Opuscula Philolichenum, **3**: 21-40. 2006.

Contributions to the Lichen Flora of New Jersey: A Preliminary Checklist of the Lichens of Wharton State Forest

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ABSTRACT. – A preliminary checklist of lichens and lichenicolous fungi of Wharton State Forest, New Jersey, USA, reports 190 named taxa as the result of recent survey work. *Abrothallus cladoniae* R. Sant. & D. Hawks. was found on *Cladonia coniocraea* (Flörke) Spreng. The following species are reported for the first time from New Jersey: *Acrocordia megalospora* (Fink) R.C. Harris, *Agonimia opuntiella* (Buschardt & Poelt) Vězda, *Bacidia coprodes* (Körb.) Lettau (Syn. *Bacidia granosa* (Tuck.) Zahlbr.), *Chaenothecopsis savonica* (Räsänen) Tibell, *Chrysothrix flavovirens* Tønsberg, *Peltigera didactyla* (With.) J.R. Laundon, *Phaeophyscia hirsuta* (Mereschk.) Essl., *Physcia pumilior* R.C. Harris, *Parmotrema subisidiosum* (Müll. Arg.) M. Choisy, *Psoroglaena dictyospora* (Orange) Harada, *Sarea resinae* (Fr.) Kuntze, *Schismatomma pericleum* (Ach.) Branth & Rostrup, *Trapelia placodioides* Coppins & P. James, and *Vezdaea leprosa* (P. James) Vězda.

INTRODUCTION

As Brodo (1968) noted, the lichen flora of eastern North American has received considerable study in comparison to other regions of the world. Indeed, material from the region was sent to some of the seminal figures of lichenology by Henry Muhlenberg and Lewis David von Schweinitz (Lendemer & Hewitt, 2002). Many early figures such as Edward Tuckerman and Henry Willey also contributed significantly to understanding the lichens of the region. Interestingly, despite being under study for over two centuries, the lichen flora of eastern North America still remains poorly known, and recent work has continued to illustrate just how much remains to be discovered.

Within the context of southern New Jersey, the lichen flora of Wharton State Forest is of particular interest, because it includes areas that have been under nearly continuous study since prior to the industrial revolution in North America (*cf.* Austin, 1881). Thus there exists the opportunity to document the changes in the lichen flora over time. The forest also includes most of the habitat/vegetation types present in southern New Jersey (as summarized by Forman, 1998a), and serves as a good representation of the region as a whole. It seemed only logical that when the opportunity presented itself, an intensive survey of the largest state forest (~110,000 acres) in the region should be undertaken.

Wharton State Forest is well known for its pine barrens. Within the "pine barrens" are any number of smaller subtypes whose lichen flora differs significantly depending on the elevation, proximity to water, understory composition, and dominant canopy species. Most of the upland portions of the forest consist of extensive pine (primarily *Pinus rigida*) - oak (*Quercus velutina, Q. alba, Q. ilicifolia, Q. rubra, Q, marilandica,* etc.) forests with the oaks and pines varying in abundance and dominance. Burned areas are dominated by pitch pine (*Pinus rigida*), while unburned areas are dominated by oaks. Swamp forests are primarily dominated by Atlantic white cedar (*Chamaecyparis thyoides*) and red maple (*Acer rubrum*), often with an understory of ericaceous shrubs, such as *Vaccinium corymbosum* and *Leucothoe racemosa*. Open areas along major rivers can be described as savannas with scattered Atlantic white cedar and pitch pine. There are also extensive peaty wetlands dominated by low ericaceous shrubs and sedges. For detailed descriptions of pineland habitats see Forman et al. (1998a).

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MATERIALS AND METHODS

In October 2004 I began to survey the lichen flora of Wharton State Forest for this study. Due to vehicular constraints (the use of a bicycle), most of the fieldwork was carried out within several miles of the town of Batsto, Burlington County. Aside from the limits initially imposed by transportation, the portion of the forest surrounding Batsto was of particular interest because it is located just above the junction of the Mullica and Batsto Rivers. This close proximity to several sources of water is likely what accounts for the varied habitat and significant diversity (as well as sheer volume) of lichens. Pleasant Mills Cemetery is also located close to the junction of the two rivers, and was regularly visited, since it provides a rare habitat for saxicolous lichens (see locality discussion in appendix). In addition to the solo collection trips made every Saturday from October 2004 to December 2004, I also surveyed the northeastern portion of the forest in November 2004 as part of a trip with R.F. Lendemer. Periodic collection trips with A.E. Schuyler were also made from January to August 2005. The northwestern portion of the forest and the area north of Pleasant Mills had been visited extensively prior to this study by me and several other individuals (S.A. Hammer, J.A. Macklin, M.J. Moody, R.F.C. Naczi, A.E. Schuyler, L.H. Smith II, and E. Tripp). The checklist presented here thus includes not only the collections made during this study but also those made during many sporadic trips from 2002 until present. An index (arranged by the citation used in the checklist) to all of these localities is provided in Appendix I.

ANNOTATED CHECKLIST

The checklist presented here should be considered as preliminary with respect to distributions, because only a fraction of the entire study area was surveyed intensively, and additional taxa were found as a result of nearly every collection effort. The list is, nonetheless, fairly complete with respect to total diversity, and most future discoveries are likely to be made in under-collected groups (i.e. crustose lichens and lichenicolous fungi). It is significant to consider, however, that in addition to the many crustose species newly reported here, several previously unreported macrolichens were also found.

The list below is arranged alphabetically by genus and species and includes material that was identified only to genus or family. The collection numbers cited following each locality are those of the author unless otherwise indicated. Though lichenicolous fungi were not directly the focus of this study, they are included and marked with an "*". Sterile crusts for which no names could be found, and for which the author (or others) could not suggest generic placement, are included at the end of the list and are grouped by chemistry. Taxonomy that does not follow official checklists or recent treatments reflects the author's preferences or interpretations, and are usually explained.

Vouchers of all collections cited here been deposited in the herbarium of the author which is currently housed at the Academy of Natural Sciences of Philadelphia (PH) with a nearly full set of duplicates in the herbarium of The New York Botanical Garden (NY). In an effort to increase the usefulness of this list, recent collections from Wharton State Forest deposited in NY (collections of L. Brako, W.R. Buck, and R.C. Harris) are also included when no voucher from the present study was available.

Abrothallus cladoniae R. Sant. & D. Hawks.* - BNI: *3208-A* (on *Cladonia coniocraea* (Flörke) Spreng.).

This is apparently the first reported occurrence of *A. cladoniae* on *Cladonia coniocraea*.

Acrocordia megalospora (Fink) R.C. Harris – BSII: *3371;* GBC: *4292;* PVC: *3158.*

These are the first published reports of the species from New Jersey.

Acarospora glaucocarpa (Wahlenb. ex Ach.) Körb. – AS: *4284.*

Agonimia sp. – BSI: *3286*; SWBAT: *3905, 3914.*

Thallus muscicolous/lignicolous, granular to dispersed areolate, perithecia black, ascospores muriform, hyaline, (33)-36-39 x 12-15µm.

Agonimia opuntiella (Buschardt & Poelt) Vězda – PVC: *3143, 3150.*

This is the first report of this species from New Jersey.

Amandinea polyspora (Willey) Lay & P. May *in* P. May & Sheard – A: *Brako 4898, Harris 16412;* AHF: *1750;* BNI: *3223*; HFI: *3513*; QB: *Buck 36801.*

Anaptychia palmulata (Michx.) Vainio– AR: *4290.*

Anisomeridium polypori (Ellis & Everh.) M.E. Barr – A: *4345;* AR: *4276;* PVC: *3159*; QB: *972*; SWBAT: *3912*.

Anzia colpodes (Ach.) Stizenb. - GBC: *5295.*

Arthonia sp. - SWBAT *3902*.

The material is similar to *Arthonia apatetica* (A. Massal.) Th. Fr., but differs in lacking brown-capped paraphyses and having somewhat larger ascospores.

Bacidia coprodes (Körb.) Lettau – GCB: *4281*.

Esslinger (2005) lists *B. coprodes* as a synonym of *B. trachona* (Ach.) Lettau. According to Llop & Ekman (2004), *B. coprodes* is the correct name for *B. granosa* (Tuck.) Zahlbr., and *B. trachona* is a separate unrelated taxon which the authors do not report from North America. In eastern North America all three of these names can be found in most herbaria, and the material often represents other taxa, especially *Bacidina egenula*.

Bacidia schweinitzii (Fr. *ex* Michener) A. Schneid. – BNII: *3336;* BSI: *3294*; BSIII: *3449*; QB: *Harris 43806.*

Bacidina sp. – SWBAT: *3904* (pycnidia only).

Apothecia have not yet been found associated with material from the region. The thallus is composed of goniocysts and the pycnidia are small and pale without a trace of pigmentation; conidia filiform 38 x 2µm.

Bacidina egenula (Nyl.) Vězda – AHF: *1727;* BSII: *3375.*

Biatora longispora (Degel.) Lendemer & Printzen – A: *4340;* SWBAT: *3909.*

Biatora printzenii Tønsberg – A: *4435.*

Buellia curtisii (Tuck.) Imshaug – A: *4341;* BNI: *3173*; SWBAT: *1477.*

Buellia stillingiana J. Stein. – QB: *Brako 4909.*

Caloplaca citrina (Hoffm.) Fr. – AHF: *1758.*

Caloplaca feracissima H. Magn. – AS: *4283;* PVC: *3272.*

Caloplaca flavovirescens (Wulfen) Dalla Torre & Sarnth. – AHF: *1749;* PVC: *3145.*

Caloplaca subsoluta (Nyl.) Zahlbr. – PVC: *3235.*

Candelaria concolor (Dicks.) Stein – W: *1004, 1005.*

Candelariella efflorescens Buck & R.C. Harris – QB: *874, 967.*

Candelariella reflexa (Nyl.) Lettau – AHF: *1761*; SWBAT: *3910.*

As has been discussed by Lendemer (2004), sterile sorediate specimens of *Candelariella* from southern New Jersey cannot be named with certainty. Both *C. efflorescens* R.C. Harris & Buck (ascospores > 8 per ascus) and *C. reflexa* (ascospores 8 per ascus) are present in the region, and sterile thalli are morphologically indistinguishable. Previous reports of *C. efflorescens* from the region by other authors need to be confirmed. Semi-diligent searching of a population in the field often results in the discovery of apothecia, so future collections should be made with this in mind.

Catinaria atropurpurea (Schrad.) Poelt & Vězda – BSIII: *3486.*

Chaenotheca hygrophila Tibell – QB: *Buck 36792, Buck 36794, Buck 36802.*

Chaenothecopsis savonica (Räsänen) Tibell – AHF: *1722;* BSIII: *3485;* PVCN: *3368.*

These records represent the first confirmed reports of this species from New Jersey.

Chrysothrix flavovirens Tønsberg – PVCW: *3293*.

Chrysothrix flavovirens is a common species in southern New Jersey, often covering the trunks of trees in Atlantic white cedar swamps. Harris & Lendemer (2005) reported this species as new to North America with the note that North American material lacked diffractaic acid (= chrysophthalma unknown). Tønsberg (1994) described *C. flavovirens* as the sorediate counterpart to *C. chrysophthalma* (P. James) P. James & J.R. Laundon. The species differs from *C. candelaris* (L.) J.R. Laundon, with which it has previously been confused in the region, by the presence of rhizocarpic acid and by the finer soredia. Previous reports of *C. candelaris* from the region need to be verified, especially those occuring on *Chamaecyparis*.

Cladonia arbuscula (Wallr.) Flot. – AHF: *1762;* BNIII: *437*; PVCN: *Harris 43763.*

Cladonia atlantica A. Evans – AHF: *1715;* AS: *4301*; BSI: *3261, 3270, 3302* (UV-); CB: *Harris 43791;* PVCW: *3268*; PVCN: *Harris 43765, Harris 43766, Harris 43767;* SB: *3531.*

Some specimens of *C. atlantica* are not UV+ blue/white, despite the presence of baeomycesic and squamatic acids. Such specimens can be confused with C. *floridana* Vainio, which contains thamnolic acid.

Cladonia beaumontii (Tuck.) Vainio – BNI: *3388, 3389*; QB: *4182, 4183*; SWBAT: *3980.*

Cladonia brevis (Sandst.) Sandst. – PVCN: *Harris 43769, Harris 43801.*
Cladonia caespiticia (Pers.) Flörke – BSI: *3244, 3247.*
Cladonia coniocraea (Flörke) Spreng. – BNI: *3208.*
Cladonia conista A. Evans – SWBAT: *5462.*
Cladonia cristatella Tuck. – A: *383;* AHF: *1718.*
Cladonia cryptochlorophaea Asah. – PVC: *3209.*
Cladonia cylindrica (A. Evans) A. Evans – BNI: *3198*; BSIII: *3473, 3476.*
Cladonia didyma (Fée) Vainio - BSIII: *3470*; QB: *Harris 43805.*
Cladonia dimorphoclada Robbins – BNIII: *440*; PVCN: *Harris 53770, Harris 43771.*
Cladonia diversa Asperges – AHF: *1759;* PVCN: *Harris 43802.*

The name *Cladonia diversa* does not presently appear on the North American checklist (Esslinger 2005). The species is separated from *C. pleurota* (Flörke) Schaer., on the basis of having microsquamulose podetia instead of sorediate podetia. All material from southern New Jersey seems to be referrable to *C. diversa*.

Cladonia floerkeana (Fr.) Flörke – BNIII: *3467 ?*; PVCN: *Harris 53772.*
Cladonia floridana Vainio – A: *431, 4184.*
Cladonia grayi G. Merr. *ex* Sandst. – A: *488;* AHF: *1719;* BNI: *3204, 3210, 3382*; BSI: *3266*; HFI: *3529, 3535;* PVC: *3385*; PVCN: *Harris 43773.*
Cladonia incrassata Flörke – AHF: *1720, 1731;* BSI: *3281;* PVCN: *3267*; QB: *Harris 16442, Harris 43812, Harris 43813.*
Cladonia macilenta Hoffm. – AHF: *1716;* AQB: *980, 981;* BNI: *3217, 3386*; BNII: *3526;* BSI: *3269, 3303;* BSII: *3383;* PVCN: *Harris 43768;* PVCW: *3282*; SB: *3534.*
Cladonia ochrochlora Flörke – BNI: *3214*; BNII: *3339*; BSII: *3340*; BSIII: *3525;* PVCN: *3341, 3342*; QB: *Harris 43823;* SB: *3536.*
Cladonia parasitica (Hoffm.) Hoffm. – BNI: *3211, 3390*; PVCN: *3307, 3387*; QB: *4181.*
Cladonia peziziformis (With.) J.R. Laundon – BNI: *3216*; HFI: *3537.*
Cladonia ramulosa (With.) J.R. Laundon – A: *431.*
Cladonia rangiferina (L.) Wigg. – PVCN: *3314.*
Cladonia rappii A. Evans – A: *386;* BNI: *3205*; PVCN: *Harris 43781*; QB: *Harris 43804, Harris 43816.*
Cladonia ravenelii Tuck. – QB: *Harris 43828* (lacking didymic acid).
Cladonia rei Schaer. – BNI: *3213.*
Cladonia santensis Tuck. – PVCN: *Harris 43782;* QB: *Harris 16450, Harris 43809.*
Cladonia sobolescens Nyl. – A: *4344;* PVC: *3311*; PVCN: *Harris 43800.*
Cladonia strepsilis (Ach.) Grognot – A: *4163.*
Cladonia submitis A. Evans – A: *432;* AS: *4280;* BSI: *3265*; SB: *3530.*
Cladonia subtenuis (Abbayes) Mattick – A: *385;* AHF: *1763;* AS: *4346;* BNI: *3207;* BSI: *3264;* PVCN: *Harris 43764;* PVCW: *3262, 3263*; SB: *3529, 3538.*
Cladonia uncialis (L.) Wigg. – A: *384;* AHF: *1763;* BSI: *3260*; HFI: *3533*; PVCN: *Harris 43784*; QB: *Harris 43820.*
Clypeococcum hypocenomycis D. Hawks.* (on *Hypocenomyce scalaris*) – PVCN: *Harris 43790.*
Coenogonium pineti (Ach.) Lücking & Lumbsch – A: *4342*

The combination of *Dimerella pineti* into *Coenogonium* can be found in Lücking et al. (2004).

Collema subflaccidum Degel. – PVC: *3157.*
Dimerella pineti (Ach.) Vězda = *Coenogonium pineti* (Acharius) Lücking & Lumbsch
Diploschistes muscorum (Scop.) R. Sant.* (on *Cladonia*) – PVC: *3299*; PVCN: *3327.*
Endocarpon spp. – AHF: *1762, 1805;* PVC: *3274.*
Flavoparmelia caperata (L.) Hale – AQB: *965;* BNII: *3344;* BNIII: *442;* BSI: *3249*; CB: *Harris 43792;* QB: *655.*
Fuscidea arboricola Coppins & Tønsberg – PVCN: *2663.*
Gyalideopsis sp. – QB: *Harris 16444*; SL: *Buck 36785, Buck 36786.*
Hertelidea pseudobotryosa R.C. Harris, Ladd, & Printzen – PVCN: *3234, 3329.*

This recently described species was first reported from New Jersey by Lendemer (2004) from a locality in Cumberland County, New Jersey. The above collections indicate that the species is likely more common than previously thought, and further collections should be sought. It occurs primarily on rotting burnt logs and tree stumps, as well as more rarely on the bark of living pitch pines.

Heterodermia hypoleuca (Ach.) Trev. – A: *Harris 16434.*

Heterodermia granulifera (Ach.) Culb. – SWBAT: *3906.*

Heterodermia obscurata (Nyl.) Trev. – A: *Harris 16428, Brako 4903;* AHF: *1728;* B: *3460;* BNI: *3155, 3176*; BSI: *3252*; HFI: *3512*; SWBAT: *1443.*

Heterodermia speciosa (Ach.) Trev. – A: *836*; AR: *4291;* BSI: *3256*; QB: *953*; SWBAT: *1443.*

Hypocenomyce anthracophila (Nyl.) P. James & G. Schneid. – BNI: *3199;* BNIII: *3466*; QB: *648.*

Hypocenomyce friesii (Ach.) P. James & G. Schneid. – PVC: *4166;* QB: *647.*

Hypocenomyce scalaris (Fr.) M. Choisy – BSIII: *3471*; HFI: *3501;* PVCN: *Harris 43803.*

Hypogymnia physodes (L.) Nyl. – BNI: *3189*; CB: *Harris 43793;* HFI: *3489.*

Hypotrachyna livida (Taylor) Hale – PVC: *3229*; PVCN: *3332, 3333, 3334*; QB: *646.*

Hypotrachyna osseoalba (Vain.) Park & Hale – BNI: *3160*; QB: *645, 964, 969.*

The above reports of *H. osseoalba* are particularly noteworthy as documentation of the northern extent of the range of this species.

Hypotrachyna showmanii Hale – QB: *961*.

See Lendemer & Harris (2006, this volume) for a discussion of this species and its status in eastern North America. The species is widespread in eastern North America, and is distinguished from other pustulose species of *Hypotrachyna* and *Parmelinopsis* by the production of esorediate pustules, presence of maculae on the lobe tips, and C+ pink chemistry (gyrophoric acid + hiascic acid complex including 5-*O*-methlyhiascic acid).

Imshaugia aleurites (Ach.) S.F. Meyer – AHF: *1737;* BNIII: *3463;* BSI: *3248*; HFI: *3519*; PVCN: *Harris 43785;* QB: *Harris 16453;* QBW: *854.*

Imshaugia placorodia (Ach.) S.F. Meyer – AHF: *1733;* HFI: *3520*; PVCN: *Harris 43786.*

Julella fallaciosa (Arn.) R.C. Harris – BSIII: *3483;* PVC: *3350;* PVCN: *3257.*

Lecanora sp. 1 – BSI: *3226.*

Lecanora sp. 2 – BSI: *3259*; BSIII: *3446.*

Initially the above collections were referred to *Lecanora ramulicola* (H. Magn.) P. May & Printzen, which resembles *L. symmicta*. The material is similar in some respects to *L. minutella* however does not seem to represent that species. *Lendemer 3259* was distributed in *Lich. East. N. Amer. Exs.*, as *Lecanora* sp.

Lecanora sp. 3 (TLC: atranorin, chloroatranorin, caperatic acid?) – BNI: *3183;* BNII: *3366;* BSI: *3230;* BSIII: *3488*; PVCN: *3241*; PVCW: *3240.*

It seems likely that the above material (and a number of additional similar collections) would have been called *Lecanora impudens* Degel., based purely on the presence of atranorin and excavate soralia. The material was loaned to I.M. Brodo, who noted some similarity to *L. farinaria* Borrer, a species that contains roccellic acid. Two collections are fertile (*3240, 3241*) and their apothecia do not match *L. impudens.*

Lecanora cupressi Tuck. – SWBAT: *3903*.

Lecanora dispersa (Pers.) Sommerf. – AHF: *1753, 1754;* PVC: *3312, 3313.*

Lecanora hybocarpa (Tuck.) Brodo – A: *Harris 16416;* BNII: *3364;* GBC: *4336;* PVC: *3348;* QB: *Brako 4915;* SWBAT: *1487;* W: *1007.*

Lecanora minutella Nyl. – BNIII: *434;* SB: *3518* (lignicolous); SL: *Buck 36783.*

Lecanora strobilina (Spreng.) Kieff. – AHF: *1755;* BNI: *3197, 3224*; PVC: *3347*; SB: *3497.*

Lecanora subpallens Zahlbr. – BNI: *3194*; QB: *Brako 4914, Harris 43814;* PVCN: *Buck 36766;* SWBAT: *1478.*

Lecanora thysanophora R.C. Harris – BNI: *3190*; BSI: *3236*; BSIII: *3456;* PVCN: *3317*; SB: *3496*; SWBAT: *1608.*

Lecidea nylanderi (Anzi) Th. Fr. – PVCN: *3271.*

Lecidea plebeja Nyl. – AHF: *1723*; SL: *Buck 36790.*

Lepraria caesiella R.C. Harris – A: *Harris 16409, Harris 16410;* BNI: *3175, 3181, 3184;* HFI: *3521, 3522;* PVCN: *3355;* PVCW: *3285;* QB: *Harris 16451, Harris 43825;* SB: *3509.*

This recently described species (Lendemer 2005) had previously been reported as *Lepraria* sp. by Harris (1985) and was called "an apparently unnamed *Lepraria*" in Brodo et al. (2001).

Lepraria elobata Tønsberg – BNI: *3179, 3187;* BNIII: *3468;* PVCN: *3326*; SWBAT: *3968.*

This species could be confused with *L. lobificans* with respect to chemistry, but differs in having a thinner/dispersed blue-gray thallus that lacks the medulla and lobes indicative of *L. lobificans*.

Lepraria aff. *incana* (L.) Ach. – PVCN: *3357, 3358*; SB: *3506, 3524*; SWBAT: *3992.*

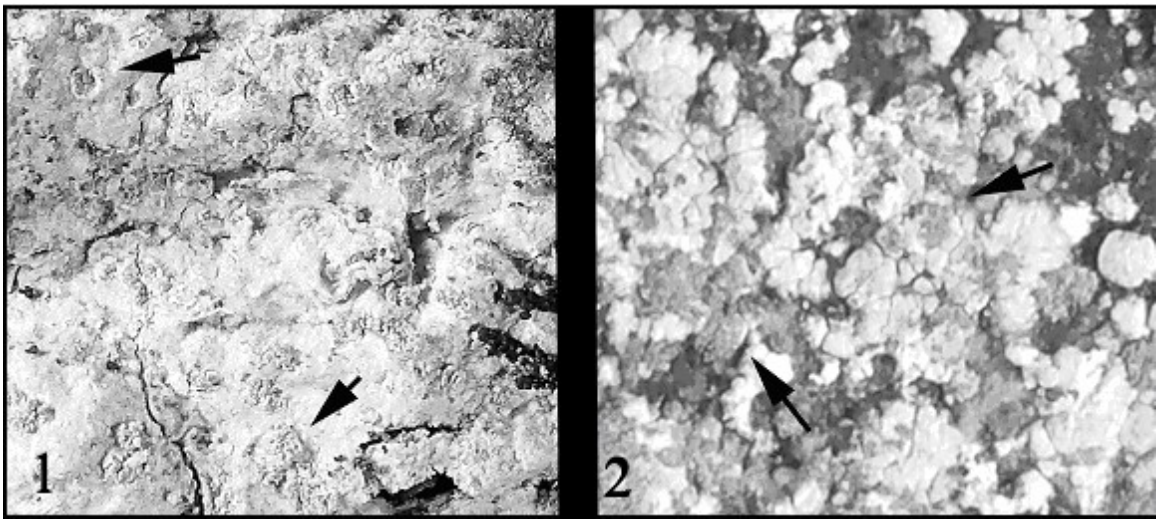

Plate 1. Fig. 1. Nadvornikia sorediata, Lendemer 3349, arrows indicate punctiform soralia. *Fig. 2. Trapelia sp., Lendemer 3279,* arrows indicate sorediate portions of areoles.

Lepraria lobificans Nyl. – AHF: 1735, 1744, 1801, 1745; BNI: 3174, 3377; BSI: 3295; BSII: 3378; BSIII: 3457; HFI: 3539; PVCN: 3288, 3376; SWBAT: 3919.

Leptogium cyanescens (Rabenh.) Körber – BSIII: *3447, 3453;* PVC: *3156*; QB: *4162.*

Lobaria quercizans Michx. – PVC: *4273.*

Loxospora pustulata (Brodo & Culb.) R.C. Harris – A: *Harris 16427;* AHF: *1732, 1740;* AQB: *958;* BNI: *3180, 4277* (fertile); BNII: *3365;* BSI: *3254;* BSIII: *3472, 3487* (fertile)*;* PVCN: *3374* (fertile)*;* PVCW: *3280* (fertile); QB: *658, 959;* SB: *3490, 3499*; SWBAT: *3915.*.

The above collections marked "fertile" have poorly to well developed ascomata, but all of the asci examined were sterile. The material is currently under study to determine the correct placement of the species. The taxon has previously been reported from the region as *Haematomma* sp. (Harris 1985).

Melanelixia subaurifera (Nyl.) Blanco et al. – CB: *Harris 43794.*

Micarea erratica (Körber) Hertel et al. – PVC: *3308.*

Micarea globulosella (Nyl.) Coppins – BSI: *3300.*

Micarea melaena (Nyl.) Hedl. – BNI: *3196*; BNII: *3325, 3330;* HFI: *3550;* PVCN: *3237*; SL: *Buck 36781.*

Micarea peliocarpa (Anzi) Coppins & R. Sant. – CB: *Harris 43795*; PVCN: *Buck 36763*; QB: *4164;* SL: *Buck 36782, Buck 36789.*

Micarea prasina Fr. *s. lat.* – BNI: *3222;* PVCN: *2653*; SL: *Buck 36780.*

Mycoblastus fucatus (Stirt,) Zahlbr. ? – BSIII: *3484.*

Mycocalicium subtile (Pers.) Szatala – BSI: *3228, 3231, 3258*; PVCN: *3232*; QB: *4161;'* SB: *3502, 3503, 3504.*

Myelochroa aurulenta (Tuck.) Elix & Hale – BNI: *3161*; BNII: *3338;* SWBAT: *1442, 3907.*

Nadvornikia sorediata R.C. Harris – A: *4343;* BSIII: *3448;* PVC: *3349*; SB: *3494*.

Ochrolechia arborea (Kreyer) Almb. – SB: *3491;* PVC: *3151.*

Ochrolechia pseudopallescens Brodo – A: *494;* BNII: *3337;* BSI: *3251, 3255;* BSIII: *3482;* PVC: *3221*; PVCN: *3238*; QB: *Brako 4919;* SB: *3510.*

Opegrapha vulgata Ach. – AR: *4278;* BNI: *3154*; BSIII: *3455*; GBC: *4335*.

Parmelia squarrosa Hale – A: *Harris 16419;* AHF: *1734;* BNI: *3170, 3202*; BSI: *3296*; BSII: *3332*; BSIII: *3479;* PVCN: *3373* (fertile); QB: *Harris 43815.*

Several of the above collections (*3332, 3373, 3479*) are referred here with some hesitation. The thalli of these collections are distinctly pruinose, especially at the lobe tips, and the isidia are somewhat isidio-sorediate. The material may represent the European isidio-sorediate species *P. ernstiae* Feuerer & Thell. Presently this is impossible to determine, however, since the authors of that species did not describe the rhizines (Feuerer & Thell 2002). Hale (1971) noted that some specimens of *P. squarrosa* are pruinose and it seems further study is clearly needed.

Parmelia sulcata Taylor – BNIII: *441*; CB: *Harris 43796.*

Parmelinopsis horrescens (Taylor) Elix & Hale – QB: *986p.p.*

Parmelinopsis minarum (Vain.) Elix & Hale – AR: *4274;* AS: *4337;* BNI: *3192, 3195;* BNII: *3370* (fertile); BSIII: *3458;* PVC: *3147*; QB: *968p.p.*

Parmeliopsis subambigua Gyelnik – BSI: *3297;* PVC: *3289*; PVCN: *3369*; QB: *657.*

Parmotrema hypoleucinum (J. Stein.) Hale – PVC: *3310*.

Parmotrema hypotropum (Nyl.) Hale – AHF: *1721, 1729, 1730;* BNI: *3172*; BNIII: *373;* BSI: *3291, 3292*; HFI: *3548;* PVCN: *3381*; SWBAT: *3917;* QB: *Harris 43819.*

Parmotrema perforatum (Jacq.) A. Massal. – QB: *Harris 43818.*

Parmotrema reticulatum (Taylor) M. Choisy – BNI: *3168, 3203*; PVCN: *3239*; QB: *Harris 43822.*

Parmotrema subisidiosum (Müll. Arg.) M. Choisy – AQB: *960;* BNI: *3164;* BNII: *3527;* GBC: *5294.*
These records are apparently the first of this species from New Jersey.

Peltigera didactyla (With.) J.R. Laundon – PVC: *3315* (apotheciate).
This is the first report for this species from New Jersey.

Pertusaria amara (Ach.) Nyl. – AHF: *1760, 1761.*

Pertusaria macounii (Lamb) Dibben – QB: *Brako 4921.*

Pertusaria ophthalmiza (Nyl.) Nyl. – B: *3680;* GBC: *4300*; PVC: *3316.*

Pertusaria paratuberculifera Dibben – A: *Harris 16432, Harris 16433*; BNI: *3220*; BSIII: *3450;* PVC: *3219*; QB: *649, 966;* SB: *3498*; SWBAT: *3916.*

Pertusaria pustulata (Ach.) Duby – AHF: *1757*; PVCN: *Buck 36764.*

Pertusaria trachythallina Erichsen – A: *Harris 16422.*

Pertusaria velata (Turner) Nyl. – BSI: *3278;* BSIII*: 3681*; GBC: *4279.*

Phaeocalicium polyporaeum (Nyl.) Tibell – A: *Buck 8964*; QB: *4160.*

Phaeographis inusta (Ach.) Müll. Arg. – QB: *Buck 36800.*

Phaeophyscia adiastola (Essl.) Essl. – AHF: *1747, 1756;* PVC: *3146.*

Phaeophyscia hirsuta (Mereschk.) Essl. – PVC: *3351, 3352, 3352.*
The synonymy (Esslinger, 2004) of *Phaeophyscia cernohorskyi* (Nàdv.) Essl., with *P. hirsuta* is followed here. As a result, *P. hirsuta* is here reported for the first time for New Jersey.

Phaeophyscia rubropulchra Degel. – A: *4338;* AHF: *1738;* BNI: *3185;* BSI: *3253;* BSII: *3322;* BSIII: *3452, 34697;* PVCW: *3233*; SWBAT: *1441;* W: *1000, 1001, 1002.*

Physcia adscendens (Fr.) H. Olivier – PVC: *3149.*

Physcia americana G. Merr. – A: *Harris 16418;* BNII: *3343*; BSII: *3367*; SWBAT: *3908, 3918*(?).
Lendemer 3918 is abnormal in having developed pustule-like lumps.

Physcia millegrana Degel. – A: *Brako 4906;* AHF: *1739;* BNI: *3162;* PVC: *3148.*

Physcia pumilior R.C. Harris – BSI: *3301;* BSIII: *3481.*
The presence of this southern species is not unexpected, since it was recently also collected farther north in the Delaware Water Gap of Pennsylvania. The report of this species from the Water Gap was inadvertently omitted from Harris & Lendemer (2005). This is the first report of the species from New Jersey. Further collections should be sought to document the northern range limits of the species.

Physciella chloantha (Ach.) Essl. – AHF: *1746, 1748.*

Physconia leucoleiptes (Tuck.) Essl. – B: *3461;* PVC: *3169, 3218.*
All of the above collections are C- and thus belong to *Physconia leucoleiptes s. str.* (i.e. not including *P. kurokawae* Kashiw.).

Placidium arboreum (Schw. *ex* Michener) Lendemer – BSIII: *3478.*
Though historically reported, this is the first modern collection of *P. arboreum* from the region. See discussion in Lendemer and Yahr (2004).

Placynthiella dasaea (Stirton) Tønsberg – BSIII: *3480;* HFI: *3515, 3516;* QB: *Buck 36806;* SL: *Buck 36784.*

Placynthiella icmalea (Ach.) Coppins & P. James ? – BNI: *3215*; BSI: *3305*; SB: *3505.*

Placynthiella oligotropha (J.R. Laundon) Coppins & P. James – A: *Harris 16421p.p.;* AQB: *979;* PVC: *3298.*

Placynthiella uliginosa (Ach.) Coppins & P. James – A: *Harris 16421p.p.*; PVCN: *Harris 43788*; SL: *Harris 36791.*

Placynthium nigrum (Huds.) S.F. Gray – GBC: *4282;* PVC: *3144.*

Pseudosagedia rhaphidosperma (Müll. Arg.) R.C. Harris – GBC: *4334*.

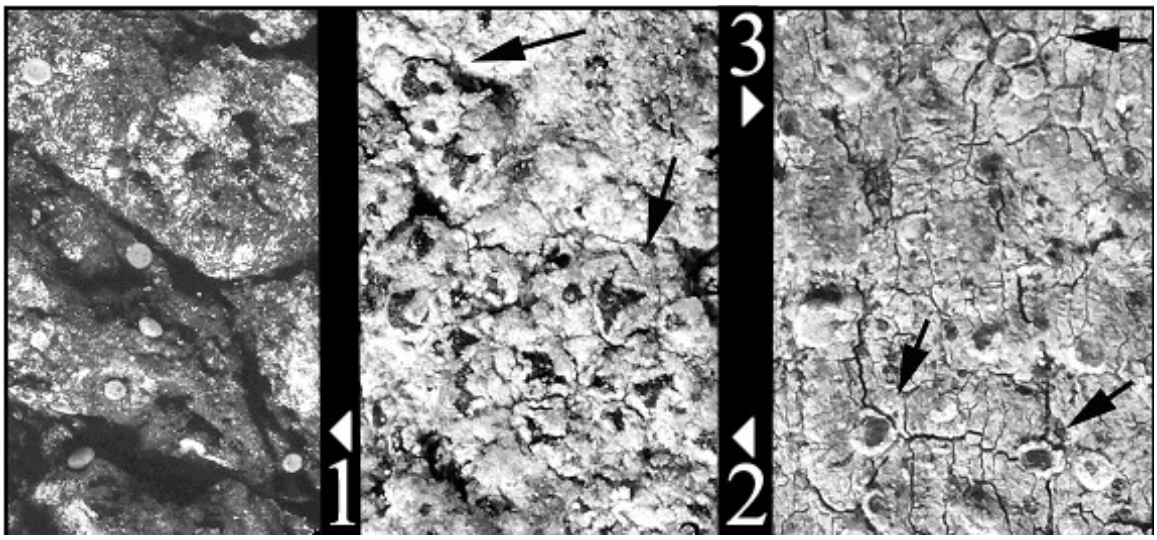

Plate 3. Fig. 1. Sarea resinae, Lendemer 3507. Fig. 2. Schismatomma pericleum, Lendemer 3372, thallus with emergent apothecia, arrows indicate apothecia. *Fig. 3. Schismatomma glaucescens, Lendemer 4165,* thallus with emergent apothecia, arrows indicate fully exposed apothecia.

Psoroglaena dictyospora (Orange) Harada – SWBAT: *3901.*

This species has previously been referred to as *Macentina dictyospora* Orange (Orange, 1991). The transfer to *Psoroglaena* was made by Harada (2003) but does not appear in Esslinger (2005). This is the first report for New Jersey.

Punctelia rudecta (Ach.) Krog – AHF: *1742, 1743;* AQB: *951, 952;* BNI: *3163, 3171;* BNII: *3319;* BSI: *3276;* HFI: *3511;* PVC: *3152*; SB: *3549.*

Punctelia subrudecta auct. Amer. – A: *Harris 16417;* AHF: *1741;* BNI: *3165*; BNIII: *3462, 3464;* BSI: *3245*; CB: *Harris 43797;* HFI: *3540A, 3540B, 3541, 3542A, 3542B, 3543, 3544*; QB: *656.*

Some of the above collections (e.g. *Lendemer 3464*) are superficially similar to *P. missouriensis* Wilhelm & Ladd in having lobulate soredia in the older soralia. However, they seem best placed in *P. subrudecta*, as the younger soralia are typical of *P. subrudecta* in having numerous soredia.

Pycnothelia papillaria Dufour – BNI: *3206*; BNIII: *446*; PVCN: *Harris 43789.*

Pyrenula pseudobufonia (Rehm) R.C. Harris – W: *999.*

Pyrrhospora varians (Ach.) R.C. Harris – PVCN: *990.*

Pyxine sorediata (Ach.) Mont. – A: *Harris 16437;* B: *3465;* BNI: *3166, 3182*; BSIII: *3451*; GBC: *5293;* QB: *653, 955*; SWBAT: *3913*; W: *1003.*

Pyxine subcinerea Stirt. – BNI: *3167*; BSIII: *3454.*

Rhizocarpon reductum Th. Fr. – PVC: *3346.*

Rinodina maculans Müll. Arg. – BNI: *3186*; W: *1006.*

Rinodina subminuta H. Magn. – SWBAT: *1483.*

Ropalospora chlorantha (Tuck.) S. Ekman – QB: *Brako 4908.*

Sarcogyne regularis Körber – AHF: *1726, 1751;* SB: *3523.*

Sarea resinae (Fr.) Kuntze – BNI: *3193*; SB: *3507.*

This species has not previously been reported from New Jersey. Additional collections should be sought, as it is likely more common than the few collections cited here indicate. It is found on the sap of shaded pine trees in open oak-dominated pine-oak forests and is not lichenized.

Schismatomma glauscescens (Nyl. *ex* Willey) R.C. Harris – QB: *4165.*

Schismatomma pericleum (Ach.) Branth & Rostrup – PVCN: *3225, 3372.*

This taxon is easily overlooked in the field, and was only noticed after an accidental collection with *Julella fallaciosa*. The species is known from only a few records in North America and is reported here as new to New Jersey.

Scoliciosporum chlorococcum (Stenh.) Vězda – A: *Harris 16429.*

Segestria leptalea (Durieu & Mont.) R.C. Harris – QB: *Buck 36810.*

Stereocaulon glaucescens Tuck. – PVC: *3309.*

Strigula americana R.C. Harris – GBC: *4287.*

Trapelia sp. – PVC: *3279.*

The above collection is characterized by a saxicolous C+ pink thallus composed of dispersed to somewhat continuous gray areoles with a phenocortex, and poorly defined ± excavate soralia with coarse gray soredia. Some forms of *Trapelia glebulosa* (Sm.) J.R. Laundon are superficially similar, but that species is esorediate. *Trapelia placodioides* Coppins & P. James, a common saxicolous sorediate species differs primarily in having a thick continuous placodioid thallus.

Trapelia glebulosa (Sm.) J.R. Laundon – PVC: *3243.*

Trapelia glebulosa is the oldest name for *T. involuta* (Taylor) Hertel, following Laundon (2005).

Trapelia placodioides Coppins & P. James – AR: *4289.*

Trapeliopsis sp. ? – BNII: *3359.*

The above collection is sterile and tentatively assigned to *Trapeliopsis*. It consists of a gray areolate thallus that reacts C+ red (strongly), with large hemispherical soralia and fine soredia, and was collected on a rotting pine tree.

Trapeliopsis flexuosa (Fr.) Coppins & P. James – A: *956;* BSI: *3250*; PVCN: *3318, 3324, 3331* (fertile); SB: *3500* (fertile).

Tuckermanella fendleri (Tuck.) Essl. – AHF: *1736;* PVCN: *3304.*

Tuckermanopsis americana (Spreng.) Hale – BNI: *3379;* BSI: *3277, 3287*; PVCN: *3273, 3275.*

Tuckermanopsis ciliaris (Ach.) Gyelnik – QB: *Brako 4920.*

Usnea mutabilis Stirt. – BNI: *3384.*

Usnea pensylvanica Motyka – BNI: *3212.*

Usnea strigosa (Ach.) A. Eaton – BH: *4298, 4299;* BSI: *3290.*

Usnea trichodea Ach. – QB: *650.*

Verrucaria sp. – BSII: *3320, 3321.*

Verrucaria muralis Ach. – HFI: *3495.*

Vezdaea leprosa (P. James) Vězda – AR: *4275, 4285.*

This is the first report of *Vezdaea leprosa* from the state. Due to its inconspicuous nature, the species is easily overlooked in the field. In southern New Jersey is has been found growing at the bases of trees along roads and over bryophytes growing on ruined stone walls.

Vulpicida viridis (Schw. *ex* Halsey) J.E. Matteson & Lai – QB: *652.*

Xanthoparmelia conspersa (Ehrh. *ex* Ach.) Hale – PVC: *3345.*

Lichenicole sp. 1 – BSI: *3246;* PVC: *3153*; SB: *3492* (on *Punctelia subrudecta*).

This species resembles a species of *Tremella* and is discussed further by Harris & Lendemer (2005)

Sterile sorediate crust 3284 (TLC: no lichen substances) – PVCW: *3284.*

Sterile sorediate crust 3459 (TLC: atranorin) – B: *3459,* BNI: *3177;* BSI: *3283;* SB: *3508.*

Sterile sorediate crust 3335 (TLC: atranorin, chloroatranorin) – BNII: *3335.*

Sterile sorediate crust 3354 (TLC: atranorin, chloroatranorin, caperatic acid?, protocetraric acid?) – PVC: *3354,* PVCW: *3306.*

Sterile sorediate crust 3356 (TLC: atranorin, chloroatranorin, caperatic acid?) – PVCN: *3356.*

The above material is morphologically similar to *sterile sorediate crust 3354* but lacks protocetraric acid.

Sterile sorediate crust 4339 (TLC: atranorin, norstictic acid, stictic acid, constictic acid, connorstictic acid). – A: *4339*.

Sterile sorediate crust 4420 (TLC: atranorin, zeorin, stictic acid, constictic acid, norstictic acid (tr.), connorstictic acid (tr.). – SWBAT: *4420.*

Sterile sorediate crust 4424 (TLC: atranorin, zeorin). – SWBAT: *4424.*

Sterile sorediate crust 2658 (TLC: fumarprotocetraric acid) – PVCN: *2658*

Sterile sorediate crust 3967 (TLC: perlatolic acid unknown) – SWBAT: *3967.*

Sterile sorediate crust 3477 (TLC: unknowns) – BSIII: *3477*

Sterile sorediate crust 3201 (TLC: unknown) – BNI: *3201*.

DISCUSSION

Phytogeography

This study is one of a very few dealing with coastal plain lichens. For this reason, despite the preliminary nature of this checklist, it is important to attempt to place the lichen flora of southern New Jersey into the larger geographic context of eastern North America. Brodo's (1968) lichen flora of Long Island, NY, remains the only comprehensive treatment of the lichens of any portion of the coastal plain of eastern North America. Though the landmark treatments of Harris (1990, 1995) also cover southern areas of the coastal plain, they remain far from complete. Wharton State Forest can, perhaps, be considered an intermediate station between the above.

The lichen flora of the coastal plain in southern New Jersey can essentially be described as one of extremes, since many species have their southernmost *or* northernmost reported occurrence in the region. Perhaps it is more important to note that the number of "northern" species (i.e. those typical of the coastal plain north of Long Island) in the flora is considerably less than the number of species more typical (or described from) the southern coastal plain (i.e. North Carolina, Florida). Only one species, *Cladonia terrae-novae* (Ahti) Ahti, does not occur farther south. In contrast is the number of species that are rare or absent farther north: *Cladonia beaumontii* (Tuck.) Vainio, *Cladonia evansii* Abbayes (see Brodo, 1968), *Cladonia ravenelii* Tuck., *Cladonia santensis* Tuck., *Physica pumilior* R.C. Harris, *Pyxine subcinerea* Stirton, and *Parmotrema subisidiosum* (Müll. Arg.) M. Choisy. Due to the paucity of data surrounding the distributions of crustose lichens in eastern North America, it is nearly impossible to discuss the edge of their ranges with any certainty.

It is also important to consider the differences between the present-day flora and that reported by Austin (1881). Though most of Austin's records come from the town of Closter or the Palisades (both northern New Jersey), it is easily seen that, even when taking into account changes in species concepts and taxonomy, the present list (as well as that of Brodo (1968)) includes many additional taxa. If one excludes the crustose species that would likely have been overlooked by early collectors (with the exception of Austin, who collected relatively few lichens in southern New Jersey), many of the southern taxa present in the flora today were not reported by Austin (1881).

It is tempting to speculate that these species have only recently been introduced to the flora. Two taxa that tend to support this hypothesis are *Physcia pumilior* and *Pyxine subcinerea*. Both of these are conspicuous foliose taxa and are not easily overlooked. *Physcia pumilior* is of particular interest because it was only recently described from the southeastern coastal plain (Harris 1990), at which time it was not known to occur north of Maryland. The species was found to be locally abundant during this study, and was recently reported from northeastern Pennsylvania on the basis of a single small collection (Harris & Lendemer, 2005). If additional records are found farther north in the future, it seems impossible to deny that the range of the species is steadily expanding. *Pyxine subcinerea* was only recently reported from southern New York, and the lack of historical records of this species from that area as well as from southern New Jersey would tend to support another scenario of range expansion.

General Comments

A total of 190 named taxa are reported here from Wharton State Forest. Many of these records arethe first for New Jersey, for the region, or the first modern report of a taxon known only from historical records. A preliminary checklist for the region based on materials held in the Herbarium of the New York Botanical Garden (NY) included 160 named taxa (R.C. Harris, unpublished). The presence of more species in a small portion of southern New Jersey than were previously known from the entire region indicates that the lichen flora of the region as a whole is likely much more species-rich than previously thought. The flora of Wharton State Forest is likely representative for the region as a whole since nearly every regional habitat is present there. (Species confined to coastal areas are one exception.) The flora of Long Island is vegetationally similar to that of this area. It is interesting, though, that that flora reported ~260 species from an area of 1401 square miles versus that of the present study which reports ~190 species from a significantly smaller area.

A classification of the species based on primary substrate (appendix II) reveals that many taxa fall into several broad ecological groups. With respect to substrate preference, the majority of corticolous species occur on hardwoods, especially *Acer* and *Quercus*. Some taxa show a preference for a specific type

of hardwood, such as *Acrocordia megalospora* for *Quercus,* while others do not. Several species are apparently confined to the bark or lignum of *Pinus,* including *Imshaugia* spp., *Hertelidea pseudobotryosa,* and *Tuckermanella fendleri*. In southern New Jersey the non-lichenized calicioid fungi *Chaenothecopsis savonica* and *Mycocalicium subtile* occur on the wood of *Pinus* and *Quercus,* respectively. Several species are also apparently confined to *Chamaecyparis thyoides,* including *Chaenotheca hygrophila* and *Chrysothrix flavovirens*. The species known only from saxicolous substrates likely represent recent additions to the flora, since the arrival significant amounts of rock (especially concrete) is a recent phenomenon. The placement of species into broader groups defined by forest type and composition essentially parallels the occurance of their substrates. Exceptions are found in trees planted by humans in unlikely places, for instance *Chamaecyparis thyoides* occuring in upland sandy areas and *Acer* planted around now abandoned habitation sites. Similarly human-introduced stands of *Juniperus virginiana* and *Malus* often host unexpected or ecologically aberrant assemblages of lichen species.

The treatment of several taxonomic groups also requires brief explanation. With respect to the array of unidentified sterile sorediate crusts, it should be noted that the majority likely represent species of *Lecanora,* which are poorly understood and have mostly been ignored, or confused/lumped into *L. impudens* Degel. One group of sorediate specimens is of particular interest, as it may represent an undescribed species of *Lecanora*; several collections were found with well developed apothecia, and the material seems chemically consistent in containing atranorin, chloroatranorin, and caperatic acid(?). In addition to the "taxa" reported here, a number of additional as yet unidentified sterile sorediate crusts that may represent *Lecanora* species also occur in southern New Jersey.

A number of additional problematic non-sorediate *Lecanora* species were also found during this study, including one or more small corticolous/lignicolous species with narrowly ellipsoid ascospores. Clearly, much further study is needed to fully understand and characterize the members of this genus that occur in the region.

Interestingly, though members of the sterile sorediate genus *Lepraria* are common throughout the forest, the genus is not particularly diverse. In fact, only four species were recorded, all of which were widely distributed. An additional species, *Lepraria vouauxii* (Hue) R.C. Harris, though not yet collected in the forest, is also expected to occur. It can also be stated with confidence that *Lepraria lobificans* Nyl. and *L. caesiella* R.C. Harris are the most common species of *Lepraria* in the forest, as they were collected at nearly every locality.

Calicioid fungi (lichenized and non-lichenized) also occur throughout the forest, and are often considered of value in assessing the age and health of a forest (Selva, 1998). Unfortunately, many species are substrate specific and easily overlooked. Though two common species (*Chaenothecopsis savonica* (Räsänen) Tibell and *Mycocalicium subtile* (Pers.) Szatala) were routinely collected during this study, the additional taxa reported from one or two collections made by others were likely overlooked by the author. Thus the lack of records for these species does not necessarily indicate that they are rare in the region. Lack of additional records of *Opegrapha* species is likely also a result of under-collection by the author.

ACKNOWLEDGEMENTS

Many individuals deserve to be acknowledged for their help in completing this project. First and foremost I wish to thank R.C. Harris for his constant (willing) help in determining problem specimens, as well as for his many discussions of these (and many other) problems. Also I am indebted to the following individuals for their help in determining/confirming collections included here, as well as providing comparative material for study: T. Ahti, I.M. Brodo, T.L. Esslinger, K. Knudsen, B. McCune, J.W. Sheard, and I.I. Tavares. Too, I thank the New Jersey Department of Forestry and staff of Wharton State Forest for allowing me to conduct the field work for this study and permission to collect vouchers. I am also grateful to the numerous individuals who aided in my field work, as well as W.R. Buck and R.C. Harris for their hospitality during my visits to NY. The staffs of the following herbaria are thanked for allowing me to examine material in person or via loans: ASU, DUKE, H, FH, NY, OSC. I am also greatful to R.C. Harris, A.E. Schuyler, and I.M. Brodo for reviewing drafts of the manuscript and I.M. Brodo (again), R. Dirig, and A.F. Rhoads for providing peer reviews.

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APPENDIX I

LOCALITY INDEX (ABBREVIATIONS AS USED IN CHECKLIST)

A - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Batsto Natural Area, along the Mullica River, S of Atsion. – Lat. 39° 44' 16"N, Long. 74° 43' 31"W. - Recently burned (ca. 1989) oak-pitch pine (*Pinus rigida*) forest.

AHF - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, from Atsion to Hampton Furnace. – Lat. 39° 45' N, Long. 74° 41' W. - Road through pine – oak forest with extensive ponds and wetlands.

AQB – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Batsto Natural Area, between Atsion and Quaker Bridge, W of Atsion. – Lat. 39° 43' N, Long. 74° 40' W. - Oak-pitch pine (*Pinus rigida*) forest.

AR – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, ca. 1 mile W of Atsion, along Atsion Road. – Lat. 39° 44' 39"N, Long. 74° 44' 25"W. – Rich upland pine (*Pinus rigida*) – oak (*Quercus* spp.) forest with *Ilex* and a sparse understory of *Kalmia* and other ericaceous shrubs.

AS – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, ca. 1 mile S of Atsion, ca. ¼ mile E of NJ Route #206. – Lat. 39° 43' 42"N, Long. 74° 43' 43"W – Pitch pine (*Pinus rigida*) forest burned 20 years ago on sandy soil, with low wet topography.

B – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, margins of Batsto Village. – Lat. 39° 38' 38"N, Long. 74° 39' 12"W. - Open pine (*Pinus rigida*) – oak (*Quercus*) forest.

As a result of the maintenance of Batsto village by the Forest Service, the forest within the immediate vicinity of the village of Batsto is nearly devoid of an understory and more open than usual due to widely spaced trees. These factors, coupled with the presence of stones as a building material, have lead to a diverse lichen community, including species growing in abundance that are rarer in other portions of the forest. Interestingly, only *sterile sorediate crust 3459* appears to be completely restricted to this locality.

BH – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Buttonwood Hill Camping Area, Crowleytown, just N of Pleasant Mills Road. - Lat. 39° 37' 43"N, Long. 74° 37' 05"W – Open sandy area surrounded by overgrown swampy forest dominated by red maple (*Acer rubrum*) and pitch pine (*Pinus rigida*) with sparse *Betula populifolia* and *Quercus*.

BNI – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, 0-1 mile N of Batsto, Batsto Natural Area, along the E shore of the Batsto River. - Lat. 39° 39' 23"N, Long. 74° 39' 01"W. - Mixed pine (*Pinus*) – oak (*Quercus*) forest.

BNII – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, N of Pleasant Mills Road and W of Batsto, E shore of the Mullica River. – Lat. 39° 38' 34"N, Long. 74° 39' 26"W. - Mixed pine (*Pinus rigida*) – oak (*Quercus*) forest grading into cedar (*Chamaecyparis*) swamps.

BNIII - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, W shore of the Batsto River, ca. 0-1 mile N of Batsto. – Lat. 39° 39' 19"N, Long. 74° 39' 22"W. - Dense pine (*Pinus rigida*) – oak (*Quercus*) forest, with many small clearings (dominated by scrub oak) and grassy openings.

Though not particularly diverse in total number of species, the area above Batsto between the Batsto and Mullica Rivers includes extensive populations of *Cladonia* species. The diversity seen directly south and west of Batsto is not paralleled here.

BSI – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, S of Batsto, just W of the shore of the Batsto River and E of the Mullica River. - Lat. 39° 38' 28"N, Long. 74° 39' 04"W. - Low, moist, mixed pine (*Pinus rigida*) – oak (*Quercus*) forest with many small depressions, grading into typical dry pine – oak barrens.

BSII – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, just S of Batsto, on a flat upland area between the Mullica River and the Batsto River. – Lat. 39° 38' 28"N, Long. 74° 39' 12"W. - Upland disturbed pine (*Pinus rigida*) – oak (*Quercus*) forest (oak dominant).

BSIII - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, just S of Batsto, E shore of the Batsto River. – Lat. 39° 38' 30"N, Long. 74° 38' 59"W. - Open oak (*Quercus*) dominated pine (*Pinus rigida*) – oak forest, on a gentle hillside grading into a swampy mixture of Atlantic white cedar (*Chamaecyparis*) – red maple (*Acer rubrum*).

CB – USA. NEW JERSEY. ATLANTIC CO.: Wharton State Forest, NNW of Batsto, Constable Bridge over Mullica River. – Lat. 39° 39' N, Long. 74° 40' W. - Pine-oak scrub and *Chamaecyparis* along river.

GBC – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Green Bank Cemetery. Green Bank. – elev. 10-20 ft. - UTM 18 535636E 4384443N – Lat. 39° 36' 32"N, Long. 74° 35' 06"W – Open cemetery and adjacent upland oak (*Quercus*) forest with a *Kalmia* understory.

HF - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, ca. 3 miles northeast of Atsion, Hampton Furnace. – Lat. 39° 45' 54"N, Long. 74° 41' 16"W. - Large clearing with sparse oaks (*Quercus*) and bordered by an unnamed stream and a pine dominated pine – oak forest.

HFI – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, E of Atsion, 0-1/4 mile N of Hampton Furnace, W shore of Batsto River. - Lat. 39° 46' 22"N, Long. 74° 40' 56"W. - Dense, upland mixed pine (*Pinus rigida*) – oak (*Quercus*) forest.

PVC – USA. NEW JERSEY. ATLANTIC CO.: Pleasant Mills Cemetery, W of Batsto, Batsto Natural Area. – Lat. 39° 38' 30"N, Long. 74° 39' 40"W

Cemeteries are well known for providing stable habitats for cryptograms that are not found elsewhere within a region, and this locality is no exception. Since there is little naturally exposed rock present in the pine barrens of southern New Jersey, abandoned settlements and cemeteries provide the only available substrate for saxicolous lichens. Pleasant Mills Cemetery is the only cemetery within Wharton State Forest that supports a significant (for the region) diversity of saxicolous taxa, several of which are typical of calcium-rich substrates. The presence of such species (including *Agonimia opuntiella* (Buschardt & Poelt) Vězda, *Caloplaca subsoluta* (Nyl.) Zahlbr., and *Phaeophyscia hirsuta* (Mereschk.) Essl.) only at this locality leads to the question of how such taxa were able to colonize an area so distant from other populations (or possible sources of substrate). The fact that many of the gravestones were clearly brought to the locality from elsewhere indicates one possible method of travel for some of the species. Since several species produce soredia or blastidia it is also possible they were wind-dispersed.

Interestingly, a sorediate species of *Trapelia* found on siliceous rocks at Batsto Village does not seem to occur at Pleasant Mills despite the fact that the localities are only a short distance apart. The siliceous rocks at Batsto were brought from elsewhere and are not the same as those found at Pleasant Mills (which are mostly calcareous).

PVCN – USA. NEW JERSEY. ATLANTIC CO.: Wharton State Forest, E of Nesco, NW of Batsto, N of Pleasant Mills Cemetery. - Lat. 39° 38' 46"N, Long. 74° 39' 52" W. - Mixed pine (*Pinus rigida*) – oak (*Quercus*) forest with sparse birch (*Betula populifolia*) and maple (*Acer*).

PVCW – USA. NEW JERSEY. ATLANTIC CO.: Wharton State Forest, E of Nesco, W of Batsto, NW of Pleasant Mills Cemetery, part of the Mullica River system. – Lat. 39° 38' 32"N, Long. 74° 39' 44"W. – Swampy mixed pine (*Pinus*) – oak (*Quercus*) forest overgrown with *Smilax*, and with large swampy depressions with maple (*Acer*) and cedar (*Chamaecyparis*).

QB - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Batsto Natural Area, E shore of Batsto River, ½ mile N of Quaker Bridge. – Lat. 39° 42' 35"N, Long. 74° 39' 59"W. - Cedar swamp.

Quaker Bridge is a well known historical locality of particular importance because it produced the type material of *Arthonia quintaria* Nyl.[2], a species that has not been found there since. The extensive cedar swamp with many clearings created by fallen trees is apparently a refuge for a number of species that are clearly rare throughout the forest. In addition to the only record of *Parmelinopsis horrescens* (Taylor) Elix & Hale, a small population of *Usnea trichodea* Acharius was found there, a species the author had previously considered extirpated.

[2] *Arthonia quintaria* Nyl. is easily recognized by the thin white thallus, irregular ascomata, 3-7 septate ascospores ca. 20 x 8µm, and lack of a photobiont. Although specimens of the species are often sterile, a recent (fertile) collection from the region is reported here:

USA. NEW JERSEY. CAPE MAY CO.: 1.6 miles southeast of Swain, ca. 0.8 miles north of Holmes Creek, Reubens Wharf, Lat. 39° 06' 17"N, Long. 74° 47' 38"W, coastal swamp of maple (*Acer*), *Liquidambar*, black oak (*Quercus*) and abundant holly (*Ilex opaca*), on branches of *Ilex opaca, J.C. Lendemer et al. 4405* (NY!, PH-hbL!, UCR!).

QBW - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Batsto Natural Area, NW of Quaker Bridge. - Lat. 39° 42' N, Long. 74° 40' W. - Oak-pitch pine (*Pinus rigida*) barrens, pitch pine dominant.

SB – USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, ca. 2.5 miles NE of Hampton Furnace, N of Carranza Memorial, W shore of the Skit Branch of the Batsto River. - Lat. 39° 47' 10"N, Long. 74° 39' 34"W. - Oak (*Quercus*) dominated, moist, pine (*Pinus rigida*) – oak forest, with many small sunny openings and sparse ericaceous understory.

The Skit Branch of the Batsto River is considered by many to be the most pristine of the tributaries to the Batsto River, since its headwaters and entire course are within the boundaries of the forest (A.E. Schuyler, pers. comm.). The lichen diversity found at this locality mirrored that of some of the areas south of Batsto, and further study would likely reveal a number of additional species.

SL – USA. NEW JERSEY. ATLANTIC CO.: Wharton State Forest, Batsto Natural Area, Sleeper Branch of Mullica River. - Lat. 39° 39' N, Long. 74° 40' W. - *Pinus rigida* barrens and *Chamaecyparis* swamp.

SWBAT - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Sweetwater, SE of Batsto, along the N bank of the Mullica River. - Lat. 39° 37' N, Long. 74° 38' W. - Mixed pine-oak forest with stand of *Juniperus.*

The forest at this locality is highly disturbed and portions of it have clearly been cleared for use in the past. The only record of *Rinodina subminuta* from the forest comes form locality.

W - USA. NEW JERSEY. BURLINGTON CO.: Wharton State Forest, Washington. - Lat. 39° 41' 02"N, Long. 74° 34' 34"W. – Oak (*Quercus*) dominated pine (*Pinus*) / oak (*Quercus*) forest.

Though little remains of the abandoned town of Washington, the forest in this area is of particular interest because it is drier (more upland) and consists nearly entirely of oaks, unlike the surrounding area, which is almost exclusively pitch pine. The crustose lichen flora at this locality differs from other oak forests in the forest in being dominated by species that are less common elsewhere, especially *Lecanora hybocarpa, L. subpallens, Pyrenula pseudobufonia,* and *Rinodina maculans.*

APPENDIX II

PRIMARY SUBSTRATES FOR TAXA

	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer* & *Quercus*	Small shrubs
Abrothallus cladoniae	x								
Acrocordia megalospora								x	
Acarospora glaucocarpa			x						
Agonimia sp.		x							
Agonimia opuntiella		x							
Amandinea polyspora								x	

Appendix II continued	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer & Quercus*	Small shrubs
Anisomeridium polypori								x	
Anzia colpodes								x	
Arthonia sp.								x	
Bacidia coprodes			x						
Bacidia schweinitzii								x	
Bacidina sp.								x	
Bacidina egenula			x						
Biatora longispora								x	
Buellia curtisii								x	
Buellia stillingiana								x	
Caloplaca citrina			x						
Caloplaca feracissima			x						
Caloplaca flavovirescens			x						
Caloplaca subsoluta			x						
Candelaria concolor								x	
Candelariella efflorescens								x	
Candelariella reflexa								x	
Catinaria atropurpurea								x	
Chaenotheca hygrophila					x				
Chaenothecopsis savonica						x			
Chrysothrix flavovirens					x				
Cladonia arbuscula				x					
Cladonia atlantica				x					
Cladonia beaumontii		x							
Cladonia brevis				x					
Cladonia caespiticia		x							
Cladonia coniocraea		x							
Cladonia conista								x	
Cladonia cristatella				x					
Cladonia cryptochlorophaea		x							
Cladonia cylindrica		x							
Cladonia didyma		x				x			
Cladonia dimorphoclada				x					
Cladonia diversa		x							
Cladonia florekeana						x			
Cladonia floridana				x					
Cladonia grayi		x							
Cladonia incrassata		x				x			
Cladonia macilenta		x				x			
Cladonia ochrochlora		x				x		x	
Cladonia parasitica		x				x			
Cladonia peziziformis		x							
Cladonia ramulosa		x							

Appendix II continued	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer* & *Quercus*	Small shrubs
Cladonia rappii		x							
Cladonia ravenelii		x							
Cladonia rei		x						x	
Cladonia santensis		x							
Cladonia sobolescens		x							
Cladonia strepsilis		x							
Cladonia submitis		x							
Cladonia subtenuis		x							
Cladonia uncialis		x							
Clypeococcum hypocenomycis	x								
Coeogonium pineti					x				
Collema subflaccidum								x	
Diploschistes muscorum	x								
Endocarpon spp.			x						
Flavoparmelia caperata								x	
Fuscidea arboricola							x		
Gyalideopsis sp.		x							
Hertelidea pseudobotryosa		x							
Heterodermia granulifera								x	
Heterodermia hypoleuca								x	
Heterodermia obscurata								x	
Heterodermia speciosa								x	
Hypocenomyce anthracophila					x				
Hypocenomyce friesii		x			x				
Hypocenomyce scalaris						x			
Hypogymnia physodes								x	x
Hypotrachyna livida								x	
Hypotrachyna osseoalba								x	
Hypotrachyna showmanii								x	
Imshaugia aleurites						x			
Imshaugia placorodia						x			
Julella fallaciosa								x	
Lecanora sp. 1	x								
Lecanora sp. 2						x			
Lecanora sp. 3		x						x	x
Lecanora cupressii								x	
Lecanora dispersa			x						
Lecanora hybocarpa								x	
Lecanora minutella						x			
Lecanora strobilina								x	

Appendix II continued	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer* & *Quercus*	Small shrubs
Lecanora thysanophora								x	
Lecidea nylanderi						x			
Lecidea plebeja		x							
Lepraria caesiella						x		x	
Lepraria elobata								x	
Lepraria incana								x	
Lepraria lobificans		x	x					x	
Leptogium cyanescens								x	
Lobaria quercizans								x	
Loxospora pustulata								x	x
Melanixia subaurifera								x	
Micarea erratica			x						
Micarea globulosella								x	
Micarea melaena						x			
Micarea peliocarpa		x							
Micarea prasina		x			x				
Mycoblastus fucatus ?						x			x
Mycocalicium subtile		x						x	
Myelochroa aurulenta								x	
Nadvornikia sorediata								x	
Ochrolechia arborea								x	
Ochrolechia pseudopallescens						x			
Opegrapha vulgata								x	
Parmelia squarrosa								x	
Parmelia sulcata								x	
Parmelinopsis horrescens								x	
Parmelinopsis minarum								x	
Parmeliopsis subambigua						x			
Parmotrema hypoleucinum					x				
Parmotrema hypotropum					x			x	x
Parmotrema perforatum								x	
Parmotrema reticulatum						x		x	
Parmotrema subisidiosum								x	
Peltigera didactyla				x					
Pertusaria amara								x	
Pertusaria macounii								x	
Pertusaria ophthalmiza								x	
Pertusaria paratuberculifera								x	
Pertusaria pustulata								x	x
Pertusaria trachythallina								x	

Appendix II continued	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer* & *Quercus*	Small shrubs
Phaeocalicium polyporaeum		x							
Phaeographis inusta								x	x
Phaeophyscia adiastola		x							
Phaeophyscia hirsuta		x							
Phaeophyscia rubropulchra								x	
Physcia adscendens			x		x				
Physcia americana			x					x	
Physcia millegrana			x					x	
Physcia pumilior								x	x
Physciella chloantha			x						
Physconia leucoleiptes			x		x			x	
Placidium arboreum								x	
Placynthiella dasaea		x				x			
Placynthiella icmalea		x							
Placynthiella oligotropha		x		x					
Placynthiella uliginosa				x					
Placynthium nigrum			x						
Pseudosagedia raphidospermum								x	
Psoroglaena dictyospora		x							
Punctelia rudecta						x		x	x
Punctelia subrudecta						x		x	x
Pycnothelia papillaria				x					
Pyrenula psuedobufonia								x	
Pyrrhospora varians						x		x	x
Pyxine sorediata								x	
Pyxine subcinerea								x	
Rhizocarpon reductum			x						
Rinodina maculans								x	x
Rinodina subminuta								x	
Ropalospora chlorantha								x	
Sarcogyne regularis			x						
Sarea resinae						x			
Schismatomma glaucescens								x	
Schismatomma pericleum								x	
Scoliciosporum chlorococcum								x	x
Segestria leptalea					x				
Stereocaulon glaucescens			x						
Trapelia sp.			x						
Trapelia glebulosa			x						
Trapelia placodioides			x						

Appendix II continued	Lichenicolous	Ligni-/muscicolous	Saxicolous	Terricolous	*Chamaecyparis*	*Pinus*	*Betula*	*Acer* & *Quercus*	Small shrubs
Trapeliopsis flexuosa		x				x			
Tuckermanella fendleri						x			
Tuckermanopsis americana						x		x	
Tuckermanopsis ciliaris						x		x	
Usnea mutabilis								x	
Usnea pensylvanica								x	
Usnea strigosa								x	
Usnea trichodea					x				
Verrucaria sp.			x						
Verrucaria muralis			x						
Vezdaea leprosa		x							
Vulpicida viridis					x				
Xanthoparmelia conspersa			x						
Lichenicole sp. 1	x								