

Checklist of bryophytes occurring in Hubbard Brook Experimental Forest

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A total of 176 species of bryophytes were found in Hubbard Brook Experimental Forest (HBEF) during detailed surveys in 1994 and 1995. *Pohlia lescuriana* and *Tetraplodon angustatus* are reported as new records for the state of New Hampshire. HBEF is located in north-central New Hampshire (43°56'N, 71°45'W) in the White Mountain National Forest, and has been part of an intensive ecosystem study since 1963 (Likens 1985). The ecology, hydrology, and biogeochemistry at HBEF have been described in detail and have added to the fundamental knowledge of forest ecosystems (see Bormann & Likens 1979; Likens 1985). However, little work on bryophytes has been conducted at HBEF, although, Bowden (1991) has studied the role of *Polytrichum* in the nitrogen cycle of successional ecosystems at HBEF.

Hubbard Brook Experimental Forest covers 3,076 ha of the Hubbard Brook valley with an elevation range from 245 m at the lower boundary of HBEF to 1,015 m at the summit of Mt. Kineo. HBEF experiences average annual temperatures around 6.6°C with average annual precipitation of 115 cm and around 239 cm of snowfall. Hubbard Brook is a fourth-order stream which flows 10 km in a generally east-west orientation. The underlying geology is primarily the Littleton formation composed of highly metamorphosed sandstone and mudstone (Likens 1985). In the western half of HBEF, an intrusion of Kinsman quartz monzonite dominates with occasional basalt dikes. Soil depth varies greatly from the deepest deposits in the valley and floodplain to the rocky ridgeline with a scanty covering of organic material. The soils are quite heterogeneous, but acid spodosols with a rich organic horizon dominate (pH about 4.5) (Likens 1985).

The forest is predominantly composed of mature northern hardwoods. It was logged in 1910-1919, but has not been disturbed by logging since that time except in some small experimental watersheds (Likens 1985). The forest is uneven aged and dominated by sugar maple (*Acer saccharum* Marshall.), American beech (*Fagus grandifolia* Ehrh.) and yellow birch (*Betula alleghaniensis* Britton.). Red spruce (*Picea rubens* Sarg.), balsam fir (*Abies balsamae* (L.) Miller.) and eastern hemlock (*Tsuga canadensis* (L.) Carriere.) are also common on ridgelines, north facing slopes and steep, rocky ravines. In addition, HBEF contains boulder fields, beaver meadows, and mountainside seep areas that contribute to the bryophyte diversity expressed in this checklist. A dirt road bisects much of HBEF providing access to experimental sites including several 0.5 ha clearings with rain gauges.

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A basalt dike in Hubbard Brook gorge supports a number of bryophytes restricted to circumneutral sites including *Preissia quadrata*, *Encalypta ciliata*, *Plagiopus oederiana*, *Saelania glaucescens* and *Amphidium lapponicum*. Frequently disturbed sandy sites such as moist roadside ditches and on the steep bank slides along Hubbard Brook support the infrequent species *Pohlia lescuriana* and *Pohlia bulbifera*. The constant sunny openings provided by rain gauge stations added a number of infrequent *Atrichum* species to the list. The perched wetlands along the ridgeline, which serve as bedding habitat for moose, also serve as habitat for unique mosses that grow only on animal dung, including *Splachnum ampullaceum* and *Tetraplodon angustatus*. Moose have only recently (mid 1980's) returned to the Hubbard Brook area after a 50 year absence (Wayne Martin, pers. comm.). Other infrequent species found during this survey were *Bazzania tricrenata*, *Lophozia capitata*, *Haplohymenium triste*, *Leskea polycarpa*, *Pylaisiadelphus tenuirostris* and *Rhytidiadelphus squarrosus*.

During statewide surveys for an ongoing bryophyte checklist for New Hampshire, many sites were discovered for a species of *Pohlia* which has not yet been named or described. This species seems to be restricted to New England and upstate New York. It is frequent on rather dry, but humid areas of sheltered rock ledges of all pHs throughout New Hampshire. It occurs in HBEF on the steep slopes of Hubbard Brook gorge area. Jonathan Shaw intends to name and describe the species by autumn of 1996. It is referred to in the list as *Pohlia nov. spp.* Shaw pers. comm.

The nomenclature used in this report follows Anderson, Crum & Buck (1990) for mosses except *Sphagnum* which follows Anderson (1990). The liverworts follow Schuster (1966 - 1992). All collections in this list are those of the first author and they are deposited in the Bailey Hortorium (BH), Cornell University.

Hepaticae (36 spp.)

Aneuraceae

Riccardia latifrons Lindb.: Cleavitt 698a

Blasiaceae

Blasia pusilla L.: Cleavitt 708

Blepharostomaceae

Blepharostoma trichophyllum (L.) Dum.: Cleavitt 571

Calypogeiaceae

Calypogeia intergristipula Steph.: Cleavitt 802

C. muelleriana (Schiffn.) K. Müll.: Cleavitt 1395

C. trichomanis (L.) Corda : Cleavitt 1388

Cephaloziaceae

Cephalozia bicuspidata (L.) Dum.: Cleavitt 710

C. lunulifolia (Dum.) Dum.: Cleavitt 698b

Nowellia curvifolia (Dicks.) Mitt.: Cleavitt 832

Conocephalaceae

Conocephalum conicum (L.) Lindb.: Cleavitt 1042

Gymnomitriaceae

Marsupella emarginata (Ehrh.) Dum.: Cleavitt 699

Jubulaceae

Frullania eboracensis Gottsche: Cleavitt 477a

F. tamarisci subsp. *asagrayana* (Mont.) Hatt.: Cleavitt 825

Jubula pennsylvanica (Steph.) Evans : Cleavitt 1392

Lejeunea cavifolia (Ehrh.) Lindb.: Cleavitt 1403

Jungermanniaceae

Jamesoniella autumnalis (DC.) Steph.: Cleavitt 828

Lophozia capitata (Hook.) Macoun.: Cleavitt 747

L. ventricosa (Dicks.) Dum.: Cleavitt 1381

Solenostoma gracillimum (Smith.) Schust.: Cleavitt 851

Lepidoziaceae

Bazzania denudata (Torrey ex Gott. et al.) Trev.: Cleavitt 1393

B. tricrenata (Wahl.) Trev.: Cleavitt 1041

B. trilobata (L.) S. Gray.: Cleavitt 819

Lepidozia reptans (Dum.) Dum.: Cleavitt 829

Lophocoleaceae

Chiloscyphus polyanthos (L.) Corda: Cleavitt 1396

Lophocolea heterophylla (Schrad.) Dum.: Cleavitt 566

Marchantiaceae

Preissia quadrata (Scop.) Nees.: Cleavitt 1116

Pelliaceae

Pellia epiphylla (L.) Corda.: Cleavitt 707

P. neesiana (Gott.) Limpr.: Cleavitt 1055

Plagiochilaceae

Plagiochila asplenoides subsp. *porelloides* (Torr. ex Nees.) Schust.:
Cleavitt 833

Porellaceae

Porella platyphylloidea (Schwein.) Lindb.: Cleavitt 836

Ptilidiaceae

Ptilidium pulcherrimum (L.) Hampe.: Cleavitt 840

Radulaceae

Radula complanata (L.) Dum.: Cleavitt 843

Scapaniaceae

Diplophyllum apiculatum (Evans) Steph.: Cleavitt 821

Scapania mucronata Buch.: Cleavitt 1402

S. nemorea (L.) Grolle.: Cleavitt 849

S. undulata (L.) Dum.: Cleavitt 846

MOSSES (140 spp.)**Amblystegiaceae**

- Amblystegium serpens* (Hedw.) B.S.G.: Cleavitt 383
A. varium (Hedw.) Lindb.: Cleavitt 701
Campylium chrysophyllum (Brid.) J Lange: Cleavitt 1047
C. hispidulum (Brid.) Mitt.: Cleavitt 576
Hygrohypnum eugyrium (B.S.G.) Loeske.: Cleavitt 440
H. luridum (Hedw.) Jenn.: Cleavitt 1394
H. montanum (Lindb.) Broth.: Cleavitt 442
H. ochraceum (Turn. ex Wils.) Loeske.: Cleavitt 444
Leptodictyum riparium (Hedw.) Warnst.: Cleavitt 1058
Sanionia uncinata (Hedw.) Loeske.: Cleavitt 434
Warnstorfia exannulata (Schimp. in B.S.G.) Loeske.: Cleavitt 433

Andreaeaceae

- Andreaea rothii* Web. & Mohr.: Cleavitt 384
A. rupestris Hedw.: Cleavitt 385

Anomodontaceae

- Anomodon attenuatus* (Hedw.) Hüb.: Cleavitt 387
A. rugellii (C. Müll.) Keissl.: Cleavitt 388
Haplohymenium triste (Ces. ex DeNot) Kindb.: Cleavitt 718

Aulocomniaceae

- Aulocomnium palustre* (Hedw.) Schwaegr.: Cleavitt 394

Bartramiaceae

- Bartramia pomiformis* Hedw. : Cleavitt 396
Philonotis fontana (Hedw.) Brid. : Cleavitt 720
Plagiopus oederiana (Sw.) Crum & Anderson: Cleavitt 1115

Brachytheciaceae

- Brachythecium plumosum* (Hedw.) B.S.G.: Cleavitt 397
B. salebrosum (Web. & Mohr.) B.S.G.: Cleavitt 721
B. velutinum (Hedw.) Schimp.: Cleavitt 704
Bryhnia novae-angliae (Sull. & Lesq. ex Sull.) Grout.: Cleavitt 407

Bryaceae

- Bryum lisae* De Not.
B. lisae var. *cuspidatum* (Bruch. & Schimp) Marg.: Cleavitt 1371
B. pseudotriquetrum (Hedw.) Gaertn. et. al.: Cleavitt 1113
Pohlia annotina (Hedw.) Lindb.: Cleavitt 989
P. bulbifera (Warnst.) Warnst.: Cleavitt 486
P. lescuriana (Sull.) Grout.: Cleavitt 990
P. nov. sp. Shaw pers. comm.: Cleavitt 1053
P. nutans (Hedw.) Lindb.: Cleavitt 488

Buxbaumiaceae

- Diphyscium foliosum* (Hedw.) Mohr.: Cleavitt 430

Climaciaceae

Climacium americanum Brid.: Cleavitt 724

Dicranaceae

Dicranella heteromalla (Hedw.) Schimp.: Cleavitt 417

D. rufescens (With.) Schimp.: Cleavitt 703

Dicranum flagellare Hedw.: Cleavitt 420

D. fulvum Hook.: Cleavitt 750

D. montanum Hedw.: Cleavitt 422

D. polysetum Sw.: Cleavitt 423

D. scoparium Hedw.: Cleavitt 424

D. viride (Sull. & Lesq. ex Sull.) Lindb.: Cleavitt 426

Oncophorus wahlenbergii Brid.: Cleavitt 469

Paraleucobryum longifolium (Hedw.) Loeske.: Cleavitt 470

Rhabdoweissia crispata (With.) Lindb.: Cleavitt 722

Ditrichaceae

Ditrichum ambiguum Best.: Cleavitt 1390

D. lineare (Sw.) Lindb.: Cleavitt 573

D. pusillum (Hedw.) Hampe.: Cleavitt 572

Saelania glaucescens (Hedw.) Broth.: Cleavitt 1043

Encalyptaceae

Encalypta ciliata Hedw.: Cleavitt 1046

Fissidentaceae

Fissidens dubius P-Beauv.: Cleavitt 437

F. osmundioides Hedw.: Cleavitt 1037

Fontinalaceae

Fontinalis dalecarlica Schimp. ex B.S.G.: Cleavitt 1386

Grimmiaceae

Racomitrium aciculare (Hedw.) Brid.: Cleavitt 506

R. heterostichum (Hedw.) Brid.: Cleavitt 507

R. sudeticum (Funck.) Bruch. & Schimp. in B.S.G.: Cleavitt 510

Schistidium apocarpum (Hedw.) Bruch. & Schimp.: Cleavitt 1382

Hedwigiaceae

Hedwigia ciliata (Hedw.) P-Beauv.: Cleavitt 719

Hylocomiaceae

Hylocomiastrum umbratum (Hedw.) Broth.: Cleavitt 445

Hylocomium splendens (Hedw.) B.S.G.: Cleavitt 447

Pleurozium schreberi (Brid.) Mitt.: Cleavitt 483

Rhytidiadelphus squarrosus (Hedw.) Warnst.: Cleavitt 723

Hypnaceae

Callicladium haldanianum (Grev.) Crum.: Cleavitt 408

Herzogiella striatella (Brid.) Iwats.: Cleavitt 438

Hypnum fertile Sendtn.: Cleavitt 449

- H. imponens* Hedw.: Cleavitt 725
H. pallescens (Hedw.) P-Beauv.: Cleavitt 451
Isoptergiopsis muelleriana (Schimp) Iwats.: Cleavitt 455
I. pulchella (Hedw.) Iwats.: Cleavitt 1373
Pseudotaxiphyllum distichaceum (Mitt.) Iwats.: Cleavitt 458
P. elegans (Brid.) Iwats.: Cleavitt 459
Platydictya subtilis (Brid.) Crum.: Cleavitt 580
Platygyrium repens (Brid.) B.S.G.: Cleavitt 479
Ptilium crista-castrensis (Hedw.) DeNot.: Cleavitt 497
Pylaisiadelphina tenuirostris (Bruch. & Schimp.) Buck.: Cleavitt 705
Pylaisiella intricata (Hedw.) Grout.: Cleavitt 501
P. polyantha (Hedw.) Grout.: Cleavitt 569
P. selwynii (Kindb.) Crum et al.: Cleavitt 477a

Leskeaceae

- Leskea polycarpa* Hedw.: Cleavitt 462
Leskeella nervosa (Brid.) Loeske.: Cleavitt 463

Leucobryaceae

- Leucobryum glaucum* (Hedw.) Angstr. ex Fr.: Cleavitt 726

Leucodontaceae

- Leucodon brachypus* Brid.
L. brachypus var. *andrewsianus* Crum & Anderson: Cleavitt 727

Mniaceae

- Mnium hornum* Hedw.: Cleavitt 465
M. thomsonii Schimp.: Cleavitt 1380
Plagiomnium ciliare (C. Müll.) T Kop.: Cleavitt 1056
P. cuspidatum (Hedw.) T Kop.: Cleavitt 472
Rhizomnium magnifolium (Horik.) T Kop.: Cleavitt 513
R. punctatum (Hedw.) T Kop.: Cleavitt 514

Neckeraceae

- Homalia trichomanoides* (Hedw.) B.S.G.: Cleavitt 1038
Neckera pennata Hedw.: Cleavitt 468
Thamnobryum alleghaniense (C. Müll.) Nieuwl.: Cleavitt 1045

Orthotrichaceae

- Amphidium lapponicum* (Hedw.) Schimp.: Cleavitt 1112
A. mougeotii (B.S.G.) Schimp.: Cleavitt 1036
Orthotrichum sordidum Sull. & Lesq. ex Aust.: Cleavitt 564
Ulota coarctata (P-Beauv.) Hamm.: Cleavitt 555
U. crispa (Hedw.) Brid.: Cleavitt 559
U. hutchinsiae (Sm.) Hammar.: Cleavitt 1044

Plagiotheciaceae

- Plagiothecium cavifolium* (Brid.) Iwats.: Cleavitt 1054
P. denticulatum (Hedw.) B.S.G.: Cleavitt 474

P. laetum Schimp. in B.S.G.: Cleavitt 476

Polytrichaceae

Atrichum angustatum (Brid.) B.S.G.: Cleavitt 391

A. crispum (James) Sull.: Cleavitt 390

A. oersteadianum (C. Müll.) Mitt.: Cleavitt 392

A. tenellum (Rohl.) B.S.G.: Cleavitt 393

A. undulatum (Hedw.) P-Beauv.: Cleavitt 389

Pogonatum pensilvanicum (Hedw.) P-Beauv.: Cleavitt 485

Polycetriastrum alpinum (Hedw.) G L Sm.: Cleavitt 484

Polytrichum commune Hedw.: Cleavitt 492

P. formosum Hedw.: Cleavitt 493

P. juniperinum Hedw.: Cleavitt 494

P. pallidisetum Funck.: Cleavitt 495

P. piliferum Hedw.: Cleavitt 567

P. strictum Brid.: Cleavitt 729

Pottiaceae

Bryoerythrophyllum recurvirostre (Hedw.) Chen.: Cleavitt 1385

Tortella tortuosa (Hedw.) Limpr.: Cleavitt 1378

Pterigynandraceae

Heterocladium dimorphum (Brid.) B.S.G.: Cleavitt 731

Seligeriaceae

Blindia acuta (Hedw.) Bruch. & Schimp. in B.S.G.: Cleavitt 1057

Sematophyllaceae

Brotherella recurvans (Michx.) Fleisch.: Cleavitt 404

Sematophyllum marylandicum (C. Müll.) Britt.: Cleavitt 518

Sphagnaceae

Sphagnum affine Ren. & Card.: Cleavitt 543

S. angustifolium C. Jens.: Cleavitt 735

S. capillifolium (Ehrh.) Hedw.: Cleavitt 736

S. centrale C. Jens.: Cleavitt 542

S. cuspidatum Ehrh.: Cleavitt 529

S. fallax (Klingrr.) Klingrr.: Cleavitt 530

S. fimbriatum Wils.: Cleavitt 531

S. fuscum (Schimp.) Klingrr.: Cleavitt 732

S. girgensohnii Russow.: Cleavitt 532

S. magellanicum Brid.: Cleavitt 733

S. papillosum Lindb.: Cleavitt 734

S. quinquefarium (Lindb. ex Braithw.) Warnst.: Cleavitt 652

S. rubellum Wils.: Cleavitt 586

S. russowii Warnst.: Cleavitt 536

S. squarrosum Crome.: Cleavitt 539

S. teres (Schimp.) Angstr.: Cleavitt 737

Splachnaceae

Splachnum ampullaceum Hedw.: Cleavitt 738

Tetraplodon angustatus (Hedw.) Bruch. & Schimp.: Cleavitt 739

Tetraphidaceae

Tetraphis pellucida Hedw.: Cleavitt 544

Theliaceae

Myurella sibirica (C. Müll.) Reim.: Cleavitt 1384

Thuidiaceae

Rauiella scita (P-Beauv.) Reim.: Cleavitt 552

Thuidium delicatulum (Hedw.) Schimp. in B.S.G.: Cleavitt 551

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