

A. Wilson



OCCASIONAL PAPER 6
SCIENCE SERIES 4

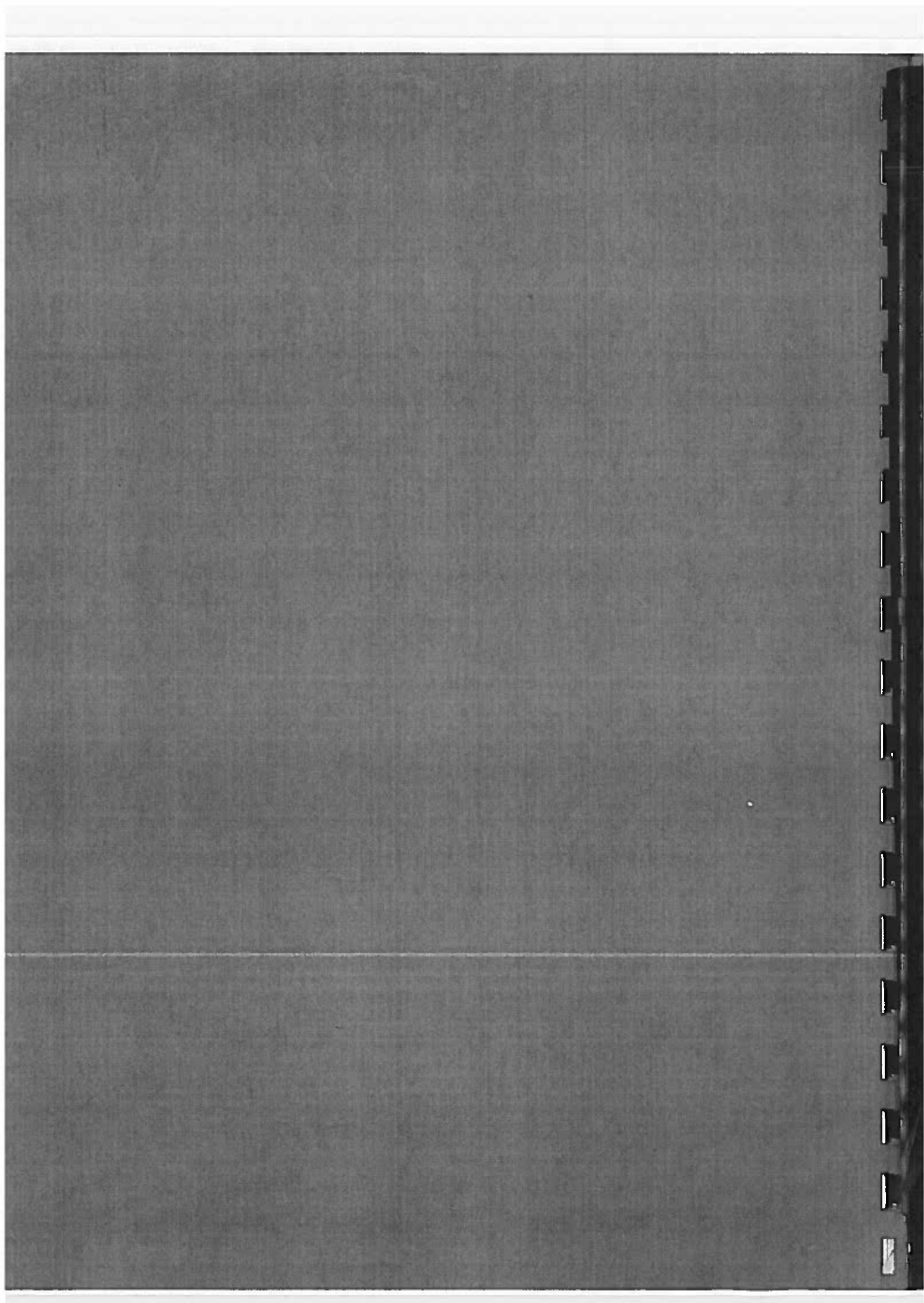
NOVA SCOTIA MUSEUM

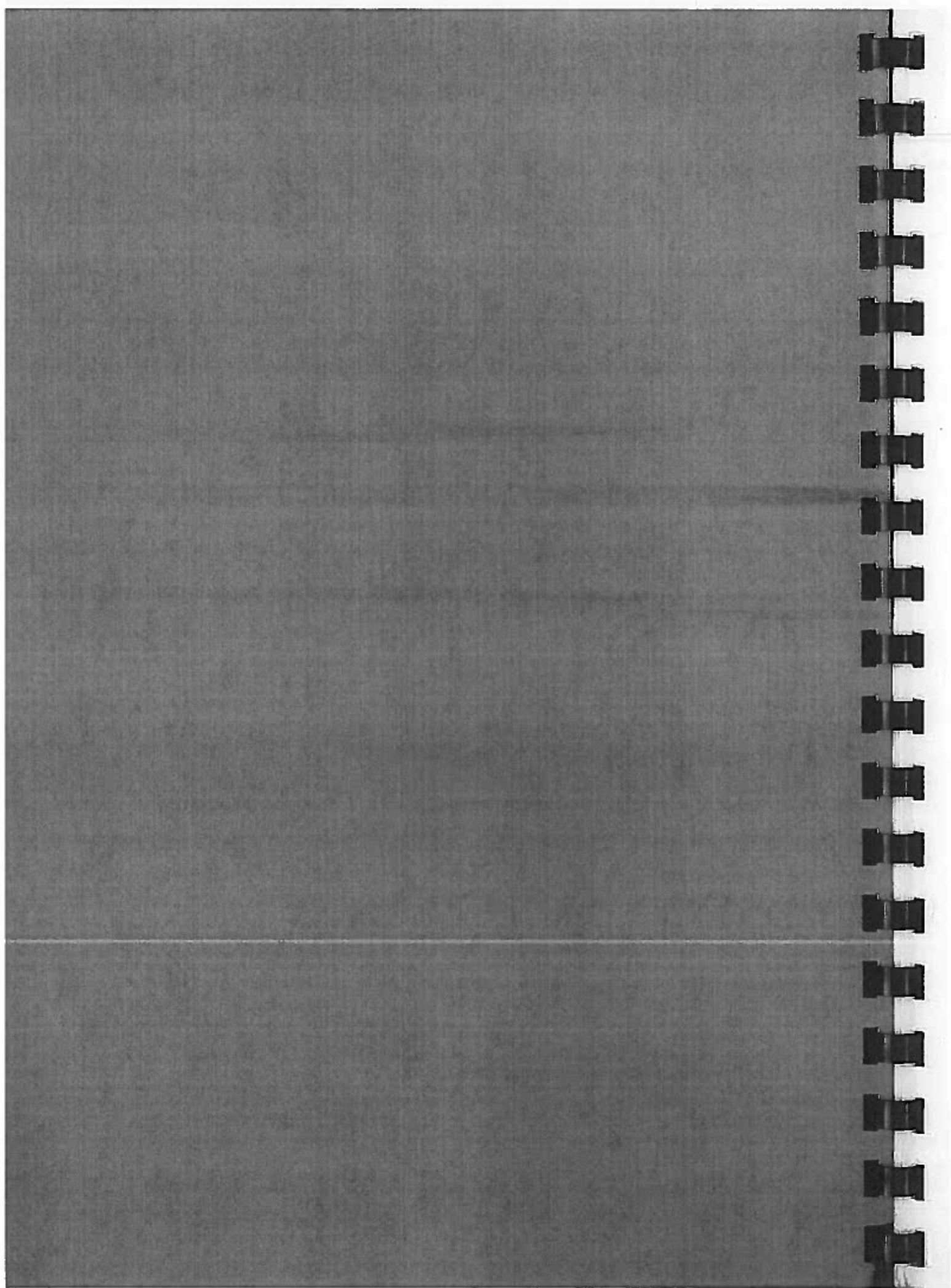
AN INTRODUCTORY MOSS FLORA
OF NOVA SCOTIA

BY J. S. ERSKINE



HALIFAX, NOVA SCOTIA AUGUST 1968





Alex Wilson

March. 1970

NOVA SCOTIA MUSEUM
Occasional Paper No. 6
Science Series No. 4

AN INTRODUCTORY MOSS FLORA OF NOVA SCOTIA

By

**J. S. Erskine,
Curatorial Associate**

Cover designed by Frederick Scott

NOVA SCOTIA DEPARTMENT OF EDUCATION

**Hon. Gerald Doucet,
Minister**

**Dr. H. M. Nason,
Deputy Minister**

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NOVA SCOTIA MUSEUM
The Nova Scotia Museum is a government department of the Government of Nova Scotia. It is responsible for the collection, preservation, and display of the natural and cultural heritage of the province. The museum is located in Halifax, Nova Scotia, and is open to the public.

AN INTERESTING MUSEUM ON NOVA SCOTIA

By J. S. Brackley,
Curatorial Assistant

Cover designed by Frederick Scott

NOVA SCOTIA DEPARTMENT OF EDUCATION

H. B. M. Mason,
Deputy Minister

Hon. Gerald Deneen,
Minister

Introduction

The objective of this outline is to lure beginners into the study of Nova Scotian mosses. The work has been going forward for about a century, yet it is probable that twenty-five percent of our mosses have not yet been collected and reported. Very little of the province has been studied more than superficially.

Mosses have both attractions and obstacles to offer to the collector. The field is so incompletely known that any amateur can add to existing knowledge; mosses take up little room and can be stored for years without precautions, except against damp, for insects do not attack them. However, mosses are so small that a hand-lens is necessary in collecting, and a microscope will be needed for adequate identification. Practical moss-books, such as Grout's Mosses with Handlens and Microscope and Dixon's Student's Handbook of British Mosses, cover only a fraction of our moss flora, which can be found only in the expensive and technical work, Grout's Moss Flora of North America. Miss Brown's List of Nova Scotian Mosses is now out of print and out of date in species and nomenclature. This paper should bring that list up to 1967 and may also enable the beginner to recognize most species without benefit of a herbarium of expertly identified specimens. Some genera are impossible even to the experts, but only those wishing to go deeply into the subject need break their hearts over Sphagnum, Grimmia and the Bryaceae. If a few enthusiasts can be tempted into this field, there is little doubt that this study will soon become obsolete. It should be possible to bring out new keys and descriptions periodically to keep it up to date.

The "keys" are attempts to guide the collector to the name of the species by elimination. A plant should be either this or the alternative, and by following through the possibilities one hopes to reach the right family, genus and species. The characters used are, when possible, those available to the hand-lens, and secondarily those available to the microscope. The species, however, have been determined by laboratory botanists equipped with complex machinery for sectioning leaves and for minute microscopic dissection. This seems to have resulted in the naming of too many species, and, until these are reduced to the true interbreeding units, most of us must be content with comparative accuracy in naming. Diagrammatic drawings are intended to indicate the size of the plant, the shape of leaves and capsules and whatever other features may help to identify them.

At the beginning of collecting it is advisable to gather only fruiting mosses which give one a double check upon identification. Mosses may be pressed for greater convenience in storing, but this tends to distort the leaves. Each moss worth keeping should be packeted with presumptive name, the habitat in which it was found, the place and the date, and a number should link it to a book of moss records. Memory is a broken reed. It is a great help if one can find someone to identify one's troubles, but this should be enlisted with discretion. Identification is time-consuming.

The collector, the first is an incomplete knowledge that any collector one has to establish knowledge; mosses take up little room and can be stored for years without preservation, except against damp, but it is not at all clear, however, that it is an ideal thing to have a book of mosses with a microscope will be needed for accurate identification. Practical moss-books, such as Green's Mosses with Handlens and Microscope and Green's Mosses with Handlens and Microscope, cover only a fraction of our moss flora, which can be found only in the expensive and technical work, Green's Moss Flora of North America. Green's Moss Flora of North America is now out of print and out of date in species and nomenclature. This book should have been first up to 1967 and may also enable the beginner to recognize most species without details of a number of expertly identified specimens. Some genera are impossible even to the experts, but only those wishing to go deeply into the subject need break their hearts over Spahny, Gilman and the Bryophytes. It is a low enthusiastic can be tempted into this field, there is little doubt that this study will soon become obsolete. It should be possible to bring out new keys and descriptions periodically to keep it up to date.

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The Moss Flora of Nova Scotia.

The study of Nova Scotian mosses began late. In 1877 Dr. John Somers was collecting in Halifax and Dr. A.H. MacKay in Pictou. The latter's collections are now in the Nova Scotia Museum, the former's have disappeared. One of Somers' species, Discelium nudum, has never been reported since, but the rest can be verified. Macoun was attracted by MacKay's collections and spent three summers in the province. Dr. G. E. Nichols of Yale worked for four summers in northern Cape Breton. In 1922 E. B. Bartram accompanied the Gray Herbarium expedition to Nova Scotia and added a few more species. During the next twenty-five years Miss Margaret S. Brown carried on the work, spending her summers in many parts of the province, and anyone who has learned anything about mosses in this quarter-century owes much to her knowledge and kindness. In 1942 Dr. Herbert Habeeb collected in the Windsor area and made the first discovery of the minute mosses of cultivated fields. In 1945 I took up the torch and from 1950 to 1956 I was enabled to extend my range by being employed as a summer collector by the Nova Scotia Museum. W. B. Schofield became interested and did some valuable collecting during the early fifties. Dr. Wolfgang Maase devoted the summer of 1961 to the Acisphagna, and I have recently, by my retirement, been enabled to take up again the collecting of the less thumbed areas.

This first century of bryology has necessarily concentrated chiefly upon "species-grabbing", the attempt to find and identify as many entities as possible, and this aspect of the study is still far from complete. My own inexperienced collecting has expanded the known species of Sphagnum by twenty-five percent and the other lists by a smaller proportion, yet every year of collecting brings in a few new species and new genera. Even so, our knowledge of the local bryoflora allows us to make some sense out of the floristic pattern.

We have found no reason to doubt that the whole of present-day Nova Scotia was covered with ice during the latter part of the last ice-age. Our present flora, therefore, must have migrated to this area from more favoured regions, and we cannot hope to find new species here. Among the vascular plants only one dubious species is considered to be peculiar to the province, and mosses evolve much less rapidly than vascular plants. Dr. A. E. Roland in his Flora of Nova Scotia grouped the sub-floras as Alleghenian, Northern, Southwestern and Introduced Plants, as well as minor groupings. Our distribution of mosses is very similar.

In textbooks one reads of the wind-distribution of spores which makes cryptogamic species world-wide. We cannot deny the wide distribution of species, since Dixon's British Mosses applies to Nova Scotia nearly as well as Grout's work for the northeastern United States, and we find occasional species in Nova Scotia with no known station within thousands of miles. Random spores may have reached us in hurricanes, but it is probable that the resemblance of our moss flora to that of Europe is that the species are older than the Atlantic barrier. Mosses spread their antherozoids (sperms) only through water, which encourages inbreeding and vegetative reproduction. That and their haploid structure make for rigid species but also for the independent survival of viable mutations. As a result the Linnaean concept of the species fits mosses poorly. We are further handicapped by our too scanty knowledge of the moss flora of Canada, past and present.

Our Nova Scotian moss-flora divides uncertainly into six groups: 1. Coastal-plain; 2. Arctic tundra; 3. Boreal forest; 4. Hardwood forest; 5. Second-growth woodland; 6. Weeds of cultivation.

The Coastal-plain flora was drawn from what are now the fishing banks but which, during the ice-age, was dry land. Remains of plants recovered from these banks suggest a boreal flora of spruce, birch and sphagnum, but this is because these are more easily preserved. Our flora, vascular and moss, suggests that the coastal plain provided a passageway from the Southern States to Newfoundland and allowed the passage of plants in both directions. Our vascular flora is a mixture of boreal and hardwood elements, so the boreal contribution from the coastal plain is not apparent and we count only the southern species as of that origin. I shall use the same names here, while recognizing that the origin of our tundra species may as well have been the coastal plain as the west. Our vascular coastal-plain plants belong to river sides and lake shores, but the cat-brier, Smilax rotundifolia, is a tree-climber, suggesting a forest background. Our moss flora that we can attribute to the coastal plain gives the same picture. Our water-sphagna, macrophyllum, Pylaesii, cuspidatum and subsecundum latissimum and the beach sphagnum, fimbriatum, might well come from dune ponds like those of Sable Island where two of these species still flourish. On the other hand, Thelia hirtella is a plant of treetrunks, yet in fifteen thousand years it has spread no farther from the South Shore than Lake Kejimikujik. It seems that the forests must have survived on the coastal plain until the mainland rivers were open and provided with trees to harbour Smilax and Thelia. These coastal-plain mosses are almost confined to the South Shore.

I have at times been misled by Grout's keys which dismiss certain mosses as "arctic only", though we find them in Nova Scotia. In fact, we have quite a variety of tundra species, chiefly in Cape Breton and on the basaltic outcrops around the Bay of Fundy. Such mosses are often yellow or white or red, colourings by which mosses protect themselves from too much sunlight, yet, like the vascular plants of the tundra, they are intolerant of shade. The crumbling basalt of the northward-facing slope of Isle Haute held Desmatodon longifolius whose nearest station was Gaspé and the next Greenland; the scree above the waterfall of the Great Southwest Aspy yielded Plagiobryum Zierii. Such rarities seem to be found chiefly on basic rock, damp and neither sunny nor shady, and these are the best conditions for arctic vascular plants also.

The boreal bryoflora is distinguished by being shade-resistant. Tundra and taiga are the results of more and less wind rather than latitude. The typical mosses of the Cape Breton forest, such as Rhytidiadelphus loreus and Plagiothecium piliferum are unknown between here and the Cascade Range. It seems likely that they overwintered the ice-age on the nunataks of Gaspé or western Newfoundland rather than that they travelled from the Pacific coast without leaving a trace of their passage. None of these are found in the area of the coastal-plain species, but they are frequent in Cape Breton and on the northward-facing slopes of the North Mountain. We can only admit our ignorance of how they reached here.

The hardwood-forest mosses are the most abundant and the least varied group, corresponding to the vascular flora of the same habitat. Of course, there is considerable variation according to soil and moisture. Where you find Dalibarda of the rose family, you may expect to find the moss Trematodon - not because they affect each other but because they both like sand. Some of the most abundant mosses of the forest, such as Pleurozium Schreberi and Hylocomium splendens, rarely fruit except in dry summers. It would seem that the coming of the white man with his forest fires and clean-cutting would have exterminated such shy breeders, but obviously it has not. Others, such as Heterophyllum Haldanianum, have adapted so well to destruction that on finding one of them one knows immediately that one can hope for nothing out of the commonplace here.

This might seem a pessimistic point of view, since all Nova Scotia has been ravaged by fire at one time or another, but there remains the blessing that all places do not burn. Rocky outcrops, marshes, lakes and gullies usually escape unhurt, and it is in these that variety remains. For other reasons than fire the flora is changing. When Nichols botanized

the Cape Breton barrens just before the First World War, he found the Splachnaceae well represented. These are the only mosses that show a specialized adaptation to Cenozoic conditions. They grow upon dung or fresh bones and make a good living in the short arctic summer. As they could land their spores upon such substrates only with infinite waste if they scattered them at random, they have enrolled flies as their distributors. They have developed sticky scent-glands just below their capsules, and the genus Splachnum has gone even farther and has developed a doorstep for the flies. This is wide and catches the falling spores on its sticky surface. A fly, attracted by the delicious odour of rotting meat, alights and gets her feet covered with sticky gum and spores but finds nowhere to deposit her maggots, so she flies away and alights on something more profitable to her offspring and also to the spores which she carried. When, forty years after Nichols, Schofield and I searched the barrens for Splachnaceae, we found none. In the meantime the caribou, which had provided the dung and bones for these mosses, had disappeared. The last caribou are said to have been killed in 1911, and in 1914 the government took action and forbade the killing of any more. By the time that deer had reached the barrens, the Splachnaceae had died out. They are still common around Goose Bay.

When Habeeb was collecting in Windsor, he happened upon a number of minute mosses in the local fields, including Pleuridium, Astomum and Phascum, all abundant enough from southern New England southward but unknown here. He suggested that these might be coastal-plain plants. In later years I added Ephemerum, Nanomitrium, Physcomitrium and Seligeria and several other minutes from the same area. Most of these tiny plants scatter their spores during the drying month of June and these remain in the soil until the wet months of autumn. During the winter they may remain as protonema, indistinguishable from soil algae to me, but with the coming of spring they grow rapidly and fruit, living their lives in the dead month of April when the surface soil is damp and the subsoil is still frozen. By June and the time when botanists are released from their universities, these tiny mosses have been reduced to dust and spores. This is one reason why they have been overlooked so long. Their distribution is not known adequately. Schofield and I have found them from Annapolis to Truro, and two other collectors have found Pleuridium near Halifax. Whatever may have been their origin, they have become weeds of cultivation, surviving only in the sparse cover of stubble-fields and roadsides and often disappearing for many years.

Several other mosses have the appearance of introduced

weeds. Physcomitrium turbinatum is known as the "green-house moss" and is found otherwise only on cultivated land. Ceratodon purpureus, our commonest roadside moss, is found on Seal Island only in the near neighbourhood of the fishermen's houses; farther away its niche in the ecology is taken by the native Didymodon recurvirostris. It is possible and even probable that many of these weed mosses, some of them a thousand miles from their nearest stations, have been brought in by the same machinery that introduced our thistles and dandelions which also could have migrated by air but probably did not.

So our study of the moss flora has gone a little beyond "species-grabbing" and is able to contribute its small quota to our understanding of the past. Nevertheless, much still remains to be done before the picture will be at all complete.

Classification of Nova Scotian Mosses

<u>Orders.</u>	<u>Families</u>	<u>Sub-Families</u>	<u>Genera</u>
1. <u>Sphaginales</u>	1. <u>Sphagnaceae</u>		<u>Sphagnum</u>
1. <u>Andreales</u>	2. <u>Andreaeaceae</u>		<u>Andreaea</u>
1. <u>Bryales</u>	3. <u>Tetraphidaceae</u>		<u>Tetraphis</u>
	4. <u>Polytrichaceae</u>		a. <u>Atrichum</u> b. <u>Pogonatum</u> c. <u>Polytrichum</u>
	5. <u>Fissidentaceae</u>		<u>Fissidens</u>
	6. <u>Ditrichaceae</u>		a. <u>Pleuridium</u> b. <u>Bruchia</u> c. <u>Saelania</u> d. <u>Trematodon</u> e. <u>Distichium</u> f. <u>Ceratodon</u> g. <u>Ditrichum</u>
	7. <u>Seligeriaceae</u>		a. <u>Seligeria</u> b. <u>Blindia</u>
	8. <u>Dicranaceae</u>		a. <u>Dicranella</u> b. <u>Rhabdoweisia</u> c. <u>Oreoweisia</u> d. <u>Dichodontium</u> e. <u>Oncophorus</u> f. <u>Arctoa</u> g. <u>Dicranum</u> h. <u>Dicranodontium</u> i. <u>Paraleucobryum</u>
	9. <u>Leucobryaceae</u>		<u>Leucobryum</u>
	10. <u>Encalyptaceae</u>		<u>Encalypta</u>
	11. <u>Buxbaumiaceae</u>		a. <u>Buxbaumia</u> b. <u>Diphyscium</u>
	12. <u>Pottiaceae</u>		a. <u>Astomum</u> b. <u>Weisia</u> c. <u>Gymnostomum</u> d. <u>Trichostomum</u> e. <u>Tortella</u> f. <u>Barbula</u> g. <u>Didymodon</u> h. <u>Phascum</u> i. <u>Pottia</u> j. <u>Aloina</u> k. <u>Desmatedon</u> l. <u>Tortula</u>
	13. <u>Grimmiaceae</u>		a. <u>Grimmia</u> b. <u>Rhacomitrium</u> c. <u>Hedwigia</u> d. <u>Campylostelium</u>

<u>Orders.</u>	<u>Families</u>	<u>Sub-families</u>	<u>Genera</u>
	14. <u>Ephemeraceae</u>		a. <u>Ephemerum</u> b. <u>Nanomitrium</u> <u>Discelium</u>
	15. <u>Disceliaceae</u>		a. <u>Physcomitrium</u>
	16. <u>Funariaceae</u>		b. <u>Funaria</u> a. <u>Tayloria</u> b. <u>Tetraplodon</u> c. <u>Splachnum</u> <u>Schistostega</u>
	17. <u>Splachnaceae</u>		a. <u>Orthotrichum</u> b. <u>Ulotia</u> c. <u>Amphidium</u> d. <u>Zygodon</u> e. <u>Drummondia</u> <u>Aulacomnium</u>
II. Bryales	18. <u>Schistostegaceae</u>		a. <u>Plagiopus</u> b. <u>Bartramia</u> c. <u>Philonotis</u> a. <u>Paludella</u> b. <u>Amblyodon</u> c. <u>Meesia</u> a. <u>Leptobryum</u> b. <u>Plagiobryum</u> c. <u>Pohlia</u> d. <u>Bryum</u> e. <u>Rhodobryum</u>
	19. <u>Orthotrichaceae</u>		a. <u>Mnium</u> b. <u>Cinclidium</u> <u>Climacium</u> <u>Porotrichum</u>
	20. <u>Aulacomniaceae</u>		a. <u>Pseudisothecium</u> b. <u>Bryhnia</u> c. <u>Cirriphyllum</u> d. <u>Eurhynchium</u> e. <u>Brachythecium</u> f. <u>Chamberlainia</u> g. <u>Camptothecium</u> h. <u>Scleropodium</u> i. <u>Homalotheciella</u>
	21. <u>Bartramiaceae</u>		a. <u>Leptodictyum</u> b. <u>Amblystegium</u> c. <u>Hygroamblystegium</u> d. <u>Sciaromium</u> e. <u>Cratoneuron</u> f. <u>Campylium</u> g. <u>Hygrohypnum</u> h. <u>Calliergon</u> i. <u>Calliergonella</u> j. <u>Pleurozium</u> k. <u>Drepanocladus</u>
	22. <u>Meesiaceae</u>		
	23. <u>Bryaceae</u>		
	24. <u>Mniaceae</u>		
Pleurocarps)	25. <u>Hypnaceae</u>	A. <u>Climaciaceae</u> B. <u>Porotricheae</u> C. <u>Brachytheciae</u> D. <u>Amblystegiae</u>	

<u>ders.</u>	<u>Families</u>	<u>Sub-families</u>	<u>Genera</u>
		<u>E. Hylocomiae</u>	a. <u>Hylocomium</u> b. <u>Rhytidiadelphus</u>
		<u>F. Hypneae</u>	a. <u>Hypnum</u> b. <u>Brotherella</u> c. <u>Heterophyllum</u> d. <u>Sematophyllum</u> e. <u>Homomallium</u> f. <u>Amblystegiella</u> g. <u>Platygyrium</u> h. <u>Pylaisia</u> i. <u>Plagiothecium</u>
<u>Bryales</u>	<u>26. Leskeaceae</u>	<u>A. Thuidiae</u>	a. <u>Thuidium</u> b. <u>Helodium</u> c. <u>Heterocladium</u> d. <u>Pseudoleskea</u> e. <u>Leskea</u> f. <u>Pterigynandrum</u> g. <u>Myurella</u> h. <u>Thelia</u> i. <u>Anomodon</u>
<u>eurocarps)</u>		<u>B. Leskeae</u>	a. <u>Neckera</u> b. <u>Homalia</u> a. <u>Leucodon</u> b. <u>Leptodon</u> <u>Anacamptodon</u>
		<u>C. Theliae</u>	a. <u>Fontinalis</u> b. <u>Dichelyma</u>
	<u>27. Neckeraceae</u>	<u>D. Anomodonteae</u>	
	<u>28. Leucodontaceae</u>		
	<u>29. Fabroniaceae</u>		
	<u>30. Fontinalaceae</u>		

Key to Families.

1. Plants with flaccid leaves; usually whitish, reddish, brown or pale green; leaf-cells of two kinds, the hyaline cells reinforced by spiral fibrils. 1. Sphagnum
Otherwise 2
2. Plants brown to almost black; on rocks; capsule splitting into four strips joined at tip 2. Andreaea
Otherwise 3
3. Stiff, harsh plants; costa with lamellae which show under the microscope as dark lines; capsule closed by teeth joined to a central plate 4. Polytrichaceae
Otherwise 4
4. Plants having gemmae on special receptacles A
Plants without these, though many have gemmae on stems or leaves 5
5. Plants with persistent protonema. Pogonatum pensilvanicum & F
Protonema disappearing early 6
6. Leaves complanate B
Leaves otherwise 7
7. Leaves bordered with long, narrow cells C
Leaves bordered with cells shorter or different from those of blade D
Leaves without special border 8
8. Plants with capsules. E
Plants without, or disregarding, capsules 9
9. Acrocarps 10
Pleurocarps 24
10. Minute mosses, hardly to be seen without hand-lens. F
Large enough to be seen 11
11. Whitish leaves; cells large rectangular, except on lower margins. 9. Leucobryum
Otherwise 12
12. Leaf-cells papillose. 19
Leaf-cells smooth 13
13. Leaves long and narrow. 14
Leaves lanceolate or wider. 17
14. Basal cells not enlarged; usually small plants. 6. Ditrichaceae
Basal cells enlarged; upper cells long or short . 15

15. Basal cells coloured 16
 Basal cells not coloured 21. Bartramiaceae
16. Erect plants 8. Dicranaceae
 Creeping plants of wet rocks 7. Blindia
17. Leaf-cells strong, rectangular or hexagonal. 18
 Leaf-cells large and lax. 16. Funariaceae; 17. Splachnaceae
18. Plants small to medium 12. Pottiaceae
 Medium-sized; cells long hexagonal . 23. Bryaceae
 Large to small; cells short and irregular. 24. Mniaceae
 (Check these in 18 under E, Capsules.) . . 22. Meesiaceae
19. Dark Green mosses of trees and rocks. 31
 Green plants of many habitats. 20
20. Leaves, ligulate, more or less opaque 21
 Leaves broader 23
 Leaves narrow to linear. 21. Bartramiaceae
21. Usually accompanied by large sessile capsules and
 bristly perichaetial leaves 11. Diphyscium
 Small round cells; leaves of two forms . . 3. Tetraphis
 Small; erect or tangled stems; setae erect when present. 22
22. Seta capped by long conical calyptra. . . 10. Encalypta
 Calyptra medium-long, cucullate; seta yellow. 12. Barbula
 Calyptra cucullate; seta red 12. Didymodon
23. Stems usually unbranched; leaves short ovate-lanceolate to
 lanceolate; cell-walls protruding 21. Philonotis
 Cells round and papillose or short, irregular and almost
 smooth 20. Aulacomnium
 Leaves squarrose, recurved; opaque above. 22. Paludella
24. Papillose cells 30
 Smooth cells 25
25. Leaves with costa short, double or absent 26
 Leaves with definite single costa, halfway or more. 29
26. stems reddish; sometimes covered with paraphyllia. 27
 Otherwise 28
27. Leaves acute and contorted; tips serrate. . 25. Hylocomiae
 Leaves entire, concave and blunt 25. Pleurozium
 Leaves complanate-secund 25. Hypneae

28. Plants medium to large, with or with costa, in water or wet places; or small, costate, on trees or rocks.

25.Amblystegiae

Plants of woods and grassland; without costa. 25.Hypneae

29. Plants of medium size; leaves ovate to lanceolate; cells long; costa definite; capsules usually short.

25.Brachytheciae

Plants large to small; leaves ovate to lanceolate; costs uncertain; capsules long . . . 25.Amblystegiae

30. Plants medium to small; very papillose usually. 26.Leskeaceae

Rich-green plants papillose from projecting cell-edges. 25.Bryhnia

31. Plants of rocks, often with hyaline tip or subula.

13.Grimmiaceae

Plants of trees more commonly; urnlike capsules.

19.Orthotrichaceae

Mats on tree trunks; no fruits or costa. 28.Leucodontaceae

A. Special Receptacles for Gemmae.

1. Cups on special sterile stems with ovate leaves. 3. Tetraphis
Pseudopodia carrying heads of leaflike gemmae. 20. Aulacomnium

B. Complanate Leaves.

1. Minute plants in rock crevices; decurrence joins leaf to leaf. 18. Schistostega
Otherwise 2
2. Leaves with what seems to be another leaf attached to costa 5. Fissidens
Otherwise 3
3. Complanate pinnate branches; complanate ovate leaves. 27. Neckeraceae
Otherwise 4
4. Short large cells; costa nearly or quite to apex 24. Mniaceae
Otherwise 5
5. Small pleurocarps with long smooth cells 25. Plagiothecium
Otherwise 6
6. Leaves oblong-cultriform; creeping in wet places. 27. Homalia
Large leaves with border of unusual cells, long toward apex, short below. 25. Sciaromium

C. Leaves with Border of Long Cells.

1. Stiff plants with pepperpot operculum 4. Polytrichaceae
Otherwise. 2
2. Complanate plants with extra leaf from costa. . . 5. Fissidens
Otherwise. 3
3. Erect plants with hexagonal cells, usually long. 23. Bryaceae
Otherwise 4
4. Plants erect or creeping; cells short 24. Mniaceae
Large leaves with border of cells, long towards apex 25. Sciaromium

D. Border of Cells Unusual or Shorter than those of

Blade.

1. Complanate plants with extra leaf from costa. . 5. Fissidens
Otherwise 2
2. Dark green mosses of trees and rocks, without costa. 28. Leucodontaceae
Large-leaved water moss; wide border of short cells below. 25. Sciaromium

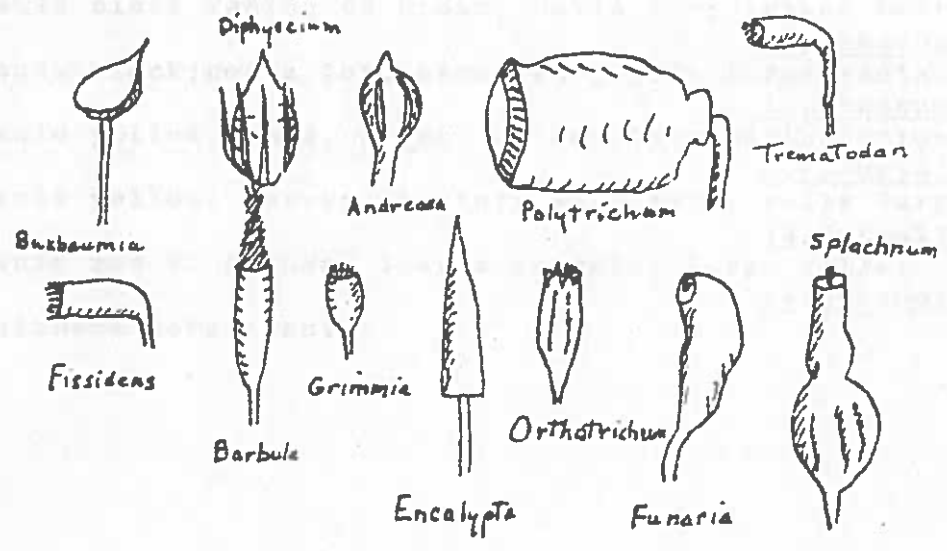
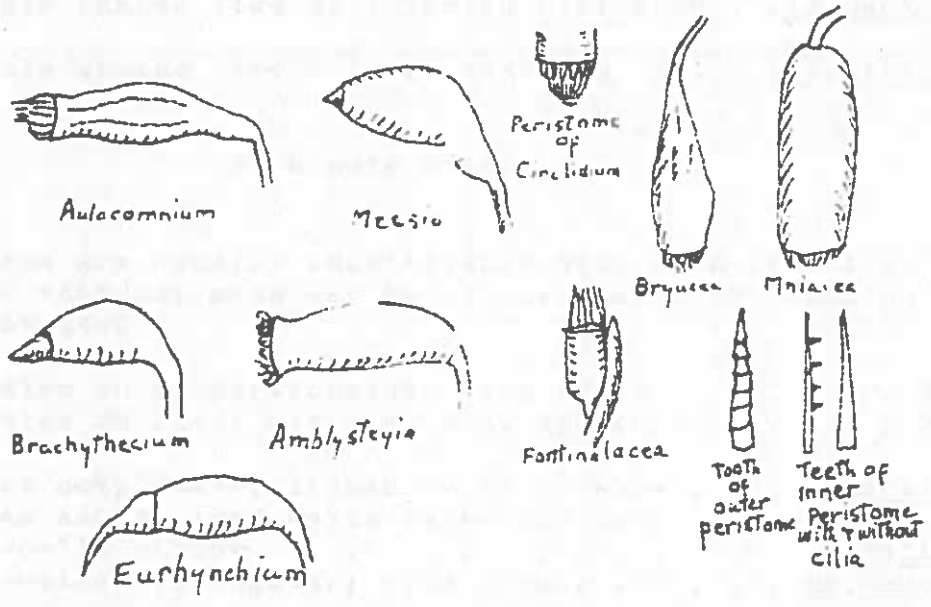
E. Classification by Capsule and Peristome.

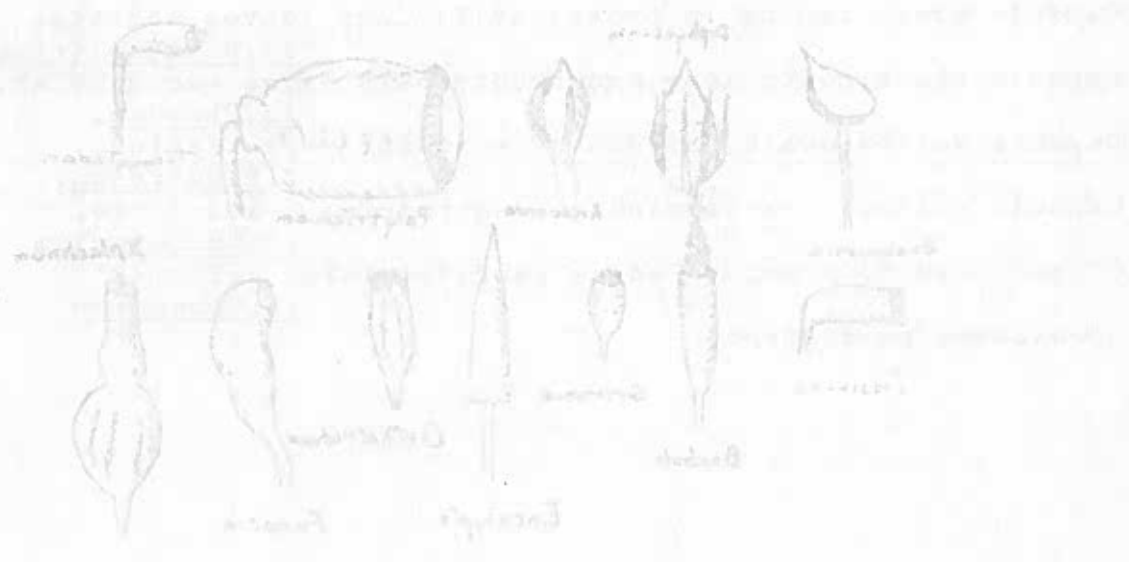
(The peristome is an improvement upon the simple cleistocarpous splitting of the capsule. The teeth are hygroscopic and open when damp weather offers more hope for germination of the spores. This has little advantage to upright capsules which tend to give up the peristome.)

1. Cleistocarpous, globular to oval, no peristome. 1. Sphagnum
and F.
2. Capsule splitting into four strips which remain attached
at tip. 2. Andreaea
3. Peristome of four horny teeth 3. Tetraphis
4. Very large capsules with no external peristome. 11. Buxbaumiaceae
5. Capsules with 16-48 teeth joined to central column. 4. Polytrichaceae
6. Peristome of 16 teeth not divided to base. 5, 6, 7, 8, 9, 10, 13, 15.
7. Peristome of 32 teeth, often long and twisted. 12. Pottiaceae
8. Outer peristome of 16 teeth and inner peristome of 16 segments. (Some species have lost the inner.) 16, 17, 19, 20,
21, 22, 23, 24, 25, 26, 27, 28, 29, 20.
9. Without peristome. Species of: Encalypta 10; 12. Pottiaceae;
16. Physcomitrium and 18. Schistostega

Shapes of Capsules when Unusual.

1. Four or six-sided boxes 4. Polytrichum
2. Urn-shaped. Species of 7. Seligeriaceae; 16. Physcomitrium;
12. Pottia; 13. Grimmiaceae; 19. Orthotrichaceae; 29. Anacamptodon;
8. Rhabdoweisia
3. Apophysis wider than the urn. 17. Splachnaceae
4. Capsule with enlarged neck. 16. Funaria; 22. Meesiaceae
Capsule with long thin neck. 6d. Trematodon
5. Capsule with a definite but less exaggerated neck. 23. Bryaceae
6. Capsule strumose. Species of: 8. Dicranaceae; 6. Ceratodon.
7. Capsule striate. 6. Ceratodon; 8. Dicranaceae; 9. Leucobryum;
16. Funaria; 19. Orthotrichaceae; 20. Aulacomnium; 21. Bartramiaceae





8. Capsule shaped like an inverted flat iron . . . 11. Bauxbaumia
9. Capsule shaped like a large teardrop . . . 11. Diphyscium

F. Minute Mosses.

These are usually identifiable only when fruiting.
Remember that any moss may be impoverished to becoming almost minute.

1. Capsules on proportionately long setae 2
Capsules on short setae or none apparent 3
2. Leaves complanate, linked by decurrence . . . 18. Schistostega
Leaves acute, leaf-cells large and lax . . . 15. Discelium
Leaf-cells narrow 7. Seligeria
Leaf-cells rectangular; seta zigzag 19. Campylostelium
3. Short erect seta; calyptra mitrate 6. Bruchia
No perceptible seta. 4
4. Capsule globular; cells small and quadrate. . 12. Astomum
Capsule and cells otherwise 5
5. Capsule black fading to brown; cells lax; leaves serrate. 16. Physcomitrium
Capsule black; costa long excurrent; cells large rectangular. 12. Phascum.
Capsule yellow, ovate, hidden by subulate perichaetium. 6. Pleuridium.
Capsule yellow; leaves minutely serrulate; cells large. 14. Nanomitrium
Capsule red to orange; leaves serrate; large cells; 14. Ephemerum
protonema persistent.

I. 1. Sphagnaceae.

Genus Sphagnum L.

The genus Sphagnum is sometimes placed in a separate subphylum between mosses and hepatics. Its protonema is thallose, its seta of stem material, as in the hepatics; its cell structure and capsule have little resemblance to either.

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The typical Sphagnum consists of a stem thinly dressed in stem-leaves which seem unrelated to the leaves of the branchlets. At the growing top is a cluster of branchlets which, as the plant grows, will be left behind in clusters on the sides of the stem. The cells of the main stem and the leaves differ in structure. The cells of stem-leaves and branch-leaves have a network of green cells enclosing larger hyaline cells which store water for the plant. All the hyaline cells, whether of stems or leaves, may or may not have reinforcements of spiral fibrils, and the pores on their surface are important clues to the species. The genus, difficult enough in itself, has been split and regrouped, and the various authorities divide the species differently and use different names. I have learned what little I know of this group from the late A.L. Andrews, to whose kindness I am very grateful. Unfortunately, in my opinion, he refused to accept the botanical decision to make Hedwig, and not Linnaeus, the starting-point of moss names, but I have retained names and groupings lest confusion become more confounded.

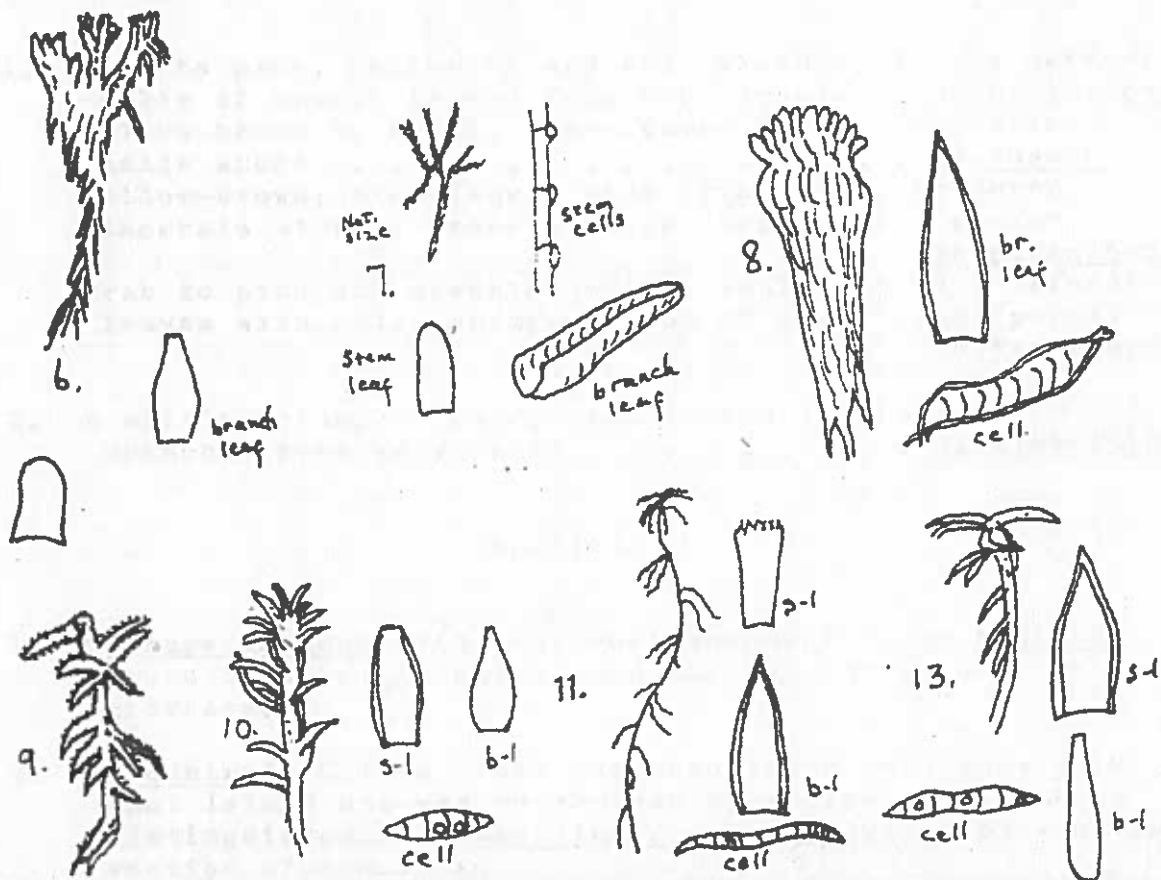
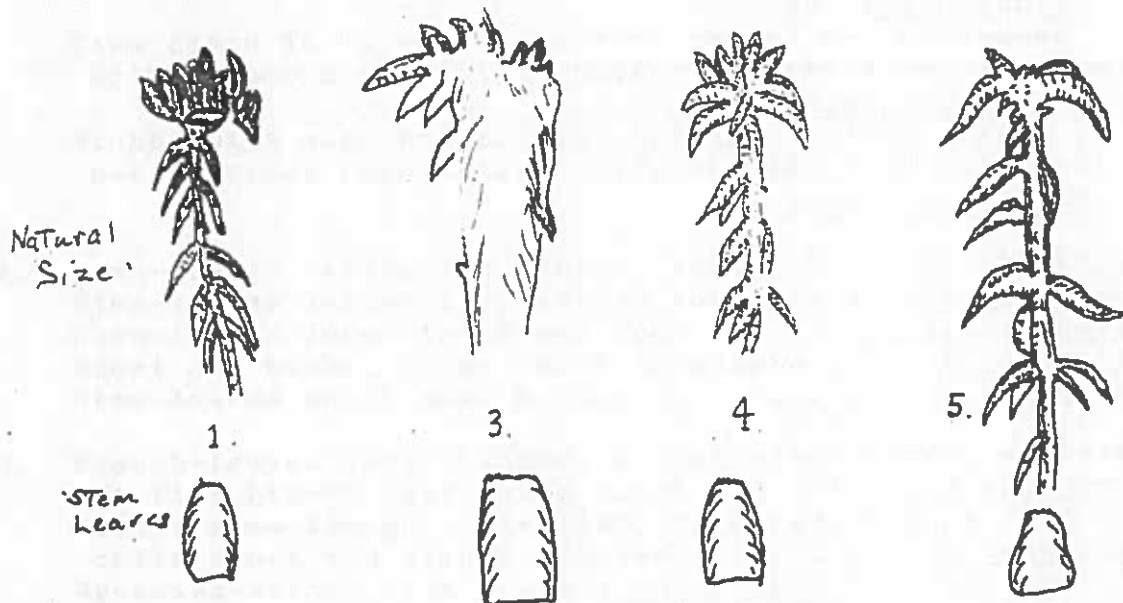
This key is intended only for beginners. Several of the common species can be distinguished with only good eyes or a strong hand-lens; most of the others are available to a simple microscope. Where the differentiation depends upon the cross-section of cells of the leaf, I have given only superficial characters which probably are not always in agreement with the cells. In the classification of human races the results are very different according to whether one uses skin-colour, hair-section, blood-types, thumb-prints or ear-wax as the criterion, and it is not likely that any classification will satisfy both laboratory botanist and field naturalist.

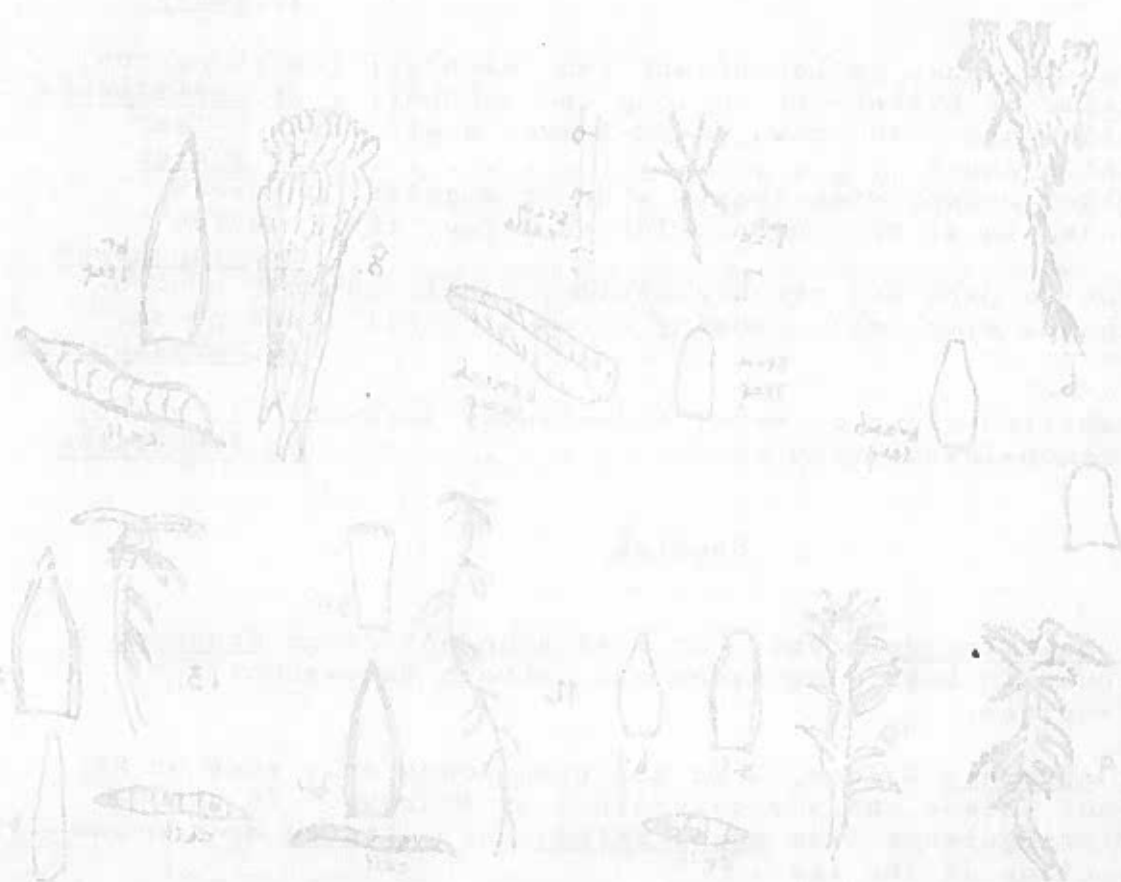
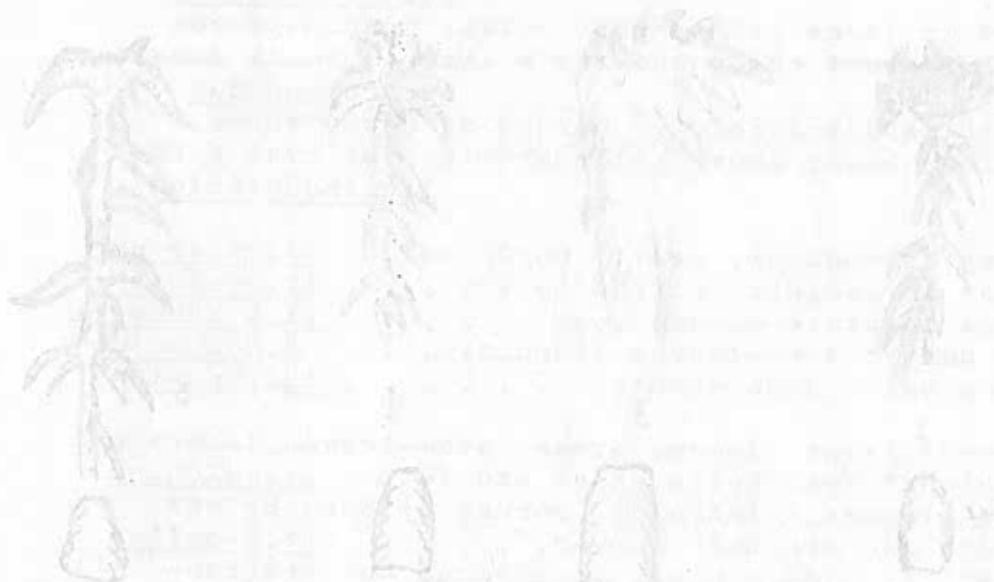
Among the sphagna colour is useful but not wholly reliable as a distinction. Mosses of shade tend to be green or whitish; those exposed to sunlight, as in bogs, are more often red, brown or yellow. There is also some variation within the species according to the habitat.

Key to Sphagnum.

1. Large plants with spoon-shaped branch-leaves; cells of stem and branches wound with fibrils 2
 Smaller plants with pointed branch-leaves; cells of branches without fibrils. 4
2. Crown of plant with many short smooth branchlets; yellow, brown, red but rarely clear green or white; bogs and banks. 1. magellanicum *
 Plant sturdy, yellowish, rather rough; in bogs. 3. papillosum
 Plant white or green; long branchlets from crown drooping 3
3. Plant white with pink shade; in wet woods 2. centrale
 Plant of shaded wet places, slender for this group. 4. palustre
 Whitish plant of damp woods; sturdy . . . 5. imbricatum
4. Plant green, brown or purple; leaves shallow spoon-shaped; no branches; growing in water; cells long; almost opaque. 19. Pylaisii *
 Otherwise. 5
5. Plants growing in lakes 6
 Otherwise. 7
6. Cells of branch-leaves without fibrils; cells long 20. macrophyllum
 (Other species growing unsuitably in water may have no branches and their cells may lack fibrils.)
 Branch-leaves long, slender, involute; cells long 16. cuspidatum
 Green; branch-leaves ovate; branch-leaf cells with typical subsecundum string of pores 19. subsecundum, var. latissimum
7. Green plants in woods or wet grassland 8
 Yellow plants in marshes and ditches 9
 White plants of bogs and marshes 10
 Pink, red and brown plants of bogs 11
 Otherwise 12
8. Bushy plants with more than 6 branchlets in a cluster. 8. Wulfianum
 Whitish green, erect; involute branch leaves; small stem leaves; branch stems with pore at upper end of cells 7. strictum
 Whitish green; squarrose branch-leaves . 9. squarrosum

I. Sphaginales 1. Sphagnaceae





Robust green moss of woodland; crown divided into five clusters; stem-leaves lacerate across apex.

23. Girgensohnii

Stem cased in large transparent cells; branch-leaves with rather short cells showing a line of small pores

18. subsecundum

Stubby with many branchlets; border of stem-leaves meets across base; short cells showing few oval pores

27. quinquefarium

9. Stem-leaves triangular, small, bordered . . . 13. recurvum*
- Stem-leaves lanceolate, narrow border . . . 17. Dusenii
- Stem-leaves lacerate across apex 11. Lindbergii
- Short and bushy; stem-leaves lingulate. 8. compactum
- Stem-leaves split down middle 12. riparium

10. Branch-leaves large, loose, ovate; stem-leaves lacerate at tip; branch-leaf cells short and fat. . . 14. pulchrum
- Small; stem-leaves triangular, bordered; branch-leaf cells short and slightly curved. 26. tenellum
- Greenish-white; like a small squarrosus but shorter-leaved; stem-leaves broad lingulate, lacerate at tip
10. teres

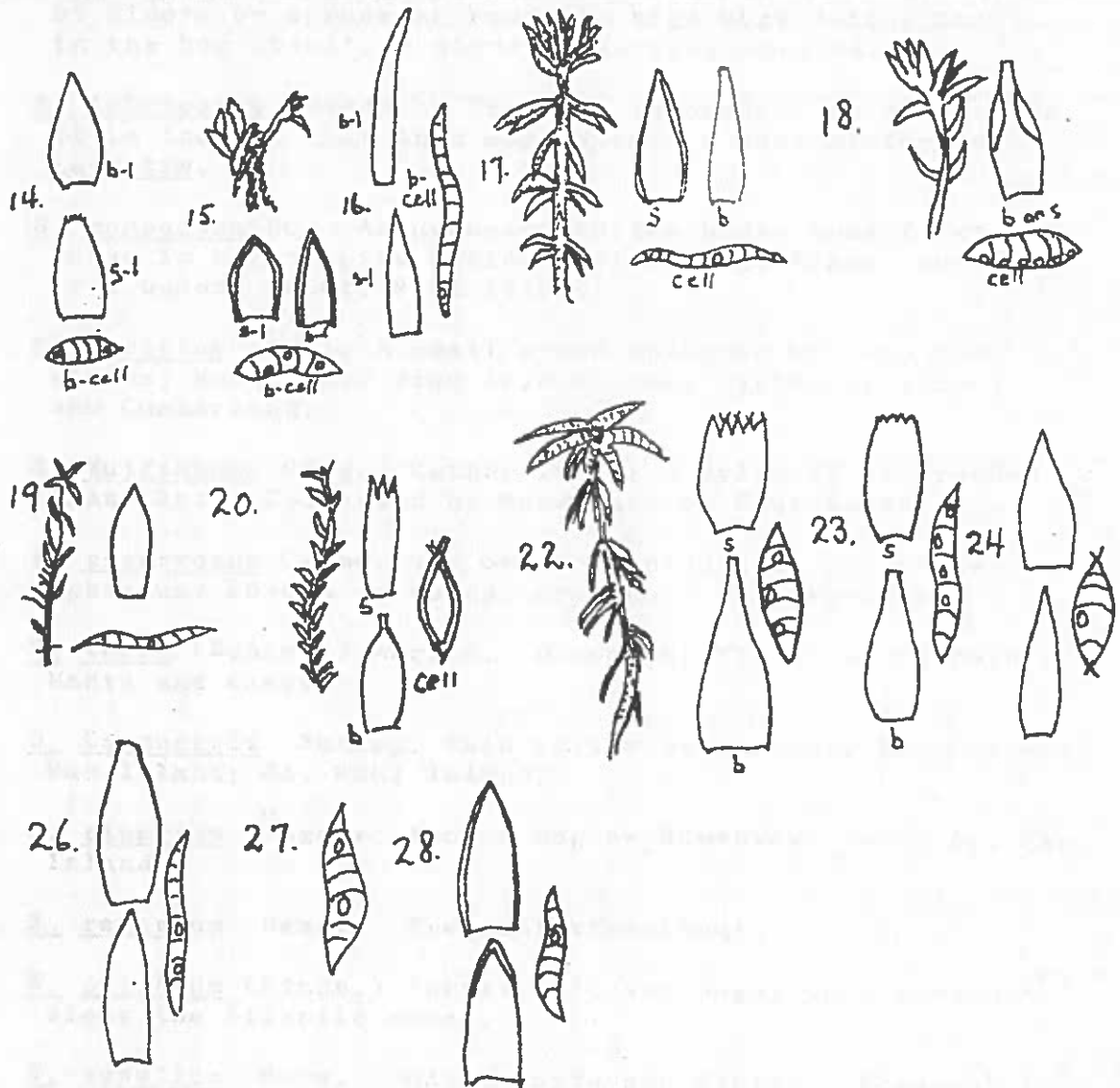
11. Drab to pink, yellowish and red; slender; leaves narrow; cells of branch-leaves long and slender. . . 26. capillaceum -
- Yellow-brown to brown; stem-leaves ovate, branch-leaf cells short 24. fuscum
- Yellow-brown; stem-leaves wide-triangular, bordered, lacerate at tip; branch-leaves large, cells medium
28. plumulosum
- Drab to pink and greenish-white; small, untidy; branch-leaves with cells showing a row of small round pores.
25. Warnstorffii*

12. A whitish clump on sand; stem-leaves lacerate all round; branch-leaves very small 21. fimbriatum

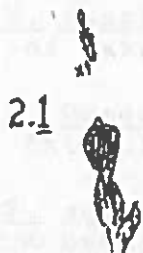
Species.

- * 1. S. magellanicum Brid. Our most abundant large Sphagnum found in bogs, lakesides and marshes throughout the province.
2. S. centrale C.Jens. This has been found only once on St. Paul Island and was determined by Andrews. It can be distinguished from magellanicum and palustre by a cross-section of the leaf.
- > 3. S. papillosum Lindb. In peat-bogs throughout but not common.

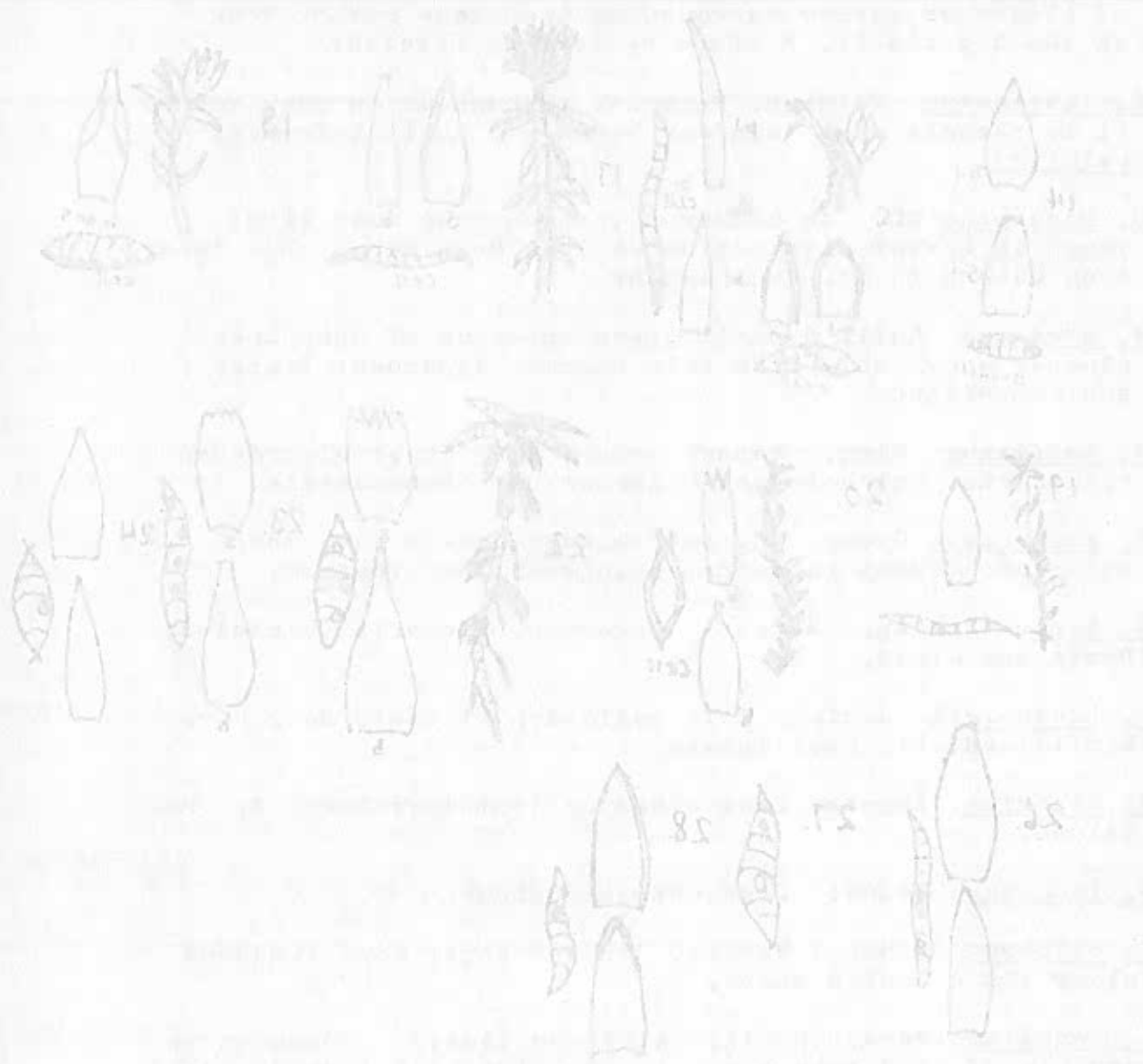
I. Sphagnales 1. Sphagnaceae 14



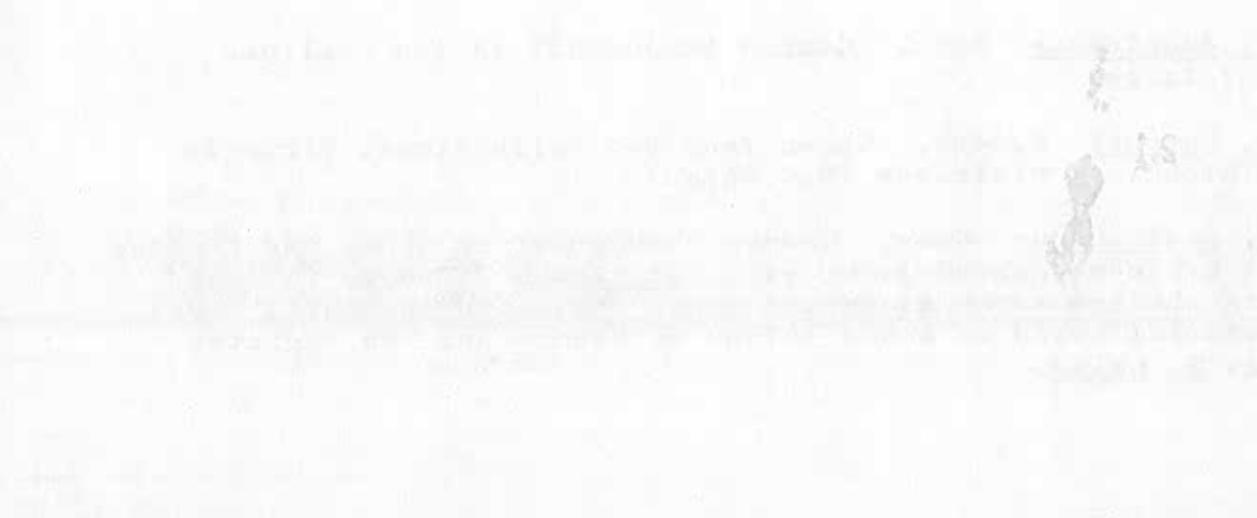
II. Andreales 2. Andreaeaceae



I. *Sepioides* & *Sepioides*



II. *Androsace* & *Androsace*



4. S. palustre L. Common throughout, usually in the shade of alders or spruce surrounding high bogs rather than in the bog itself. A shade-perfering species.
5. S. imbricatum Hornsch. Frequent throughout in damp woods. It is thought that this may be only a habitat-form of palustre.
6. S. compactum DC. An uncommon toffee-brown moss first found in borrow-pits beside Caribou Bog, Kings, but later from Queens to St. Paul Island.
7. S. strictum Sull. A small green sphagnum of damp open places; known only from Isle Madame, Richmond; Truro; and Cumberland.
8. S. Wulfianum Girg. Rather large; a cylinder of crowded branchlets. Collected by Maaseast of Shubenacadie.
9. S. squarrosum Crome. Our only conspicuously squarrose sphagnum. Common in woods throughout the province.
10. S. teres (Schimp.) Ångstr. Uncommon. Victoria (Nichols); Hants and Kings.
11. S. Lindbergii Schimp. Thin yellowish strands. Bear River; Mud Island; St. Paul Island.
12. S. riparium Ångstr. From a bog on Southwest Head, St. Paul Island.
- * 13. S. recurvum Beauv. Frequent throughout.
- * 14. S. pulchrum (Lindb.) Warnst. In wet bogs; more frequent along the Atlantic shore.
15. S. tenellum Pers. Small, white and fluffy. Frequent in runnels of high bogs where it, Pylaisii and lichens alone seem able to survive the coating of algae they receive in floodtime.
- * 16. S. cuspidatum Ehrh. Common throughout in the shallows of lakes.
17. S. Dusenii C.Jens. Known from two collections: Victoria (Nichols); Shelburne (D.C.Eaton).
18. S. subsecundum Nees. Common throughout in woods and fields. A broader -leaved form, var. latissimum Andrews, is found in shallow water along the South Shore and in Hants. This was collected on Sable Island by Macoun and was reported as S. molle.

- *19. S. Pylaeii Brid. Frequent throughout in shallows, especially along the Atlantic shore.
- 20. S. macrophyllum Bernh. A water-sphagnum first found by Bartram in Hants. Maase reports it as still present there and in my collections, but I cannot find it in either. I have found such plants in Clyde River, but the cells bear a suspicious resemblance to those of fuscum which tends to slough its fibrils when growing in water.
- 21. S. fimbriatum Wilson. Known thus far only from Scatari Island, St. Paul Island and Mud Island.
- 22. S. Girgensohnii Russ. Abundant throughout in woods.
- 23. S. robustum (Russ.) Röhl. Dixon reduces this to a variety of the last. Only a pinker tinge distinguishes this in the field. Kings and, more, commonly, Cape Breton.
- +24. S. fuscum (Schimp.) H. Klingr. Common throughout in high bogs.
- *25. S. Warnstorffii Russ. A small, shaggy, drab moss common in woods and bogs. Found throughout.
- 26. S. capillaceum (Weiss.) Schrank. The abundant pink moss of high bogs. A variant with narrower stem-leaves and subsecund branch-leaves has been named S. rubellum Wilson or var. tenellum Andrews. This also occurs.
- 27. S. quinquefarium (Lindb.) Warnst. A shaggy green sphagnum of woods; throughout.
- 28. S. plumulosum Roll. The more robust var. flavicomans (Card.) Andrews, by some elevated to a species, was found by Nicolas in Victoria, by Schofield on Brier Island.

11. 2. ANDREACEAE

Genus Andreaea Hedw.

Small primitive mosses inhabiting bare boulders and cliffs. The plants are toffee-brown when young and damp, black when old or dry. The cells are so thick-walled as to be almost opaque; the fruit on an erect bulging seta has no true operculum and splits into four segments which remain united at the top. The brown colour, once learned, is unmistakable; the black state might be confused with the Grimmiaceae but

the fruit and the opaque leaves are distinctive.

Key to Species.

1. No costa 1. rupestris
With costa 2
2. Costa bordered by 6 rows of cells 1/3 from apex.
2 rows instead of 6. 2. Rothii
Rothii var. crassinervia

Species.

1. A. rupestris Hedw. Common on outcrops in Cape Breton,
South Shore and White Rock, Kings.
2. A. Rothii (Web & Mohr). Aspotogan, Lunenburg (MSB).
var. crassinervia (Bruch) Monchm. Shubenacadie (Bartram).

III. 3. TETRAPHIDACEAE.

Genus Tetraphis Hedw.

Our only genus with a peristome of four thick teeth. The leaves of fruiting branches are long ligulate, those of sterile branches ovate, but both have small, round incrassate cells. The sterile branches usually carry cups of gemmae. The tufts turn from a bright green to a distinctive yellow-chestnut.

Key to Species

1. Seta smooth and straightish. 1. pellucida
Seta rough, angled or both 2. geniculata

Species.

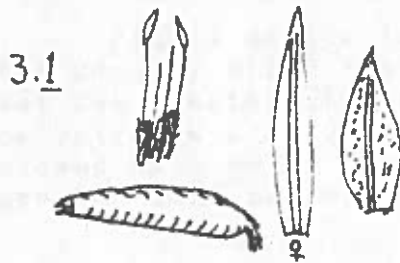
1. T. pellucida Hedw. Common on rotten wood everywhere.
2. T. geniculata Girgens. Dubiously distinct from the last.
Margaree, Inverness and Lake Charlotte, Halifax (MSB)

the first and second stages of the process are as follows:
1. The first stage is the preparation of the material.
2. The second stage is the preparation of the material.
3. The third stage is the preparation of the material.
4. The fourth stage is the preparation of the material.
5. The fifth stage is the preparation of the material.
6. The sixth stage is the preparation of the material.
7. The seventh stage is the preparation of the material.
8. The eighth stage is the preparation of the material.
9. The ninth stage is the preparation of the material.
10. The tenth stage is the preparation of the material.

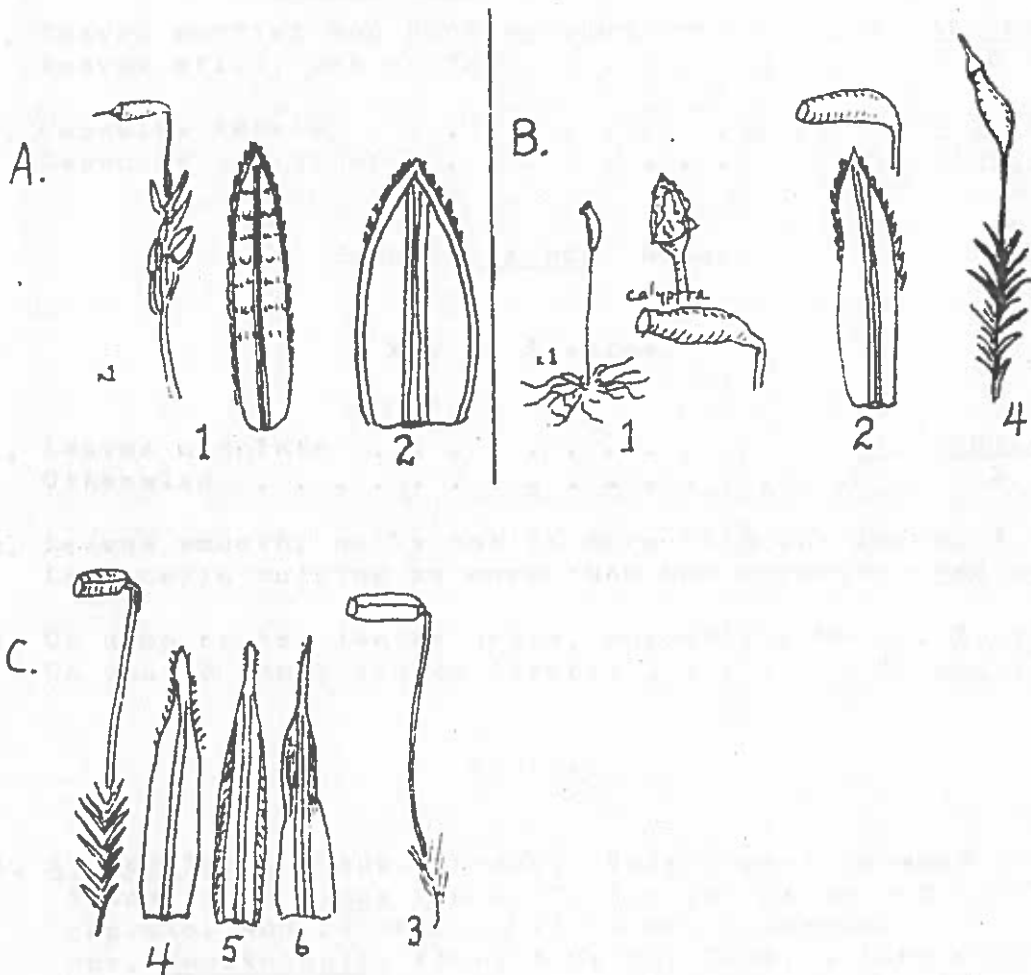
11. The eleventh stage is the preparation of the material.
12. The twelfth stage is the preparation of the material.
13. The thirteenth stage is the preparation of the material.
14. The fourteenth stage is the preparation of the material.
15. The fifteenth stage is the preparation of the material.
16. The sixteenth stage is the preparation of the material.
17. The seventeenth stage is the preparation of the material.
18. The eighteenth stage is the preparation of the material.
19. The nineteenth stage is the preparation of the material.
20. The twentieth stage is the preparation of the material.
21. The twenty-first stage is the preparation of the material.
22. The twenty-second stage is the preparation of the material.
23. The twenty-third stage is the preparation of the material.
24. The twenty-fourth stage is the preparation of the material.
25. The twenty-fifth stage is the preparation of the material.
26. The twenty-sixth stage is the preparation of the material.
27. The twenty-seventh stage is the preparation of the material.
28. The twenty-eighth stage is the preparation of the material.
29. The twenty-ninth stage is the preparation of the material.
30. The thirtieth stage is the preparation of the material.

31. The thirty-first stage is the preparation of the material.
32. The thirty-second stage is the preparation of the material.
33. The thirty-third stage is the preparation of the material.
34. The thirty-fourth stage is the preparation of the material.
35. The thirty-fifth stage is the preparation of the material.
36. The thirty-sixth stage is the preparation of the material.
37. The thirty-seventh stage is the preparation of the material.
38. The thirty-eighth stage is the preparation of the material.
39. The thirty-ninth stage is the preparation of the material.
40. The fortieth stage is the preparation of the material.
41. The forty-first stage is the preparation of the material.
42. The forty-second stage is the preparation of the material.
43. The forty-third stage is the preparation of the material.
44. The forty-fourth stage is the preparation of the material.
45. The forty-fifth stage is the preparation of the material.
46. The forty-sixth stage is the preparation of the material.
47. The forty-seventh stage is the preparation of the material.
48. The forty-eighth stage is the preparation of the material.
49. The forty-ninth stage is the preparation of the material.
50. The fiftieth stage is the preparation of the material.

III. Bryales 3. Tetraphidaceae



4. Polytrichaceae

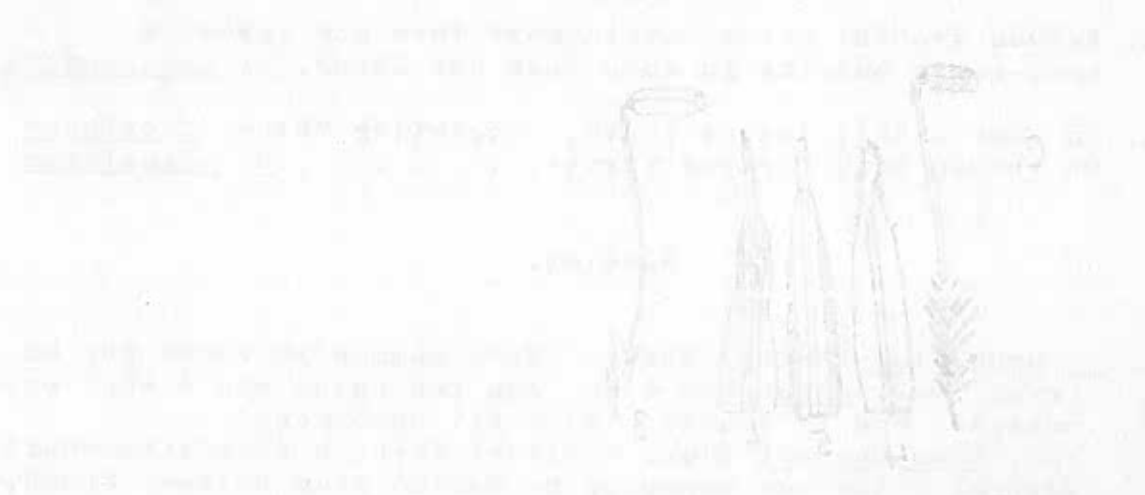
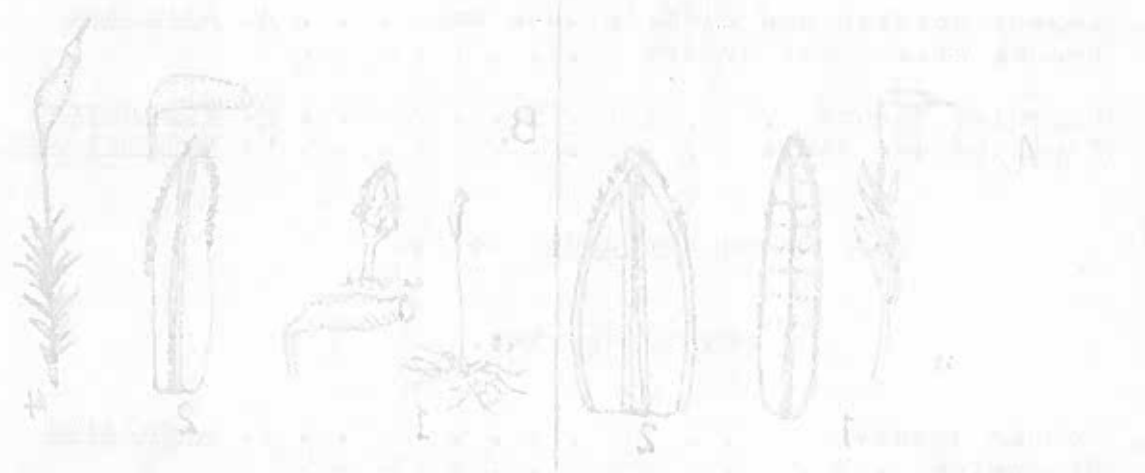


Utricularia *subulnifolia* L.

The plant is a small, creeping, perennial herb, growing in wet, boggy places. It has a single, upright, leafy stem, which is branched at the base. The leaves are small, narrow, and pointed, with a distinct midrib. The flowers are small, tubular, and have a long, slender corolla. The fruit is a small, round, capsule, which is attached to the base of the plant.



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4. POLYTRICHACEAE

Plants medium to large. They may be recognized by the usually stiff leaves with lamellae along the costa, but few species should be identified when sterile. The calyptra is a mitrate fur cap; the capsule, when ripe, is closed by a white membrane joined to 32-64 teeth. They grow on soil or rocks, in the open, in woods, in bogs.

Key to Genera..

1. Leaves softish and curling when dry. A. Atrichum
Leaves stiff, wet or dry 2
2. Capsules terete B. Pogonatum
Capsules 4-6 sided C. Polytrichum

Genus Atrichum Beauv.

Key to Species.

1. Leaves undulate 1. undulatum
Otherwise 2
2. Leaves smooth; cells not in more than one layer. 3
Leaf-cells bulging in more than one layer. 4. xanthopelma
3. On damp banks; leaves ovate, suggesting Mnium. 2. crispum
On shaded sand; leaves firmer. 3. angustatum

Species.

1. A. undulatum (Hedw.) Beauv. Very common in woods and on lawns. var. minus Lam & DC. has red setae and almost erect capsules and is small. It is not uncommon.
var. Hausknechtii (Jur. & Milde) Frye, a form with short lateral setae was reported by Macoun from Halfway Brook, C.B.
2. A. crispum (James) Sull. Common on damp sand by brooks and bogs. Rarely fruits.

3. A. angustatum (Brid.) BSG. Rare, but occurring throughout.
4. A. xanthopelma J. & S. Windsor, Hants. (det. Frye).
(There is some doubt whether the last two can be separated).

B. Genus Pogonatum Beauv.

Rather small mosses, except P. alpinum which resembles Polytrichum except in capsule.

Key to Species.

1. Protenema persistent, a yellow-green felt. 1. pensilvanicum
Protenema vanishing early 2
2. Large and resembling Polytrichum in habit. 4. alpinum
Small 3
3. Top cells of lamellae bulging. 2. urnigerum
Top cells of lamellae dented 3. capillare
(I apologize for this, but I cannot find any other distinction between them.)

Species.

1. P. pensilvanicum (Hedw.) Paris. Common on clay banks in woods throughout. The plants have few leaves and depend wholly upon the protonema. For teachers this moss offers a useful demonstration of moss development, since all phases from spore to ripe fruit can be found together.
2. P. urnigerum (Hedw.) Beauv. Not uncommon, Cape Breton and along the North Mountain. This is usually larger than the next but not reliably so.
3. P. capillare (Rich.) Brid. Uncommon. South Shore (MSB); Kings.
4. P. alpinum (Hedw.) Roehl. Common throughout on rocks in woodland. var. arcticum (Wahl.) Brid. Squat clumps with longer leaves. Assigned to Nova Scotia by Grout. At Hell's Gate dam, Kings.

C. Genus Polytrichum Hedw.

Coarse, erect mosses, very conspicuous and the common ones easily learned.

Key to Species.

1. Capsule boxlike; marginal cells near base 9:1 . . . 2
 Capsule oval; marginal cells near base 3:1 . . . 2. gracile
2. Capsule angles definite 3
 Capsule angles rounded 1. formosum
3. Leaves ending in hyaline hair 6. piliferum
 Leaves otherwise 4
4. Seta yellow 3. ohioense
 Seta red-brown 5
5. Leaves toothed all the way up the margin . . . 4. commune
 Leaves inrolled, entire; apex rough 5. juniperinum

Species.

1. P. formosum Hedw. Reported from Windsor, Hants (Habeeb)

2. P. gracile Sm., var. anomala Milde, was found at Barachois, Victoria (Nichols).

3. P. ohioense Ren. & Card. Locally frequent; Cape Breton to Windsor.

4. P. commune Hedw. Common everywhere and very variable.

5. P. juniperinum Hedw. Common in woods and on rocks. Its blue-green colour is distinctive.

Var. alpestre B.S.G. has rhizoids furring the stem to the top.

It is not uncommon in bogs.

6. P. piliferum Hedw. Common on bare rocks. It is small as in its habitat economy is more important than competition. Var. hyperboreum (R.Br.) C. Muell. has reddish awns, hyaline only at the tip. We have something like this in exposed places, as at White Rock, Kings.

5. FISSIDENTACEAE

Genus Fissidens Hedw.

The plants of this genus are easy to recognize. They are conspicuously complanate and, under magnification show what seems to be another leaf folded around the costa. Fruits are abundant sturdy capsules on long setae and have scarlet peristomes of 16 teeth. Our major troubles lie with the minute types which blend into each other. The distinctions are given here, not because I think them reliable and constant, but because these are the names published.

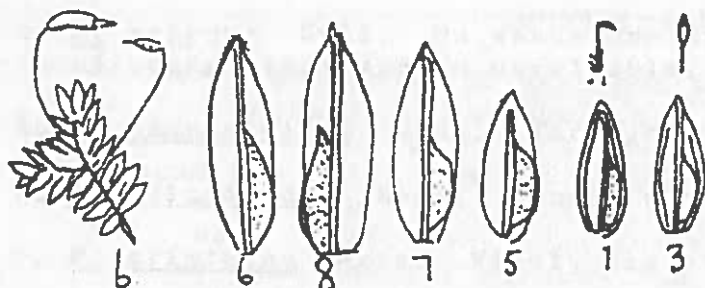
Key to Species

1. Minute; plants 2-5 mm. 2
 Larger than 10 mm. 5
2. Leaves more than half bordered with long cells. 3
 Leaves almost without borders except on lamella 4. exiguus
3. Border of long cells complete, meeting costa at tip.
 1. bryoides
 Border incomplete 4
4. Capsule length: breadth - 2:1 3. minutulus
 Capsule length: breadth - 3:1 2. viridulus
5. Costa ending below leaf-tip; cells small, slightly papillose 5. osmundioides
 Otherwise 6
6. Costa excurrent 8. taxifolius
 Costa percurrent or less 7
7. Leaf bordered with transparent cells, small and regular.
 7. cristatus
 Leaf sometimes with similar border; cells large, irregular. 6. adiantoides

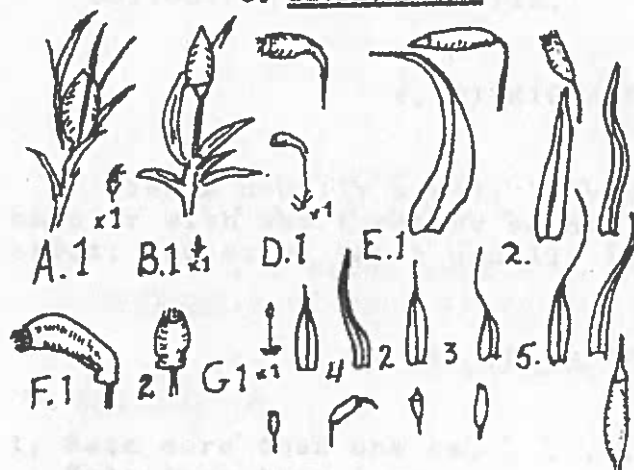
Species.

1. F. bryoides Hedw. Recorded only from Hants and Kings, but it is easy to miss. Grows on soil.
2. F. viridulus (Web. & Mohr) Wahlenb. Found in a field at Windsor and determined by Habeeb.

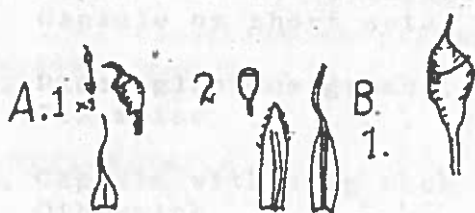
III. Bryales 5. Fissidentaceae



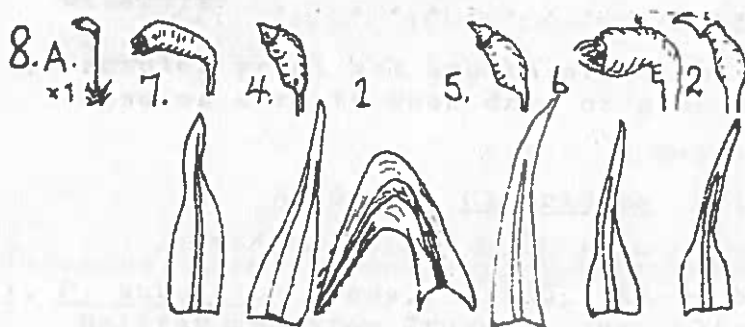
6. Ditrichaceae



7. Seligeriaceae



8. Dicranaceae



III. Section 3. *Stylidium*



4. *Stylidium*



5. *Stylidium*



3. F. minutulus Sull. Found at Pictou (MacKay); Kings.
On rock.
4. F. exiguus Sull. On sandstone at Whitewaters, Kings.
A young plant and so unreliable.
5. F. osmundioides Hedw. Throughout on damp rocks.
6. F. adiantoides Hedw. Common on damp rocks.
7. F. cristatus Wils. Widely distributed but uncommon.
8. F. taxifolius Hedw. Frequent in Kings and Hants; one
collection from Victoria.

6. DITRICHACEAE

Plants usually small; leaves often subulate from small base or with short rather square cells; capsules usually erect; peristome teeth usually 16 but sometimes divided.

Key to Genera.

1. Seta more than one cm. 3
Seta less than 1 cm. 2
2. Capsule immersed in second hairlike leaves . . A. Pleuridium
Capsule on short seta; calyptra mitrate . . . B. Bruchia
3. Plant glaucous-green C. Saelania
Otherwise 4
4. Capsule with long neck D. Trematodon
Otherwise 5
5. Leaves distichous or opaque E. Distichium
Otherwise 6
6. Capsules erect and smooth or on yellow setae . G. Ditrichum
Capsules striate when dry, or globose. . . . F. Ceratodon

A. Genus Pleuridium Brid.

1. P. subulatum (Hedw.) Lindb. Known only from fields near
Halifax and from Truro to Annapolis. Very common at Wind-
sor in May.

P. axillare was determined for me from a Wolfville collection, but I doubt its correctness. With diligence P. palustre should be found. It is distinguished from subulatum by its mitrate calyptra and the immersed stomata in the middle of the capsule. I have found the stomata but not yet the mitrate calyptra.

B. Genus Bruchia Schwaegr.

1. B. Sullivantii Aust. Found once on Wolfville Ridge, Kings., its habitat is fields.

C. Genus Saelania Lindb.

1. S. glaucescens (Hedw.) Bruch, Engl. and Prantl. Reported from Cape Breton by Schofield but not seen.

D. Genus Trematodon Mich.

1. T. ambiguus (Hedw.) Hornsch. On sandy soil; locally common in Victoria and Hants.

E. Genus Distichium B. & S.

1. D. capillaceum (Hedw.) B. & S. Long slender leaves with sheathing bases are arranged in two rows up stem; capsule erect or inclined. Inverness (Macoun); Victoria (Nichols); Hants and Colchester.
2. D. inclinatum (Hedw.) B. & S. Aspy Bay, Victoria (Nichols). This bears no macroscopic resemblance to the former species. Leaves incrassate (making them opaque), some with hyaline tips. Capsules heavier than in capillaceum and inclined.

F. Genus Ceratodon Brid.

Bright green tufts on soil, stones or trees, in autumn and winter with bright wine-red setae. Leaves somewhat papillose.

Key to Species.

1. Capsule inclined, curved, striate, slightly strumose. 1.purpureus
- Capsule erect, globular. 2.conicus

Species.

1. C. purpureus (Hedw.) Brid. Our commonest weed-moss.
2. C. conicus (Hampe) Lindb. Same habitats. Hants and Kings.

G. Genus Ditrichum (Timm.) Hampe

Some of these species are among our most abundant mosses and are very variable, like most abundant species. Typically they have erect symmetric capsules and leaves ending in a long awn. Cells at the base are fairly long but grow shorter upward.

Key to Species.

1. Stem 2 cm. or less. 2
- Stem longer 5.flexicaule
2. Stem less than 2.5 mm. 6.cylindricum
- Stem longer. 3
3. Seta yellow; capsule often inclined 4.pallidum
- Otherwise 4
4. Awn much longer than blade. 3.heteromallum
- Awn as long as blade. 1.pusillum
- Awn less long than blade. 2.lineare

Species.

1. D. pusillum (Hedw.) E.G.B. Abundant on the shoulders of roads, giving them a yellow tinge. Seta with orange tint. Throughout.
2. D. lineare (Sw.) Lindb. A form of the above but distinctive at times. Widespread but not well known.

3. D. heteromallum (Hedw.) E.G.B. Common in open places. Seta red-brown; plant larger than the two preceding species.
4. D. pallidum (Hedw.) Hampe. Common on sandy ground throughout.
5. D. flexicaule (Schwaegr.) Hampe. Thick peaty mats under forest, the lower half a tangle of radicles.
6. D. cylindricum (Hedw.) Grout. This tiny plant looks like a small Distichium except that the leaves are not in neat rows. Each has a short sheathing blade and a very long subula. Cape Breton (Macoun).

7. SELIGERIAACEAE

Plants with erect capsules, urnlike or ovoid, with sixteen peristome teeth, entire, divided or branching. All species are minute except Blindia.

Key to Genera.

1. Minute mosses, about 2 mm. in height. A. Seligeria
2. Moss of wet rocks, 1-8 cm. in length. B. Blindia

A Genus Seligeria B. & S.

Minute plants said to be found on rocks elsewhere but here known only as weed mosses of fields and road-edges.

Key to Species.

1. Leaves long subulate from clasping base; capsule urn-shaped. 1. pusilla
- Leaves otherwise; capsule long ovoid. 2
2. Costa excurrent as an awn 2. recurvata
- Costa subpercurrent 2. campylopoda

Species.

1. Seligeria pusilla (Hedw.) B. & S. Wolfville Ridge, Kings;

Martock Mountain, Hants; Victoria Park, Truro; always on roadsides. The specimens were consistent except for variations in the peristome.

2. S. recurvata (Hedw.) B. & S.
S. campylopoda Kindb. Sherbrooke, Guysborough; Cape North Corner, Victoria; in field at Cambridge, Kings. Some of the plants have the leaves of recurvata, some of campylopoda, and some of both species. There can be little doubt that the older name, recurvata, should suffice for both.

B. Genus Blindia B. & S.

1. B. acuta (Hedw.) B. & S. Common in northern Cape Breton.

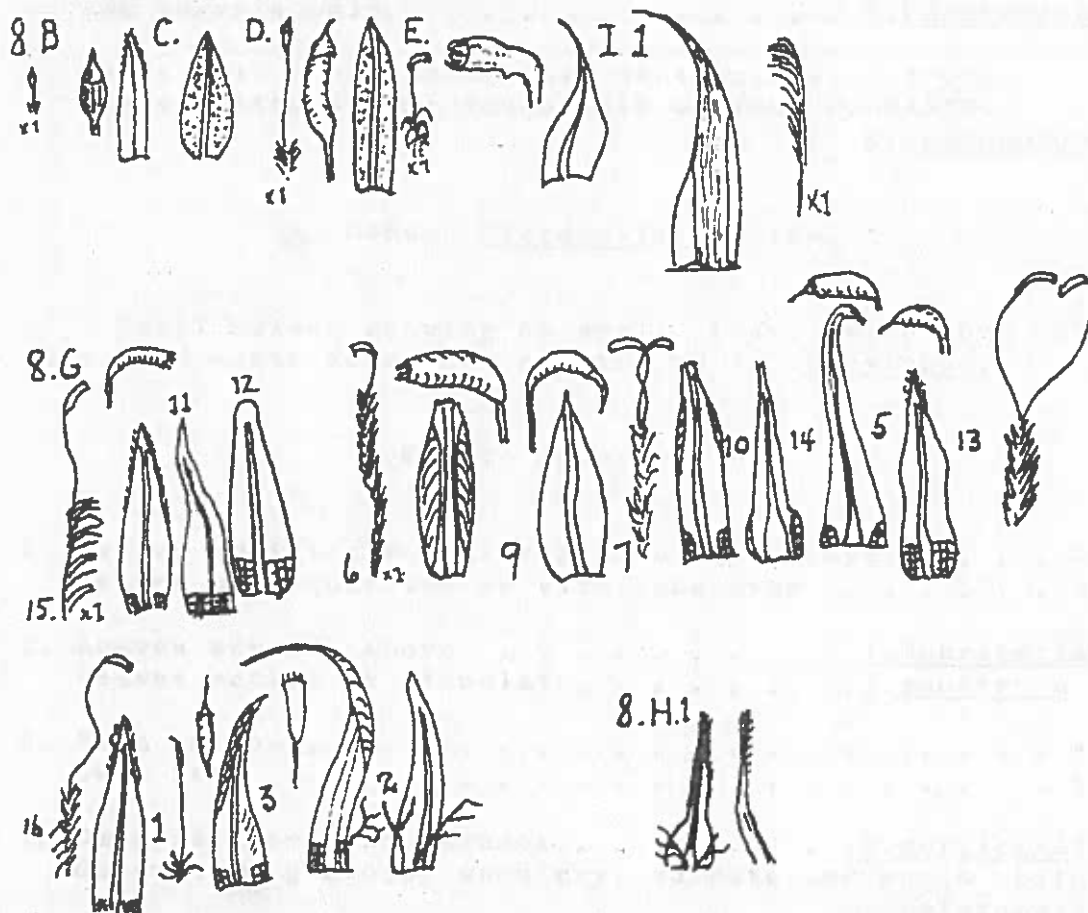
8. DICRANACEAE

A family not easy to define. Most plants are erect with narrow leaves, costa percurrent or excurrent, cells long at least at base of leaf, a peristome of 16 teeth usually divided about halfway down.

Key to Genera.

1. Plant less than 1 cm. tall, seta excepted. 2
Plant taller than 1 cm. 4
2. No. capsules; leaves lanceolate and papillose. C. Oreoweisia
Cells smooth or nearly so. 3
3. Capsules erect and striate B. Rhabdoweisia
Capsules not both erect and striate. A. Dicranella
4. Capsule erect and slightly eccentric; leaves papillose. D. Dichodontium
Otherwise. 5
5. Capsules strumose 8
Capsules not strumose 6
6. Basal cells enlarged and coloured; costa never more than one-fifth of base. G. Dicranum
Costa one-half of leaf base 7

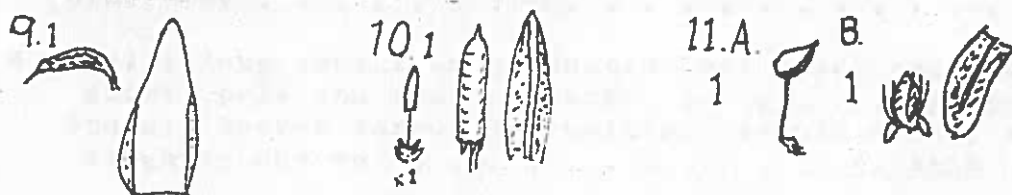
III. Bryales 8. Dicranaceae (Cont'd)



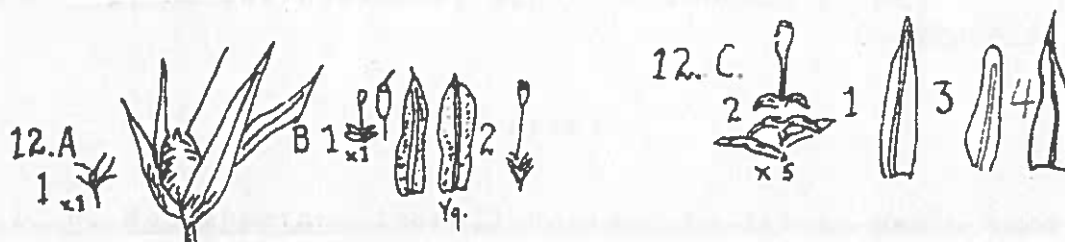
9. Leucobryaceae

10. Rhacalyptaceae

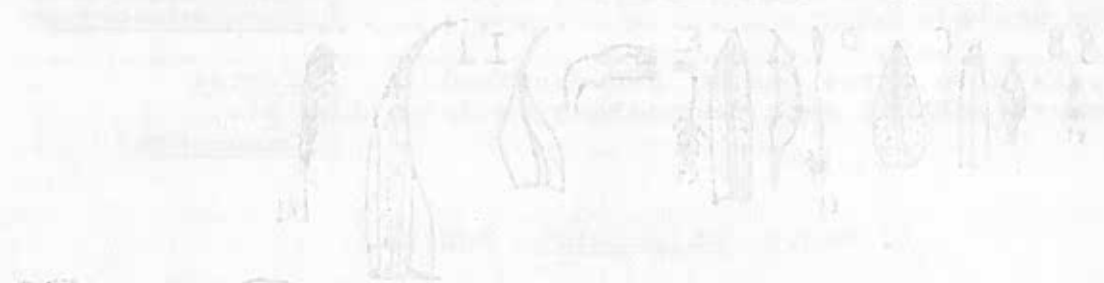
11. Buxbaumiaceae



12. Pottiaceae



11. *Hyacinthaceae* (part 4)



12. *Hyacinthaceae* 13. *Hyacinthaceae*



7. Awn rough all around H. Dicranodontium
 Awn serrate only I. Paraleucobryum
8. Costa with three bands; awn denticulate. F. Arctoa
 Leaves without awn; lanceolate or long subulate.
E. Oncophorus

A. Genus Dicranella Schimp.

Small mosses growing on soil. Leaves with long cells below and costa sometimes as wide as in Campylopus.

Key to Species.

1. Leaves definitely squarrose and lanceolate. 2
 Leaves not squarrose or with long awns 3
2. Leaves serrate above1. Schreberiana
 Leaves entire or sinuate.3. squarrosa
3. Seta yellow 4
 Seta red 5
4. Capsule short and strumose.6. cerviculata
 Capsule long ovoid; when dry, sulcate and mouth oblique
.7. heteromalla
5. Leaves with clasping base and long awn. 7
 Otherwise 6
6. Small; long awns from graduated leaf-base; capsule short, pale and nearly erect5. rufescens
 Sturdy; leaves narrow-lanceolate; capsule nearly erect, slightly curved4. varia
7. Capsule slightly strumose; upper leaf-cells 3:1
.2. Grevilleana
 Capsule not strumose; upper leaf-cells 8-10:1
.8. subulata

Species.

1. D. Schreberiana (Hedw.) Schimp. In ditch, Hants (258)

2. D. Grevilleana (Brid.) Schimp. Some leaves slightly squarrose which suggests it as a form of Schreberiana. Grand Pre, Kings.
3. D. squarrosa (Schrad.) Schimp. On wet rocks in Cape Breton.
4. D. varia (Hedw.) Schimp. On poor soils. Kings, Hants, Colchester, Victoria.
5. D. rufescens (Sm.) Schimp. A roadside weed. Kings, Hants, Colchester, Halifax.
6. D. cerviculata (Hedw.) Schimp. On sandy or peaty soils throughout.
7. D. heteromalla (Hedw.) Schimp. Very common throughout on roots of trees. Var. orthocarpa (Hedw.) Paris, with capsule erect but mouth oblique. Annapolis, Victoria.
8. D. subulata (Hedw.) Schimp. On sandstone, Economy River, Colchester; det. Andrews.

B. Genus Rhabdoweisia B. & S.

1. R. denticulata (Brid.) B. & S. Tiny clumps on rocks by the sea, always on basalt from Brier Island to Hall's Harbour, except for a collection by Miss Brown from Windsor. Leaves linear-lanceolate; cells medium-long at base, quadrate or rhombic above with occasional projecting teeth. Capsules urnlike, erect, and strongly striate when dry.

C. Genus Oreoweisia DeNot.

1. O. serrulata (Funck) DeNot. Yellow-green clumps in crevices of the basalt cliff behind Victoria Beach, Annapolis. Leaves lanceolate, papillose with projecting cells making fine serrulations. Fruit has not been found in this latitude.

D. Genus Dichodontium Schimp.

1. D. pellucidum (Hedw.) Schimp. Yellow-green on rocks by brooks. Leaves narrow lanceolate; cells papillose,

scantly translucent; edges serrulate from bulging cells. Capsule not quite straight; erect, operculum long-beaked. Cape Breton (Macoun); Digby (MSB); Kings.

E. Genus Oncophorus Brid.

We have two species with few obvious characters in common except strumose capsules and being of the size of small *Dicranum*.

Key to Species.

1. Leaves lanceolate, only the perichaetial long-subulate; cells papillose. 1. lanceolata
- Leaves long-subulate from a broad base; cells smooth. 2. Wahlenbergii

Species.

1. O. polycarpa (Hedw.) Brid. Victoria (Nichols). Just to confuse one, this at times is not even strumose.
2. O. Wahlenbergii Brid. Common throughout on rotten logs and rocks. It fruits freely, and the pale strumose capsules with bulging scarlet peristome and the tangle of long subulae of a pale clean green make it easy to recognize.

F. Genus Arctoa B. & S.

A sub-genus of *Dicranum* from which it is separated on anatomical grounds. The somewhat incrassate cells and strumose capsule distinguish our species rather than the genus.

1. Arctoa Starkei (Web. & Mohr) Grout. Costa with three bands; awn denticulate; no auricles; cells thick-walled, 3:1 at base, 1:1 at tip. Seta yellowish; capsule curved and slightly strumose. Known from Aspotogan, Lunenburg, and Jeddore, Halifax, (MSB); and Kings.

G. Genus Dicranum Hedw.

Plants large to medium; leaves usually smooth, linear-lanceolate to wide lanceolate; costa about 1/9 of width or at most 1/5; capsules usually cernuous, in some species erect, always long and narrow, never characteristically strumose. Most are green pincushion mosses of forest, a few are boreal yellow mosses of the open.

Key to Species.

1. Yellowish or brownish mosses of open land or rocks;
 - small 2
 - Yellowish mosses of open land; large 3
 - Green mosses of forest 4
2. Matted plants with flagella in leaf axils. . . 2. flagellare
 - Tawny or blackish, on rocks or rotten wood, leaves falcate, papillose; capsules erect. 3. fulvum
 - Small to medium; leaf-tip obtuse and entire; auricles inflated to costa 12. groenlandicum
3. Tip of leaves obtuse and toothed; costa not reaching apex. 6. Bergeri
 - Upper face of leaf papillose; costa excurrent 9. spurium
 - Upper face of leaf faintly papillose, costa percurrent; leaves lanceolate 8. condensatum
4. Leaves with protonema or flagella in the axils; capsules
 - erect 5
 - Otherwise. 6
5. Leaves linear, tubular, with tomentum in axils; brown.
 - 3. fulvum
 - Leaves as in fulvum but usually broken off; green
 - 3a. var. viride
 - Leaves long-lanceolate, flagella in axils 2. flagellare
6. Leaves crisping and capsules furrowed when dry . . . 7
 - Leaves not crisping. 8
7. Leaves secund when damp; plant medium size . . 4. fuscescens
 - As large as scoparium; leaves spreading when damp.
 - 5. Muhlenbeckii
8. Leaves undulate; setae 1 - 4 from same perchaetium;
 - stems white tomentose 13. rugosum
 - Otherwise 9

9. Small; leaves lanceolate; less inrolled than in other small *Dicrana*; sometimes papillose on back above; auricles inflated but not reaching costa; capsules erect.
1. montanum
 Otherwise. 10
10. Inflated alar cells extending to costa; medium size 11
 Inflated alar cells not reaching to costa. 12
11. Costa 1/5 of base of leaf. 10. elongatum
 Costa 1/9 of base of leaf. 11. spadiceum
 (*Fulvum* and *groenlandicum* above have similar auricles.)
12. Leaves conspicuously secund; leaf-cells long to apex.
15. scoparium
 Like *scoparium* but not secund; leaves flatter and occasionally undulate. 16. Bonjeani
 Capsules often in pairs. 13
13. Larger than *scoparium*. 14. majus
 Smaller than *scoparium*, leaves long and slender and slightly undulate when dry. 7. Drummondii

Species.

1. *D. montanum* Hedw. Rare or perhaps overlooked as it fruits rarely. Found in Pictou (MacKay); Victoria (Nichols); Kings.
2. *D. flagellare* Hedw. Frequent in peaty spots and on rotten wood.
3. *D. fulvum* Hook. Typical *fulvum*, tawny, papillose and without broken leaves is uncommon. Most is intermediate between this and the variety, but both are found throughout the province.
 Var. *viride* (Sull. & Lesq.) Grout, is quite common.
4. *D. fuscescens* Turn. Very common in forests. Careless observation may confuse this with *Oncophorus Wahlenbergii*.
5. *D. Muhlenbeckii* B. & S. A larger variety of *fuscescens* known only from Ingonish Barrens, Victoria (Nichols) and Ponhook Lake, Queens.
6. *D. Bergeri* Bland. Found frequently in bogs and barrens.
7. *D. Drummondii* C. Muell. A woodland moss rarely collected, Recorded from Victoria (Nichols); Queens, Kings, Lunenburg.

8. D. condensatum Hedw. A coastal-plain moss of sandy soils, attributed to Nova Scotia in Grout's Moss Flora. No collections are known.
9. D. spurium Hedw. Clumps in poor soil in damp places. Inverness to Digby.
10. D. elongatum Schleich. Small clumps like scoparium but not secund. Known from Kings and Halifax.
11. D. spadiceum Zett. Small, compact clumps in woods. Kings. Ireland, like Dixon, would count this as merely variant scoparium, but it has a definite distribution here.
12. D. groenlandicum Brid. A small clump in a rock outcrop, White Rock, Kings. Ireland considers it to be erratic scoparium. If no more turns up, the species may well be dropped from our list.
13. D. rugosum (Hoffm.) Brid. Common in most woods.
14. D. majus Smith. In forest, not common but widespread.
15. D. scoparium Hedw. The commonest Dicranum. A universal woodland moss. The windswept secund leaves are distinctive.
16. D. Bonjeani DeNot. Uncommon. Victoria (Nichols); Halifax.

H. Genus Dicranodontium B. & S.

1. D. denudatum (Brid.) E.G.B. Tufts of pale silky leaves consisting chiefly of costa and rough awn. Auricles of inflated cells reach costa at base. Capsule oblong and smooth. Big Southwest Aspy, Inverness, and Kings.
2. D. asperulum (Mitt.) Broth. Similar but with dentate awn Hants.

I. Genus Paraleucobryum (Lindb.) Loeske

1. P. longifolium (Hedw.) Loeske. Curly, silky yellow-green patches on rocks. Costa takes up all the leaf except the basic angles; serrate at tip. Inverness, Victoria.

9. LEUCOBRYACEAE

Genus Leucobryum Hampe

1. L. glaucum (Hedw.) Schimp. A tight-pincushion moss under coniferous forests throughout the province; white when dry, glaucous when wet. The whiteness comes from the fact that nine-tenths of the leaf is costa, with only a narrow fringe of leaf cells along the borders. Capsules are Dicranum-like, arcuate, striate and small for the size of the leaves. I have found fruits only in 1948 and the very damp summer of 1967. In other seasons, fruits sticking up from the clumps have belonged to Plagiothecium, Dicranum or Philonotis exploiting the stored water.

10. ENCALYPTACEAE

Genus Encalypta Schreb.

This genus is most easily distinguished from Pottiaceae by its enveloping, extinguisher-like calyptra. The cells are papillose or incrassate to the point of opacity. The distribution follows the outcrops of basic rocks, even including concrete bridges, but it surprisingly laps over into swamps.

Key to Species.

1. Calyptra fringed; costa excurrent shortly; small; yellowish

1. ciliata

Calyptra not fringed; costa subpercurrent; apex obtuse

2. streptocarpa

Species.

1. E. ciliata Hedw. Small to medium. On rocks, Victoria (Nichols), Blomidon and Isle Haute; on sandy margins of Caribou Bog, Kings.

2. E. streptocarpa Hedw. Margaree (Macoun); North Sydney (MSB). A much larger moss than ciliata.

11. BUXBAUMIACEAE

The only two species of this family may not at first be recognized as mosses, but they cannot be confused with any others. The capsules are very large, leaves absent or inconspicuous, except for the bristly perichaetium of Diphyscium.

Key to Genera.

1. Capsule shaped like an inverted flatiron, mounted on a stiff seta; sometimes with shreds of protonematous leaf.

A. Buxbaumia

Capsule teardrop-shaped (point upwards), surrounded while developing by bristly perichaetial leaves; true leaves are short-lingulate, papillose and with short costa.

B. Diphyscium

A. Genus Buxbaumia Hedw.

1. B. aphylla Hedw. Single or few plants on rotten wood or humus in early summer. The known distribution extends from Annapolis northward, but one cannot expect to find stations anywhere as these, like many annuals, appear and disappear for years. In 1946-48 I found four stations, and in the nineteen years since I have not seen any.

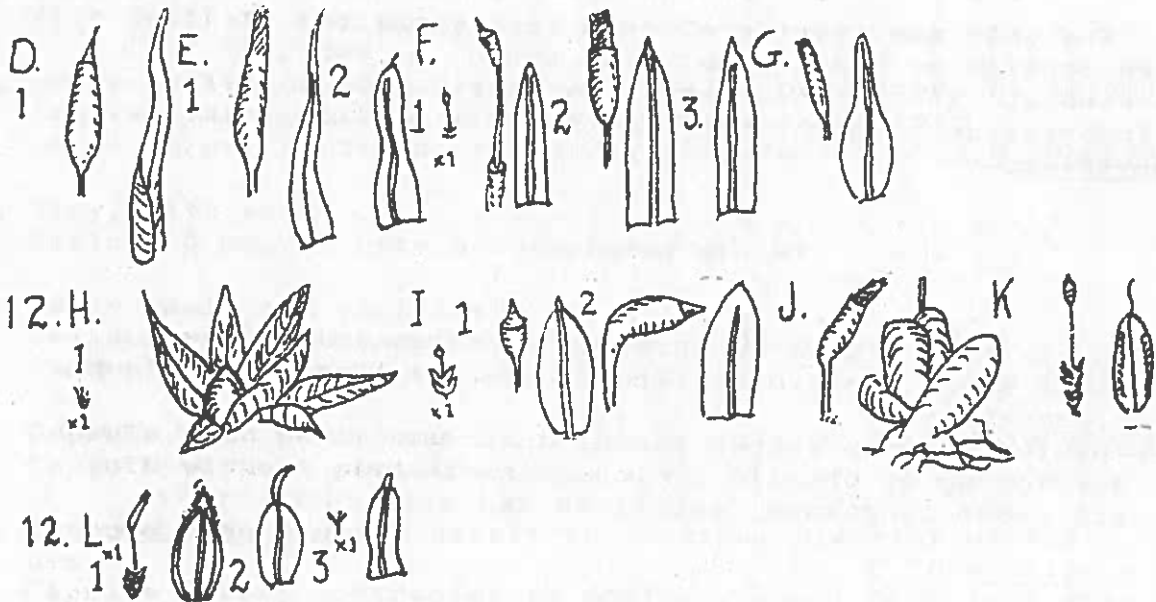
B. Genus Diphyscium Mohr.

1. D. foliosum (Hedw.) Mohr. Abundant and persistent on sterile soil, such as well-beaten paths and banks. The capsules are so striking that one is apt to overlook the leaves which are like no other and will identify the plant at any season.

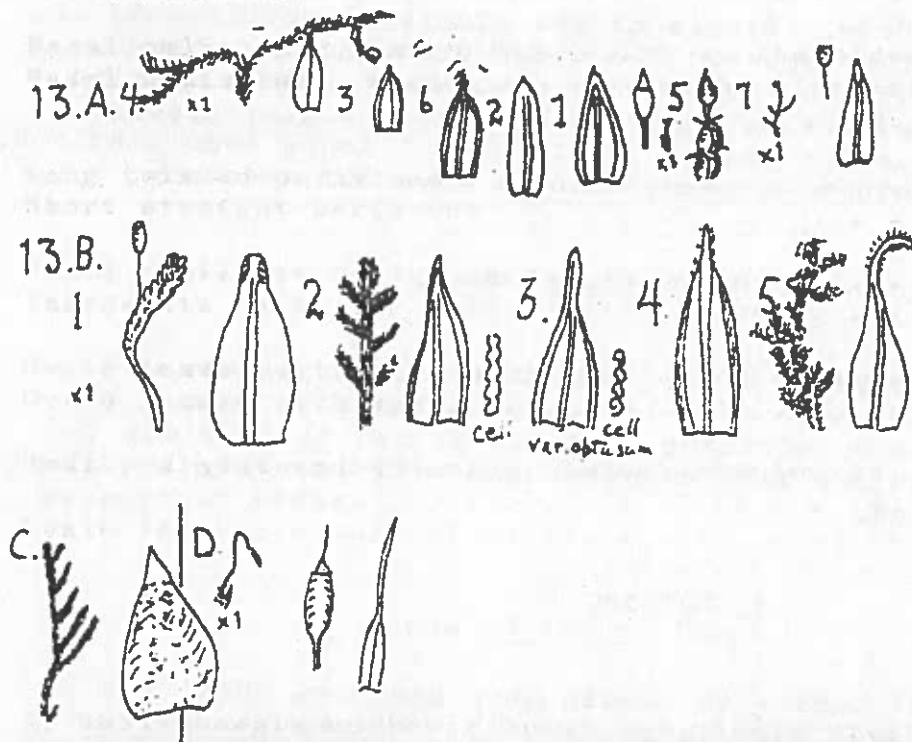
12. POTTIACEAE

A difficult family to handle when sterile. Most are papillose, but some have large, smooth, rectangular cells. Some have long twisted peristomes of 32 teeth, others short peristomes, others none. They range from minute to medium.

III. Bryales 12. Pottiaceae (Cont'd)



13. Grimmiaceae



12. *Epilobium* (Cov.)



13. *Epilobium*



Key to Genera:

1. Minute (under 3 mm) and cleistocarpous 2
 With definite peristome, 3
2. Leaves crisping when dry; cells small, papillose. A. Astomum
 Leaves ovate, embracing capsule, costa excurrent;
 cells large, rectangular, hardly papillose . . . H. Phascum
3. Tiny, with setae 4
 Medium, 5 mm. or more before seta, 7
4. Cells small and papillose. 5
 Cells large, rectangular; capsule urnlike or ovoid
 and slightly inclined I. Pottia
5. Capsule with peristome B. Weisia viridula
 Capsule without peristome. 6
6. Capsule erect; mouth nearly the maximum diameter of the
 urn. C. Gymnostomum
 Capsule erect, contracted to mouth. B. Weisia microstoma
7. Leaves long, slender, involute 8
 Leaves otherwise 9
8. Basal cells long, extending V-like up the sides. E. Tortella
 Basal cells long, ending in a straight line across leaf,
D. Trichostomum
9. Long twisted peristome 10
 Short straight peristome 12
10. Small papillose cells; leaves lanceolate F. Barbula
 Incrassate papillose cells; ovate leaves 11
11. Ovate leaves without subula, embracing seta. J. Aloina
 Ovate leaves with subula I. Tortula
12. Small, almost smooth cells; lanceolate leaves, sub-
 percurrent costa. G. Didymodon
 Ovate leaves; excurrent costa. K. Desmatodon

A. Genus Astomum Hampe

1. A. Muhlenbergianum (Sw.) Grout. A minute creeping Weisia
 with immersed apiculate capsules; linear-lanceolate invol-
 ute leaves, excurrent costa and small round papillose cells.
 The leaves, as in Weisia, are crisped into ringlets when

dry. Kings and Hants, on sandy soil of fields and roadsides.

B. Genus Weisia Hedw.

Leaves as in Astomum but capsule long exserted.

Key to Species.

1. A white membrane but no visible peristome 2. microstoma
Reddish peristome. 1. viridula
1. W. viridula Hedw. Found throughout the province.
Much variation - short and ovoid capsules, smooth or
furrowed when dry; brown or yellow setae.
2. W. microstoma (Hedw.) C. Muell. Reported only from Hants,
Kings and Halifax. In the Valley it is the abundant
Weisia, yellow-green on starved lawns and fields.

C. Genus Gymnostomum Hedw.

Plants of this genus are minute to small and are found on dripping ledges of basic rocks. The leaves are not distinguishable from Weisia and Astomum (so Dixon included these three genera under Weisia) but these lack peristome. The habitat alone is sufficient to distinguish this genus from others.

Key to Species.

1. Plants, seta excluded, not taller than 1 cm. 2
Plants taller than 1 cm. 3
2. Tiny; leaves obtuse 3. tenue
Very small; leaves usually coming to a
point 2. calcareum
3. Basal cells quadrate 1. aeruginosum
Basal cells 2:1 or 3:1 4. recurvirostrum

Species

1. G. aeruginosum Sm. Pictou (C.B. Robinson); Windsor
(Bartram); Inverness, Hants and Kings. Not rare.
2. G. calcareum Nees & Hornsch. Pictou (MacKay); generally
on gypsum and basic rocks from Inverness to Digby.
3. G. tenue Hedw. Grand Narrows (Macoun).

4. G. recurvirostrum Hedw. Cape Dauphin, C.B. (Nichols).

D. Genus Trichostomum Bruch

1. T. cylindricum (Brid.) C. Muell. Small yellow plants, rarely fruiting. Leaves long and slender, involute; costa to apex which may be serrulate and is often broken. Cells long, 5:1, at base and diminish upward until they are quadrate at apex. The longer cells extend as far up the leaf beside the costa as on the margin, unlike those of Tortella. Halfway House, C.B., (Macoun); Newport, Hants (MSB).

E. Genus Tortella (C.Muell.) Limpr.

This genus would be well distinguished by the long twisted peristome like that of most Barbulas, but unfortunately it rarely fruits. One must rely upon the curled dried leaves which resemble those of Dichodontium to the eye but are distinguished by their long basic cells which continue up the margins in abrupt contrast to the shorter cells of the upper part. Plants grow in close, yellow-green mats.

Key to Species.

1. Leaves long-lanceolate to a long acute point. . 1.tortuosa
Leaves less long, ending abruptly and continuing
with an excurrent nerve 2.caespitosa

Species.

1. T. tortuosa (Turn.) Limpr. Known from Cape North to Cape Forchu, chiefly on basic rocks.
2. T. caespitosa (Schwaegr.) Limpr. Victoria, Hants (MSB)

F. Genus Barbula Hedw.

Tiny to medium plants of poor soil and rocks, chiefly basic. Capsules erect or nearly so; seta usually conspicuously yellow; peristome long and twisted; leaves lanceolate and papillose. Dixon treats this and Didymodon as a single genus which would have suited the Nova Scotian species well enough..

Key to Species.

1. Tangled tufts of rust-coloured strands; leaf-margins recurved. 4. reflexa
Plants erect 2
2. Tiny; perichaetium enveloping seta like a socket.
Small-medium plants; perichaetial leaves loose . 3
1. convoluta
3. Leaves ending in a definite tooth. 2. unguiculata
Leaf-margins recurved below; costa subpercurrent
3. fallax

Species.

1. B. convoluta Hedw. Common on poor soils of sand or gypsum. Hants, Kings, Inverness.
2. B. unguiculata Hedw. Not common but widely distributed on poor soil from Inverness to Hants.
3. B. fallax Hedw. A single specimen from Windsor gypsum, det. R. R. Ireland.
4. B. reflexa (Brid.) Brid. A single specimen from the gorge at Eskasoni, Cape Breton, det. Andrews.

G. Genus Didymodon Hedw.

The short peristome, red seta and usually red colouring of leaves distinguish it from Barbula.

1. D. recurvirostris (Hedw.) Jenn. Common on rocks through out.

H. Genus Phascum Hedw.

1. P. cuspidatum (Schreb.) Hedw., var. americanum Ren. & Card. A minute weed-moss known only from Kings and Hants, usually in fields or on roadsides in May and June. It is about 2 mm. high, a blackish capsule sitting among lanceolate leaves with costa long-excurrent. Cells large, rectangular, after the fashion of Pottia truncata from which it can scarcely be distinguished before fruiting.

I. Genus Pottia Furnr.

Small plants with wide leaves and large rectangular cells slightly papillose. Our species lack apparent peristome.

Key to Species.

1. Capsule erect, urnlike, widest at mouth; leaves ovate-

acuminate. 1. truncata
 Capsule slightly asymmetric and inclined, ovoid, contracted below mouth; leaves spatulate and short acuminate. 2. Randii

Species.

1. P.truncata (Hedw.) Furr. A small weed-moss of fields and roadsides. It has been collected from Truro to Annapolis and Lunenburg Counties. It fruits in May.
2. P.Randii Kennedy. This rare moss was found at Peggy's Cove, Halifax, by Miss Brown and was named by her, in collaboration with Mrs. Britton, as Entosthodon neoscoticus, a new species of the Funariaceae. Now it has been referred to this species of which it is only the fourth station. The two stations in Maine were, like this one, "in sand among stones on the seashore".

J. Genus Alonia (C.Muell.) Kindb.

1. A.rigida (Hedw.) Kindb. Our only station for this plant was found by Schofield on gypsum near Sweet's Corner, Hants. The fruiting plants are strikingly different from anything else, the seta rising from clasping ovate papillose leaves. The capsule is narrow ovoid and more or less erect, the peristome long and twisted. The root system is amazingly complex and efficient for a moss.

K. Genus Desmatodon Brid.

1. D.latifolius (Hedw.) Brid. On the rotting basalt of the northward-facing slope of Isle Haute, Cumberland. Its nearest station is in Gaspé, the next in Greenland. The plant is small; the capsule narrow-ovoid and erect; the peristome of medium length and not twisted. The leaves are ovate with long excurrent costa; the cells short-hexagonal and papillose; the margins revolute.

L. Genus Tortula Hedw.

Plants from tiny to medium. Leaves typically ovate, papillose, with excurrent costa and usually short, incrassate cells. Capsules are long, terete, usually slightly curved and nearly erect, with long, twisted peristome. They are usually on trees or rocks but nowhere very common.

Key to Species

1. Tiny; on bark of elm trees; propagula on costa. 3. papillosa

Medium size; on rock or soil; long capsules. . . . 2

2. Costa long and abruptly excurrent from ovate leaf.

2. ruralis

Costa short-excurrent from ovate-acuminate leaf.

1. mucronifolia

Species.

1. T. mucronifolia Schwaegr. Recorded from Truro (Macoun); Aspy Bay (Nichols); Mabou, Inverness (Schofield), and along the Fundy basalt from Blomidon to Isle Haute.

2. T. ruralis (Hedw.) Smith Aspy Bay (Nichols).

3. T. papillosa Wils. In 1947 I found a tiny moss embedded in a clump of Pylaisia on an elm in Windsor. I could not place it and so sent it to Miss Brown who passed it on to E. B. Bartram. He determined it as this species and congratulated us on a new species for the province. Later I read the account of the Gray Herbarium expedition to Nova Scotia in 1922. It included a report from E.B. Bartram on the mosses found. One of them was Tortula papillosa from an elm in Windsor.

13. GRIMMIACEAE

Minute, small and medium-sized plants of rocks.

Key to Genera.

1. Minute; capsule straight on long zigzag seta. . . D. Campylostelium
Plants small to medium 2

2. Grey ecostate plant with hyaline leaf-tips . . . C. Hedwigia
Otherwise 3

3. Plants with sinuose cells, or like a crowded string of beads, either in base or apex of leaves; leaves often with hyaline spines, not tips; seta more than five times longer than the capsule. B. Rhacomitrium
Plants grey, green or black; cells of the upper leaf small and papillose; seta never more than three times length of capsule and usually very short . . . A. Grimmia

A. Genus Grimmia Hedw.

These divide, as usual, into a few uncommon and unvarying species and a complex of infinite variation which can

be divided indefinitely without satisfying either experts or amateurs. Fortunately we have few species, for this is "a horror of great darkness".

Key to Species.

1. Capsule long exserted 7. affinis
Seta short 2
2. Leaf-tip obtuse; costa subpercurrent. 2. Agassizii
Leaf-tip acute or spinulose 3
3. Seta just longer than capsules. 4
Capsules immersed 5
4. Capsules yellowish; leaves with excurrent costa
Capsules brown; leaves ending in hyaline awn. 1. maritima
5. Olneyi
5. Leaves ending in short hyaline spine. 4. apocarpa
Leaves ending in long, toothed hyaline spine 6. pilifera
Leaves ending without hyaline spine 3. alpicola

Species.

1. G. maritima Turn. On sea-cliffs from St. Paul Island to Brier Island. The dark clumps with yellowish fruits on top are distinctive, but other species of Grimmia are found on such cliffs.
2. G. Agassizii (Sull. & Lesq.) Lesq. & James. Known only from Sherbrooke, Guysborough (MSB); and Kings.
3. G. alpicola Hedw. Very common and with many variations.
4. G. apocarpa Hedw. As common and as varied.
5. G. Olneyi Sull. Known from Lake Kejimikujik, Annapolis (MSB); Wild Cove, C.B. (Schofield).
6. G. pilifera Beauv. Cited in Grout's Moss Flora; also in Kings.
7. G. affinis Hornsch. Near Curry's Corner, Hants; det. H. Crum.

B. Genus Rhacomitrium Brid.

These divide into two groups, those of wet boulders which are almost smooth-celled, those of exposed rocks which protect themselves with papillae. The mitrate capsule is distinctive but not always present; the sinuose cells demand a microscope. In the field, however, all the species are distinguishable by their leaf-tips, except in stunted specimens, and, in any case, the varieties of heterostichum have a tiresome way of showing key-characters of two forms on a single plant.

Key to Species.

1. Leaf-tip obtuse or at least blunt. 2
Some or all leaf-tips ending in a hyaline spine. . . 4
2. Leaf-tip broadly obtuse, usually toothed . . 1. aciculare
Leaf-tip blunt, costa ending below tip. 3
3. Cells smooth, short in upper half of leaf. 3d. heterostichum
affine obtusum
Cells finely papillose, long nearly to tip . 2. fasciculare
4. Hyaline tips toothed, forming 1/5 of leaf, papillose
5. lanuginosum
Hyaline tips serrulate, 1/9 of leaf; papillose 4. canescens
Hyaline tips short; cells smooth . . (heterostichum).5
5. Cells of upper two-thirds short . . 3b. var. sudeticum
Cells of upper one-third short . . . 3a. var. affine
Cells of upper one-third long . . . 3c. var. ramulosum

Species.

1. R. aciculare Brid. Our most abundant species throughout.
On wet rocks in streams.
2. R. fasciculare (Hedw.) Brid. Frequent, especially in Cape Breton. Small branches alternating up the stem and without hyaline spines.
3. R. heterostichum (Hedw.) Brid. This seems to be more abundant on dripping cliffs than by brooks.
a. var. affine (Schleich.) C. Jens. Halifax (Macoun).
b. var. sudeticum (Funck) Grout. Truro (Macoun);
Aspy (Nichols).
c. var. ramulosum (Lindb.) Grout. Kings, Inverness, Victoria. This sometimes has a superficial resemblance to fasciculare apart from its hyaline spines.

4. R. canescens Brid. Common on shaded rocks, especially in Cape Breton and along the North Mountain.
5. R. lanuginosum (Hedw.) Brid. The woolly hyaline tips of this are unmistakable. Common on exposed rocks from Cape Breton to Peggy's Cove, Halifax.

C. Genus Hedwigia Ehrh.

1. H. ciliata (Ehrh.) Hedw. Patches of greyish creeping stems on rocks. The ecostate, hyaline-tipped leaves and pinkish stems are distinctive. In early summer capsules may be found immersed in the terminal leaves. Common throughout.

D. Genus Campylostelium B. & S.

1. C. saxicola (Web. & Mohr) B. & S. The complete plant is about 1 mm. tall. It has been found in the province once, on a siliceous rock at Port Mouton, Queens, by Miss Brown. The leaves are lanceolate-acuminate, costa subpercurrent, cells quadrate and opaque. The seta is three to five times as long as the gametophyte and is zigzag; the capsule is straight and terete and carried at an angle.

14. EPHEMERACEAE

Minute plants of disturbed soil.

Key to Genera.

1. Orange to red ovate capsules in green mats of persistent protonema. A. Ephemerum
Yellow-brown capsules, each in its cup of ligulate leaves. B. Nanomitrium

A. Genus Ephemerum Hampe

1. E. serratum (Hedw.) Hampe The protonema of these is scarcely to be distinguished from soil algae until the buds form in April, when fruit follows rapidly. By June they have dried up and crumbled. The leaves are ovate and serrate; the capsules roll away with the decay of the plant. These plants can scarcely be seen with the naked eye. The species is known from Truro to Brier Island.

B. Genus Nanomitrium Lindb.

1. N. Austinii (Sull.) Lindb. The protonema of this plant is said to be persistent, but I did not find it. I had read in Dixon that this plant was usually found in the bed of

1. *Salix glauca* L. - Common on exposed rocks, especially in the mountains and along the coast.

2. *Salix repens* L. - The most typical type of *Salix* in the mountains. It is a small shrub with green leaves and small flowers. It is common in the mountains and along the coast.

3. *Salix glauca* L. - Common on exposed rocks, especially in the mountains and along the coast. It is a small shrub with green leaves and small flowers. It is common in the mountains and along the coast.

Salix glauca L.

1. *Salix glauca* L. - The common plant in the mountains. It is a small shrub with green leaves and small flowers. It is common in the mountains and along the coast. It is a small shrub with green leaves and small flowers. It is common in the mountains and along the coast.

Salix repens L.

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Salix repens L.

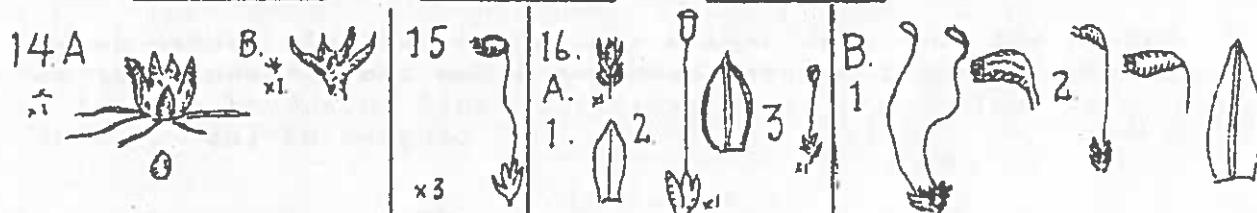
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III. Bryales

14. Ephemeraceae 15. Disceliaceae 16. Fumariaceae



14. *Phlox paniculata* L.



15. *Phlox paniculata* L.



16. *Phlox paniculata* L.



17. *Phlox paniculata* L.



18. *Phlox paniculata* L.



dried ponds. In 1947 a very dry summer dried out the ponds of the Windsor area, and I searched perhaps forty before I found a hoofprint lined with this moss. Each plant is about 11 mm. in height.

15. DISCELIACEAE

Genus Discelium Brid

1. D. nudum (Dicks.) Brid. This tiny plant has tiny lanceolate leaves without costa and with large hexagonal cells, and the protonema is said to persist. The seta is long and erect, the capsule cernuous, globular and with a 16-toothed peristome. Somers reported this species in 1877 from Halifax.

16. FUNARIACEAE

Annual plants; leaves have large hexagonal cells.

Key to Genera

1. Capsules curved and with peristome. B. Funaria
Capsules either immersed and cleistocarpous or erect
and without peristome A. Physcomitrium

A. Genus Physcomitrium Brid.

Key to Species.

1. Minute; black or brown capsule immersed in ovate leaves; fruiting in autumn. 1. immersum
Small; seta about 1 cm., urnlike; fruits in autumn. 3. collenchymatum
Medium to tall, 2 cm. up; capsule urnlike; fruits in spring 2. turbinatum

Species

1. Ph. immersum Sull. Known only from Hants and Kings. On cultivated or disturbed soil.
2. Ph. turbinatum (Mx.) Brid. Common in old fields in June. Reported only from Kings, Halifax and Hants.
3. Ph. collenchymatum Gier. Collected by Schofield on Brier Island. Determined as turbinatum by Andrews - "It is very small, but what else can it be?" Named later by Crum.

B. Genus Funaria (Schreb) Hedw.

Key to Species.

1. Setae long and curving, often entangled; capsule thick and wide, length to breadth about 1.5:1; seta usually hygroscopic. 1. hygrometrica
Setae nearly straight; capsule 2:1; seta not hygroscopic 2. flavicans

Species.

1. F. hygrometrica Hedw. Abundant on burnt and waste ground. Fresh setae, if breathed upon, uncoil rapidly, and then, if warmed over a light, recoil again.
2. F. flavicans Mx. Frequent on roadsides in Hants and Kings; found once in Inverness. A type looking intermediate between the two species but possibly belonging here, as it is not hygroscopic, is found on sea cliffs.

17. SPLACHNACEAE

A family of annuals adapted to fly-dispersal of spores and to a short rich life on dung or organic matter. The erect capsules have beneath them a hypophysis which baits the flies and helps to distribute the spores. It is unlikely that these will be collected without fruit (the only plant that I have found had none), but the key is intended to help one over this barrier. The large cells resemble only those of the Funariaceae and Ephemeraceae which have no serrate tips or long excurrence.

Key to Genera.

1. Hypophysis three times wider than capsule; leaves obovate serrate. C. Splachnum
Hypophysis a little wider than capsule; leaves excurrent or lanceolate. B. Tetraplodon
Hypophysis less wide than capsule; leaves obovate serrate. A. Tayloria

A. Genus Tayloria Hook.

1. T. serrata (Hedw.) B. & S., var. tenuis (Sm.) B. & S. Guysborough and Victoria (Macoun); Digby (MSB).

B. Genus Tetraplodon B. & S.

Key to Species.

1. Leaves entire; capsule red to black, hypophysis crimson. 1. mnioides
Leaves toothed. 2

2. Leaves ovate, long-excurrent, short teeth at apex; capsules brownish, hypophysis yellowish. . . . 2. angustatus
Leaves long-lanceolate with long teeth and short excurrent; capsule darker than hypophysis . . . 3. pennsylvanicus

Species.

1. T. mnioides (Hedw.) B. & S. Victoria (Nichols).
2. T. angustatus (Hedw.) B. & S. Victoria (Nichols); Kejimikujik (MSB).
3. T. pennsylvanicus (Brid.) Grout. Isle Madame, Richmond (A.J. Allen)

C. Genus Splachnum Hedw.

Key to Species.

1. Hypophysis violet; leaves spatulate, toothed at apex. 1. ampullaceum
Hypophysis a crimson umbrella under an orange capsule;
leaves obovate, toothed nearly to base. . 2. rubrum

Species.

1. S. ampullaceum Hedw. Found widely but not commonly; Cape Breton, Victoria, Guysborough, Queens, Yarmouth, Hants.
2. S. rubrum Hedw. Found once at Bass River, Colchester.
This plant has to be seen to be believed.

18. SCHISTOSTEGACEAE

Genus Schistostega Mohr.

1. S. pennata (Hedw.) Hook. & Tayl. A minute moss of cracks in rocks from which it reflects the light in a pale golden glow. The leaves are ovate and complanate, the decurrence of each linking it to the next. The capsule on a 3 mm. seta is erect, ovoid and without peristome. Found beside Northwest Arm, Halifax, on the Bird Islands and up Salmon River, Victoria.

19. ORTHOTRICHACEAE

Green to dark-green plants, chiefly of tree trunks, some of rocks. The flat, triangular teeth of the outer peristome are distinctive when they can be seen; the inner peristome is so often absent that it plays no part in the classification

of species. Orthotrichum causes the most trouble as the species are numerous and scantily differentiated. Capsules are more or less urnlike.

Key to Genera

1. Capsule exserted on seta 4 or more times the length of capsule. E. Drummondia
Capsule immersed or on shorter seta. 2
2. Capsule immersed or emergent 3
Seta apparent. 4
3. Leaves imbricate when dry. A. Orthotrichum
Leaves crisping when dry B. Ulota
4. Leaf-margins plane; cells only faintly papillose. C. Amphidium
Leaf-margins usually revolute in part; strongly papillose. D. Zygodon

A. Genus Orthotrichum Hedw.

Small dark tufts of mosses on trees, rarely on rocks. Capsules usually emergent; peristomes double; leaves papillose.

Key to Species.

1. Leaves obtuse with plane margins (some a little revolute). 3. obtusifolium
Leaves acute with revolute margins 2
2. Costa ending below apex. 3
Costa reaching apex 4
3. Tip of leaf almost hyaline; capsule buff 5. pumilum
Tip of leaf rounded; capsule straw-coloured. . 6. ohioense
4. Capsule fat, pyriform, slightly striate. . . 1. sordidum
Capsule long terete 5
5. Capsule contracted below mouth; striate . . . 4. strangulatum
Capsule not contracted below mouth; striate or not. 2. speciosum

Species.

1. O. sordidum Lesq. & James. Common in the Annapolis Valley.
An occasional tooth is found on the apex of leaves.

2. O. speciosum Nees. Common but not much reported. Apart from a dubious report by Macoun from Margaree, we know it only from the Annapolis Valley and Halifax. If the capsules are smooth, they may be called elegans. Sometimes found on rocks.
3. O. obtusifolium (Schrad.) Brid. Uncommon but widely reported: Inverness (Macoun); Yarmouth, Colchester (MSB); Hants and Kings.
4. O. strangulatum Schwaegr. Common from Annapolis to Pictou.
5. O. pumilum Dicks. Common in the Annapolis Valley.
6. O. ohioense Sull. & Lesq. Occasional in the Annapolis Valley.

B. Genus Ulota Mohr.

Rather light green tufts on trees or darker on rocks; leaves usually crisped when dry; capsules exserted conspicuously on necks rather than setae.

Key to Species.

1. On rocks 1. americana
On tree trunks 2
2. Creeping with vertical fruiting offshoots 3. Drummondii
Tufts on bark 3
3. Leaves often tipped with blackish brook-bodies 4. phyllantha
Otherwise 4
4. Capsules strongly striate 2. crispa
Capsules smooth with puckered mouth . . . 5. Ludwigii

Species.

1. U. americana (P.B.) Lindb. Very common along brooks throughout.
2. U. crispa (Hedw.) Brid. Abundant throughout.
3. U. Drummondii (Hook & Grev.) Brid. This rare plant was reported by Macoun from three places in Cape Breton, which is as many as the rest of the collections in North America. As Grout ignores Macoun's records in this case,

I suspect that he did not agree with the determinations. However, as this species has been found as near as Miquelon,, it may turn up and be authenticated.

4. U. phyllantha Brid. Found beside the sea on conifers from St. Paul Island to Yarmouth.
5. U. Ludwigi Brid. Abundant in the same hardwood habitat as crispa.

C. Genus Amphidium Nees

These plants grow on cliffs and bear a general resemblance to Ulota. Grout says that they are found "rarely on rocks containing lime", whereas Gymnostomum grows on "rocks containing more or less lime". Here they are less particular. The two genera used to look at each other from opposite sides of the waterfall on Harding Brook by Melanson, Kings, until this beauty spot was transformed into the local dump.

Key to Species.

1. Basal cells thin-walled. lapponicum
- Basal cells incrassate Mougeotii

Species

1. A. lapponicum (Hedw.) Schimp. Known from Margaree and Truro (Macoun); Clyburn Brook, Inverness (E.C.Smith); Melanson and Hall's Harbour, Kings.
2. A. Mougeotii (B. & S.) Schimp. Margaree (Macoun); Lake Charlotte, Halifax; (MSB); Big Intervale, Margaree (ECS); Aspy Trail.

D. Genus Zygodon Hook. & Tayl.

This genus is not well known here and has been misidentified by most of us. In general, the species are more heavily papillose than Amphidium and have longer setae and shorter stems.

1. Z. conoideus (Dicks) Hook. & Tayl. Seta less than 1 cm.; slender acute leaves ending in a long cell; capsule erect. Reported by Miss Brown from Sheet Harbour, Halifax, and Lake Kejimikujik, Annapolis. She sent me one dubious specimen from Yarmouth, but it was clearly Orthotrichum obtusifolium, so I retain doubts.

E. Genus Drummondia Hook.

1. D. prorepens (Hedw.) Jenn. A rather creeping form with erect branches tipped by ovate erect capsules on setae four times as long as the capsules. No other moss can be confused with this when it is fruiting, but this is not every year. A plant which I watched for three years fruited only in the first summer. The only known stations are: Milton, Queens (MSB); Windsor, Hants.

20. AULACOMNIACEAE

Genus Aulacomnium Schwaegr.

Plants commonly of marshy land. The capsules are rare in all species. When they occur, they are arcuate, inclined striate. Androgynum and palustre usually reproduce by brood-bodies carried aloft by pseudopodia, as common with them as setae are scarce. Not a single superficial feature is common to all four.

Key to Species.

1. Plant small; brood-bodies in conspicuous balls on stilts.
Plants medium to large 2. androgynum 2
2. Plant large with yellowish imbricate cucullate leaves.
Plant of medium size. 4. turgidum 3
3. Brood-bodies like tiny leaves on a tall pseudopodium; leaves serrulate to entire. 3. palustre
Brood-bodies in small balls, very rare; leaves narrow and toothed, cells small and papillose. 1. heterostichum

Species.

1. A.heterostichum Hedw. Compact dark clumps on damp ground. Not common but well distributed. Known from Victoria (MSB); Shelburne, Kings, Hants.
2. A.androgynum Schwaegr. Found throughout, chiefly in damp places and on manure. It seems to fruit freely on gypsum, while on more fertile substrates it is covered with balls of brood-bodies.
3. A.palustre (Web. & Mohr) Schwaegr. Common throughout and infinitely variable. On almost any damp ground one may see the striking yellow-green new growth above

Genus *Agrostis* L.

Agrostis (L.) Nees. A slender, erect, perennial grass with narrow leaves, often by dense tufts. The spikelets are borne on long, slender peduncles. The spikelets are composed of many small flowers. The spikelets are borne on long, slender peduncles. The spikelets are composed of many small flowers. The spikelets are borne on long, slender peduncles. The spikelets are composed of many small flowers.

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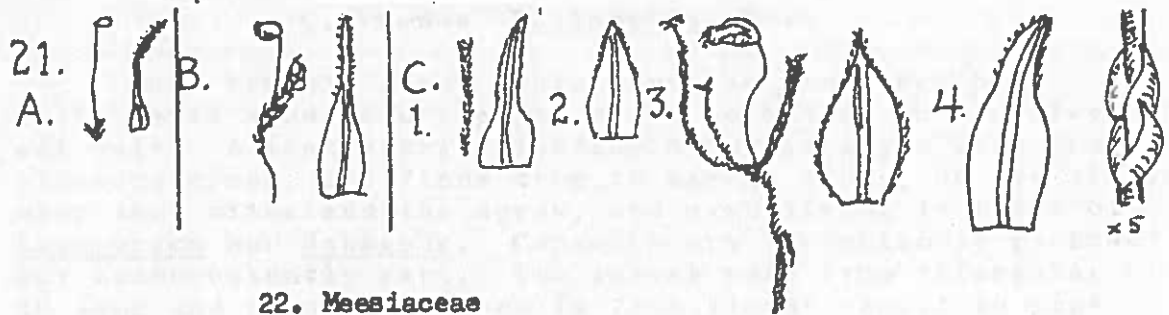
Key to Species

1. Spikelets small; spikelets in dense tufts. *Agrostis alba* L.
2. Spikelets large; spikelets in dense tufts. *Agrostis alba* L.
3. Spikelets small; spikelets in dense tufts. *Agrostis alba* L.
4. Spikelets large; spikelets in dense tufts. *Agrostis alba* L.
5. Spikelets small; spikelets in dense tufts. *Agrostis alba* L.
6. Spikelets large; spikelets in dense tufts. *Agrostis alba* L.
7. Spikelets small; spikelets in dense tufts. *Agrostis alba* L.
8. Spikelets large; spikelets in dense tufts. *Agrostis alba* L.
9. Spikelets small; spikelets in dense tufts. *Agrostis alba* L.
10. Spikelets large; spikelets in dense tufts. *Agrostis alba* L.

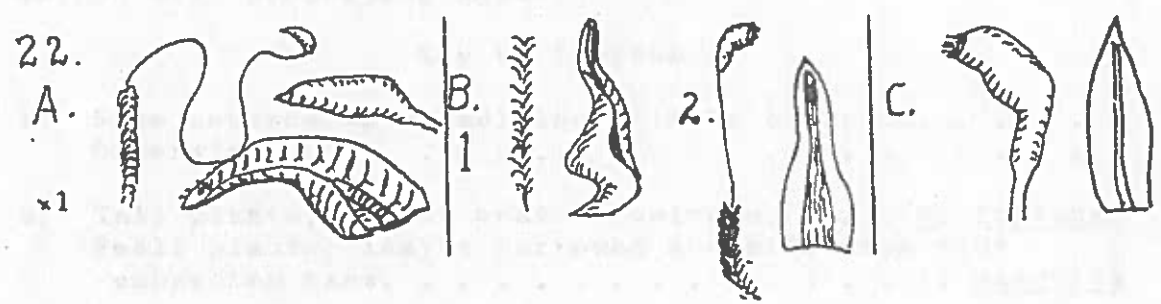
Species

1. *Agrostis alba* L. Common in damp ground. Not common in dry ground. *Agrostis alba* L.
2. *Agrostis alba* L. Common in damp ground. Not common in dry ground. *Agrostis alba* L.
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10. *Agrostis alba* L. Common in damp ground. Not common in dry ground. *Agrostis alba* L.

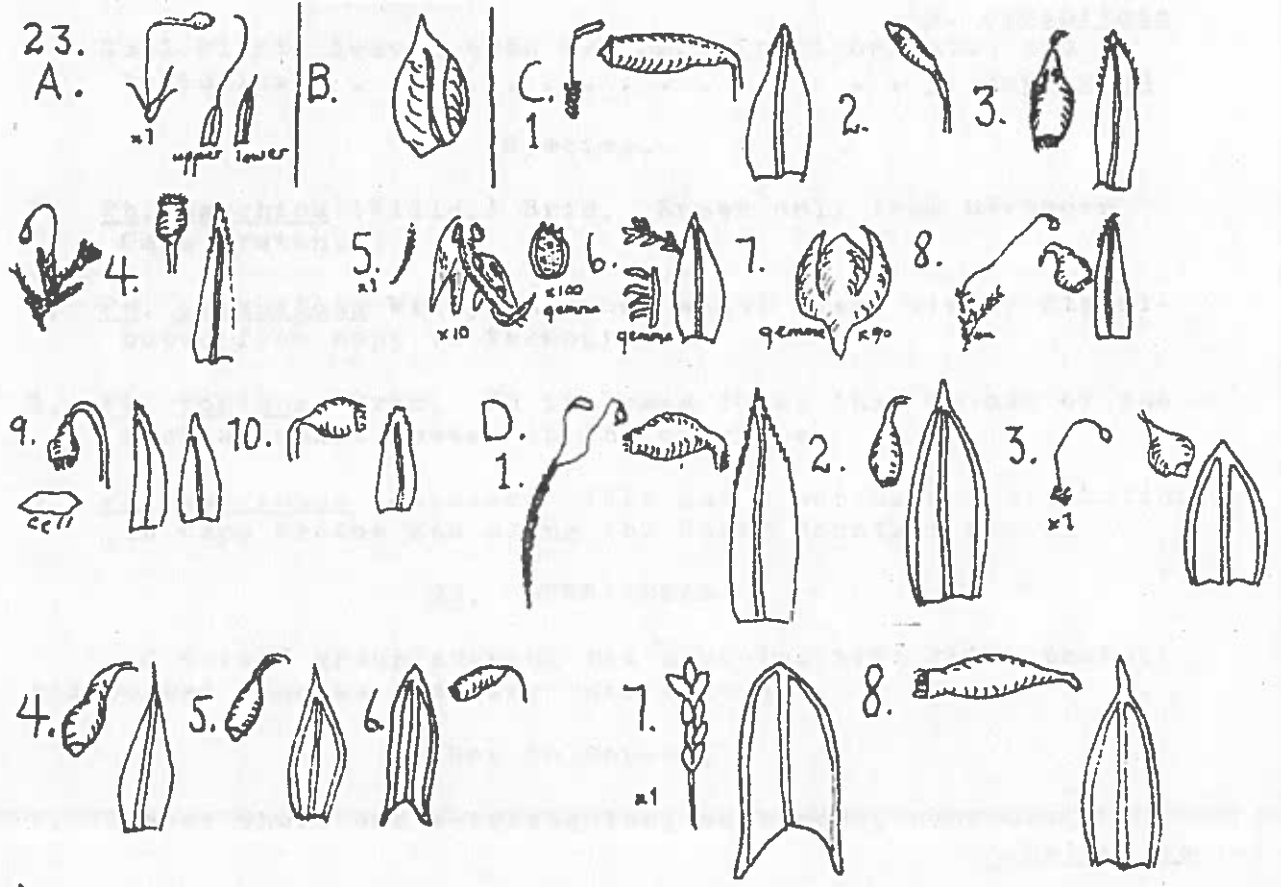
III. Bryales 21. Bartramiaceae



22. Meseliaceae



23. Bryaceae



III. *Hydrocotyle* sp. *Hydrocotyle*

32
A



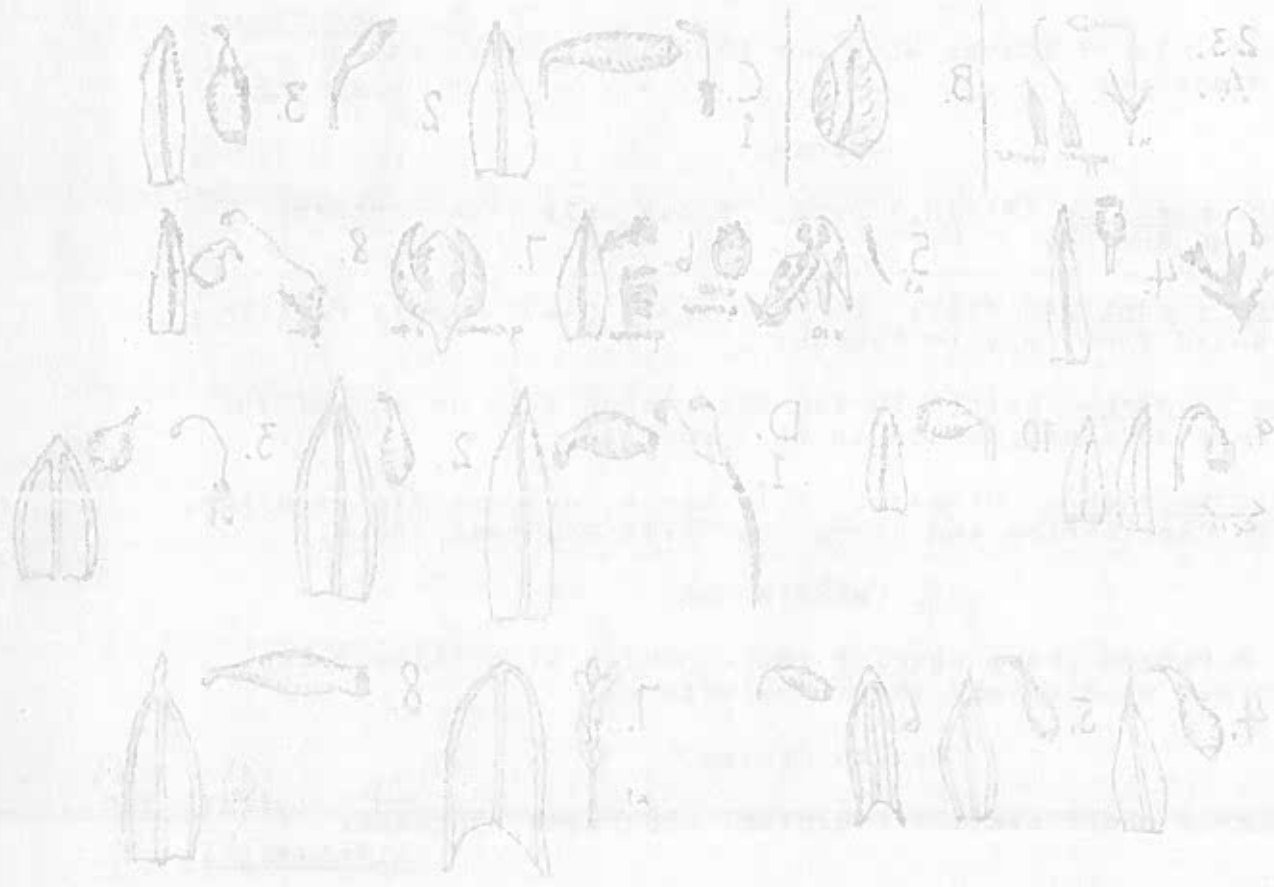
33. *Hydrocotyle*

33
A



34. *Hydrocotyle*

34
A



C. Genus Philonotis Brid.

Here trouble lies. This variable group has been split until almost every plant seems to belong to a different unit. Almost every trickling brook is edged with their glaucous-green; one finds them in marshy sands, on sea-cliffs when they withstand the spray, and even living in tufts of Leucobryum and Sphagnum. Capsules are conveniently globose but inconveniently rare. The leaves vary from triangular to long and slender, the cells from almost smooth to papillose with projecting walls.

Key to Species.

1. Stem covered with radicles, little branched. 2
Otherwise 3
2. Tall plants, leaves ovate-acuminate. 3. fontana
Small plants; leaves narrowed abruptly from wide
embracing base. 1. marchica
3. Tiny plant; leaves 10 cells wide on each side of costa. 2. caespitosa
Tall Plant; leaves when dry becoming imbricated and
braidlike. 4. americana

Species.

1. Ph. marchica (Willd.) Brid. Known only from northern Cape Breton.
2. Ph. caespitosa Wils. Another small plant widely distributed from Aspy to Yarmouth.
3. Ph. fontana Brid. In its many forms this is one of the most abundant mosses in the province.
4. Ph. americana Dismier. This has a northern distribution, in Cape Breton and along the North Mountain shore.

22. MEESIACEAE

A varied group sharing fat capsules with thick necks. All boreal species and very rare with us.

Key to Genera.

1. Leaves short ovate-triangular, squarrose, concave. A. Paludella

Leaves ovate-lanceolate, crowded on top of stem;
cells lax. B. Amblyodon
Leaves lanceolate-ligulate or lanceolate-acuminate.
C. Meesia

A. Genus Paludella Brid.

1. P. squarrosa (Hedw.) Brid. Found by Schofield by a pond near Baddeck. Typically a northern marsh plant.

B. Genus Amblyodon P. Beauv.

1. A. dealbatus Hedw. Reported by Somers for Halifax; Upper Salmon River, Inverness.

C. Genus Meesia Hedw.

1. M. hexasticha (Funck) Monkem. Leaves squarrose, lanceolate-long-acuminate, ending in a rounded tip; costa subpercurrent; margins of some leaves revolute. North Aspy, Victoria (Schofield).
2. M. uliginosa Hedw. Leaves not squarrose, lanceolate-ligulate; costa subpercurrent, one-third of base; margins revolute. Truro bogs (?) (Macoun); South Blair River, Inverness.

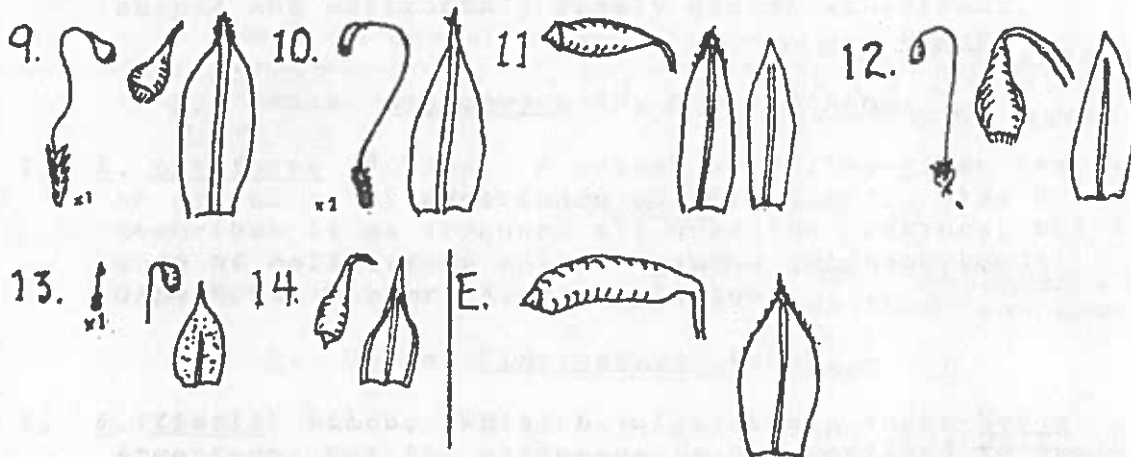
23. BRYACEAE

A difficult group. In general our five genera have long hexagonal cells and capsules with a definite neck. Three are stable species, but Pohlia and Bryum, the two largest genera, cannot be separated with any conviction, and both consist chiefly of unstable adapting species which, by careful hair-splitting, can be divided into innumerable entities without floristic significance.

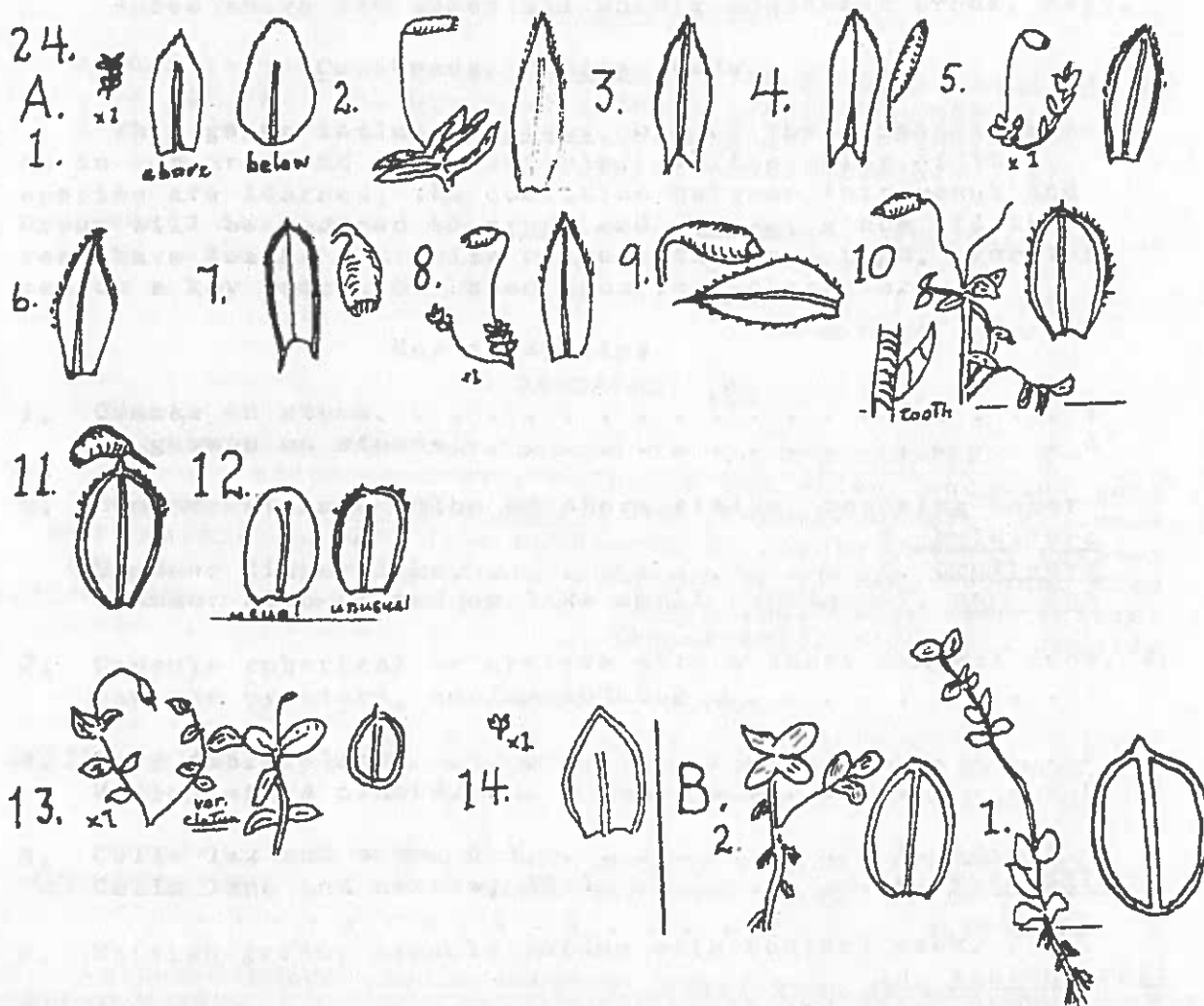
Key to Genera.

1. Whitish leaves with large hexagonal cells. . B. Plagiobryum
Green leaves, at most, white-tipped 2
2. Yellow-green narrow leaves, the upper with excurrent
many times longer than the blade A. Leptobryum
Otherwise 3
3. Upper leaves very large, serrate above, obovate-spatulate. E. Rhodobryum
Otherwise 4
4. Cells usually narrow hexagonal; capsule usually pendulous;
never both wide cells and horizontal capsule. C. Pohlia

III. Bryales 23. Bryaceae (Cont'd)



24. Mniaceae



Cells usually wide hexagonal; capsules usually pear-shaped and horizontal, rarely almost spherical..

D. Bryum

A. Genus Leptobryum (B. & S.) Schimp.

1. L. pyriforme Schimp. A cobweb of yellow-green leaves on gypsum is my experience of this plant. Miss Brown describes it as frequent all over the province, but I know of collections only in gypsum neighbourhoods: Cape North Corner, Windsor, Pictou.

B. Genus Plagiobryum Lindb.

1. P. Zierii Lindb. Whitish tufts like a super-Bryum argenteum, but the whiteness is not confined to the tip of the leaves. The only find reported is from the scree above the waterfall on Big Southwest Brook, Aspy.

C. Genus Pohlia Hedw.

This genus includes nutans, one of the commonest mosses in our area and very variable. If the cells of this species are learned, the confusion between this genus and Bryum will be reduced to cruda and carnea, since all the rest have leaves and cells of much the same type. For this reason a key cannot be based upon leaf characters.

Key to Species

1. Gemmae on stems. 2
No gemmae on stems. 3
2. Gemmae: stemmed bulbs on short stalks, becoming amber 5. bulbifera
Gemmae: finger-like. 6. proligerata
Gemmae: club-shaped or like small cabbages 7. annotina
3. Capsule spherical or urnlike with a short conical neck. 4.
Capsule pyriform, medium to long 7
4. Very small plants. 5
Medium-sized plants. 6
5. Cells lax and wide, 5:1. 9. carnea
Cells long and narrow, 10:1. 8. pulchella
6. Whitish-green; capsule rotund with conical neck.
Green; capsule short with wide mouth and short neck. 10. Wahleneergii
4. gracilis

7. Capsule very long and slender. 8
Capsule much wider than neck 9
8. Capsule and neck slender but distinct. 2. elongata
Capsule and neck almost continuous 1. cruda
9. Capsule stout, usually pendulous, sometimes horizontal. 3. nutans
Similar but tall and radiculose, in sphagnum. 3a. sphagnicola

Species.

1. P. cruda Lindb. Pale green tufts. Guysborough and Inverness (Macoun); Kings and Cumberland.
2. P. elongata Hedw. Halifax (MSB); Guysborough and Kings.
3. P. nutans (Schreb.) Lindb. Common throughout in many habitats. 3a. sphagnicola (B. & S.) Lindb. Kings (Macoun). Grout is dubious.
4. P. gracilis (Schleich.) Lindb. Kings.
5. P. bulbifera (Warnst.) Warnst. Yellowish tiny plants on sand. Sable Island (Macoun); Halifax (MSB).
6. P. prolifera Lindb. Digby (MSB); Halifax.
7. P. annotina (Hedw.) Loeske. Pictou (MacKay); Halifax (MSB). There is much confusion between this and prolifera. I have not seen any definite annotina.
8. P. pulchella (Hedw.) Lindb. A delicate small plant of roadsides in woods. Truro (Macoun); Halifax (MSB); Inverness, Hants, Kings.
9. P. carnea Lindb. A rare small moss of clay banks. Truro (Macoun); Pictou (MacKay); Kings.
10. P. Wahlenbergii (Web. & Mohr) Andrews. Pale green clumps. Pictou (MacKay); Halifax (MSB); Hants.

D. Genus Bryum L.

This genus has many exploding and variable species which can be determined only after painstaking dissection and then are not always certain or constant. In her list of the Mosses of Nova Scotia (1936) Miss Brown cites twenty species of Bryum of which half have since been abandoned, yet we are not sure

that we have not still too many. The last word on Bryum lies with the dissectors, so this key cannot be regarded as more than an indication.

Key to Species.

1. Leaves long-decurrent. 2
Leaves little or not at all decurrent. 3
2. Leaves ovate to an obtuse point. 6. Weigeli
Leaves ovate, tip rounded, sometimes cucullate . . .
7. tortifolium
3. Leaves hyaline at tip. 13. argenteum
Otherwise 4
4. Capsule fat ovoid apart from neck. 5
Capsule long ovoid apart from neck 6
5. Leaves with percurrent costa and no border . 1. turbinatum
Tiny; leaves with short lax cells; bordered; costa
subpercurrent 3. lacustre
Small; radiculose; leaf cells incrassate; no borders.
12. Muhlenbeckii
6. Costa long excurrent; cells long, 7:1. . 10. caespiticium
Shorter cells. 7
7. Neck as long as urn of capsule 8
Neck shorter than urn of capsule 9
8. Leaves bordered. 5. pallens
Leaves not bordered. 4. cernuum
9. Leaves ovate, often with apiculus; cells lax. 14. capillare
Costa excurrent; no apiculus; cells average . . . 10
10. Capsule short and wide 9. pallescens
Urn 3:1 or more. 11
11. Capsule inclined 2. inclinatum
Capsule horizontal 12
12. Costa long-excurrent 8. cuspidatum
Costa short-excurrent. 11. bimum

Species.

1. B. turbinatum (Hedw.) Schwaegr. The chubby reddish capsules of this are not infrequent in clumps of other mosses in Inverness. Macoun reported it from Truro.
2. B. inclinatum Sturm. Reported by Macoun from Cape Smoky and Truro; Halifax and Kings.
3. B. lacustre Bland. Sable Island (Macoun); Brier Island (D.S. Erskine)
4. B. cernuum Lindb. Boulardrie, C.B. (MSB)
5. B. pallens Sw. Found chiefly in Cape Breton and by Miss Brown; south to Hants and Kings.
6. B. Weigellii Spreng. Victoria (Nichols); Kings. A tangle of wine-red fruitless stems.
7. B. tortifolium Funck. Victoria (Nichols).
8. B. cuspidatum (B. & S.) Schimp. Hants (MSB); Kings.
9. B. pallescens Schleich. It is doubtful whether this can be distinguished from the last, except to one's own satisfaction. Reported from Cape Breton by Macoun and Nichols; and suspected in Kings and Hants.
10. B. caespiticium L. An abundant weed of sandy soils in farming areas. Usually it is very small but occasionally tall.
11. B. bimum Schreb. (pseudotriquetrum). The commonest Bryum in most wet habitats.
12. B. Muhlenbeckii (B. & S.) Truro (Macoun); Neil's Harbour, Victoria.
13. B. argenteum Hedw. A common weed of sandy areas and of cracks in pavement. Tiny.
14. B. capillare L. Pictou (MacKay); Victoria (Nichols); Queens (MSB); Inverness.

E. Genus Rhodobryum (Schimp.) Limpr.

1. Rh. roseum (B. & S.) Limpr. Our largest acrocarp. On rocks in unshaded places. Most frequent in Cape Breton but occurs on Blomidon, Kings.

24. MNIACEAE

The larger species of this genus are among the most conspicuous mosses and are easy to distinguish; the smaller need rather more attention, and the intermediate demand an examination of cells. Many species are known from only one or two collections in this province; others are confined to particular areas. In short, this pleasant group is less easy to master than it might seem.

Leaves are usually ovate and bordered; cells are short and irregular; capsules terete boxes. Mnium punctatum belongs in peristome to Mnium, in all else to Cinclidium.

Key to Genera.

1. Peristome teeth free at tip; leaves not oval-entire or, if so, stems not radiculose. A. Mnium
- Peristome teeth joined at tip; leaves oval-entire; stems radiculose B. Cinclidium

A. Genus Mnium L.

1. Leaves with border of long cells. 3
- Leaves without border of long cells 2
2. Small; ovate leaves serrate with projecting cells above. 1. stellare
- Large; oval leaves, entire or with traces of border and irregular small teeth; cells lozenge-shaped. 12. cinclidioides
3. Leaves long-decurrent; capsule long and slender 4. Lycopodioides
- (Bryum tortifolium might fit in here)
- Leaves not decurrent; capsules fat or Bryum-like. . 4
4. Leaves more than twice as long as wide. 5
- Leaves less than twice as long as wide. 7
5. Costa excurrent; border double-toothed; cells quadrate in rows. 5. marginatum
- Costa subpercurrent (cinclidioides may have got in here) 6.
6. Small; ovate leaves; cells hexagonal, small and in neat rows 3. orthorhynchum
- Large; leaves long ovate; cells rectangular and untidy. 2. hornum
7. Without teeth on border 8
- With teeth on border 9

8. Plants medium to large; costa nearly or quite reaching apex; cells hexagonal and thin-walled. (See also Cinclidium). 13. punctatum
Plant small; costa ends well short of apex; cells isohexagonal and thick-walled 14. hymenophylloides
9. Leaves broad ovate 10
Leaves contracted toward base, with nearly acute apex 11
10. Cells round-hexagonal; leaves keep shape when drying. 7. Drummondii
Cells oval; capsules curved and fat. . . . 11. rostratum
11. Large; teeth made of three cells 10. affine
Small to medium; teeth of one cell 12
12. Teeth continued to base; capsule Bryum-like. . . 9. medium
Teeth only in upper half of leaf 13
13. Single teeth on upper border 8. cuspidatum
Double teeth on upper border 6. spinulosum

Species.

1. M. stellare Reich. Inverness (Macoun); Hants and Halifax (MSB); Victoria. Usually on gypsum where there is least competition. This is small and red; so is hymenophylloides.
2. M. hornum L. Very common throughout on damp banks. Its long terete fruits are uncommon, and I have only once found the calyptra fused to the seta as illustrated by Grout. This varies chiefly in size. Atrichum crispum is sometimes mistaken for sterile hornum.
3. M. orthorhynchum Brid. Canso (Macoun); Ingonish (Nichols). This is supposed to frequent calcareous areas.
4. M. lycopodioides (Hook) Schwaegr. Guysborough (Macoun).
5. M. marginatum Beauv. Loose tufts on rocks in brooks. Victoria (Nichols); Antigonish (MSB); Kings, Hants.
6. M. spinulosum B. & S. Victoria (Nichols); Canso (Macoun).
7. M. Drummondii B. & S. Pictou (MacKay). An uncommon woodland form.
8. M. cuspidatum Hedw. Common throughout, even in gardens.

9. M. medium B. & S. Victoria (Nichols).
10. M. affine Bland. Common throughout on brooks with rocks.
11. M. rostratum Schrad. In a marsh in Greenfield, Kings.
12. M. cinclidioides Hüb. Not common but found from Inverness to Annapolis and Cumberland. Pale green patches in marshy spots.
13. M. punctatum Hedw. Common on damp rocks throughout. The species is reddish, like a small Cinclidium, but there is the fairly common var. elatum Schimp. which has leaves nearly twice the size and lacks the red colouring. This is sterile, which suggests that it may be a diploid like those developed in the laboratory from pieces of seta. However, I have one specimen with a stunted seta and capsule.
14. M. hymenophylloides Hüb. Guysborough and Cape Breton (Macoun); Victoria and Hants. A tiny crimson sterile species usually found on gypsum.

B. Genus Cinclidium Sw.

Like giant Mnium punctatum but redder and more radiculose. The inner peristome is fused into a domelike pepper-shaker, but, since fruits are rare, the identification must be based upon leaves. These are northern plants and rare with us.

Key to Species

1. Obovate leaves sharply apiculate 1. stygium
- Obovate leaves blunt or emarginate 2. subrotundum

Species.

1. C. stygium Sw. Truro (Macoun). This plant grows in bog or swamp and may be 15 cm. long, the leaves changing from green above, through reddish, to nearly black below.
2. C. subrotundum Lindb. Truro (Macoun); Oakfield, Halifax (MSB); Lone Shieling, Inverness. The leaves of this are broader and redder. Some disobligingly show a slight apex, others a dent where the apex might be.

Sub-order Pleurocarpi. 25. HYPNEAE

25. A. CLIMACIAE

Genus Climacium Web. & Mohr

The only abundant dendroid mosses in the province. In water, however, they may lie down and trail long stems with no dendroid appearance. The leaves, however, retain their character and cells.

Key to Species.

1. Cells long, 7:1 or longer; auricles unimportant; common. 1. dendroides
- Cells 5:1 or less; rounded auricles conspicuous; rare. 2. americanum

Species.

Intervale - Upper Blackville Bridge, N.S.

1. C. dendroides Web & Mohr. In most damp places but fruiting rarely. Leaves are long linulate and toothed around apex; costa subpercurrent; capsules erect.

2. C. americanum Brid. A clump matted together and showing dendroid habit only when individual plants were disentangled, was found in a swamp patch near Windsor. Hants. Miss Brown named this C. Kindbergii and published it as such, but I think that it belongs in C. americanum. The cells are about 5:1 and the auricles bulged and short-celled, but the stems are covered with paraphyllia which is not characteristic of any species.

24. B. POROTRICHEAE

Genus Porotrichum Brid.

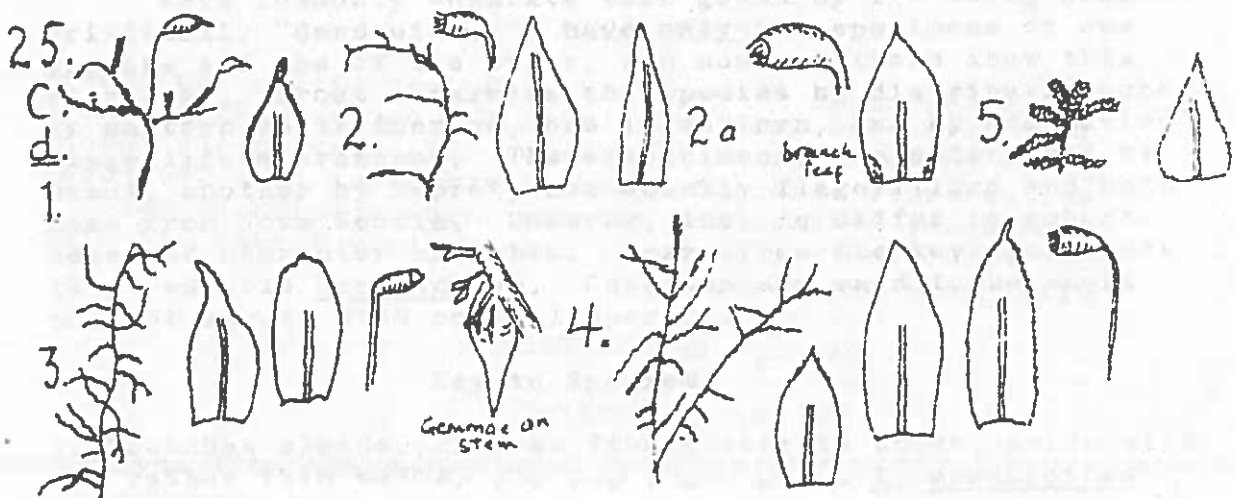
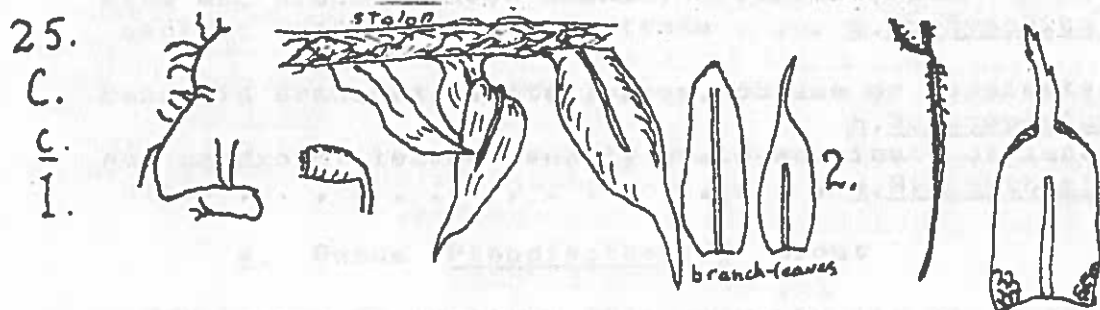
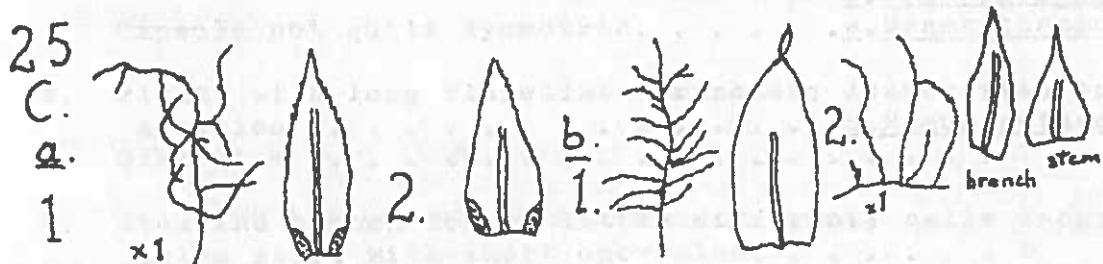
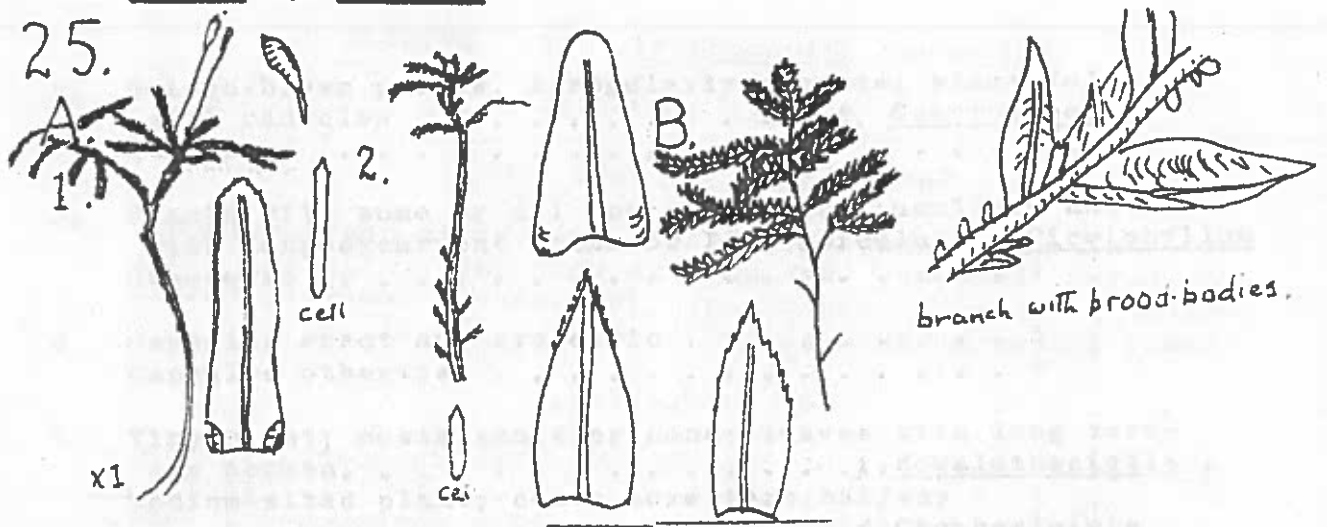
1. P. alleghaniense (C.M.) Grout. On wet cliffs and screes from Inverness and Victoria in the north to Hants and Kings in the south. The plants are harsh to the touch, and somewhat dendroid branches stand out from the rock. Leaves are costate and serrate, the capsules hypnoid but rare, their work being done by tiny leaves and flagella along the stem.

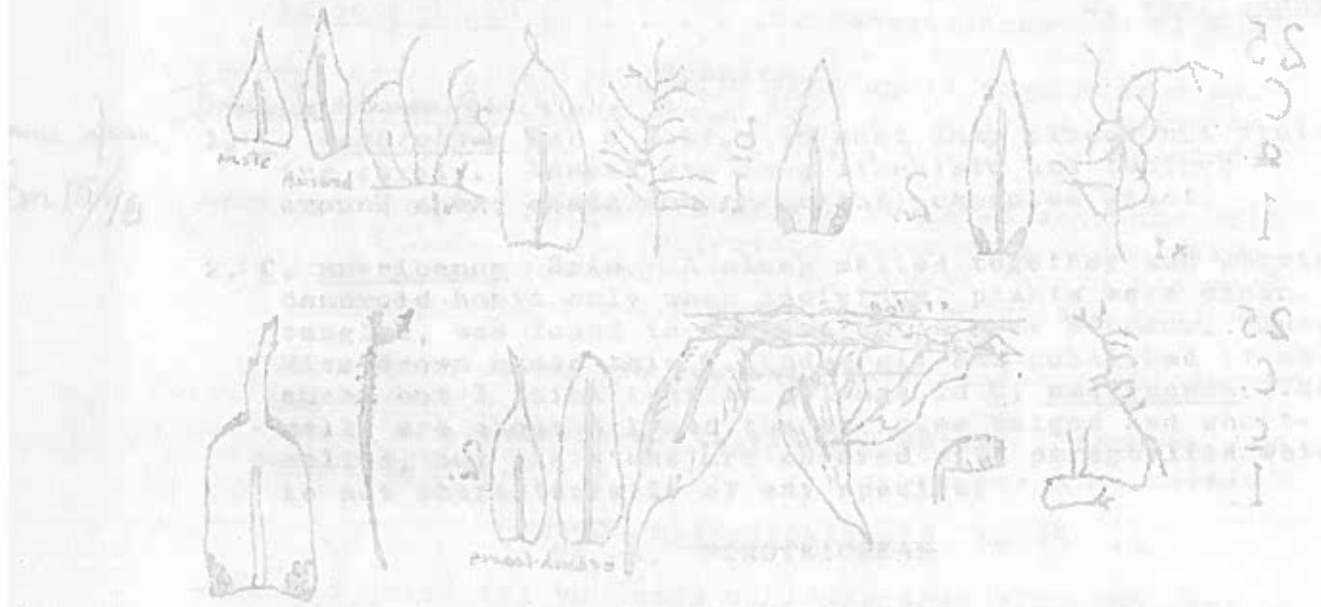
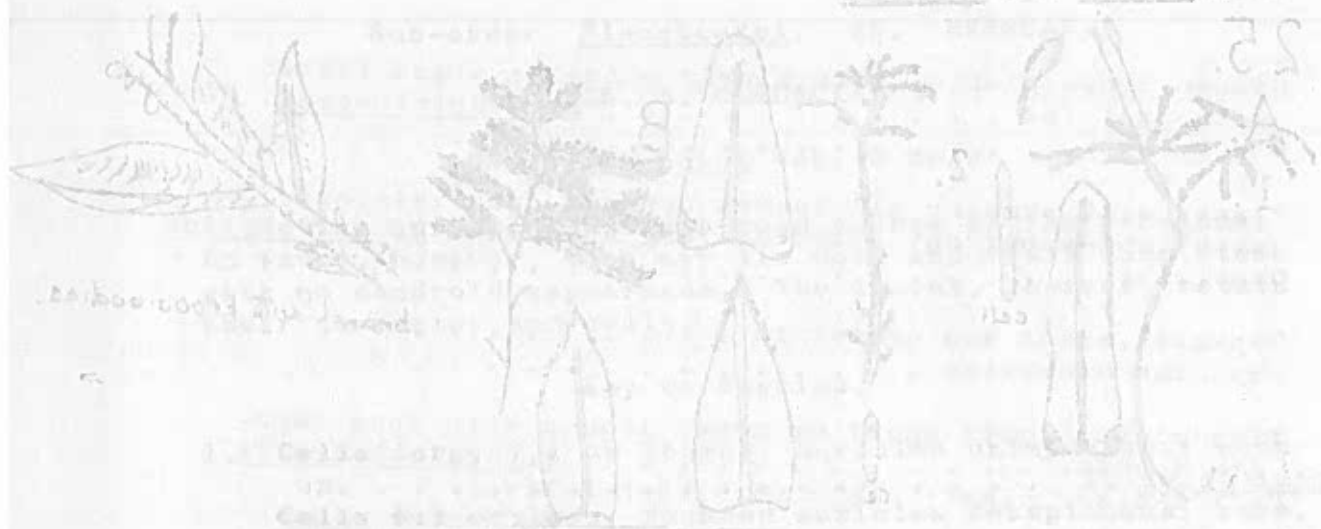
25. C. BRACHYTHECIAE

Key to Genera.

1. Leaves papillose on back through thickened cell angles. b. Bryhnia
- Leaves smooth 2

III. Bryales 25. Hypnaceae





2. Golden-brown plants, irregularly pinnate; stems felted with radicles g. Camptothecium
Otherwise 3
3. Plants with some or all leaves concave-cucullate and with long-excurrent spine or long apiculus. c. Cirriphyllum
Otherwise 4
4. Capsules erect and symmetric 5
Capsules otherwise 6
5. Tiny plant; costa short or none; leaves with long serrate acumen. i. Homalotheciella
Medium-sized plant; costa more than halfway f. Chamberlainia
Capsule not quite symmetric. e. Brachythecium
6. Plants with long flagellate branches; leaves with opaque auricles a. Pseudisothecium
Otherwise 7
7. Stem and branch-leaves little different; cells long; capsules short with short operculum. 8
Stem and branch-leaves usually different; cells long or medium; operculum long rostrate d. Eurhynchium
8. Dendroid branches; ovate leaves, obtuse or cuspidate. h. Scleropodium
Not dendroid; leaves usually ovate-acuminate or lanceolate e. Brachythecium
a. Genus Pseudisothecium Grout

Keys commonly separate this genus by its being characteristically "dendroid". I have only two specimens of one species and one of the other, and none of these show this character. Grout separates the species by distribution, one in eastern North America, one in western, and by one having flagelliform branches. These specimens, one determined by Grout, another by Dupret, are equally flagelliform and both come from Nova Scotia. However, they do differ in robustness and character of cells. Apart from the key-characters they resemble Eurhynchium. Capsules are said to be short and not stout, with conical opercula.

Key to Species

1. Branches slender; leaves finely serrate above; cells with rather thin walls. 1. myosuroides

Branches less frail; leaves coarsely serrate; cells
with thick walls 2. stoloniferum

Species.

1. Ps. myosuroides (L.) Grout. "Nova Scotia" (James);
Yarmouth (Macoun); Halifax (MSB); Hants.
2. Ps. stoloniferum (Hook.) Grout. Queens, Digby, Yarmouth
(MSB).

b. Genus Bryhnia Kaurin.

The two species of this genus fall between Eurhynchium
and Brachythecium. They are alike in having a rich green
colour and cell walls that thicken into papillae at the
angles, and both fruit rarely. A third is yellow with hya-
line or coloured auricles.

Key to Species.

1. Medium-large; branches conspicuous for their narrowness;
ovate acuminate leaves serrulate above with the apex
twisted. 1. Novae-Angliae
- Small; leaves serrate all around, ovate-lanceolate. 2. graminicolor
- Small; yellowish; with definite auricles. 3. Hultenii

Species.

1. B. Novae-Angliae (Sull. & Lesq.) Grout. Found throughout
in swampy spots.
2. B. graminicolor (Brid.) Grout. Found beside brooks in
most counties from Inverness to Seal Island.
3. B. Hultenii Bartram. An Alaskan species determined by
Grout from Habeeb's collection in Hants. Nothing more is
known of it.

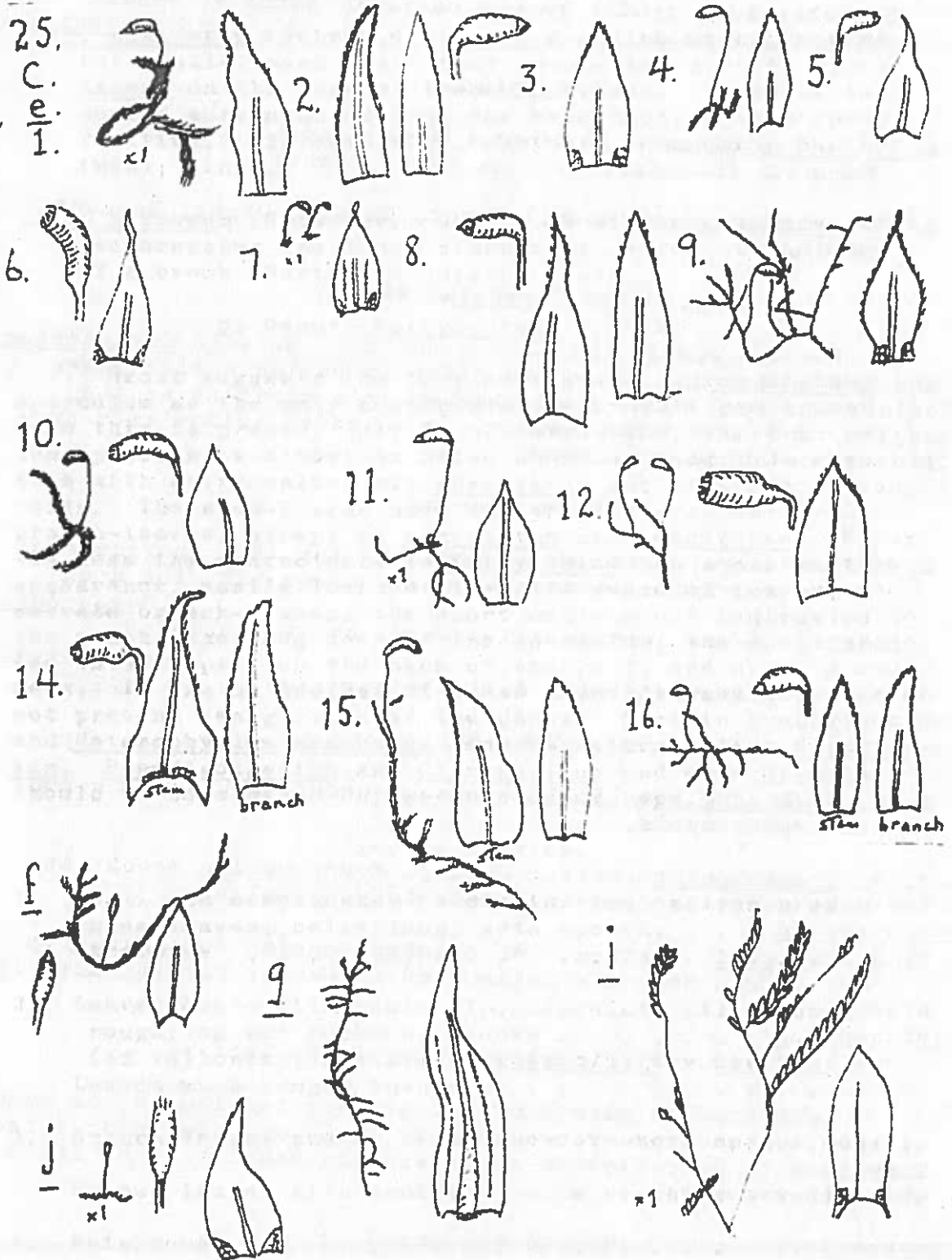
c. Genus Cirriphyllum Bull. Torr. Bot.

Long-stemmed plants of wet places; the leaves, or some
of them, concave or even cucullate with long acumen or spine.
They tend to be yellowish-green and are usually found mixed
with other mosses.

Key to Species.

1. Stem-leaves imbricate, ovate with long, abrupt sinuose
acumen. 2. cirrosum
- Leaves on stolons and tips ovate with gradual long
piliferous acumen. 1. piliferum

III. Bryales 25. Hypnaceae



III. *Stylis* 25. *Stylis*



1. *Stylis* (L.) *Stylis*
 Leaves in pairs, opposite, sessile, ovate-lanceolate, acuminate, serrate, glabrous.

Species.

1. C. piliferum (Schreb.) Grout. A yellow-green, robust but small-leaved plant that creeps among other Hypnaceae on the base of trees in swamps. It seems to depend more upon stolons for reproduction than upon fruiting. Victoria (D.S.Erskine); Annapolis, Hants (MSB); Kings.
2. C. cirrosum (Schwaegr.) Grout. A single tall stem with two branches was found standing in water at the edge of a brook, Martock Mountain, Hants.

d. Genus Eurhynchium B. & S.

Grout suggests the long-rostrate apiculus of the operculum as the only common feature of this genus, but even this is present only in illustrations, while in reality the apiculus is almost as often short as long. He supports this with short cells, but serrulatum and others have long cells. The stem-leaves have different characters from the branch-leaves, except in serrulatum and rusciforme. Nevertheless the characteristic Eurhynchium has a distinctive appearance, easily learned: the difference of leaves, the serrate branch-leaves, the short capsule not contracted to the mouth, the long nose of the operculum, the costa projecting into a spine on the back of the leaf, and often a rough seta. If one or another of these points is absent, it need not prevent recognition of the genus. Certain Brachythecium and Heterophyllum nemorosum look deceptively like Eurhynchium. Pseudisothecium and Cirriphyllum and even Bryhnia should be considered before abandoning hope.

Key to Species.

1. Small and complanate; no distinction between branch and stem-leaves; cells long; seta smooth. 5. serrulatum
Otherwise 2
2. Leaves ovate with acute tip, serrulate all around; seta rough; on wet rocks by brooks 4. rusciforme
(If yellowish; costa more than 1/2, try Cirriphyllum)
Leaves much longer than wide 3
3. Branch-leaves ending in an apex of short opaque cells. 1. hians
Branch leaves with ordinary cells reaching the tip . 4
4. Seta rough 3. praelongum
Seta smooth 2. strigosum

Species.

1. E. hians (Hedw.) Jaeger & Sauerb. Uncommon. Guysborough (Macoun); Hants.
2. E. strigosum (Hoffm.) B. & S. Common in woods throughout. The larger form, var. robustum Roll., is also common.
3. E. praelongum (L.) Bryhn. This species, with rough seta and rather short branch-leaves is also common. The more straggly form, var. Stokesii (Turn.) Dixon, also occurs.
4. E. rusciforme (Neck) Milde. This grows on rocks and even on clay beside brooks and will usually be sought under Hygrohypnum. The capsules, and especially the operculum, give it away, but these are usually absent. However, it is common and easily learned.
5. E. serrulatum (Hedw.) Kindb. This resembles a Plagiothecium except for the characteristic Eurhynchium serrulation of the leaves. It is known only from Kings.

e. Genus Brachythecium B. & S.

Brachythecium is so close to Eurhynchium that confusion traps even expert bryologists. These genera share the short capsules and often papillose setae and the type of cells. Characteristically Brachythecium capsules contract to the mouth, but those of some species do not; cells are characteristically longer than in Eurhynchium, but not always. Leaves tend to be serrulate rather than dentate, ovate-acuminate rather than lanceolate, but, when you have noticed these matters, it remains wise to check that the costa does not end in a spine on the back of the leaf and signify Eurhynchium. Even when the typical appearance of Brachythecium has been mastered, there may be trouble with the neighbouring genera. Dixon lumps Scleropodium and Chamberlainia with Brachythecium, and Homalotheciella seems to be too near for comfort. However, that is a matter for taste and convenience, and here I am following Grout.

The species are even more confusing. We have perhaps ten true species of this genus and two complexes of interlocking varieties called species, one the Starkei-glaciale group, the other dominated by salebrosum and rutabulum, including acutum, flexicaule, albicans, campestre, oxycladon. Probably these represent entities separated for some time, perhaps by ice-ages, but still interbreeding when their ranges overlap. Grout evades the problem in his keys by using the formula, "most of the leaves", which is sound democratic practice but slipshod science. 51% of the leaves makes the plant belong to one species, 49% to another.

I must apologize for the following key. It does not make possible the identification of sterile specimens and by no means clarifies the confusion of species. But the confusion is moss-made, the key man-made. I can only quote a consoling comment from Andrews who had made many keys: "They never work anyway."

Key to Species.

1. Capsule erect or nearly so (see also Chamberlainia).
 6. oxycladon
 Capsule horizontal or arcuate 2
2. Seta smooth 3
 Seta rough above, smooth below 5
3. Leaves entire 5. albicans
 Leaves serrate or serrulate 4
4. Leaves narrowing evenly to flat acute apex. 3. acutum
 Leaves ending in narrow serrate acuminations 2. flexicaule
 Leaves ending in short acuminations 1. salebrosum
 Leaves with margins reflexed below. 7. digastrum
5. Costa reaching apex of most leaves. 11. populeum
 Costa reaching two-thirds to apex; seta red-brown 4. campestre
 Costa two-thirds; seta black, faintly rough above; leaves glossy, complanate-secund. 10. plumosum
6. Costa of most leaves reaching apex or nearly. 7
 Costa of most leaves definitely not reaching apex 8
7. Small; stem-leaves decurrent. 12. reflexum
 Stem-leaves scarcely decurrent; large straggly plants 15. Starkei
 Leaves decurrent; medium-large plant; stem radiculose 14. Bestii
8. Small; branch-leaves at tip secund. 16. velutinum
 Otherwise 9
9. Medium-small with imbricate branches. 13. glaciale
 Otherwise 10
10. Auricles with inflated cells reaching nearly to costa 9. rivulare
 Few or no inflated cells; leaves barely serrulate 8. rutabulum

Species.

1. B. salebrosum B. & S. Very common in woods and gardens, on soil and tree roots, throughout the province.
2. B. flexicaule Common; grading into salebrosum.
3. B. acutum (Mitt.) Sull. One specimen from Inverness, a large glossy plant.
4. B. campestre B. & S. Not uncommon in Hants and Kings. Small.
5. B. albicans B. & S. Slight and yellow. Victoria (Nichols); Kings, and it seems to be a typical moss of the Mabou Highlands.
6. B. oxycladon (Brid.) Jaeger & Sauerb. Victoria (Nichols); otherwise many mainland records from Pictou (MacKay) to Kings. Found in the same habitats as salebrosum.
7. B. digastrum C. Muell & Kindb. Young shoots yellow-green; older parts dirty green. Inverness (Macoun); Hants.
8. B. rutabulum B. & S. Large yellow-green moss with many branches. Victoria (Nichols); Pictou (MacKay) to Kings. Only locally common.
9. B. rivulare B. & S. Abundant on wet rocks of brooks; sometimes stiff and almost dendroid. Found throughout the province. Those who like more species, may call the leaves in which the inflated cells reach the costa, B. Nelsoni.
10. B. plumosum B. & S. A beautiful glossy-green plant in mats on sandy soil. It looks like a cross between Plagiothecium and Eurhynchium, and the capsules are arcuate and slender for Brachythecium. Cape Breton (Macoun); Inverness.
11. B. populeum (Hedw.) B. & S. Common throughout. Damp places.
12. B. reflexum (Starke) B. & S. Small yellow-green patches with yellow branches thread-thin. Uncommon. Halifax (MSB); Inverness, Kings.
13. B. glaciale B. & S. The only specimen for North America was found at Margaree by Macoun.
14. B. Bestii Grout. Creeping radiculose stems and short terete capsule may help in recognition. Hants (Habeeb).

15. B. Starkei (Brid.) B. & S. Victoria (Nichols); Halifax (MSB). A woodland plant very unlike other Brachytheciums, glaciale excepted. The seta is very long, the capsule long and curved.

16. B. velutinum B. & S. Our common small Brachythecium. On tree roots and damp banks, fruiting freely.

f. Genus Chamberlainia Grout.

The erect capsules and the non-ciliate peristome alone distinguish this genus from Brachythecium. Enlarged basal cells extend farther up the leaf, but there is no norm for this.

1. C. acuminata (Hedw.) Grout. The only known specimens came from the roots of trees, one on Wolfville Ridge, the other a mile away in the Gaspereau Valley, Kings. The plants are loosely pinnate, yellow-brown; the leaves ovate-acuminate and almost entire to faintly serrulate; capsules are erect, and they and the setae vary in length and slenderness.

g. Genus Camptothecium B. & S.

1. C. nitens Schimp. Masses of golden-brown; irregularly pinnate: stems woolly with brown radicles; in swamps. This has not been found fruiting, but it seems to be well distributed. Victoria (Nichols); Hants, Annapolis.

h. Genus Scleropodium B. & S.

1. S. obtusifolium (Hook.) Kindb. A coarse Brachythecium of dendroid appearance growing on stones in brooks. The leaves are ovate, blunt to acute and cuspidate, entire of slightly serrulate; costa to two-thirds; cells long; auricles inflated with rectangular hyaline cells; decurrent. Inverness and Kings, but never fruiting.

i. Genus Homalotheciella Cardot.

1. H. subcapillata (Hedw.) Card. A tiny Brachythecium with long serrate acumen, costa short or absent; cells Brachythecial; auricles of quadrate cells; seta about 1 cm.; capsule erect and symmetrical. Known only from Inverness and Kings but probably overlooked because of its small size and habit of growing among other mosses on trees.

25. D. AMBLYSTEGIAE

A sub-family with no single character in common, yet showing a distant relationship. They are obviously hypnaceous;

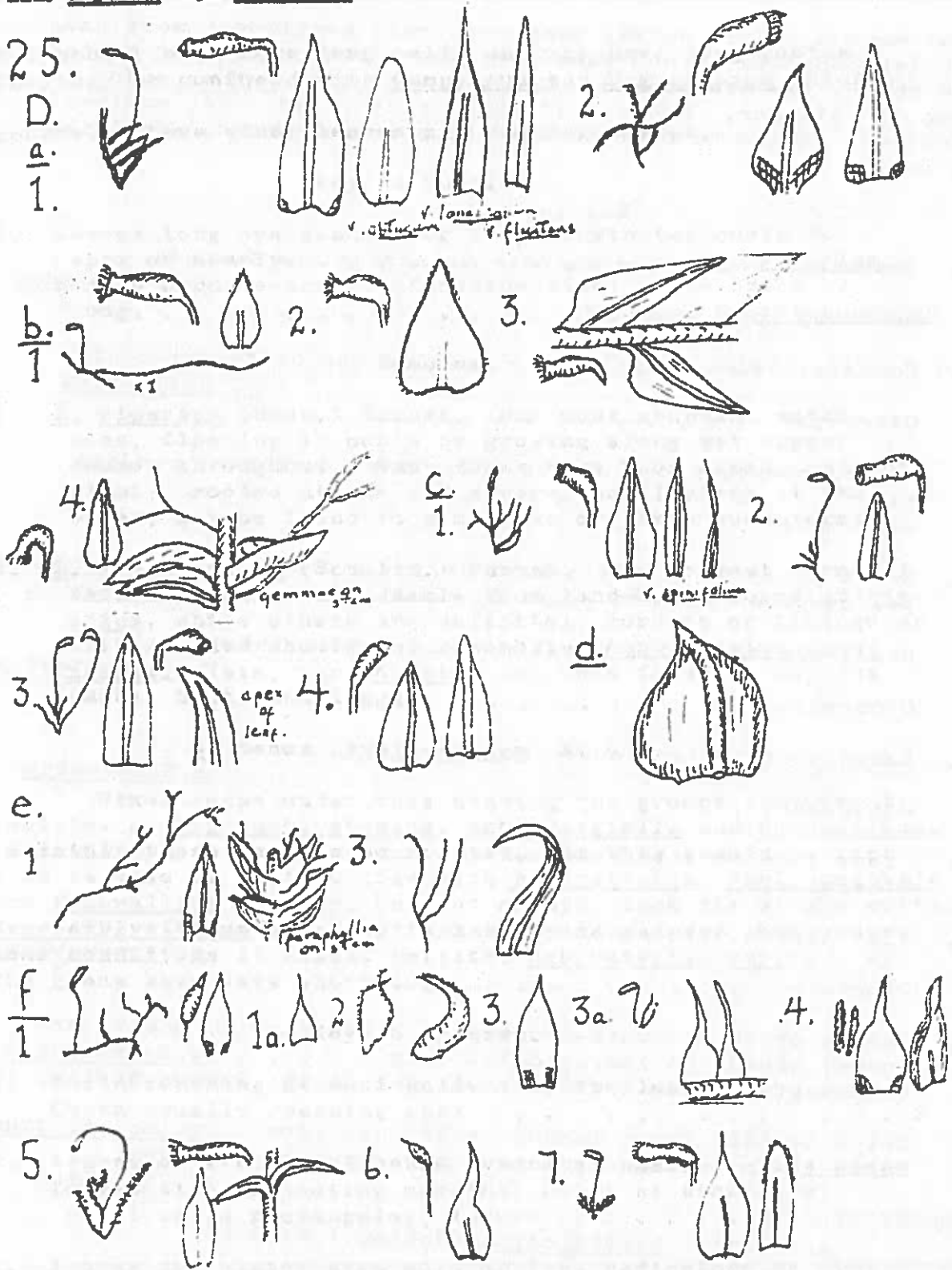
most have a single costa; none are truly papillose; most have longish capsules which, when dry, are often contracted behind the mouth; few are secund. Cells may be from rather short to long and slender. Because of these many exceptions, dubious specimens should be checked against neighbouring sub-families as well.

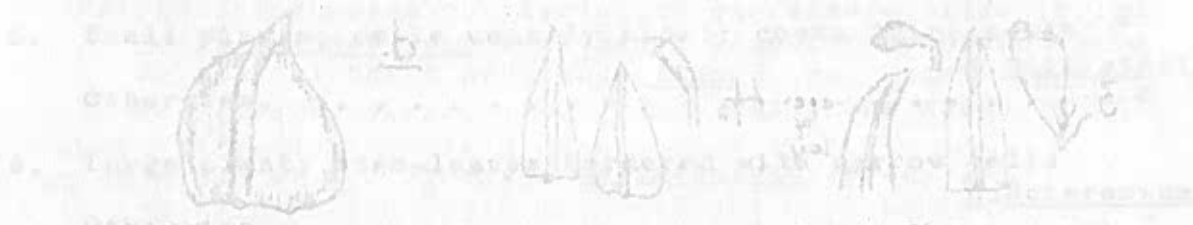
Key to Genera.

1. Costate; very long-acuminate or narrow and falcate.
k. Drepanocladus
Not very long acuminate. 2
2. Costate; leaves cucullate or yellow and ovate-triangular
h. Calliergon
Otherwise 3
3. Leaves ovate, cucullate or apiculate; no costa; reddish stems. 4
Otherwise. 5
4. Green plant of marshes; most leaves cucullate l. Calliergonella
Yellow-green pinnate plant of woodlands. . . . j. Pleurozium
5. Small plants; cells usually short; costa thin; acute
b. Amblystegium
Otherwise. 6
6. Large plant; stem-leaves bordered with narrow cells
d. Sciaromium
Otherwise. 7
7. Stems covered with radicles and paraphyllia. .e. Cratoneuron
Otherwise. 8
8. Flat leaves with short cells and thick percurrent costa
c. Hygroamblystegium
Otherwise. 9
9. Leaves ovate to ovate-acuminate; costa single, double or none; medium to large; cells long g. Hygrohypnum
Golden-green plants with or without costa; leaves narrow. 10
10. Costa usually long; leaves never squarrose . .a. Leptodictyum
Costa absent or short; leaves squarrose or straight.
f. Campylium
a. Genus Leptodictyum (Schimp.) Warnst.

Our two species with their innumerable forms tend to melt into each other. Both are yellowish plants of water or

III. Bryales 25. Hypnaceae





wet banks; both have long cells and may have long costas. They may be confused with Campylium and Hygrohypnum which generally have wider leaves and varying costas.

Key to Species

1. Leaves long ovate-acute or long-acuminate; costa to apex or nearly. 1. riparium
Leaves cordate-acute, of medium-size; costa short or long. 2. trichopodium

Species.

1. L. riparium (Hedw.) Warnst. Our most abundant water-moss, floating in pools or growing along wet edges; common throughout. Many forms have been named, and long plants, rooted at one end ashore and floating at the other, may be found to yield two or three such forms.
2. L. trichopodium (Schults.) Warnst. The longest forms of this are indistinguishable from land-bound forms of riparium, while others are definitely cordate or triangular with rounded shoulders, resembling Amblystegium Juratzkanum. This, var. Kochii, has been found in Halifax (MSB); Hants and Kings.

b. Genus Amblystegium B. & S.

Dixon lumps under this heading the groups that Grout isolates as Hygroamblystegium, Amblystegiella and Homomallium. Certainly these seem to be related, and this should be kept in mind in case of difficulties with Amblystegium. Amblystegiella and Homomallium usually, but not always, lack the single costa; Hygroamblystegium normally is larger and coarser, but under some conditions it almost imitates Amblystegium varium. All the group have very short cells.

Key to Species.

1. Costa reaching at most halfway up the leaf. 2
Costa usually reaching apex 3
2. Leaves entire; basal cells quadrate; small. . 1. serpens
Leaves with projecting marginal cells at shoulders; basal cells rectangular; larger. 2. Juratzkanum
3. Leaves serrulate; stem more or less radiculose or with paraphyllia. 4. compactum
Leaves entire; without radicles or paraphyllia. 3. varium

Species.

1. A. serpens (Hedw.) B. & S. A very abundant small moss of trees and rotten wood. Very common on the mainland.
2. A. Juratzkanum Schimp. This is found in the same area as serpens and grades into it.
3. A. varium (Hedw.) Lindb. Common beside water throughout the province. It varies considerably in size, from as small as serpens to as large as small Hygroamblystegium.
4. A. compactum (C.M.) Aust. Although this was missed by the early collectors, it has now been found in St. Paul and Sable Islands and in many counties. It varies in size and habit, is sometimes creeping, sometimes in compact clumps of erect branchless stems thickly radiculose. Usually on rocks or coarse soil.

c. Genus Hygroamblystegium Loeske

A group of water-mosses which refuse to conform to definite types. Our records show four species which have been lumped into one by good authorities and separated by others. Ours vary in size from that of Amblystegium to long, trailing robust stems, and the variation of leaves on a single plant may cover the range of the whole genus. I have had specimens determined by experts and have found no agreement between their names and the descriptions of Dixon and Grout. My treatment, therefore, must be skeptical and second-hand, since I am not convinced that boundaries can be established between them.

Key to Species.

1. Costas consistently and definitely percurrent. 2
Costas varying between excurrent and fading short of apex
1. irriguum
2. Leaves small and blunt. 2. orthocladon
Leaves of stem larger and almost always acute 3. fluviatile
Leaves very large and dark green. 4. noterophilum

Species.

1. H. irriguum (Wils.) Loeske. On rocks in brooks. This is consistently of medium size or smaller. Often it floats in water, which produces long slender leaves consisting chiefly of costa. Such plants (or branches) may then be called var. spinifolium (Sch.) Grout. Our records are from Kings (MSB); Inverness and Hants.
2. H. orthocladon (P.B.) Grout. This is a diminished and stubby form of irriguum. The records are: Pictou (MacKay); Kings.

3. H. fluviatile Loeske. Elsewhere this plant is a mass of trailing branchless stems 2-3 mm. in width; here we find similar leaves on plants as small as Amblystegium varium and never larger than our irriguum, Cape Breton (Macoun); Hants.

4. H. noterophilum (Sull.) Warnst. Reported by Miss Brown. No details are known. This is fluviatile overgrown.

d. Genus Sciaromium Mitt.

1. S. Lescurii (Sull.) Broth. A large water-moss of brooks, distinguished by large cordate-ovate stem-leaves, abruptly short-acuminate. Annapolis and Hants (MSB).

e. Genus Cratomeuron (Sull.) Roth

The long cells, costate leaves and yellowish tinge of this genus suggest Leptodictyum and Campylium, but they are heavily radiculose and have abundant paraphyllia along the stems. The tips of the common filicinum are often secund, the leaves of all commutatum and falcatum are secund to falcate and plicate as well, which might suggest Drepanocladus, but the paraphyllia are definite.

Key to Species.

1. Leaves not falcate or plicate; decurrent auricles.

1. filicinum

Leaves falcate and plicate; no definite auricles. . . 2

2. Stems furred with radicles and paraphyllia. 2. commutatum

Stems with only scattered radicles and paraphyllia

3. falcatum

Species.

1. C. filicinum (Hedw.) Roth. Commoner in Cape Breton but found south to Hants. This grows on wet rocks.

2. C. commutatum (Hedw.) Roth. Reported twice, but the specimens sent to me were, I think, filicinum and falcatum.

3. C. falcatum (Brid.) Roth. Leaves more falcate. Victoria (Schofield)

f. Genus Campylium (Sull) Mitt.

A very variable and important group but not easy to recognize. With minor exceptions they are long-celled, golden-

green with leaves straight or squarrose and entire. Costa is variable. Capsules are of a long amblystegial type. Most grow in damp places, and their size varies confusingly with their habitat. The abundant species, and most genera have one, is chrysophyllum which varies from a minute creeping moss of fields to a robust one of cliffs and tree trunks.

Key to Species.

1. With costa 2
Without costa 5
2. Very small, with acumen longer than blade . 1a. hispidulum,
var. Sommerfeltii
Small to medium, acumen shorter or absent 3
3. Squarrose 5. chrysophyllum
Leaves erect 4
4. Branch-leaves somewhat serrulate and tubular; small. 7. radicale
Branch-leaves entire and flattish, small. . 1. hispidulum
Leaves entire and tubular; medium-sized plant. 6. polygamum
5. Leaves imbricate, ovate, with acumen; amber-yellow. 4. arcticum
Leaves squarrose 6
6. Small; leaves very squarrose; tips serrate; cells 5:1 2. Halleri
Leaves entire; cells 8:1 7
7. Large for genus; leaves short acuminate . . 3. stellatum
Very small; acumen longer than blade. 3a. stellatum, var. protensum

Species.

1. C. hispidulum (Brid.) Mitt. Colchester (Macoun); Victoria (Nichols); Hants, Kings. Not uncommon and far from uniform.
a. Sommerfeltii (Myr.) Lindb. has been reported.
2. C. Halleri (Hedw.) Lindb. This creeping, radiculose small plant has been found only at Black Hole, and White Rock, Kings.
3. C. stellatum (Hedw.) Lang & C. Jens. Conspicuously enlarged alar cells. Found throughout the province in swamps but not abundant.
a. var. protensum (Brid.) Roehl. has been found once.

4. C. arcticum (Williams) Broth. Typically arctic; robust, yellow, imbricate leaves. Basal cells are enlarged and reinforced. A marsh near Melanson, Kings, a not improvable site since this area has always been free from forest.
5. C. chrysophyllum (Brid.) Bryhn. Of all sizes. Abundant in fields, on basic cliffs and on tree trunks throughout the province.
6. C. polygamum (B. & S.) Bryhn. On wet soil and rotten wood throughout the province but nowhere abundant.
7. C. radicale (P.B.) Grout. One specimen from Kings.

g. Genus Hygrohypnum Lindb.

Mosses of brooks, variable like most water-mosses and tending to overlap. Capsules are those of large Amblystegia; the costa varies from absent to strong single to double and forking. Leaves may be imbricate, almost circular, ovate or second, and most of these types may be found in a single species and often on the same plant. The result is a great confusion. Nevertheless, they are abundant and conspicuous mosses and have their own interest.

Key to Species.

1. Ovate leaves less than twice as long as wide. 2
Leaves twice or more as long as wide 5
2. Single costa, not acuminate 3
Double costa, not acuminate 7. molle
Variable costa; acuminate 4
3. Leaves with margin of hyaline cells; costa halfway
Leaves serrulate at apex; costa nearly to apex. 6. Smithii
3. polare
4. Lower leaves concave, secund 9. Bestii
Lower leaves not differentiated. 8. dilatatum
5. Imbricate concave leaves in length about 2:1 . . 4. alpestre
Some or all leaves secund 6
6. Stems with outer layer of hyaline cells; leaf-cells lax for genus; green 1. ochraceum
Otherwise 7
7. Costa usually single; auricles small and coloured. 2. palustre
Costa usually absent or double 8

2. *Arctostaphylos* (L.) Nutt. (1818) *Arctostaphylos* Nutt. (1818)
Yellow, lanceolate leaves. Petal white and enlarged and
lobed. A small, dark, globose fruit. A small, dark,
globose fruit. A small, dark, globose fruit.

3. *Arctostaphylos* (L.) Nutt. (1818) *Arctostaphylos* Nutt. (1818)
In fields, on rocky hills and on some mountains throughout
the state.

4. *Arctostaphylos* (L.) Nutt. (1818) *Arctostaphylos* Nutt. (1818)
In fields, on rocky hills and on some mountains throughout
the state.

5. *Arctostaphylos* (L.) Nutt. (1818) *Arctostaphylos* Nutt. (1818)
In fields, on rocky hills and on some mountains throughout
the state.

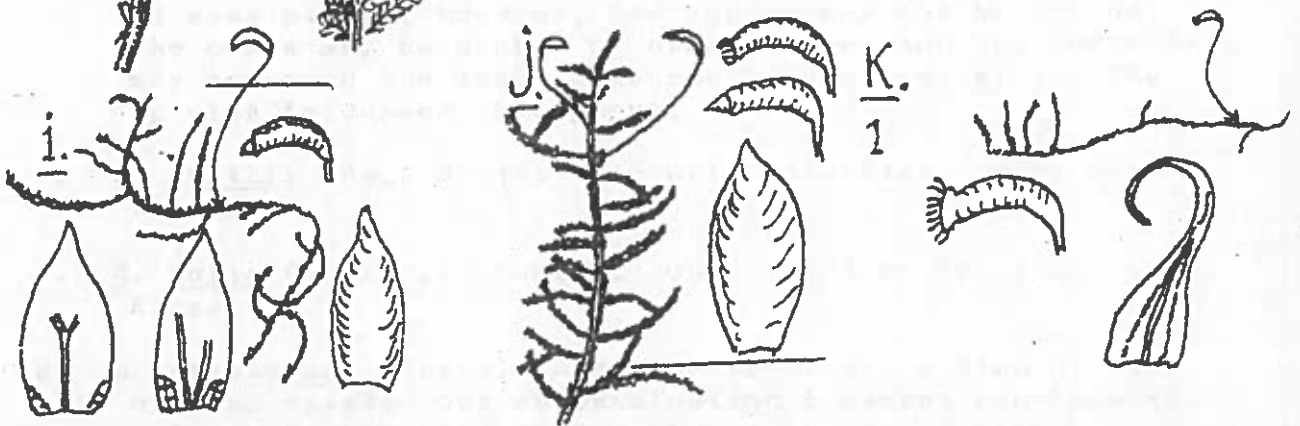
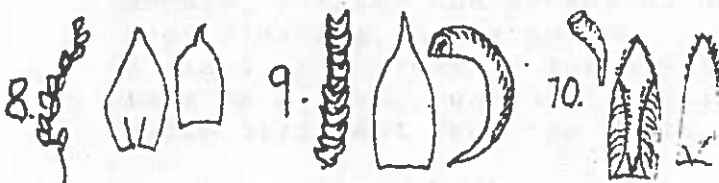
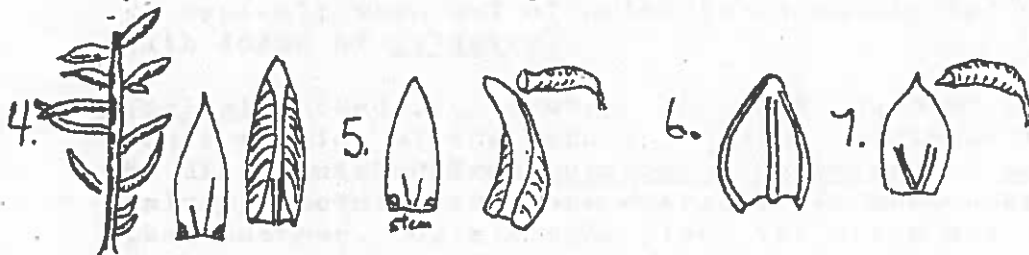
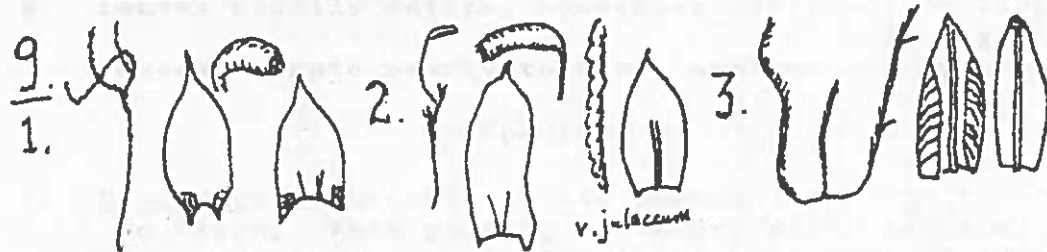
6. *Arctostaphylos* (L.) Nutt. (1818) *Arctostaphylos* Nutt. (1818)
In fields, on rocky hills and on some mountains throughout
the state.

Number of species, variable like most water-mosses
and leading to variety. Leaves are those of large *Arctostaphylos*
species; the leaf varies from almost to almost single to
double and triple. Leaves may be imbricate, almost cir-
cled, or second, and most of these types may be found
in a single species and often on the same plant. The result
is a great confusion. Nevertheless, they are abundant and
conspicuous mosses and have their own interest.

Key to Species.

1. Ovals leaves less than twice as long as wide. 2
Leaves twice or more as long as wide. 2
2. Single costa, not acuminate. 3
Double costa, not acuminate. 1. *holle*
Variable costa; acuminate. 4
3. Leaves with margin of hyaline cells; costa halfway
leaves truncate at apex. 6. *Smithii*
leaves truncate at apex. 6. *Smithii*
4. Lower leaves horizontal, second. 6. *Smithii*
Lower leaves not horizontal. 6. *Smithii*
5. Imbricate concave leaves in length about 3. 1. *nicotiana*
None or all leaves second. 5
6. Stem with outer layer of hyaline cells; leaf cells lax
for ground; green. 1. *Schizocarpum*
Globose. 7
7. Costa usually single; margins small and coloured. 3. *palustris*
Costa usually double or double. 8

III. Bryales 25. Hypnaceae





8. Leaves usually entire, sometimes denticulate; large
8. eugyrium
Leaves serrate nearly to base; small . 10. montanum

Species.

1. H. ochraceum Loeske. Quite common from Cape Breton to Kings. When growing in water, which is usual, it is typical; when out of water it is easily confused with forms of palustre.
2. H. palustre (Hedw.) Loeske. The most abundant and variable species of the genus. In some specimens it can be distinguished from ochraceum, eugyrium and polare only by deciding that one character is more significant than another. On a single plant the costa may be single, double, forking and absent on different leaves. It may grow floating, submerged or on dry land. Branches of a plant on a floating log may trail in the water and take on a form, such as f. subsphaericum or julaceum, quite different from the parts above water.
3. H. polare (Lindb.) Broth. Upright branched stems from thready black stolons; the ovate leaves are somewhat cucullate or, near the end of the branch, acuminate. Kings and Inverness.
4. H. alpestre (Hedw.) Loeske. In wet spots. Stiffly imbricate and pinnate. Victoria (Nichols); Inverness.
5. H. eugyrium (B. & S.) Loeske. This rivals palustre in abundance and variety. Usually it can be distinguished by its lack of costa, second leaves, wide hyaline auricles and hyaline cells in a line across the base. In some plants, however, the leaves may not be second, the costa may be double or even single, and the auricles may approach the small coloured ones of palustre. The species is common throughout.
6. H. Smithii (Sw.) Broth. Victoria (Nichols). Rare anywhere.
7. H. molle (Schimp.) Loeske. Once found on wet rocks in Kings.
8. H. dilatatum Loeske. Reported from Cape Breton by Nichols and myself, but on examination I cannot convince myself that this is a different species from molle.
9. H. Bestii (Rem. & Bryhn) Broth. Reported from Victoria (Schofield).

10. H. montanum (Wils.) Broth. Inverness and Kings.

h. Genus Calliergon (Sull.) Kindb.

Calliergon is reasonably free from puzzles and exceptions. The leaves are blunt and cucullate when wet, except that the terminal leaves of stramineum may not show this. The costa is strong and single, and only freak single costas in the pink-stemmed Calliergonella may cause confusion. The habitat in general is in marshes, but most of them at times make do with rotten logs.

Key to Species.

1. Stems with close pinnate branches. 2. giganteum
 Stems with few and irregular branches. 2
2. Straw-yellow; costa to 3/4 of leaf; most leaves blunt rather than cucullate 3. stramineum
 Green; costa to apex or nearly 3
3. Leaves apiculate; broad ovate. 4. turgescens
 Leaves with rounded tips; ovate-triangular . 1. cordifolium

Species.

1. C. cordifolium (Hedw.) Kindb. Found in almost any cattail marsh. Long and little branched. Throughout the province.
2. C. giganteum (Schimp.) Kindb. Leaves like those of the last, but the habit is like nothing else. Victoria and Cape Breton (Nichols)
3. C. stramineum (Brid.) Kindb. Glossy yellow plants in damp places. Not uncommon but rarely fruiting. Throughout the province.
4. C. turgescens (Schimp.) Kindb. A single record from Hants. With Climacium in a swamp. Erect branches in clusters at the top of erect stems. The minute apiculus, often recurved, is distinctive.

1. Genus Calliergonella Loeske

This genus is scarcely necessary as different from Calliergon. The lack of costa is distinctive, but sometimes leaves forget themselves and have costas, single, double or forking.

1. C. cuspidata (Brid.) Loeske. Common in wet places throughout.

j. Genus. Pleurozium Mitt.

In this I have diverged from Grout who put this species in Calliergonella, which is anatomically sound but misleading to those who judge by appearance.

1. P. Schreberi (Brid.) Mitt. The pinnate-branching, golden-green carpet of this moss in coniferous woodland must be familiar to all. The leaves have no costa or a double one and are ovate-apiculate like those of Calliergonella but never cucullate. Fruits are more like Hypnum, but it seems to fruit readily only in dry summers. Common throughout.

k. Genus Drepanocladus (C.Muell.) Roth.

Drepanocladus provides us with a double system of difficulties. The majority of species are frequenters of marshes, water and flooded banks and tend to develop forms for each habitat. In addition, the species seem to have been separated, probably during ice-ages, into tundra and forest types. All these have been named as different species or varieties. In recent times Nova Scotia has been recolonized by mosses from both south and north, and we have not only these extremes but also intermediate types which suggest either that they have hybridized or that we have retained older intermediate strains. In any case, I have ignored varieties and forms, of which there are legion, since it is difficult enough to define the species.

The genus is characterized by single costa halfway or more; leaves secund or long-acuminate or both; long narrow cells. All belong to wet places except uncinatus, the commonest.

Key to Species.

1. Leaves plicate. 2
Leaves not plicate. 3
2. Small plant; leaves narrow, serrulate at tip, circinate;
on rotten wood; rarely in swamps and then larger.
Large for genus; leaves lanceolate, entire; falcate.
 1. uncinatus
 2. vernicosus
3. Leaves with acumen longer than the blade. 4
Leaves with acumen shorter than the blade 6
4. Green and rather frail. 5
Sturdy pinnate golden-brown masses; basal cells coloured.
 8. exannulatus

5. Costa halfway; inflated cells of auricles may reach costa. 4. aduncus
Costa three-quarters or more; inflated cells few or none. 7. fluitans
6. With coloured auricles. 5. Sendtneri
Without definite auricles 7
7. Costa three-quarters; small irregular old-gold stems in close mat 3. revolvens
Costa half to three-quarters; large pinnate plants with toffee-brown second leaves 6. lycopodioides

Species.

1. D. uncinatus (Hedw.) Warnst. The only *Drepanocladus* found commonly on wood. At first it may be mistaken for a *Hypnum* as the costa is hidden by the incurving leaves and confused by the plicae. Specimens of this from farther north are almost intermediates between this and *vernicosus*, and, on the rare occasions when one finds *uncinatus* growing in a marsh, it is much of this intermediate appearance, larger, with shorter acumen, yellower, but still nearer to *uncinatus*. Many forms of the species are found in the province.
2. D. vernicosus (Lindb.) Warnst. This has been found only once, at Hunting Point, Kings, in a marsh beside Fundy. It is large for the genus, yellow-green, pinnate.
3. D. revolvens (C. Muell.) Warnst. A small moss found by a spring on Isle Madame, Richmond, and was determined by Andrews. Large hyaline cells surrounding the stem are the usual key-characters, and I am unable to distinguish these.
4. D. aduncus (Hedw.) Warnst. Probably our commonest water-*Drepanocladus*. The leaves take many forms but are usually long and slender with the costa stopping halfway. The decurrent auricles, reaching even to the costa, are distinctive.
5. D. Sendtneri (Schimp.) Warnst. A brown version of *aduncus* but more robust with thicker costa and small coloured auricles. Victoria (Macoun); Shelburne.
6. D. lycopodioides (Brid.) Warnst. Doubtfully represented Macoun reported a "*pseudo-lycopodioides*, Kindb." from Margaree, but that species has sunk without leaving a ripple by which to identify it. In Margaree I collected another

large Drepanocladus in Big Intervale, and it keyed out to lycopodioides in both Grout and Dixon. I compared it with some plants from the northwest which had been determined by experts, and mine did not agree exactly with them, and both those and mine lacked several of the characters described by Grout and Dixon. In any case, it is a large tundra-type Drepanocladus with leaves secund-imbricate, short acumen and yellowish colour.

7. D. fluitans (Hedw.) Warnst. This will with difficulty be separated from aduncus whose general habit and water habitat it shares. The key characters are apt to vary from leaf to leaf, but in general this species pairs with exannulatus rather than with aduncus. Common throughout.
8. D. exannulatus (Guemb.) Warnst. A sturdy marsh moss with a northern record. Most of the specimens come from Cape Breton or Halifax, especially Point Pleasant.

25. E. HYLOCOMIAE

Large plants of woodland, some of them very common. They may be regularly pinnate, or erect or extremely untidy. The reddish stems and the stem-leaves, broad, contorted and usually with double costa are hardly mistakable.

Key to General.

1. Stems or axils of stem-leaves covered with paraphyllia.
 - a. Hylocomium
 Stems and axils of stem-leaves nearly free from paraphyllia.
 - b. Rhytidiadelphus
- a. Genus Hylocomium B. & S.
 1. Costa of stem-leaves usually single; serrate. 3. pyrenaicum
 Costa of stem-leaves usually double; plicate. 2
 2. Bi- or tri-pinnate; branch growing from midrib of last year's branch 1. splendens
 Pinnate or untidy 3
 3. Stem-leaves acute or short-acuminate; strongly serrate
 2. umbratum
 4. brevirostre
 Stem-leaves long and slenderly apiculate; serrulate

Species.

1. H. splendens (Hedw.) B. & S. One of the commonest fern-like mosses of rocky woods. It fruits rather rarely. Throughout.

Large *Graminifera* is big, coarse, and it is known out to
the *Graminifera* in both *Graminifera* and *Graminifera*. It is
some plants from the northwest which had been determined by
expert, and it did not agree exactly with them, and both
large and also lacked several of the characters mentioned
by *Graminifera* and *Graminifera*. In any case, it is a large, coarse,
Graminifera with leaves second-implicate, short, narrow
and yellowish, etc.

Large *Graminifera* (Lam.) *Graminifera*. This will also naturally be
regarded as a *Graminifera* whose general habit and water habitat
is similar. The characters are quite to vary from leaf to
leaf, but in general this species is with *Graminifera*
habits, common throughout.

Large *Graminifera* (Lam.) *Graminifera*. A study of the leaves with a
microscope. Most of the specimens from Cape Breton
of *Graminifera*, especially *Graminifera*, and the
characters are quite to vary from leaf to leaf, but in general
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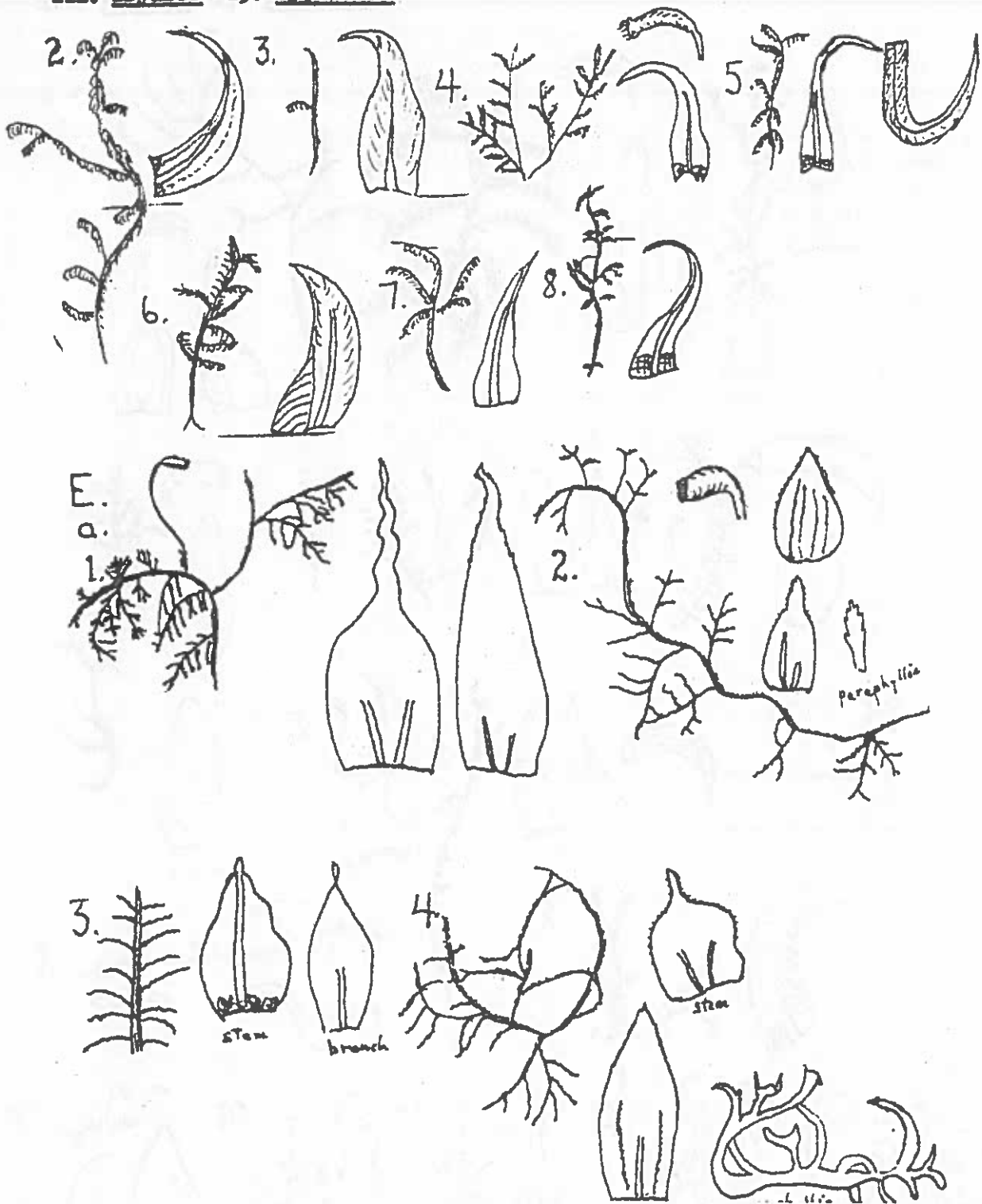
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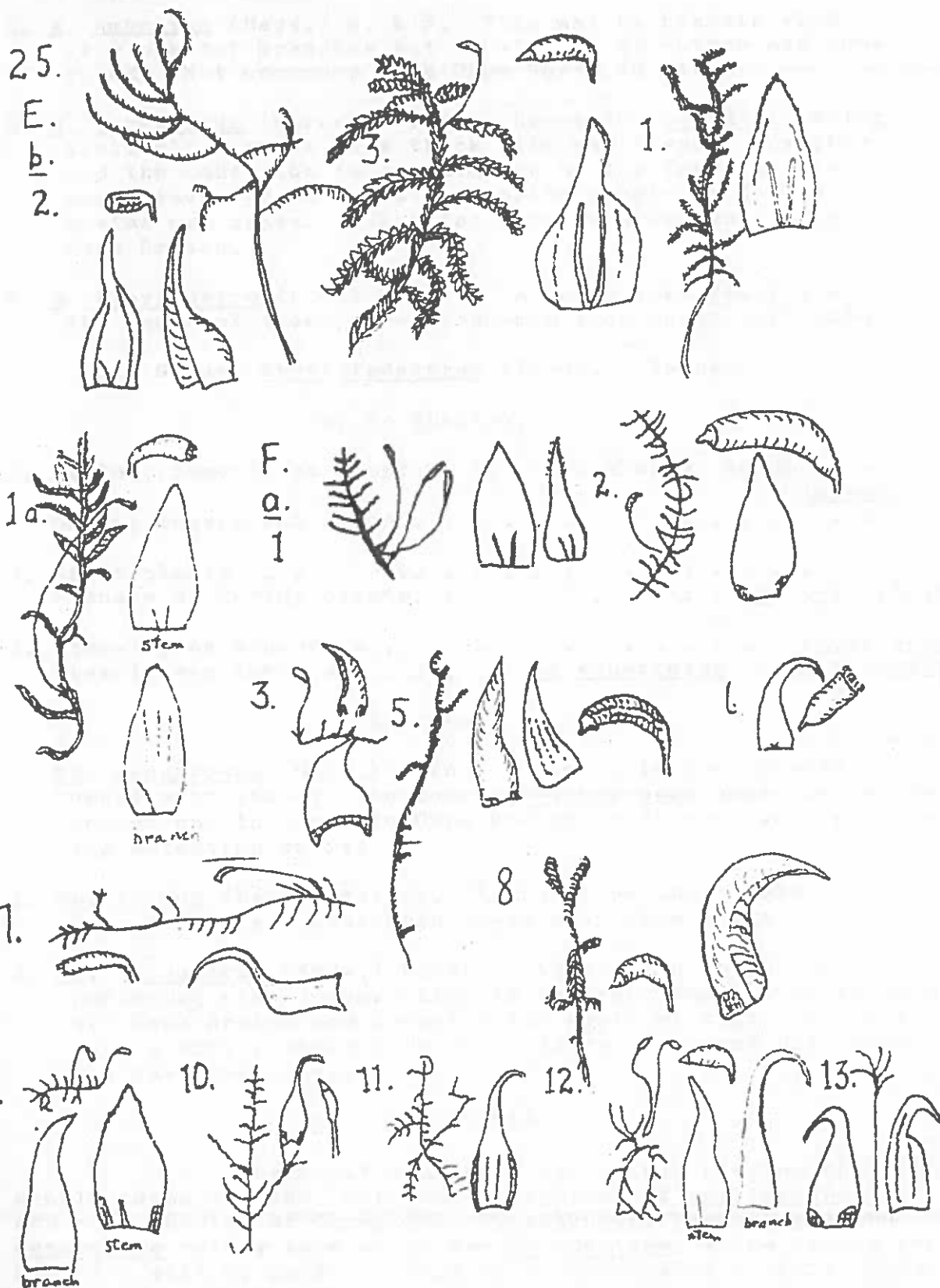
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this species is with *Graminifera* habits, common throughout.

III. Bryales 25. Hypnaceae





III. Bryales 25. Hypnaceae





2. H. umbratum (Hedw.) B. & S. This may be pinnate with very slender branches but usually it is matted and confused. Not uncommon from Cape North to Kings.
3. H. pyrenaicum (Spruce) Lindb. Resembles umbratum, being similarly pinnate with thick stem and slender branches and the confusion is accentuated by the fact that in some leaves of each the inapposite single or double costas may appear. Thus far this is known only from Cape Breton.
4. H. brevirostre (P.B.) B. & S. A large moss found around the roots of trees. Not uncommon from Hants northward.

b. Genus Rhytidiadelphus (Lindb.) Warnst.

Key to Species.

1. Yellow; leaves, at least at tip of branches, secund. 2. lozeus
Green; leaves not secund. 2
2. Erect plants 3
Pinnate or untidy plants. 3. triquetrus
3. Stem-leaves squarrose 1. squarrosus
Stem-leaves imbricate 1a. squarrosus f. non-squarrosus

Species.

1. Rh. squarrosus (Hedw.) Warnst. Common in damp places, usually in shade. The form non-squarrosus seems to be the common one in northern Cape Breton which may justify calling attention to it.
2. Rh. lozeus (Hedw.) Warnst. Abundant on the highlands of Cape Breton and otherwise known only from Kings.
3. Rh. triquetrus (Hedw.) Warnst. The common shaggy moss with contorted stem-leaves which is in every wood north to southern Cape Breton and occasionally north of that. There is also a tidy pinnate form which looks different but shows the same stem-leaves.

25. F. HYPNEAE

By Grout's classification all pleurocarps with double costa or none, with the exceptions of Calliergonella and some species of Campylium, Hygrohypnum, Neckeraceae and Leskeaceae belong here or in the Entodontaeae, which is not represented with us as yet. This is a wastebasket classification but serves its purpose.

1. H. umbellata (Nees) S. & S. This may be identical with very distinct branches but usually it is rather and common. Not uncommon from Cape North to Kanga.

2. H. pyramidalis (Nees) S. & S. Resembling umbellata, being similar in general shape with thick stem and slender branches and the corolla is somewhat flattened by the fact that in some flowers of each the opposite stamens or ovules converge and appress. Thus far this is known only from Cape Province.

3. H. brevifolia (P. B.) S. & S. A large mossy low spreading shrub of Kanga. Not uncommon from Kanga northwards.

4. Genus Pyramidalis (Nees) S. & S.

Key to Species:

1. Yellow; leaves at least at tip of branches, serrate.
2. Pyramidalis
Green; leaves not serrate. 3

2. Branches of mostly plants 3. Pyramidalis

3. Pyramidalis 1. Pyramidalis
Stems-leaves imbricate 1. Pyramidalis

Species:

1. Pyramidalis (Nees) S. & S. Common in damp places, usually in shade. The first Pyramidalis seen to be the common one in Kanga and Kanga which may justify calling attention to it.

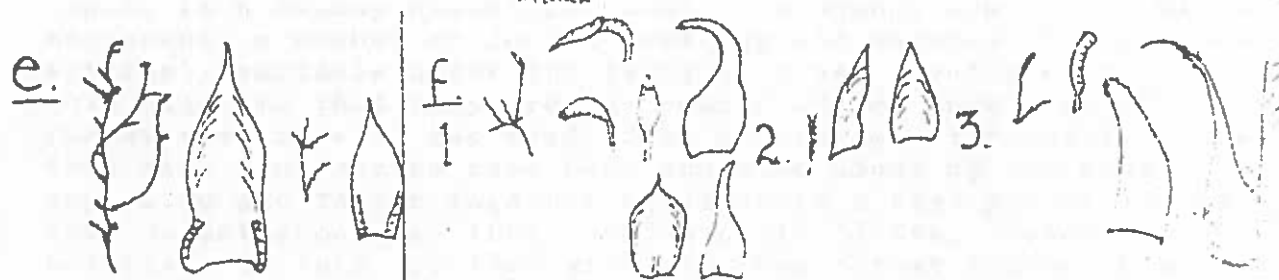
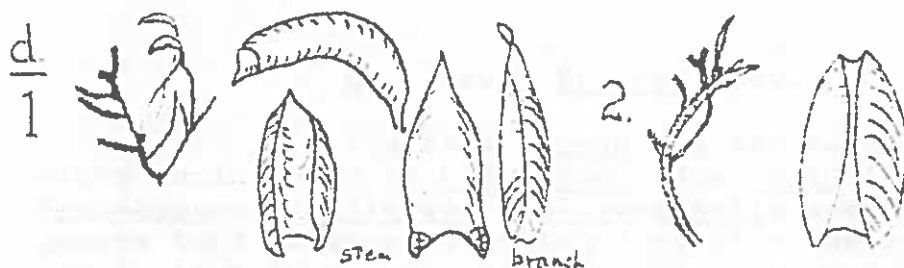
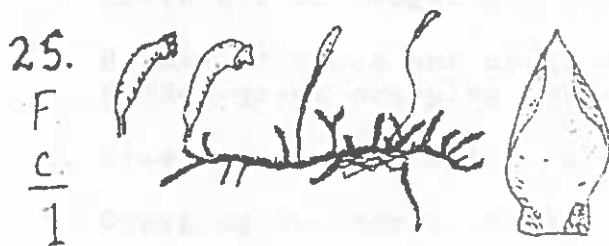
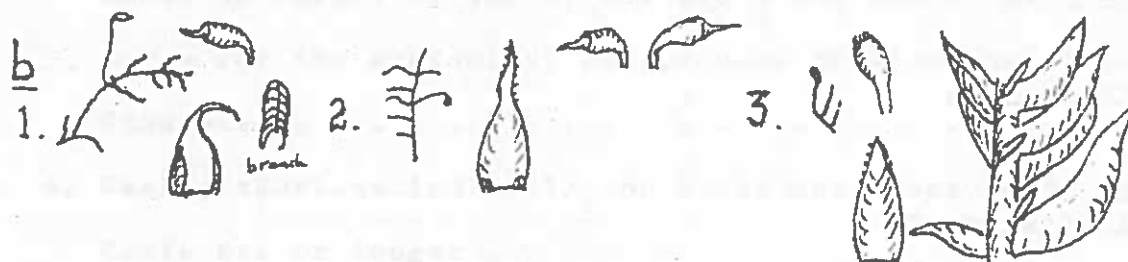
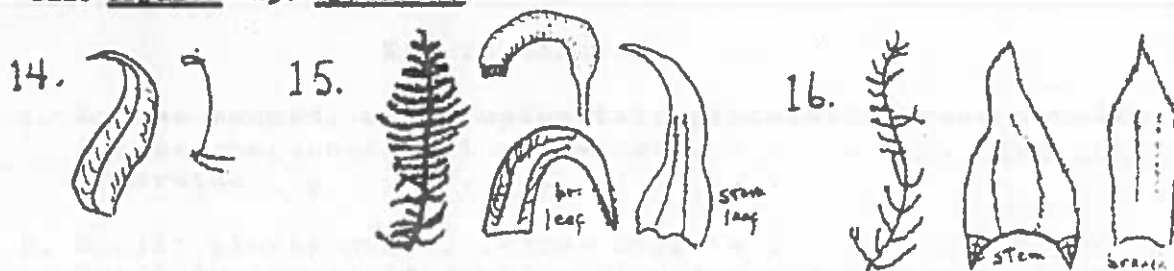
2. Pyramidalis (Nees) S. & S. Abundant on the high peaks of Cape Kanga and otherwise known only from Kanga.

3. Pyramidalis (Nees) S. & S. The common shrubby moss with serrated stem-leaves which is in every wood north to south and Cape Kanga and occasionally north of that. There is with a high proportion of which looks different but shows the same characteristics.

5. Pyramidalis

5. Pyramidalis classification all Pyramidalis with Pyramidalis as none with the exception of Pyramidalis and Pyramidalis. Pyramidalis, Pyramidalis and Pyramidalis belong here or in the Pyramidalis, which is not represented with us at present. This is a Pyramidalis classification but serves the purpose.

III. Bryales 25. Hypnaceae





Key to Genera.

1. Leaves secund, and complanately pinnate-branched usually. 2
 Leaves complanate but not secund. i. Plagiothecium
 Otherwise 3
2. Small; glossy-green; leaves serrate b. Brotherella
 Small to large; if small, not green and glossy a. Hypnum
3. Large for the subfamily; conspicuous hyaline auricles.
 Otherwise c. Heterophyllum 4
4. Small; short-celled (3:1); on rocks and trees. e. Homomallium -
 Cells 5:1 or longer f. Amblystegiella 5
5. Plants of trees and rocks and soil. 6
 Golden-green creeping mosses of wet places. d. Sematophyllum
6. Creeping; making silky threads or mats; gemmae on stem.
 Creeping on trees; usually secund at tips; no gemmae. h. Platygyrium
 Creeping or erect; cells very long and slender. g. Pylaisia
 Otherwise i. Plagiothecium

a. Genus Hypnum Hedw.

The name Hypnum has had curious applications. Dixon included in it Campylium, some Leptodictyum, Drepanocladus, Hygrohypnum, Calliergon, Calliergonella and Pleurozium. These genera tend to overlap, which justifies the lumping, but the result is a clumsy classification. The Hypnum complex of Dixon represents a number of forest-dwelling and water-loving species extremely variable after the fashion of new developments. This suggests that they are the result of new invasions of forest environments restored after a long age of drought. Since that time the species have been shuttled about by ice-ages, separated and thrown together again until a high proportion of them do not recognize their own specific limits. However, botanists do this for them with the result that innumerable species have been defined and most of them scrapped by those with other ideas. For the sake of communication we must use the surviving names, but for the sake of our sanity we should recognize that many of these fall into Julian Huxley's "clines" and "reticulate species".

The hypnums are among our commonest and most varied mosses and so cannot be ignored. But neither can they be determined except by microscopic comparisons, so a super-

ficial key like this one is likely to land one's specimen in a desirable but rather improbable rare species. Experts have done this before with the result that our provincial list is cluttered with the names of species which have never existed.

Key to Species.

1. Branching regularly pinnate. 2
Otherwise 7
2. Leaves golden, circinate, pinnate. .15. Crista-castrensis
Otherwise. 3
3. Stems red. 4
Otherwise. 5
4. Large for genus; capsules erect or nearly. . 1. imponens
Medium for genus; capsules curved and inclined 2. fertile
5. Leaves cordate; cells of wings papillose; plicate. 16. molluscum
Otherwise. 6
6. Margin of leaves revolute in lower half. . . 11. revolutum
Margin of leaves not revolute; leaves circinate, filiform. 7. callichroum
7. Auricles of inflated hyaline cells 8
Auricles of quadrate cells or absent 11
8. Tiny threadlike plant; with a few inflated cells. 14. fastigiatum
Larger 9
9. Large yellowish plants with large inflated auricles 8. arcuatum
Otherwise. 10
10. Large green plant with only a few inflated cells. 5. curvifolium
Small yellowish plant; plicate, circinate, denticulate leaves. 6. canariense
11. Small yellowish plant with no distinct auricles. 12. hamulosum
Auricles of quadrate cells 12
12. Sturdy yellowish plant; concave leaves; incrassate auricles. 13. Bambergeri
Green 13

13. Leaves definitely serrate; auricles of many quadrate cells. 9/ reptile
Leaves usually entire or serrulate. 14
14. Very small plants like reptile; quadrate cells few; capsule erect 10. pallescens
Plants with a few inflated cells among quadrate . . . 15
15. Very small plant but variable 3. cupressiforme
Larger similar plant. 4. Vaucheri

Species.

1. H. imponens Hedw. Very common on ground and rotten wood throughout. Very regularly pinnate.
2. H. fertile Sendt. This seems to be a northern form of imponens. It has been found from Cape Breton to Cumberland and Kings in imponens habitats.
3. H. cupressiforme Hedw. Common and variable, on trees and rocks; throughout the province.
4. H. Vaucheri Lesq. This is a robust northern form of the last. Andrews determined it as of this species; Schofield thinks that it should be the intermediate cupressiforme, var. subjulaceum. As Grout said, where you split the cline is a matter of taste. This has been found on rocks of the islands from Seal Island to Brier Island, a coastal-plain distribution which stresses the fact that passage along the coastal plain was southwards as well as northwards.
5. H. curvifolium Hedw. Matted thick stems and thick capsules striate when dry. Found only on the mainland and not often.
6. H. canariense (Mitt.) Dixon. Macoun reported this from Baddeck. It needs to be confirmed.
7. H. callichroum Brid. Very small and inconspicuous. Found from Victoria (Nichols) to Yarmouth, but most stations are southerly.
8. H. arcuatum Lindb. Large and yellow-green; abundant chiefly in grassy places on the mainland.
9. H. reptile Mx. On tree-roots. This forms another cline with pallescens. The typical reptile with serrate leaf-tips seems to have a coastal-plain distribution from Victoria (Nichols) southward.
10. H. pallescens (Hedw.) B. & S. Very common in both the small form and one approaching reptile in size. Throughout.

11. H. revolutum (Mitt.) Lindb. A small pale Hypnum on a rock in Hants.
12. H. hamulosum B. & S. A doubtful specimen from Pictou.
13. H. Bambergeri Schimp. From a marsh in Point Pleasant Park, Halifax, and Halls Harbour, Kings. A tundra form.
14. H. fastigiatum Brid. Small threads found among other mosses on tree trunks. Probably frequent but rarely collected. Victoria to Queens.
15. H. Crista-castrensis Hedw. A striking and common plant on rotten wood in shade. In my experience it does not fruit here as it does in Labrador.
16. H. molluscum Hedw. Unique among our Hypnums. It is cordate, plicate and harsh to the touch. One station, on a stone in an alder swamp near Swinamer's Corner, Hants.

b. Genus Brotherella Loeske

This genus is separated from Hypnum chiefly by its long-rostrate operculum (which, unfortunately, is not always present and is sometimes very short.) Two of our species seem to constitute another north-south cline, and many specimens straddle the difference between them. Our species are very small Hypnum-like plants, the branches complanate-secund, the leaves long-acuminate and serrate, the general appearance green and glossy.

Key to Species.

1. Several hyaline cells in auricles; capsule yellow-brown; operculum half the length of the urn. . . . 1. recurvans
- Few hyaline cells in auricles; capsule in part red-brown; operculum 3/4 or more the length of urn . . . 2. delicatula
- Few hyaline cells surrounded by quadrate cells; capsule erect and symmetric 3. tenuirostris

Species.

1. B. recurvans (Mx.) Fleisch. Common in woodland throughout. Length: width of capsule about 3:1.
2. B. delicatula (James) Fleisch. Occasional in same habitat. "On old logs" (Macoun); Halifax (MSB); Kings and Hants. Capsule 2:1 or less.
3. B. tenuirostris (Schimp.) Broth. Grout does not accept Macoun's collections of this species but does not say

what they were. We have one collection from the Southwest Margaree, Inverness, (Macoun's area) which corresponds in detail to Grout's description, though the capsule is rather shorter and less symmetrical than that illustrated in the Moss Flora, while the leaves, branch and perichaetial, are longer acuminate. A specimen from Newfoundland seems to fall between this and delicatula. Possibly we are dealing with a "reticulate species".

c. Genus Heterophyllum (Schimp.) Kindb.

Key to Species.

1. Broad, yellowish, entire leaves without costa; capsule sub-erect; not pinnate. 1. Haldanianum

Species.

1. H. Haldanianum (Grev.) Kindb. Typical of second-growth scrub where it grows on the base of trees. Very common on the mainland, less so in Cape Breton.

d. Genus Sematophyllum Mitt.

Characterized by creeping habit, irregular branching golden-green entire leaves with a very faint double costa or none, and long cells. Basal cells have the redness of the stem, and the auricles may or may not be transparent. Capsules are curved and have an amblystegiate air. We have one species, but it varies in size sufficiently to earn two names.

Species.

1. S. carolinianum (C. Muell.) E.G.B. Badly crowded specimens fall into this smaller species. Wet rocks, Fall River, Halifax (MSB), det. Dupret; on rotten log, Clyde River, Shelburne.
2. S. marilandicum (C. Muell.) E.G.B. Under better conditions it may reach this species which has leaves more than 1:5 mm. long. Among Scapania nemorosa on a damp scree, Big Intervale, Inverness.

e. Genus Homomallium (Schimp.) Loeske

1. H. adnatum (Hedw.) Broth. Miss Brown made the first collection at Oakfield, Halifax. She sent me another, labelled Platygyrium, of which Grout had said that it looked like a hybrid between that and Homomallium. However, in the features by which it differs from Homomallium, it also differs from Platygyrium. Typically the leaves of

this are like a large Amblystegiella, entire, without costa but with a groove where an amblystegiate costa might be expected. Miss Brown's specimen, collected from cordwood, was a slim serpent with short branches on each side alternately. Plants from White Rock, Kings, were shorter and more sturdily branched, and occasionally a stub of costa appeared in the groove.

f. Genus Amblystegiella Loeske

Dixon grouped these plants with Amblystegium, and on first encounter one is almost certain to hunt for them there. Because they usually have no costa or traces of a double one, Grout put them in the Hypneae. The cells are short, the leaves ovate-acuminate.

Key to Homomallium and Amblystegiella.

- 1. Leaves 1 mm. long. Homomallium
- Leaves .6 mm. or less. Amblystegiella.2

Key to Amblystegiella.

- 1. On tree trunks; leaves .6mm.; capsule curved, often horizontal. 1. subtilis
Usually on rocks; leaves .5 mm. or less 2
- 2. On rocks or roots; leaves serrate at tip; stem-leaves with slender reflexed acumen 3. Sprucei
On rocks; leaves entire. 3
- 3. Sturdy, with Grimmia-like habit; leaves edged with short rectangular cells; capsule curved 2. confervoides
Frail; thin strands on gypsum; capsule erect, symmetrical. 4. minutissima

Species.

- 1. A. subtilis (Hedw.) Loeske. Fairly common bases of trees where found, but as yet our records are all from Victoria and Kings.
- 2. A. confervoides (Brid.) Loeske. Cape Dauphin, C.B.(Nichols); Peggy's Cove, Halifax (MSB); Sweet's Corner, Hants.
- 3. A. Sprucei (Bruch) Loeske. Inverness (Nichols); Halifax (MSB); Hants and Kings.
- 4. A. minutissima (Sull. & Lesq.) Nichols. Usually on gypsum and seems to be wherever gypsum is found but has rarely been recorded or found fruiting. Black Brook, Victoria.

g. Genus Pylaisia B. & S.

Very small hypneous plants on bark. The leaves are more or less secund; costa fragmentary, often only one branch of a double costa; margins entire or faintly serrulate; capsules erect. By misplaced ingenuity the classification has been based wholly upon the inner peristome and the degree of adherence of its segments to the outer teeth. On the rare occasions when I have found capsules in a condition for making this distinction, I have been convinced only of polyantha. My examination of the other plants has not convinced me that we have more than one species with some variations of minor significance. For anyone who can do better, I give the major species which have been reported here and the accepted distinctions.

Key to Species.

1. Inner peristome teeth free from outer peristome teeth.
Inner peristome teeth half free from outer 1. polyantha
Inner peristome teeth not at all free from outer. 2. Selwynii
3. intricata

Species.

1. P. polyantha B. & S. Rather frequent on bark. Inverness to Kings.
2. P. Selwynii Kindb. Pictou (MacKay); Cape Breton (Macoun)
3. P. intricata (Hedw.) Schimp. Victoria (Nichols); Halifax (MSB).

h. Genus Platygyrium B. & S.

1. P. repens (Brid.) B. & S. A silky pale-green moss either in thin mats or weaving through other species on the trunks of trees. The leaves are straight; without costa or rarely with a double one, lanceolate-acuminate, entire or faintly serrulate; cells linear. Capsules are rare, erect and symmetric, and in their absence there are paraphyllia on the stems and sometimes on the leaves. There are records from most counties.

i. Genus Plagiothecium B. & S.

The most abundant small creeping Hypneae, but they are not always easy to identify. Many common species have the leaves flat and complanate. If one begins by becoming familiar with the long slender smooth cells of the leaves, it will make

recognition of the non-complanate species easier. Most species grow on rotten logs and humus in crevices, but Roeseanum usually grows on soil.

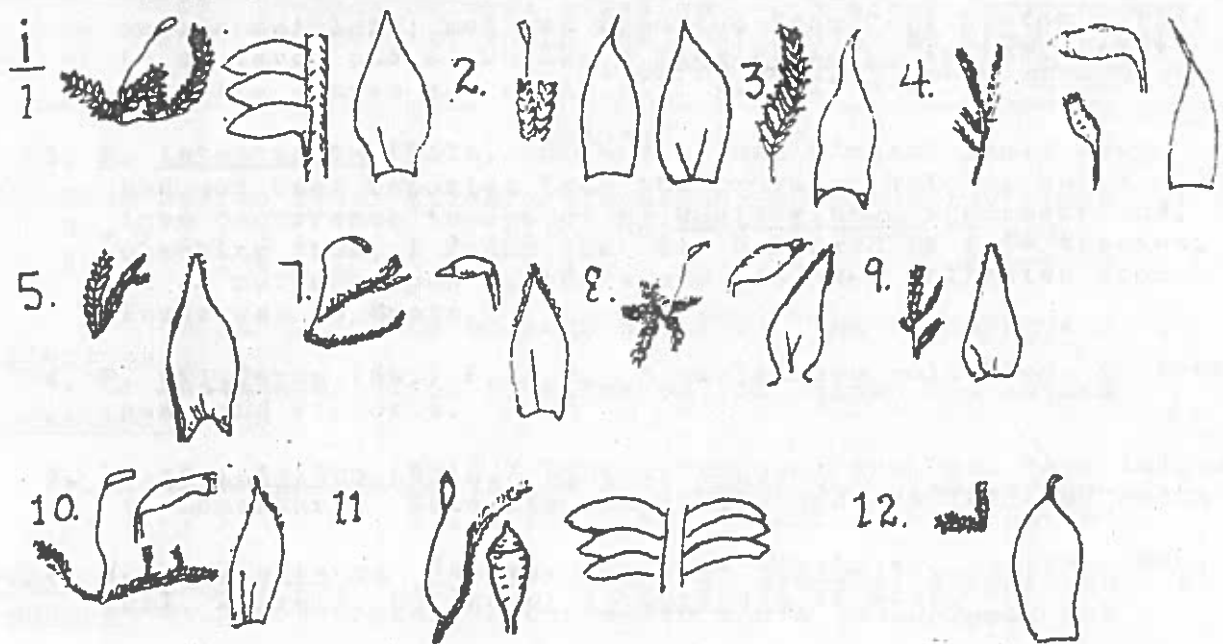
Key to Species.

1. Small yellow-green complanate plants; stems coated with large rectangular hyaline cells. 2
Otherwise 3
2. Leaves decurrent, inflated hyaline cells at angles 3. latebricola
Leaves not decurrent; no inflated cells at angles. 6. Mullerianum
3. Leaves large for genus (1.5 mm. or more); decurrent. .4
Leaves shorter than 1. mm 5
4. Complanate; serrate or not at tip 1. denticulatum
Not complanate; stems often crowded and erect 2. Roeseanum
5. Most leaves with slender or filiform acumen 6
Tips merely acute 7
6. Yellow-green; entire leaves 4. piliferum
Green; serrate acumen, serrulate below. 12. Seligeri
7. Leaves spreading to squarrose; decurrent. 5. striatellum
Otherwise 8
8. Small; leaves complanate and almost cultriform 11. subfalcatum
Otherwise 9
9. Complanate or not; leaves serrate or serrulate all around; capsule striate when dry 10. turfaceum
Leaves serrulate at tips only 10
10. Glossy green; complanate. 8. elegans
Yellow-green; not complanate. 7. pulchellum
Yellowish; creeping; radiculose; thick basal cells. 9. micans

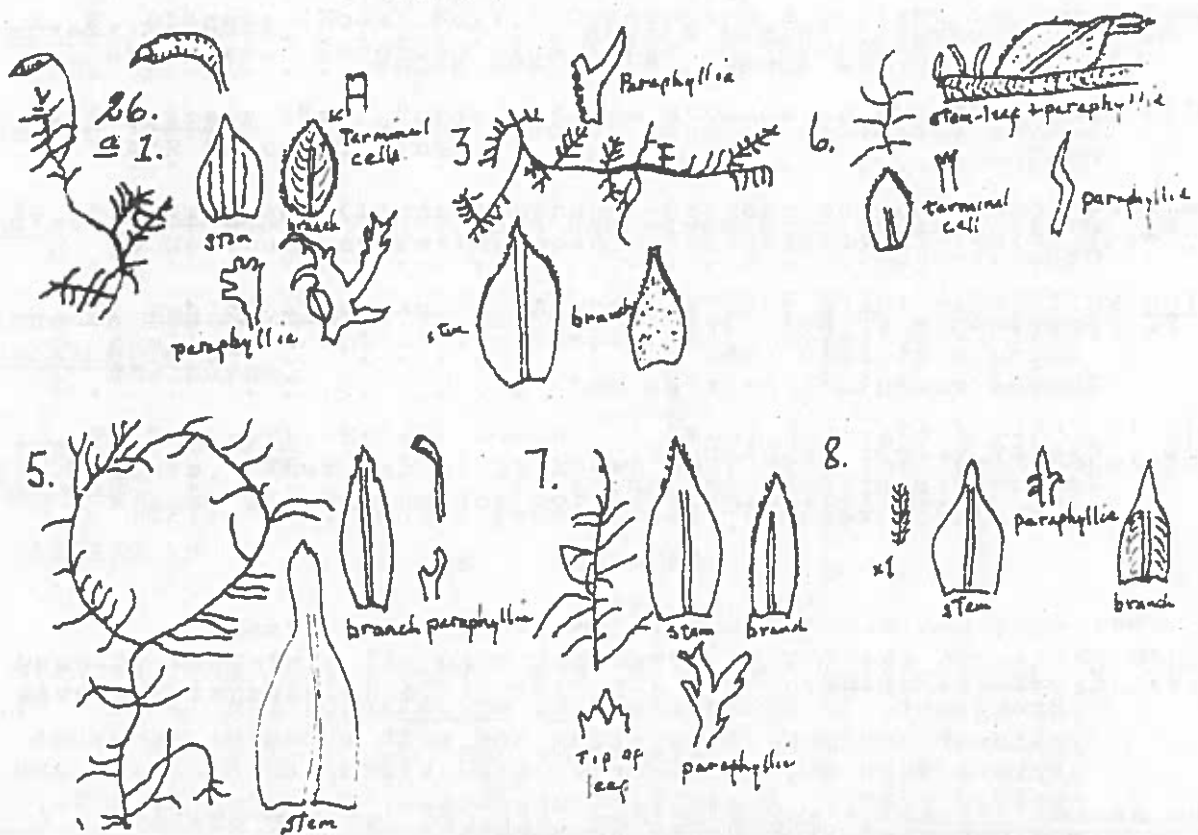
Species.

1. P. denticulatum (Hedw.) B. & S. Very common and variable throughout. A subspecies, P. sylvaticum (Brid.) B. & S., yellower and more straggling and with capsules somewhat striate when dry is reported from Victoria (Nichols) and Halifax (MSB). A smaller subspecies, P. laetum B. & S., was reported from Hants by Habeeb.
2. P. Roeseanum (Hampe) B. & S. Rather common on banks of brooks

III. Bryales 25. Hypnaceae



26. Leskeaceae





St. James



St. James



St. James

St. James

on the mainland; not yet reported from Cape Breton. This is so large and so unlike a Plagiothecium in habit that only its leaves and cells will give it away.

3. P. latebricola (Wils.) B. & S. This elegant small moss had not been reported from the province before, but I noticed decurrence in one of my Muellerianum specimens and, checking them, I found that all belonged in this species. It is not uncommon on humus and has been collected from Inverness to Hants.
4. P. piliferum (Sw.) B. & S. A small moss collected in Inverness and Victoria.
5. P. striatellum (Brid.) Lindb. Frequent from St. Paul Island to Lunenburg. Note the decurrence and its inflated cells.
6. P. Muellerianum Schimp. Victoria (Nichols); Halifax (MSB, det. Dupret), but keep latebricola in mind.
7. P. pulchellum (Hedw.) B. & S. Cape Breton and Blomidon. Not very common.
8. P. elegans (Hook) Sull. Common and a delight to see. Usually on rocks. Recorded from Kings to Inverness.
9. P. micans (Sw.) Paris. A few strands in humus on the White Rock outcrop, Kings.
10. P. turfaceum (Lindb.) Lindb. Perhaps our commonest species to be found on rotten wood. Fortunately it fruits freely.
11. P. subfalcatum Aust. A small glossy plant resembling pulchellum except in its complanate, asymmetrical leaves. Shelburne.
12. P. Seligeri (Brid.) Lindb. A small deep-green plant of conifers. Thus far it is known only from the North Mountain, Kings, a refugium for boreal forest species.

26. LESKEACEAE

A family characterized by short cells and peristomes, usually costate. The majority creep over trees and rocks and give the impression of forest plants adapted to rigorous climate.

Key to Genera.

1. Fernlike plants, pinnate, medium-sized to small; leaves very different on stems and branches; papillose; paraphyllia conspicuous. 2
- Not pinnate. 3

2. Leaves papillose; paraphyllia attached to stems, not leaf-base. a. Thuidium
 Leaves almost to quite smooth; paraphyllia attached to leaf-base. b. Helodium
 3. A mat of fine stems like a small, non-pinnate Thuidium. c. Heterocladium
 Stem and branch-leaves little differentiated. 4
 4. Creeping; leaves flat and entire or nearly so 5'
 Otherwise or with opaque blade of leaf 6
 5. Leaf-margins revolute. d. Pseudoleskea
 Leaf-margins plane e. Leskea
 6. Creeping; concave-leaved 7
 Flat-leaved; blade of leaf opaque, costa translucent. i. Anomodon
 Broad, acuminate leaves with long papillae. h. Thelia
 7. Ovate acute leaves; costa none, single or short double. f. Pterigynandrum
 Ovate apiculate, very concave leaves; single costa. g. Myurella
- a. Genus Thuidium B. & S.

Delicatulum is one of our most abundant "fern-mosses" and should make the genus familiar. The leaves, especially the small branch-leaves are studded with papillae, and the stems are covered with a fur of paraphyllia, in the larger species branching.

Key to Species.

1. Regularly bipinnate; branch-leaves ecostate. 1. delicatulum
 Same with filiform hyaline tips to stem-leaves 2. Philiberti
 Pinnate or irregularly bipinnate. 2
2. Tiny creeping yellow plants with linear paraphyllia 6. minutulum
 Small yellow-green pinnate plants with acuminate leaves and costa to apex. 8. virginianum
 Larger and normally green 3
3. Like an untidy delicatulum; stem-leaves spreading, recurved, acuminate; branch-leaves costate 3. recognitum
 Pinnate green plants with slender branches. 4
4. Branch-leaves whose terminal cells end in 2-4 papillae. . 5
 Branch-leaves whose terminal cells end in a single papilla; stem-leaves buried in much-forked paraphyllia. 7. microphyllum

5. Cells on face of blade of branch-leaf with only one pap-
illa. 5. abietinum
Cells on face of blade of branch-leaf with several pap-
illae. 4. scitum

Species.

1. Th. delicatulum (Hedw.) Mitt. Common on soil and roots of trees. It distantly resembles Hylocomium splendens which has a different habit of growth and has leaves as smooth as these are harsh. It is found throughout.
2. Th. Philiberti Limpr. The hyaline tips of the stem-leaves give this a distinctive frosty appearance, but otherwise it seems to be delicatulum. Inverness (Macoun); Lake Kej-
imkujik (MSB).
3. Th. recognitum (Hedw.) Lindb. In spite of its name, many do not recognize this as a species. We have, however, a rare form which corresponds to most, if not all, of Grout's description. Colchester (Macoun); Victoria (Nichols): Inverness.
4. Th. scitum (P.B.) Aust. Found by Janet Phillips in Victoria (MSB). I have not seen this species or specimen. The key-character which distinguishes it from abietinum, in Grout's Mosses does not hold in my specimen of abietinum (det. Habeeb) in which one to five papillae are found on the cells of a single leaf.
5. Th. abietinum (Brid.) B. & S. Rare, on rocks. Guysborough (Macoun); Victoria (Nichols); Inverness.
6. Th. minutulum (Hedw.) B. & S. Rare; creeping on damp soil. Shelburne, Hants.
7. Th. microphyllum (Hedw.) Best. Mats of fine green threads which disentangle into pinnate plants. Yarmouth (MSB); Inverness, Kings.
8. Th. virginianum (Brid.) Lindb. On soil. Branch-leaves also acuminate. Kentville, Kings.

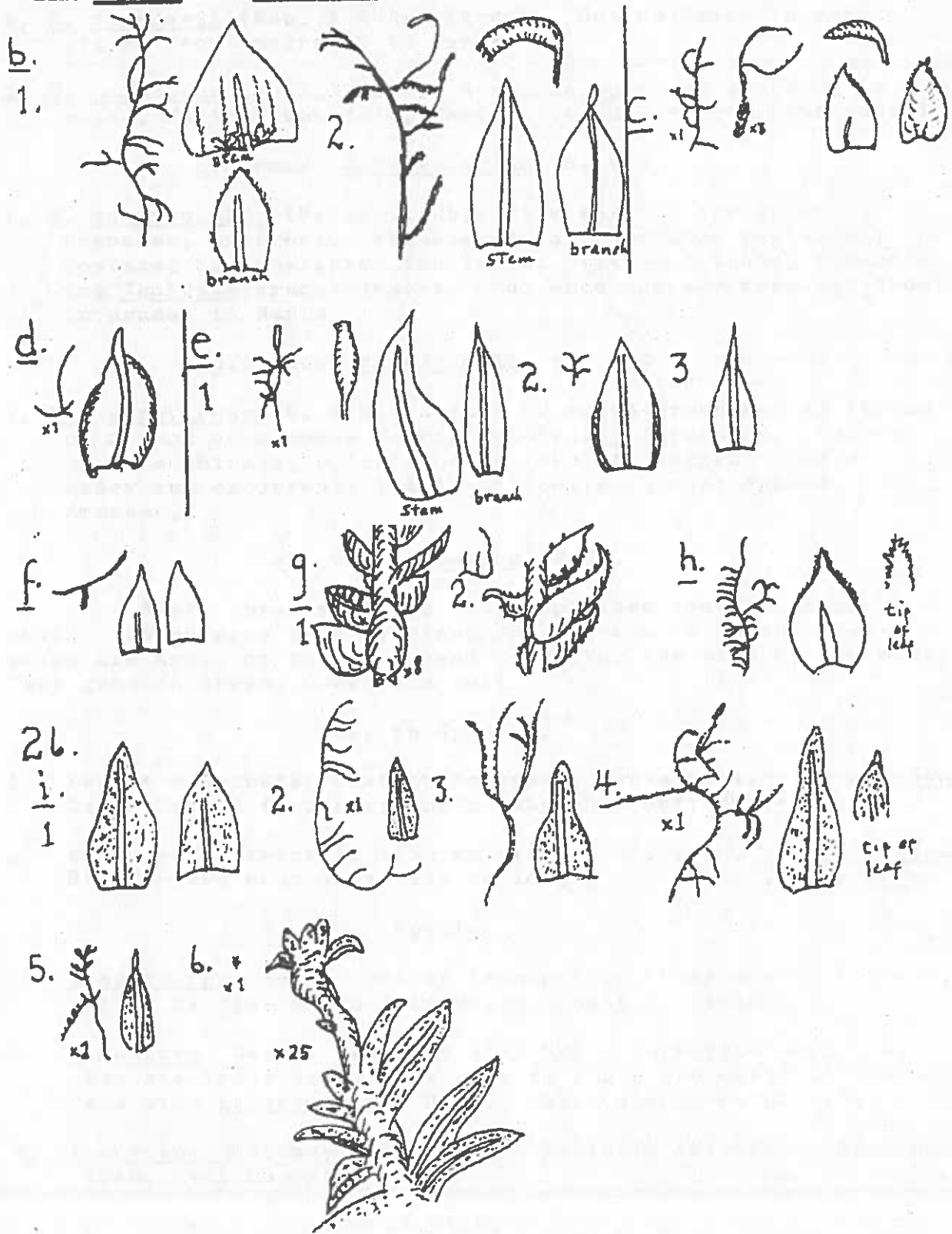
b. Genus Helodium (Sull.) Warnst

These are Thuidiums with smoothish instead of harsh papillose blade-cells and with the abundant paraphyllia attached to the base of stem-leaves.

Key to Species.

1. Pinnate; stem bristling with paraphyllia; leaves slightly papillose. 1. Blandowii
Irregularly pinnate; erect; few paraphyllia; leaves smooth. 2. paludosum

III. Bryales 26. Leskeaceae



Species.

1. H. Blandowii (Web. & Mohr) Warnst. Not uncommon in damp places from Inverness to Hants.
2. H. paludosum (Sull.) Aust. A single specimen standing in water, Martock Mountain, Hants. Capsule curved, horizontal.

c. Genus Heterocladium B. & S.

1. H. squarrosulum (Voit) Lindb. Fine mats of irregular branches, on trees. Stem-leaves are serrate, papillose; costate; branch-leaves imbricate, ovate-acuminate, resembling Thuidium branch-leaves. Not uncommon and reported from Inverness to Hants.

d. Genus Pseudoleskea B. & S.

1. Ps. atrovirens B. & S. A fine brownish-green mat of threads on a rock on a scree of Big Intervale, Inverness. Leaves ovate-acuminate, plicate, with revolute margins; costa heavy and excurrent; 1:1 or 2:1 cells, almost opaque. (det. Andrews.)

e. Genus Leskea Hedw.

Small thready plants with papillose leaves and short cells, the margins usually plane or scarcely revolute. Capsules are erect or nearly so and large for the size of the plant. They grow on trees, rocks and soil.

Key to Species.

1. Leaves acuminate; costa percurrent; cells oval. 3. nervosa
Leaves acute to ovate; costa subpercurrent; cells round. 2
2. Stem-leaves twice as long as wide. 1. polycarpa
Stem-leaves nearly as wide as long 2. obscura

Species.

1. L. polycarpa Hedw. Rather frequent on trees around Windsor. Found by Miss Brown from Musquodoboit to Yarmouth.
2. L. obscura Hedw. Found by Miss Brown in Guysborough. My own specimens from Kings seem to share the critical characters with gracilescens Hedw., which should be plicate.
3. L. nervosa (Schwaegr.) Myrin. Victoria (Nichols); Blomidon (MSB, det. Dupret.)

f. Genus Pterigynandrum Hedw.

1. Pt. filiforme Hedw. Very fine creeping threads on soil or wood. The leaves are ovate-acute, sometimes rather acuminate; papillose on the back; entire or serrulate; costa absent, short-double or short-single; cells rhombic, about 3:1. Some stems have minute leaves between the normal ones. The variation in the species is great. Found throughout the province.

g. Genus Myurella B. & S.

Small, creeping, glaucous-green plants, usually on rocks, rarely on roots. The leaves are short-ovate, concave and papillose.

Key to Species.

1. Leaves bristling with projecting papillae; long slender apiculus. 2. Careyana
- Leaves shortly papillose and shortly apiculate. 1. julacea

Species.

1. M. julacea (Schwaegr.) B. & S. Inverness to Kings. Rare.
2. M. Careyana Sull. Common on gypsum and basic rocks. From Inverness to kings.

h. Genus Thelia Sull.

1. Th. hirtella (Hedw.) Sull. Small patches of green on tree-trunks. The leaves are wide ovate and long acuminate and covered with long and sometimes forked papillae. It is common from Yarmouth to Queens and inland as far as Lake Kejimikujik (MSB).

i. Genus Anomodon Hook. & Tayl.

Plants creeping on tree trunks and rocks. Under magnification they are easily recognized by the opaque leaves with translucent costa, which is found elsewhere only in Thelia and there less definitely.

Key to Species.

1. Minute compact plant, about 3 mm. in length. 6. tristis
- Larger 2

2. Most leaves with long filiform acumen. 5.rostratus
Leaves otherwise 3
3. Frail long threads with short branches; leaves lingulate.
2. minor
Larger 4
4. Creeping on tree trunks; occasional attenuate branches;
leaves lingulate and acute, often with a terminal tooth.
4.attenuatus
Without attenuate branches 5
5. Smallish; a ligulate acumen and expanded auricles.
3. Rugelii
Largest of genus; leaves broad-bladed below, contracting
evenly toward apex. 1.viticulosus

Species.

1. A. viticulosus (Hedw.) Hook & Tayl. On tree- roots. Un-
common. Big Intervale, Inverness (Macoun); Kings.
2. A. minor (P.B.) On rocks. Rare. Halifax (MSB); Kings.
3. A. Rugelii (C.Muell.) Keissl. Like smaller forms of att-
enuatus but without the slender branches; leaves like
minor but rounded at tip and widened to auricles. Anna-
polis (MSB); Kings.
4. A. attenuatus (Hedw.) Hueben. Very common on tree trunks
and occasionally on rocks. From Cape North to Kings.
5. A. rostratus (Hedw.) Schimp. Small and fairly common, chiefly
on rocks. Cape North to Kings.
6. A. tristis (Cesati) Sull. A tiny plant too small to attract
attention but probably also rare. On a tree, Lake Char-
lotte, Halifax (MSB); on sand under pines west of Kent-
ville, Kings.

27. NECKERACEAE

We have only two genera and three species, resembling each other in leaves and cells but very different in habit. The leaves are large and thin, costa absent or faint, cells very slender but not very long.

Key to Genera.

1. Leaves symmetrical, ecostate... a. Neckera
 Leaves cultriform, with faint costa... b. Homalia

2. Most leaves with long, linear acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

3. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

4. Clusters of small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

5. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

6. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

7. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

8. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

9. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

10. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

11. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

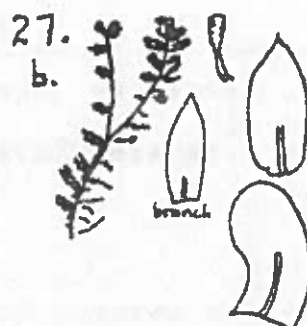
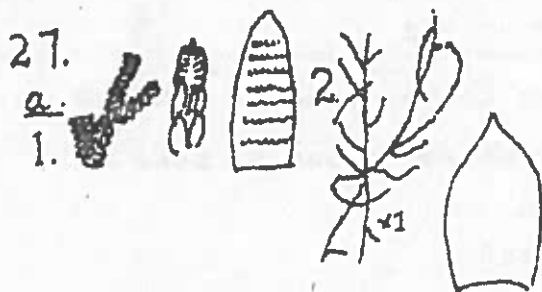
12. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

13. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

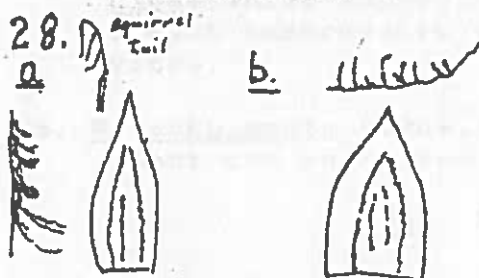
14. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

15. Small, long, linear, acuminate to lanceolate leaves opposite, above and below with small, dark brown, punctate glands.

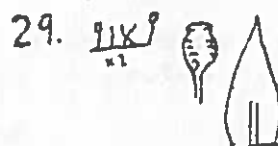
III. Bryales 27. Neckeraceae



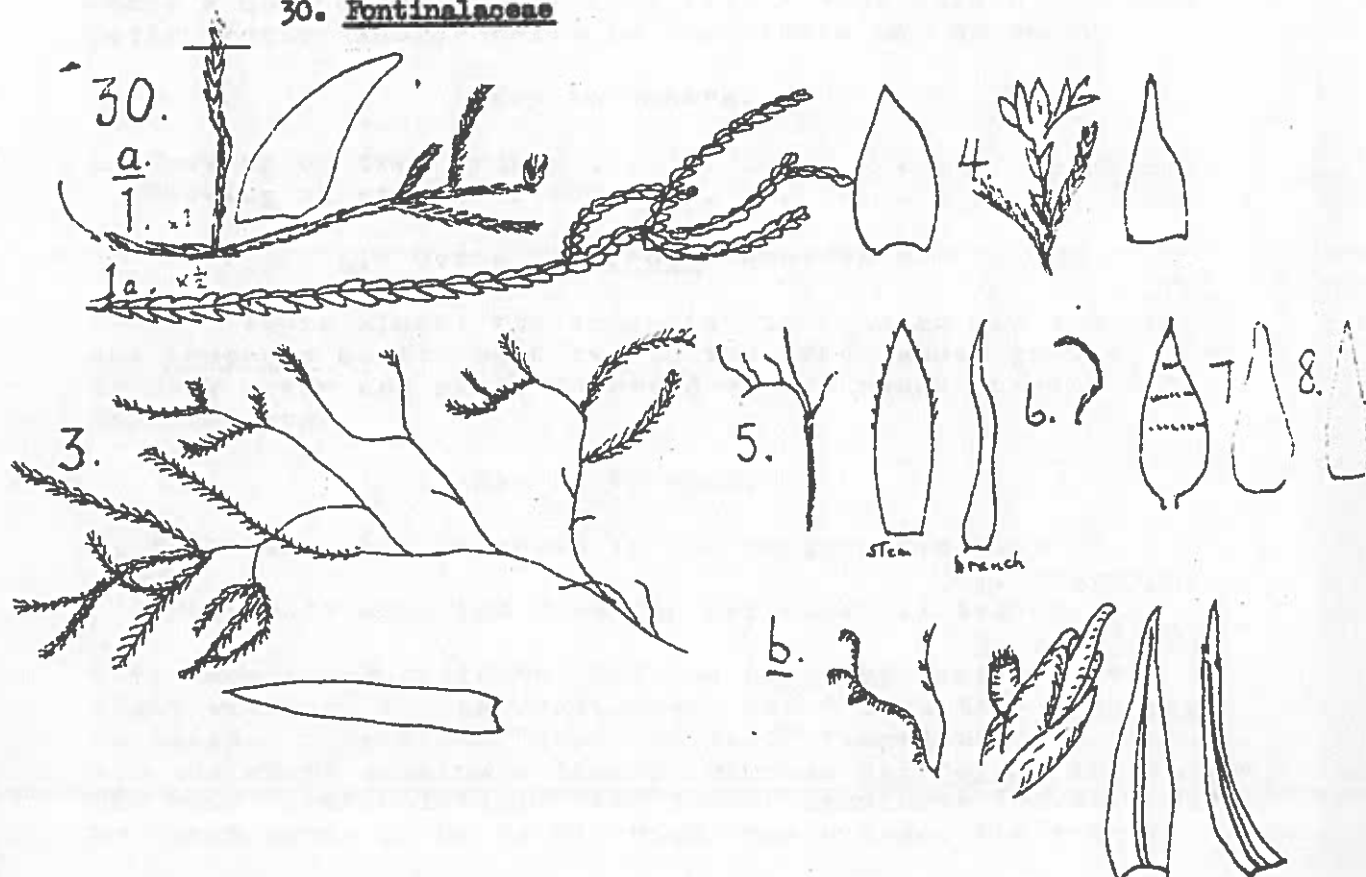
28. Leucodontaceae



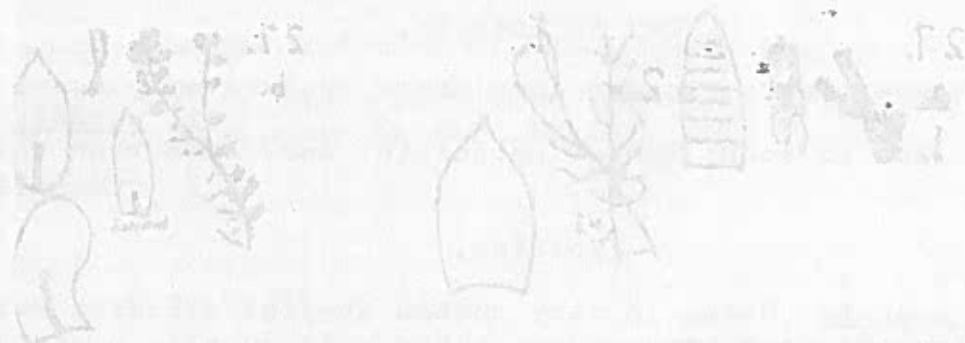
29. Fabroniaceae



30. Fontinalaceae



PL. Populus 77. Populus



28. Populus



30. Populus



a. Genus Neckera Hedw.

Key to Species.

1. On tree trunks; leaves complanate, undulate, glossy.

1. pennata

On wood or rock; leaves apiculate; more stem than branch.

2. complanata

Species.

1. N. pennata Hedw. A very common species standing out in flounces from tree trunks along with Porella platyphyll-oidea which superficially resembles it. The capsules are almost immersed in the branch-tips. Throughout the province.

2. N. complanata (Hedw.) Hueben. This is a more straggly plant and much less common though collected throughout.

28. LEUCODONTACEAE

We have two genera of this family, one very common on trees, the other very rare on stones on the ground. They share a unique pattern of leaf with a wide border of short cells, rather longer cells in the middle and no costa.

Key to Genera.

1. Growing on tree trunks Leucodon
Growing on stones or roots Leptodon

a. Genus Leucodon Schwaegr.

It is almost the exception to find an old elm without Leucodon on its bark two to four feet above ground. It is dark green and grows downward with strands curving out from the tree.

Key to Species.

1. Fruit somewhat immersed in the perichaetial leaves.

1. brachypus

Fruit well exserted from the perichaetial leaves.

2. sciuiroides

(This key sounds definite, but, as Leucodon does not seem to fruit with us, it has drawbacks. Grout says that brachypus is larger, rarely has "squirrel-tail" flagellate branches, and has short-acuminate leaves, whereas sciuiroides is smaller, has many "squirrel-tails" and longer acuminate leaves. With us there seems to be no dividing line between the robust

plants and the depauperate ones, which latter have the characters of sciuroides in proportion to their poverty.)

Species.

1. L. brachypus Brid. Pictou (MacKay); Lake Charlotte (MSB, det. Dupret). Miss Brown says also "Not rare on trees in woods." Windsor (Bartram).

2. L. sciuroides (Hedw.) Schwaegr. Victoria (Nichols); Lake Charlotte (MSB).

b. Genus Leptodon Mohr

1. L. trichomitrium (Hedw.) Mohr. Dark-green moss with erect imbricate branches, creeping over rocks by a spring. Walbrook, Kings.

29. FABRONIACEAE

A southern family of tree-infesting genera.

Genus Anacamptodon Brid.

1. A. splachnoides (Froehl.) Brid. A very small moss of rotten wood, affecting chiefly knotholes in hardwoods. Leaves are ovate-lanceolate acuminate; costa half-way; cells pointed at ends, length 3:1, embedded in heavy walls. The capsule, on a seta of some 5 mm. is urnlike and erect. Cape Breton (Nichols); Halifax (MSB); Hants.

30. FONTINALACEAE

These are true water mosses, almost always completely submerged and, as one would expect, infinitely variable. We have comparatively few species, but even these cause much trouble. I have not attempted to offer more than a simple, and probably misleading, approach to the subject.

Key to Genera.

1. Leaves without costa. a. Fontinalis
Leaves with costa; branches usually hooked at tip. b. Dichelyma

a. Genus Fontinalis Myrin.

Key to Species.

1. Dominant colour - green; large ovate leaves keeled.
 la. antipyretica gigantea
 - green and black; few leaves and many stems like black thread. 3. dalecarlica
 - dirty-green, ovate lanceolate leaves.

4. Novae-Angliae
- yellow to green 2
2. Leaves ovate lanceolate 3
 Leaves linear-lanceolate; stem-leaves dentate.
5. Sullivantii
3. Leaves keeled (folded along centre). .1. antipyretica
 Leaves not keeled 4
4. Two forms of leafage: soft and ovate-lanceolate on new
 growth; narrowly lanceolate on older. 2. biformis
 Without this distinction of leaves 5
5. Alar cells enlarged, often yellow-brown, not forming
 auricles. 6. hypnoides
 Alar cells forming distinct auricles 6
6. Broadly acuminate. 7. Lescurii
 Narrowly acuminate 8. flaccida

Species.

1. F. antipyretica Hedw. Strong plants in flowing water.
 Recorded from Hants northward.
 a. var. gigantea Sull. Very large plants in swift brooks.
 Recorded from Kings northward.
2. F. biformis Sull. Reported from Victoria by Nichols.
3. F. dalecarlica B. & S. Common in swift water throughout.
4. F. Novae-Angliae Sull. The common Fontinalis of still
 water. It has been collected in every county and on
 many islands such as St. Paul and Sable. The varieties
Delamarei (Ren. & Card.) Grout, with imbricate leaves,
 and latifolia Card. with flaccid, broad leaves, are rec-
 ognized forms of a very variable species.
5. F. Sullivantii Lindb. A delicate species with surpris-
 ing stem-leaves. Victoria (Nichols); Hants.
6. F. hypnoides Hartm. Slender and yellowish. Cape Breton
 (Macoun); Kings.
7. F. Lescurii Sull. Very similar to the last. Victoria
 (Nichols).
8. F. flaccida Ren. & Card. Victoria (Nichols). If any
 bryological benefactor should assert that the last three

were all variants of one species, I could offer no objections.

b. Genus Dichelyma Myrin

1. C. capillaceum B. & S. Found by Nichols in Victoria, but all other collections are from Hants and Lunenburg and southward. With its slender, costate and even at times toothed leaves and in its habit of rooting on wood in water it should not be confused with Fontinalis, but, when I collected a specimen, fruiting freely, from eight feet up the trunk of a rotten yellow birch and fifty feet from water, I was confused. This is common in the southwestern part of the province.

Glossary of Technical Terms.

- Acrocarp** - fruiting at tip of stem or branch.
- Acumen** - narrow tip of a leaf.
- Apiculus** - narrow point on leaf or operculum.
- Auricle** - expanded corner where leaf joins stem.
- Awn** - excurrent costa of a leaf, often with bristly teeth.
- Calyptra** - hood covering developing capsule.
- Capsule** - container of spores of fruiting moss.
- Cernuous** - partly drooping.
- Cilia** - minute teeth projecting from segments of inner peristome.
- Circinate** - describes leaf curved in complete circle.
- Cleistocarpous** - capsule splitting to release spores.
- Cline** - species distinct at their extremes but grading into each other.
- Complanate** - lying in the same plane, usually referring to leaves.
- Costa** - midrib of moss leaf.
- Crisping** - curling like wool when dry.
- Cucullate** - of leaves which are folded hoodlike at tip.
- Cultriform** - leaves with edges curved parallel to each other.
- Cuspidate** - having a tooth at the tip.
- Decurrent** - auricle runs down the stem.

- Dendroid - treelike; branches above a branchless stem.
- Denticulate - small-toothed along margin.
- Diploid - having twin sets of chromosomes (leafy part of moss normally has only one set).
- Distichous - leaves arranged in two opposed rows, not complanate.
- Ecostate - lacking costa.
- Emarginate - margin dented in, usually at apex of leaf.
- Emergent - capsule showing beyond perichaetium.
- Excurrent - costa continues beyond end of leaf-blade.
- Falcate - curved like a sickle.
- Flagella - fine thready branches.
- Gemma - leaflike or budlike body for vegetative reproduction.
- Hyaline - transparent; tips of leaves or cells used for water storage.
- Hypophysis - enlarged neck beneath capsules of the Splachnaceae.
- Imbricate - leaves pressed to the stem.
- Immersed - of capsules hidden in perichaetial leaves.
- Incrassate - of cells having very thick walls.
- Lacerate - edge of leaf as though torn or eroded.
- Lamella - thin fin of leaf along costa.
- Lanceolate - narrower than ovate.
- Ligulate - strap-shaped.
- Lingulate - wider than ligulate but sides still nearly parallel.

- Mitrate - symmetric calyptra split at opposite sides.
- Operculum - stopper of the mouth of capsule.
- Ovate - more or less oval in outline.
- Papilla - knoblike projection of the wall of a cell.
- Percurrent - costa reaches tip of leaf.
- Perichaetium - leafy organization surrounding fruiting parts.
- Peristome - toothed guards of the mouth of capsule.
- Pinnate - herring-bone pattern of branching.
- Pleurocarp - fruiting from special side-branches.
- Plicate - with special folds along blade of leaf.
- Propagula - same as gemmae.
- Protonema - alga-like green threads which spring from
moss spore.
- Pseudopodium - stemlike growth carrying gemmae on top.
- Pyriform - pear-shaped.
- Quadrata - more or less square.
- Radicles - rootlets.
- Recurved - turned backwards.
- Revolute - rolled backward; thickened edge of leaf.
- Secund - when groups of leaves are bent in the same
direction.
- Serrate - jagged edge, usually resulting from protruding
cells.
- Serrulate - serrate but less pronounced.

- Sessile** - without stem.
- Seta** - stem supporting capsule.
- Sinuate** - undulant margin.
- Spatulate** - of leaves widening towards tip.
- Striate** - neatly furrowed.
- Strumose** - of capsules showing Adam's-apple.
- Subula** - very fine point.
- Sulcate** - irregularly furrowed.
- Terete** - smoothly cylindrical.
- Tomentum** - short radicles felting the stem.
- Urn** - spore-containing part of capsule.
- Urn-shaped** - like an inverted bell, widest at mouth.
- Ventral** - the upperside of leaf.

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