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## Bryophytes of the Loess Hills of Western Iowa

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Seventy-nine mosses, 15 liverworts, and one hornwort are reported to occur in the seven Loess Hills counties of Iowa. *Barbula acuta* is a new state record; 29 species represent new county records. The flora consists primarily of species characteristic of the eastern deciduous forest, but there is also a significant representation of prairie species. Arid climate, absence of extensive bedrock exposures, and absence of non-calcareous soils limit bryophyte diversity in the Loess Hills region.

Index Descriptors: Bryophytes, Loess Hills, Iowa flora

Bryophytes from the Loess Hills have been reported in two publications (Conard, 1956; Bowers and Peck, 1978), but a systematic survey of the Loess Hills bryoflora has not been compiled previously. Conard (1956) reported a total of 82 species from the 7-county area and Bowers and Peck (1978) listed 19 species new to Fremont County. Neither paper included descriptions of the species' habitats. Churchill (1982) compared mosses reported from the Loess Hills counties with those of the Black Hills, the Niobrara River basin, and the Mississippi River basin of eastern Iowa, but did not list taxa. In light of the increased scientific interest in the Loess Hills (see additional papers in this issue on the flora and fauna of the Loess Hills), it seems worthwhile to compile a list of Loess Hills bryophytes and make some observations on their ecology.

One of us (SPC) collected extensively between 1976 and 1979 in all

seven counties where the Loess Hills occur, making observations on bryophyte communities and habitats of individual species as well. The other two of us (JvdL and DRF) collected in Fremont and Pottawattamie Counties in 1983. Voucher specimens have been deposited at the New York Botanical Garden (NY) or at Iowa State University (ISC). Many of the specimens collected by Conard (deposited in the University of Iowa Herbarium (IA) were also examined and verified. Species reported by Conard (1956) and by Bowers and Peck (1978) are included in the accompanying list. Nomenclature for mosses follows that of Crum and Anderson (1981), and for hepatics, Stotler and Crandall-Stotler (1977).

Ninety-five species of bryophytes are known from the seven Loess Hills counties (Table 1). One species reported herein, *Barbula acuta*, is a new State record; four species, *Barbula convoluta*, *Campylium poly-*

**Table 1. Bryoflora of the Loess Hills. Notation: (1) Ply = Plymouth, Wdb = Woodbury, Mon = Monona, Har = Harrison, Pot = Pottawattamie, Mil = Mills, Fre = Fremont; (2) s = soil, c = corticolous, r = rupestral (saxicolous), a = aquatic, (P) = prairie; (3) f = frequent, o = occasional, r = rare; \* = county record; \*\* = state record; (x) = collections not examined by the authors.**

SPECIES	COUNTIES <sup>1</sup>							HABITAT <sup>2</sup> OCCURRENCE <sup>3</sup>	
	Ply	Wdb	Mon	Har	Pot	Mil	Fre		
MUSCI									
<i>Acaulon schimperianum</i> (Sull.) Sull. & Lesq.		x						s (P)	r
<i>Aloina rigida</i> (Hedw.) Limpr.		(x)	x*		x			s (P)	o
<i>Amblystegium riparium</i> (Hedw.) BSG	x	x	x	x	(x)	x	x	s	f
<i>Amblystegium serpens</i> (Hedw.) BSG	x	x	x			x		s,c	o
<i>Amblystegium tenax</i> (Hedw.) C. Jens	x	x	(x)		x		x	s,r	f
<i>Amblystegium trichopodium</i> (Schultz) Hartm.	x	x		x		x	x	s (P)	f
<i>Amblystegium varium</i> (Hedw.) Lindb.	x	x		x	(x)	(x)	x	s,c,r	f
<i>Anomodon attenuatus</i> (Hedw.) Hüb.		x		x			x*	s,c	o
<i>Anomodon minor</i> (Hedw.) Fürnr.	x	x	x*	x	x	x*	x	s,c	f
<i>Anomodon rostratus</i> (Hedw.) Schimp.		x		x				s,c	r
<i>Astomum mühlenbergianum</i> (Sw.) Grout	x	x				x	x*	s (P)	o
<i>Atrichum angustatum</i> (Brid.) BSG	(x)						x	s	o
<i>Atrichum undulatum</i> var. <i>alticristatum</i> Ren. & Card.		x		x		x	x	s	f
<i>Barbula acuta</i> (Brid.) Brid.		x**					x**	s (P)	r
<i>Barbula convoluta</i> Hedw.							x*	s (P)	r
<i>Barbula fallax</i> Hedw.			(x)		x*		x	s (P)	r
<i>Barbula unguiculata</i> Hedw.	x	x	x*	x	x	x*	x	s,r (P)	f
<i>Brachythecium acuminatum</i> (Hedw.) Aust.	x	x	x*	x	x	x	x	s,c	f
<i>Brachythecium salebrosum</i> (Web. & Mohr) BSG		(x)	(x)				(x)	s (P)	o
<i>Brachythecium oxycladon</i> (Brid.) Jaeg. & Sauerb.	x	(x)	x	x	x	x	x	s,c	f
<i>Bryhnia graminicolor</i> (Brid.) Grout		(x)				x*	x	s	o
<i>Bryum argenteum</i> Hedw.	(x)	x		(x)	(x)	x	x	s (P)	f
<i>Bryum caespiticium</i> Hedw.	(x)	(x)		x	x*		s	s (P)	f
<i>Bryum lisae</i> var. <i>cuspidatum</i> (BSG) Marg.					x*		x	s (P)	r

<i>Bryum pseudotriquetrum</i> (Hedw.) Gaertn., Meyer & Scherb.							x	s (P)	r
<i>Callicladium haldanianum</i> (Grev.) Crum							x	s	r
<i>Campyllum chrysophyllum</i> (Brid.) J. Lange	x*			x	x		x*	s (P)	o
<i>Campyllum hispidulum</i> (Brid.) Mitt.	x	x	(x)	x	x		x	s,c (P)	f
<i>Campyllum polygomum</i> (BSG) C. Jens.							x*	s	r
<i>Ceratodon purpureus</i> (Hedw.) Brid.	x	x		x	(x)	x	x	s,c (P)	f
<i>Conardia compacta</i> (C.M.) Robins.							x	s	r
<i>Desmatodon obtusifolius</i> (Schwaegr.) Schimp.							x	c (P)	r
<i>Dicranella heteromalla</i> (Hedw.) Schimp.		x		x				s	o
<i>Dicranella varia</i> (Hedw.) Schimp.	x	(x)		(x)	x		x	s	f
<i>Dicranum viride</i> (Sull. & Lesq.) Lindb.	(x)							c	r
<i>Ditrichum pallidum</i> (Hedw.) Hampe				(x)				s	r
<i>Ditrichum pusillum</i> (Hedw.) Hampe				(x)				s	r
<i>Entodon compressus</i> C.M.	x	x		x	x	x	x	s,c	f
<i>Entodon cladorrhizans</i> (Hedw.) C.M.	x						x	c	o
<i>Entodon seductrix</i> (Hedw.) C.M.	x	x		x	x	x	x	s,c	f
<i>Eurhynchium bians</i> (Hedw.) Sande-Lac.	x	x		x		x	x	s	f
<i>Eurhynchium pulchellum</i> (Hedw.) Jenn.							x	s (P)	r
<i>Fabronia ciliaris</i> (Brid.) Brid.							x	c	r
<i>Fissidens bryoides</i> Hedw.				x			x	s,r (P)	o
<i>Fissidens osmundoides</i> Hedw.							x	r	r
<i>Fissidens taxifolius</i> Hedw.			x			x	(x)	s	o
<i>Funaria hygrometrica</i> Hedw.	(x)	x		x	(x)		(x)	s (P)	f
<i>Grimmia laevigata</i> (Brid) Brid.		x						r	r
<i>Haplcladium virginianum</i> (Brid.) Broth.							x	c	r
<i>Hedwigia ciliata</i> (Hedw.) P.-Beauv.	x							r	r
<i>Homomallium adnatum</i> (Hedw.) Broth.	x				(x)			r	r
<i>Leptobryum pyriforme</i> (Hedw.) Wils.	x			(x)			x*	s (P)	o
<i>Leskea gracilescens</i> Hedw.	x	x	x	x	x	x	x	s,c	f
<i>Leskea obscura</i> Hedw.		(x)					x	c	r
<i>Leskeella nervosa</i> (Brid.) Loeske							x	c	r
<i>Lindbergia brachyptera</i> (Mitt.) Kindb.	x	x*		x				c	o
<i>Mnium affine</i> Bland. ex. Funck		(x)						s	r
<i>Mnium cuspidatum</i> Hedw.	x	x	x	x	x	x	x	s	f
<i>Mnium spinulosum</i> BSG		(x)						s	r
<i>Mnium stellare</i> Hedw.							(x)	s	r
<i>Orthotricum anomalum</i> Hedw.	x							r	r
<i>Orthotricum pumilum</i> Sw.	x	x		(x)	x*	x	x	c	f
<i>Orthotricum stragulatatum</i> P.-Beauv.	(x)							r	r
<i>Phascum cuspidatum</i> Hedw.		x					x*	s (P)	r
<i>Physcomitrium bookeri</i> Hampe		(x)						s (P)	r
<i>Physcomitrium pyriforme</i> (Hedw.) Hampe	(x)	x		x	x	x*	(x)	s (P)	f
<i>Platygyrium repens</i> (Brid.) BSG	x	x*		(x)	x*		x	c	f
<i>Pleuroidium subulatum</i> (Hedw.) Rabh.							x*	s	r
<i>Poblia atropurpurea</i> (Wahl.) H. Lindb.		(x)						s	r
<i>Poblia nutans</i> (Hedw.) Lindb.							x	s,c	r
<i>Pottia davilliana</i> (Sm. ex Drake) C. Jens							x*	s	r
<i>Pylaisiella selwynii</i> (Kindb.) Crum, Steere & Anders.	(x)			x			x	c	o
<i>Rhodobryum roseum</i> (Hedw.) Limpr.	x*	x						s	r
<i>Rhynchostegium serrulatum</i> (Hedw.) Jaeg. & Sauerb.	x	x*		x	x	x	x	s,c	f
<i>Taxiphyllum deplanatum</i> (Bruch & Schimp. ex Sull.) Fl.	x	x	x*	(x)	x		x	s	f
<i>Timmia megalopolitana</i> Hedw.	x	x		x	x		x	s	f
<i>Tortella tortuosa</i> (Hedw.) Limpr.							x	s	r
<i>Tortula mucronifolia</i> Schwaegr.	x	x*			x*			s	o
<i>Weissia controversa</i> Hedw.				x	x	x*	x	s (P)	o
<b>HEPATICAE</b>									
<i>Aneura pinguis</i> (L.) Dum.	x	x			x*			s	r
<i>Conocephalum conicum</i> (L.) Lindb.	x	x					x	s	o
<i>Frullania brittoniae</i> Evans							x	c	r
<i>Frullania eboracensis</i> Gott.							x	c	r
<i>Frullania inflata</i> Gott.	x	x			x	x	x	c	f
<i>Frullania riparia</i> Hampe ex Lehm.	(x)							r	r
<i>Lophocolea heterophylla</i> (Schrud.) Dum.		x*	(x)				(x)	s,c	o
<i>Marchantia polymorpha</i> L.		(x)						s	r
<i>Porella platyphylloidea</i> (Schwein.) Lindb.	x							s,c,r	r
<i>Reboulia hemisphaerica</i> (L.) Raddi							(x)	s (P)	r
<i>Riccia cavernosa</i> Hoffm.		(x)						s	r
<i>Riccia fluitans</i> L.							(x)	s,a	r
<i>Riccia frostii</i> Aust.		x						s	r
<i>Riccia sullivantii</i> Aust.			x					s	r
<i>Riccocarpos natans</i> (L.) Corda		x						s,a	r
<b>ANTHOCEROTAE</b>									
<i>Phaeoceros laevis</i> (L.) Prosk.				(x)			x	s	r

*gamum*, *Pleuridium subulatum* and *Pottia davilliana* are new to the Loess Hills region. Twenty-five additional species collected by the authors represent new county records. Five of these, *Anomodon minor*, *Barbula unguiculata*, *Campylium chrysophyllum*, *Platygyrium repens*, and *Tortula mucronifolia*, each were found in two new counties within the Loess Hills region.

The 95 bryophyte species in the Loess Hills counties represent less than 40% of the 246 species reported to occur in the easternmost tier of Iowa counties bordering the Mississippi River (Peck, 1978). As pointed out by Churchill (1982) most of the moss taxa occurring in the Loess Hills counties (about 87%) also occur in these eastern Iowa counties. Thus the Loess Hills bryoflora is primarily a depauperate eastern deciduous flora. Churchill (1982) attributed this depauperization in part to arid periods of the Holocene climate and past occurrence of prairie fires. Additional factors contributing to the reduced bryophyte diversity of the Loess Hills region are the absence of significant bedrock exposures with associated microhabitats, and the lack of non-calcareous soils required by a number of acidophilous species.

Most of the bryophytes of the Loess Hills region occur on soil, trees and decaying logs in the deciduous forest habitats of east- and north-facing slopes within narrow valleys (Table 1). Wetland and floodplain species are represented by a number of thalloid liverworts and a few mosses.

A significant proportion of the bryophyte flora (26 species or about 27%) occurs on dry prairie soils. These species are found throughout the prairies but are most common on dry south- and west-facing slopes and on ridge crests where vascular plant cover is sparse and soil exposure is considerable. Some of these prairie species may be

physiologically adapted to the high temperatures and light intensities encountered in prairie habitats (van der Linden and Farrar, 1983). Together with soil lichens and algae, such species form a soil cover undoubtedly of significance in checking erosion of these fragile soils.

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