

A
GRAPHIC
GUIDE
to
ONTARIO
MOSSSES

by ROBERT MUMA

©1985



TORONTO FIELD NATURALISTS

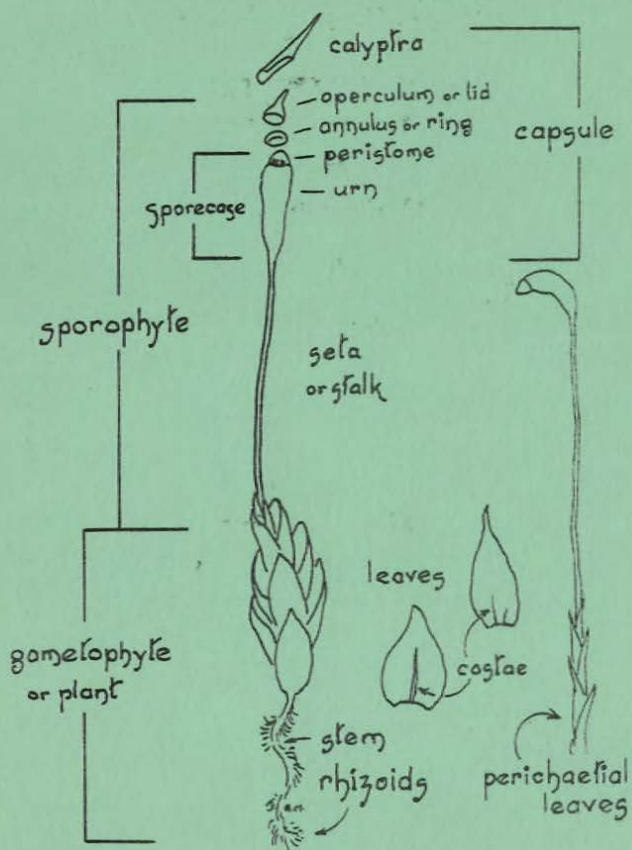
Canadian Cataloguing in Publication Data

Muma, Robert, 1907-
Graphic guide to Ontario mosses

Bibliography: p.
Includes index.
ISBN 0-920011-04-7

1. Mosses - Ontario - Identification - Pictorial
works. I. Toronto Field Naturalists. II. Title.

QK541.7.05M85 1984 588'.2'09713 C84-099748-5



ANATOMY of a
TYPICAL MOSS PLANT

CONTENTS

	Page Number		Page Number
Anatomy	inside front cover	Form:	
Foreword	1	Long, narrow leaves	6, 7
Acknowledgements	1	Brush/Broom-like	7
Area covered	1	Fan-like	8, 13
Nature of a moss	2	Tree-shaped	9
Typical habitat	2	Rope-like	10, 15
Description	2	Feather/Fern-like	11
Classification	5	Hook-Sickle-shaped	
Identification	5	leaves	12
Sporophyte	16-18	Leaves in 2 ranks	8-13
Moss habitats	19	Umbrella-shaped	14
Checklist of mosses			
Jim Baillie			
Nature Reserve	20		
Collecting	21		
Bibliography	22		
Index	23, 24		
Life cycle	inside back cover		

FOREWORD

This Guide is intended only as a graphic aid to PROBABLE GENUS, based on recognizable growth forms of mosses. (The growth forms charted here do not include all genera, and the growth form under which a genus is listed does not always represent all species of that genus.) It is hoped that a study of Plates 1 to 10 will make it easier to use one of the recommended texts on mosses listed on page 22. For a systematic listing of Ontario genera under class, sub-class, order, and family, refer to Ireland and Cain, CHECKLIST OF THE MOSSES OF ONTARIO.

If this Guide helps the beginner who is as yet unfamiliar with moss terms, then it will have served its purpose.

ACKNOWLEDGEMENTS

Robert R. Ireland of the National Museum of Natural Sciences in Ottawa has given valuable suggestions and Terry Carleton of the University of Toronto has been enthusiastic and helpful from the beginning. Their encouragement and advice are appreciated. Illustrated by the author. Edited by Helen Juhola and Diana Banville.

AREA COVERED

Although this Guide has been devised for Ontario mosses, a few west coast genera have been included for broader interest.

THE NATURE OF A MOSS

The Mosses (*MUSCI*) belong to a group of plants called the *BRYOPHYTA*, believed to have evolved from that aquatic life form known as the green algae. They are "cryptogamous", i.e. sexually reproducing but without stamens, pistils, or true seeds. Thus the bryophytes are the first land-based forms of plant life we know of. A few species of mosses are still aquatic, but most of them can survive long periods of dry weather successfully because their structure is such that, after the drought, they absorb moisture very quickly and soon "revive". All mosses, besides requiring moisture for their survival, also need water for sexual reproduction. The sperm, in order to reach the nearest ovum, must swim through a film of moisture (from rain or dew) over the surface of the plant. (See diagram inside back cover.) It is obvious then that mosses flourish most readily in moist and cool habitats.

Another significant feature of the bryophytes is that they do not take nourishment from the soil directly by means of a central core and elaborate root system. They have no roots as such, nor a central core, but absorb all the nutrients they require from the air and from the minerals washed by the rain from the foliage of trees and other plants overhead.

TYPICAL HABITAT

With the foregoing facts in mind, typical habitat can be described as "moist, cool, and shady places".

DESCRIPTION

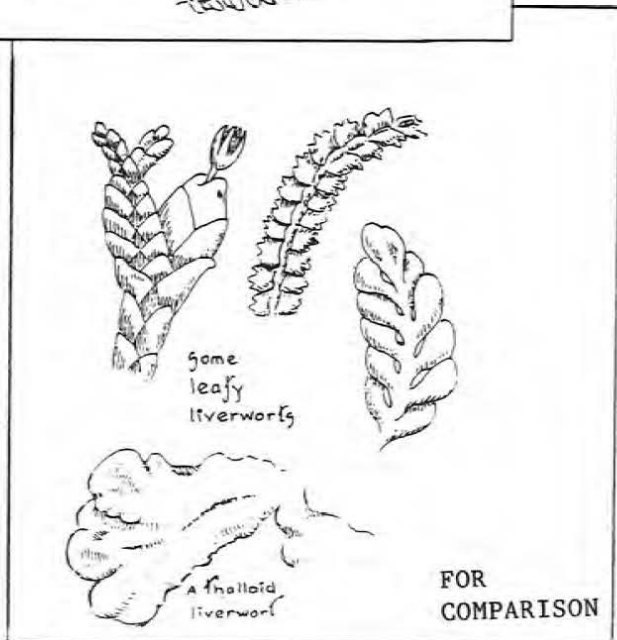
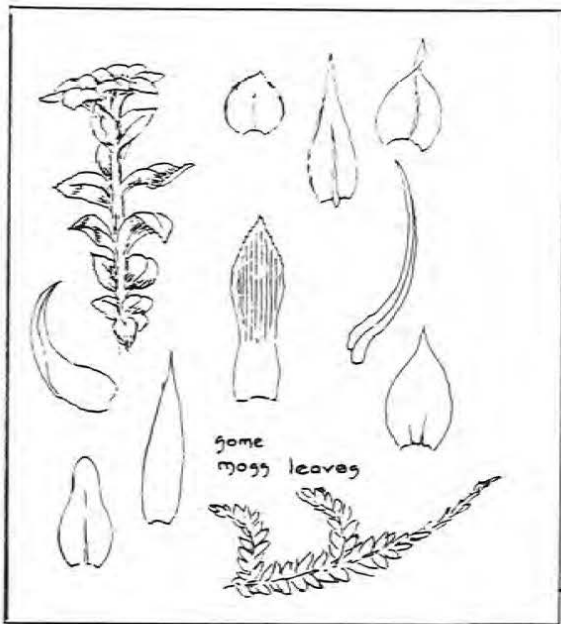
Most mosses are characteristically plant-like in structure, with stem, leaves,* and "fruit". Although not always readily apparent, the leaves grow spirally around the stem or in a flat, two-row arrangement. They superficially resemble another group of bryophytes in class *HEPATICAE* - the leafy liverworts, which have flattened leaves arranged in two rows, often with a third row underneath (distinct from the thalloid liverworts which lie flat on the ground without a stem or separate leaves). See illustrations opposite, for comparison.

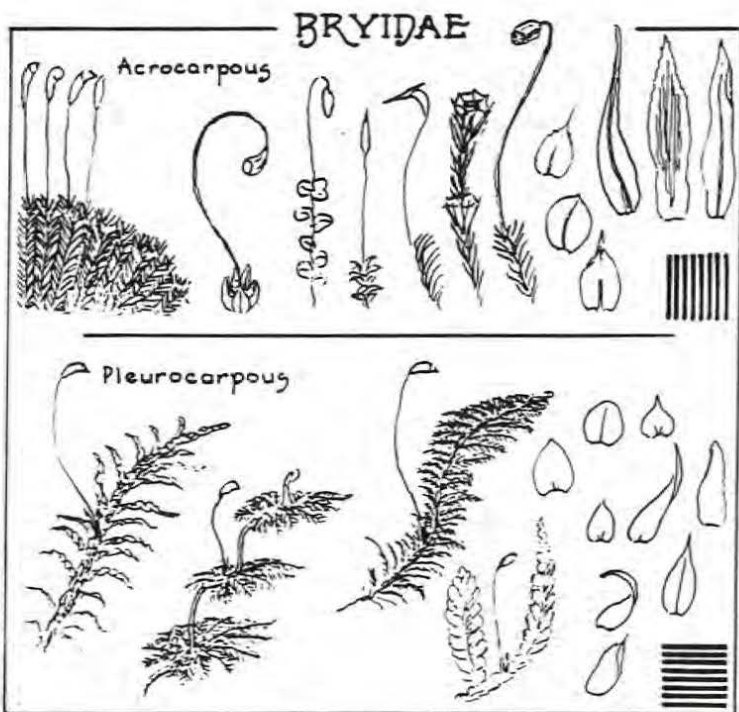
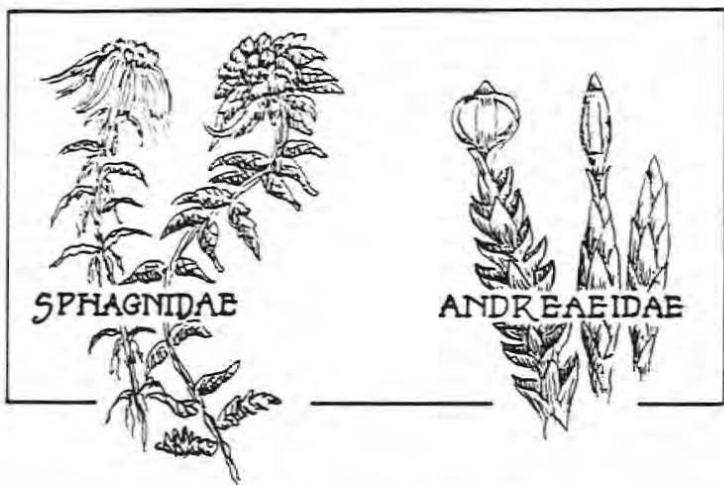
Sharing the same habitat, mosses and liverworts are often found growing together, intertwined and at first seemingly indistinguishable. With experience, however, the more flexible, almost gelatinous texture of the liverworts becomes an instantly recognizable characteristic.

*The leafless "reindeer moss" or "caribou moss" is a misnomer; it is not a moss but a lichen.

"...the soft green beds into which our feet sink,
and all the loveliness which we think of
when we think of -- mosses."



John Ruskin





CLASSIFICATION OF MOSSES

The class *MUSCI* (Mosses) is divided into three sub-classes: (See illustrations opposite.)

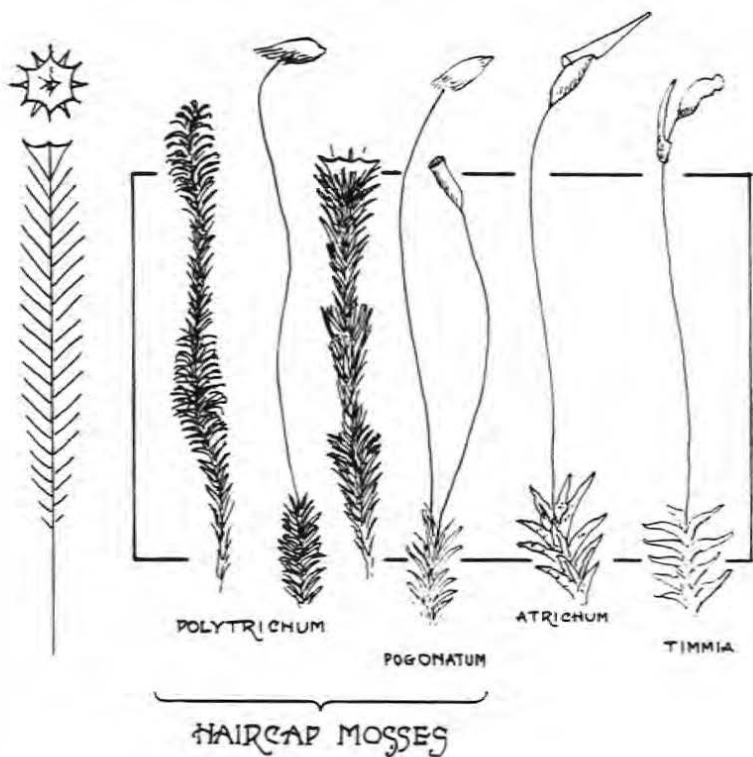
- (1) *SPHAGNIDAE*, a small sub-class consisting of a single family and a single genus with 135 species world-wide. These are the familiar *SPHAGNUM* mosses of the peat bogs.
- (2) *ANDREAEIDAE* has two families; only two species in genus *ANDREAEA* are in our area. These are boreal and alpine rock mosses.
- (3) *BRYIDAE* contains all other mosses, of numerous genera and an estimated 10,000 species throughout the world. They belong to many families, but it is more useful to divide the genera into two growth forms. These are known as (a) *Acrocarpous* mosses and (b) *Pleurocarpous* mosses. In any standard systematic guide to the mosses you will find (with only two or three exceptions) the first group in the first half of the book, and the second group in the latter half. Recognition of these two growth forms constitutes the basis for this guide. (For moss-anatomy terms mentioned below, see diagram inside front cover.)
 - (a) *Acrocarpous* mosses are those which grow upright as individual plants, either separately or very close together to form a turf, tuft, or cushion. In this group, the leaves nearly always have a costa, and the sporophyte grows from the tip or highest part (*acros*: highest; *karpus*: fruit). Some of the common acrocarpous genera are *DICRANUM*, *TORTELLA*, *BARBULA*, *MNIUM*, *BRYUM*, *POLYTRICHUM*. Perichaetial leaves not usually visible. 
 - (b) *Pleurocarpous* mosses are the prostrate or creeping plants on ground, wood, or rock surfaces. Some of these add new intertwining or overlaid growth each year to form mats. The leaves are usually without costa and the sporophyte grows from the side of one of the branches of the plant (*pleura*: side; *karpus*: fruit). The perichaetial leaves are longer and often quite different from the regular leaves. Many of the pleurocarpous mosses are known popularly as "feather mosses" and "fern mosses", including the genera *HYPNUM*, *THUIDIUM*, *AMBLYSTEGIUM*, *BRACHYTHECIUM*, *PLAGIOTHECIUM*, *HYLOCOMIUM*. 

IDENTIFICATION

- Note the symbols for acrocarpous and pleurocarpous moss forms and look for the clues to your specimen's genus under the applicable symbol in the following growth-form plates numbered 1 - 10.
 - If your specimen has sporophytes,* check their posture with the diagrams on pages 16, 17, 18.
 - Also check for habitat, page 19.
- Note: In this *GUIDE* the name of each genus is shown in upper case letters, e.g. *BRYUM*. Where a single species is relevant, the genus (in capitals) is followed by the specific name in lower case, as *BRYUM argenteum*. Where broader classifications are mentioned, they are shown in upper case italics, i.e. family, order, sub-class, class, and the phylum (*BRYOPHYTA*).

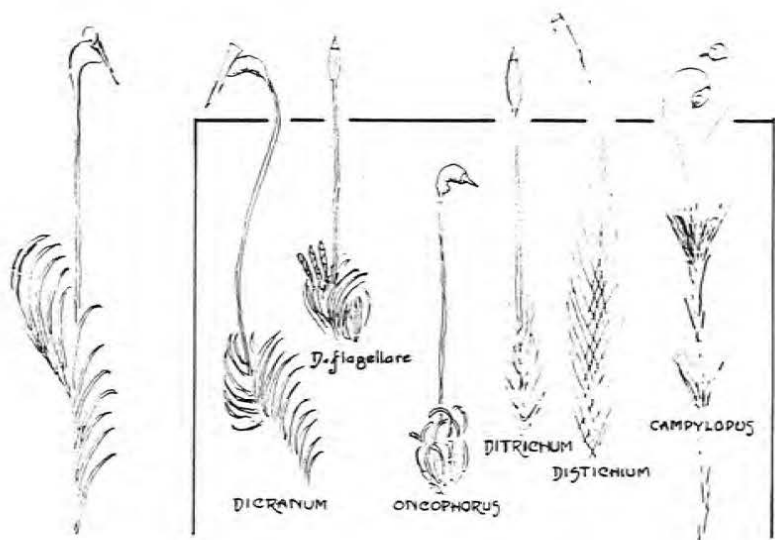
*Some mosses seldom produce sporophytes but tend to reproduce asexually.

1 LONG NARROW LEAVES in
3 or more RANKS about the stem



ATRICHUM
POGONATUM
POLYTRICHUM
TIMMIA

2 LONG NARROW LEAVES ^{straight} or ^{curved}
 brush or BROOM shaped



CAMPYLOPUS (West Coast)

CYNODONTIUM

DICRANELLA

DICRANUM

DISTICHUM

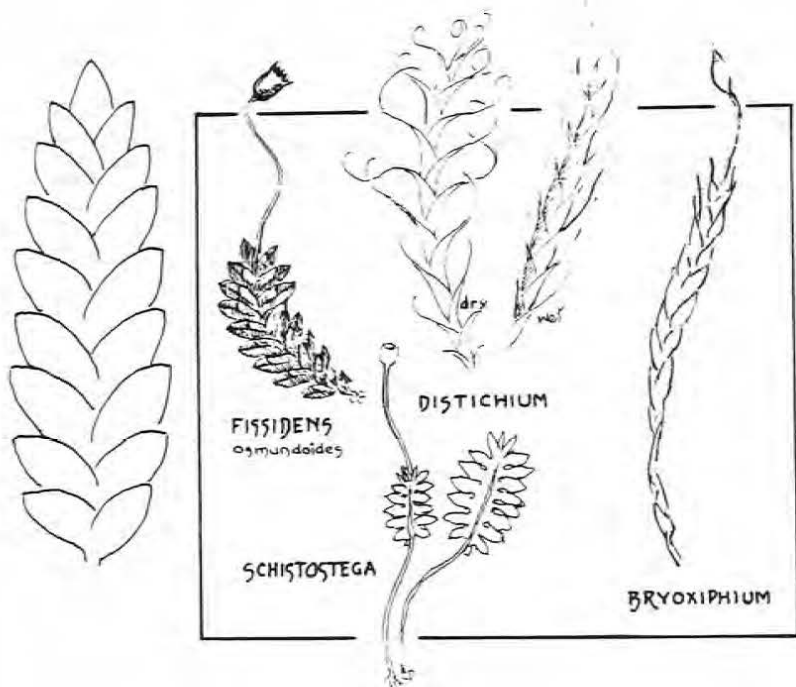
DITRICHUM

ONCOPHORUS

PARALEUCOBRYUM

TREMATODON

3 LEAVES in 2 RANKS and forming FLAT (fan-like) PLANTS



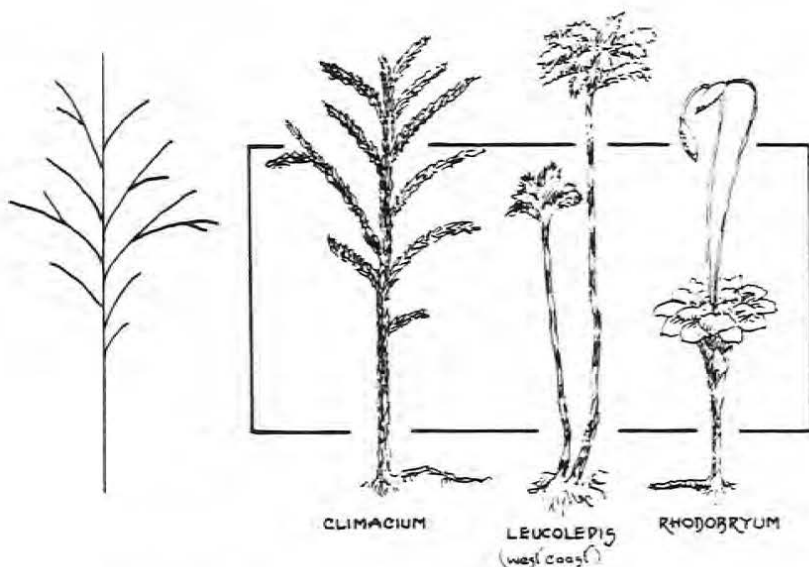
FISSIDENS DISTICHUM SCHISTOSTEGA BRYOXIPHIMUM

These are the only distichous (leaves in 2 ranks) acrocarpous genera occurring on our continent, and only the first two are very likely to be encountered here. SCHISTOSTEGA (Cave Moss) has been found a few times in Ontario in dark places cut off from direct light. BRYOXIPHIMUM (Sword Moss) has never been found in Canada at all. It is a curious moss found on some vertical sandstone cliffs across the U.S., Greenland and Iceland. It illustrates here the wide ranging form of this limited group.

The FISSIDENS genus is unusual in having species in both acrocarpous and pleurocarpous groupings. Position of the sporophyte determines which group the species belongs to. See also Plate 8.



SEPARATE UPRIGHT PLANTS
DENDROID (tree-shaped) or UMBRELLA-shaped



North America has few dendroid genera:

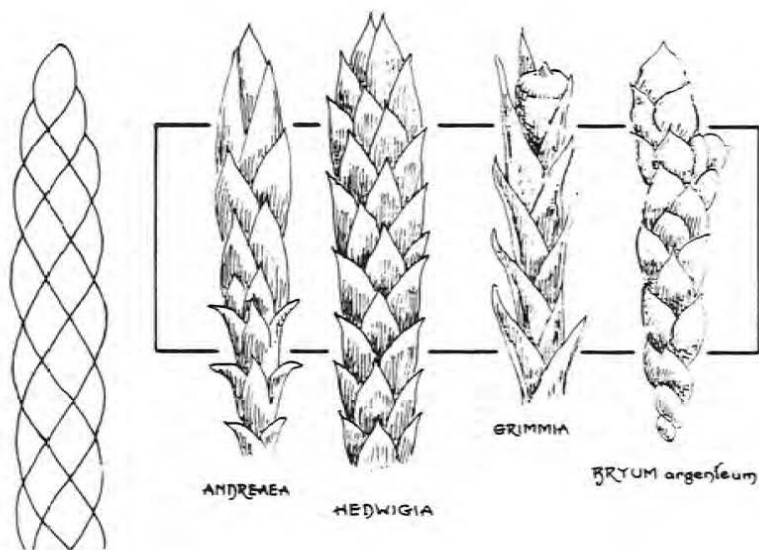
In the east: CLIMACIUM*
 RHODOBRYUM
 THAMNOBRYUM

On the west coast: LEUCOLEPIS

New Zealand is noted for its variety of dendroid mosses, including the picturesque "umbrella mosses".

*CLIMACIUM is included in this acrocarpous grouping only because it is so obviously a separate, upright plant and seldom has sporophytes to establish its true identity in this respect. When it does have sporophytes, they emanate from along its branches; therefore, it properly belongs with the pleurocarpous mosses. See Plate 9 (page 14).

5 LEAVES MULTI-RANKED appressed, julaceous* 
forming cylindrical, ROPE-like PLANTS



ANDREAEA

BRYUM argenteum

GRIMMIA

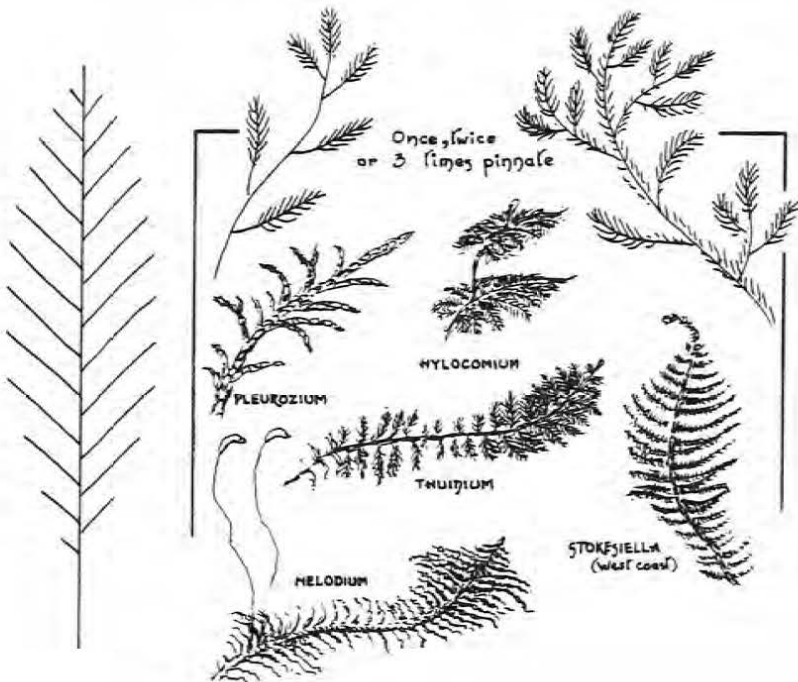
HEDWIGIA

ORTHOTRICHUM

ULOTA

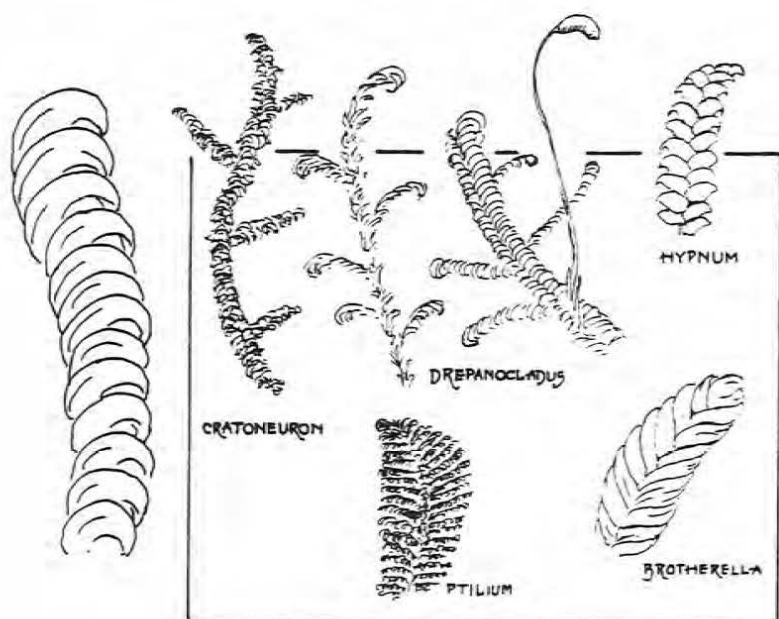
* Julaceous = smoothly cylindrical

6 PINNATE BRANCHING FEATHER-shaped or FERN-like MOSSES



- | | |
|---------------|-------------------------------|
| ABIETINELLA | PLEUROZIUM |
| BRACHYTHECIUM | PTILIUM (illustrated page 12) |
| DREPANOCLADUS | RHYTIDIADELPHUS |
| HAPLOCLADIUM | STOKESIELLA |
| HELODIUM | THELIA |
| HYLOCOMIUM | THUIDIUM |
| HYPNUM | |

7 LEAVES : FALCATE HOOK or SICKLE - shaped



BROTHERELLA

DREPANOCLADUS

CRATONEURON

HYPNUM

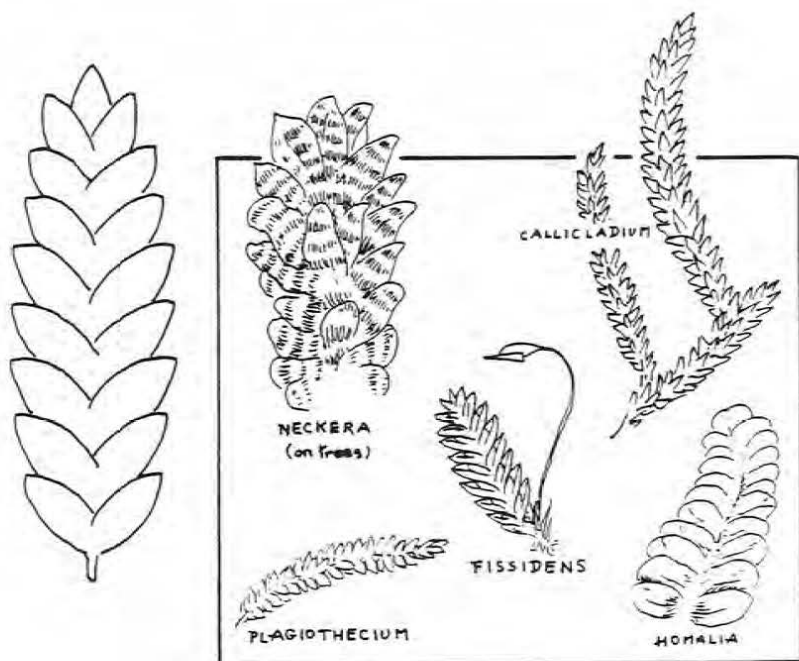
CTENIDIUM

PTILIUM

The genus HYPNUM is the largest of this group with several common species. The name comes from a Greek word meaning "sleep" and is believed to have referred to the mosses' recumbent nature. Many of the pleurocarpous mosses were thus formerly classed as HYPNUM species.

8

LEAVES in 2 RANKS and/or forming
FLAT (fan-like) BRANCHES

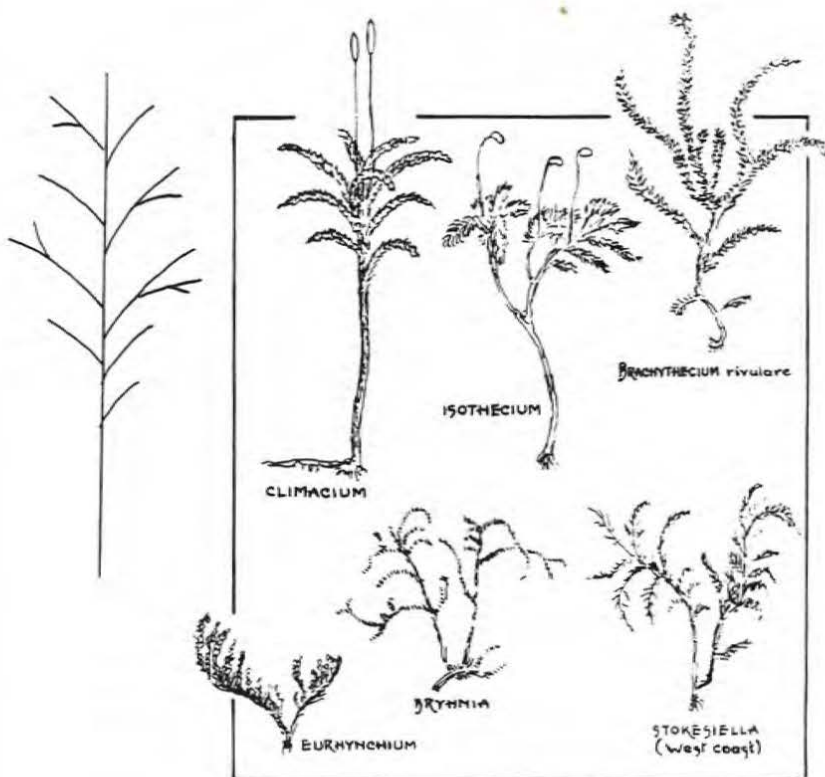


CALLICLADIUM
ENTODON
FISSIDENS
HOMALIA

ISOPTERYGIUM
NECKERA
PLAGIOTHECIUM
TAXIPHYLUM

CALLICLADIUM is one of our commonest woodland mosses with its single species *C. haldanianum* on tree roots and rotting logs. It can also be confusing with its complanate (flattened) branches so similar to other genera.

9 DENDROID (tree-shaped) and SUB-DENDROID PLANTS



BRACHYTHECIUM

EURHYNCHIUM

BRYHNTA

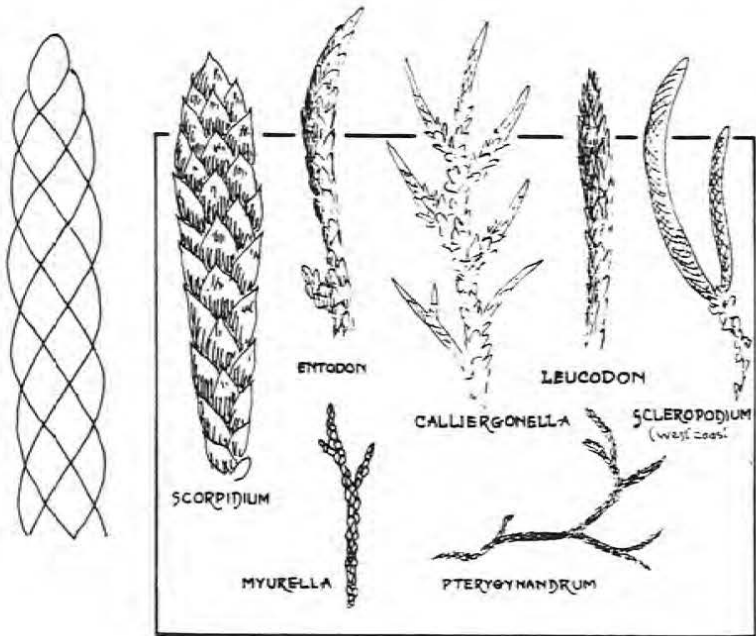
ISOETIUM

CLIMACIUM

STOKESIELLA

CLIMACIUM is the most typically dendroid of these genera. All of the others are members of the family BRACHYTHECIACEAE and various BRACHYTHECIUM species may be found growing sub-dendroid in very wet, or deep grassy places.

10 LEAVES MULTI-RANKED *appressed julaceous* 
forming cylindrical, ROPE-like BRANCHES



CALLIERGONELLA
CALLIERGON
ENTODON
GRIMMIA*

HEDWIGIA*
LESKEA
LEUCODON
MYURELLA

PTERYGANDRUM
SCLEROPODIUM
SCORPIDIUM
THELIA

*Although HEDWIGIA and GRIMMIA may at times appear to be either pleurocarpous or acrocarpous, for taxonomic reasons the former is classified as pleurocarpous and the latter as acrocarpous.
See Plate 5 (page 10).

SPOROPHYTE characteristics

A. With little or NO SETA and little or NO STEM



DIPHYSICIUM
EPHEMERUM
GRIMMIA
HEDWIGIA
PHASCUM
PHYSCOMITRIUM *immersum*
PLEURIDIUM



B. ERECT capsule, on seta at least 2 x capsule



ATRICHUM	PHYSCOMITRIUM <i>pyriforme</i>	
BARBULA	PLATYGYRIUM	
CERATODON*	POGONATUM	
CLIMACIUM	POLYTRICHUM	TETRAPHIS
DESMATODON	POTTIA	TORTELLA
DISTICHIUM	PYLAISSIELLA	TORTULA
DITRICHUM	RHACOMITRIUM	WEISSIA
ENCALYPTA	SELIGERIA	
GYMNOSTOMUM		



C. Suberect or HORIZONTAL capsule, on seta at least 2 x length of capsule



BARTRAMIA	LEUCOBRYUM
CERATODON*	ONCOPHORUS
DICRANELLA	PHILONOTIS
DICRANUM	TIMMIA
FISSIDENS	



D. With NODDING capsule



BRYUM	PLAGIOMNIUM
CINCLIDIUM	POHLIA
FUNARIA	RHIZOMNIUM
LEPTOBRYUM	RHODOBRYUM
MNIUM	



*inclined to horizontal capsules
but may also be erect.

SPOROPHYTE characteristics

a. With little or NO SETA

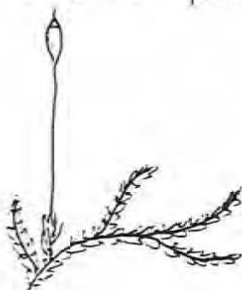


GRIMMIA
HEDWIGIA
NECKERA

ORTHOTRICHUM
ULOTA



b. ERECT capsule, on seta at least 2 x capsule

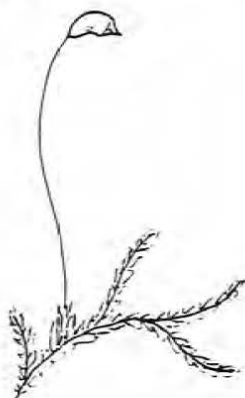


ANACAMPTODON
BRYHNIA
CLIMACIUM
ENTODON

LESKEA
PLATYDICTYA
PTERYGNANDRUM
THELIA



c. Suberect or HORIZONTAL capsule on seta
2 x capsule length

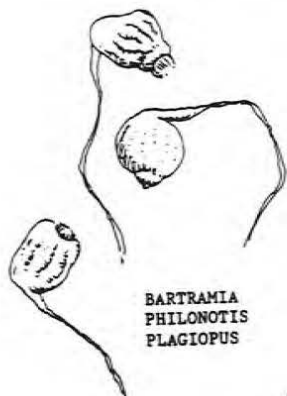


AMBLYSTEGIUM
BRACHYTHECIUM
BROTHERELLA
CALLICLADIUM
CALLIERGON
CALLIERGONELLA
CAMPYLUM
CRATONEURON
DREPANOCLADUS
EURHYNCHIUM
FISSIDENS
HELODIUM
HERZOGIELLA

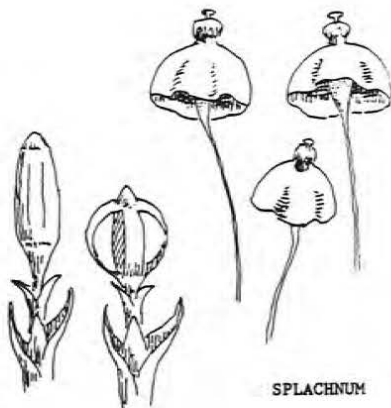
HOMALIA
HYGROAMBLYSTEGIUM
HYLOCOMIUM
HYPNUM
ISOTHECIUM
LEPTODICTYUM
PLAGIOTHECIUM
PLEUROZIUM
PTILIUM
RHYTIDIADELPHUS
SCORPIDIUM
THUIDIUM
TOMENTHYPNUM



Some UNUSUAL & RARE SPOROPHYTES



BARTRAMIA
PHILONOTIS
PLAGIOPUS



SPLACHNUM

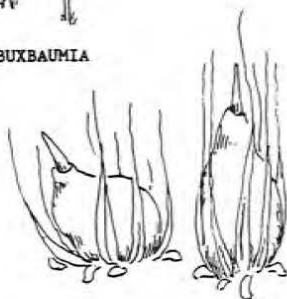


TREMATODON

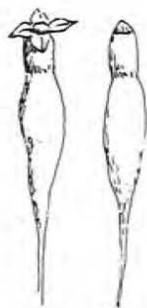


BUXBAUMIA

ANDREAEA



DIPHYSCIUM



TETRAPLODON

MOSS HABITATS

A. Forest Floor

ATRICHUM
BRACHYTHECIUM
HYLOCOMIUM
HYPNUM
PLAGIOTHECIUM
PLEUROZIUM
POLYTRICHUM
RHYTIDIADELPHUS
THUIDIUM

B. Tree Trunks
and Branches

ANTITRICHIA
(west coast)
DENDROALSIA
(west coast)
ISOTHECIUM (w. coast)
LEUCODON
NECKERA
ORTHOTRICHUM
PLATYGIUM
PYLAISIELLA
ULOTA

C. Old Logs
and Stumps

CALICLADIUM
CTENIDIUM

DICRANUM
ENTODON
HYLOCOMIUM
HYPNUM
PLATYGIUM
PTILIMUM
PYLAISIELLA
RHYNCHOSTEGIUM
TETRAPHIS
THUIDIUM

D. Base of Trunk
and Tree Roots

ANOMODON
BRACHYTHECIUM
BROTHERELLA
CALICLADIUM
HOMALIA
LEUCOBRYUM
PLAGIOTHECIUM

E. Swamps, Bogs,
Open Ditches,
Marshy Ground

AULACOMNIUM
BRACHYTHECIUM
BRYHNIA
BRYUM
CALLIERGON
CALLIERGONELLA
CLIMACIUM
CRATONEURON
DREPANOCLADUS
HELOIDIUM
MNIUM
PHILONOTIS
PLAGIOTHECIUM
POLYTRICHUM
SCORPIDIUM
SPHAGNUM
TOMENTHYPNUM

F. Stream Banks,
Shady Hillsides

ATRICHUM
BRACHYTHECIUM
FISSIDENS
HYPNUM
MNIUM

G. Bare Roadside Banks

BARBULA
BRYUM
CERATODON
HYPNUM
MNIUM

H. Disturbed Soil,
Garden Paths,
Greenhouses

BARBULA
BRYUM
CERATODON
DITRICHUM
EPHEMERUM
FUNARIA
LEPTOBRYUM
PHASCUM
PHYSCOMITRIUM
POHLIA
POTTIA

I. Old Animal Droppings & bones

SPLACHNUM
TAYLORIA
TETRAPLODON

J. Sidewalks, Pavement,
Walls, Roofs

BARBULA
BRYUM argenteum
CERATODON
TORTULA muralis

K. Burned Area, Campfire Sites

BRYUM
FUNARIA
POLYTRICHUM

L. Rocks

GRIMMIA NECKERA
HEDWIGIA ORTHOTRICHUM
HYPNUM PLATYGIUM
ISOTHECIUM TORTULA
MYURELLA ULOTA

M. Rocks on Mountains

ANDREAEA
GRIMMIA
RHACOMITRIUM

CHECKLIST OF MOSSES IN THE JIM BAILLIE NATURE RESERVE
(property of the Toronto Field Naturalists near Uxbridge, Ontario)
AT OCTOBER 10, 1984

SPHAGNIDAE

SPHAGNUM fimbriatum
SPHAGNUM magellanicum
SPHAGNUM russowii
SPHAGNUM squarrosum
SPHAGNUM warnstorffii

This checklist of specimens has been confirmed
by Robert R. Ireland, Curator of Bryophytes
Dept. of Botany, National Museum of Sciences,
Ottawa.

BRYIDAE (Acrocarpi)

ATRICHUM oerstedianum
AULACOMNIUM palustre
BRYUM argenteum (silvery bryum)
BRYUM pallescens
DICRANUM flagellare (whip fork moss)
DICRANUM montanum
DICRANUM undulatum
DICRANUM viride
FISSIDENS adiantoides
LEPTOBRYUM pyriforme (thread moss)
LEUCOBRYUM glaucum (white moss or
or pin cushion moss)
ONCOPHORUS wahlenbergii
ORTHOTRICHUM speciosum var. elegans
PLAGIOMNIUM ciliare
PLAGIOMNIUM ellipticum
PHILONOTIS fontana (fountain apple m.)
POHLIA nutans
POLYTRICHUM commune (common haircap m.)
POLYTRICHUM juniperinum (juniper moss)
POLYTRICHUM strictum
RHIZOMNIUM appalachianum
RHIZOMNIUM pseudopunctatum
RHODOBRYUM ontariense (Ontario rose m.)
TETRAPHIS pellucida (four-tooth moss)
TIMMIA megapolitana (Indian brave moss)
ULOTA crispa

BRYIDAE (Pleurocarpi)

AMBLYSTEGIUM varium
BRACHYTHECIUM campestre
BRACHYTHECIUM rivulare
BRACHYTHECIUM salebrosum
BRACHYTHECIUM oxycladon
BROTHERELLA recurvans

CALLICLADIUM haldanianum
CALLIERGON cordifolium
CAMPYLIIUM chrysophyllum
CLIMACIUM dendroides (tree moss)
DREPANOCLADUS aduncus
DREPANOCLADUS exannulatus
DREPANOCLADUS uncinatus
HELODIUM blandowii
HERZOGIELLA turfacea
HYLOCOMIUM splendens (stair-step moss)
HYPNUM imponens (common feather moss)
HYPNUM pallescens
HYPNUM lindbergii
LEPTODICTYUM trichopodium
PLAGIOTHECIUM denticulatum
PLAGIOTHECIUM laetum
PLATYGYRIUM repens
PLEUROZIIUM schreberi (Schreber's moss)
PYLAISIELLA polyantha
RHYTIDIADELPHUS triquetrus (shaggy moss
or rough-neck moss)
THUIDIUM recognitum (fern moss)

A collection of specimens of the above species is deposited
in the National Herbarium in Ottawa. It is requested that
specimens of any other species found at the Reserve be sent,
for addition to this collection, to:

Robert Muma
625 Rushton Road
Toronto, Ontario, M6C 2Y8 (phone 654-5635)

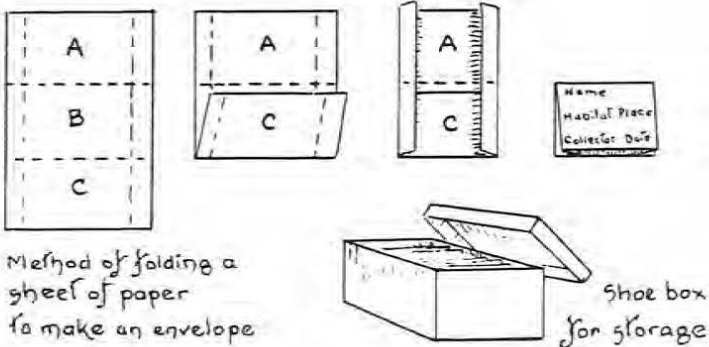
COLLECTING

The best way to identify and know the mosses is to collect a sample of each kind you find (being careful not to disturb the habitat). Plastic sandwich bags are an ideal way to carry them from the field. Be sure to remove them as soon as possible when you get home, or keep them in a cool place. Remember, mosses contain a lot of moisture and will sweat and mildew if left for too long in a warm place in an airtight container.

The simplest way of storing specimens is in paper envelopes made from plain or scrap paper and folded as shown. Either letter size or half is suitable. Be sure to write details of geographic location, habitat, date, and name when you have determined it, on the outside. Store these packets in a shoe box or similar container. These dried specimens can be quickly "revived" for study at any time by immersing a sample in water.

Select a suitable specimen of each species to press lightly (they dry very quickly) and paste in a note book with the name for future reference. This saves the bother of opening up envelopes for comparing specimens.

For identification purposes, you will need a good 10-power hand lens. If you have access to a binocular dissecting microscope, so much the better; and a compound microscope may be necessary for observing the finer distinctions between some species.



Method of folding a sheet of paper to make an envelope

Shoe box for storage

BIBLIOGRAPHY

- CONARD, Henry S. - HOW TO KNOW THE MOSSES AND LIVERWORTS. 2nd Edition 1979. Revised by Paul L. Redfern Jr. Wm. C. Brown Co. Publishers, Dubuque, Iowa. 302 pp. 478 figs. Covers all of North America.
- CRUM, Howard - MOSSES OF THE GREAT LAKES FOREST. 417 pp. 153 Figs. U. of Michigan, Ann Arbor. 1983. 3rd Ed.
- CRUM and ANDERSON - MOSSES OF EASTERN NORTH AMERICA. An extension of above. Columbia U. Press, New York City, 1981. 2 vols. 1328 pp. 637 plates.
- IRELAND, Robert R., and Roy F. CAIN. CHECKLIST OF THE MOSSES OF ONTARIO. Publications in Botany No. 5, National Museums of Canada, 1975. 66 pp. Lists 464 species for Ontario by counties.
- IRELAND, Robert R. (+ BIRD, BRASSARD, SCHOFIELD, VITT) - CHECKLIST OF THE MOSSES OF CANADA. Publications in Botany No. 8 of the National Museums of Canada, Ottawa, 1980. 75 pp. Lists almost 1400 species, subspecies, varieties etc. for Canada.
- IRELAND, Robert R. MOSS FLORA OF THE MARITIME PROVINCES. Publications in Botany No. 13 of the National Museums of Canada, Ottawa, 1982. Illustrat-glossary, 398 plates of line drawings, 738 pages.
- LAWTON, Elva - MOSS FLORA OF THE PACIFIC NORTHWEST. Hattori Botanical Laboratory, Japan, 1971. 362 pp.+ 195 full page plates.
- MUMA, Robert - "Discovering the Mosses" and "Let's Make a Moss Garden" ONTARIO NATURALIST, Vol. 19 No. 4 pp 20-32, Winter 1979.
- "The Andreaeidae" TORONTO FIELD NATURALIST 355 p20 April 1983.
 "Four Ontario Mosses" (BRACHYTHECIUM, CLIMACIUM, DIPHYSCIUM, FUNARIA) TORONTO FIELD NATURALIST 353 pp 1, 2 Feb. 1983.
 "More about Mosses - the Bryidae" - TORONTO FIELD NATURALIST 359 pp 6, 7 Nov. 1983.
 "The Sphagnum Mosses" - TORONTO FIELD NATURALIST 354 pp 28-29 March, 1983.
- NICHOLSON and BRIGHTMAN - THE OXFORD BOOK OF FLOWERLESS PLANTS. Oxford U. Press 1966 with corrections 1979. 208 pp. Includes fungi, lichens, ferns, mosses, liverworts. Lavishly illustrated in full colour. Contains many of our mosses.
- SCHOFIELD, W. B. - SOME MOSSES OF BRITISH COLUMBIA. Dept. of Botany, U. of B.C. 1969. 262 pp. Fully illustrated with line drawings. Now out of print; a new work in progress.
- SHUTTLEWORTH, Floyd S. - NON-FLOWERING PLANTS. 160 pages. Golden Press, New York 1967. 10 pp on mosses illustrating 34 common species in colour.
- WATSON, E. V. - THE STRUCTURE AND LIFE OF BRYOPHYTES. Hutchinson & Co., London, 1971. 211 pp. Illustrated.
- BRITISH MOSSES AND LIVERWORTS. Second Edition 1968. Cambridge U. Press. 495 pp. Illustrated. The moss flora of many countries around the world overlap in some degree and extend our interest that much farther afield.

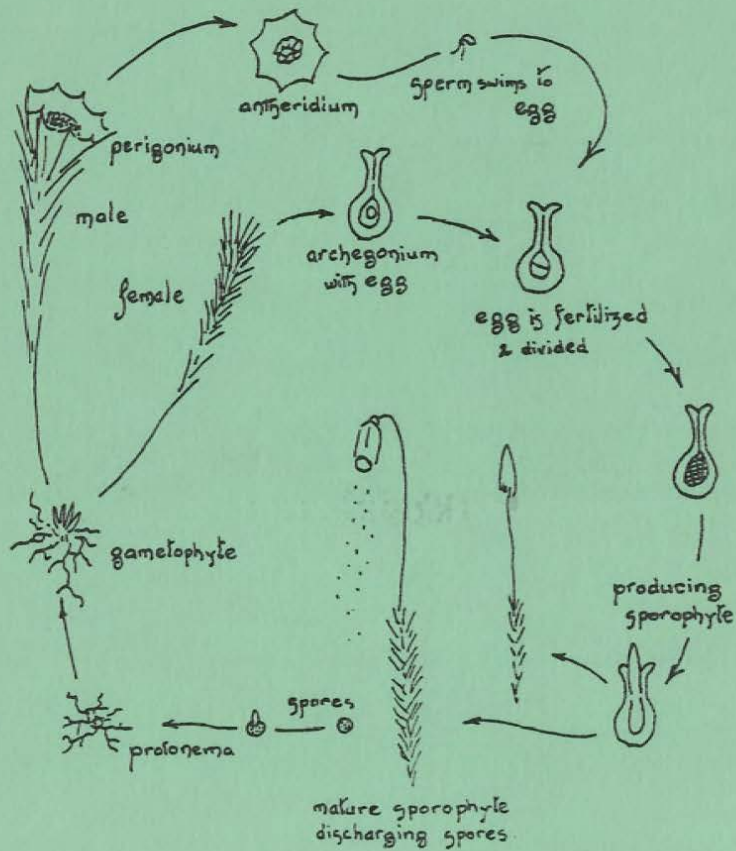
INDEX

	page(s)		page(s)
Abietinella	11	Falcate leaves	12
Acrocarpous mosses	4,5,6-10,15,20	Fan-shaped mosses	8,13
Amblystegium	5,17C,20	Feather-shaped mosses	5,11,20
Anacamptodon	17B	Fern-like mosses	5,11
Anatomy of a moss	inside front cover	Ferns	22
Andreaea	5,10,18,19M,22	Fissidens	8,13,16C,17C,19F,20
Andreaeidae	4,5,22	Fork moss	20
Annulus	inside front cover	Fountain apple moss	20
Anomodon	19D	Four-tooth moss	20
Antheridium	inside back cover	Funaria	16D,19K,22
Antitrichum	19B	Fungi	22
Apophysis	inside front cover	Gametophyte	inside front cover, inside back cov.
Archegonium	inside back cover	Grimmia	10,15,16A,17A,19B,L,M
Area covered	1	Gymnostomum	16B
Atrichia	6,16B,19A&F,20	Habitat	2, 11
Aulacomnium	19E,20	Haircap mosses	6, inside back cover
Barbula	5,16B, 19G,H,J	Haplocladium	11
Bartramia	16C,18	Hedwigia	10,15 ,16A,17A 19L
Bibliography	22	Helodium	11,17C,19E,20
Brachytheciaceae	14	Hepaticae	2
Brachythecium	5,11,14,17C,19ADEF,20,22	Herzogiella	17C,20
Broom-shaped mosses	7	Homalia	13,17C,19D
Brotherella	12,17C,19D,20	Hooked leaves	12
Brush-shaped mosses	7	Hygroamblystegium	17C
Bryhnia	14,17B, 19E	Hylocomium	5,11,17C,19A,C, 20
Bryidae	4,5,20,22	Hypnum	5,11,12,17C,19A,C,F,G,L, 20
Bryophyta	1, 22	Indian brave moss	20
Bryoxiphium	8	Isopterygium	13
Bryum	5,10,16D,19EGJ, 20	Isothecium	14,17C,19B, L
Buxbaumia	18	Julaceous leaves	10,15
Callicladium	13,17C,19C,D, 20	Juniper moss	20
Calliergon	15,17C,19E,20	Leptobryum	16D,19H,20
Calliergonella	15,17C,19E	Leptodictyum	17C,20
Calyptra	inside front cover	Leskea	15,17B
Campylium	17C,20	Leucobryum	16C,19D,20
Campylopus	7	Leucodon	15,19B
Capsule	inside front cover	Leucolepis	9
Caribou moss	2	Lichens	2,22
Ceratodon	16B,19G,H,J,L	Life cycle	inside back cover
Cinclidium	16D	Liverworts	2,3,22
Classification	5	Long-leaved mosses	6,7
Climacium	9,14,16B,17B,19E,20,22	Mnium	5,16D,19E,F,G
Collecting	21	Musci	1
Costa	inside front cover, 5	Myurella	15, 19L
Cratoneuron	12, 17C, 19E	Neckera	13,17A,19B
Ctenidium	12, 19C	Oncophorus	7,16C,20
Cynodontium	7	Operculum	inside front cover
Dendroaalsia	19B	Orthotrichum	10,17A,19B,20
Dendroid mosses	9,14	Paraleucobryum	7
Desmatodon	16B	Perichaetial leaves	inside front cov., 5
Dicranella	7,16C	Perigonium	inside back cover
Dicranum	5, 7,16C,19C,20	Peristome	inside front cover
Diphyscium	16A, 18, 22	Phascum	16A,19H
Distichum	7,8,16B	Philonotis	16C,18,19E,20
Ditrichum	7,16B,19H	Physcomitrium	16A,B,19H
Drepanocladus	11,12,17C,19E,20	Pinnate branching	11
Encalypta	16B		
Entodon	13,15,17B,19C		
Ephemerum	16A,19H		
Eurhynchium	14,17C		

INDEX - continued

Plagiomnium	16D,20	Seligeria	16B
Plagiopus	18	Seta	inside front cover
Plagiothecium	5,13,17C,19A,D,E, 20	Shaggy moss	20
Platydictya	17B	Sickle-shaped leaves	12
Platygyrium	16B,19C,20	Sphagnidae	4,5,20,22
Pleuridium	16A	Sphagnum	4,5,19E,20,22
Pleurocarpus		Splachnum	18, 19I
mosses	4,5,11,12,13,14,15,20	Spore case	inside front cover
Pleurozium	11,17C,19A,20	Sporophyte	inside front cover,5,16,17,18, inside back cover
Pogonatum	6, 16B	Stair-step moss	20
Pohlia	16D,20	Stokesiella	11,14
Polytrichum	5,6,16B,19A,E,K,L, 20	Taxiphyllum	13
Pottia	16B, 19H	Tayloria	19I
Protonema	inside back cover	Tetraphis	16B,19C,20
Pterygynandrum	15,17B	Tetraplodon	18,19I
Ptilium	11,12,17C,19C	Thalloid liverworts	2,3
Pyleisiella	16B,19B,C, 20	Thamnobryum	9
Reindeer moss	2	Thelia	11,15,17B
Rhacomitrium	16B,19M	Thread moss	20
Rhitiadiadelphus	11,17C,19A,20	Thuidium	5,11,17C,19A,C, 20
Rhizoids	inside front cover	Timmia	6,16C,20
Rhizomnium	16D,20	Tomentum	2
Rhodobryum	9,16D,20	Tomenthypnum	17C,19E
Rhynchostegium	19C	Tortella	5,16B
Rope-like mosses	10,15	Tortula	16B,19J,L
Rose moss	20	Tree-shaped mosses	9,14, 20
Schistostega	8	Trematodon	7,18
Schreber's moss	20	Ulota	10,17A,19B,20
Scleropodium	15	Umbrella-shaped mosses	9
Scorpidium	15,17C,19E	Urn	inside front cover
		Weissia	16B
		Woodsy mnium	10

NOTES



LIFE CYCLE of a HAIRCAP MOSS



TORONTO FIELD NATURALISTS
83 Joicey Blvd.
Toronto, Ont.
M5M 2T4