

A Preliminary Catalog of New Jersey Hornworts and Liverworts

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ABSTRACT: Based on a survey of herbarium collections, three species of hornworts (Anthocerotophyta) and ninety-three species of liverworts (Marchantiophyta) are known to have grown in New Jersey. More than half of these records are based on collections more than 50 years old. Eighteen species of liverworts are potentially rare.

INTRODUCTION

Liverworts (Marchantiophyta) and hornworts (Anthocerotophyta) have been largely ignored in studies of the plant diversity of New Jersey. Though they are widespread and sometimes abundant, they are usually overlooked by collectors. Most specimens in herbaria were collected before 1950 and many genera have not been sampled for more than 100 years. The only lists for the state are also more than 100 years old (Parker 1881, Rau 1889), and Formann (1998) mentions only a few species occurring in the pine barrens. We have almost no understanding of the current status and distribution of these plants in the state.

To gain a better understanding of liverworts and hornworts in New Jersey, there is a need for new collections of these plants throughout the state. Both liverworts and hornworts, like mosses, can be conveniently collected into envelopes or packets (Hicks 1992). They should be sought in wet to moist habitats, especially along stream corridors and on fallen, rotting branches and trunks that have lost their bark. They are frequent in all kinds of swamps and wetlands, and many interesting species can be found growing in wet portions of fallow fields (Crum 1991).

Identifications are not difficult with fresh material and proper magnification. Most of the common species can be reliably identified even in sterile condition using Hicks (1992), Conard & Redfearn (1979), Crum (1991), and Lincoln (2008). For detailed information and keys to all of our species, Schuster (1966–1992) is unsurpassed. Within the next few years, a definitive treatment of the liverworts and hornworts will appear as part of the Flora North America series (Zander & Eckel 2007).

METHODS

The following checklist was compiled from specimens at the Academy of Natural Sciences, Philadelphia (PH), Brooklyn Botanic Garden (BKL), and the Chrysler Herbarium at Rutgers University (CHRB). In addition, database records of the specimens at the Lewis Anderson Herbarium of Duke University (DUKE), the University of Michigan Herbarium

(MICH), the Missouri Botanical Garden (MO) and the New York Botanical Garden (NY) were checked, as were the lists of representative specimens in Schuster (1966-1992).

RESULTS

Based on a survey of herbarium records, three species of hornworts in three genera and 93 species of liverworts in fifty genera are known from New Jersey (Appendix 1). For all of the hornwort species and 55 liverwort species (about 60%), the most recent collections were made before 1950.

DISCUSSION

With so few recent collections of hornworts and liverworts available, it is difficult to determine which species are truly rare in New Jersey. Vascular plant rarities tend to be either plants that occupy very specific or uncommon habitats, or plants whose range has been severely limited by habitat change, or plants near their climatic or distributional limits (Breden, et al. 2006, Snyder 2006). If we apply these criteria, a few liverwort species stand out as potentially rare species for the state (Table 1).

Table 1. Species that appear to be rare

Aneura pinguis
Cephaloziella elachista
Cephaloziella rubella
Chiloscyphus minor
Chiloscyphus pallescens
Fossombronia brasiliensis
Fossombronia foveolata
Frullania inflata
Herbertus aduncus
Jubula pennsylvanica
Lepidozia reptans
Mannia fragrans
Marsupella emarginata
Mylia anomala
Pellia epiphylla
Preissia quadrata
Scapania glaucocephala
Tritomaria exsecta

Four species appear to be limited to cool sphagnum bogs similar to those found in extreme northern and northwestern New Jersey (Breden, et al. 2001). *Cephaloziella elachista* (J. B. Jack) Schiffn., *C. rubella* (Nees) Warnst., *Mylia anomala* (Hook.) Gray, and *Scapania glaucocephala* (Taylor) Austin were collected from cool bogs in Sussex, Passaic, and Bergen counties. All but *C. rubella* are limited to this habitat throughout their range, which tends to be northern, with an extension south along the Appalachians to Virginia. The historical records from Bergen County seem odd today, when no suitable sites are known, but other historical collections in the county, notably the historical occurrence of *Cornus canadensis* L., provide further evidence for the occurrence of cool bogs in Bergen County in the past.

Other species share the Appalachian distribution of these species, and they appear to be rare even though they are not limited to bogs, because they are at the eastern edge of their range. *Chiloscyphus pallescens* (Ehrh.) Dumort., *Frullania riparia* Hampe, *Herbertus aduncus* (Dicks.) Gray, *Lepidozia reptans* (L.) Dumort., *Mannia fragrans* (Balbis) Freye & Clark, *Preissia quadrata* (Scop.) Nees, and *Tritomaria exsecta* (Schmidel) Schiffner all occur in the Appalachian mountains and are found at the edge of their range in northwest New Jersey.

Limestone endemics and calciphiles are usually rare in New Jersey because there is so little undisturbed habitat (Breden, et al. 2006). *Aneura pinguis* (L.) Dumort. and *Preissia quadrata* have been collected twice in New Jersey, and are known to be limited in the northeastern United States to wet, basic substrates, like wet limestone, which are uncommon in New Jersey (Schuster 1992).

Two of the species of *Fossombronia* with historical records in the state, *F. brasiliensis* Steph. and *F. foveolata* Lindb., prefer clay soils. The known collections were made on the inner coastal plain, which is known for its clay deposits (Breden, et al. 2001). This area has been subject to extreme population pressures and it is likely that habitat destruction has severely limited their distribution.

CONCLUSION

Further study and collecting will greatly expand our understanding of New Jersey's liverworts and hornworts. It is very likely that there are more species in the state than are included in this list. For example, six species that have been collected on the Pennsylvania side of the Delaware Water Gap have not been found on the New Jersey side: *Barbilophozia barbata* (Schreb.) Loeske, *Frullania brittoniae* Evans, *Metzgeria crassipilis* (Lindb.) A. Evans, *M. furcata* (L.) Corda, *Pellia endiviifolia* (Dicks.) Dumort., and *Tritomaria exsectiformis* (Briedl.) Schiffner. Nevertheless, suitable habitat exists on the New Jersey side, so the proximity of good populations strongly suggests that they will be found there.

Some species that are widespread in other states are known from only one or a few counties in New Jersey, so it is likely that further collecting will show that these species are more widespread. For example, *Cephalozia catenulata* (Huebn.) Lindb. appears to be limited to white cedar swamps on the coastal plain in New Jersey, based on the records we have now. However, Hicks (1992) points out that it also grows in inland cedar swamps and, therefore, should be searched for in northwestern New Jersey. Also, our only record of *Cololejeunea biddlecomiae* is from shaded ravines in Bergen county. South of New Jersey, this species grows on the coastal plain (Hicks 1992).

Finally, we cannot be sure that many of the species listed here still occur in the state, because many have not been seen in more than 50 years. We have no idea how the rapid development in the state has affected the populations of these organisms, but it is likely that many are now rare or endangered (Breden, et al 2006).

Only additional collecting and study can begin to answer the many questions still outstanding on the distribution and health of the hornwort and liverwort populations in the state. I hope that this list will make that work a little easier.

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APPENDIX I

CHECKLIST OF THE HORNWORTS AND LIVERWORTS OF NEW JERSEY

Nomenclature generally follows Stotler & Crandall-Stotler (1977) unless a more recent treatment is available. If there has been any confusion, or a recent nomenclatural change, synonyms are cited. Accepted names are in boldface.

When there is no field number for a collection, the collection date is cited. If the specimens are part of a numbered distribution of exsiccatae, the exsiccata number is cited. The two distributions cited are C. F. Austin's *Hepaticae Boreali-Americanae* [Hep. Bor.-Amer.] and Caroline C. Haynes' *American Hepaticae* [Amer. Hep.].

Because of the paucity of specimens for some species, habitat notes are drawn from the literature as well as from specimens labels.

Hornworts (Anthocerotophyta)*Anthoceros* (Anthocerotaceae)***Anthoceros agrestis* Paton**

capsules: fall and early winter

on dripping basalt cliffs, also reported from harvested cornfields (Schuster 1992b)

Bergen: *Wiegmann 1212* (BKL, NY)

Monmouth: *N. Britton s.n.*, 2 Oct 1886 (CHRB)

Anthoceros laevis L. (see *Phaeoceros laevis*)

Anthoceros punctatus L. (ours are *Anthoceros agrestis*)

Aspiromitus (Anthocerotaceae)

Aspiromitus punctatus ssp. *agrestis* (Paton) R. M. Schust. (see *Anthoceros agrestis*)

Notothylas (Notothyladaceae)***Notothylas orbicularis* (Schwein.) Sull.**

capsules: Aug-Nov

on wet soil at the edges of corn fields, in ruts and trails

Bergen: *C. F. Austin s.n.*, Oct 1863 (MO, NY)

Hunterdon: *E. Britton s.n.*, 28 Sep 1886 (CHRB)

Sussex: *Nearing s.n.*, 27 Sep 1947 (NY)

Phaeoceros (Anthocerotaceae)***Phaeoceros laevis* (L.) Prosk.**

capsules: fall and early winter

on wet soil in harvested cornfields

Monmouth: *Haynes 1638* [Amer. Hep. 20] (BKL, NY)

Morris: *N. Britton s.n.*, 21 Sep 1886 (CHRB)

Sussex: *N. Britton s.n.*, 20 Sep 1887 (CHRB)

Schuster (1992b) reports an Austin specimen from Bergen County.

Liverworts (Marchantiophyta)*Aneura* (Aneuraceae)***Aneura pinguis* (L.) Dumort.**

capsules: Mar-May

wet limestone or traprock ledges and on mossy soil (Schuster 1992)

Bergen: *Austin s.n.* [112 Hep. Bor.-Amer.] (BKL, NY)

Morris: *R. Torrey s.n.*, 8 Jan 1922 (NY)

Asterella (Ayttoniaceae)

Asterella tenella (L.) P. Beauv.

capsules: Mar-Jun

on soil-covered ledges on trap rock or limestone, usually dripping wet

Bergen: *M. A. Howe 16* (NY)

Essex: *Underwood s.n.*, 9 May 1897 (NY)

Hudson: *J. Torrey s.n.*, *s.d.* (NY)

Somerset: *Wiegmann 5002* (NY)

Schuster (1992b) reports a specimen from Passaic County.

Bazzania (Lepidoziaceae)

Bazzania trilobata (L.) Gray

on wet soil, rocks, decaying logs, or tree bases in moist forests, swamps

Bergen: *C. F. Austin s.n.* [79 Hep. Bor.-Amer.] (BKL, NY)

Burlington: *H. Webster s.n.*, 27 Feb 1968 (CHRB)

Cumberland: *Long 1376* (PH)

Gloucester: *Long 1395* (PH)

Hunterdon: *Cantlon & Moul 1001* (CHRB)

Monmouth: *Cantlon & M. Buell s.n.*, 13 Apr 1949 (CHRB)

Ocean: *Long 2232* (PH)

Passaic: *Barringer 20493* (BKL)

Salem: *Long 995* (PH)

Sussex: *Barringer 20623* (BKL)

Blasia (Blasiaceae)

Blasia pusilla L.

capsules: spring

wet, disturbed roadbanks, ditches, rarely on rocks in streambeds

Bergen: *Wiegmann s.n.*, 12 Oct 1916 (NY)

Essex: *Haynes s.n.*, 10 May 1902 (NY)

Monmouth: *M. A. Howe s.n.*, 15 Jun 1918 (NY)

Morris: *Britton s.n.*, 21 Sep 1886 (CHRB)

Sussex: *Lawton 544* (NY)

Warren: *Henley s.n.*, 1940 (NY)

Blepharostoma (Pseudolepicoleaceae)

Blepharostoma trichophyllum (L.) Dumort.

usually mixed with bryophytes or on moist, shaded rocks in mountains (Hicks 1992)

Atlantic: *M. Robertson 7206* (PH)

Burlington: *Thiers 1254* (NY)

Cumberland: *Thiers 1255* (NY)

Gloucester: *Rau s.n.*, Jul 1882 (NY)

Ocean: *Matzke s.n.*, Oct 1933 (NY)

Union: *Barringer 20532* (BKL)

Calypogeia (Calypogeiaceae)

Calypogeia fissa (L.) Raddi

on various moist substrates in shaded woods, esp. near streams

Bergen: *Beals s.n.*, 28 Nov 1946 (NY)

Monmouth: *Haynes s.n.*, 28 May 1908 (NY, PH)

Passaic: *Barringer 20503* (BKL)

Somerset: *Stevenson s.n.*, 27 Mar 1962 (CHRB)

Sussex: *Barringer 20630* (BKL)

Union: *Barringer 20528* (BKL)

***Calypogeia muelleriana* (Schiffner) Mull. Frib.**

on soil of moist streambanks

Hudson: *Austin s.n.*, 1862 (NY)

Monmouth: *Barringer & D. Barringer 21594* (BKL)

Passaic: *Barringer 22356* (BKL)

Sussex: *Barringer 21003* (BKL)

Union: *Barringer 21485* (BKL)

Warren: *Barringer 22091* (BKL)

***Calypogeia sphagnicola* (Arnell & J. Perss.) Warnst. & Loeske**

peat bogs and *Sphagnum* stands

Burlington: *Thiers 1249* (NY)

Camden: *Barringer 20826* (BKL)

Cape May: *Wonderly 818* (NY)

Gloucester: *Rau s.n.*, Jun 1882 (NY)

Middlesex: *Moul 6995* (CHRB)

Monmouth: *Haynes 1123* (BKL, MO, NY)

***Calypogeia sullivantii* Austin**

on soil or acid rocks in shade

Bergen: *Austin* [74b Hep. Bor.-Amer.] (BKL, NY)

Burlington: *Evans s.n.*, 12 Aug 1892 (NY)

Somerset: *Stevenson s.n.*, 19 Mar 1962 (CHRB)

Calypogeia trichomanis (L.) Corda (ours are *C. muelleriana* or *C. fissa*)

Cephalozia* (Cephaloziaceae)**Cephalozia bicuspidata* (L.) Dumort.**

on shaded, wet, usually peaty soils along stream and trails, rarely on acidic rocks (Schuster 1974)

Bergen: *Wurdack & Cowan 7* (NY)

Gloucester: *Barringer 21205* (BKL)

Hunterdon: *Barringer 20752* (BKL)

Monmouth: *Barringer & D. Barringer 21592* (BKL)

Ocean: *Gilly s.n.*, 25 Oct 1941 (NY)

Sussex: *Barringer 20627* (BKL)

***Cephalozia catenulata* (Huebner) Lindb.**

on decaying logs, *Chamaecyparis* swamps

Bergen: *Howe s.n.*, 22 Sep 1898 (NY)

Burlington: *Evans s.n.*, 12 Aug 1892 (NY)

Monmouth: *Howe s.n.*, 15 Jun 1918 (NY)

Ocean: *Torrey Botanical Club s.n.*, 29 May 1896 (NY)

***Cephalozia connivens* (Dicks.) Lindb.**

on soil in swamps and bogs with *Sphagnum*

Atlantic: *Long 1984* (PH)

Burlington: *Barringer 20696* (BKL)

Camden: *Barringer 20846* (BKL)

Gloucester: *Rau s.n.*, Jun 1882 (NY)

Mercer: *Long 1885* (PH)

Monmouth: *Barringer & D. Barringer 21599* (BKL)

Ocean: *Barringer 20921* (BKL)

Cephalozia fluitans (Nees) Spruce (see *Cladopodiella fluitans*)

***Cephalozia lunulifolia* (Dumort.) Dumort.**

on peaty soils, rotting wood and in bogs and swamps with *Sphagnum*

Bergen: *Barringer 22301* (BKL)

Burlington: *Underwood s.n., s.d.* (NY)

Camden: *Barringer 20881* (BKL)

Gloucester: *Barringer 21230* (BKL)

Ocean: *Matzke s.n., s.d.* (NY)

Sussex: *Barringer 21906* (BKL)

Cephaloziella (Cephaloziellaceae)

Cephaloziella divaricata (Sm.) Warnst.

on soil in woods

Bergen: *Howe s.n., s.d.* (NY)

Burlington: *Evans s.n., s.d.* (NY)

Ocean: *Matzke s.n.*, 1 Nov 1947 (NY)

Cephaloziella elachista (J. B. Jack) Schiffner

in *Sphagnum* bogs often with *Mylia*

Bergen: *Austin* [54 Hep. Bor.-Amer.] (BKL, NY)

Cephaloziella rubella (Nees) Warnst.

on peaty soil, wet roadbanks, and sometimes on rotting wood

Sussex: *Barringer 20595* (BKL)

Warren: *Barringer 20985* (BKL)

Chiloscyphus (Geocalycaceae)

Chiloscyphus cuspidatus (Nees) J. Engel & R. M. Schust.

on tree bases along streams in uplands

Warren: *Barringer 21218* (BKL)

Chiloscyphus minor (Nees) J. J. Engel & R. M. Schust.

on soil and tree bases in coastal plain swamps

Burlington: *Barringer 20700* (BKL)

Monmouth: *Barringer & D. Barringer 21590* (BKL)

Passaic: *C. Gilly s.n.*, 18 Oct 1941 (NY)

Chiloscyphus pallescens (Ehrh.) Dumort.

on moist soil and decorticated logs in swamps

Passaic: *Barkley s.n.*, 10 Oct 1958 (NY)

Chiloscyphus polyanthos (L.) Corda

Bergen: *Matzke s.n.*, 10 Apr 1947 (NY)

Burlington: *T. P. James s.n.*, Jul 1851 (NY)

Chiloscyphus profundus (Nees) J. J. Engel & R. M. Schust.

on soil and tree bases, occasionally on rotting wood

Atlantic: *Long 2036* (PH)

Bergen: *Wiegmann 5008* (NY)

Burlington: *Burlington 20682* (BKL)

Camden: *Burlington 20851* (BKL)

Cumberland: *M. Robertson 3145* (PH)

Essex: *Haynes s.n.*, 10 May 1902 (NY)

Gloucester: *Long 1926* (PH)

Hunterdon: *Barringer 20797* (BKL)

Mercer: *Conard 0-1521* (NY)

Middlesex: *E. Britton s.n.*, 19 Apr 1884 (CHRB, NY)

Monmouth: *Barringer & D. Barringer 21591* (BKL)

Morris: *Barringer 20115* (BKL)

Ocean: *E. Britton s.n.*, 28 May 1887 (CHRB)

Passaic: *Barringer 20603* (BKL)

Salem: *Long 2117* (PH)

Sussex: *Barringer 20586* (BKL)

Union: *Barringer 20096* (BKL)

Warren: *Barringer 21231* (BKL)

Chiloscyphus rivularis (Schrad.) Hazsl. (ours are *C. polyanthos*)

Cladopodiella (Cephaloziaceae)

***Cladopodiella fluitans* (Nees) Jörg.**

peat bogs, in sun (Schuster 1974)

Bergen: *Austin* [35 Hep. Bor.-Amer.] (BKL)

Burlington: *Leonard 6395* (NY)

Ocean: *Allen 16892* (MO)

Cololejeunea (Lejueneaceae)

***Cololejeunea biddlecomiae* (Austin) A. Evans**

on tree bark, rarely on rocks in shaded ravines

Bergen: *Howe s.n.*, 5 Nov 1898 (NY)

Sussex: *Barringer 22359* (BKL)

Conocephalum (Conocephalaceae)

Conocephalum conicum (L.) Underw. (not in NJ, see *C. salebrosum*)

***Conocephalum salebrosum* Szweyk., Buczkowska and Ordzyoski**

on soil or rocks along streams and in swamps

Bergen: *Wiegmann 5005* (NY)

Essex: *Haynes s.n.*, 10 May 1902 (NY)

Hunterdon: *Barringer 20743* (BKL)

Mercer: *Long 1886* (PH)

Monmouth: *Haynes 12* (NY)

Morris: *Barringer 18238* (BKL)

Ocean: *Barringer 22149* (BKL)

Passaic: *Barkley 36* (NY)

Sussex: *Barringer 18056* (BKL)

Warren: *Barringer 21226* (BKL)

Diplophyllum (Scapaniaceae)

***Diplophyllum apiculatum* (A. Evans) Stephani**

on peaty soil on roadbanks, thin soil over rocks, steep roadcuts

Bergen: *Howe s.n.*, 6 Oct 1898 (NY)

Monmouth: *Barringer & D. Barringer 21606* (BKL)

Passaic: *Barringer 21445* (BKL)

Warren: *Barringer & D. Barringer 21845* (BKL)

***Diplophyllum obtusifolium* (Hook.) Dumort.**

Bergen: *Austin* [20 Hep. Bor.-Amer.] (NY)

Fossombronia (Fossombroniaceae)

***Fossombronia brasiliensis* Stephani**

moist, exposed clay of ditches and old fields (Schuster 1992)

no county designated: *Austin s.n. s.d.* (NY)

Fossombronia cristula Austin (see *F. foveolata*)

***Fossombronia foveolata* Lindb.**

on exposed clay and moist sand (Schuster 1992)

Burlington: *Austin* [121 Hep. Bor.-Amer.] (BKL, NY)

Monmouth: *Haynes s.n. s.d.* (BKL)

Frullania (Jubulaceae)

***Frullania asagrayana* Mont.**

on bark and rock (Schuster 1992)

Atlantic: *H. A. Green s.n.*, 1882 (NY)

Bergen: *Austin s.n.*, 1861 (NY)

Gloucester: *Rau s.n.*, 1882 (NY)

***Frullania eboracensis* Gottsche**

on tree bark, especially maples, birches, poplars

Bergen: *Austin s.n.*, 17 Jun 1865 (BKL, NY)

Burlington: *Barringer 20900a* (BKL)

Cape May: *Long 2012* (PH)

Cumberland: *Long 854* (PH)

Essex: *Haynes 510* (NY)

Gloucester: *Long 918* (PH)

Mercer: *M. Barbun s.n.*, Jul 1900 (PH)

Middlesex: *Barringer 21764* (BKL)

Monmouth: *Barringer & D. Barringer 21606* (BKL)

Morris: *Barringer & Zielinski 21667* (BKL)

Ocean: *Copeland 660* (NY)

Passaic: *Barringer 21468* (BKL)

Salem: *Long 927a* (PH)

Sussex: *Barringer 20327b* (BKL)

Warren: *Barringer 20986* (BKL)

***Frullania ericoides* (Nees) Mont.**

on rocks and tree bark

Bergen: *Austin s.n.*, Sep 1867 (NY)

Burlington: *M. Haines s.n., s.d.* (NY)

***Frullania inflata* Gottsche**

on dry rock walls, often traprock (Schuster 1992)

Bergen: *Austin* [104 Hep. Bor.-Amer.] (BKL, NY, PH)

***Frullania plana* Sull.**

calciphile, on dry, exposed rocks (Schuster 1992)

Bergen: *Austin* [102 Hep. Bor.-Amer.] (BKL, NY, PH)

***Frullania riparia* Hampe**

On vertical faces of shaded rock (Schuster 1992)

Bergen: *Matzke s.n., s.d.* (NY)

Schuster (1992) reports this species from Ogdensburg in Sussex County.

Frullania tamarisci (L.) Dumort. (see *F. asagrayana*)

Frullania virginica Gottsche (see *F. eboracensis*)

***Geocalyx* (Geocalycaceae)**

***Geocalyx graveolens* (Schrad.) Nees**

on rotting wood or humus in conifer woods, usually mixed with bryophytes

Ocean: *Matzke s.n.*, 1 Nov 1947 (NY)

***Gymnocolea* (Jungermanniaceae)**

***Gymnocolea inflata* (Huds.) Dumort.**

on soil in *Sphagnum* bogs, swamps, occasionally on wet rock faces

Bergen: *Austin* [34 Hep. Bor.-Amer.] (NY, PH)

Burlington: *Thiers 1253* (NY)

Ocean: *E. Britton s.n.*, 30 Jun 1900 (NY)

Passaic: *Nearing s.n.*, 15 Dec 1946 (NY)

***Herbertus* (Herbertaceae)**

***Herbertus aduncus* (Dicks.) Gray**

on rocks and trees in conifer woods, in gorges on rock underledges

Passaic: *Underwood 52a* (NY)

***Jamesoniella* (Jungermanniaceae)**

***Jamesoniella autumnalis* (DC.) Stephani**

coastal plain swamps or black spruce swamps, on soil or rotting logs (Hicks 1992)

Bergen: *Howe s.n.*, 22 Sep 1898 (NY)

Cumberland: *Long 853* (PH)

Sussex: *Buser 12033* (NY)

Jubula (Jubulaceae)

***Jubula pennsylvanica* (Stephani) A. Evans**

on wet rocks along streams in shaded ravines (Hicks 1992, Schuster 1992)

Bergen *Matzke s.n.*, Oct 1931 (NY)

Schuster (1992) reports a specimen from Gloucester County.

Jungermannia (Jungermanniaceae)

Jungermannia biformis Austin (see *J. hyalina*)

***Jungermannia crenuliformis* Austin**

on acid rocks along shaded streams

Bergen: *Austin* [31 Hep. Bor.-Amer.] (BKL, NY)

Burlington: *Moul 7982* (CHRB)

Hunterdon: *Cantlon 1024* (CHRB)

Middlesex: *Moul 11052* (CHRB)

Monmouth: *Haynes 6626* (MO)

Ocean: *E. Moul 2667* (CHRB, NY)

Jungermannia divaricata Sm. (see *Cephaloziella divaricata*)

***Jungermannia fossombronioides* Austin**

thin soil over acid rocks, especially along streams (Hicks 1992)

Bergen: *Austin* [32 Hep. Bor.-Amer.] (BKL, NY)

***Jungermannia gracillima* Sm.**

on moist soils and acid rocks in woods

Bergen: *Barkley s.n.*, 3 Oct 1958 (NY)

Burlington: *Barringer 20693* (BKL)

Monmouth: *Haynes 809* (NY)

***Jungermannia hyalina* Lyell**

on soil over rocks in deciduous woods

Bergen: *Austin* [28 Hep. Bor.-Amer.] (BKL, NY)

Warren: *Barringer 15988* (BKL)

Jungermannia lanceolata L. (see *J. leiantha*)

***Jungermannia leiantha* Grolle**

on wet soil, usually near streams and falls, on wet rocks in ravines

Hunterdon: *Barringer 20743b* (BKL)

Sussex: *Nearing s.n.*, 27 Sep 1947 (NY)

Union: *Stephenson s.n.*, Mar 1962 (CHRB)

Jungermannia laxa Lindb. (see *Lophozia laxa*)

Jungermannia novae-caesariae A. Evans (see *Lophozia capitata*)

***Jungermannia pumila* With.**

on damp, shaded, acidic rocks along streams (Hicks 1992)

Bergen: *Austin* [33 Hep. Bor.-Amer.] (NY)

Kurzia (Lepidoziaceae)

***Kurzia sylvatica* (A. Evans) Grolle**

on peaty soil beside streams, sometimes mixed with bryophytes on logs

Bergen: *Cowan & Wurdack 22* (NY)

Burlington: *Barringer 20707* (BKL)

Camden: *Krout s.n.*, Aug 1914 (BKL, CHRB, PH)

Gloucester: *Rau s.n.*, 13 Jul 1882 (NY)

Mercer: *Long 1886* (PH)

Middlesex: *Wiegmann 5001* (NY)
 Monmouth: *Haynes s.n.*, 15 May 1910 (BKL, NY)
 Ocean: *Cowan & Wurdack 135* (NY)
 Sussex: *Barringer 21917* (BKL)
 Union: *Rudolph & Rissanen s.n.*, 19 Jun 1949 (NY)

Lejeunea (Lejeuneaceae)

Lejeunea cavifolia (Ehrh.) Lindb.

on bark

Passaic: *Barkley 215* (NY)
 Union: *Rissanen & Rudolph s.n.*, 19 Jun 1949 (NY)

Lepidozia (Lepidoziaceae)

Lepidozia reptans (L.) Dumort.

on soil, tree bases, rotting wood (Hicks 1992)
 without county designation: *Austin* [75 Hep. Bor.-Amer.] (BKL, NY)

Leucolejeunea (Lejeuneaceae)

Leucolejeunea chypeata (Schwein.) A. Evans

on trees, but in uplands can grow on rocks
 Cumberland: *Theirs 1257* (NY)
 Gloucester: *Barringer 21201* (BKL)
 Warren: *Rau s.n., s.d.* (NY)

Lophocolea (Geocalyceaceae)

Lophocolea bidentata (L.) Dumort. (not in NJ, ours are *Chiloscyphus profundus*)
Lophocolea heterophylla (Schrad.) Dumort. (see *Chiloscyphus profundus*)
Lophocolea minor Nees (see *Chiloscyphus minor*)

Lophozia (Jungermanniaceae)

Lophozia bicrenata (Schmidel) Dumort.

moist, acid, leached soils, abandoned farmland
 Bergen: *Austin* [40 Hep. Bor.-Amer.] (BKL, NY)
 Monmouth: *Haynes 1490* (BKL, NY)
 Passaic: *Cowan & Wurdack 95* (NY)

Lophozia capitata (Hook.) Macoun

moist, sandy barrens and dune swales
 Atlantic: *Evans s.n.*, Apr 1893 (NY)
 Burlington: *Evans s.n.*, Aug 1892 (NY)

Lophozia laxa (Lindb.) Grolle

peat bogs
 Bergen: *Austin* [46 Hep. Bor.-Amer.] (BKL, NY)

Lunularia (Lunulariaceae)

Lunularia cruciata (L.) Dumort.

weedy in greenhouses
 Passaic: *Nash s.n.*, 29 Nov 1893 (NY)

Mannia (Aytoniaceae)

Mannia barbifrons Shimizu & S. Hatt. (not in NJ, ours are *M. fragrans*)

Mannia fragrans (Balbis) Frye & L. Clark

on rock or thin soil over siliceous rocks in sun (Schuster 1992b)
 Bergen: *Austin s.n.*, May 1858 (NY)
 Warren: *T. C. Porter s.n.*, 4 May 1869 (PH)

Marchantia (Marchantiaceae)

Marchantia polymorpha L.

on soil or rocks in disturbed sites, a weed in greenhouses
 Atlantic: *Moul 6138* (CHRB)

Burlington: *Krout s.n.*, Jun 1907 (BKL)
 Camden: *E. Gadsby s.n.*, 15 Jun 1910 (PH)
 Essex: *Nash 910* (NY)
 Gloucester: *Lippincott s.n.*, 3 Jun 1894 (PH)
 Hudson: *Torrey s.n., s.d.* (NY)
 Mercer: *Stowell 2* (NY)
 Monmouth: *Haynes* [11 Amer. Hep.] (NY)
 Passaic: *Nash 625* (NY)
 Salem: *Heritage s.n.*, 14 Jun 1888 (CHRB)
 Somerset: *Moul 10827* (CHRB)
 Warren: *Barringer 21210* (BKL)

Marsupella (Gymnomitriaceae)***Marsupella emarginata* (Ehrh.) Dumort.**

on wet rocks and thin soil along streams (Schuster 1974)

Sussex: *Barringer 21875* (BKL)

Warren: *Buser 12048* (NY)

Metzgeria (Metzgeriaceae)***Metzgeria conjugata* Lindb.**

shaded rock outcrops and on trees in uplands

Bergen: *Wiegmann s.n.*, 9 July 1915 (NY)

Hunterdon: *Barringer 20742b* (BKL)

Morris: *Barringer 18248* (BKL, CHRB)

Passaic: *Cowan & Wurdack 46* (NY)

Sussex: *Barringer 21549* (BKL)

Union: *Wynne 2788* (NY)

Warren: *Barringer 21217* (BKL)

Mylia (Jungermanniaceae)***Mylia anomala* (Hook.) Gray**

in sphagnum bogs in uplands

Bergen: *Austin* [25 Hep. Bor.-Amer.] (BKL, NY, PH)

Sussex: *Beals s.n.*, 11 Oct 1947 (NY)

Nardia (Jungermanniaceae)***Nardia geoscyphus* (De Not.) Lindb.**

thin soil over acid rocks, sandy streambanks

Bergen: *Cowan & Wurdack 18* (NY)

Burlington: *Evans s.n.*, Aug 1892 (NY)

Monmouth: *Haynes 803* (BKL, PH)

Nardia lescurii (Austin) Underw. (not in NJ, ours are *N. geoscyphus*)

Nowellia (Cephaloziaceae)***Nowellia curvifolia* (Dicks.) Mitt.**

on decorticated, rotting logs, rarely on adjacent soil

Bergen: *Kuwahara 6954* (NY)

Hunterdon: *Barringer 22168* (BKL)

Middlesex: *Barringer 21763* (BKL)

Morris: *Barringer & Zielinski 21646* (BKL)

Ocean: *Barringer 22125* (BKL)

Passaic: *Barringer 20668* (BKL)

Sussex: *Barringer 20989* (BKL)

Warren: *Barringer 21230* (BKL)

Odontoschisma (Cephaloziaceae)***Odontoschisma denudatum* (Nees) Dumort.**

on soil and rotting logs

- Atlantic: *Long 208* (PH)
 Burlington: *Barringer 21149* (BKL)
 Gloucester: *Barringer 21197* (BKL)
 Monmouth: *Haynes s.n.*, 29 Apr 1908 (BKL, NY)
 Ocean: *Cowan & Wurdack 131* (NY)
 Cumberland: *Thiers 1256* (NY)

***Odontoschisma prostratum* (Sw.) Trevis.**

on peaty soil and rotting logs

- Atlantic: *Tees 1354* (NY)
 Bergen: *Barringer 20280* (BKL)
 Burlington: *Barringer 20697* (BKL)
 Camden: *Barringer 20844* (BKL)
 Cape May: *Long 2154* (PH)
 Cumberland: *Long 1175* (PH)
 Gloucester: *Long 2115* (NY, PH)
 Mercer: *Long 1888* (PH)
 Monmouth: *Barringer & D. Barringer 21595* (BKL)
 Ocean: *Barringer 20920* (BKL)
 Passaic: *Barringer 21475* (BKL)
 Salem: *Long 941* (PH)
 Sussex: *Barringer: 21090* (BKL)

***Pallavicinia* (Pallaviciniaceae)**

***Pallavicinia lyellii* (Hook.) Gray**

on soil and bark in wet woods, swamps, cedar swamps, pond edges

- Atlantic: *Underwood s.n.*, 6 Sep 1884 (NY)
 Bergen: *Barringer 21730* (BKL)
 Burlington: *Barringer 16714* (BKL)
 Camden: *Barringer 20872* (BKL)
 Cumberland: *Long 1253* (NY, PH)
 Gloucester: *Barringer 21200* (BKL)
 Hudson: *s.l. s.n., s.d.* (NY)
 Middlesex: *Barringer 21810* (BKL)
 Monmouth: *Barringer & D. Barringer 21598* (BKL)
 Morris: *Barringer 17793* (BKL)
 Ocean: *Barringer 22110* (BKL)
 Passaic: *Barringer 20612* (BKL)
 Sussex: *Barringer 20616* (BKL)
 Union: *Moul s.n.*, 16 Apr 1947 (PH)
 Warren: *Barringer 22082* (BKL)

***Pellia* (Pelliaceae)**

***Pellia epiphylla* (L.) Corda**

on soil along streams and on the edges of lakes and ponds

- Bergen: *Barkley s.n.*, 3 Oct 1958 (NY)
 Essex: *Haynes s.n.*, 10 May 1902 (NY)
 Mercer: *s.l. s.n.*, 27 Apr 1909 (CHRB)
 Monmouth: *Barringer & D. Barringer 21598* (BKL)
 Morris: *Barringer 18238* (BKL, CHRB)
 Passaic: *Barringer 21427* (BKL)
 Sussex: *Barringer 21569* (BKL)
 Union: *Rissanen s.n.*, 19 Jun 1941 (NY)

Warren: *Barringer & D. Barringer 21844* (BKL)

***Pellia neesiana* (Gottsche) Limpr.**

on wet soil, especially along streams (Schuster 1992)

Bergen: *Wurdack & Cowan 9* (NY)

Schuster (1992) reports specimens from Camden and Burlington Counties.

***Plagiochila* (Plagiochilaceae)**

***Plagiochila porelloides* (Torr.) Lindenb.**

on shaded rocks along streams

Bergen: *Wiegmann s.n.*, 19 Jul 1915 (NY)

Burlington: *Montaigne s.n.*, Apr 1851 (NY)

Morris: *Austin s.n.*, Aug 1867 (NY)

***Porella* (Porellaceae)**

***Porella pinnata* L.**

on rocks along streams

Bergen: *Barringer 21262* (BKL)

Burlington: *M. Haines s.n., s.d.* (NY)

Hunterdon: *Cantlon 1010* (CHRB)

Morris: *Barringer 18505* (BKL)

Ocean: *Barringer 22109* (BKL)

Passaic: *Barringer 18182* (BKL)

Union: *Barringer 18133* (BKL)

Somerset: *Barringer 18129* (BKL)

Sussex: *Barringer 20308* (BKL)

Union: *Barringer 18133* (BKL)

Warren: *Barringer 21211* (BKL)

***Porella platyphylla* (L.) Pfeiff.**

on trees or occasionally rocks in moist woodlands

Atlantic: *Long 2033* (NY)

Bergen: *Haynes s.n.*, 29 Nov 1902 (NY)

Burlington: *Stowell 1* (NY)

Essex: *Haynes s.n.*, 10 May 1902 (NY)

Gloucester: *Rau s.n.*, Jun 1882 (NY)

Hudson: *Brainerd s.n., s.d.* (BKL)

Hunterdon: *Cantlon 1011* (CHRB)

Mercer: *Torrey s.n.*, 1831 (NY)

Morris: *Barringer 18505* (BKL)

Ocean: *Cowan & Wurdack 129* (NY)

Passaic: *Barringer 20607* (BKL)

Warren: *Barringer 21227* (BKL)

***Porella platyphylloidea* (Schwein.) Lindb.**

Hunterdon: *Moul 6789* (CHRB)

Ocean: *Cowan & Wurdack 129* (NY)

Sussex: *H. Webster 170* (CHRB)

Warren: *Matzke s.n.*, 10 Nov 1946 (NY)

***Preissia* (Marchantiaceae)**

***Preissia quadrata* (Scop.) Nees**

calciphile, on rocks near running water, ravines, dripping cliffs (Hicks 1992, Lincoln 2008)

Middlesex: *Vail s.n.*, May 1891 (NY)

***Ptilidium* (Ptilidiaceae)**

***Ptilidium pulcherrimum* (Weber) Hampe**

on fallen logs and rock outcrops in uplands

- Atlantic: *Long 1996* (PH)
 Bergen: *Howe s.n.*, 6 Oct 1898 (NY)
 Camden: *Long 1527* (PH)
 Cumberland: *Long 774* (PH)
 Hudson: *Austin s.n., s.d.* (NY)
 Hunterdon: *Cantlon & Moul 1022* (CHRB)
 Middlesex: *Barringer 21784* (BKL)
 Morris: *Barringer & Zielinski 21675* (BKL)
 Passaic: *Barringer 20657* (BKL)
 Sussex: *Barringer 21490* (BKL)
 Warren: *Barringer 21250* (BKL)

Radula (Radulaceae)***Radula complanata* (L.) Dumort.**

- on tree bark and rock outcrops (Hicks 1992, Lincoln 2008)
 Bergen: *Austin* [86 Hep. Bor.-Amer.] (NY)
 Hunterdon: *Cantlon 1008* (CHRB)

***Radula obconica* Sull.**

- on rock outcrops or bark in deep shade along streams (Hicks 1992, Lincoln 2008)
 Bergen: *Austin* [88 Hep. Bor.-Amer.] (MO, NY)

Reboulia (Aytoniaceae)***Reboulia hemisphaerica* (L.) Raddi**

- on soil over rocks, humid sites; a calciphile, but not exclusively (Schuster 1992b)
 Bergen: *Wiegmann 5018* (NY)
 Hudson: *Torrey 3* (NY)
 Hunterdon: *Barringer 20742* (BKL)
 Warren: *Cowan & Wurdack 174* (NY)

Riccardia (Aneuraceae)***Riccardia chamaedryfolia* (With.) Grolle**

- on dripping rocks near streams (Schuster 1992)
 Monmouth: *Haynes* [14 Amer. Hep.] (NY)

Riccardia latifrons* (Lindb.) Lindb. (ours are *R. palmata*)**Riccardia multifida* (L.) Gray**

- in N on soil or rocks in wet seeps and near falls, in S on trees in cedar swamps (Schuster 1992)
 Bergen: *Austin s.n.*, 1873 (NY)
 Burlington: *Evans s.n.*, 10 Aug 1892 (NY)
 Gloucester: *Rau s.n.*, 1882 (NY)
 Hudson: *Austin s.n.*, 1861 (NY)

***Riccardia palmata* (Hedw.) Carruth.**

- on wet, rotting wood, especially in streams, shaded gorges
 Bergen: *Howe s.n.*, 22 Sep 1898 (NY)
 Hudson: *Austin* [15 Hep. Bor.-Amer.] (BKL, NY)
 Sussex: *Barringer 21130* (BKL)

Riccia (Ricciaceae)***Riccia austinii* Stephani (see *R. lamellosa*)*****Riccia beyrichiana* Hampe**

- on soil in wet fields and ditches, usually in partial shade (Hicks 1992, Lincoln 2008)
 Bergen: *Austin* [143 Hep. Bor.-Amer.] (NY)

***Riccia bifurca* Hoffm.**

- spores: fall (Lincoln, 2008)
 on wet soil at edges of plowed fields or along streams (Hicks 1992, Lincoln 2008)

Bergen: *Austin* [141 Hep. Bor.-Amer.] (MO, NY)

Monmouth: *Haynes1649* (NY)

***Riccia cavernosa* Hoffm.** (in NJ?)

spores: Sep-Oct

on wet or seasonally wet soil in disturbed sites and pond edges (Schuster 1992b)

no county designated: *Austin s.n.*, 1863 (MO)

***Riccia fluitans* L.**

on still water of ditches and ponds or along their margins

Bergen: *C. C. Curtis s.n.*, 22 Sep 1898 (NY)

Burlington: *R. Sim s.n.*, 1934 (PH)

Camden: *Underwood s.n.*, Oct 1855 (NY)

Cape May: *Heritage s.n.*, 7 May 1857 (PH)

Gloucester: *Long 2905* (PH)

Hudson: *Howe s.n.*, 22 Sep 1898 (NY)

Ocean: *Cowan & Wurdack 136* (NY)

Salem: *Long 1246* (PH)

Sussex: *Barringer 19930* (BKL)

***Riccia huebeneriana* Lindenb.**

on soil in grassy ditches or at the edges of ponds

Atlantic: *A. Tuckerman s.n.*, 12 Oct 1970 (CHRB)

Bergen: *Cowan & Wurdack 27* (NY)

Mercer: *James s.n.*, 1867 (NY)

Monmouth: *Haynes* [116 Amer. Hep.] (BKL, NY)

***Riccia hirta* (Austin) Underw.**

on wet soil in stubble fields or along the banks of streams (Schuster 1992b)

Bergen: *Austin 669* (NY)

***Riccia lamellosa* Raddi**

on thin soil of exposed outcrops and overgrazed fields (Schuster 1992b)

Bergen: *Austin s.n.*, 1864 (NY)

***Riccia membranacea* Gottsche & Lindenb.**

on soil in periodically flooded sites (Hicks 1992, Schuster 1992b)

Bergen: *Austin* [150 Hep. Bor.-Amer.] (BKL, NY)

***Riccia sorocarpa* Bisch.**

on soil in ditches and periodically flooded fields (Schuster 1992b)

Bergen: *Austin* [139 Hep. Bor.-Amer.] (BKL, NY)

Monmouth: *Haynes 1493* (NY)

Riccia sullivantii Austin (see *R. huebeneriana*)

Riccia tenuis Austin (see *R. membranacea*)

***Ricciocarpos* (Ricciaceae)**

***Ricciocarpos natans* (L.) Corda**

floating on still water or on soil along ponds and swamps

Bergen: *Wiegmann 1119* (BKL, NY)

Burlington: *Stowell 3* (NY)

Mercer: *Underwood s.n.*, Dec 1888 (CHRB)

Morris: *Moul 73-2* (CHRB)

Sussex: *Nearing s.n.*, 27 Sep 1947 (NY)

***Scapania* (Scapaniaceae)**

***Scapania glaucocephala* (Taylor) Austin**

on rotting wood in shade, usually evergreen logs (Schuster 1974)

Bergen: *Austin s.n., s.d.* (NY)

***Scapania nemorea* (L.) Grolle**

on soil in seeps and moist roadbanks

Bergen: *Barringer 22300* (BKL)

Cape May: *Long 870* (PH)

Cumberland: *Long 1111* (PH)

Gloucester: *Long 2060a* (PH)

Hudson: *Williams s.n.*, 7 Nov 1899 (NY)

Hunterdon: *Barringer 20746* (BKL)

Monmouth: *Haynes 987* (BKL, NY)

Morris: *Barringer 20111* (BKL)

Ocean: *Barringer 22123* (BKL)

Passaic: *Barringer 20648* (BKL)

Sussex: *Barringer 20550* (BKL)

Warren: *Barringer 20925* (BKL)

Scapania nemorosa (L.) Dumort. (see *S. nemorea*)

***Scapania undulata* (L.) Dumort.**

on rocks along streams, always near fast running water (Schuster 1974)

Bergen: *Wurdack & Cowan 19* (NY)

Burlington: *Moul s.n.*, 23 Jul 1950 (PH)

Sussex: *Barringer 21037* (BKL)

Union: *Stephenson s.n.*, 27 Mar 1962 (CHRB)

Warren: *Barringer 21248* (BKL)

Telaranea (Lepidoziaceae)

***Telaranea nematodes* (Austin) M. Howe**

in swamps

Burlington: *Buck 28290* (NY)

Gloucester: *Barringer 21206* (BKL)

Monmouth: *Haynes s.n.*, 30 Sep 1905 (BKL, NY)

Trichocolea (Trichocoleaceae)

***Trichocolea tomentella* (Ehrh.) Dumort.**

along cool, shaded streams, swamps

Bergen: *Howe s.n.*, 6 Oct 1898 (NY)

Hudson: *Austin s.n., s.d.* (NY)

Middlesex: *Marshall* [56 Amer. Hep.] (BKL, NY)

Monmouth: *Haynes* [9 Amer. Hep.] (NY)

Passaic: *Barringer 22543* (BKL)

Sussex: *Moul 7186* (CHRB, NY)

Tritomaria (Jungermanniaceae)

***Tritomaria exsecta* (Schmidel) Schiffner**

on rocks or tree bark in uplands (Hicks 1992)

Bergen: *Austin* [46 Hep. Bor.-Amer.] (BKL, NY)