the most diverse growth form. None of the lichens we found had a cyanobacterial symbiont, which is common for lichen communities in this region.



Parmotrema sp.
James Lendemer



Ptilidium pulcherrimum
Ohio Mosses and lichens



Atrichum angustatum
Ohio Mosses and Lichens

RESULTS - USUAL SUSPECTS

Some of the species we found are common to urban areas based on their observed distributions in inaturalist. Some lichens we find regularly in urban areas of the Mid-Atlantic include *Amandinea polyspora*, *Candelaria concolor*, and *Lecanora strobilina* (Allen and Lendemer, 2021). Some common mosses of urban forests are *Atrichum angustatum* & *Entodon seductrix*.

Other species are common to relatively undisturbed open forests in the Mid-Atlantic coastal plain, including *Cladonia subtenuis*, *Polytrichum commune* and *Lecobryum album*.



Lecanora strobilina
Stephen Sharnoff



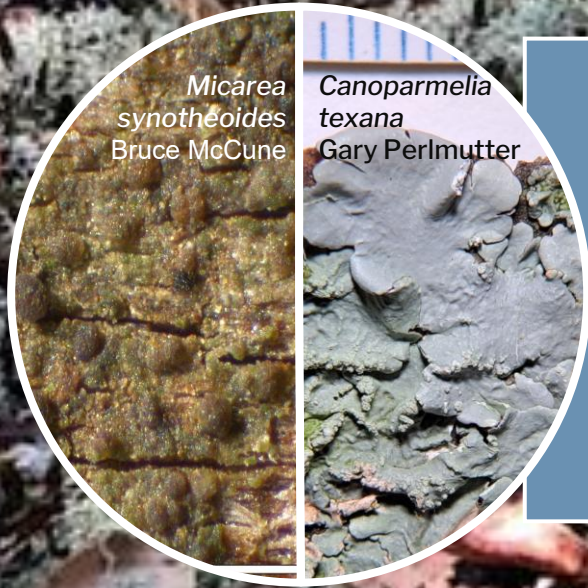
Leucobryum album
Ohio Mosses and Lichens

RESULTS - NOTABLE FINDS

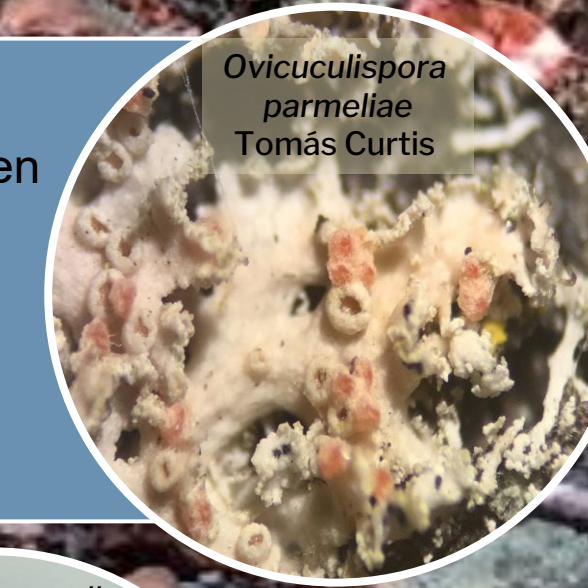
Ovicuculispora parmeliae is a lichen parasite, which has been reported from many parks across New Jersey (Waters and Lendemer 2019a), but not from the New York area (Allen et al. 2020); the literature on identification of lichen parasites is not mainstream.

Catillaria nigroclavata is widespread in the northeast, and documented from Mercer County in Jersey (Waters and Lendemer, 2019b) but it is easy to confuse that species with other "black button lichens", including the very common *Amandinea polyspora*;

Two of the lichens (*Canoparmelia texana* and *Micarea synotheoides*) were the first records of their species from NJ, And the fungus (*Synnemasporella aculeans*) was last reported from New Jersey 126 years ago.



Micarea synotheoides
Bruce McCune



Ovicuculispora parmeliae
Tomás Curtis

CONCLUSIONS

- (1) We need more urban lichen surveys, so more people can appreciate the astounding lives of cryptogams in urban natural areas like this one. Appreciating small lives helps us to slow down and connect to ways of being very different from our own.
- (2) Historically disturbed areas can be valuable refuges for biodiversity; it's worthwhile to reconsider redeveloping them.
- (3) Who knows what hidden worlds of cryptograms live in other protected areas of urban landscapes? We're finding fascinating biodiversity on undeveloped parts of the high line in Manhattan, Freshkills Park in NYC, and Rock Creek park in DC.



Cladonia subtenuis
Natalie Howe



Synnemasporella aculeans
Jonathan Mack

References:
Allen, J. L. (2020). An annotated checklist of lichens reported from New York City since 1968. *Memoirs of the Torrey Botanical Society*, 29, 141-155.
Allen, J. L., & Lendemer, J. C. (2021). *Urban Lichens*. Yale University Press.
Waters, D.P. and Lendemer, J.C., 2019a. A revised checklist of the lichenized, lichenicolous and allied fungi of New Jersey. *Bartonia*, (70), pp.1-62.
Waters, D.P. and Lendemer, J.C., 2019b. The lichens and allied fungi of Mercer County, New Jersey. *Opuscula Philolichenum*, 18:17-51

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