

The Bryophytes and Lichens of Rock Hill Preserve, Florida

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Rock Hill, lying 4.5 miles southeast of Chipley in Washington County of the Florida Panhandle, has attracted the attention of botanists and geologists for much of this century. The vascular flora includes several listed or endangered taxa among which are *Bigelowia nuttallii*, *Asclepias viridula*, *Marshallia ramosa*, *Crotonopsis elliptica* and *Aster hemisphericus*. The geology of this locale is also noteworthy, representing the only exposed sandstone formation in Florida.

Harper (1911, 1914) laid claim to being the first botanist to visit Rock Hill and, undoubtedly, published the first record of a lichen (*Cladonia* sp.) from the site, but he misinterpreted the stratigraphy of the sandstone, asserting that it was an extension of the Altamaha Grit, a Miocene-age formation with outcroppings in Alabama and Georgia. The floras, particularly the cryptogamic, of Rock Hill and the Altamaha Grit do show considerable overlap (cf. Griffin, Snow & Buck 1994), but the Rock Hill sandstone lies to the south of the Altamaha Grit arc and is dated from the Middle Pliocene to the Pre-Nebraskan Pleistocene (Isphording and Lamb, 1970, 1971). It is classified as the Citronelle Formation and represents material washed down from the southern and southwestern flanks of the Appalachians. According to Dr. Walter Schmidt (per. comm.), Chief of the Florida Geological Survey, Citronelle materials surface in many localities in the Florida Panhandle, but only at Rock Hill are they cemented into a sandstone, a condition attributed to the relatively high level of iron oxides at this site.

Because sandstone is otherwise unknown at the surface in Florida, it is at the Rock Hill locality that certain lithophilous bryophytes and lichens have their only known Florida station. In this group are species such as *Grimmia laevigata*, *Hedwigia ciliata* and *Ptychomitrium incurvum*. Among the lichens the genera *Acarospora*, *Psorula*, *Pycnothelia* and *Xanthoparmelia* are known only from Rock Hill as well as a number of the species noted below. Another interesting phenomenon both here and at Broxton Rocks Preserve, Georgia (Altamaha Grit)

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is the large number of normally corticolous taxa which occur on the sandstone. As far as we know, Rock Hill and Broxton Rocks collections are the only records of *Pseudoparmelia sphaerospora* on rock. Although the list of lichens for Broxton Rocks is still in preparation, it is clear that the number of species at Rock Hill is considerably fewer though otherwise very similar. This could be due to a variety of factors; smaller site, drier site, historical factors and geographical position being the most obvious. The presence of *Toninia tristis* (Nebraska westward) and *Lecidella viridans* (Arizona and Texas) suggest a western element in the Rock Hill lichens.

Similarly, the bryophyte and lichen floras of the sandstone outcrops seem significantly different from those of granitic outcrops not far away geographically. At this stage this is just an impression and quantitative studies are needed. However, it has recently been documented (Porembski *et al.* 1994) that granitic and sandstone outcrops in west tropical Africa have very different floras and that sandstone harbors a richer flora with more endemics.

In 1990 the Nature Conservancy acquired 373 acres of the Rock Hill habitat (now called Rock Hill Preserve) in a move to protect the unusual flora of the area. It is as a part of the on going inventory of the Rock Hill biota that the authors volunteered to conduct a survey of the bryophytes and lichens of the preserve. Insofar as we are aware, this is the first listing of these organisms from Florida's only sandstone formation.

The collections cited here are deposited at two herbaria, those of Harris (nos. 35574-35622) and Buck (nos. 27121-27186) at NY, those of Griffin (nos. 1792-1835, 2907-2974) at FLAS.

List of Species

MOSSES (D. Griffin and W. R. Buck)

CALYMPERACEAE

Syrrhopodon ligulatus Mont., 27183

DICRANACEAE

Campylopus carolinae Grout, 1808, 1830, 27138

Campylopus pilifer Brid., 1792

Campylopus tallulensis Sull. & Lesq. in Sull., 1793, 27150

Dicranella heteromalla (Hedw.) Schimp., 1794, 1813, 1828, 27160, 27166

Dicranum condensatum Hedw., 1797, 1825, 1833, 27131

DITRICHACEAE

Eccremidium floridanum Crum, 27169

FISSIDENTACEAE

Fissidens elegans Brid., 1802

FUNARIACEAE

Entosthodon drummondii Sull., 1801, 1824

GRIMMIACEAE

Grimmia laevigata (Brid.) Brid., 1819, 1832, 27180

HEDWIGIACEAE

Hedwigia ciliata (Hedw.) P. Beauv., 1798

HYPNACEAE

Isopterygium tenerum (Sw.) Mitt., 1795

LEUCOBRYACEAE

Leucobryum albidum (Brid.) Lindb., 1799, 1811, 1823, 1827, 27137

POLYTRICHACEAE

Atrichum angustatum (Brid.) B.S.G., 1800

Pogonatum brachyphyllum (Michx.) P. Beauv., 1818, 27173

PTYCHOMITRIACEAE

Ptychomitrium incurvum (Schwaegr.) Spr., 1810, 27171

SEMATOPHYLLACEAE

Sematophyllum adnatum (Michx.) E.G. Britt., 1805

SPHAGNACEAE

Sphagnum affine Ren. & Card., 1804, 1812, 1829, 1834, 27121

Sphagnum cyclophyllum Sull. & Lesq., 1809, 27161, 27168

Sphagnum lescurii Sull., 1820, 1821, 1835

HEPATICS (D. Griffin)

ADELANTHACEAE

Odontoschisma prostratum (Sw.) Trev., 1826, 1831

CEPHALOZIELLACEAE

Cephaloziella rubella (Nees) Warnst., 1814

DILAENACEAE

Pallavicinia lyellii (Hook.) S. F. Gray, 1796

JUBULACEAE

Frullania inflata Gott. in G., L. & N. var. *communis* Schust., 1806

Frullania kunzei (Lehm. & Lindenb.) Lehm. & Lindenb., 1807, 1816, 1817

LEJEUNEACEAE

Cololejeunea minutissima (Sm.) Schiffn. ssp. *minutissima*, 1806a

Leucolejeunea uncioloba (Lindenb.) Evans, 1815

LEPIDOZIACEAE

Kurzia sylvatica (Evans) Grolle, 1803

SCAPANIACEAE

Scapania nemorosa (L.) Dum., 1822

LICHENS (R. C. Harris)

The macrolichens of Florida are well known (Moore, 1968; Harris, 1990), but, although under intensive study, the microlichens are not. This will explain the tentative nature of many of the identifications below. Macrolichens previously not reported from Florida are referred to as "new". Macro- and microlichens which will probably prove unique to Rock Hill for the state are marked with an asterisk.

ACAROSPORACEAE

**Acarospora schleicheri* (Ach.) Massal. s. lat., on rock, 2908, 35622

ARTHONIAEAE

Arthonia sp., on trunk of *Quercus geminata*, 2970 Ascomata irregular, thin, becoming quite broad, ocher, KOH+ green-blue; ascospores macrocephalic, 6-celled.

BACIDIACEAE

**Toninia tristis* (Th. Fr.) Th. Fr. s. lat., on soil, 27123 This collection and others from Broxton Rocks are the only collections of *Toninia* in eastern North America south of the Arctic. They do not match any of the nine described subspecies.

CHRYSOTHRICEAE

**Chrysothrix chlorina* (Ach.) Laundon, on rock, 35596

CLADONIAEAE

Cladina evansii (Abbeyes) Hale & Culb., on soil, 2966, 35609

Cladina sandstedei (Abbeyes) Ahti, on soil, 35618 This is the rarest of the Florida *Cladinae*. Its distribution is odd: western Panhandle and Dade and Monroe counties.

Cladina subtenuis (Abbeyes) Hale & Culb., on soil, 2967, 35576

**Cladonia caroliniana* Schwein. ex Tuck. s. lat., blanketing exposed, wet soil, 2962, 2964, 2965, 2968, 35577, 35599, 35612. New to Florida. This complex is badly in need of revision, mainly through field studies. "Typical" *Cladonia caroliniana* is a distinctly erect taxon containing squamatic acid. It probably is restricted to western North Carolina, northern Georgia and northern Alabama. Material from southern Georgia, Florida and the Central Highlands, etc. is mostly sprawling and contains only usnic

acid. I have referred such material to *Cladonia dimorphoclada* Robbins on this basis. However, this latter species is generally understood to have slender podetia that are distinctly bent downwards and lacking squamatic acid with the exception of a single population from northern Alabama. Among the Rock Hill material, 35612 is quite erect but most are sprawling, while 35577 has downturned branches suggestive of *C. dimorphoclada*.

Cladonia cristatella Tuck., on rotting pine bark, 27165

Cladonia didyma (Fée) Vainio, barbatic acid, on rotting bark, 35608, barbatic and thamnolic acids, on plant remains, 35621

**Cladonia dimorphoclada* Robbins, on exposed, wet soil, 35616 Reported from Florida without location by Ahti (1973). Our collection has slender podetia but they are rather erect and is only tentatively assigned here. See discussion of *C. caroliniana*.

Cladonia grayi Merr. ex Sandst., on various organic substrates, 2910, 2947, 27147, 27148, 35598

Cladonia leporina Fr., on soil, 2956, 2957, 35604

Cladonia peziziformis (With.) Laundon, on soil, 2974, 35619

Cladonia polycarpia Merr., on soil, 2972, 2973, 35605, 35611

Cladonia ravenelii Tuck, on pine, 27129

Cladonia simulata Robbins, on soil, 2957

Cladonia strepsilis (Ach.) Vainio, on exposed, wet soil, 2959, 2960, 35600, 35615. New to Florida. Also recently collected in Holmes County.

Cladonia subradiata (Vainio) Sandst., on soil, 35603

**Pycnothelia papillaria* Dufour, on wet, exposed soil, 35592. New to Florida.

COCCOCARPIACEAE

Coccocarpia palmicola (Sprengel) Arvidsson & Galloway, on trunk of *Nyssa*, 2954

GOMPHILLACEAE

Gyalideopsis sp., on twig, 27139 Only hyphophores present. There are six or so corticolous species of *Gyalideopsis* in Florida which eventually will prove separable solely on the basis of their hyphophores.

GRAPHIDACEAE

Graphina abaphoides (Nyl.) Müll. Arg., trunk of *Quercus nigra*, 2913, on twigs, 27136

Phaeographis erumpens (Nyl.) Müll. Arg., on twig, 27122

HAEMATOMMATACEAE

Haematomma puniceum (Ach.) Massal., on *Quercus*, 2931, 27184

ICMADOPHILACEAE

Dibaeis baeomyces (L. fil.) Rambold & Hertel, on soil, 35620. New to Florida. Also recently collected in Santa Rosa County.

LECANORACEAE

**Carbonea latypizodes* (Nyl.) Knoph & Rambold ined., on rock, 27142, 27158, 27177, 35597, 35606, 35607

Lecanora caesiorubella Ach. ssp. *glaucomodes* (Nyl.) Imshaug & Brodo s. lat., on branches, protocetraric acid, 2929, 35583, unknown substance, 27155

Lecanora cupressi Tuck., on lignum, 27130

Lecanora louisianae B. de Lesd., on twig, 35575

**Lecanora oreinoides* (Körber) Hertel & Rambold, on rock, 2909, 2950, 2952, 2953, 35593

Lecanora sp., on branch of *Quercus geminata*, 2917 Thallus and margin green-gray; disk black; hypothecium golden brown; atranorin, usnic acid, low amounts of other substances? I have not seen this taxon before.

*?*Lecanora*, on sides and underhangs of rock, abundant, 27186 A sterile crust with small, bullate/rugose areoles and slightly capitate soralia containing usnic acid and a substance unknown to me. It is placed here largely on the basis of chemistry. I cannot recall seeing this taxon in eastern North America previously.

**Lecidella viridans* (Flotow) Körber, on rock, 27149 The thallus is rather better developed than is apparently normal, which would lead one to *L. enterolucella* (Nyl.) Hertel, but the chemistry seems to be that of *L. viridans*.

Lecidella sp., on lignum, 27162

Pyrrhospora russula (Ach.) Hafellner, on twigs, 2928, 27154

LICHINACEAE

**Pyrenopsis* sp., on rock, 27176, 35582

MICAREACEAE

**Micarea cyrtidia* (Tuck.) ined., on lignum, 27124

MYCOCALICIACEAE

Chaenothecopsis sp., on lignum, 27172 Superficially similar to *C. savonica* (Räs.) Tibell but central hyphae of stalk dark and very much out of range.

MYCOPORACEAE

Mycoporum eschweileri (Müll. Arg.) ined., on twig, 27127

PARMELIACEAE

Bulbothrix confoederata (Culb.) Hale, on twigs, 2923A

Bulbothrix goebelii (Zenker) Hale, on rock, 35581

Bulbothrix isidiza (Nyl.) Hale, on branches of *Quercus geminata*, 2834, 2971

Canoparmelia caroliniana (Nyl.) Elix & Hale, on *Quercus geminata*, 2924

Canoparmelia cryptochlorophaea (Hale) Elix & Hale, on rock, 35584

Hypotrachyna livida (Taylor) Hale, on branches of *Quercus geminata*, 2923, 2933, 2951

- Parmotrema dominicanum* (Vainio) Hale, on rock, 35578
Parmotrema gardneri (Dodge) Serusiaux, trunk of *Quercus geminata*, 2955
Parmotrema hypoleucinum (Steiner) Hale, on twig, 27134
Parmotrema rampoddense (Nyl.) Hale, on *Vaccinium arboreum*, 2918
Parmotrema rigidum (Lynge) Hale, on branch of *Quercus geminata*, 2946
Parmotrema tinctorum (Nyl.) Hale, on *Quercus geminata*, 2922, 2969, on *Vaccinium arboreum*, 2925, on rock, 2945, 27152, 35588
Parmotrema ultralucens (Krog) Hale, on rock, 2940, 2944, 2961, 35594
Parmotrema xanthinum (Müll. Arg.) Hale, fatty acids only, on *Quercus geminata* 2949, on rock, 2939, 35579, fatty acids with gyrophoric acid, on rock, 2948, 27164, 35602
Pseudoparmelia sphaerospora (Nyl.) Hale, on *Quercus geminata*, 2920, on rock, 2926, 2937, 27151, 35613
Punctelia rudecta (Ach.) Krog, on rock, 2938, 35590
Rimelia reticulata (Taylor) Hale & Fletcher, on rock, 2916, 2941, 27146
Rimelia subisidiosa (Müll. Arg.) Hale & Fletcher, on rock, 2915, 35587
Usnea mutabilis Stirton, on *Quercus geminata*, 2914
Usnea strigosa (Ach.) A. Eaton, on *Quercus geminata*, 2912
**Xanthoparmelia conspersa* (Ach.) Hale, on rock, 2927, 2935, 27141, 27143, 27153, 27170, 27178, 35595, 35617. New to Florida. The material is variable from narrow lobed and tightly adnate to broad lobed and rather loose.

PERTUSARIACEAE

- Ochrolechia africana* Vainio, on branches, 2911, 27182
Pertusaria texana Müll. Arg., on branches, 2907, 27163
Pertusaria venosa Malme, on rock, 27145
Pertusaria xanthodes Müll. Arg., on twig, 27144

PHYSICIACEAE

- Buellia curatellae* Malme, on lignum, 27125, on twig, 35589
Buellia curtisii (Tuck.) Imshaug, on twig, 27135
Buellia imshaugiana R. C. Harris, on branch of *Quercus geminata*, 2930, 2932
**Buellia mamillana* (Tuck.) Weber, stictic acid, on rock, 27185
Buellia punctata (Hoffm.) Massal., on rock, 27174
**Buellia spuria* (Schaerer) Anzi, stictic acid, on rock, 35610
**Buellia* sp., on rock, 27181 Thallus of subsquamulose, green-yellow areoles, KC- but UV+ orange, ascospores *Buellia* type. Does not appear to be any species recorded for eastern North America or the Caribbean.
Hafellia bahiana (Malme) Sheard var. *pleiotropa* (Malme) Sheard, on twig, 27128

Heterodermia obscurata (Nyl.) Trevisan, on rock, 35591

Pyxine eschweileri (Tuck.) Vainio s. lat., laminal soralia, on rock, 2963, 35586

PSORACEAE

**Psorula rufonigra* (Tuck.) G. Schneider, on rock, 2936, 27179

THELOTREMATACEAE

**Diploschistes actinostomus* (Pers.) Zahlbr., on rock, 27126, 27157, 35601, 35614

TRAPELIACEAE

Trapeliopsis flexuosa (Fr.) Coppins & P. James, on lignum, 27159, base of pine, 35585

TRYPETHELIACEAE

Polymeridium catapastum (Nyl.) R. C. Harris, on branches and trunks of *Quercusgeminata*, 2921, 2942, 2943

Polymeridium quinqueseptatum (Nyl.) R. C. Harris, on *Vaccinium arboreum*, 2919

INCERTAE SEDIS

**Lepraria neglecta* (Nyl.) Lettau, on rock, 35580.

Acknowledgments. We wish to thank Greg Seamon of The Nature Conservancy for help in facilitating the field work and Angus Gholson, Jr. of Tall Timbers Research, Inc. for guiding us to the Rock Hill Preserve. Lewis Anderson identified Buck's *Sphagna*.

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Letter to the Editor from William A. Weber, Prof. Emeritus, University of Colorado Museum, January 1995.

Volume 11(4) 1994, pp. 121-130 included an article on the *Lichens and bryophytes of the Rochelle Hills, Campbell County, Wyoming*. Sole authorship was claimed by Alvin L. Medina. Although not credited to me, this paper was based on my report: *Inventory of the Cryptogamic Flora (Lichens and Bryophytes) of the Rochelle Hills in the SE Corner of Campbell County, Wyoming*. I submitted this 14 page report in 1975 to Dr. John Thilenius, Rocky Mountain Forest and Range Experiment Station, USFS, Laramie, Wyoming. In June, 1989, Mr. Medina wrote me stating the Experiment Station's interest in publishing the report, and saying "perhaps we could jointly coauthor the publication... I would very much appreciate your technical review of the manuscript." I responded favorably and provided corrections and additions. I received no further correspondence from Mr. Medina, saw no copy of a manuscript, and knew nothing further about the project until it appeared in *Evansia*. In the publication, no mention of my report was included. I was acknowledged only for my "assistance".

Reply from A. Medina, Research Ecologist, USDA Forest Service, Flagstaff, AZ, 1/26/95.

The author accepts full responsibility and apologizes for errors in the 'Acknowledgement' of said article. The 'Acknowledgement' should have read as follows with changes in italics: Thanks are *sincerely* expressed to Dr. William A. Weber, under contract to the USDA Forest Service, for *the* collection, identification, and photographing of specimens, *to include annotations and preparation of the report 'Inventory of the Cryptogamic Flora (Lichens and Bryophytes) of the Rochelle Hills in the SE Corner of Campbell County, Wyoming', which is the basis for this article.* The manuscript was prepared only after Dr. Weber wrote on November 24, 1992 and stated: "I see no reason why you can't go ahead and publish the report, as long as you give me credit for making the collections and preparing the list with whatever annotations I made to it, and for the set of color slides that I seem to remember submitting. I really don't care for joint authorship at all."



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