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## Phenology of Mosses In Iowa

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## PHENOLOGY OF MOSSES IN IOWA

HENRY S. CONARD

As with other groups of plants, the Atracheata observe times and seasons. A few species may be found in all stages of reproduction at almost all times of year, but most of them produce archegonia and antheridia at a certain season, and mature capsules and spores at another season. Spring fruiting mosses are subject to the vagaries of the weather much as the wild flowers and fruit trees are. And there may be straggling stages of almost any species at almost any time. A prolonged drought is likely to delay development.

The following table shows when the different stages may be expected in Iowa, based upon the collections at the State University of Iowa and Grinnell College. The date for capsules is the date on which a collection shows some opercula shed and others still in place. When the calyptra falls long before the capsule is ripe, we have tried to get a date when good calyptras may be collected. Our knowledge of the times of maturity of sperms and eggs is very incomplete; much observation is needed to fill out the dates for fertilization. Young sporophytes before the capsule swells perceptibly we have called spikes. Old spikes show nearly mature calyptras.

Grout's books name the season for spores. This is almost identical with our date for capsules. The data given for authorities outside of Iowa are mostly drawn from Grout.

### PHENOLOGY OF ATRACHEATA\*

Name of Plant	Perfect capsules	Calyptras	Spikes	Antheridia Archegonia	Spores, outside of Iowa
MUSCI					
Acaulon rubrum .....					early spring
Acaulon rufescens .....	April				
Acaulon Schimperianum .....	Nov.				
Acaulon triquetrum .....	Apr. 23				
Aloino rigida .....	Nov.				
Amblystegiella confervoides .....	July 23				
Amblystegium americanum .....	Not fruiting in Iowa				
Amblystegium compactum .....	Not fruiting in Iowa				
Amblystegium Juratzkanum .....	May 4- June 22				
Amblystegium serpens .....	June 28	Apr. 8, 13	Mch. 31	Aug. 21	spring spring
Amblystegium varium .....	May 19				autumn-
Anomodon attenuatus .....	Sept. 15- Oct. 14				e. winter
Anomodon minor .....	Oct. 3- Nov. 18				l. autumn- winter
Anomodon rostratus .....	Oct. 18				autumn
Aphanorhegma patens .....	October				Sept.-Dec.
Aphanorhegma serratum .....	Oct. 21- Dec. 1				Apr.-May
Astomum Muhlenbergianum .....	April				

\*The list of species is taken from *Bryologist* 48:70-82.

Name of Plant	Perfect capsules	Calyptras	Spikes	Antheridia, Archegonia	Spores, outside of Iowa
<i>Atrichum angustatum</i> .....	Oct.-May	Oct. 13			1. autumn-e. spring
<i>Atrichum crispum</i> .....	Not fruiting in Iowa				
<i>Atrichum Macmillani</i> .....					
<i>Atrichum undulatum</i> .....	Sep.-Oct.	Sep. 8			1. autumn-e. spring
<i>Aulacomnium heterostichum</i> .....	May 10		Nov. 17		1. autumn-e. spring
<i>Aulacomnium palustre</i> .....	Not fruiting in Iowa				
<i>Barbula fallax</i> .....	Oct.-Mch.				e. summer
<i>Barbula reflexa</i> .....	Not fruiting in Iowa				
<i>Barbula unguiculata</i> .....	Oct.-Apr.		Aug. 30		1. autumn-e. spring
<i>Bartramia pomiformis</i> .....	May		Mch. 22		Apr.-May
<i>Brachythecium campestre</i> .....	Oct.-Nov.				
<i>Brachythecium flagellare</i> .....	October				autumn-e. winter
<i>Brachythecium flexicaule</i> .....	October				autumn-e. winter
<i>Brachythecium oxycladon</i> .....	Oct.-Dec.				autumn-e. winter
<i>Brachythecium populeum</i> .....	Nov. 13				
<i>Brachythecium rivulare</i> .....	Oct. 25				
	Nov. 8				e. autumn
<i>Brachythecium rutabulum</i> .....	November				winter
<i>Brachythecium salebrosum</i> .....	Oct.-Nov.			May?	autumn-e. winter
<i>Brachythecium velutinum</i> .....	Not fruiting in Iowa				
<i>Brothera Leana</i> .....	Not fruiting in Iowa				
<i>Brotherella recurvans</i> .....	June				March
<i>Bruchia Sullivanti</i> .....	May				Sep.-Nov.
<i>Bryhnia graminicolor</i> .....	Not fruiting in Iowa				
<i>Bryum argenteum</i> .....	All year				autumn aut.-wint. e. spring
<i>Bryum caespiticium</i> .....	May			April	May-June
<i>Bryum capillare</i> .....	Not fruiting in Iowa				
<i>Bryum uliginosum</i> .....	May 12				August
	June 28				early summer
<i>Bryum pendulum</i> .....	June-				spring-
	July 19				summer
<i>Bryum pseudotriquetrum</i> .....	June				summer
<i>Bryum uliginosum</i> .....	July 1				June-
	Aug. 25				Sept.
<i>Calliergonella cuspidata</i> .....	Not fruiting in Iowa				
<i>Calliergonella Schreberi</i> .....					
<i>Campyllum chrysophyllum</i> .....	May 7	Apr. 17	Apr. 17		e. summer
<i>Campyllum hispidulum</i> .....	May 13	April	April		summer
<i>Campyllum polygamum</i> .....	Not fruiting in Iowa				
<i>Campyllum stellatum</i> .....	Not fruiting in Iowa				
<i>Catascopium nigratum</i> .....	Not fruiting in Iowa				
<i>Ceratodon purpureus</i> .....	May-July		Sep.-Apr.	Aug. 5	May
<i>Chamberlainia acuminata</i> .....	Oct.-Nov.				autumn
<i>Chamberlainia cyrtophylla</i> .....	Oct. 29				
<i>Cirriphyllum Boscii</i> .....	Not fruiting in Iowa				
<i>Climacium americanum</i> .....	May 8				autumn
<i>Climacium dendroides</i> .....	Not fruiting in Iowa				
<i>Cratoneuron filicinum</i> .....	Not fruiting in Iowa				
<i>Desmatodon coloradensis</i> .....	May				autumn
<i>Desmatodon obtusifolius</i> .....	June	Apr. 13	Apr. 13		autumn
<i>Desmatodon plinthibius</i> .....	June				spring
<i>Desmatodon Porteri</i> .....	June-July				spring
<i>Dicranella heteromalla</i> .....	Sep.-Apr.	Aug.-Apr.			Nov.-Dec.
<i>Dicranella rufescens</i> .....	Oct.-Nov.				
<i>Dicranella varia</i> .....	Oct.-Nov.				autumn-winter
<i>Dicranum Bonjeani</i> .....	Not fruiting in Iowa				
<i>Dicranum condensatum</i> .....	Not fruiting in Iowa				
<i>Dicranum flagellare</i> .....	July				spring
<i>Dicranum fulvum</i> .....	Not fruiting in Iowa				

Name of Plant	Perfect capsules	Calyptras	Spikes	Antheridia Archegonia	Spores, outside of Iowa.
MUSCI					
Dicranum montanum .....	Not fruiting in Iowa				a. autumn summer
Dicranum rugosum .....	Not fruiting in Iowa				l. summer
Dicranum scoparium .....	Aug. 10				l. summer- autumn
Dicranum viride .....	Not fruiting in Iowa				
Didymodon recurvirostris .....	July		May 27		summer- autumn
Didymodon rigidulus .....	Not fruiting in Iowa				spring
Didymodon tophaceus .....	Not fruiting in Iowa				winter
Didymodon trifarius .....	Not fruiting in Iowa				winter
Distichium capillaceum .....	June- July				e. summer
Ditrichum lineare .....	Sept.				autumn
Ditrichum pallidum .....	May				June
Ditrichum pusillum .....	Oct.-Dec.				autumn
Drepanocladus aduncus .....	Not fruiting in Iowa				summer
Drepanocladus intermedius .....	Not fruiting in Iowa				spring
Drepanocladus revolvens .....	Not fruiting in Iowa				spring
Drepanocladus Sendtneri .....	Not fruiting in Iowa				spring- summer
Drepanocladus uncinatus .....			May 9		spring
Drummondia prorepens .....	Not fruiting in Iowa				spring
Encalypta ciliata .....	May 27	May 27			l. summer
Encalypta streptocarpa .....	Not fruiting in Iowa				l. summer
Entodon cladorrhizans .....	October				autumn
Entodon compressus .....	Oct.-Apr.				
Entodon seductrix .....	October				autumn- e. winter
Ephemerum cohaerens .....	November				l. autumn- e. winter
Ephemerum crassinervium .....	Oct.-Dec.				l. autumn- e. spring
Ephemerum spinulosum .....	Sept.-Nov.				l. autumn- e. spring
Eurhynchium hians .....	Oct. 18- Nov. 3	Oct.-Nov.			l. autumn
Eurhynchium serrulatum .....	Oct. 12- 20	Oct. 12			Sept.-Oct.
Eurhynchium strigosum .....	Not fruiting in Iowa				autumn spring
Fabronia ciliaris .....	Not fruiting in Iowa				l. autumn- winter
Fissidens cristatus .....	Dec. 9	Dec. 9			summer summer
Fissidens exiguus .....	Sept. 27				summer
Fissidens Julianus .....	Not fruiting in Iowa				l. autumn
Fissidens minutulus .....	Sept.				autumn
Fissidens obtusifolius .....	June-Oct.				January
Fissidens subbasilaris .....					Nov.-Mch.
Fissidens taxifolius .....	March				summer
Fontinalis Duriaei .....	Not fruiting in Iowa				
Funaria calvescens .....	Nov. 16				May-July
Funaria flavicans .....	May				e. June
Funaria hygrometrica .....	October		Mch.-May		winter- e. spring
Grimmia alpicola .....					e. spring
Grimmia apocarpa .....	April	Apr. 13			spring
Grimmia laevigata .....	April		October		April
Grimmia pillifera .....					spring
Grimmia plagiopodia .....	Apr. 13	Apr. 13			winter- spring
Grimmia pulvinata .....	Apr. 13	Apr. 13			winter- spring
Grimmia Raui .....					winter- spring
Gymnostomum aeruginosum .....					l. summer- autumn
Gymnostomum calcareum .....	July- Sept.				summer
Gymnostomum recurvirostrum .....	Sept.- Oct.				l. summer- autumn
Gyrowesia tenuis .....	July 3				

Name of Plant  MUSCI	Perfect capsules	Calyptras	Spikes	Antheridia Archegonia	Spores, outside of Iowa
Haplohymenium triste .....	Not fruiting in Iowa				Unknown
Hedwigia ciliata .....	May 26		Sept. 14		spring
Helodium Blandowii .....	Not fruiting in Iowa				July
Helodium paludosum .....	Not fruiting in Iowa				winter
Heterophyllum Haldanianum .....	Oct. 13				1. fall
	Nov. 13				winter
Homomallium adnatum .....	July	June	May		summer
Hygroamblystegium irriguum .....	May	Mch.-Apr.	November		summer
Hygroamblystegium noterophilum .....	Not fruiting in Iowa				
Hygroamblystegium orthocladon .....	May 12	March			
	June 24				
Hygorhynchium ochraceum .....	Not fruiting in Iowa				spring- e. summer
Hylocomium splendens .....					e. spring
Hyophila Tortula .....	Not fruiting in Iowa				
Hypnum crista-castrensis .....	May 9				1. summer- autumn
Hypnum cupressiforme .....	Not fruiting in Iowa				1. autumn e. winter
Hypnum curvifolium .....	May 12				spring
Hypnum imponens .....	Not fruiting in Iowa				autumn- e. winter
Hypnum Patientiae .....	June 12				spring
Hypnum reptile .....	Aug. 15	Aug. 15			mid- summer
Leptobryum pyriforme .....	June-July		November		June-July
Leptodictyum brevipes .....	Not fruiting in Iowa				
Leptodictyum riparium .....	May-June		Mch. 31		spring summer
Leptodictyum trichopodium .....	May 31	Apr. 22			e. summer summer
Leskea gracilescens .....	Sept.-Oct.				e. summer summer
Leskea nervosa .....	Not fruiting in Iowa				e. summer e. summer
Leskea obscura .....	Sept.-Oct.				Sept.- June
Leskea polycarpa .....					1. fall- e. winter
Leucobryum glaucum .....	Oct.-Nov.				
Leucodon julaceus .....	Not fruiting in Iowa				
Leucodon sciuroides .....	Not fruiting in Iowa				
Lindbergia brachyptera var. Austinii .....	Sept. 15				
	Nov. 13				
Mnium affine .....	May-June		January	June	May
Mnium cuspidatum .....	Apr.-June		Sept.-Apr.	October?	May
Mnium longirostrum .....	Not fruiting in Iowa				e. spring May
Mnium medium .....	June		October	June	July-Aug.
Mnium orthorhynchum .....	August			August	
Mnium punctatum .....	Not fruiting in Iowa				
Mnium serratum .....			June 22		June May
Mnium stellare .....	Not fruiting in Iowa				
Myurella Careyana .....	August				
Nanomitrium synoicum .....	November				summer
Neckera pennata .....	Not fruiting in Iowa				
Oncophorus Wahlenbergii .....	May 9				
Orthotrichum anomalum .....	June				July-Sept. spring
Orthotrichum Lescurii .....					
Orthotrichum obtusifolium .....	Not fruiting in Iowa				
Orthotrichum pumilum .....	Apr.-June	June	November		spring May
Orthotrichum stellatum .....	June		October		
Orthotrichum strangulatum .....	May-June		May 5		
Phascum cuspidatum var. americanum .....	March				e. spring May-June
	June				
Philonotis fontana .....	Not fruiting in Iowa				
Philonotis longiseta .....	May				
Philonotis marchica .....	Not fruiting in Iowa				
Physcomitrium Hookeri .....	May				
Physcomitrium immersum .....	Oct.-Nov.				fall
Physcomitrium Kellermani .....	June				
Physcomitrium turbinatum .....	Apr.-June	April	March		spring May summer
Plagiopus Oederi .....	May				
Plagiothecium denticulatum .....					

Name of Plant	Perfect capsules	Calyptas	Spikes	Antheridia Archegonia	Spores, outside of Iowa
<b>MUSCI</b>					
Plagiothecium deplanatum .....	autumn				
Plagiothecium geophilum .....	Not fruiting in Iowa				spring-summer
Plagiothecium Roeseanum .....	Aug. 14-October				
Plagiothecium sylvaticum .....	Not fruiting in Iowa				
Platygyrium repens .....	October				e. autumn
Pleuridium subulatum .....	May 12-June 9	April 7			Apr.-June
Pogonatum pensilvanicum .....	Oct.-Nov.				l. autumn
Pohlia annotina var. decipiens .....	Not fruiting in Iowa				summer
Pohlia atropurpurea .....	November				
Pohlia cruda .....	July				summer
Pohlia delicatula .....	May				May
Pohlia elongata .....	July				August
Pohlia nutans .....	May-June	April	October		spring-summer
Pohlia pulchella .....	May				May
Pohlia Wahlenbergii .....	Not fruiting in Iowa			June	spring-summer
Polytrichum commune .....	June			July	June
Polytrichum juniperinum .....	June		Oct.-Apr.		
Polytrichum ohioense .....	June		May		
Polytrichum piliferum .....	Not fruiting in Iowa				
Pottia Randii .....	July				
Ptychomitrium incurvum .....	May	April 13	April 13		l. winter
Pylaisia Jamesii .....	August				e. spring
Pylaisia Selwynii .....	August				autumn
Pylaisia subdenticulata .....					
Pyramidula tetragona .....	March				
Rhodobryum roseum .....	Sep.-Nov.			Aug.-Sep.	autumn
Rhytidadelphus triquetrus .....	June				winter-e. spring
Rhytidium rugosum .....	Not fruiting in Iowa				
Saelania glaucescens .....	Not fruiting in Iowa				
Seligeria calcarea .....	June				
Seligeria campylopoda .....	May				
Seligeria pusilla .....	June				
Sematophyllum adnatum .....	Not fruiting in Iowa				summer-autumn
Sematophyllum carolinianum .....	all year	June			summer
Sphagnum capillaceum .....	Not fruiting in Iowa				
Sphagnum magellanicum .....	Not fruiting in Iowa				
Sphagnum palustre .....	July 5	August			
Sphagnum subsecundum .....	Not fruiting in Iowa				
Sphagnum tenerum .....	Not fruiting in Iowa				
Tetraphis pellucida .....	August	August	August		l. autumn
Thelia asprella .....	October	Sept.			e. autumn
Thelia hirtella .....	Not fruiting in Iowa				autumn
Thuidium abietinum .....	Not fruiting in Iowa				
Thuidium delicatulum .....	October	Sept.			winter
Thuidium microphyllum .....	Not fruiting in Iowa				summer
Thuidium minutulum .....	November				autumn
Thuidium Philiberti .....	Not fruiting in Iowa				October
Thuidium pygmaeum .....					autumn
Thuidium recognitum .....	October	July 12			July
Thuidium virginianum .....	August	Apr. 13	April 13		spring
Timmia megapolitana .....	Apr.-June		Aug.-May		May
Tortella fragilis .....	Not fruiting in Iowa				summer
Tortella tortuosa* .....	Not fruiting in Iowa				spring
Tortella humilis .....	October				summer
Tortula mucronifolia .....	May-June				
Tortula muralis .....				spring	
Tortula pagorum .....	Not fruiting in Iowa				
Tortula ruralis .....	Not fruiting in Iowa			spring	
Trichostomum cylindricum .....	Not fruiting in Iowa				
Weisia viridula .....	Apr.-Nov.			spring	

\*Detected in Jackson County, Oct. 13, 1945.

HEPATICAЕ	Perianths	Sporo-phytes	Arche-gonia Anth-ridia
Bazzania trilobata .....	Not fruiting in Iowa	April	June October
Blasia pusilla .....	Not fruiting in Iowa	April	
Blepharostoma trichophyllum .....	Not fruiting in Iowa	Not fruiting in Iowa	
Calyptogeia fissa .....	Not fruiting in Iowa	Not fruiting in Iowa	
Calyptogeia Trichomanis .....	Not fruiting in Iowa	Not fruiting in Iowa	
Cephalozia bicuspidata .....	Sept.	April	
Cephalozia connivens .....	Sept.	Sept.	
Cephalozia media .....	Not fruiting in Iowa	Not fruiting in Iowa	
Cephaloziella byssacea .....	October	October	
Cephaloziella Hampeana .....	October	October	
Cephaloziella pulchella .....	November	November	
Chiloscyphus fragilis .....	Oct. 12	May 2	
Chiloscyphus pallescens .....	May	Aug. 4	
Chiloscyphus polyanthus .....	May	Aug. 4	
Cololejeunea Biddlecomiae .....	November	November	
Conocephalum conicum .....	Not fruiting in Iowa	April	
Frullania Bolanderi .....	Not fruiting in Iowa	April	
Frullania eboracensis .....	Aug.-May	May	
Frullania inflata .....	Jan.-July	Apr.-May	
Frullania riparia .....	Not fruiting in Iowa	Not fruiting in Iowa	
Frullania squarrosa .....	November	November	
Harpanthus scutatus .....	Not fruiting in Iowa	Not fruiting in Iowa	
Jamesoniella autumnalis .....	August	Aug.-Oct.	
Jungermannia lanceolata .....	Sept. 7	Sept. 7	
Jungermannia pumila .....	November	November	
Leiocolea badensis .....	May	May	
Lepidozia reptans .....	June	June 27	
Lophocolea heterophylla .....	December	Apr.-June	
Lophocolea minor .....	Not fruiting in Iowa	Not fruiting in Iowa	
Lophozia Mildeana .....	Not fruiting in Iowa	Not fruiting in Iowa	
Lunularia cruciata .....	Not fruiting in Iowa	Not fruiting in Iowa	
Mannia fragrans .....	May-June	May 8	
Mannia pilosa .....	June	June 29	
Mannia rupestris .....	June	June	
Marchantia polymorpha .....	Not fruiting in Iowa	July	
Nowellia curvifolia .....	Not fruiting in Iowa	Not fruiting in Iowa	
Odontoschisma prostratum .....	Not fruiting in Iowa	Not fruiting in Iowa	
Plagiochila aspinioides .....	March 24	March 24	
Plectocolea hyalina .....	June	Apr. 20	
Porella pinnata .....	Not fruiting in Iowa	Not fruiting in Iowa	
Porella platyphylla .....	Not fruiting in Iowa	Not fruiting in Iowa	
Porella platyphylloidea .....	May	May	
Preissia quadrata .....	Not fruiting in Iowa	May 13- June 22	
Ptilidium pulcherrimum .....	Not fruiting in Iowa	May	
Radula complanata .....	May	May	
Reboulia hemisphaerica .....	Not fruiting in Iowa	May-June	
Riccardia pinguis .....	October	October	
Riccia Beyerichiana .....	Not fruiting in Iowa	October	
Riccia fluitans .....	Not fruiting in Iowa	October	
Riccia Frostii .....	Not fruiting in Iowa	Oct.-Nov.	
Riccia Sullivantii .....	Not fruiting in Iowa	Sept.-Nov.	
Ricciocarpus natans .....	Not fruiting in Iowa	April	
Scapania nemorosa .....	Not fruiting in Iowa	Not fruiting in Iowa	
Tricholea tomentella*	Not fruiting in Iowa	Not fruiting in Iowa	
Tritomaria execta .....	Not fruiting in Iowa	Not fruiting in Iowa	
Tritomaria exesectiformis .....	Not fruiting in Iowa	Not fruiting in Iowa	
ANTHOCEROTAE			
Anthoceros laevis .....	June-Nov.	June-Nov.	Sept.-Oct.
Anthoceros punctatus .....	October	October	
Anthoceros crispulus .....	October	October	
Notothylas orbicularis .....	Sept.-Oct.	Sept.-Oct.	

\*Detected in Iowa County, Aug. 10, 1945.

GRINNELL COLLEGE AND  
STATE UNIVERSITY OF IOWA