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How common and diverse is the epidendric alga *Trentepohlia* (Ulvophyceae, Chlorophyta) in New England?

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Filaments of the green alga *Trentepohlia* (Chlorophyta, Ulvophyceae) can cover tree trunks in conspicuous “fuzzy” biofilms, the color of which ranges from yellow to red due to accumulation of carotenoid pigments. The genus has a worldwide distribution, with the highest diversity and abundance in tropical and subtropical humid climates. It occurs most commonly on tree bark and bare rock surfaces, sometimes in lichenized form. In the United States, *Trentepohlia* is thought to be widespread, the most information being available from southern USA.

Although *Trentepohlia* growing on tree bark can be quite conspicuous and occurs fairly frequently in New England (personal observations), surprisingly little documentation is available regarding the abundance, distribution, and species diversity of this alga in the region. I compiled available historical information from herbarium databases (Table 1) for epidendric *Trentepohlia* in New England and the nearby New York, and logged additional observations in the iNaturalist database (Fig. 1, Table 1).

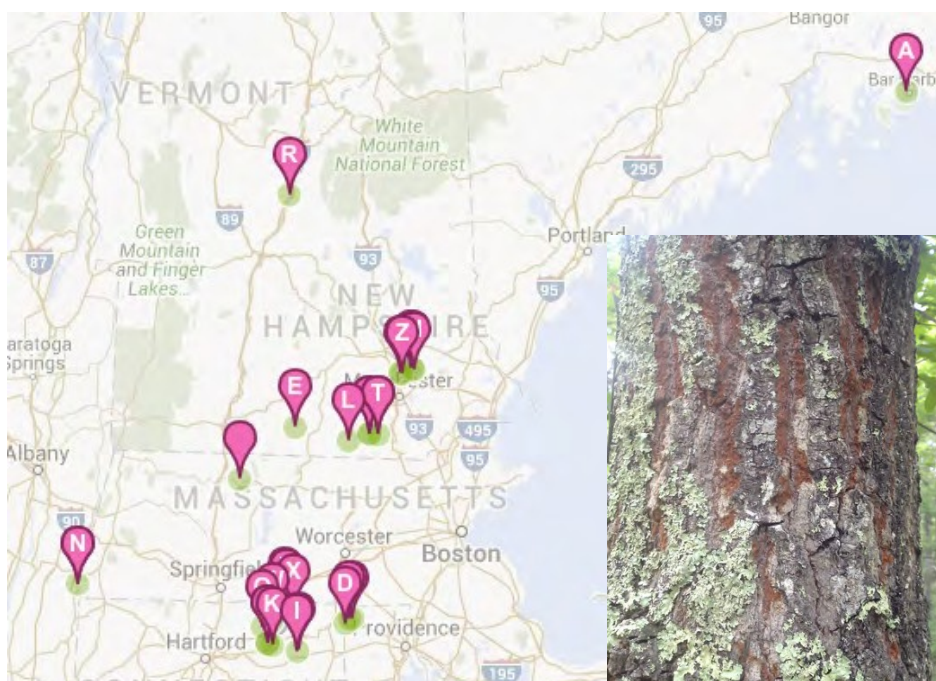


Fig. 1. Observations of epidendric *Trentepohlia* databased in iNaturalist.org. Photographs and micrographs available in iNaturalist for selected representatives. Inset shows the typical appearance on oak bark: a fuzzy, orange-ish film mostly restricted to the cracks in the bark.

Because of the great morphological variation and plasticity in this genus, molecular tools are generally necessary for reliable species-level identification (Lopez-Bautista et al. 2006; Rindi et al. 2002, 2009). Morphologically, all collected New England specimens were consistent with the species *T. umbrina* (Figs. 2-4). I was not able to obtain unialgal cultures from every collected specimen (specimens, for which culturing was successful are marked in green in Table 1). Three additional cultures were obtained: one from willow bark from Dolni Cerekev, Czech Republic (voucher specimen CONN000197561), and two from unvouchered samples from the Nipmuck State Forest and Storrs, CT. Other samples are in various stages of isolation.



Figs. 2-4 (left to right). *Trentepohlia* cf. *umbrina* from tree bark collected in New York (Fig. 2) and CT (Figs. 3 and 4). Figs. 2 and 3 show the morphology found in wild-collected material, with cells swollen to almost spherical and filaments short, red, and often tangled. Fig. 4 shows cultured material, ca. 1 month old, in which cells are long and cylindrical and red pigment only begins to accumulate.

Obtaining sufficient amounts of DNA from the cultures proved difficult as well, but I had some success with PCR amplification directly from a cultured filament or a cluster of filaments, frozen and thawed prior to PCR to help break the cells open. Unfortunately, only one of these amplifications also yielded good sequencing reads (the Czech specimen CONN000197561). For an accurate assessment of species diversity in the genus *Trentepohlia* in New England, I would like to test other direct-PCR protocols, as this direction seems to be the most promising.

Table 1. Summary of information on New England epidendric *Trentepohlia* available from herbarium databases. Specimens with uncertain habitat information were included but specimens clearly collected from other habitats (e.g., rock surfaces) were not included. Empty cells indicate missing or illegible information on the label. Boldface indicates vouchers deposited in this study.

Species	Locality	State	Habitat	Barcode	Year
NYBG herbarium					
<i>Trentepohlia aurea</i>	Mt Kineo	ME	bark	2111642	1897
<i>Trentepohlia aurea</i>	Orono	ME	elm bark	2111710	1907
<i>Trentepohlia aurea</i>	Oxford	ME	pine bark	2111593	1931
<i>Trentepohlia aurea</i>	Agassiz Basin	NH		2111651	1904
<i>Trentepohlia aurea</i>	Mt Mansfield	VT		2111649	1891
<i>Trentepohlia aurea</i>	Chocorua	NH		2111687	1909
<i>Trentepohlia aurea</i>	Chocorua	NH	birch bark	2111685	1916

<i>Trentepohlia odorata</i> <i>var. betulina</i>	Mt. Chocorua	NH	birch bark	2111905	1906
<i>Trentepohlia odorata</i> <i>var. betulina</i>	Chocorua	NH		2111923	1906
<i>Trentepohlia odorata</i> <i>var. betulina</i>	Mt. Chocorua	NH	birch bark	2111907	1906
<i>Trentepohlia odorata</i> <i>var. betulina</i>	Mt. Chocorua	NH	birch bark	2111928	1906
<i>Trentepohlia odorata</i> <i>var. umbrina</i>	Easthmapton?	MA	oak	2111929	1912
<i>Trentepohlia setifera</i>	Ledyard, Norwich	CT	white oaks	2111963	1890
<i>Trentepohlia setifera</i>	Ledyard	CT	white oaks	2111964	1891
<i>Trentepohlia setifera</i>	Ledyard	CT	white oaks	2111962	1891
<i>Trentepohlia setifera</i>	Norwich	CT	<i>Quercus alba</i>	2111965	
<i>Trentepohlia setifera</i>	Norwich	CT	<i>Quercus alba</i>	2111961	
<i>Trentepohlia umbrina</i>	Saugus	MA	bark	2111981	1890
<i>Trentepohlia umbrina</i>	Hancock	ME	white birch	2111986	1897
<i>Trentepohlia umbrina</i>	Mt Kineo	ME		2111978	1897
<i>Trentepohlia umbrina</i>		NY	<i>Betula papyrifera</i>	2111969	1907
<i>Trentepohlia umbrina</i> <i>var. quercina</i>	Saugus	MA	bark of white oaks	2111971	1887
<i>Trentepohlia umbrina</i> <i>var. quercina</i>	Saugus	MA	oak	2111985	1898
<i>Trentepohlia umbrina</i> <i>var. quercina</i>	Saugus	MA	bark of white oaks	2111968	1898
<i>Trentepohlia umbrina</i> <i>var. quercina</i>		MA?	oak	2111987	1906

NMNH herbarium

<i>Trentepohlia aurea</i>	Dover, Piscataquis River	ME		239747	1897
<i>Trentepohlia aurea</i>	Buffalo	NY		239743	
<i>Trentepohlia aurea</i>	Pemadumcook Lake	ME		239748	1895
<i>Trentepohlia aurea</i>	Mt. Mansfield	VT		239746	1891
<i>Trentepohlia aurea</i>	Gaylordsville	CT		239741	1898
<i>Trentepohlia aurea</i>	Watkins Glen	NY		239744	1932
<i>Trentepohlia aurea</i>	Stockbridge	MA		239745	1890
<i>Trentepohlia aurea</i>	Salisbury	CT		239742	1906
<i>Trentepohlia sp.</i>	Mt Washington	NH		239925	1893
<i>Trentepohlia setifera</i>	Ledyard	CT		239884	1891
<i>Trentepohlia setifera</i>	Norwich	CT	<i>Quercus alba</i>	170747	1889

<i>Trentepohlia setifera</i>	Norwich	CT	<i>Quercus alba</i>	170746	1889
<i>Trentepohlia setifera</i>	Norwich	CT	<i>Quercus alba</i>	258467	1889
<i>Trentepohlia odorata</i> <i>var. betulina</i>	Chocorua	NH		239878	1906
<i>Trentepohlia odorata</i> <i>var. betulina</i>	Chocorua	NH		239877	1907
<i>Trentepohlia umbrina</i>	North Weymouth	MA		239891	1887
<i>Trentepohlia umbrina</i>	Jackman	ME		239892	1895

CONN herbarium

<i>Trentepohlia umbrina</i>	Bar Harbor	ME	maple bark	197560	2015
<i>Trentepohlia umbrina</i>	Mansfield, Baxter Rd.	CT	oak bark	197562	2015
<i>Trentepohlia umbrina</i>	Bish Bash Falls	NY	hemlock bark	197563	2015
<i>Trentepohlia umbrina</i>	Bear Brook State Park	NH	oak bark	197564	2015
<i>Trentepohlia umbrina</i>	Bar Harbor	ME	hemlock bark	197565	2015
<i>Trentepohlia umbrina</i>	Russell Abbot State Park	NH	oak bark	197566	2015
<i>Trentepohlia umbrina</i>	Mansfield, Homestead Dr.	CT	oak bark	197567	2015
<i>Trentepohlia umbrina</i>	Bear Brook State Park	NH	elm bark	197568	2015
<i>Trentepohlia umbrina</i>	Milford	NH	oak bark	197569	2015
<i>Trentepohlia umbrina</i>	Ponemah Bog	NH	oak bark	197570	2015
<i>Trentepohlia umbrina</i>	Northfield Mtn	MA	oak bark	197571	2015
<i>Trentepohlia umbrina</i>	Bish Bash Falls	NY	spruce bark	197572	2015
<i>Trentepohlia umbrina</i>	Pulaski State Park, Center Trail	RI	oak bark	197573	2015
<i>Trentepohlia umbrina</i>	Pulaski State Park, Richardson Trail	RI	oak bark	197574	2015

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