

THE FLORA of NOVA SCOTIA

BY

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ABSTRACT

The "Flora of Nova Scotia" treats, with the exception of the grasses, all the vascular plants of the province. These comprise 1202 species, 222 additional varieties, and 72 forms. If the grasses are added, a total of 1323 species, 255 varieties and 100 forms are present.

The introduction discusses the physical background and climate, the history of our knowledge of the flora, the main herbaria and literature, and the general distribution of the plants.

The region shows three main physiographic areas: the Atlantic Upland or south slope, composed of resistant slates, quartzites and granites; the true uplands along the northern length of the province which are composed of igneous basalt, syenites and granites; and the lowlands carved from the less-resistant shales, sandstones, limestones and gypsums. Botanically, Nova Scotia is on the margins of the hemlock-white pine northern hardwood region and the boreal evergreen forest. The hardwood forests are best developed along the north uplands; pines are common on the lowlands; and the evergreen forest is dominant along the Atlantic slope and eastward in Cape Breton.

The total flora is divided into six main types of plants according to their general distribution; one, plants of a wide southern or western Alleghenian, Hudsonian or Canadian range; two, plants mostly northern in range, found in Cape Breton or on the coastal headlands; three plants found predominately in southwestern N. S. and for the most part related to the coastal flora further south; fourth, isolated plants closely related to the European flora; five, endemic plants; and six, introduced weeds and escapes. Lists are given for each of these types and the local distribution discussed.

The early knowledge of the flora depended largely upon the work of the local botanists and the Dominion Botanist, John Macoun. This was greatly augmented later by the collections made by the Gray Herbarium Expedition to southwestern N. S. and to a limited extent elsewhere. Numerous collections exist. The principal ones are at the Gray Herbarium, in the National Herbarium at Ottawa, and at Acadia University.

The main part of the treatment includes keys to the families, genera, species and forms; and the general habitat, range and abundance of each is noted. 177 plates are included, illustrating about 700 plants. 127 dot maps show the distribution of the more interesting species.

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INTRODUCTION

The aim of this work is to give a list of the native and introduced plants growing without cultivation in the province, to bring up to date the nomenclature, and to provide a means of identification for the various species, varieties and forms that have been found in the region.

The order of the families is that used in Gray's *New Manual of Botany*, edition 7; and, with the exception of the ferns, which are arranged according to the order in "The Ferns of Nova Scotia" (Roland, 1941), the genera are likewise placed in the order found in that treatment. The grasses have been omitted, since they have been treated in a previous publication (Dore and Roland, 1942).

The International Botanical Rules are followed in the nomenclature. Specific or subspecific names derived from proper nouns are capitalized. Abbreviations of authors follow that of Gray's *Manual* or of recent treatments. The general ranges of the plants have been obtained from recent monographs or floras.

Keys to the families, genera and species are included. Recent monographs have been freely used and references to such monographs or discussions of nomenclature are included with the discussion of the plants concerned. Descriptions of families and genera are excluded because of the extra space involved and their general availability in other publications. Keys to the species and sub-specific forms are, however, relatively detailed.

Maps showing the ranges of the various species were compiled from herbarium specimens and from reports which were considered authentic. Doubtful or unusual records have been discarded until further study is made. In general those species which have been mapped are those which show an unusual or interesting range or are ones which are not well known. Since most of the roads are near the coast, few plants have been collected in the center of the province and the ranges shown are usually incomplete in this respect. The region along the Atlantic Coast from Halifax to northern Cape Breton will likewise show many gaps. The plant distribution in New Brunswick, Prince Edward Island and

the Magdalen Islands is not worked out in detail but is shown only in so far as the data were easily available when the Nova Scotian plants were checked.

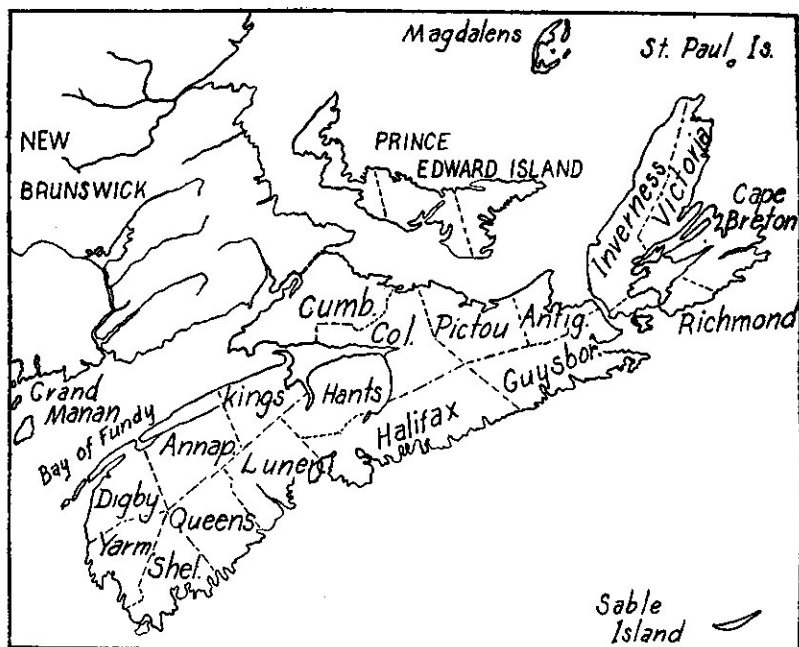
Since this report has been in progress a number of years I wish to express my thanks to the Department of Agriculture of Nova Scotia for their continued support. The work also covers in part the requirements for the degree of Doctor of Philosophy from the University of Wisconsin. A research fellowship from the Wisconsin Research Foundation has made possible an extra year's study to complete the library and herbarium work.

I here express my thanks particularly to Dr. N. C. Fassett of the University of Wisconsin; and to Mr. C. A. Weatherby of Gray Herbarium who has helped me in many ways and placed data on the plants of Grand Manan at my disposal.

The curators of the various herbaria have freely placed at my disposal the Nova Scotian collections. Many collectors in the province have given me data or shown me collections. Mr. W. G. Dore of Dalhousie University and Mr. Rundall Lewis of the Plant Pathology Station at Kentville have carried on much field work; and Mr. Eville Gorham of Dalhousie University has assisted in working up the Junceaee.

THE PHYSICAL BACKGROUND

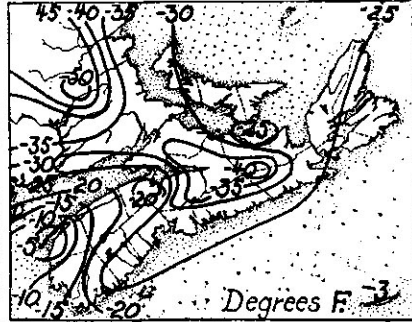
Nova Scotia, the most eastern of the provinces of Canada, lies between 43° and 47° north latitude with the axis running in a general north-east south-west direction. It has a length of about 340 miles and an average width of 50 miles; it consists of a peninsula joined to the mainland by the low swampy Isthmus of Chignecto, and the Island of Cape Breton separated from the eastern end of the peninsula by the narrow Strait of Canso. Two small islands, extensively explored botanically, lie off Cape Breton. St. Paul Island is a few miles north of the northern tip; and Sable Island, a narrow sandy bar 20 miles long, is one hundred miles to the southward. The province is divided into 18 counties as shown in map A.



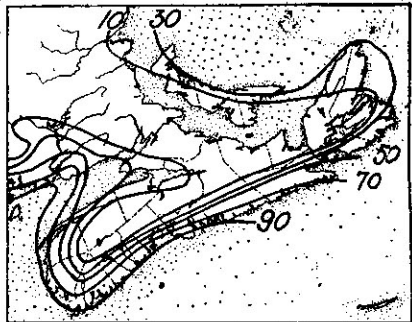
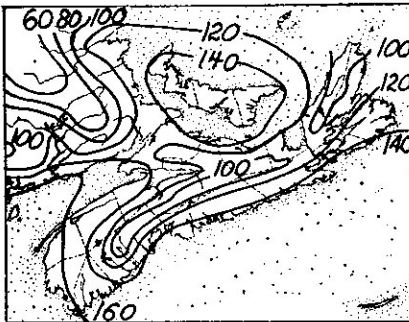
Map A.—Map of Nova Scotia showing the counties.

Geologically the province is the up-tilted and eroded surface of an old Cretaceous peneplain. This dips below the surface of the Atlantic Ocean to produce the drowned and very irregular coast-line, and raises gradually and evenly to the northward to attain in the highlands of northern Cape Breton and southern New Brunswick a height of 1200 feet. The weaker rocks and structures of the northern area have worn away so that the province, which is flat, sterile and poorly-drained along the Atlantic Coast, becomes increasingly hilly and irregular inland.

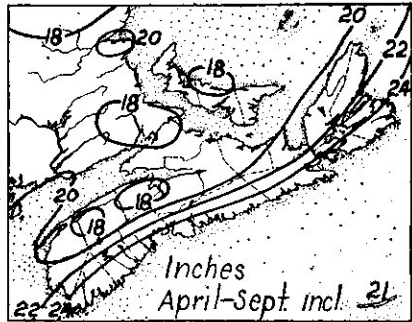
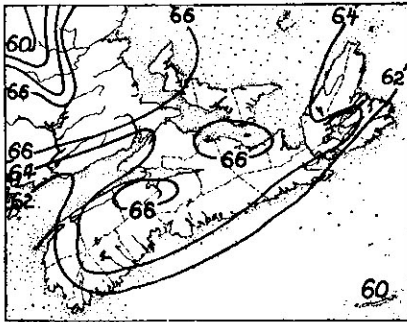
Map B shows the main physiographic areas of the province. The unshaded area comprising nearly the southern half of the area is called the Atlantic Upland. This is composed of very resistant rocks, slates, quartzites and granites and it is not essentially an upland but rather gently rises from sea-level at the southern edge to a height of 100 to 500 feet at its northern boundary. The western half of this upland has the three main types of rocks in about equal proportions, with the areas of slate appearing in southern Yarmouth, central Queens and in Lunenburg counties while



B. Physiographic Regions C. Extreme Low temp.



D. Frost-free Days E. Foggy Days per Year



F. Mean Temperature G. Summer Rainfall

Map B. Physiographic regions, with explanation in the text. Maps C-G. Climatic data, after Putnam, courtesy of the Canadian Geographic Journal.

the eastern half is mainly granites and quartzites. The topography is of slight relief, and innumerable lakes, streams, bogs, barrens and stillwaters occur.

The shaded areas comprise the true uplands of the province. The long range, or North Mountain, from Kings County to Digby County, is composed of basalt or trap rock and it gradually falls from a height of nearly 600 feet at its eastern end until it dips beneath the sea at the southern end of Digby Neck. From western Cumberland County to northern Cape Breton occur ranges of hills and highlands composed of igneous rocks, syenites, diorites, and granites. Those occurring from Cumberland County to Pictou County, known as the Cobequid Mountains, rise to 1000 feet and are covered mostly with deciduous forest; the broad plateaus of northern Cape Breton, often attaining a height of 1200 feet, have a much poorer drainage, a more severe climate and a shorter growing season, and are covered with bogs, swamps, and coniferous trees.

The vertically hatched areas are lowlands of Carboniferous to Triassic age very diverse in character. The Annapolis Valley from Digby County to Kings County is carved from Triassic sandstones; the northern and eastern lowlands have various mixtures of sandstones, shales, conglomerates, limestones and gypsum. Extensive intervals occur; deep valleys and rugged cliffs are found next to the uplands; and lakes and ponds are relatively few.

The climatic data given in maps C to G are taken from Putnam (1940). The southwestern part of the province shows a longer frost-free period, lower July temperatures, more foggy days per year, and a higher minimum winter temperature than the other regions. The Island of Cape Breton differs markedly in having a shorter growing season. The temperature and the number of fog-free days, of the northern region at least, are also low throughout the year.

The soils of the province have not been studied in detail. Although the region has been wholly glaciated they show close correlation with the underlying rocks. The soils of the granitic and quartzite areas are thin and rocky. Extensive sand areas occur in the Annapolis Valley and in Cumberland County. The undulating or hilly areas are usually well-drained with deep soils; but much of the lowlands of northern and eastern Nova Scotia have soils heavy in texture and of poor drainage. Near the coast extensive peat bogs and swamps occur and raised Sphagnum bogs are common in Guysborough County and in Cape Breton.

HISTORICAL ASPECTS AND HERBARIA

The local history of our knowledge of the flora of Nova Scotia may properly be started when the first number of the Transactions of the N.S. Institute of Science was published in 1863. Before this time there had been scattered lists, published or unpublished, and a book on the wild flowers of the province had been written by Maria Morris and illustrated by twelve colored plates, but no comprehensive work on the plants had been undertaken. The publication of the Transactions gave, for the first time, a medium of publication which would bring together the scattered information and place it in a form which would later be readily available for reference.

At about this same time a number of workers in different parts of the province began to make systematic collections of the plants. Dr. Howe collected at Windsor; Dr. A. H. MacKay worked in the neighborhood of Pictou; Dr. A. W. H. Lindsay of Halifax collected extensively in the eastern part of the province; and the Rev. E. H. Ball made numerous collections at various places where he held pastorates. Many of these collections are still preserved in the Provincial Museum at Halifax. In general they consist of the common plants of the province, usually correctly named, but in some cases with names attached of plants now known not to occur or to be rare in the province.

The results of this early work were gathered together by Lindsay (1877) to form his Catalogue of the Flora of Nova Scotia, published in the Transactions of the Institute of Science; this has remained until today as the only attempt to bring together a comprehensive list of the plants of the province.

Most of the papers following this catalogue have been lists of plants collected in scattered localities throughout the province or they have been notes upon rare or unusual plants. Howe, the following year, made a list of additions to Lindsay's list; Lawson (1884, 1890) notes the occurrence of other rare plants; Campbell, (1885, 1886) lists the plants found in the vicinity of Truro; Cox (1894) likewise gives a list from Shelburne; Robinson (1903, 1907) notes plants collected in eastern Nova Scotia, and especially intervale plants; Fowler (1907) reported on the plants of Canso; Barbour

(1908) reviews the flora of McNab's Island in Halifax Harbour; and Prest (1908) discusses the edible plants of the province. Many of the discoveries of these early botanists, as well as the numerous collections from northern and eastern Nova Scotia of John Macoun himself, were reported or listed in the various volumes of Macoun's Catalogue of Canadian Plants which appeared between the years 1883 and 1902.

The ferns were perhaps the most intensively studied. Rev. E. H. Ball (1876) early studied this group and his information was later supplemented by the work of Lawson. Lawson's Fern Flora of Canada, printed in Halifax in 1889, was used extensively in the common schools of the province.

Two ecological works published during this period may also be mentioned since they add to the distributional knowledge of the plants. These were the only attempts to study the vegetation instead of the individual species, and were based on the successional concepts developed by Cowles in his study of the vegetation about Lake Michigan. Ganong (1903) discusses in detail the vegetation about the head of the Bay of Fundy, the ecological factors, and the various plant associations of the salt and dyked marshes to be found in that region. The short paper by Transeau (1909) is a study of the littoral vegetation of the rocky coast at the southern end of the province.

By this time, 1907, the plants of Nova Scotia as a whole were still imperfectly known, and the enthusiasm of the earlier workers had largely died down. To be sure, the repeated visits of the Dominion Botanist, John Macoun, to the province had resulted in extensive collections being made of the plants of the northern and eastern parts of the province, but the flora of the southwestern counties was almost entirely unknown. Little collecting had been done between Halifax and northern Cape Breton and many other counties were represented by only occasional specimens. Plants now known to be dominant or common over much of the western area of the province were discarded or believed to be rare. The grasses and sedges were very imperfectly known and many other groups were poorly collected.

The second period in this history includes the twenty years following the publication of the seventh edition of Gray's Manual in 1907. During this period the plants of the province were studied mostly by outside workers and

few additions were made to the local herbaria. Several publications gave a much more comprehensive picture of the flora and vegetation, and laid a firm foundation for future work. Fernow, Howe and White were called in to study the forest conditions of the province. The vegetation of northern Cape Breton was studied in detail by Nichols (1918) and this resulted in one of the most important ecological studies of any area in northeastern North America, as well as an increased knowledge of the flora in general. St. John (1921) studied the flora of Sable Island, and reviewed the earlier collections made by Macoun and Gussow; and the reports of Fernald (1921, 1922) of the Gray Herbarium Expedition to southwestern Nova Scotia are indispensable to anyone studying the plants of the province. The study of the estuarine plants by Fassett carried on during this period, although it does not deal in much detail with the plants of Nova Scotia, gives a further background to our knowledge of plant distribution.

From 1927 to the present time the local botanists have been mainly occupied in enlarging the herbaria in the province and in gaining a more adequate knowledge of the distribution of the plants. Most of this work has not been published; but Perry (1931) describes the vascular flora of St. Paul Island in northern Cape Breton, and the studies of Weatherby (1942) have enlarged our knowledge of a little-known region in central Queens County. During this same period the plants of north-eastern North America in general have been intensively studied, and practically no group of plants is present that has not been recently revised or monographed.

The geographical setting of the flora and its relation to that of other regions is given by Fernald (1918) and further enlarged in his report in 1921. The distribution of many of the northern plants and their bearing on the problem of glaciation was discussed in 1925 in his paper on "The persistence of plants in unglaciated areas of boreal America."

The earlier collections of Nova Scotian plants exist mainly in the Provincial Museum at Halifax. The collections made by Dr. Howe at Windsor, mostly between the years 1862 and 1866, are found here; as are also the numerous col-

lections of E. H. Ball from Springhill, Westville, Mahone Bay and other localities. The Lindsay collection, upon which many of the reports in his catalogue are based, comprise eight drawers of plants. These are unmounted between single sheets of the N.S. Journal of Agriculture and were collected mostly between 1869 and 1873. The Museum has also a duplicate set of the plants collected by C. D. Howe and W. F. Lang in Nova Scotia and Newfoundland during the summer of 1901.

The most representative collection exists at the Gray Herbarium, Harvard University. This is composed of the extensive collections made by the Gray Herbarium Expedition to the province in the summers of 1920 and 1921. It also includes duplicate sets made by Howe and Lang, by Fowler at Canso in 1901, by C. A. Hamilton at Boylston, Guysborough County in the 1890's, and many of the collections of Macoun. Harold St. John collected in Pictou County in 1913, and on Sable Island in the same year. Many of Nichols' collections from northern Cape Breton, obtained mainly during the summers of 1914 and 1915, are here, as are also J. G. Jack's collections of woody plants made in the province in 1924. Other more limited collections were made by botanists who made shorter visits to the province.

In addition to the Nova Scotian collections, others from surrounding areas are shown upon the distributional maps. Thus, collections made by Fernald, Bartram, Long and St. John in Prince Edward Island in 1912, and by Macoun in 1888, give a representative sample of the flora of that province. Likewise collections by Fernald, Long and St. John, supplemented later by the work of Frere Victorin and others of the Botanical Institute of the University of Montreal, were seen for the Magdalen Islands. F. Tracey Hubbard made extensive collections at Shediac Cape, N.B. during the summer of 1914; Mr. C. A. and Una Weatherby repeatedly visited the Island of Grand Manan and compiled information of the plants; and S. F. Blake collected on the Gulf of St. Lawrence coast of New Brunswick.

While the Gray Herbarium is especially rich in the plants of southwestern Nova Scotia, the National Herbarium at Ottawa contains the best representation of the plants of

the eastern region. These are mainly the collections of John Macoun, but comprise also the plants collected by Jacques Rousseau in eastern Halifax County and Guysborough. Duplicates of many plants of the Gray Herbarium Expedition are found here, so that in general there is a good representation of the plants of this province. The weed flora is best represented by the many collections made by Herbert Groh and J. Adams, in the herbarium of the Central Experimental Farm, Ottawa.

The best and most extensive herbarium in the province itself is at Acadia University. This was built up mainly by the efforts of Drs. H. G. Perry and M. V. Roscoe and their students, of whom might be mentioned in particular A. E. Longley and R. W. Ward. A set of the estuarine plants of northeastern North America collected by Fassett and the herbarium of Dr. G. U. Hay of New Brunswick are found here. The Laboratory of Plant Pathology at the Kentville Experimental Station has a representative collection consisting mainly of plants found in Kings County, but also containing many sheets from other parts of the province. For the north-central counties the best collection is at the Agricultural College, Truro. This is composed in large part of the plants collected by A. R. Prince and C. E. Atwood between 1925 and 1930., and the collections made by the author since that time. The main collections of grasses and sedges have been made by W. G. Dore of Dalhousie University and are in the herbarium of that institution or at the Central Experimental Farm, Ottawa.

Thus in general the flora is becoming fairly well known and extensive collections are being built up. Unfortunately for local botanists, however, the more valuable ones are to be found outside the province. Particular groups of plants, and the variation within individual species and their ecological variation on the other hand, have been little studied. Complex groups like *Oenothera*, *Rubus*, *Crataegus*, *Agrostis* and *Aster* offer much ground for investigation, and certain areas of the province are virtually unstudied. Distributional maps are thus often incomplete, and the central part of the province and the eastern Atlantic region in particular are yet to be covered in a systematic manner.

THE FLORA OF THE REGION

Botanically, Nova Scotia lies within the hemlock-white-pine-northern hardwood region of eastern North America (Nichols, 1935). The dominant trees are the hemlock, sugar maple, beech, yellow birch, white and red pine, white ash, red and white spruce, balsam fir and red maple. Sugar maple is found on the better well-drained soils, beech on the drier ridges, and hemlock and yellow birch on lower ground or on more poorly-drained soils. Sandy soils formerly had good stands of pine. Red maple is found in swampy areas or near lake borders. Poorly-drained areas or exposed locations of the northern plateaus or the Atlantic Upland have a dominant vegetation of balsam fir and red spruce, while larch and black spruce predominate in bogs and swamps. In general, the hardwoods are more common in the northern half of the province, while the spruces, fir and red maple are dominant in the southern and eastern regions. Eastward towards Cape Breton, and to some extent along the Bay of Fundy, white birch, fir and mountain ash increase in amount. Basswood, silver maple and butternut have never penetrated into Nova Scotia, although they are found in central and southern New Brunswick. White cedar is very local; jack pine is found only on the poorest soils and originally in small amounts.

The vascular flora of Nova Scotia consists of 1323 species, 255 additional varieties and 100 forms. Of these, 368 species and 26 varieties are introduced plants. The total flora may be divided roughly into six main types of plants: one, plants of a wide southern or western Alleghenian, Canadian or Hudsonian range; two, plants mostly northern in range found mostly in Cape Breton or on the coastal headlands; three, plants found predominantly in southwestern Nova Scotia and related to the flora found near the coast further south, or in a few cases of a more general inland range; four, plants related to the European flora, rare or unknown westward; five, endemic species or varieties; and six, introduced plants. The salt marsh plants, which will be discussed separately, show much the same general divisions.

1. PLANTS OF ALLEGHENIAN, CANADIAN OR HUDSONIAN RANGE.

Plants that show an affinity to the Alleghenian flora are mainly plants of deciduous woods. Consequently they are found in, and are often restricted to, the northern part of the province from Annapolis County to Cape Breton in the region of rich woodlands or intervalles. Some, like *Allium tricoccum* or *Caulophyllum thalictroides* are very local; others are widespread and general. A few are rare or scattered on the intervalles of central Nova Scotia, and become general only along the flood-plains along the rivers of northern Cape Breton. *Caltha palustris*, for example, is luxuriant on some of the intervalles of Cape Breton, but only an unverified report of it exists for the peninsula. Characteristic plants of this southern range which are confined mainly to the northern half of the province are listed below.

<i>Adiantum pedatum</i>	<i>Caulophyllum thalictroides</i>
<i>Athyrium thelypteroides</i>	<i>Sanguinaria canadensis</i>
<i>Botrychium virginianum</i>	<i>Dicentra Cucullaria</i>
<i>Sparganium eurycarpum</i>	<i>Dentaria diphylla</i>
<i>Glyceria melicaria</i>	<i>Tiarella cordifolia</i>
<i>Hystrix patula</i>	<i>Desmodium acuminatum</i>
<i>Carex scabrata</i>	<i>Desmodium canadense</i>
<i>Spirodela polyrhiza</i>	<i>Impatiens pallida</i>
<i>Lemna trisulca</i>	<i>Viola pensylvanica</i>
<i>Uvularia sessilifolia</i>	<i>Circaea latifolia</i>
<i>Allium tricoccum</i>	<i>Aralia racemosa</i>
<i>Lilium canadense</i>	<i>Panax trifolium</i>
<i>Erythronium americanum</i>	<i>Sanicula marilandica</i>
<i>Polygonatum pubescens</i>	<i>Sanicula gregaria</i>
<i>Trillium erectum</i>	<i>Osmorhiza longistylis</i>
<i>Trillium cernuum</i>	<i>Osmorhiza Claytoni</i>
<i>Ostrya virginiana</i>	<i>Apocynum sibiricum</i>
<i>Laportea canadensis</i>	<i>Verbena hastata</i>
<i>Polygonum arifolium</i>	<i>Mimulus ringens</i>
<i>Ranunculus recurvatus</i>	<i>Veronica americana</i>
<i>Claytoniana caroliniana</i>	<i>Solidago flexicaulis</i>
<i>Hepatica americana</i>	<i>Bidens discoidea</i>
<i>Caltha palustris</i>	

Other plants of a more distinctly Canadian range across the continent often show much the same distribution in the province and are usually found in similar habitats. The great majority, however, are those of general distribution such as the spruces, poplars and birches. Many of the herbaceous plants are likewise general throughout; and plants like *Clintonia*, twin-flower, blueberries, cranberries and many of the goldenrods and asters are found everywhere. Plants of this group which are restricted to the northern part of the province are:

<i>Pteretis pensylvanica</i>	<i>Ribes lacustre</i>
<i>Botrychium matricariaefolium</i>	<i>Ribes triste</i>
<i>Equisetum scirpoides</i>	<i>Potentilla palustris</i>
<i>Sagittaria cuneata</i>	<i>Geum macrophyllum</i>
<i>Poa saltuensis</i>	<i>Geum laciniatum</i>
<i>Alopecurus aequalis</i>	<i>Geranium Robertianum</i>
<i>Milium effusum</i>	<i>Rhamnus alnifolia</i>
<i>Scirpus rubrotinctus</i>	<i>Viola Selkirkii</i>
<i>Carex disperma</i>	<i>Circaea quadrisulcata</i>
<i>Carex diandra</i>	<i>Cicuta bulbifera</i>
<i>Carex leptalea</i>	<i>Cornus stolonifera</i>
<i>Carex aurea</i>	<i>Cornus rugosa</i>
<i>Carex retrorsa</i>	<i>Lysimachia thyrsiflora</i>
<i>Habenaria hyperborea</i>	<i>Fraxinus nigra</i>
<i>Listera convallarioides</i>	<i>Menyanthes trifoliata</i>
<i>Spiranthes Romanzoffiana</i>	<i>Satureja vulgaris</i>
<i>Polygonum amphibium</i>	<i>Mimulus moschatus</i>
<i>Ranunculus Gmelini</i>	<i>Viburnum trilobum</i>
<i>Ranunculus abortivus</i>	<i>Triosteum aurantiacum</i>
<i>Anemone quinquefolia</i>	<i>Bidens cernua</i>

Similarly, the wide-ranging northern plants are usually found wherever bogs, barrens or headlands occur. Plants like *Scirpus cespitosus*, var. *callosus*, *Carex oligosperma*, *Juncus filiformis*, *Rubus Chamaemorus* or *Empetrum nigrum* are found in such localities throughout the province. A small group, however, are restricted to the northern part of the province where they may be found on heavy clay soils, or in swamps or bogs. The following are more or less general in this northern region, but countless others have been collected once or a few times and are commoner northwards in

N.B., P.E.I. or on the Magdalen Islands.

Lycopodium sabinaefolium *Eriophorum viridi-carinatum*
Scirpus hudsonianus *Carex limosa*
Eriophorum Chamissonis

2. NORTHERN PLANTS.

Plants that have their range mostly to the north of Nova Scotia are concentrated mainly in northern Cape Breton. They are much like the preceding group of plants and may be considered as forming a continuous series with them. Plants rare in the province that have been found only in Cape Breton, or in a few cases on Cape Blomidon or at some other local point around the coast, may be represented by the following:

<i>Asplenium viride</i>	<i>Draba norvegica</i>
<i>Woodsia glabella</i>	<i>Saxifraga aizoon</i>
<i>Botrychium Lunaria</i>	<i>Potentilla pectinata</i>
<i>Sparganium hyperboreum</i>	<i>Empetrum atropurpureum</i>
<i>Trisetum spicatum</i>	<i>Empetrum Eamesii</i>
<i>Carex gynocrates</i>	<i>Cornus suecica</i>
<i>Tofieldia glutinosa</i>	<i>Vaccinium uliginosum</i>
<i>Salix cordifolia</i>	<i>Pinguicula vulgaris</i>
<i>Salix Uva-ursi</i>	<i>Lobelia Kalmii</i>
<i>Silene acaulis</i>	<i>Solidago multiradiata</i>
<i>Draba arabisans</i>	<i>Hieracium Robinsonii</i>

Plants rather general in Cape Breton but not found upon the mainland are:

<i>Polystichum Lonchitis</i>	<i>Betula pumila</i>
<i>Dryopteris Filix-mas</i>	<i>Sanguisorba canadensis</i>
<i>Lycopodium Selago</i>	<i>Angelica atropurpureum</i>
<i>Luzula parviflora</i>	<i>Galium kamtschaticum</i>
<i>Goodyera decipiens</i>	<i>Viburnum edule</i>
<i>Populus tacamahacca</i>	<i>Solidago macrophylla</i>

Other plants are common in Cape Breton and are also found throughout much of the northern part of the mainland. These comprise plants like *Asplenium Trichomanes*, *Polystichum Braunii*, *Dryopteris fragrans*, *Schizachne purpurascens* and *Primula mistassinica*. Similarly many of the plants which are found about the coast of northern Cape

Breton are also found at scattered places around the coast of the whole province.

Juniperus communis megistocarpa	Sedum roseum
Juniperus horizontalis	Coelopleurum lucidum
Iris setosa canadensis	Halenia deflexa
Smilacina stellata	Euphrasia Randii
Senecio Pseudo-Arnica	

One other group of plants which shows a more or less localized range in the province may be mentioned here. They are found on or near gypsum. Some are northern plants that here find a habitat free from competition; others also grow in rich woods. *Senecio balsamitae* var. *neoscoticus*, *Erigeron hyssopifolius*, *Sphenopholis intermedia* and *Carex eburnea* are restricted to this habitat. *Cystopteris bulbifera* and *Fragaria vesca* var. *americana* are common here and also are found elsewhere in very rich woods or on calcareous slopes; and such shrubs as *Shepherdia canadensis*, *Potentilla fruticosa* and *Cornus rugosa* are frequently seen.

3. SOUTHWESTERN PLANTS.

The southwestern part of the province has a floral element allied to the plants growing further south along the coast. This region comprises that part of the old Atlantic Upland in the southwestern part of the province, particularly that part of it formed from slates. Roughly this area comprises the part of the province south of a line from Digby Neck east through central Annapolis and Hants Counties to Musquodoboit Harbour in Halifax County, with parts of eastern C.B. and the plateau of northern C.B. showing some similarities in climate and habitats. The plants typical of this region are largely lacking in the quartzite and granitic areas northwards and eastwards.

It is a region of lakes and barrens, of innumerable pond-holes and sloughs, with rather level lands, high humidity and acid soils. Plants which are absent or rare in the northern regions often grow here in great luxuriance and abundance. At the same time many of the heaths, sedges and bog plants of more northern range are also common. This intermingling of northern and southern plants is often very conspicuous.

Fernald (1921) commenting upon Merriam's life zones remarks: "In a region where the Louisianian *Lycopodium inundatum*, var. *Bigelovii* (*L. adpressum*) and the Louisianian and Carolinian *Utricularis subulata* creep among the bases of *Carex Goodenowii* (Greenland and arctic America, south to Nova Scotia and eastern Massachusetts) or of *Juncus filiformis* (Greenland to Massachusetts and the mountains of Pennsylvania); where the Louisianian and Carolinian *Eleocharis tuberculosa* vies with *Carex oligosperma* (Labrador to Great Bear Lake, etc.) for the possession of the edge of a savannah; where the dominant undergrowth in the spruce, fir and larch swamps includes the Louisianian and Carolinian Inkberry, and such a distinctly southern plant as *Solidago Elliottii*; where the Inkberry makes tall thickets with *Ledum groenlandicum* or pushes its branches through the carpet of arctic Crowberry, *Empetrum nigrum*, or the arctic Cloudberry or Bakeapple (*Rubus Chamaemorus*); —in a region where these comminglings are met at every turn, one is certainly perplexed to make Merriam's zones fit the facts."

At least 75 species are either confined to this area of the province or are else abundant here with only scattered stations elsewhere. The following are typical of plants that are local and rare in southwestern Nova Scotia and which are found elsewhere near the coast from southern Maine or Massachusetts southward.

Woodwardia areolata	Polygonum puritanorum
Potamogeton pulcher	Rhexia virginica
Panicum clandestinum	Hydrocotyle umbellata
Panicum dichotomiflorum	Lilaeopsis lineata
Panicum longifolium	Sabatia Kennedyana
Eleocharis tuberculosa	Utricularia inflata
Lachnanthes tinctoria	Eupatorium dubium
Lophiola aurea	

Plants which are general or abundant in this area and very rare or unknown elsewhere in eastern Canada are:

Dryopteris simulata	Sisyrinchium atlanticum
Glyceria obtusa	Ilex glabra
Panicum spretum	Myriophyllum humile
Eleocharis Robinsonii	Proserpinaca pectinatus
Rynchospora glomerata	Vaccinium corymbosum
Carex bullata	Bartonia virginica

Xyris caroliniana
Smilax rotundifolia

Utricularia subulata
Solidago Elliottii

Some of the plants, like *Vaccinium corymbosum*, and to a lesser degree plants like *Cyperus dentatus*, *Eleocharis Smallii*, *Scirpus Longii* and *Utricularia purpurea*, are also found in southern Quebec or extend locally into southwestern New Brunswick. Others like *Symplocarpus foetidus*, *Juncus marginatus*, *Decodon verticillatus* and *Cephalanthus occidentalis* are confined to southwestern Nova Scotia but have a general range far to the westward and of an Alleghanian or Canadian type. On the other hand some of these plants which are abundant in the southwestern region also are scattered northward to the Annapolis Valley or through Cumberland County to P.E.I. Here belongs plants like *Woodwardia virginica*, *Muhlenbergia uniflora*, *Carex cumulata*, *Subularia aquatica*, *Polygonum hydropiperoides* and *Nymphoides lacunosum*.

A few of the plants belonging to this group of the southwest are also found on the plateau of northern Cape Breton or on the southern or south-eastern, area of Newfoundland.

Schizaea pusilla	Elatine minima
Lycopodium inundatum var. Bigelovii	Myriophyllum tenellum
Potamogeton confervoides	Gratiola aurea
Juncus militaris	Bartonia paniculata
	Xyris montana

Still other plants which are related to a more southern coastal flora are general throughout the whole area of the province wherever suitable habitats occur. Here belong *Juncus canadensis*, *Eriocaulon septangulare*, *Lobelia Dortmanna* and *Utricularia cornuta*.

The flora of Sable Island has been treated in detail by Harold St. John. In general it is an attenuated flora of mostly herbaceous plants with a few low creeping shrubs and consisting of plants capable of existing in open situations. It does not differ greatly from that of the mainland. 147 species, varieties and forms are known, of which St. John divides the native ones into 30% boreal types, 24% Canadian and Alleghanian types, 16% southwestern types, 15% coastal plain species and 7 endemic plants, some of which have since been found on the mainland.

The northern plants are represented by *Juniperus communis* var. *megistocarpa*, *Juniperus horizontalis*, *Smilacina stellata*, *Coelopleurum lucidum*, *Menyanthes trifoliata* and *Senecio Pseudo-Arnica*. The rarer southwestern plants are *Sisyrinchium graminoides*, *Tillaea aquatica*, *Viola primulifolia*, *Bartonia paniculata*, *Gerardia neoscotica* and *Myriophyllum tenellum*. Particularly interesting are three European plants: *Centaurium umbellatum*, *Potamogeton polygonifolius*, and *Juncus bulbosus*. The last two, at least, are also found in southeastern Newfoundland; and *J. bulbosus* reaches Cape Cod. The five endemic varieties are listed below.

4. EUROPEAN PLANTS.

Three European plants localized on Sable Island are mentioned above. Several others are found in eastern Nova Scotia, but the number is much smaller than is found in Newfoundland. *Potentilla procumbens* and *Linum Catharticum* are found in Cape Breton, but it is difficult to know whether they are native or introduced. Similarly *Gnaphalium sylvaticum* shows much the habits of a native plant. Around the coast are several plants that are found in the Baltic Sea or neighboring regions of northern Europe: *Polygonum Raii*, *Polygonum acadiense*, *Polygonum maritimum* and *Atriplex glabriuscula*. The rockweed, *Fucus serratus*, shows much the same distribution. *Ranunculus Flammula* has been found at one place in Yarmouth County; it occurs also in Newfoundland and Europe. The genus *Corema* is also known from Spain; and *Eriocaulon septangulare* is common in western Ireland and Scotland. Many other plants are common to both continents but show no peculiar range.

5. ENDEMIC PLANTS.

Since Nova Scotia is a peninsula the plants are more or less isolated from those of other regions. Further, those of southwestern Nova Scotia are separated by 350 miles of ocean from those on Cape Cod, New Jersey or further south. Consequently it might be expected that many local species or varieties would evolve and that their number would give some idea of how fast the evolution of the plants has pro-

ceeded. Outside of *Rubus* and *Crataegus* only two dubious species and thirteen minor varieties are found. In many cases these varieties are also of uncertain value. The larger part of them are found in the southwestern counties, and five are confined to Sable Island.

Agropyron pungens var. *acadiense*.
Panicum longifolium var. *tusketense*.
Eleocharis tuberculosa forma *pubnicoensis*
Juncus pelocarpus var. *sabulonensis*
Juncus subcaudatus var. *planisepalus*
Pogonia ophioglossoides var. *brachypoda*
Polygonum hydropiperoides var. *digitatum*
Polygonum hydropiperoides var. *psilostachyum*
Lathyrus japonicus var. *retusus*
Epilobium nesophilum var. *sabulonense*
Asclepias incarnata var. *neoscotica*
Gerardia neoscotica
Solidago galetorum
Rudbeckia laciniata var. *gaspereauensis*
Hieracium scabrum var. *leucocaule*

6. INTRODUCED PLANTS

The number of introduced plants in the province is high relative to the total flora. 368 species and 26 varieties, are included here, with several others belonging to the doubtful list. Nova Scotia, since it is a coastal province, has had numerous foreign plants brought in around the ports where they were merely adventive or became locally established. Many of these are probably no longer found and, if further exploration does not rediscover them, they should be relegated to the list of excluded species.

The common weeds are found throughout; others like the mustards and many hawksweeds are still rapidly spreading. Many of the small plants are found mainly as railroad weeds; and numerous plants of European origin are being repeatedly introduced from western America in grains and feeds.

Several species are common in southwestern Nova Scotia and have not spread far outside this region. Here may be mentioned *Sieglingia decumbens*, *Holcus lanatus* and

Alchemilla pratensis. In the eastern part of the province the Ragwort, *Senecio Jacobaea*, has overrun the country. The European Cuckoo Flower, *Cardamine pratensis*, is very common in the Annapolis Valley; other weeds that are rapidly spreading are *Rumex Acetosa*, *Hieracium aurantiacum*, *Sonchus arvensis*, and *Daucus Carota*. In several cases the introduced species and a native very similar variety grow together.

SALT MARSH PLANTS

The plants of the sea-strands and brackish marshes are well-developed, and estuaries and brackish ponds near the coast also often have a characteristic flora. Such plants as *Spartina alterniflora* and *Spartina patens* are common throughout, as is the bulrush *Scirpus paludosus*. *Plantago decipiens*, various species of *Polygonum*, *Suaeda*, *Sarsola*, and *Amaranthus* are all common. In general the plants of the sea-shores show as much diversity in general distribution as do the more inland plants. Many, like *Limonium Nashii* var. *trichogonum*, are common from the Gulf of St. Lawrence south to New Jersey; others, like *Spergularia canadensis*, *Cakile edulenta*, *Ligusticum Scotthicum*, *Glaux maritima* and *Potentilla pacifica* are also common on the West Coast.

A few, already mentioned above, like *Polygonum Raii*, *Atriplex glabriuscula* and *Polygonum acadense* are found about the coast of Europe; and several, like *Scirpus rufus*, have isolated stations westward in James Bay.

A number of the typical salt marsh plants, for example *Scirpus paludosus*, *Atriplex hastata* and *Distichlis spicata* or very similar varieties of them, are common on the brackish or alkaline plains in Western America. A further group, which are confined entirely, or nearly so, to the upper borders of brackish marshes or sea-shores on the Atlantic Coast, are often found in fresh-water or on lake shores around the Great Lakes and westward. A few of these are listed below.

Zannichellia palustris	Spartina pectinata
Potamogeton pectinatus	Carex lacustris
Potamogeton bupleuroides	Juncus Gerardi
Distichlis spicata	Juncus balticus
Phragmites communis	Lathyrus japonicus
Hierochloe odorata	Bidens frondosa anomala

Scirpus Olneyi and *Eleocharis rostellata* are general in southwestern Nova Scotia and are found elsewhere from southern Maine southward; while *Gerardia maritima* and *Iva frutescens* var. *oraria* are known from one and two stations respectively. Similarly, some of the northern plants are found isolated at one or a few stations in the northern part of the province. Estuarine plants of our coast have been studied by Fassett (1928), who visited numerous points in Nova Scotia.

PTERIDOPHYTA FERNS AND THEIR RELATIVES

- a. Stems conspicuously grooved, with conspicuous toothed sheaths at the nodes (Fig. 4, 5). *Equisetaceae* p. 59
- a. Stems not conspicuously grooved, without toothed sheaths.
 - b. Stem very short, corm-like, usually submersed; leaves long, linear, in a rosette; sporangia sunken on the inner faces of the leaf-bases (Fig. 7, a, b). *Isoetaceae* p. 69
 - b. Stem erect or prostrate; leaves scattered; spores not borne in the leaf-bases.
 - c. Leaves small and scale-like, spreading or overlapping, numerous; sporangia in the axils of ordinary or reduced leaves, in a terminal cone, or on the upper part of the plant.
 - d. Plants moss-like, less than 5 cm long; spores of 2 sizes (Fig. 6, d, e). *Selaginellaceae* p. 63
 - d. Plants much larger; spores of one size (Fig. 6, 7). *Lycopodiaceae* p. 63
- c. Leaves (fronds) not scale-like, growing from underground root stocks or on short prostrate or erect stems.
 - e. Sterile blade entire, ovate or else thread-like.
 - f. Plant 1-4 dm high; sterile blade ovate; fertile portion spike-like, unbranched (Fig. 4, g). *Ophioglossum* p. 57
 - f. Plant 4-7 cm high; sterile fronds thread-like, curly; fertile frond with a very short folded blade (Fig. 4, h). *Schizaea* p. 55
 - e. Sterile blades lobed or divided.
 - g. Fertile frond, or portions of it, conspicuously unlike the sterile; sporangia not on the lower surface of green fronds.
 - h. Rootstock obscure; roots fleshy; plants mostly with solitary stems, up to 5 dm high (Fig. 3, h; 4, f). *Botrychium* p. 57
 - h. Rootstock conspicuous, woody; roots fibrous; plants forming large clumps, 5-40 dm high.
 - i. Sporangia exposed in powdery masses; veins of the ultimate divisions forked (Fig. 3, c, f, g). *Osmundaceae* p. 56
 - i. Sporangia enclosed in bead-like or tube-like inrolled segments of the frond; veins unforked or anastomosing (Fig. 1, b, c). *Polypodiaceae* p. 41
 - g. Fertile frond like the sterile; sporangia borne on the lower surface of green fronds. *Polypodiaceae* p. 41

SPERMATOPHYTA SEED PLANTS

SUBDIVISION I. GYMNOSPERMAE "CONIFERS OR EVERGREENS"

- a. Seed formed in cones; trees. *Pinaceae* p. 70

- a. Seed formed in berry-like structures.
- b. Berry blue, of 3-6 fleshy scales, with 1-3 seeds (Fig. 9, g, h).
Juniperus p. 76
- b. Berry bright red, cup-shaped, with one seed. (The sharp point to the leaves together with the long green base adherent to the twig, will separate this species from prostrate young growth of other Gymnosperms (Fig. 9, a).
Taxaceae p. 70

SUBDIVISION II. ANGIOSPERMAE FLOWERING PLANTS

CLASS I. MONOCOTYLEDONEAE

Leaves parallel-veined, (ex. *Trillium*); flower-parts in 3's; herbaceous, (ex. *Smilax*); wood of stem broken up into strands, scattered, not increasing in thickness.

- a. Plants less than 2 cm long without true leaves, floating free in or on the water (Fig. 32, d-f).
Lemnaceae p. 154
- a. Plants much larger, differentiated into stems and leaves.
- b. Perianth absent, or else scale- or bristle-like.
- c. Flowers enclosed, or partly so, by scales; plants grass-like with jointed stems, sheathing leaves and 1-seeded fruits.
- d. Stem hollow, round or flattened; leaf-sheaths usually split; anthers attached by the middle.
Gramineae (not included)
- d. Stems solid, usually more or less triangular, with the leaves in three ranks; leaf-sheaths not split; anthers attached at the base.
Cyperaceae p. 95
- c. Flowers not enclosed nor closely subtended by scales, although sometimes in involucrate heads.
- e. Plants aquatic, mostly submerged, leafy and branching, the upper leaves often floating.
- f. Leaves alternate or opposite; pistils solitary or aggregated into loose cluster, the styles absent or filiform (See also *Vallisneria*, p. 95).
Najadaceae p. 80
- f. Leaves alternate; pistils and nutlets in a round, very compact head; style bases stiff, mostly 1-4 mm long (nearly absent in *S. hyperboreum*) (Fig. 10).
Sparganiaceae p. 77
- e. Plants terrestrial or of marsh habitats, erect.
- g. Leaves petioled, the blades wide and pinnately-veined (Fig. 31).
Araceae p. 152
- g. Leaves linear or sword-shaped; blades parallel-veined.
- h. Flowers in a long spike-like raceme; ovaries 3-6, separating, at least when ripe (Fig. 14, a, b).
Juncaginaceae p. 91
- h. Flowers in dense short spikes, or in heads.
- i. Flowers in dense short spikes, the fruiting spike solitary on the scape.

- j. Pistillate spike erect on the round scape, with the staminate one above it; fruit with downy hairs. *Typhaceae* p. 77
- j. Pistillate spike lateral near the summit of the two-edged scape; fruit naked (Fig. 31, d). *Acorus* p. 152
- i. Flowers clustered or in round heads.
 - k. Head button-like, whitish, solitary at the summit of the scape; roots with prominent cross-markings; leaves basal (Fig. 32, b). *Eriocaulaceae* p. 155
 - k. Head globose, green to brownish, usually several; roots without prominent markings; leaves scattered.
 - l. Flowers dioecious, the staminate and pistillate ones in separate heads; pistils prominent; perianth very small; fruit 1-2-seeded (Fig. 10). *Sparganium* p. 77
 - l. Flowers perfect, with 3 bract-like sepals and 3 similar petals; pistil with 3 carpels and numerous seeds. *Juncaceae* p. 157
- b. Perianth always present, herbaceous or colored, neither scale-like nor bristle-form.
 - m. Pistils numerous in a head or ring (Fig. 14, c-f). *Alismaceae* p. 93
 - m. Pistils 1, compound, with mostly 3 cells.
 - n. Pistil superior or only partly joined to the calyx.
 - o. Stamens 3; plants rush-like; marshes and bogs.
 - p. Flowers in a long loose or spike-like raceme, greenish to greenish-yellow (Fig. 13, e). *Juncaginaceae* p. 91
 - p. Flowers in a dense scaly head, yellow, showy (Fig. 32, c). *Xyridaceae* p. 156
 - o. Stamens 4 or 6; flowers not in scaly heads nor in long slender racemes.
 - q. Plants rush-like; perianth small, greenish to purplish-brown (Fig. 35). *Luzula* p. 166
 - q. Plants not rush-like; flowers mostly showy.
 - r. Perianth woolly, partly joined to the ovary, yellowish. (Fig. 39, d). *Lophiola* p. 178
 - r. Perianth not woolly, not joined to the ovary.
 - s. Flowers tubular, 2 lipped, violet blue, in a thick dense spike subtended by a leafy bract (Fig. 32, a). *Pontederiaceae* p. 156
 - s. Flowers mostly of separate perianth parts, not violet-blue, solitary or in an open inflorescence. *Liliaceae* p. 167
 - n. Pistil inferior.
 - t. Flowers regular or nearly so; stamens 3 or 6.
 - u. Flowers loosely woolly, dingy-yellow; plants rare; stem hairy near the top (Fig. 39, e). *Lachnanthes* p. 177
 - u. Flowers not woolly; stem smooth. *Iridaceae* p. 178
 - t. Flowers very irregular; stamens 1 or 2; lowest placed petal forming a conspicuous lip. *Orchidaceae* p. 180

CLASS 2. DICOTYLEDONAE

Leaves netted-veined; flower-parts mostly in 4's and 5's; wood of stem increasing in thickness; embryo of seed with 2 seed-leaves.

- a. Corolla none; calyx present or absent.
- b. Flowers pistillate and staminate, or perfect, one or both types in catkins or catkin-like heads.
- Plants rough, herbaceous (Fig. 49, a-d). *Urticaceae* p. 214
- Plants either shrubs or trees.
- Fertile flowers 1-3, in a cup or involucre; fruit a nut (Fig. 48, a-c). *Fagaceae* p. 212
- Fertile flowers in catkins or catkin-like heads.
- Ovules many; fruit a many-seeded capsule; seeds hairy-tufted (Fig. 43, 44). *Salicaceae* p. 193
- Ovule one; fruit one-seeded, not hairy-tufted.
- Fertile flowers 2 or 3 at each scale of the catkin; shrubs or trees; leaves not resinous-dotted beneath (Fig. 46, 47). *Betulaceae* p. 205
- Fertile flowers solitary in the axils of the scales; leaves resinous-dotted and often aromatic (Fig. 45). *Myricaceae* p. 204
- b. Flowers not in catkins.
- c. Shrubs or trees.
- Shrubs, less than 3 dm high, low or trailing; leaves evergreen, needle-like (Fig. 80, a, b). *Empetraceae* p. 343
- Shrubs over 1 m high, or trees.
- Leaves silvery-downy and scurfy beneath; fruit a yellowish berry; flowers in early May; shrubs (Fig. 82, f). *Shepherdia* p. 365
- Leaves not silvery-downy beneath.
- Leaves pinnately-compound, the terminal leaflet not lobed.
- Trees; fruit a one-seeded samara. Ash (Fig. 97). *Fraxinus* p. 409
- Shrubs; flowers in a terminal spike; fruit an achene, enclosed in the 4-angled dry calyx-tube (Fig. 74, a). *Sanguisorba* p. 317
- Leaves simple, or if irregularly compound with leaflets then the terminal one lobed.
- Leaves palmately lobed or divided, opposite; fruit of two united winged halves. Maples (Fig. 83). *Aceraceae* p. 348
- Leaves not lobed nor compound, alternate.
- Tree; fruit a single winged nutlet; leaves toothed. Elm (Fig. 48, d, e). *Ulmus* p. 214

Shrubs; fruit a berry.

Flowers pinkish, in late April before leaves appear; calyx lobes 4; leaves entire; fruit reddish (Fig. 82, g). *Daphne* p. 365

Flowers greenish, June; calyx lobes 5; leaves serrate; fruit black (Fig. 82, c-e).

Rhamnus p. 351

c. Herbaceous plants.

Pistils several to many; stamens numerous.

Calyx tube constricted at the mouth, enclosing the pistils, 4-lobed. *Rosaceae* p. 288

Calyx tube not enclosing the pistils. *Ranunculaceae* p. 252

Pistil one.

Plant less than 3 cm high, parasitic and forming witches brooms on the branches of conifers (Fig. 49, e).

Arceuthobium p. 218

Plant larger, not parasitic on conifers.

e. Leaves, at least the lower, deeply lobed or divided.

Plants terrestrial, erect; calyx-tube enclosing the fruit, 4-lobed. *Rosaceae* p. 288

Plants aquatic.

Leaves repeatedly forked, the divisions toothed along one side. *Ceratophyllum* p. 250

Leaves pinnately divided, not toothed along one side of the divisions (Fig. 89). *Haloragidaceae* p. 373

e. Leaves entire or merely toothed, or absent.

f. Leaves reduced to scales or absent.

Leaves small, scale-like, alternate; fresh water habitats (Fig. 89, a). *Myriophyllum* p. 373

Leaves absent; branches opposite, very fleshy; salt marshes (Fig. 54, a). *Salicornia* p. 236

f. Leaves green, prominent.

g. Leaves opposite; pistillate flowers few, in the axils of the leaves.

Staminate flowers separate in terminal interrupted spikes. *Mercurialis* p. 339

Staminate flowers in the same involucre as the pistillate, or else the flowers perfect.

Leaves nearly round, obscurely and crenately lobed (Fig. 66, f). *Chrysosplenium* p. 285

Leaves linear to oblong, entire.

Plants erect; calyx bell-shaped, pinkish, petal-like (Fig. 98, a). *Glaux* p. 409

Plants prostrate; calyx small, greenish.

Plant with milky juice; staminate and pistillate flowers in an urn-shaped involucre; fruit triangular, 3-seeded (Fig. 78, e-f).

Euphorbia p. 340

Plant without milky juice; flowers perfect, generally solitary in the leaf axils.

Ovary superior; fruit minute, flattened, separating into 2 portions; lower leaves linear, sessile (Fig. 79, c,d).

Callitriche p. 342

Ovary inferior; fruit 4-sided with the 4 calyx lobes at the tip; leaves lanceolate, short-petioled (Fig. 88, h).

Ludwigia p. 367

g. Leaves alternate.

Stipules present, sheathing the stem above the nodes; calyx often corolla-like, 4-6 lobed (Fig. 50-52).

Polygonaceae p. 218

Stipules not sheathing the stem, or absent.

Flowers included in a large palmately lobed bract, axillary, both staminate and pistillate kinds.

Acalpha p. 340

Flowers not included in a lobed bract.

Fruit 3-angled and 3-seeded; flowers in a compound inflorescence which is terminal and umbel-like; juice milky.

Euphorbia p. 340

Fruit 1- or 2-seeded; juice not milky.

Plants about 1 dm high, from running rootstocks; ovary inferior, forming a dryish or fleshy berry-like fruit.

Santalaceae p. 217

Plants various, without running rootstocks.

Flowers in a terminal raceme; fruit roundish, flattened, 2-celled and 2-seeded; basal leaves often deeply lobed (Fig. 62, b).

Lepidium p. 269

Flowers crowded in a large inflorescence; fruit a small roundish achene.

Calyx lobes papery; flowers surrounded by scarious bracts (Fig. 53, c).

Amaranthaceae p. 239

Calyx lobes fleshy; bracts absent (Fig. 53-54).

Chenopodiaceae p. 232

a. Corolla and calyx both present.

h. Corolla of separate petals.

i. Stamens numerous, more than 10, and more than twice as many as the petals.

Plants aquatic; leaves mostly floating, large, peltate or deeply cordate (Fig. 57).

Nymphaeaceae p. 250

Plants terrestrial; submersed forms may be found.

Filaments numerous, united into a tube about the pistil; pistils several, united in a ring or to form a several-celled ovary (Fig. 79, e-f)

Malvaceae p. 353

Filaments not united in a tube; pistils not in a ring.

Leaves trumpet-shaped; insectivorous bog plants (Fig. 65, f).

Sarracenia p. 280

Leaves flattened, not trumpet-shaped.

Sepals 2.

Juice milky or colored; petals 4-12, showy.

Papaveraceae p. 262

Juice watery; prostrate garden weed with wedge-shaped, thick fleshy leaves, flowers very small (Fig. 54, e).

Portulaca p. 249

Sepals more than 2.

Leaves punctate with translucent dots, entire, opposite; pistil one (Fig. 84).

Hypericaceae p. 354

Leaves not punctate.

Pistil one, 1-celled, opening by 3-5 valves; low wiry herbs or shrubs; flowers minute, or else large and yellow; leaves simple, narrow.

Cistaceae p. 357

Pistils several; or else one without several valves.

Stamens inserted on the receptacle; calyx usually colored or petal-like; stipules absent.

Ranunculaceae p. 252

Stamens inserted on the calyx or on a raised disk; sepals green; stipules usually present.

Rosaceae p. 288

i. Stamens few, not more than twice the number of petals.

j. Shrubs, trees or vines.

k. Leaves compound or palmately lobed.

Leaves compound.

Leaves pinnately compound.

Leaflets entire, smooth; branches thorny.

Leguminosae p. 323

Leaflets serrate, downy beneath, lanceolate (Fig. 82, a).

Rhus p. 345

Leaves palmately once or twice compound.

Leaflets 3-5, simple; ovary superior.

Leaflets mostly 3; tendrils absent; berries whitish, 1-seeded; short shrubby or low trailing plants (Fig. 82, b).

Rhus p. 345

Leaflets mostly 5; tendrils present; berries becoming purplish, usually 4-seeded; long trailing vines.

Vitaceae p. 352

Leaflets again divided into many divisions; ovary inferior (Fig. 90).

Aralia p. 377

Leaves not compound, palmately lobed only.

Low shrubs; ovary inferior; fruit a berry; currants and gooseberries (Fig. 67).

Ribes p. 286

Tall shrubs or trees; ovary superior; fruit a samara. Maple (Fig. 83).

Aceraceae p. 343

k. Leaves neither lobed nor compound.

Flowers in hanging racemes; introduced thorny shrubs (Fig. 61, a). *Berberis* p. 262

Flowers solitary or in an upright inflorescence.

Flowers very irregular; ovary superior; fruit a capsule, persistent on the heath-like plants. *Ericaceae* p. 389

Flowers regular; fruit few-seeded.

Flowers in late fall; fruit a persistent thick woody capsule; leaves ovate with wavy edges (Fig. 68, a).

Hamamelis p. 288

Flowers in early summer; fruit berry like.

Flowers few or clustered in the leaf-axils; ovary superior.

Stamens alternate with the petals; petals slightly joined at the base, or else linear and free (Fig. 81).

Aquifoliaceae p. 346

Stamens opposite the petals and enclosed by the small rolled petals (Fig. 82). *Rhamnus* p. 351

Flowers numerous in a large flattish inflorescence; ovary inferior.

Petals large and conspicuous; thorns present. Hawthorns (Fig. 69, d, e). *Crataegus* p. 297

Petals minute; thorns absent (Fig 93).

Cornus p. 387

j. Plants herbaceous.

l. Flowers extremely irregular; ovary superior.

Leaves compound.

Leaves but once divided; flowers with flaring lateral petals; fruit a legume. *Leguminosae* p. 323

Leaves very finely divided glaucous beneath, thin; petals not widely flaring (Fig. 61, d, e).

Fumariaceae p. 264

Leaves not compound.

Petals 3; the two lateral sepals petal-like; neither sepals nor petals spurred (Fig. 77, g). *Polygala* p. 339

Petals 2 or 5, the flower conspicuously spurred.

Petals 5, the lower one spurred; flowers on long erect peduncles (Fig. 85-86). *Viola* p. 359

Petals 2, each 2-lobed; lower sepal forming a large spurred sac; flowers pendant on slender pedicels (Fig 79, a, b). *Impatiens* p. 350

i. Flowers regular or but slightly irregular.

m. Leaves deeply lobed, or compound.

n. Leaves compound with 3 leaflets (occasionally 4 or 5).

Leaflets heart-shaped, the margins entire; flowers yellow, or white veined with pink (Fig 77, e, f).

Oxalis p. 336

Leaflets widely lanceolate, coarsely-toothed; flowers whitish.

Plants from a superficial thick root-stock; flowers in a short raceme; pistil superior; petals 4 (Fig. 65, b).

Dentaria p. 279

Plants from a deep, globular tuber; flowers minute, in a simple umbel; pistil inferior; petals 5 (Fig. 87, d).

Panax p. 378

n. Leaves finely divided or deeply lobed.

Plants aquatic; submersed leaves finely divided (Fig. 89).

Haloragidaceae p. 373

Plants terrestrial.

Ovary superior.

Sepals 4; petals 4, white or yellow; leaves pinnately divided.

Cruciferae p. 266

Sepals 5-6; petals 5-6; leaves palmately lobed or divided.

Leaves ternately tricomound, sessile; flowers greenish-yellow; styles 2.

Caulophyllum p. 262

Leaves deeply lobed, petioled; ovary deeply lobed; style conspicuous (Fig. 78, a-c).

Geraniaceae p. 337

Ovary inferior.

Plant a vine with tendrils; leaves palmately lobed (Fig. 110, e).

Cucurbitaceae p. 472

Plant not vine-like, without tendrils; flowers in umbels.

Styles 2; fruit dry, splitting at maturity into two halves.

Umbelliferae p. 378

Styles more than 2; fruit berry-like (Fig. 90).

Araliaceae p. 377

m. Leaves entire, or but shallowly toothed.

o. Leaves basal; plants often tufted.

Leaves provided with long gland-tipped bristles; plants insectivorous (Fig. 65, d, e).

Droseraceae p. 281

Leaves without such bristles; plants not insectivorous.

Plants of salt marshes only; corolla bluish, papery (Fig. 96, a).

Limonium p. 404

Plants never growing on brackish soil; corolla cream to white, not papery.

Ovary 1 or 2-celled; stamens inserted on the calyx; leaves thin; petals delicate, often lobed (Fig. 66, e-g).

Saxifragaceae p. 284

Ovary 5-celled; stamens free from the calyx; leaves leathery; petals fleshy, never lobed.

Ericaceae p. 389

o. Leaves scattered along the stem.

Pistils 3-5; separate; leaves thick and succulent (Fig. 66, a-d). *Crassulaceae* p. 282

Pistil 1; leaves not succulent, or absent.

Leaves reduced to hollow thickened petioles; flowers white, small, in umbels; dwarf creeper.

Lilaeopsis p. 385

Leaves with an expanded blade.

Ovary plainly inferior.

Flowers small, in a close cluster surrounded by usually 4 white or purplish large petal-like bracts (Fig. 93). *Cornus* p. 387

Flowers not surrounded by petal-like bracts.

Leaves orbicular; flowers minute, in umbels; plants trailing; petals and stamens in 5's (Fig. 91, g). *Hydrocotyle* p. 381

Leaves ovate to linear; flowers various, often large, the parts in 2's or 4's.

Leaves bristly along the margin and the 3 prominent veins, opposite, sessile (Fig. 88, g). *Rhexia* p. 366

Leaves not bristly, various.

Onagraceae p. 367

Ovary superior; flowers not in umbels.

Middle and upper stem-leaves alternate.

Leaves thick, leathery, evergreen; plant woody near the base and usually trailing; petals 5; stamens 10. *Ericaceae* p. 389

Leaves not leathery, the upper not evergreen.

Petals 4; sepals 4; stamens 6.

Cruciferae p. 266

Petals 3 or 5; sepals 5; stamens 3 to many. *Cistaceae* p. 357

Middle and upper stem-leaves opposite.

Leaves with punctate translucent dots (Fig. 84). *Hypericaceae* p. 354

Leaves without translucent dots.

Flowers sessile, axillary, the parts in 2's; seeds visible through the capsule wall, with rounded pits; plants small (Fig. 79, h).

Elatinaceae p. 356

Flowers not sessile.

Stamens equal in number to the petals, opposite them and adherent to the petal base.

Sepals 2; stamens 3 or 5; styles

3 or 1 and 3-cleft.

Portulacaceae p. 249

Sepals 5; stamens 4-8; style 1.

Primulaceae p. 404

Stamens not of the same number as the petals, or alternate with them if so.

Flowers whorled in the leaf axils or in an interrupted spike (Fig. 88, a).

Lythraceae p. 365

Flowers not whorled.

Ovules, and usually seeds, several to many in each cell.

Caryophyllaceae p. 239

Ovules and seeds 1 or 2 in each cell (Fig 77, c, d).

Linaceae p. 334

h. Corolla with the petals more or less united.

p. Stamens more numerous than the corolla lobes.

Leaves compound.

Leaves finely divided, thin, glaucous beneath; flowers very irregular (Fig. 61, d, e).

Fumariaceae p. 264

Leaves but once compound.

Flowers regular, bell-like; leaflets 3, obcordate; fruit a capsule (Fig. 77, e, f).

Oxalidaceae p. 336

Flowers very irregular; leaflets not as above except in *Trifolium*; fruit a pod.

Leguminosae p. 323

Leaves simple, sometimes deeply lobed palmately.

Filaments very numerous, united in a tube about the pistil; leaves palmately lobed.

Malvaceae p. 353

Filaments not united in a tube; leaves simple.

Ericaceae p. 389

p. Stamens not more numerous than the corolla lobes.

r. Stamens of the same number as the lobes and opposite them; flowers regular; ovary superior.

Style 1; plants of non-brackish habitats.

Primulaceae p. 404

Styles 5; plants of salt marshes; fruit a one-seeded sac (Fig. 96, a).

Limonium p. 404

r. Stamens alternate with the corolla lobes or fewer.

s. Flowers not in a dense head on a common receptacle, nor surrounded by a scaly involucre.

t. Shrubs.

Leaves alternate.

Style absent; flowers clustered in the leaf axils, regular; fruit berry-like, 4-8-seeded (Fig. 81).

Aquifoliaceae p. 346

Style 1; flowers mostly in a terminal inflorescence, often irregular; fruit a capsule. *Ericaceae* p. 389

Leaves opposite.

Flowers in a dense spherical head, white, small, regular (Fig. 111, a). *Cephalanthus* p. 464

Flowers not in a dense head, irregular if crowded (Fig. 111, 112). *Caprifoliaceae* p. 465

t. Herbaceous plants.

Plants parasitic, without green color or nearly so.

Plant twining, attached to the stems of other plants; capsule 1-4-seeded (Fig. 99, f). *Cuscuta* p. 418

Plants stout, erect, rooted in the soil or parasitic on roots; capsule many-seeded (Fig. 108, a, b).

Orobanchaceae p. 455

Plants not markedly parasitic, green.

u. Flowers quite irregular.

Aquatic plants or rooting in wet mud; leaves absent or finely divided; bladders present, sometimes in the wet substrate; insectivorous plants (Fig. 107). *Utricularia* p. 450

Terrestrial plants; bladders absent, leaves present.

Ovary superior; anthers not united in a tube.

Ovary deeply 4-lobed; fruit of 4 nutlets.

Leaves alternate; inflorescence coiled when young, gradually unrolling.

Boraginaceae p. 421

Leaves opposite; inflorescence not coiled.

Labiatae p. 424

Ovary not deeply lobed, the style coming from the apex; fruit a capsule.

Leaves scattered on the stem.

Scrophulariaceae p. 436

Leaves all basal, not scattered.

Leaves linear; corolla nearly regular, not spurred (Fig. 104, d). *Limosella* p. 441

Leaves elliptical or wider; corolla irregular, spurred. *Pinguicula* p. 454

Ovary inferior; anthers 5, united in a tube about the pistil; fruit a many-seeded capsule (Fig. 114, d, f). *Lobeliaceae* p. 474

u. Flowers regular or nearly so.

v. Leaves in a basal rosette; flowers solitary or in dense spikes, small and insignificant.

Plantaginaceae p. 456

v. Leaves usually scattered on the stem.

w. Ovary superior.

- x. Leaves opposite, or all basal.
 Filaments united in a tube, covered with a crown of 5 hooded and spurred bodies; juice milky; fruit of 2 follicles (Fig. 99, g).
Asclepias p. 416
- Filaments not united; a crown not present.
 Juice milky; ovaries 2, forming 2 follicles united only by their tips (Fig. 99, a, b, e).
Apocynaceae p. 414
- Juice not milky; ovary 1; fruit not a follicle.
 Ovary 3-celled; capsule 3-celled; corolla rolled in the bud, with a slender tube and flaring limb (Fig. 100, a). *Phlox* p. 419
- Ovary not 3-celled.
 Leaves deeply lobed or palmately divided; flowers small, in a long spike (Fig. 100, g). *Verbena* p. 424
- Leaves entire, or toothed only.
 Ovary deeply 4-parted, with the style arising between the lobes; fruit of 4 nutlets. *Labiatae* p. 424
- Ovary not deeply lobed; fruit a many-seeded capsule.
 Flowers regular; capsule 1-celled.
Gentianaceae p. 411
- Flowers usually slightly irregular; capsule 2-celled.
Scrophulariaceae p. 436
- x. Leaves alternate, or lily-like and floating.
 Leaves floating, lily-like; flowers white, borne near the surface, small, in an umbel (Fig. 98, g). *Nymphoides* p. 414
- Leaves not lily-like, nor floating.
 Leaves with 3 thickish leaflets; flowers in an erect raceme; bogs (Fig. 98, d).
Menyanthes p. 414
- Leaves entire, or finely divided, or lobed.
 Plants long-trailing; leaves sagittate or hastate; flowers large, funnel-form (Fig. 99, c, d). *Convolvulus* p. 417
- Plants not long-trailing, if slightly so then woody.
 Ovary deeply 4-lobed, with the style arising between the lobes; inflorescence coiled when young.
Boraginaceae p. 421
- Ovary not deeply lobed; inflorescence not coiled when young.

Ovary 3-celled; capsule 3-celled.

Polemoniaceae p. 419

Ovary 2-celled; fruit 2-celled.

Fruit a capsule; flowers less than
1 cm wide.

Scrophulariaceae p. 436

Fruit a berry, or rarely a capsule;
flower over 1 cm wide.

Solanaceae p. 433

w. Ovary inferior.

Plant a vine; leaves deeply and palmately 5-
lobed; corolla lobes 6; tendrils present (Fig.
110, e). *Echinocystis* p. 472

Plant not a vine; leaves not palmately lobed.
Leaves deeply and pinnately lobed (Fig.
110, f). *Valeriana* p. 471

Leaves entire.

Leaves alternate.

Flowers bell-like, large (Fig. 114, a-c).
Campanulaceae p. 472

Flowers irregular, small to minute.

Lobeliaceae p. 474

Leaves opposite or whorled.

Leaves opposite, without stipules.

Caprifoliaceae p. 465

Leaves whorled, or opposite with sti-
pules. *Rubiaceae* p. 459

s. Flowers in a dense head on a common receptacle, sur-
rounded by an involucre of bracts, the outer of which may
be leafy.

Stamens 4, not united; heads subglobose; flowers bright
blue; chaff or bracts mixed with the flowers and of
about the same length (Fig. 114, e). *Succisa* p. 471

Stamens 5, their filaments united in a tube about the style.
Compositae p. 475

PTERIDOPHYTA

1. POLYPODIACEAE FERN FAMILY

a. Fronds of two types; sterile ones flat and expanded; fertile ones with
the divisions inrolled, tube or berry-like, brown when mature.

b. Sterile fronds once-divided or lobed, the divisions with netted veins;
fertile fronds with the divisions berry-like (Fig. 1, b).

10. *Onoclea*

b. Sterile fronds twice-divided, the divisions with unforked straight
veins; fertile fronds with the divisions tube-like, strongly ascending
(Fig. 1, c).

11. *Pteretis*

- a. Fronds all green, not of two conspicuous types.
- e. Sporangia protected by an indusium associated with or consisting of the inrolled edge of the frond.
- d. Sporangia forming a continuous line around the whole edge of the frond; frond large, conspicuously three-parted or ternate (Fig. 1, d).
 - 2. *Pteridium*
- d. Sporangia associated with a reflexed tooth of the margin; frond not ternate.
- e. Sporangia in minute cup-like indusia; frond lanceolate, the lower surface with erect glandular hairs (Fig 1, e). 7. *Dennstaedtia*
- e. Sporangia covered with a membranous inturned lobe; frond repeatedly forking, glabrous; stipe and branches shining purplish brown (Fig. 1, g). 3 *Adiantum*
- c. Sporangia naked, or else covered by an indusium not associated with the edge of the frond.
 - f. Sori, and indusium when present, more or less round.
 - g. Fronds deeply lobed, or once-divided.
 - h. Sporangia not covered; margin of the frond not toothed (Fig. 1, a). 1. *Polypodium*
 - h. Sporangia covered with a round indusium; margin of the frond finely toothed (Fig. 2, g). 8. *Polystichum*
 - g. Fronds twice divided or more finely so.
 - i. Indusium absent (That of *Woodsia* is obscure). (Fig. 2, a, d). 9. *Dryopteris*
 - i. Indusium present.
 - j. Indusium round, attached by a dot at the center, or by a notch or line from the center to the margin.
 - k. Indusium attached by the center; stipe very chaffy; frond thick, evergreen (Fig. 2, e). 8. *Polystichum*
 - k. Indusium attached at a notch; stipe smooth, or chaffy chiefly near the base (Fig. 3, a, b, d, e). 9. *Dryopteris*
 - j. Indusium not as above.
 - l. Indusium delicate, attached at its base and arching over the sporangia; fronds delicate (Fig. 2, c, f). 12. *Cystopteris*
 - l. Indusium of several jagged lobes or thread-like divisions attached below the sporangia and curving over them; fronds 3-15, rarely to 30, cm long (Fig. 2, b). 13. *Woodsia*
- f. Soria and indusia elongated, oblong to linear, often curved.
 - m. Sori and indusia parallel to the mid-rib of the pinnae and the midveins of the segments (Fig. 2, i). 4. *Woodwardia*
 - m. Sori and indusia not parallel as above.
 - n. Fronds 5-15 cm long, once-divided, with rounded pinnae; cliffs, rare. 5. *Asplenium*
 - n. Fronds 30-100 cm long, twice-divided; common (Fig. 2, h). 6. *Athyrium*

1. **POLYPODIUM** (Tourn.,)L.

1. **P. virginianum** L. ROCK POLYPODY. (*Rhodora* 24: 125-142. 1922). Fig. 1, a.

Common throughout; on damp cliffs, boulders, wooded banks, preferring a rocky substratum with shallow leaf-mold. In very moist regions it is sometimes found on the trunks of trees. (*P. vulgare* L. of earlier American authors).

Nfld. to Alta. south to Ga. & Ark.

2. **PTERIDIUM** Scop.

1. **P. aquilinum** (L.) Kuhn, var. **latiusculum** (Desv.)

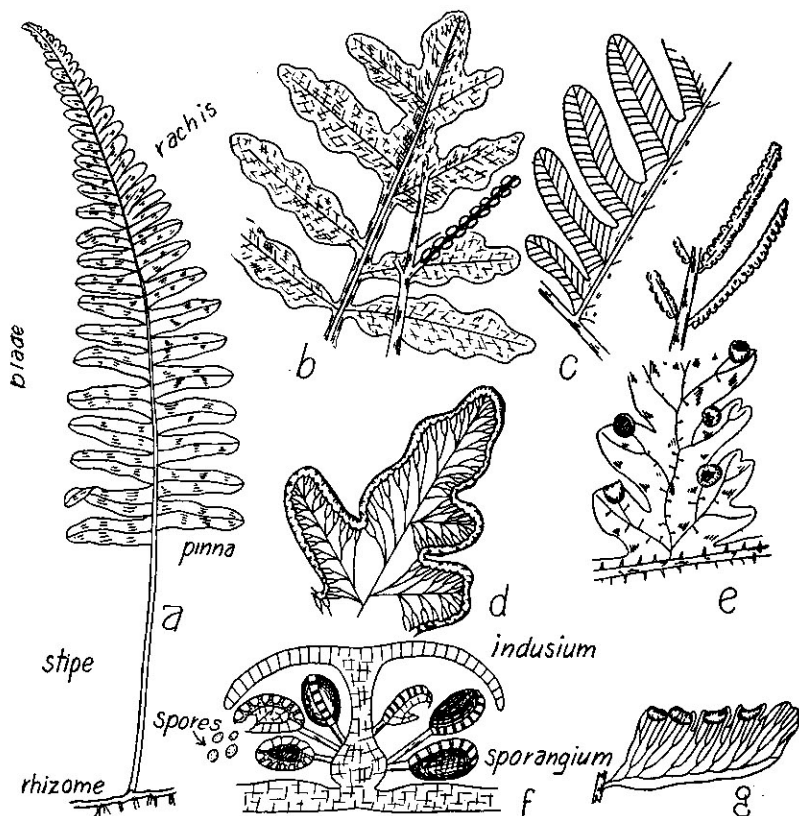


Figure 1.—**Polypodium**. a, plant, $\times \frac{1}{2}$. **Onoclea**. b, parts of fertile and sterile fronds, $\times \frac{1}{2}$. **Pteretis**. c, detail of pinna and part of fertile frond, $\times 3$. **Pteridium**. d, small part of frond, $\times 2$. **Dennstaedtia**. e, part of pinnule showing sori, $\times 3$. Fern: cross-section through a sorus such as that of **Dryopteris**, highly magnified. **Adiantum**. g, pinna, $\times 1 \frac{1}{2}$.

Underw. BRACKEN. (See Tryon, R. M., Jr. *Rhodora* 43: 1-31, 37-67. 1941. Fig. 1, d.

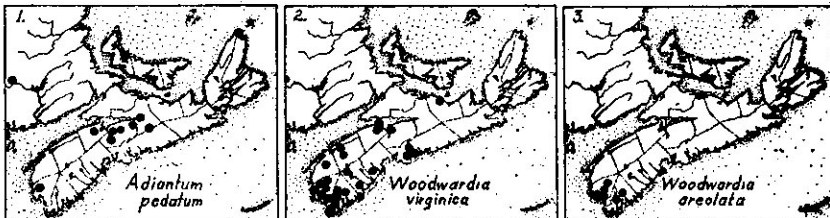
Common throughout; in pastures, barrens, waste land and burnt-over areas; often associated with sweet fern and wire birch and characteristic of light soils. Scattered plants have the blade ovate instead of ternate, with the segments of the frond minutely hairy near the margin and beneath. This form may be the result of burning or other adverse growing conditions. Nfld. to Alta. south to Ga. & Ark.

3. ADIANTUM (Tourn.)L.

1. **A. pedatum** L. MAIDENHAIR FERN. Map 1. Fig. 1, g.

Rare; found only in rich woods, about gypsum or in limestone locations.

N. S. to Minn. south to Ga. & Okla; Alaska to Calif.; Asia.



4. WOODWARDIA J. Sm.

a. Fronds twice-divided, the fertile and the sterile ones similar

1. *W. virginica*

a. Fronds once-divided only, the fertile ones much narrowed, more erect, and with narrow divisions.

2. *W. areolata*

1. **W. virginica** (L.) J. Sm. CHAIN FERN. Map 2. Fig. 2, i.

Characteristic of swampy woods, boggy shores, swamps and cobbly lake-shores from Yarmouth Co. east to Halifax; scattered north to Pictou and Kings Co. (*Anchistea* Presl).

Coastal plain plant from Fla. to Tex. north to L. Is. and N.S.; rarer inland to Ont. & Mich.

2. **W. areolata**. (L.) Moore. DWARF CHAIN FERN. Map 3. Local in the Tusket Valley; abundant and well-develop-

ed along the upper limits of the Clyde and Roseway river systems where it is found in swamps, wet woods, and at the margins of bogs. (*Lorinseria* Presl).

Fla. to Tex. north along the coast to Mass. & N.S.; rare inland to Mo. & Mich.

5. ASPLENIUM L.

a. Rachis shining-purplish; fronds wiry and stiff. 1. *A. Trichomanes*
 a. Rachis greenish; fronds thinner and delicate. 2. *A. viride*

1. *A. Trichomanes* L. MAIDENHAIR SPLEENWORT.

Rare and local; damp shaded cliffs. Specimens have been seen from Kings, Cumberland, Guysborough and Inverness Cos. Scattered records exist for other localities in the northern part of the province.

N.S. to Alaska south to Ga. & Ariz.; Eu. & Asia.

2. *A. viride* Huds. GREEN SPLEENWORT.

Collected by Macoun at Big Intervale, Inverness Co. in July, 1898. No other collection or record is known for the province.

Nfld. & N.S. west to Wisc.; and northwest to Alaska.

6. ATHYRIUM Roth

a. Sori and indusia often curved, not silvery; pinnules pointed at the tip with irregular sharp teeth.

b. Fronds of two kinds, the fertile thicker and more leathery in texture; sori at maturity running together and covering the lower surface of the frond.

c. Longest pinnae of the fertile frond 5-12 cm long; pinnules 4-12 mm long, with the sori mostly straight, those of the sterile frond oblong and rounded, but slightly toothed or lobed. 2. *A. angustum*

c. Longest pinnae of the fertile frond 1-2 dm long; pinnules 12-15 mm long, somewhat pointed, strongly toothed or lobed.

A. angustum var. *elatus*

b. Fronds all alike, the fertile ones almost membranous; sori separate at maturity; pinnules pointed, often strongly toothed.

A. angustum var. *rubellum*

a. Sori and indusia straight, silvery when immature; pinnules rounded at the tip, with blunt teeth.

d. Pinnules with straight sides and rounded tips; the margins undulate or but slightly toothed. 1. *A. thelypteroides*

d. Pinnules with curved sides and slightly pointed tips, the margins coarsely toothed. *A. thelypteroides* forma *acrostichoides*

1. *A. thelypteroides* (Michx.) Desv. SILVERY SPLEENWORT. Map 4.

Common in rich woods, on seepy slopes and along stream alluvium; rarely in the open; rare in the southwestern counties, scattered from Annapolis to northern C.B. (*A. acrostichoides* of earlier authors).

Forma *acrostichoides* (Sw.) Gilbert is characteristic of the richest locations in its range. It was collected in a run on the slope of Cape Blomidon, and plants from the Cobequids approach it.

N.S. to Minn. south to Ga. & Mo.; Asia.

2. *A. angustum* (Willd.) Presl. See Butters, F. K., *Rhodora* 19: 170-207. 1917. LADY FERN. Fig. 2, h.

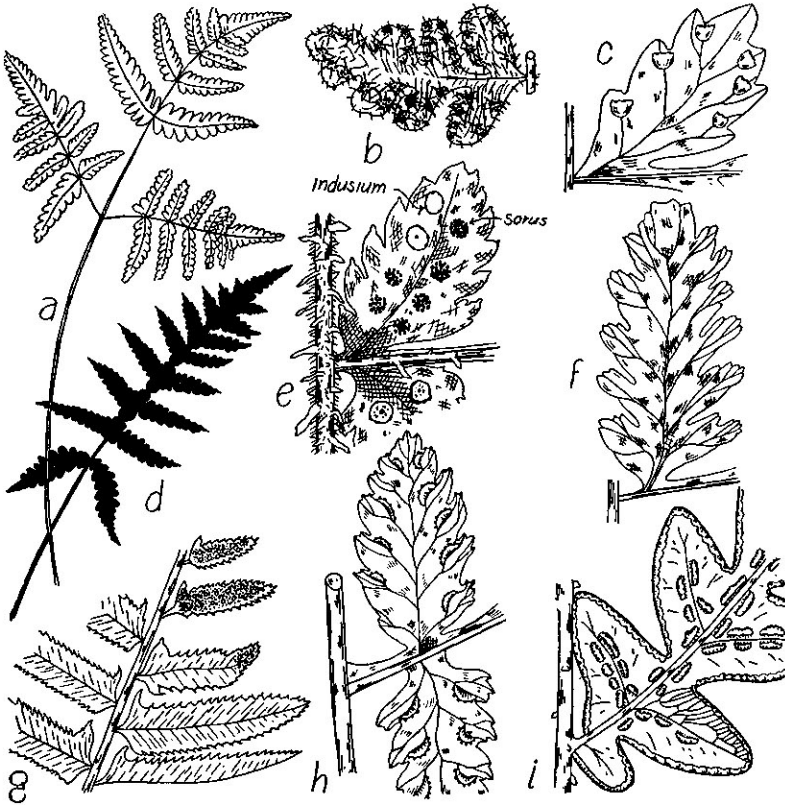


Figure 2.--*Dryopteris*. a, frond of *D. disjuncta*, $\times 1/3$. d, *D. Phegopteris*. *Woodsia*. b, pinna of *W. ilvensis*, $\times 3$. *Cystopteris*. c, pinnule of *C. fragilis*, $\times 5$. f, pinnule of *C. bulbifera*, $\times 2$. *Polystichum*. e, pinnules of *P. Braunii*, $\times 2\frac{1}{2}$. g, part of frond of *P. acrostichoides*, $\times \frac{1}{2}$. *Athyrium*. h, pinnules of *A. angustum*, $\times 3$. *Woodwardia*. i, part of pinna of *W. virginica*, $\times 2$.

Scattered. This seems to be the sun form and is found in open situations, pastures and along roadsides. N.S. to Man. south to Penn. & Iowa.

Var. **elatus** (Link) Butters is a luxuriant form of rich, moist soil. It is rather rare but is scattered in the center of the province. N.S. to Me. & Md. west to Minn.

Var. **rubellum** (Gilbert) Butters is common throughout along roadsides, in pastures, moist thickets, swamps and open woods. The three varieties treated grade into each other. Earlier records of *A. Filix-femina* belong here.

Nfld. to Man. south to Va. & Colo.

7. DENNSTAEDTIA Bernh.

1. **D. punctilobula** (Michx.) Moore. HAY-SCENTED FERN.
Fig. 1, e.

Dry hillsides and slopes throughout, especially around rock piles and hummocks; typical of upland pastures from Annapolis to northern C. B.; frequent also in open or dryish woods, along roadsides and rarely in swamps, often a weed. (*Dicksonia punctilobula* (Michx.) Gray).

N.S. to Minn. south to Ga. & Mo.

8. POLYSTICHUM Roth

a. Fronds once-divided; stipe and rachis chaffy only near the base.

b. Fruiting pinnae smaller than the sterile ones; sori very crowded; pinnae lanceolate, not curved. 1. *P. acrostichoides*

b. Fruiting pinnae similar to the sterile ones; sori well separated; pinnae about twice as long as wide, scythe-shaped. 2. *P. Lonchitis*

a. Fronds twice-divided with the divisions lobed or cut; stipe and rachis very chaffy. 3. *P. Braunii*

1. **P. acrostichoides** (Michx.) Schott CHRISTMAS FERN.
Fig. 2, g.

Common throughout; in moist woods, cool ravines, thickets and on wooded banks. More luxuriant forms have the pinnae deeply toothed. This is named forma **incisum** (Gray) Gilbert. Intergrading plants are found in the same woods.

N.S. to Ont. & Wisc. south to Fla. & Tex.

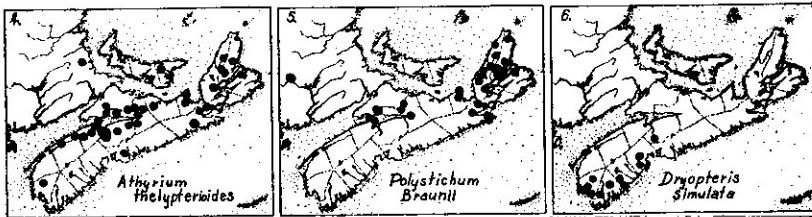
2. **P. Lonchitis** (L.) Roth HOLLY FERN.

Known only from C.B. It was reported from Aspy Bay (Macoun); from along the roadside near the top of

Glencoe Mountain, (Robinson, 1904); and from River Deny's Cave. It is rather common along the sides of the gypsum sinkholes in the region between Cape North Corner and Dingwall; and Nichols collected it in similar locations west of Ingonish.

Nfld. & Greenland to Alaska south to N.S., Gaspé, around the Great Lakes, and south in the Rocky Mts.; Eu.

3. **P. Braunii** (Spenner) Fee, var. **Purshii** Fern., *Rhodora* **30**: 28-30. 1928. BRAUN'S HOLLY FERN. Map 5. Fig. 2, e.



Typical of rich woods, ravines and seepy hillsides; Cape Split and Blomidon in Kings Co., and from Cumberland Co. east along the Cobequids and to northern C.B. It is rare in the western part of the range but in the hill country of C.B. it becomes luxuriant with clumps exceeding four feet in height.

Nfld. to northern Wisc. south to the uplands of N. Eng.; N.Y., Penn.; also in Alaska.

9. **DRYOPTERIS** Adans.

- a. Indusium absent or present; fronds thin not evergreen, the smallest divisions obscurely toothed or with a smooth margin; veins simple or but once-forked; stipe smoothish.
- b. Fronds lanceolate in outline; pinnae not stalked.
- c. Indusium present; lowermost pinnae not deflexed.
 - d. Blade with the lower pinnae as long as the middle ones.
 - e. Veins of the sterile fronds mostly forked. 1. *D. Thelypteris*
 - e. Veins of the sterile fronds mostly unforked. 2. *D. simulata*
 - d. Blade with the lower pinnae gradually decreasing in size to mere auricles. 3. *D. novaboracensis*
- c. Indusium absent; blade finely chaffy, the lower pair of pinnae deflexed. 4. *D. Phegopteris*
- b. Frond triangular in outline with three almost equal divisions; lower pinnae stalked; frond smooth. 5. *D. disjuncta*
- a. Indusium always present; fronds thick, often evergreen, the divi-

- sions toothed or cut; veins twice-forked or more; stipe more or less chaffy with scales near the base.
- f. Frond small, to 25 cm long and 5 cm wide, resinous, with the teeth of the pinnules blunt. 6. *D. fragrans*
- f. Frond much larger, not resinous.
- g. Scales at the base of the stipe numerous and linear.
- h. Sori placed near the margin of the blade; pinnules not sharply toothed. 7. *D. marginalis*
- h. Sori not marginal; pinnules minutely and sharply toothed towards the tip. 8. *D. Filix-mas*
- g. Scales at the base of the stipe ovate or oblong.
- i. Fronds bipinnate or partly tripinnate near the base.
- j. Indusium glabrous; pinnae rather triangular, firm in texture. 9. *D. cristata*
- j. Indusium glandular-pubescent; pinnate mostly more divided and thinner than the above species. 10. *D. Bootii*
- i. Fronds tripinnate, the segments with spinulose teeth.
- k. Upper and lower inside pinnules of the basal pinnae nearly opposite, 4 mm or less apart.
- l. Inner pinnule on the lower side of each basal pinna as long or longer than the one next to it; pinnae oblique to the rachis; stipe-scales light brown.
- m. Indusium and frond glabrous. 11. *D. spinulosa*
- m. Indusium, and often the frond, glandular.
D. spinulosa var. *fructuosa*
- l. Inner pinnule shorter than the one adjacent to it; pinnae mostly at right angles to the rachis and lanceolate; stipe-scales with a dark center. *D. spinulosa* var. *intermedia*
- k. Upper and lower inside pinnules of the basal pinnae widely separated; blade widely triangular; indusium glabrous, or rarely with a few marginal glands. *D. spinulosa* var. *americana*

1. ***D. Thelypteris*** (L.) Gray, var. ***pubescens*** (Lawson) Nakai, Bot. Mag. Tokyo 45: 97. 1931. MARSH FERN.

Common throughout; along ditches, damp roadsides, in meadows and on bog hummocks. Forma ***suaveolens*** (Clute) A. R. Prince, Am. Fern. Jour. 26: 95. 1936, is a fragrant form reported from N. H. and from near Baddeck (Fernald, 1921). (*Thelypteris palustris* Schott, var. *pubescens* (Lawson) Fern., Rhodora 31: 27-36. 1929).

Nfld. to Man. south to Ga. & Okla.

2. ***D. simulata*** Davenp. BOG FERN. Map 6.

Scattered from Yarmouth east to Lunenburg and Hants Cos.; swales, wet thickets, knolls in peaty barrens and in sphagnous spruce bogs, growing in situations too shady for the marsh fern and too wet for the New York fern.

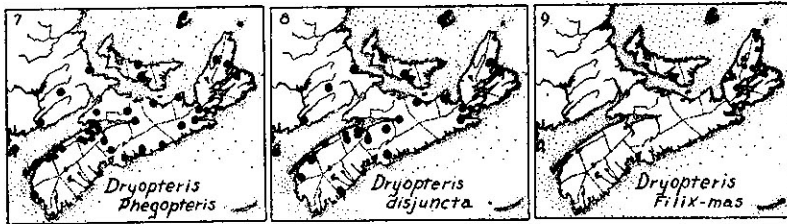
(*Thelypteris simulata* (Davenp.) Nieuwl.).

Ala. north near the coast to N. S., and sporadically inland to P. E. I., southern Que., N. Y. & W. Va.

3. **D. noveboracensis** (L.) Gray. NEW YORK FERN. Fig. 3, b.

Common throughout; dry woodlands, along shady roadsides and fences, not vigorous either in open sunlight or in wet locations. (*Thelypteris noveboracensis* (L.) Nieuwl.).

Nfld. to Minn. south to Ga. & Ark.



4. **D. Phegopteris** (L.) C. Chr. BEECH FERN. Map 7. Fig. 2, d.

Common throughout; rich cool woods, shaded hillsides, and especially on damp, dripping cliffs and in ravines near running water. (*P. polypodioides* Fee. *Phegopteris connectilis* Watt).

Nfld. to Alaska south to the Gulf States.

5. **D. disjuncta** (Rupr.) Morton, *Rhodora* 43: 216-219. 1941. OAK FERN. Map 8. Fig. 2, a.

Common throughout in rocky or dryish hardwoods. Forma **erecta** (Lawson) Roland, *Proc. N.S. Inst. Sci.* 20:92. 1941, is a taller form with the frond rigid and erect, the lower pinnae little larger than the upper one. Lawson states that this form grows around the shores of Bedford Basin, the Basin of Minas, and in Ontario. (*Phegopteris Dryopteris* (L.) Fee).

Nfld. to Alaska south to Va. & N.M.

6. **D. fragrans** (L.) Schott, var. **remotiuscula** Komarov, *Fl. U.R.S.S.* 1: 38. 1934. FRAGRANT FERN.

Local; Nichols records it as characteristic of the cliff crevices along streams in northern C.B.; and it has been found on the mainland at Hartley's Waterfall on the Strait of Canso and on cliffs of Moose R., near Parrsboro. (*T. fragrans* var. *Hookeriana* Fern., *Rhodora* 25: 3. 1923).

Nfld. to central Minn. south to N.Y.; eastern Asia.



Figure 3.—*Dryopteris*. a, *D. cristata*. b, *D. noveboracensis*. d, pinnule of *D. marginalis*, x 1½. e, pinnule of *D. cristata*, x 1½. *Osmunda*. c, *O. Claytoniana*. f, upper part of frond of *O. regalis*, x½. g, detail of *O. Claytoniana* or *O. cinnamomea*, x 1½. *Botrychium*. h, *B. matricariaefolium*, x ½.

7. *D. marginalis* (L.) Gray. MARGINAL FERN. Fig. 3,d.

Common through the center and eastern part of the province; apparently rare in the southwestern counties; rocky woods, shady slopes, ravines and characteristic of hardwood forests of C.B. Forma *Trilliae* (Lawson) Gruber, (see Weatherby, Amer. Fern. Journ. 31: 59-62. 1941), is a luxuriant form found on gypsum at Antigonish Harbour and near Newport. (Forma *tripinnatifidum* Clute).

N. S. to Minn. south to Ala. & Okla.; B.C.

8. *D. Filix-mas* (L.) Schott. MALE FERN. Map 9.

Known only from C.B.; rich woods and ravines in the south, becoming commoner northwards and there character-

istic of the hardwood climax forest. Around Cape North and Bay St. Lawrence it is frequent in thickets and along open roadsides.

Nfld. to Vt. and northern Mich.; B.C. to Calif. & Tex.; Greenland, Iceland, and northern Eurasia.

Forma **incisa** (Moore) Hayek is an European form found also in Nfld. & N.S. It is characterized by the coarsely toothed pinnules tapering somewhat to a rounded or slightly pointed tip. This luxuriant form is common near Cape North.

9. **D. cristata** (L.) Gray. CRESTED FERN. Fig. 3,a,e.

Common throughout; well-drained swamps, swales, boggy ground and wet thickets, usually in shady situations but persisting for some time in open sunlight.

Nfld. to Idaho south to Va.; Eu.

10. X **D. Bootii** (Tuckerm.) Underw. BOOTT'S SHIELD FERN.

This hybrid of *D. cristata* and *D. spinulosa* var. *intermedia* has the characters of the parents in varying proportions. Frequent in swampy woods of Yarmouth Co.; found at various places east to Shelburne and Lunenburg; scattered elsewhere.

N.S. to Minn. south to Va.

11. **D. spinulosa** (O.F. Muller) Watt. WOOD FERN.

Scattered; in swamps, wet thickets and rich alluvial soil through the center of the province. Nfld. to Idaho south to Va. & Mo.; Greenland & Eurasia.

Var. **fructuosa** (Gilbert) Trudell is found growing with the species, and probably occurs wherever the species is found. It is considered to be a variety by some, and by others a hybrid between the species and var. *intermedia*.

Var. **intermedia** (Muhl.) Underw. is common throughout; woods, rocky slopes and swamp hummocks. Nfld. to Wisc. south to N.C. & Mo.

Var. **americana** (Fisch.) Fern., *Rhodora* 17: 48. 1915, is luxuriant along the Bay of Fundy, scattered in rich woods in the southwestern counties, and common along the Cobequids to northern C.B... Miss Perry (1931) states that both this and var. *intermedia* were common on St. Paul Is. and about as common was a form transitional between the two. (*Aspidium spinulosum*, var. *dilatatum* f. *anadenium*. *D. campyloptera* (Kunze) Clarkson).

Lab. to B.C. south to N.C., Tenn & Wisc.

10. ONOCLEA L.

1. *O. sensibilis* L. SENSITIVE FERN. Fig. 1, b.

Common throughout; in mucky soil, around streams, pools, in ditches, wet woodlands or low open areas. Forma *obtusilobata* (Schkuhr) Gilbert, produced when the early fronds are injured, has the fronds intermediate between the sterile and fertile ones.

Nfld. to Sask. south to Fla. & Tex.

11. PTERETIS Raf.

1. *P. pensylvanica* (Willd.) Fern., Rhodora 47: 123.

1945. OSTRICH FERN. Map. 10. Fig. 1, c.

Common from Annapolis to northern C. B.; rare in the southwestern counties and absent from the more acid regions; in rich soil, alluvial ground, about limestone and gypsum outcrops; characteristic of the higher parts of the flood plains in northern C.B. (*Onoclea Struthiopteris* (L.) Hoffm. *P. nodulosa* (Michx.) Nieuwl.).

Nfld. to Alaska south to Va. & Mo.

12. CYSTOPTERIS Bernh.

a. Frond lanceolate, usually long-attenuate, often bearing bulblets beneath; veins of the pinnules ending mostly in a notch.

1. *C. bulbifera*

a. Frond lanceolate but not attenuate; veins of the pinnules ending mostly in a tooth or on the un-notched margin.

b. Pinnules, at least the basal, orbicular to triangular, rounded to the base; indusium to 1 mm long, more or less cleft at the apex.

c. Indusium without glands; fronds up to 3 dm long. 2. *C. fragilis* is

c. Indusium glandular on the back; fronds 3.8-4.8 dm long.

C. fragilis var. *laurentiana*

b. Pinnules oblong to nearly lanceolate, wedge-shaped at the base indusium about 0.5 mm long, shallowly or not at all toothed.

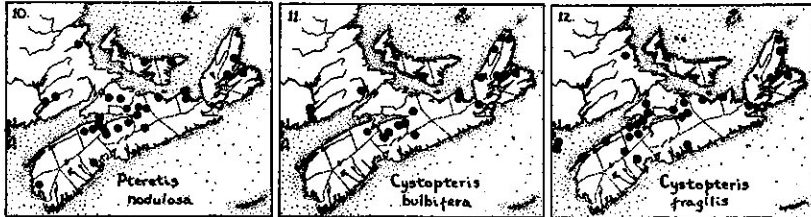
C. fragilis var. *Mackayii*

1. *C. bulbifera* (L) Bernh. BULBLET FERN. Map 11. Fig. 2, f.

Found only in rich or calcareous areas; Moore's Fall's south of Kentville; common on the gypsum outcrops in

Hants Co.; and scattered on rich hillsides from Cumberland Co. to northern C.B. It is abundant on the gypsum areas, often carpeting the ground or covering the sides of ravines.

Nfld. to Man. south to Ga. & Ariz.



2. **C. fragilis** (L.) Bernh. FRAGILE FERN. Map 12.
Fig. 2, c.

Common throughout the northern parts of the province; shaded cliffs, rich moist woods and rocky crevices. Intermediate forms between this and var. *Mackayii* often occur. Forma *cristata* (Lowe) Weatherby has the fronds and their divisions much forked. This was reported from Whycomomagh by Macoun & Burgess.

Nfld. to Alaska south to N. Eng., Penn., Mo., Tex. and southern Calif.

Var. **laurentiana** Weatherby, Rhodora 28: 128-131. 1926, grows on dolomite ledges west of Dingwall, and in moist sinkholes in plaster, South Ingonish. It is one of a number of plants found about the Gulf of St. Lawrence, and sparingly westward to Ont. & Wisc.

Var. **Mackayii** Lawson is found on shaded ledges, damp cliffs and occasionally in rich woods; frequent but never abundant. N.S. & southern Que. to Minn. south to N.C.

13. **WOODSIA** R. Br.

- a. Stipe plainly jointed near the base; lobes of the indusium linear; frond chaffy or smooth, not glandular.
- b. Frond chaffy throughout; blade oblong-lanceolate. 1. *W. ilvensis*
- b. Frond smooth; blade linear, delicate. 2. *W. Bellii*
- a. Stipe not jointed; lobes of the indusium of a few broad segments; frond often glandular. 3. *W. obtusa*

1. **W. ilvensis** (L.) R. Br. RUSTY WOODSIA. Map 13.
Fig. 2, b.

Local, often abundant where found; basaltic cliffs, slate ledges, talus slopes and rocky ravines from Digby Neck

to Halifax and Truro; characteristic of cliff associations in C.B.

Lab. to Alaska south to N.C., Iowa & Calif.

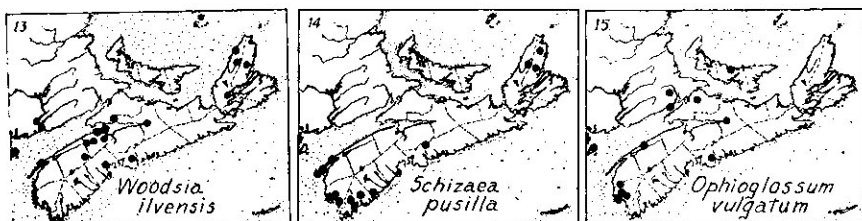
2. **W. Bellii** (Lawson)Porsild, *Rhodora* **47**: 147-148, 1945.
SMOOTH WOODSIA.

Recorded but once for the province: two plants were found near the summit of a hill, 1300 feet high, near Cheticamp (Robinson, 1904). The American relative of *W. glabella*.

Nfd. to N.Y. west to Lake Superior.

3. **W. obtusa** (Spreng.)Torr. BLUNT-LOBED WOODSIA.

Macoun lists this plant as occurring "In the gorge through which Dr. Hamilton's road winds up to the summit of the North Mountain near Canning", Kings Co. No recent collections are known, and this report seems to be the



only basis for the inclusion of N.S. in the range of this fern.
N.S. to Minn. south to Fla. & Tex.; B.C. to Alaska.

2. SCHIZAEACEAE CURLY-GRASS FAMILY

1. SCHIZAEA J. Sm.

1. **S. pusilla** Pursh. CURLY-GRASS FERN. Map 14. Fig. 4, h.

Scattered to local along Digby Neck, and from southern Yarmouth Co. to Queens Co.; Grand Lake, Halifax Co.; and on the highlands of C.B. It is found in sphagnous bogs, peaty borders of lakes, sphagnous hollows and in wet, undrained depressions, apparently most abundant in bogs at the southern ends of Long and Brier Islands, Digby Co. within a few yards of the sea.

Nfd.; N.S.; southern N.J.; Bruce Peninsula, Ont.

3. OSMUNDACEAE FLOWERING-FERN FAMILY

1. OSMUNDA (Tourn.) L.

- a. Fertile frond with only a few pinnae modified to bear sporangia; fronds without a tuft of cinnamon wool at the base of each pinna.
- b. Modified fruiting pinnae only in the middle of the frond; pinnae deeply lobed with the small divisions not separated.

2. *O. Claytoniana*

- b. Modified fruiting pinnae at the top of the frond; pinnae large, with widely separated pinnules.

3. *O. regalis*

- a. Fertile fronds with the pinnae all modified, cinnamon-colored; fronds with a tuft of wool at the base of each pinna.

1. *O. cinnamomea*

1. *O. cinnamomea* L. CINNAMON FERN. Fig. 3, g.

Common throughout; swamps, bogs, wet pastures, low fields and roadsides everywhere; often a weed in poorly-drained areas where the stout rootstocks are extremely difficult to eradicate. Forma **frondosa** (Torr. & Gray) Britt. is not uncommon. This has the fronds intermediate between fertile and sterile ones. Other variations may occur.

Nfld. to Minn. south to Fla. & N.M.; S.A. & Eurasia.

2. *O. Claytoniana* L. INTERRUPTED FERN. Fig. 3, c, g.

Throughout, not as common as the last; moist thickets, margins of swamps, and wooded poorly-drained areas.

Nfld. to Man. south to Ga.

3. *O. regalis* L., var. **spectabilis** (Willd.) Gray. ROYAL FERN. Fig. 3, f.

Common throughout; in wet places, usually along streams next to running water but often also on the shores of lakes, in marshes or wet woods.

Nfld. to Sask. south to Fla., Tex. and into S.A.

4. OPHIOGLOSSACEAE ADDER'S TONGUE FAMILY

Clausen, Robert T. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club 191:1-77. 1938.

- a. Sterile portion ovate with a smooth margin and netted veins; fertile part a simple spike arising from the base of the blade.

1. *Ophioglossum*

- a. Sterile part more or less lobed or divided, often 3-parted, with fork-

ing veins; fertile part paniculate, often nearly separate from the leafy part.

2. *Botrychium*1. **OPHIOGLOSSUM** (Tourn.)L.

1. **O. vulgatum** L., var. **pseudopodium** (Blake)Farw., see Fernald, *Rhodora* 41: 494-499. 1939. ADDER'S TONGUE. Map 15. Fig. 4, g.

Frequent in Yarmouth and Digby Cos.; scattered eastward to Halifax and Amherst; damp sandy and cobbly beaches of lakes, sterile meadows, or grassy swamps. It is very insignificant and probably often overlooked.

N.S. & P.E.I. to Wash. south to Dela., Ind. & Mex.

2. **BOTRYCHIUM** Sw.

- a. Sterile blade small, oblong to triangular, attached near the middle or top of the plant.
- b. Sterile blade oblong or ovate, with a short stalk, the segments obtuse.
 - c. Sterile blade once-divided, with three or more pairs of fan- or spoon-shaped pinnae. 1. *B. Lunaria*
 - c. Sterile blade variously cut, with pinnae of different shapes; if the pinnae fan- or spoon-shaped, the plants very small with not more than two pairs of pinnae.
 - d. Sterile blade simple with the sides at the base curving inward, or if once-divided with fan-shaped pinnae, or twice-divided with the pinnules smooth-margined. 2. *B. simplex*
 - d. Sterile blade usually larger and more divided; if undivided, with the sides at the base curving outward; if once-divided, with the pinnae ovate; if twice-divided, with the pinnules toothed. 3. *B. matricariaefolium*
- b. Sterile blade triangular, sessile with acute lobes. 4. *B. lanceolatum*
- a. Sterile blade large, triangular, finely-divided.
 - e. Sterile blade stalked, joined to the fertile portion near the base of the plant.
 - f. Chief terminal divisions elongate, more than twice as long as broad, often deeply dissected. 5. *B. dissectum*
 - f. Chief terminal divisions mostly ovate to oblong, not elongate. 6. *B. multifidum*
 - e. Sterile blade not stalked, thin, finely divided, attached near the middle or upper part of the plant. 7. *B. virginianum*

1. **B. Lunaria** (L.) Sw. MOONWORT

The only collection of this species is reported by Clausen (1.c.) from New Campbellton, C.B. and is referred to var.

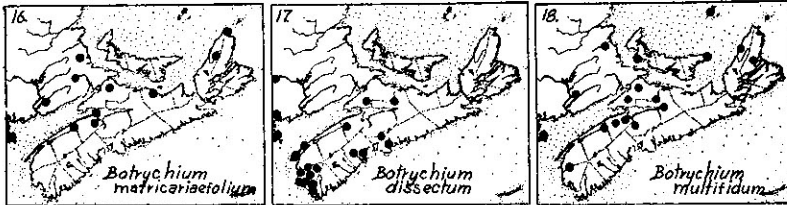
minganense (Vict.)Dole. See Victorin, Trans. Roy. Soc. Canada 21: 331. 1927.

Nfld. to Alaska south to Me., northern Mich. and south in the Rockies.

2. **B. simplex** Hitchc.

Rare; Clausen reports it as common in Me., and from Cumberland, Lunenburg and Yarmouth Cos. in N.S. with no mention of N.B. or P.E.I. Macoun lists it from True-manville in Cumberland Co.; and Fernald (1921) says "Rare, a small colony of extremely dwarf plants, sandy and gravelly beach of Cedar Lake," on the border of Yarmouth and Digby Cos.

Nfld. to B.C. south to N.J., Penn. & Calif.; Eurasia.



3. **B. matricariaefolium** A. Br. MATRICARY GRAPE FERN. Map 16. Fig. 3, h.

Scattered from Annapolis Co. to C.B.; usually in rich alluvial soil or leaf mold in hardwoods where the plants are small and delicate. Nichols states that it is commonly encountered on bleak, exposed headlands around northern C.B. A field was noted on Beech Hill south of Kentville during the dry summer of 1942 with thousands of plants growing upon it. (*B. ramosum* (Roth)Aschers.).

Nfld. to Alta. south to Md. & Ohio; northern Eurasia.

4. **B. lanceolatum** (S. G. Gmel.)Angstroem, var. **angustisegmentum** Pease and Moore. LANCE-LEAVED GRAPE FERN.

Rare: rich wooded hillsides in Cumberland and Inverness Cos.

Nfld. to Wisc. south to Penn. & W. Va.

5. **B. dissectum** Spreng. CUT-LEAVED GRAPE FERN. Map 17.

Frequent to common in sandy or gravelly, either open or turfy soils of Digby, Yarmouth and Shelburne Cos; scattered east to Hants and Halifax Cos. Form a **obliquum**

(Muhl.) Fern., *Rhodora* **23**: 151, 1921, is of similar range but has the segments of the blade smooth or lobed at the base and merely finely toothed. Common with the species in the southwestern counties, rarer east to Colchester and Cumberland Cos. (*B. obliquum* Muhl.).

N.S. to Minn. south to Fla. & Mo.

6. **B. multifidum** (S. G. Gmel.)Rupr. GRAPE FERN. Map 18. Fig. 4, f.

Scattered from Digby Co. to C.B.; rare or absent in the southwestern area; grassy pastures and sandy hillsides. Luxuriant forms approach var. *intermedium* (D. C. Eaton) Farw. but the rather thick, crowded segments of the blade are more typical of the species. (*B. ternatum* (Thunb.)Sw., var. *rutaefolium* (A. Br.) D. C. Eaton. *B. matricariae* Spreng.).

Nfld. to Alta. south to N.Y.; northern Eu. & Asia.

7. **B. virginianum** (L.) Sw. RATTLESNAKE FERN. Map 19.

Scattered from Annapolis Co. and Amherst to northern C.B.; rich hardwoods and calcareous slopes, usually occurring as isolated plants.

N.S. to B.C. south to Fla. & Calif.

5. Equisetaceae HORSETAIL FAMILY

1. Equisetum (Tourn) L.

- a. Aerial stems pale-colored, with very little chlorophyll, unbranched at first or permanently so; cones present, without a sharp point.
- b. Sheaths not reddish-brown nor translucent, the teeth not cohering in 3 or 4 lobes.
 - c. Fertile stem not developing branches; teeth of the sheath yellowish-brown with dark-brown teeth (Fig. 4, a). 1. *E. arvense*
 - c. Fertile stem soon developing whorls of 3-angled green branches; sheaths pale and with white-margined teeth (Fig. 4, d). 2. *E. pratense*
 - b. Sheaths reddish-brown, translucent, the teeth long and cohering in 3 or 4 broad lobes; fertile stem with whorls of compound green branches (Fig. 4, b). 3. *E. sylvaticum*
- a. Aerial stems green or with green branches, with or without a cone.
 - d. Main stem without a central cavity, with 6 ridges; plant small, slender, tufted, flexuous; cone small, apiculate (Fig. 5, b). 7. *E. scirpoides*
 - d. Main stem mostly with a central cavity; if not, very different from the above.
 - e. Teeth of the sheaths cohering in 3 or 4 broad lobes, bright reddish-

brown, persistent; branches numerous, compound.

3. *E. sylvaticum*

- e. Teeth of the sheaths not cohering in lobes, not reddish-brown; branches, mostly simple.
- f. Teeth of the sheaths not jointed with the sheath, persistent; stems annual; cones not apiculate.
- g. Central cavity of the main stem small, half or less the diameter of the stem, often with side cavities nearly as large; sheaths rarely with more than 10 teeth.
- h. Sheaths of the branches with 3-4 teeth; cone-bearing stems different than the sterile ones; branches solid.
- i. Sheaths with the teeth usually longer than wide, with long subulate tips (Fig. 4, c). 1. *E. arvense*
- i. Sheaths with the teeth about as wide as long, not long-tipped but thin and papery (Fig. 4, d). 2. *E. pratense*
- h. Sheaths of the branches with 5 or more teeth; cone-bearing

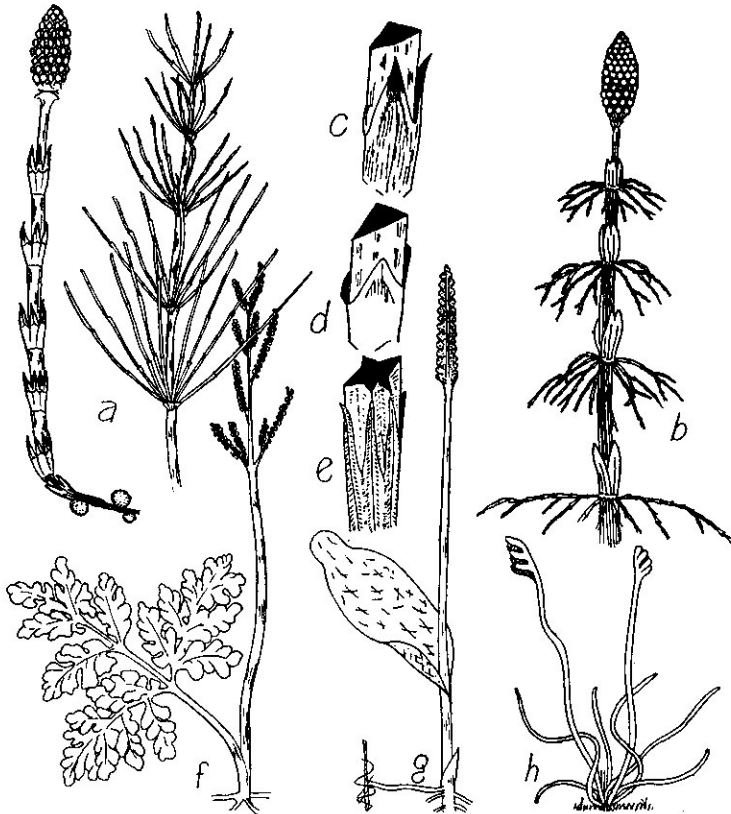


Figure 4.—*Equisetum*. a, *E. arvense*, $\times \frac{1}{2}$. b, *E. sylvaticum*, $\times \frac{1}{2}$. c,d,e, sheaths and teeth of *E. arvense*, *E. pratense* and *E. litorale*. *Botrychium*. f, *B. multifidum*, $\times \frac{1}{2}$. *Ophioglossum*. g, *O. vulgatum*, $\times \frac{1}{2}$. *Schizaea*. h, plant $\times \frac{1}{3}$.

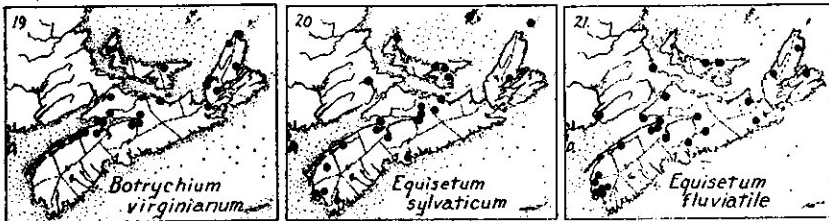
stems similar to the sterile ones, with the central cavity about half the stem diameter; branches with a small cavity (Fig. 4, e, 5, a).
 4. *E. litorale*

g. Central cavity of the main stem at least four-fifths the diameter of the stem; sheaths with 15-20 teeth (Fig. 5, a, c).
 5. *E. fluviatile*

f. Teeth of the sheaths definitely jointed and falling away; sheath ashy-gray; cones apiculate; stems stout, 3-8 dm high, perennial, usually not branched (Fig. 5, d).
 6. *E. hyemale* var. *affine*

1. ***E. arvense* L. FIELD HORSETAIL.** Fig. 4, a, c.

Common throughout; low areas, wet fields, along roadside embankments and railroads, often a bad weed in poorly-drained areas. Many plants have the branches 3-angled instead of 4-angled, but this seems very variable. This variety, var **boreale** (Bongard)Rupr., may be more northern but is as yet of dubious value. The species is very



variable and a large number of ecological forms have been named.

Widely distributed in the Northern Hemisphere.

2. ***E. pratense* Ehrh. MEADOW HORSETAIL.** Fig. 4, d.

Doubtful; Howe's records from Windsor and Musquodoboit belong to *E. fluviatile*; Macoun records it from the North West Arm, Halifax and from near Annapolis. I have not seen it during several summers' collecting in the central part of the province.

Nfld. to Alaska south to N.J. & Ia; Eurasia.

3. ***E. sylvaticum* L. WOOD HORSETAIL.** Map 20. Fig. 4, b.

Common throughout; wet meadows, slopes, open woods, and banks of streams. The common American plant is sometimes treated as var. *multiramum* (Fern.)Wherry, Amer. Fern. Jour. 27: 58. 1937.

Nfld. to Alaska south to Va., Ohio & Iowa.

4. ***E. litorale* Kuehl.** Fig. 4, e.

Scattered in ditches and near streams about Truro;

very abundant on the wet lower gravelly beach of Shubenacadie Grand Lake (Fernald 1921). The status of these plants is at present unknown; they may be hybrids between the next species and *E. arvense*.

N.S. to Penn., Minn. and westward.

5. *E. fluviatile* L. WATER HORSETAIL. Map 21. Fig. 5, a, c.

Common throughout; in ditches, along the edges and in the bottoms of shallow slow-moving streams, edges of lakes, at the heads of salt marshes and in low areas on the dyke-lands. Various ecological forms have been named which have little value and may be found in the proper habitat. Forma **typica** has numerous branches at each node; forma **natans** (Vict.) Broun has the branches reduced to 1-2 at a node, turned all one way. Forma **Linnaeanum** (Doll) Broun has unbranched stems. (*E. limosum* L.).

Nfld. to Alaska south to Va., Nebr. & Ore. Eurasia.

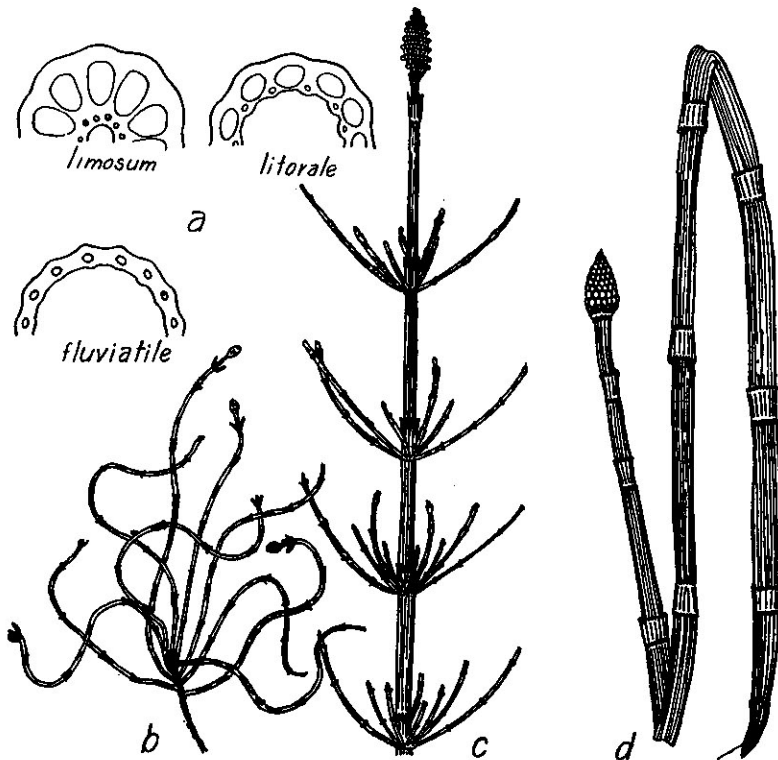
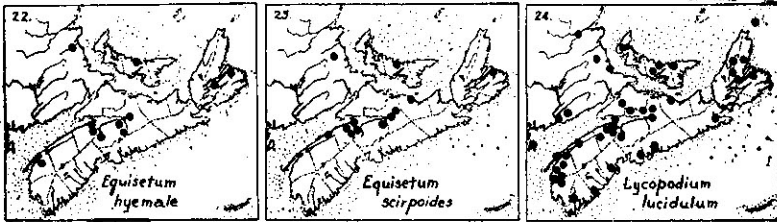


Figure 5.—*Equisetum*. a, cross-sections of the main stem. b, *E. scirpoides*, $\times \frac{1}{2}$. c, *E. fluviatile*, $\times \frac{1}{2}$. d, *E. hyemale*, $\times \frac{1}{2}$.

6. *E. hyemale* L., var. *affine* (Engelm.) A. A. Eaton.
SCOURING RUSH. Map 22. Fig. 5, d.

Light sandy or gravelly banks, railroad embankments, shaded banks, and low areas in calcareous places, scattered;



through the northern counties; common near Truro, and occasionally west to the banks of the Sissiboo R., Digby Co. In most parts of its range in the province the plant is associated with calcareous soil or marly areas. (*E. praeattum* Raf.).

Nfld. and Canada to Mexico.

7. *E. scirpoides* Michx. DWARF SCOURING RUSH. Map 23. Fig. 5, b.

Rich wooded banks and mossy slopes from northern C.B. to Cumberland Co., and along the North Mt. to Annapolis Co.; rather scattered and typical of alkaline areas.

Nfld. to Alaska south to N. Y., Wisc., S. D., & Wash.

6. LYCOPODIACEAE CLUBMOSS FAMILY

1. LYCOPODIUM L. CLUBMOSS

- a. Sporangia in the axils of ordinary leaves, not in terminal spikes; plants ascending from a prostrate base.
- b. Stems erect, in tufts; leaves all the same length, yellowish, ascending, attenuate.
 - 1. *L. Selago*
- b. Stems ascending, isolated or loosely grouped; leaves dark green, spreading to deflexed, toothed, in alternate zones of shorter and longer ones (Fig. 6, g, h).
 - 2. *L. lucidulum*
- a. Sporangia in the axils of reduced or scale-like leaves, in a terminal spike.
- c. Leaves of the spike green, but slightly reduced; spike sessile, greenish; plant small, the prostrate base superficial on the surface of the ground.
- d. Plants dwarf, 3-10 cm high; spikes 1-3 cm long (Fig. 6, f).
 - 3. *L. inundatum*

d. Plants stout, 1-3 dm high; spikes 2-5 cm long.

L. inundatum var. *Bigelovii*

c. Leaves of the spike scale-like and yellowish, very different from the stem leaves; spike yellow.

e. Leaves in 6 or more ranks; ultimate branches not flattened, or but obscurely so.

f. Spikes sessile, terminal on leafy branches.

g. Plants creeping on the surface; ascending branches similar to the prostrate stem, little forked.

h. Leaves toothed, spreading to reflexed (Fig. 6, b).

4 *L. annotinum*

h. Leaves not toothed, rigid, rather narrow.

i. Leaves 5-10 mm long, firm, spreading.

L. annotinum var. *acrifolium*

i. Leaves 3-5 mm long, ascending to appressed, narrow and pointed, often incurved.

L. annotinum var. *pungens*

g. Plants from scaly underground rootstocks; upright stems much branched; bushy or tree-like.

j. Branches loose and spreading; leaves over 1 mm wide, the upper and lower ranks reduced so that the branches appear flattened (Fig. 6, c).

5. *L. obscurum*

j. Branches ascending, crowded; leaves less than 1 mm wide, all alike so that the branches appear terete, often appressed.

L. obscurum var. *dendroideum*

f. Spikes on long bracted peduncles; leaves soft, linear, with long tips.

k. Spikes normally 2-4 on each stalk (Fig. 6, a).

6. *L. clavatum*

k. Spikes mostly solitary.

L. clavatum var. *megastachyum*

e. Leaves in 4 ranks, small, scale-like, joined to the branch by half their length or more.

l. Leaves nearly alike, spreading with incurved tips, joined by half their length; peduncles mostly less than 10 mm. long; spikes mostly solitary (Fig. 7, e).

7. *L. sabinaefolium*

l. Leaves of two kinds, the upper and lower rows much reduced, making the branches flattish, appressed, joined by more than half their length.

m. Branching regular, the main branches almost opposite upon the axis, the secondary ones arranged fan-like; constrictions not marking the ends of the year's growth; rootstock superficial (Fig. 7, f).

8. *L. flabelliforme*

m. Branching very irregular; constrictions present on the branches marking the end of each year's growth.

n. Rootstocks superficial; ventral leaves reduced, free only at the points.

9. *L. complanatum*

n. Rootstalk very deeply buried; ventral leaves scarcely reduced; branches stiff, narrow and erect (Fig. 7, g).

10. *L. tristachyum*

1. **L. Selago**. L. FIR CLUBMOSS.

Scattered on stream cliffs and in moist ravines in northern C.B. It has not been found on the mainland.

Nfld. to Alaska south to Conn., N.C., Wisc. & Ore.

2. **L. lucidulum** Michx. SHINING CLUBMOSS.

Map 24. Fig. 6, g, h.

Throughout; common in the northern and hardwood region from Annapolis to northern C.B.; scattered elsewhere. It is characteristic of rich hardwoods, damp hillsides and alluvial woods.

Nfld. to B.C. south to N.C., Iowa & Wash.

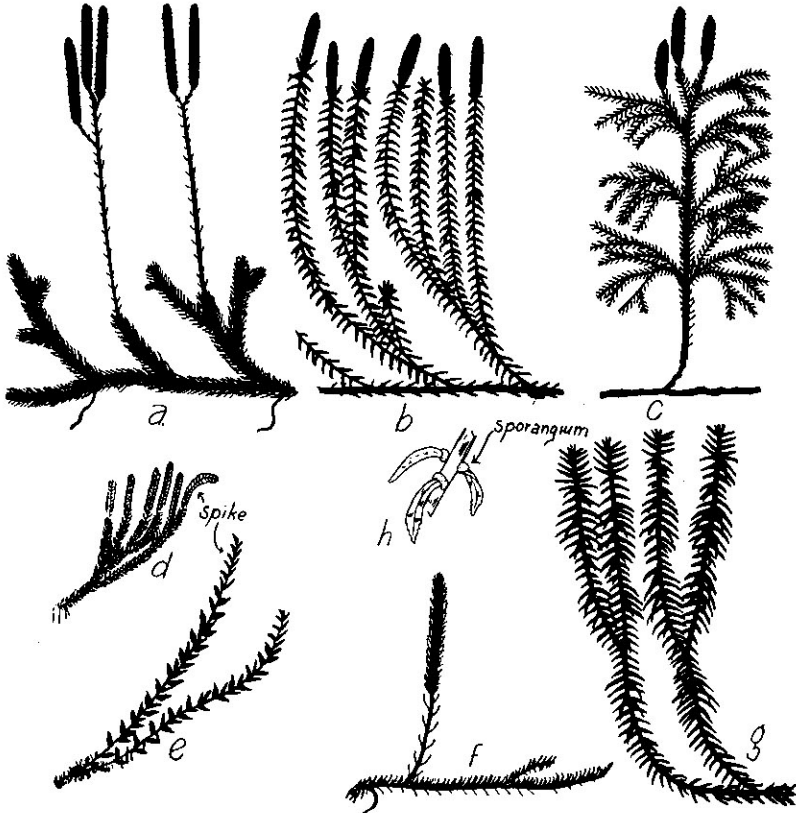
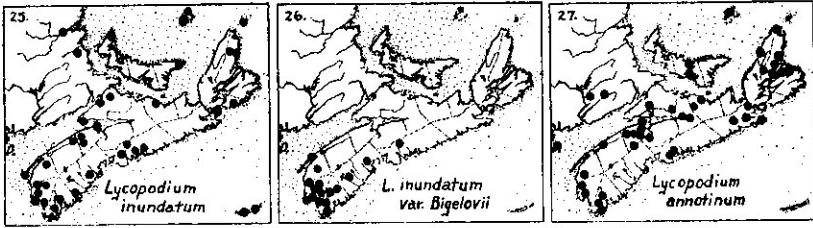


Figure 6.—*Lycopodium*. a, *L. clavatum*. b, *L. annotinum*. c, *L. obscurum*. f, *L. inundatum*. g, *L. lucidulum*. h, *L. lucidulum* leaves and sporangia. *Selaginella*. d, *S. rupestris* x $\frac{1}{2}$. e, *S. selaginoides*, x $\frac{1}{2}$.

3. **L. inundatum** L. BOG CLUBMOSS. Map 25.

Fig. 6, f.

Common throughout in its habitat; swamps, bog mead-



ows, poorly-drained depressions, sandy beaches; somewhat general in the wet dune hollows on Sable Island.

Nfld. to Alaska south to W. Va., Ind. & Ore.

Var. **Bigelovii** Tuckerm. Map 26. This giant form is common from Digby Neck and Yarmouth around to Shelburne; scattered eastward to Grand Lake in Halifax Co.; collections from North Sydney and Louisburg are intermediate between the species and the variety. It is found on sandy and peaty beaches, boggy savannahs, and wet depressions.

Nfld.; N.S.; Mass. to N.J.

4. **L. annotinum** L. BRISTLY CLUBMOSS. Map 27. Fig. 6, b.

Common throughout; open dry hardwoods. Nfld. to Alaska south to Penn., Wisc., Colo. and Ore.

Var. **acrifolium** Fern., *Rhodora* 17: 124. 1915, is less common than the species and occurs in drier or more acid habitats. Scattered throughout, common on dry hillsides in beech woods. Nfld. to Wisc. south to Va.

Var. **pungens** Desv. is more northern; characteristic of the grass-sedge heath association of northern C.B. (Nichols); grading into the species inland. Nfld. to Minn. south to W. Va.

5. **L. obscurum** L. FLATBRANCH CLUBMOSS. GROUND PINE. Fig. 6, c.

Common throughout; dry hillsides and open woods.

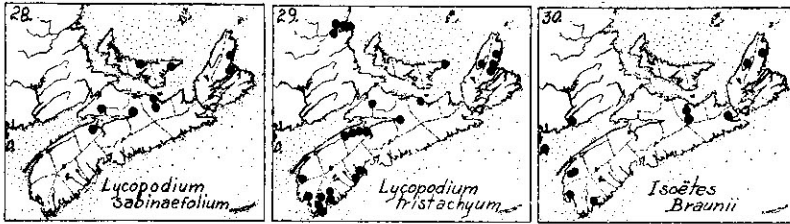
Nfld. to B.C. south to Ala.

Var. **dendroideum** (Michx.) D. C. Eaton is frequent in open dry woods, pastures and clearings, often found in sandy areas or pine country.

Nfld. to Wash. & Alaska south to N.C. & Ind.

6. **L. clavatum** L. CLUBMOSS. Map 34. Fig 6, a.

Common throughout; light soil on hillsides, pastures and in dry open bush. Cosmopolitan.



Var. **megastachyon** Fern. & Bissell, *Rhodora* **12**:53, 1910, is likewise common throughout in dry soils and open sandy areas. Other minor forms and varieties of little significance have been named.

7. **L. sabinaefolium** Willd., var. **sitchense** (Rupr.) Fern., *Rhodora* **25**: 166. 1923. Map 28. Fig. 7, e.

Characteristic of the grass-sedge association in northern C.B. (Nichols); scattered west to Cumberland and Kings Cos. in exposed places, on wet hillsides and clayey ill-drained soils. (*L. sitchense* Rupr.).

Lab. to the mts. of N. Eng. & N.Y.; near Lake Superior and in Alaska.

8. **L. flabelliforme** (Fern.) Blanchard, *Rhodora* **13**: 168-1911. Fig. 7, f.

Common throughout; mixed woods, pastures, sometimes on sandy soil, or even in spruce woods. (*L. complanatum*, var. *flabelliforme* Fern.). Nfld. to Minn. south to Ga.

Forma **ambiguum** Vict., *Contrib. Inst. Bot. Univ. Montreal*, no. **3**: 65. 1925, shows a transition to the next species. Plants with the spikes having a few more or less normal leaves at the summit are named forma **proliferum** Vict. l.c. page 66. Both these variations are commonly seen.

9. **L. complanatum** L.

Rare; hardwoods, or on hillsides, rarely in coniferous woods; scattered in the Cobequids and south along the Annapolis Valley; also in C.B. It is rarely seen fruiting.

Nfld. to Alaska south to N.S., Mich. & Wash.

10. **L. tristachyum** Pursh. Map 29. Fig. 7, g.

Dry barrens, sandy woods and gravelly embankments; scattered throughout, but common on the sandy soils of Shelburne, Kings and Cumberland Cos. Plants intermediate between this species and *L. complanatum* were found in the Cobequids and in C.B. and may be called var. *Habereri* (House) Vict., l.c. page 51.

Nfld. to James Bay & Minn. south to Ala.

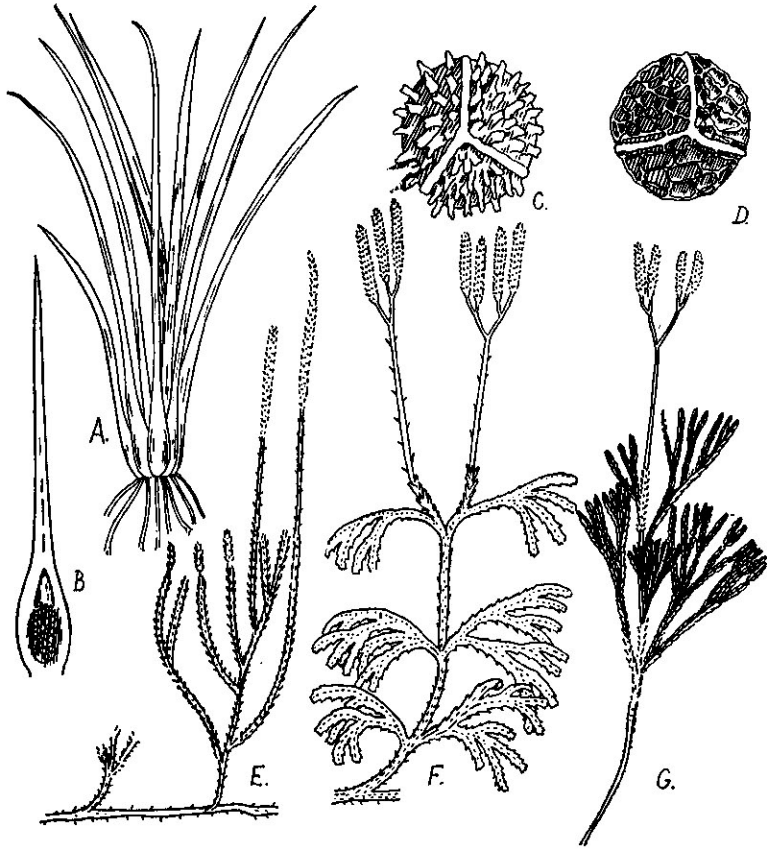


Figure 7.—*Isoetes*. a, habit sketch, x 1. b, inner view of a single sporophyll (leaf). c, spore of *I. Braunii*, x 40. d, spore of *I. Tuckermanni*, x 40. *Lycopodium*. e, *L. sabinæfolium*, x $\frac{1}{2}$. f, *L. flabelliforme*, x $\frac{1}{2}$. g, *L. tristachyum*, x $\frac{1}{2}$.

7. SELAGINELLACEAE

1. SELAGINELLA Beauv.

- a. Plant densely tufted, grayish green; leaves rigid and appressed, minutely ciliate and bristle-tipped. 1. *S. rupestris*
- a. Plant prostrate or creeping, often solitary, green; leaves spreading, or the two lower ranks smaller and appressed, soft, bristly-margined, not bristle-tipped. 1. *S. selaginoides*

1. *S. rupestris* (L.) Spring. ROCK SELAGINELLA. Fig. 6,d.

Known only from basalt ledges at the summit of Shobel's Mt., Sandy Cove, Digby Neck.

Dry exposed rocks and sandy sterile soil; N.S. to Minn. south to Ala.

2. **S. selaginoides** (L.) Link. Fig. 6, e.

Scattered in many of the sphagnous bogs in northern C.B.; borders of tussocks, overhanging the margins of a sluggish stream, St. Paul Is. (Perry, 1931).

Nfld. to N.Y.; west to Idaho & Alaska; Magdalen Islands.

8. **ISOETACEAE** QUILLWORT FAMILY

1. **ISOETES** L. QUILLWORT

a. Megaspores spiny, 420-580 microns in diameter. 1. *I. Braunii*

a. Megaspores with a network of ridges or projections.

b. Megaspores 600-800 microns in diameter. 2. *I. macrospora*

b. Megaspores 460-600 microns in diameter. 3. *I. Tuckermani*

1. **I. Braunii** Dur. QUILLWORT. Map 30. Fig. 7, a, c.

Scattered, probably throughout; well-drained lakes and ponds in C.B. (Nichols); gravelly and muddy bottoms of brooks in southwestern N.S. (Fernald, 1921); scattered elsewhere. (*I. echinospora* Dur., var. *Braunii* (Dur.) Engelm., and including var. *muricata* (Dur.) Engelm.).

Nfld. to N.J., Ohio, Minn. and westward.

2. **I. macrospora** Dur. Map 31.

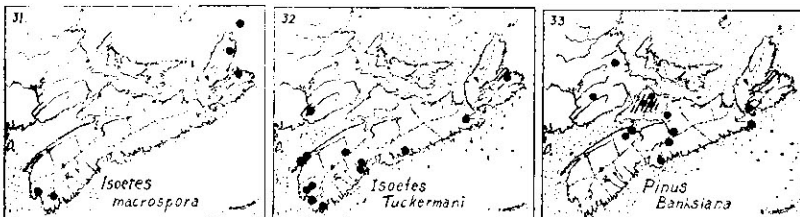
Sandy soil in a lake at North Sydney, Warren Lake at Ingonish, cobbly margins of east branch of the Tusket R. and gravelly bottom of the Clyde R.; abundant in Ethel Lake on St. Paul Is.

Nfld. to Minn. south to Mass.

3. **I. Tuckermani** A. Br., including var. *borealis* Eaton. Map 32. Fig. 7, d.

Shallow water of brooks, quiet pools, and lakes, on sandy, peaty or muddy margins; scattered throughout the Atlantic region from Digby and Yarmouth Cos. to Sydney.

Lab. to Conn.



SPERMATOPHYTA

9. TAXACEAE YEW FAMILY

1. TAXUS (Tourn.)L.

1. **T. canadensis** Marsh. CANADA YEW. Fig. 9, a, f.

Rather common throughout; cool damp woods, ravines, coniferous climax forests and wooded swamps; sometimes it forms a dense ground cover which excludes other plants.

Nfld. to Man. south to Va. & Iowa.

10. PINACEAE PINE FAMILY

- a. Leaves linear, in bundles of 2 or 5, or many together (Fig. 8, a, b).
- b. Leaves in 2's or in 5's; evergreen. 1. *Pinus*
- b. Leaves on short spurs, many in each cluster, or solitary on the more rapid terminal growth, deciduous. 2. *Larix*
- a. Leaves short, linear or scale-like, solitary.
- c. Leaves all linear; seeds in a woody cone.
- d. Leaves squarish in cross-section, not in two ranks. 3. *Picea*
- d. Leaves flattish in cross-section, whitened along the lower side, in two ranks so that the twigs appear flattened.
- e. Cone 5-10 cm long, upright, the scales readily falling away from the axis; leaves 1-3.2 cm long, leaving a smooth circular scar upon the twig (Fig. 9, b, d). 4. *Abies*
- e. Cone 1.5-2.5 cm long, hanging, the scales not falling away from the axis; leaves 8-13 mm long, attached to the twigs by hard, raised woody bases, leaving raised scars (Fig. 9, c, e). 5. *Tsuga*
- c. Leaves shorter, overlapping and often scale-like; seeds in an ellipsoid cone of 8-12 scales, or in a bluish, berry-like structure.
- f. Seeds in a cone; leaves scale-like, blunt, more or less 2-ranked (Fig. 8, g). 6. *Thuja*
- f. Seeds in the axils of 3-6 fleshy scales, which coalesce to form a round, bluish, berry-like structure; leaves not 2-ranked (Fig. 9, g, h). 7. *Juniperus*

1. PINUS (Tourn.) L. PINE

- a. Leaves 5 in a bundle; cones 10-15 cm long. 1. *P. Strobus*
- a. Leaves 2 in a bundle; cones 2-6 cm long.
- b. Leaves 9-16 cm long; stout tree with reddish bark. 2. *P. resinosa*
- b. Leaves less than 8 cm long; bark not reddish.

c. Leaves 1-4 cm long, widely divergent; resin ducts mostly 2 in each leaf, deeply imbedded (Fig. 8, d); bark of the upper branches and trunk dark.

4. *P. Banksiana*

c. Leaves 4-6 cm long, not widely divergent; resin ducts many in each leaf, nearly peripheral (Fig. 8, c); bark of the upper branches and trunk yellowish.

3. *P. sylvestris*



Fig. 8.—*Pinus*. a, *P. Strobus*, cone and leaves, x $\frac{1}{2}$. b, *P. resinosa*, cone and leaves, x $\frac{1}{2}$. c, *P. sylvestris*, cross-section of leaf. d, *P. Banksiana*, cross-section of leaf. *Larix*. e, *L. laricina*, x $\frac{1}{2}$. *Picea*. f, cones of *P. glauca*, *P. rubens*, and *P. mariana*. *Thuja*. g, twig, x $\frac{1}{2}$.

1. *P. Strobus*. L. WHITE PINE. Fig. 8, a.

Common on the sandy or gravelly well-drained soils of the province; formerly reaching its best development on the glacial granitic sands of Shelburne Co., on the sands of the Annapolis Valley, and on the lowlands of Cumberland and north Colchester Cos; scattered elsewhere, becoming rarer east to C.B.

Nfld. along the mts to Ga. west to Man. & Iowa.

2. **P. resinosa** Ait. RED PINE. Fig. 8, b.

Common in the Annapolis valley and the lowlands of Colchester and Cumberland Cos. on sandy or rocky soils; scattered in other parts of the province. It is frequently found in poorly-drained areas. Due to cutting and frequent fires it has been replaced in the northern part of the province by Jack Pine.

Nfld. to Man. south to Penn. & Wisc.

3. **P. sylvestris** L. SCOTCH PINE.

Frequently planted; common only around towns.

Introduced from Eu.

4. **P. Banksiana** Lamb. JACK PINE. Map 33.

Very sandy, barren or poorly-drained soils; common and spreading rapidly in Cumberland Co.; rare in the Annapolis Valley; scattered eastward.

Forma **procumbens** Rousseau, Nat. Canad. **65**: 301. 1938, is a shrubby form 0.5-2 m high, with the branches procumbent. Found on the exposed rocky headlands in the vicinity of Canso. Known also from Que.

N. S. to northern N.Y., n. Ind., Minn. and northward.

2. **LARIX** (Tourn.) Adans.

a. Leaves 10-25 mm long; cones 12-16 mm long, with scales smooth; branches stiff. 1. *L. laricina*

a. Leaves 20-40 mm long; cones 20-40 mm long, with scales finely hairy; branches slender and pendulous. 2. *L. decidua*

1. **L. laricina** (DuRoi) Koch. TAMARACK, LARCH, HACKMATAACK, "JUNIPER". Fig. 8, e.

Common in bogs and poorly-drained soils throughout; one of the few trees able to grow in peat bogs, where stunted individuals a few feet high may be almost 100 years old. Nichols states that it is rare in northern C. B., but this may have been due to an earlier insect infestation.

Depressed forms of the tree which grow on exposed and sterile places are forma **depressa** Rousseau, Bull. Nat. Mus. Canada **66**: 28. 1931. Common, according to Rousseau, on exposed headlands at Canso.

Lab. & Nfld. to the mouth of the Mackenzie, south to Penn.

2. **L. decidua** Mill. EUROPEAN LARCH.

Occasionally seen along roadsides, and planted as wind-

breaks. Introduced from Eu.; throughout eastern N.A.

3. *PICEA* Link SPRUCE

- a. Native and common; cones 2-5 cm long; branches usually spreading.
- b. Twigs smooth; cones cylindrical, 2-5 cm long, with 60-90 scales which are flexible and smooth-edged; leaves blue-green, sharp (Fig. 8, f).
 - 1. *P. glauca*
- b. Twigs finely hairy; cones ovoid to roundish, with about 30 scales which are often wavy or ragged-edged; leaves blunter, rigid at maturity (Fig. 8, f).
- c. Leaves grayish or bluish-green; cones persisting 2-5 years on the branches; scales of the cones ragged-edged; branches stiff; bark usually dark.
 - 2. *P. mariana*
- c. Leaves yellowish-green, rather long and blunt, not shiny; cones mostly falling the first autumn and confined to the top of the tree; scales of the cones smooth- to wavy-edged; branches often drooping; bark reddish-tinged.
 - 3. *P. rubens*
- a. Introduced, occasionally planted; cones 10-15 cm long; branches drooping; leaves sharp-pointed, 12-25 mm long.
 - 4. *P. Abies*

1. ***P. glauca*** (Moench)Voss. WHITE, PASTURE, or CAT SPRUCE.

This tree was probably not common in the original forest but is now common throughout, and invariably occupies any grazed pasture or neglected field. (*P. canadensis* (Mill.) BSP.).

Forma **parva** (Vict.) Fern. & Weatherby, Rhodora **34**: 187. 1932, is a prostrate form found in exposed places, upon headlands, sand beaches and bogs in the northern part of the province.

Nfld. & Lab. to Alaska south to Mass., Wisc. & Mont.

2. ***P. mariana*** (Mill.) BSP. BLACK or BOG SPRUCE.

Common throughout in swamps, bogs and poorly drained areas, rarely found on the uplands or in dense forests. In many places it is difficult, or impossible, to distinguish this from the next species. The prostrate form found on the exposed bogs and sterile headlands is forma **semi-prostrata** (Peck) Blake, Rhodora **15**: 200. 1913. This is common along the Atlantic Coast from Halifax northward.

Nfld. to N.J. west along the Great Lakes and northward.

3. ***P. rubens*** Sarg. RED SPRUCE.

Common throughout in good soils, well- to medium-

drained situations. In places, as around Amherst, the red spruce covers large areas of lowland soils. (*P. rubra* (Du-Roi) Dietr.).

N.S. to eastern Que. south in the mts. to N.Y.

4. **P. Abies** (L.) Karst. NORWAY SPRUCE.

Occasionally planted as an ornamental or for wind-breaks.

Intro. from Eu. into many parts of N.A.

4. **ABIES** (Tourn.) Hill FIR

1. **A. balsamea** (L.) Mill. BALSAM FIR. Fig. 9 b, d.

This is one of the commonest trees of the province, replacing many of the more valuable hardwoods and spruces. The interior of C.B. is covered mostly with fir; elsewhere fir comes in whenever deciduous woods are opened up, and often establishes itself in the open pasture or bush before the spruces or other conifers.

Nfld. to the Yukon, south around the Great Lakes and in the mts. to Va.

Var. **phanerolepis** Fern., *Rhodora* 11: 203. 1909, is similar to the species but with the cones shorter and the mature scales sub-orbicular or reniform, and with a conspicuous exerted awn which gives a peculiar whitish appearance to the cones. Scattered along the Atlantic Coast; growing with the typical form at Argyle, Yarmouth Co; rather common at Musquodoboit Harbour and Jeddore (Rousseau), and the commonest form on St. Paul Is. (Perry).

Scattered and its distribution not well-known; Nfld., Que. and northern N.J.

5. **TSUGA** (Endl.) Carr.

1. **T. canadensis** (L.) Carr. HEMLOCK. Fig. 9, c, e.

Hemlock is now one of the commonest trees cut for lumber. It is rather local, sometimes being the predominant tree but often scattered or local. It prefers northern slopes, ravines, or sandy soil with subsurface water. Annapolis has been called the hemlock county, but the tree is commonest in southwestern N.S. and gradually gives way

to the spruces and firs eastward.

N.S. to Minn. south along the mts. to Ga.

6. THUJA L.

1. *T. occidentalis* L. ARBOR VITAE, WHITE CEDAR
Fig. 8, g.

Local; scattered along some of the lakes in the back regions of Digby and Yarmouth Cos.; absent elsewhere, although it is possible that it exists on the isthmus between N.S. & N.B. In places in the Annapolis Valley it has escaped and spread extensively along the rocky pastures.

N.S. to Man. & Minn. south to Penn. & N.C.

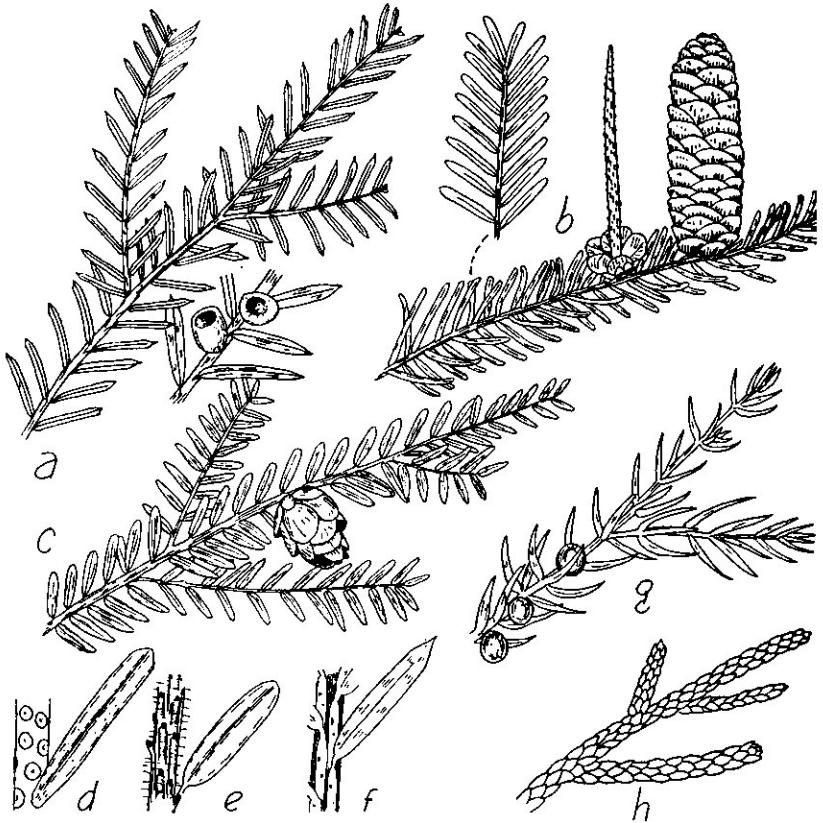


Fig. 9.—*Taxus*. a, *T. canadensis*, x $\frac{1}{2}$. *Abies*. b, twig, x $\frac{1}{2}$. *Tsuga*. c, twig, x $\frac{1}{2}$. d, *Abies*. e, *Tsuga*. f, *Taxus*. *Juniperus*. g, *J. communis*, twig, x $\frac{1}{2}$. h, *J. horizontalis*, twig, x 2.

7. JUNIPERUS (Tourn.) L. JUNIPER

- a. Leaves needle-like, more or less whorled, 7-22 mm long (Fig. 9, g).
- b. Shrub low or erect, but not strictly depressed with age; leaves narrow, sharp and straight.
 - c. Shrub erect; leaves 7-22 mm long. 1. *J. communis*
 - c. Shrub depressed with the branch tips erect or creeping, forming circular patches 2-4 m in diameter; leaves usually shorter than the last. *J. communis* var. *depressa*
- b. Shrub decumbent with the branches pressed against the soil; leaves short, stout and incurved.
 - d. Fruit less than 9 mm in diameter; seeds less than 5 mm long. *J. communis* var. *montana*
 - d. Fruit 9-12 mm in diameter; seeds 5-7 mm long. *J. communis* var. *megistocarpa*
- a. Leaves scale-like, generally opposite, 1.5-3 mm long, much overlapping, (juvenile forms may have the leaves sharp and spreading, 4-5 mm long). Fig. 9, h. 2. *J. horizontalis*

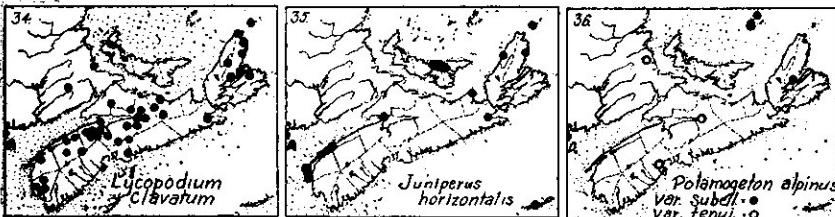
1. *J. communis* L. COMMON JUNIPER. Fig. 9, g.

Erect bush-like forms occur near Halifax which may be placed with the species. (See Sommers, Trans. N.S. Inst. Sci. 9: 2: 175-179. 1896). Such transitional forms, which resemble to some extent the European plant, occur from N.S. and Me. south to N.C.

Var. **depressa** Pursh is common throughout, in sandy areas, hillside pastures, poorly-drained soil, or even in bogs and on heaths. It is especially common in the Annapolis Valley. Lab. to B.C. south to N.Y., Ind. & Utah.

Var. **montana** Ait. is rare around the coast: bogs near Canso, on the heaths of northern C.B., and scattered on St. Paul Is.

Var. **megistocarpa** Fern. & St. John, Proc. Bost. Soc. Nat. Hist. 36: 58. 1921, is found near the coast. It was originally described from Sable Island; and is reported from St. Paul Is., Nfld., the Magdalen Islands, and Gaspé.



2. **J. horizontalis** Moench. CREEPING JUNIPER. Map 35. Fig. 9, h.

Rocky headlands, or on cliffs, pastures or beaches near the coast; scattered along the Bay of Fundy; rare on the North Shore; common in northern C.B. and on Sable Is. Plants reported by Rousseau from Guysborough have the leaves needle-like and sharp like the juvenile branches. This has been named forma **alpina** (Loud.) Rehd., Journ. Arnold Arb. 6: 203. 1925.

Nfld. to N.Y., northern Minn. and northward.

11. TYPHACEAE CAT-TAIL FAMILY

1. TYPHA (Tourn.) L. CAT-TAIL

a. Leaves flat, 12-24 mm wide; staminate and pistillate spikes touching; pistillate spikes in fruit 2.5 cm thick. 1. *T. latifolia*

a. Leaves usually slightly rounded, 3-7 mm wide; staminate and pistillate spikes separated by an interval; pistillate spike in fruit 10-17 mm thick. 2. *T. angustifolia*

1. **T. latifolia** L. BROADLEAVED CAT-TAIL. Fig. 10, a.

Common throughout; in miry swamps, shallow ponds, wet areas in fields, edges of rivers and streams, in estuaries above salt water, and occasionally in floating bog associations. Local on Sable Is., growing on the borders of the fresh water ponds; very rare on the highlands of C.B.

Throughout N.A.

2. **T. angustifolia** L.

Local around some of the small lakes south of Amherst near the head of the tide. Dore has collected it near Cheticamp in C.B. Lindsay lists it from Beaverbank in Halifax Co.; and Macoun reports it from near Windsor. The last two are not supported by records; but the plant is to be expected in scattered localities near the coast.

Southern Me. and N.S. south along the coast to Fla. and inland about the Great Lakes.

12. SPARGANIACEAE BUR-REED FAMILY

1. SPARGANIUM (Tourn.) L. BUR-REED

a. Stigmas 2; fruit squarish across the top when mature; plants large and stout (Fig. 10, b). 1. *S. eurycarpum*

- a. Stigma 1; mature fruit tapering at each end (Fig 10, e).
 b. Beak of the fruit long and slender; staminate heads 2-many.
 c. Beak of the fruit slender, straight or nearly so; leaves erect or floating; sepals attached near the top of the flower stalk.
 d. Pistillate heads or branches borne directly in the axils of the leaves; nutlets not ribbed at the summit (Fig. 10, c).
 2. *S. americanum*
 d. Pistillate heads or branches usually borne some distance above the leaf axils (Fig. 10, d); nutlets ribbed or angled above the middle.
 e. Plants usually with erect leaves; nutlets ribbed plainly at the summit, with beaks about the length of the body.
 f. Pistillate heads 2-4, well separated, 1.5-2.7 cm in diam.; staminate part of the inflorescence 2-10 cm long, of 4-9 heads.
 3. *S. chlorocarpum*
 f. Pistillate heads 1-3, the upper touching each other, 1-2.2 cm in diam.; staminate part of the inflorescence 1-4 cm long, of 2-5 heads.
S. chlorocarpum var. *acaule*

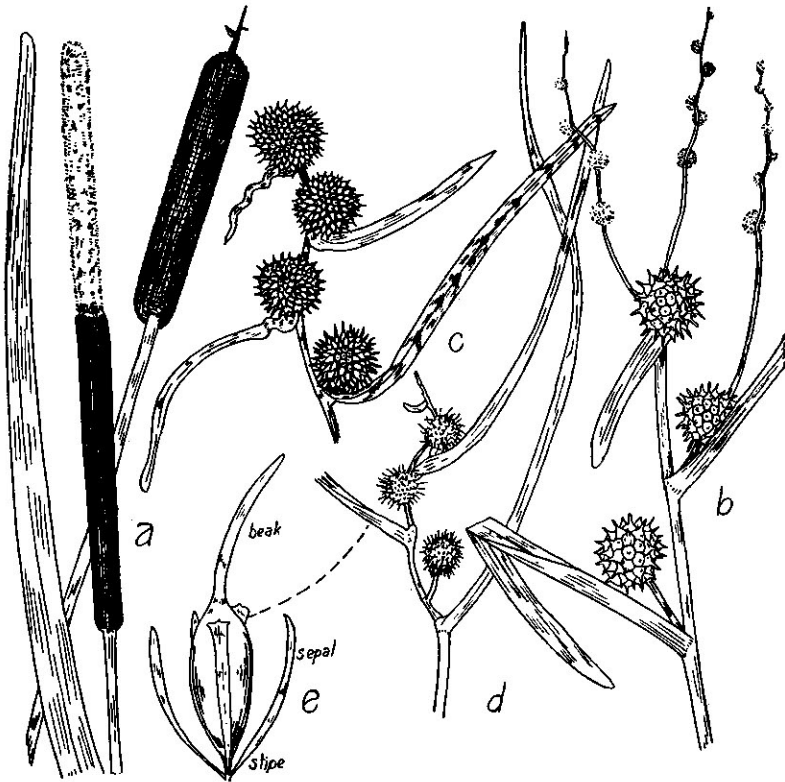


Figure 10.—*Typha latifolia*. a, plant, $\times \frac{1}{2}$. *Sparganium*. b, *S. eurycarpum*, top of plant, $\times \frac{1}{2}$. c, *S. americanum*, $\times \frac{1}{3}$. d, *S. fluctuans*, $\times \frac{1}{3}$. e, single floret of *S. fluctuans*, $\times 8$.

- e. Plants with usually floating leaves; nutlets obscurely or not ribbed; beak shorter than the body.
- g. Leaves 1.5-4 mm wide, rounded on the back; pistillate heads 1.3-2 cm in diam.; nerves on the underside of the leaf 0.2-0.8 mm apart. 4. *S. angustifolium*
- g. Leaves 5-10 mm wide, flat on both sides; pistillate heads 2-2.5 cm in diam.; nerves on the under side of the leaf 0.8-2 mm apart. 5. *S. multipedunculatum*
- c. Beak of the fruit long and very curved; leaves all floating; sepals attached near the base of the flower stalk (Fig. 10, d, e). 6. *S. fluctuans*
- b. Beak of the fruit short or none; staminate head one; plants small.
 - h. Beak short and conical, 0.5-1.5 mm long; pistillate heads all borne directly in the axils of the leaves. 7. *S. minimum*
 - h. Beak none; pistillate heads a short distance above the leaf axils. 8. *S. hyperboreum*

1. ***S. eurycarpum*** Engelm. GIANT BUR-REED. Fig. 10, b.
 Common in rich swampy areas, on mucky shores, borders of sloughs and sink-holes; Annapolis Valley east to C.B., rare elsewhere.

N.S. to B.C. south to Fla. & Calif.

2. ***S. americanum*** Nutt., including var. *androcladum* Fern. and Eames. Map 37. Fig. 10, c.

Common throughout; muddy shores of lakes and slow-moving streams; probably more abundant in southwestern N.S. than elsewhere, where it forms extensive areas with *Pontederia* around the shallow edges of the lakes.

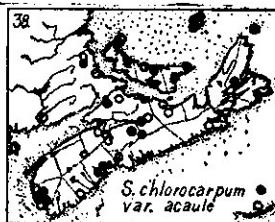
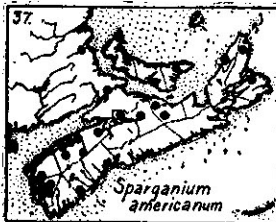
Nfld. to Minn. south to Fla. & Mo.

3. ***S. chlorocarpum*** Rydb. Map 38.

Common throughout on wet mucky shores, and in muddy shallow water. (*S. diversifolium* Graebner). Nfld. & Ont. to Iowa south to N.J. & Ind.

Var. ***acaule*** (Beeby) Fern. is also frequent throughout in much the same locations.

Nfld. to N.D. south to Va.



4. *S. angustifolium* Michx. Map 39.

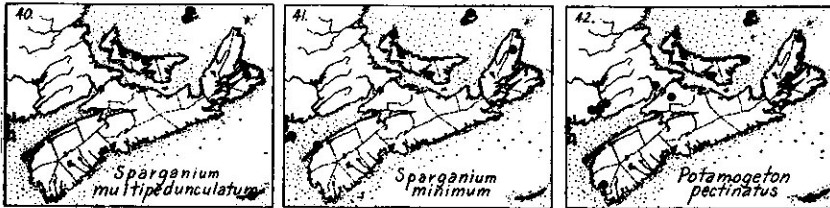
Common throughout the Atlantic Region, scattered elsewhere; sandy shores of ponds, edges of lakes, and marshy places.

Nfld. to N. Eng. west to Alaska and Ore.

5. *S. multipedunculatum* (Morong) Rydb. Map 40.

See Fernald, *Rhodora* 27: 190-193. 1925.

Rare; known only from Sable Island, and from North Sydney and Sydney Mines. It is found at the edge of fresh



or brackish lakes or ponds.

Southern Lab. to Alaska south to N.S., N.H., & Calif.

6. *S. fluctuans* (Morong) Robinson. Fig. 10, d, e.

Scattered; found in shallow to deep water at the edge of ponds: near Yarmouth, Millstream in Pictou Co., and around the edges of the dykelands at the head of Cobequid Bay.

Nfld. to Minn. south to Penn. & Wisc.

7. *S. minimum* Fries. Map 41.

Local; collected in quiet pools in the Little River, east of Tiddville, Digby Co. (Fernald, 1921), and previously found by Nichols in a brook, mountains west of Ingonish.

Nfld. to Alaska south to Conn., Mich. and Ore.

8. *S. hyperboreum* Laestad.

The only record is that of Macoun: ditch near Louisburg (Cat. Can Pl. IV:71).

Arctic regions south to N. S., Que. & Man.

13. NAJADACEAE PONDWEED FAMILY

a. Leaves alternate.

b. Flowers perfect, in spikes or clusters; leaves widely scattered along the stem (Fig. 11, a-c).

c. Fruits sessile, in spikes or heads; floating leaves often present; fresh to brackish water.

1. *Potamogeton*

- c. Fruits more or less stalked, with a cluster on a long peduncle; brackish to salt water (Fig. 13, c). 2. *Ruppia*
- b. Flowers of two kinds, of sessile anthers, or pistils attached in 2 vertical rows on the inner side of a leaf-like spadix; leaves very long and grass-like, the bases sheathing the short jointed rootstock; salt water only. 3. *Zostera*
- a. Leaves opposite.
 - d. Leaves linear, entire; fruits in clusters of 3-5, on short stalks in the leaf axils, flattened and toothed along one side; brackish water (Fig. 13, b). 4. *Zannichellia*
 - d. Leaves less than 1 mm wide, serrulate; flowers solitary; fresh water only (Fig. 13, d). 5. *Najas*

1. POTAMOGETON (Tourn.) L. PONDWEED

St. John, Harold. *Potamogeton*, Section *Coleophylli*. *Rhodora* 18: 121-138. 1916. Fernald, M.L. The linear-leaved North American species of *Potamogeton*. *Mem. Amer. Acad. Arts and Sci.* 17: pt. 1, 1-183. 1932. Ogden, E. C. The broad-leaved species of *Potamogeton* of North America north of Mexico. *Rhodora* 45: 57-105; 119-163; 171-214. 1943.

- a. Floating leaves present.
 - b. Floating leaves delicate, translucent, grading with no sharp distinction into the petiole; fruits with the exocarp hard and smooth; beak of the fruit linear, 1-1.3 mm long. 12. *P. alpinus*
 - b. Floating leaves thick and leathery, the blade distinct from the petiole; fruit with the exocarp soft and porous.
 - c. Floating leaves with 21-41 nerves (in *P. epihydrus* 11-33); spikes large with numerous flowers; fruit 2.5-5 mm long.
 - d. Floating leaves typically cordate at the base, or occasionally tapering in running water (Fig. 12, d, e).
 - e. Floating leaves with 23-37 nerves, one third more prominent than the rest; fruit 3.5-5 mm long; submersed leaves linear, 0.8-2 mm wide, with 3-5 obscure nerves (Fig. 12, d). 16. *P. natans*
 - e. Floating leaves with 21-29 equal nerves; fruit 3-3.5 mm long, with the beak 1 mm long; submersed leaves on the upper part of the stem lanceolate, 10-25 mm wide, with 11-21 nerves and 4-8 rows of areolae each side of the mid-rib (Fig. 12, e). 15. *P. pulcher*
 - d. Floating leaves tapering to the base.
 - f. Floating leaves with 29-41 nerves, one-quarter more prominent than the others; submersed leaves on upper part of the stem broadly lanceolate to ovate, strongly arcuate; fruit with the beak up to 1 mm long (Fig. 12, a). 14. *P. amplifolius*
 - f. Floating leaves with 11-33 nerves; submersed ones strongly dis-

- tichous, long, 2-8 mm wide, 5-7 nerved with a wide reticulated mid-rib (Fig. 12, f); fruit essentially beakless.
11. *P. epiphydrus*
- c. Floating leaves all with less than 21 nerves, the bases rounded to tapering.
- g. Submersed leaves linear with parallel sides, 0.5-2 mm wide, with 1-3 nerves; floating leaves 0.7-4 cm long, 0.2-2 cm wide (Fig. 12, c).
- h. Spikes 2-6 cm long, with 3-8 whorls of flowers, in the axils of upper leaves; fruit 2.5-3.5 mm long, with a short broad beak; stipules of the submersed leaves not joined to the edges of the leaves.
17. *P. Oakesianus*
- h. Spikes small and few-flowered, common in the axils of the submersed leaves, the lower 1-6-flowered and sessile; fruit 1.3-2.2 mm long, the beak absent; stipules joined to the edges of the submersed leaves to form a sheath (Fig 11, c, f).
10. *P. Spirillus*
- g. Submersed leaves with curving sides, 2-15 mm wide, with 5-11 nerves; fruiting spikes 6-8 mm thick.
- i. Submersed leaves with sharp apices, and 1 or 2 rows of obscure areolae at the mid-rib; fruit 1.7-3.5 mm long, with a weak linear beak 0.3-0.5 mm long; floating leaves 1.5-5 cm long, 1-2 cm wide (Fig. 12, b).
18. *P. gramineus*
- i. Submersed leaves with blunt apices, with 2-4 obscure rows of areolae; fruit reddish, 2-2.5 mm long, with the beak absent or minute; floating leaves 3-8 cm long, 1-4 cm wide.
13. *P. polygonifolius*
- a. Floating leaves absent.
- j. Submersed leaves elliptic to ovate, cordate or tapering to the base, more than 1 cm wide (Fig. 13, a).
- k. Leaves elliptic or wider, cordate or rounded at the base, plainly clasping.
- l. Leaves 10-20 cm long; stipules usually persistent and conspicuous; peduncles 15-60 cm long; fruit more than 4 mm long, with the dorsal keel strongly developed.
19. *P. praelongus*
- l. Leaves 1-6 cm long; stipules delicate, disappearing; peduncles 1-9 cm long; fruit less than 3 cm long, with the keel absent or weak.
20. *P. bupleuroides*
- k. Leaves linear to linear-oblong, sessile, but slightly clasping, 1-2 cm wide.
12. *P. alpinus*
- j. Submersed leaves linear, less than 10 mm wide.
- m. Stipules joined to the base of the leaf, making a sheath 1 cm long or longer; flowering spikes slender and interrupted; leaves 2 mm wide or less.
- n. Leaves tapering to long slender points; fruit with a short beak; stem much branched (Fig 11, b).
1. *P. pectinatus*
- n. Leaves blunt or rounded at the tips; fruit without a beak.
- o. Sheaths tightly clasping the stem; leaves 0.5 mm wide or less; flowers in 2-5 whorls.
2. *P. filiformis*

- o. Sheaths swollen, 2-5 times wider than the stem; leaves ribbon-like, 1-2 mm wide (Fig. 11, h); flowers in 5-12 whorls.

3. *P. vaginatus*

- m. Stipules not joined to the base of the leaf; or, if so, with the sheath less than 5 mm long; spikes usually not interrupted.

- p. Stipules joined to the leaf-base, forming a sheath longer than the free tips (Fig. 11, f); spikes of the lower submersed leaves 1-6 flowered, sessile, the upper peduncled (Fig. 11, c); fruit 1.3-2.2 mm wide, the beak absent, the form of the coiled embryo clearly visible.

10. *P. Spirillus*

- p. Stipules not joined; spikes with peduncles 3-100 mm long; fruits definitely beaked, or else with the beak obscure and the fruit more than 2.5 mm long; embryo not clearly visible.

- q. Leaves 0.5-4 mm wide; fruit plump, beaked.

- r. Rootstock extensively creeping; leaves thread-like, 0.1-0.5 mm wide; stipules essentially nerveless; peduncle long and erect, a continuation of the main stem (Fig. 11, a).

4. *P. confervoides*

- r. Rootstock short or wanting; leaves coarser; peduncles mostly in the upper forks of the stem.

- s. Leaves 1.5-3.5 mm wide, 5-7 nerved; stipules strongly fibrous, becoming whitish.

6. *P. Friesii*

- s. Leaves 0.3-4 mm wide, 1-3- rarely -5-nerved; stipules not strongly fibrous nor becoming whitish.

- t. Plants coarse; leaves with 2-4 bands of areolae each side of the mid-rib, and usually 2 large glands at the base on the stem; inflorescence dense, thick-cylindric; fruit 3-4 mm long.

8. *P. obtusifolius*

- t. Plants delicate; leaves narrow with the areolae poorly developed, and the glands small or absent; inflorescence few flowered, globose or interrupted; fruit 1.8-2.8 mm long.

- u. Spikes with 3-5 distant whorls of flowers; stipules joined to form a short sheath; peduncles 1.5-8 cm long

7. *P. pusillus*

- u. Spikes subglobose, or short, thick cylindric.

- w. Stipules joined to form a sheath (Fig. 11, e); leaves without areolae or with 1-3 rows near the base; peduncles 0.4-1 cm long.

5. *P. foliosus*

- w. Stipules separate (Fig. 11, g); leaves with 1 or more rows of areolae; peduncles 0.5-3 cm long.

9. *P. Berchtoldi*

- q. Leaves 2-8 mm wide, strongly 2-rowed; fruit essentially beakless.

11. *E. epihydrus*

1. *P. pectinatus* L. SAGO POND WEED. Map 42. Fig. 11, b.

Brackish ponds around the coast; common in ponds on Sable Is; forming, with *Ruppia*, the bulk of the vegetation in brackish ponds around C.B.; common in the salt lake at

Oxford; found also in alkaline sink-holes. Bennett, Jour. Bot. **39**: 199. 1901, names a form, forma **pseudomarinus** Benn. and credits it to Sable Is.

Alkaline, brackish or sometimes fresh water; Nfld. to B.C. southward; widely distributed throughout the world.
 2. **P. filiformis** Pers., var. **borealis**. (Raf.) St. John, 1. c. page 134.

Reported by Fernald (1921) from a fresh to brackish swale at the head of Baddeck Bay. Scattered in cool spring streams in eastern P.E.I.

Calcareous water: Nfld. to Alaska south to Penn. & Colo.; Asia.

3. **P. vaginatus** Turcz.

Rare; cold shallow brook at the head of Baddeck Bay

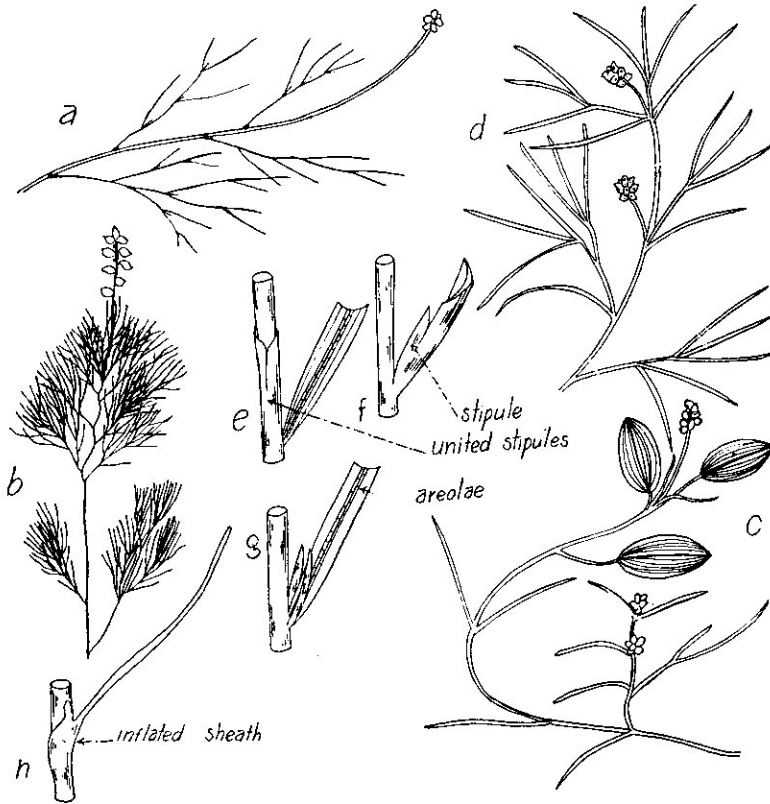


Figure 11.—*Potamogeton*. a, *P. confervoides*, "x $\frac{1}{2}$ ". b, *P. pectinatus*, x $\frac{1}{2}$. c, *P. Spirillus*, x $\frac{1}{2}$. d, *P. foliosus*, x $\frac{1}{2}$. e, f, g, h, leaf-sheaths of *P. foliosus*, *P. Spirillus*, *P. Berchtoldi*, and *P. vaginatus*.

(Fernald, 1921), poorly fruiting in the northeast. Re-described as *P. moniliformis* by St. John, l. c.

Local in hard or brackish waters; Lab. to Alta. south to N.Y., Wisc. and N.D.

4. ***P. confervoides*** Reichenb. Map 43. Fig. 11, a.

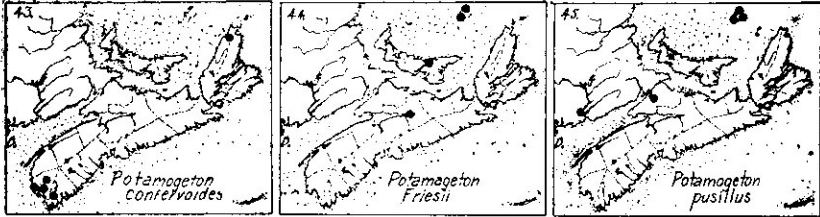
Lakes, small ponds and bog pools; frequent in Yarmouth Co.; occasional in Shelburne Co; found on the mountains east of Pleasant Bay, C.B.

Acid or siliceous regions; Nfld to N.Y., southern N.J. and Penn.

5. ***P. foliosus*** Raf., var. ***macellus*** Fern., l.c. page 46.

Fresh to brackish water; Sydney Mines, Truro and Sandy Cove.

N.S. & Gaspé to the Yukon south to Fla. & Calif.



6. ***P. Friesii*** Rupr. Map 44.

Quiet waters of the Salmon River., Truro; the record from south of Amherst apparently belongs elsewhere. Chiefly in calcareous or brackish water.

Lab. & Nfld. to the MacKenzie south very locally to N.S., Mass., N.J., Wisc. & B.C.; Eurasia.

7. ***P. pusillus*** L. See Jour. Bot. 76: 89-92. 1938: Map 45.

Spring pools and ditches south of Amherst (Fernald, l.c. page 62). Basic or brackish water. (*P. panormitanus* var. *major* G. Fischer. *P. strictifolius* Benn.).

N.S. to B.C. south to Va., Mex. & Calif.; Eurasia, etc.

8. ***P. obtusifolius*** Mert. & Koch.

Collected by Macoun at Mira Bay, C.B.

Cold water of ponds and lakes, Lab. to Minn. south to C.B., & N.J., Mich. & Vancouver Is.; Eurasia.

9. ***P. Berchtoldi*** Fieber, see Rhodora 42: 246. 1940.

a. Leaf-tips subacute to sharply pointed, only exceptionally obtuse.

- b. Primary leaves of principal stems 0.5-1.5 mm wide, with well-defined lacunae often in 2 rows each side of the lower half of the midrib.

var. *typicus*

- b. Primary leaves 0.3-1 mm wide, with a single row of frequently evanescent lacunae each side of the midrib.

var. *tenuissimus*

- a. Leaf-tips rounded or obtuse.

var. *mucronatus*

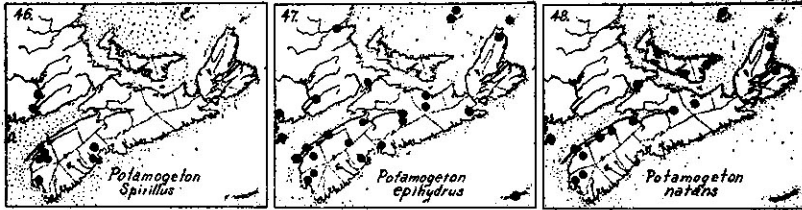
Var. *typicus* was collected by Howe and Lang in a brook pool, Grand Pre; and by Long and Linder at Hectanooga Lake, Digby Co. (*P. pusillus* of earlier authors).

N.S. to Minn. south to La.; Alaska to Calif.; Eurasia.

Var. *tenuissimus* (Mert. & Koch) Fern. is found in fresh or brackish pools on Sable Is. and in southwestern N.S. Reports of *P. Sturrockii* Benn. and *P. Aschersonii* from Sable Is. are based on plants of this and the following variety. Distribution and range as in the typical plant.

Var. *mucronatus* Fieber is scattered in brackish, alkaline or fresh water; Digby Co; Sable Is.; and C.B.

Greenland to Dela. west around the Great Lakes to B. C. and north to Alaska.



10. **P. Spirillus** Tuckerm. Map 46. Fig. 11, c.

Shallow pools, lake margins and quiet streams; known from Digby, Yarmouth and Lunenburg Cos. (*P. dimorphus* Raf.).

Nfld. & N.S. to S.D. south to Iowa & Penn.

11. **P. epihydrus** Raf., var. **Nuttallii** (Cham. & Schlecht.) Fern., l.c. page 115. Map 47.

Shallow water of pools, streams and ponds; throughout. (*P. epihydrus* in Gray Man.).

Nfld. to Man. south to Ga; Alaska to Calif.

12. **P. alpinus** Balbis

- a. Submersed leaves 7-25 cm long, usually more than 8 times as long as broad, tapering to an obtuse or acutish apex. var. *tenuifolius*

- a. Submersed leaves 4-10 cm long, usually less than 8 times as long as broad; apex rounded and sometimes slightly cucullate.

var. *subellipticus*

Var. **tenuifolius** (Raf.) Ogden, l.c. page 90, has been found at Truro and Mahone Bay. (*P. microstachys* Wolfg.).

Streams and cold ponds, Greenland to Alaska south to Penn., Colo. and Calif.

Var. **subellipticus** (Fern.) Ogden, l.c. page 94, collected by Fernald and Long from a cold shallow brook Baddeck Bay.

Nfld. south to Vt. and east N.Y., west to Wisc., etc.

13. **P. polygonifolius** Pourret

Abundant in fresh-water ponds on Sable Island, even in ponds that dry up for part of the summer.

Nfld., St. Pierre and Sable Is.; Europe & Africa.

14. **P. amplifolius** Tuckerm. Fig. 12, a.

Lakes and streams, usually in deep water; scattered



Figure 12.—Potamogeton. a, *P. amplifolius*, $\times \frac{1}{2}$. b, *P. gramineus*. c, *P. Oakesianus*. d, *P. natans*. e, *P. pulcher*. f, submersed leaves showing veining.

lakes from Yarmouth Co. through Digby and Annapolis Cos. to Kings Co., where it is found in the streams around Minas Basin.

Nfld. south to Tenn.; west to Mo. & Kans.; Wash. to Calif.

15. **P. pulcher** Tuckerm. Fig. 12, e.

Muddy cove in Lily Lake, Sandy Cove, Digby Co.; quagmire margin of Sears Lake, New Tusket, Digby Co.; brook beds in peaty swale, Rhodenizer Lake east of Bridge-water.

Chiefly on the coastal plain and Mississippi embayment; N.S.; Mass. to Ga. and scattered west to Mo. & Minn.

16. **P. natans** L. Map 48. Fig. 12, d.

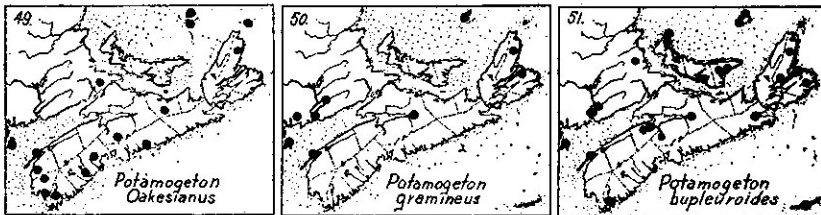
Throughout; common from Digby Neck to C.B.; probably scattered elsewhere. It is often the only species on the larger rivers, where it fruits abundantly.

Lakes and streams, Nfld. to Alaska south to Penn. & Calif.

17. **P. Oakesianus** Robbins. Map 49. Fig. 12, c.

Frequent in shallow peat- or sand-bottomed lakes and pools of Yarmouth and Digby Cos.; scattered eastward.

Nfld. to N.J. west to Central N.Y.; local in Ont., Mich. Wisc. and westward.



18. **P. gramineus**. L. Map 50. Fig. 12, b.

a. Principal submersed leaves 1.5-4.5 cm long, 0.2-0.6 cm wide, with 5-7 nerves. var. *typicus*

a. Principal submersed leaves 6-9 cm long, 0.6-1 cm wide, with 7-9 nerves. var. *maximus*

This species is scattered, and but little collected.

(Including var. *graminifolius* Fries. *P. heterophyllus* Schreb.).

Var. **maximus** Morong has been collected in the Salmon R. at Truro.

Hybrids between this species and *P. perfoliatus* var.

bupleuroides are rather common in the Maritimes. Plants reported as *P. gramineus* var. *spathulaeformis* Robbins from Centreville, Digby Co. (*Rhodora* 23: 190. 1921) are placed here by Ogden; also that of Fassett from Shinimicas R., Northport, and of Nichols from Dingwall.

Greenland to Alaska south to N.J., Ariz. & Calif.

19. **P. praelongus** Wulf.

The only collection known is that of McKay from the Earltown Lakes, 1883.

Deep cold water, Lab. and Nfld. south to N.J. and west.

20. **P. bupleuroides**. Fern. Map 51. Fig. 13, a.

Frequent in brackish water around the province; reported from fresh water only from Midway Lake, Digby Neck (Fernald, 1921); but often growing above tide level near the mouth of streams. Common in brackish ponds on Sable Is.

Nfld. to Fla. west to Ont., Ohio & La.

2. RUPPIA L.

Fernald, M.L. & K. M. Wiegand. The genus *Ruppia* in eastern North America. *Rhodora* 16: 119-127. 1914.

1. **R. maritima** L. DITCH-GRASS. WIDGEON-GRASS. Fig. 13, c.

a. Carpels ovoid, slightly oblique but not strongly eccentric nor curved, bluntish or not tapering to a conspicuous beak; pedicels 6-25 mm long. var. *obliqua*

a. Carpels strongly eccentric and distinctly beaked, or very strongly curved.

b. Mature pedicels (podogynes) 1-3 cm long.

c. Peduncles at maturity 3-30 cm long, spiraling or flexuous.

var. *longipes*

c. Peduncles at maturity 0.5-3 cm long, not spiraling. var. *rostrata*

b. Mature pedicels 2-6 mm long.

var. *subcapitata*

Common around the province in flat pools on the tidal marshes, brackish ponds or stagnant salt water. Var. **obliqua** (Schur) Aschers. & Graebn. has been found on the Magdalens and on P.E.I., but not yet in N.S. Var. **longipes** Hagstrom is common. Var **rostrata** Agardh is found at Truro and Guysborough and undoubtedly elsewhere. Var. **subcapitata** Fern. & Wieg. is known from P.E.I., and

was reported from Point Pleasant, Halifax Co. (Rousseau, 1935).

The species in its various forms is worldwide.



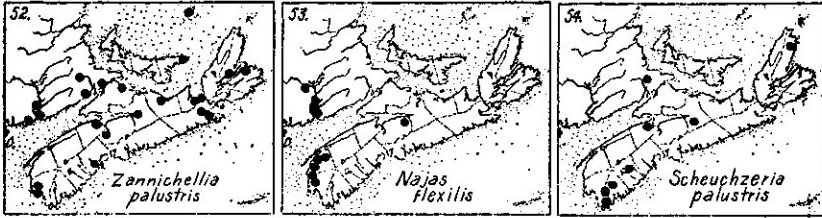
Figure.13.—*Potamogeton*. a, *P. bupleuroides*, x $\frac{1}{2}$. *Zannichellia*. b, part of plant, x 1. *Ruppia*. c, fruiting part of plant, x 1. *Najas*. d, branches, x $\frac{1}{2}$. *Scheuchzeria*. e, upper part of plant showing fruits, x 1.

3. ZOSTERA L.

1. *Z. marina* L. EEL-GRASS

Common around the coast in salt water and washed up on the beaches; abundant in salt lakes and ponds in C.B.; abundant in Wallace Lake on Sable Is. Var. *stenophylla* Aschers, & Graebn. is a very slender extreme reported as abundant in the gravel about Kidstone Is., Great Bras d'Or Lake (Fernald, 1921).

Lab. & Nfid. along the coast to N.C.; James Bay; Alaska to Ore.; Eurasia.



4 **ZANNICHELLIA** (Mich.) L.

1. **Z. palustris** L. var. **major** (Boenn.) Koch, See Rhodora **23**: 110. 1921. Map 52. HORNE D PONDWEED Fig. 13, b.

Frequent in brackish or in saline waters or on saline mud; often found in streams at or just above the head of the tide; around the coast.

Nfld. and the Gulf of St. Lawrence to Fla.; James Bay.

5. **NAJAS** L.

1. **N. flexilis** (Willd.) Rostk. & Schmidt. BUSHY PONDWEED Map 53. Fig. 13, d.

Distribution poorly known; Fernald (1921) states that it was not seen in Yarmouth, Shelburne or Queens Cos. It is present through Digby Co.; at Five-Mile R. in Hants; and was reported by Macoun as collected by McKay in the Earltown Lakes.

Common and widespread across the continent.

14. **JUNCAGINACEAE** ARROW-GRASS FAMILY

- a. Flowers 3-8, in a loose short raceme; ovaries 3, nearly separate; rootstock creeping. 1. *Scheuchzeria*
- a. Flowers numerous in a long linear raceme; ovaries united until maturity; rootstock but little developed. 2. *Triglochin*

1. **SCHEUCHZERIA** L.

1. **S. palustris** L., var **americana** Fern., Rhodora **25**: 178. 1923. Map 54. Fig. 13, e.

Quagmires of Shelburne Co. (Fernald, 1922); sphagnum mat around Lily Lake, Centreville, King's Co.; reported by Nichols as associated with the sphagnum mat of undrain-

ed swamps in the highlands of C.B. June.

Nfld. to Alaska south to N. Eng., Penn., Wisc. & Calif.

2. TRIGLOCHIN L. ARROW-GRASS

- a Fruit oblong, with a rounded base, separating into 6 sections; scape stout, 2-4 mm in diameter. 1. *T. maritima*
 a. Fruit linear or club-shaped, with a tapering base, separating into 3 sections; scape slender, 1 mm in diameter. 2. *T. palustris*

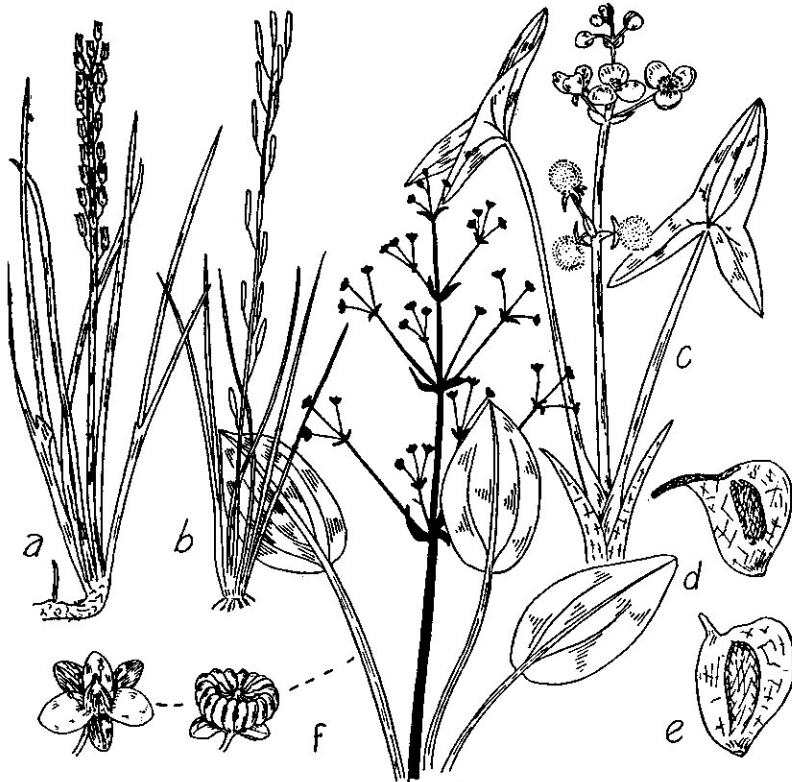


Fig. 14.—*Triglochin maritima*. a, plant, x $\frac{1}{2}$. *T. palustris*. b, plant, x $\frac{1}{3}$. *Sagittaria cuneata*. c, plant, x $\frac{1}{2}$; e, achene, x 8. *S. latifolia*. d, achene, x 8. *Alisma*. f, plant, x $\frac{1}{2}$; flower and fruit.

1. *T. maritima* L. ARROW-GRASS. Map 56. Fig. 14, a.

Scattered to common in salt marshes, especially on the older mown areas; rarely found in highly acid peat around lakes or pools. June-July.

Lab. to Alaska south to N.J. & Mex.

2. *T. palustris* L. Map 57. MARSH ARROW-GRASS. Fig. 14, b.

Characteristic of the inner brackish marshes or on brackish sand flats, in swampy marshes, open springy or damp areas along streams or more rarely acid peat; scattered throughout but rather rare and little noticed. July-Aug.

Greenland to Southern Me; inland to the Great Lakes; on the West Coast; Eurasia.

15. ALISMACEAE WATER PLANTAIN FAMILY

a. Leaves sagittate or lanceolate; lowest flowers with stamens only or carpels only; stamens many; achenes forming a dense spherical head.

1. *Sagittaria*

a. Leaves usually ovate or oblong, never sagittate; lower flowers all perfect; stamens usually 6; achenes in a thick dense ring (Fig 14, f).

2. *Alisma*

1. SAGITTARIA L. ARROWHEAD

a. Blades sagittate; bracts at the base of each whorl of flowers separate. (Submersed forms may have the blades of the leaves lacking).

b. Beak of the achene 0.5-2 mm long, arising from the inner margin of the top and pointing inward, making the fruiting head smoothish (Fig, 14, d); leaves usually 10-30 cm long.

c. Tip of the leaf sharp; leaves narrow; pedicels of the fruiting heads less than twice as long as the heads.

1. *S. latifolia*

c. Tip of the leaf blunt or rounded; leaves broad; pedicels more than twice as long as the heads.

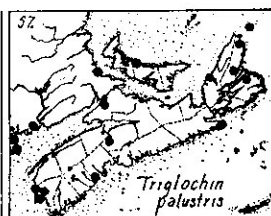
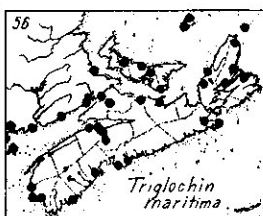
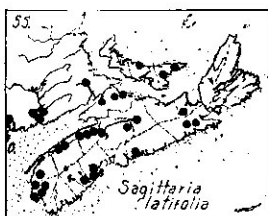
S. latifolia var. *obtusata*

b. Beak of the achene short, less than 0.5 mm long, erect so that the fruiting heads are roughened (Fig, 14, e); leaves mostly 4-15 cm long.

2. *S. cuneata*

a. Blades all elliptical to lanceolate, without basal lobes; bracts united, the uppermost for over half their length; plants rather small.

3. *S. graminea*



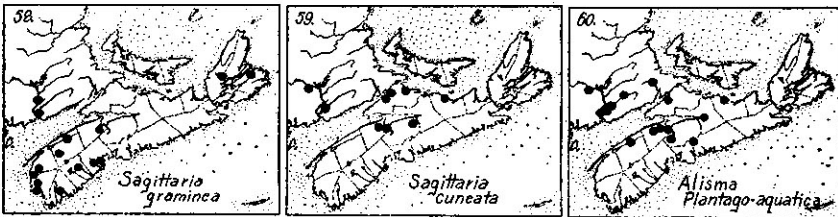
1. **S. latifolia** Willd. COMMON ARROWHEAD. Map. 55. Fig. 14, c, d.

Common throughout, found around the margins of lakes, in mucky streams bottoms and around ponds. The leaf-blade is very variable in outline. The narrow extreme, forma **gracilis** (Pursh) Robinson, with the leaves and their lobes less than 1 cm wide is often seen in running water.

N.S. to B.C. south to Fla. & Calif.

Var. **obtusa** (Muhl.) Robinson is not as common as the species, but is occasionally seen growing with it.

General distribution unknown.



2. **S. cuneata** Sheldon. Map 59. Fig. 14, c, e.

Occasional and probably general in the center of the province; common in shallow water and rooting in mud at Grand Pre; common around the sink-holes in the gypsum area south of Amherst; and in the richer alluvial soils near Pictou. (*S. arifolia* Nutt.).

N.S., Que. to B.C. south to Conn., Kans. & Calif.

3. **S. graminea** Michx. Map 58.

Sandy or silty margins of ponds or on fresh tidal mud at various places from Yarmouth Co. to C.B.; apparently local and rare in the northern and central parts of the peninsula.

Nfld. to Sask. south to Fla. & Tex.

ALISMA L.

1. **A. triviale** Pursh, see Fernald, *Rhodora* 48: 86-88. 1946. WATER PLANTAIN. Map 60. Fig. 14, f.

Scattered, and often rather common, from Annapolis County to Pictou and northwards into N.B.; wet mud of ditches, edges of quiet pools or muddy edges of slow streams. (*A. Plantago-aquatica* L., var. *brevipes*, and var. *parviflora* of some authors).

N.S. to B.C. south to Md., Mich. & Calif.

16. HYDROCHARITACEAE**1. VALLISNERIA (Michx.) L.**

1. **V. americana** Michx., see Fernald, *Rhodora* **20**: 108-110. 1918. WILD CELERY.

This plant has not been recently collected. Older records are: near Prince's Lodge, Halifax (Lindsay); in a small lake, N. Sydney (Macoun); and Friar's Head, C.B. (Robinson, 1906). It is desirable to establish new locations. (*V. spiralis* L.).

N.S., Me. to S.D. south to Fla. & Tex.

17. GRAMINEAE GRASS FAMILY

The grasses are not treated in this flora since they were taken up in detail by Dore, W.G., and A. E. Roland, *Proc. N.S. Inst. Sci.* **20**: 177-288, 1942.

18. CYPERACEAE SEDGE FAMILY

- a. Stamens and pistils in the same flower; achenes in the axils of bracts of the inflorescence, not enclosed in sac-like perigynia.
- b. Spikelets with 6-many fertile flowers; or, if fewer-flowered, terminal without leafy bracts.
- c. Scales of the spikelet strictly 2-ranked, folded and keeled.
 - d. Inflorescence terminal; flowers without bristles; achenes beakless; stem solid, more or less 3-angled. 1. *Cyperus*
 - d. Inflorescence lateral; flowers with 6-9 bristles; achenes long-beaked; stem hollow, round (Fig. 15, b). 2. *Dulichium*
- c. Scales of the spikelet spirally arranged and imbricated.
 - e. Spikelet solitary and terminal; leaves reduced to sheaths; base of the style persistent as a tubercle at the top of the achene; bristles present, little longer than the achene (Fig. 15, d, etc.). 3. *Eleocharis*
 - e. Spikelets one to usually many; leaves present, or occasionally absent in *Scirpus*; base of the style not persistent, or if so not sharply delimited from the achene.
 - f. Bristles 0-8, usually short, if exerted the spikelets solitary, or else small and very numerous (Fig. 17). 4. *Scirpus*
 - f. Bristles 6, 4-6-cleft to near the base and appearing very numerous, long and exerted (Fig. 18). 5. *Eriophorum*
- b. Spikelets with 1-2 fertile flowers and several empty lower scales; inflorescence subtended by one to several leafy bracts.
- g. Style 2-cleft, the enlarged base forming a persistent tubercle on

- the achene; bristles present (Fig. 19, a-c). 6. *Rynchospora*
 g. Style 3-cleft, the base not enlarging to form a tubercle; bristles
 absent (Fig. 19, d). 7. *Cladium*
 a. Stamens and pistils in separate flowers, often in separate spikes;
 achenes enclosed in a sac-like papery covering called a perigynium,
 with the style projecting from the apex (Fig. 20-30.). 8. *Carex*

1. CYPERUS (Tourn.)L. GALINGALE

- a. Spikelets flattened, often replaced by bulblets, the scales spreading
 and overlapping most of the next scale above on the same side.
 1. *S. dentatus*
 a. Spikelets terete, not replaced by bulblets, the scales pointing forward
 and overlapping less than half of the next scale above.
 2. *S. esculentus*

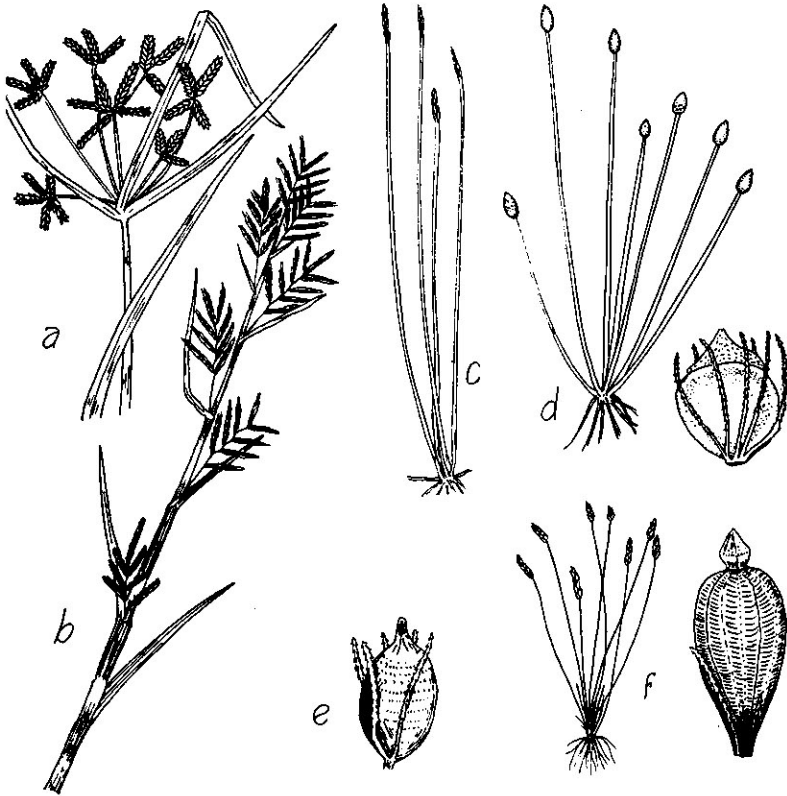


Fig. 15.—*Cyperus dentatus*. a, top of plant, $\times \frac{1}{2}$. *Dulichium arundinaceum*. b, top half of plant, $\times \frac{1}{2}$. *Eleocharis Robbinsii*. c, plant, $\times \frac{1}{2}$. *E. obtusa*. d, plant, $\times \frac{1}{2}$; achene, $\times 12$. *E. rostellata*. e, achene, $\times 8$. *E. acicularis*. f, plant, $\times \frac{1}{2}$; achene, $\times 25$.

1. *C. dentatus* Torr. Map 61. Fig. 15, a.

Characteristic of many sandy and gravelly lake-shores and beaches; common in Yarmouth Co., scattered east at least to Lunenburg Co. (Fernald, 1922).

N.S. & Me. to Ind. south to W. Va. & S.C.

2. *C. esculentus* L.

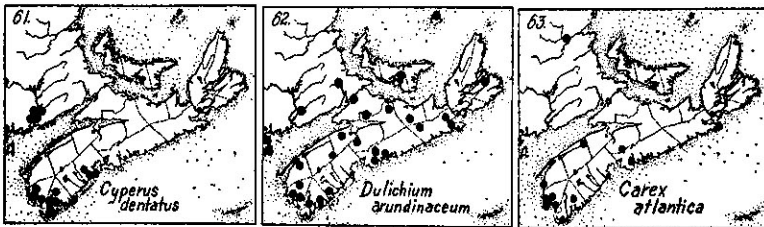
Found but once; rich orchard soil at Starr's Point, Kings Co., where it is scattered; introduced.

N.S. to Minn. south to Fla. & Tex.; Alaska to Calif.

2. **DULICHIMUM** Pers.

1. *D. arundinaceum* (L.) Britt. Map 62. Fig. 15, b.

Muddy shores, around lakes and ponds, and occasionally in poorly-drained swamps; throughout, especially abundant



in the Atlantic Region of the province; common in the dense vegetation along the bog meadows above the influence of the tide on the Fundy marshes.

Nfld. to Wash. south to Fla. & Tex.

3. **ELEOCHARIS** R. Br. SPIKE RUSH

Fernald, M.L. & A.E. Brackett. The representatives of *Eleocharis palustris* in North America. *Rhodora* 31: 56-77. 1929. Svenson, H. K. Monographic studies in the genus *Eleocharis*—V. *Rhodora* 41: 1-19, 43-77, 90-110. 1939.

a. Spikelets hardly, if at all, thicker than the spongy stems; scales firmly persistent; stem 1-2 mm thick, bluntly 3-angled (Fig. 15, c).

1. *E. Robbinsii*

a. Spikelets usually much thicker than the stem; scales easily removed when the achenes are mature.

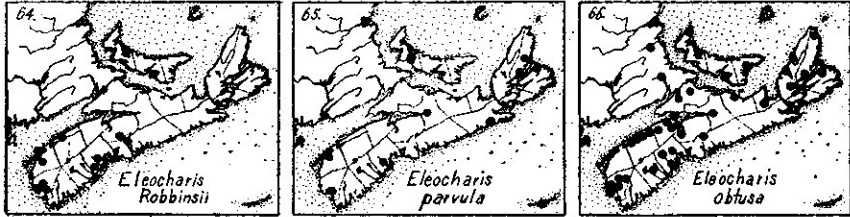
b. Tubercle not plainly distinct from the body of the achene, appearing merely like an acute point at the apex (Fig. 15, e; 16, b).

- c. Spikelets 3-9- (rarely -15) flowered; plants mostly less than 5 cm high.
- d. Scales dark-brown, often with a green mid-rib; stems solitary or a few together; on marl bogs or calcareous areas.
 - 2. *E. pauciflora*
- d. Scales light-brown or greenish; plants forming a mat over the ground; near the coast, usually on salt marshes. 3. *E. parvula*
- c. Spikelets 12-20-flowered; stems 25-150 cm high, often reclining and rooting at the tip; salt marshes, southwest N.S. only.
 - 4. *E. rostellata*
- b. Tubercle plainly distinct, in appearance at least, from the body of the achene (Fig. 16, b).
- e. Spikelets mostly 5-8- flowered; plants 2-20 cm high, forming a turf (Fig. 15, f).
 - 5. *E. acicularis*
- e. Spikelets many-flowered; plants mostly taller and stouter.
- f. Tubercle much smaller than the body of the achene.
- g. Plants growing from fibrous roots.
 - h. Stems 3-50 cm high; sheaths firm and not whitish at the tip; spikelets round- to cylindrical-ovoid, blunt at the apex; common (Fig. 15, d).
 - 6. *E. obtusa*
 - h. Stems 2-15 cm high; sheaths whitish and inflated towards the apex; spikelets oblong-ovoid and acute at the apex.
 - 7. *E. olivacea*
- g. Plants with rootstocks.
 - i. Achene flattened with 2 angles; style 2-cleft.
 - j. Rootstock thread-like; spikelets lanceolate to slenderly ovoid loosely 5-30-flowered with a single sterile scale at the base; salt marshes.
 - 11. *E. halophila*
 - j. Rootstock generally 2 mm or more thick; plants not or very rarely found in brackish places.
 - k. Sterile scales at base of the spikelet 2 or 3.
 - l. Tubercle higher than broad; stem softish; scales of the spikelet acute but not long-pointed (Fig. 16, a, b).
 - 8. *E. palustris*
 - l. Tubercle as broad or broader than high; stems wiry; lower scales of the spikelets usually very long-pointed.
 - 10. *E. Smallii*
 - k. Sterile scale of the spikelet 1, encircling the base of the spikelet; plant rare.
 - 9. *E. calva*
- i. Achene 3-cornered; style 3-cleft; stem often capillary.
- m. Tip of the upper sheath dark-girdled; stems usually stout; achenes 0.9-1.5 mm long.
 - n. Achenes waxy-yellow; pits in the surface usually shallow; stems relatively stout, 6-8-angled.
 - 12. *E. elliptica*
 - n. Achenes yellowish-olive; pits on the surface usually deep; stem capillary, rarely over 30 cm high, 4-5-angled.
 - 13. *E. tenuis*
- m. Tip of the upper sheath whitened; stem capillary, less than

8 cm high; achenes 0.7-1.0 mm long.

14. *E. nitida*
 f. Tubercle nearly or quite as large as the body of the achene
 (Fig. 16, b).
 15. *E. tuberculosa*

1. *E. Robbinsii* Oakes. Map 64. Fig. 15, c.



Lake margins and bog-pools; scattered in southwestern N.S., and collected by Howe and Lang at Windsor Junction, Halifax Co.

A plant of the coastal plain from Fla. northward to N. S. and entering into southwestern N.B.

2. *E. pauciflora* (Lightf.) Link., var *Fernaldii* Svenson
 Rhodora 36: 30. 1934.

Rare in N.S.; known only from Baddeck Bay where it grows in the springy border of a salt marsh. In the north-eastern part of its range the plant is said to occur almost entirely on marl bogs or wet calcareous ledges. (*Scirpus pauciflorus* Lightf. in part).

Nfld. to James Bay & Calif. south to N. Eng., & Ind.

3. *E. parvula* (R. & S.) Link, see Svenson, Rhodora 31: 168-171. 1929. Map 65.

Salt marshes or about salt springs; scattered round the coast. It usually forms mats with the thread-like stems 2-7 cm high. (*Scirpus nanus* Spreng.).

Nfld. to Cuba, rarely inland to Wisc.

4. *E. rostellata* Torr.

Saline or brackish marshes and swales of Yarmouth Co; Sand Beach, Chebogue, Tusket, and Argyle (Fernald, 1921); and scattered up the Bay of Fundy.

A coastal plain species occurring from N.S. and southern Me. to Fla; also in Bermuda, the Carribean, and on the West Coast.

5. *E. acicularis* R. & S. Fig. 15, f.

Common on wet shores and in shallow water throughout the Maritime Provinces, becoming abundant and growing

in large patches where shallow ponds become dried up. A form with bristles absent is found on Cape Cod and the adjacent territory, and has been collected at Great Pubnico Lake in Yarmouth Co. (Svenson, *Rhodora* **31**: 190. 1929).

Nfld. and Lab. west to B.C., south to Penn.; Asia.

6. *E. obtusa* (Willd.) Schultes. Map 66. Fig. 15, d.

Muddy or wet places, edges of ponds, slow streams and ditches; common from Annapolis Co. eastward, rare in the southwestern Cos. Var. *jejuna* Fern., Proc. Amer. Acad. Sci. **34**: 492. 1899, seems to be an ecological phase which occurs when the plant is growing in muddy inundated places. The stems are generally decumbent, 1 dm or less high, with smaller and fewer-flowered heads. This intergrades with the typical form. A collection from Springhaven, Yarmouth Co. has been placed here (Svenson, *Rhodora* **31**: 215. 1929).

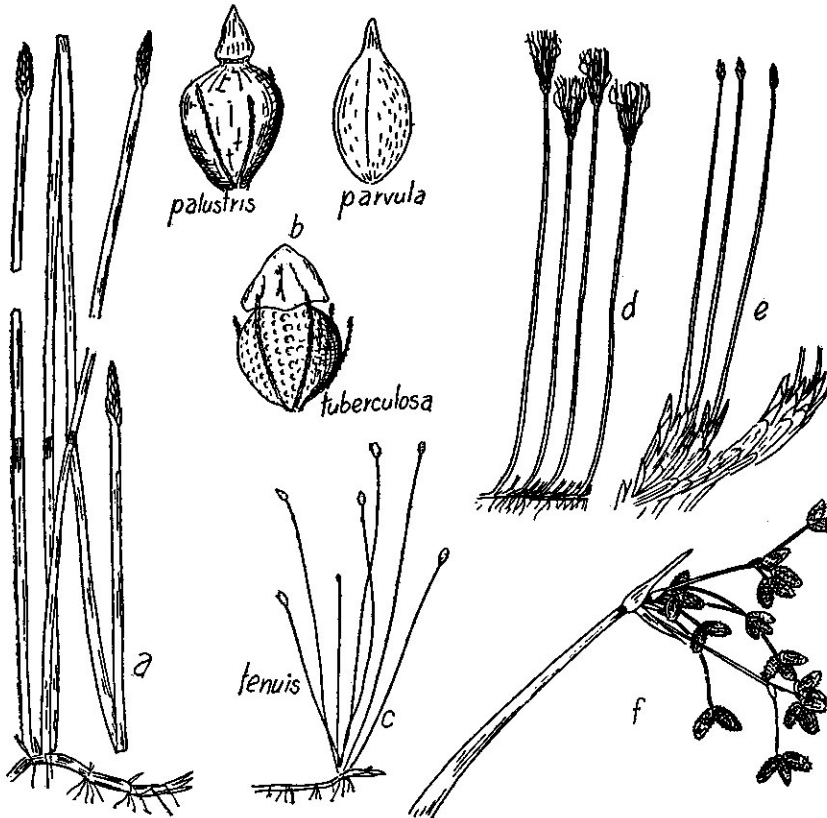


Fig. 16.—*Eleocharis*. a, *E. palustris*, x $\frac{1}{2}$. b, achenes, x 10. c, *E. tenuis*, x $\frac{1}{2}$. *Scirpus*. d, *S. hudsonianus*, x $\frac{1}{2}$. e, *S. caespitosus*, x $\frac{1}{2}$. f, *S. validus*, top of plant, x $\frac{1}{3}$.

N.S. to Wisc. and B.C. south to Mex.; West Coast & Hawaii.

7. *E. olivacea* Torr.

Rare in the province; edge of peaty quagmire pools, or sphagnous pond-holes. The most northeastern stations known are in southwestern N.B., and in southwestern N.S. at Italy Cross, Tiddville, and Argyle Head.

Chiefly on the coastal plain; N.S. & N.B. to Fla.; and sparingly west to Ont. & Minn.

8. *E. palustris* (L.) R. & S., var. *major* Sonder, Fl. Hamb. 22. 1851. Map 67. Fig. 16, a, b.

Common throughout; shallow to comparatively deep water, or in sandy to gravelly and muddy pond-margins and marshy shores, varying greatly in size. Nichols lists it as typical of the edges of periodic ponds, or brackish marshes, and the shoreward reaches of salt marshes in C.B. It is luxuriant around sink-holes in gypsum south of Amherst. True *E. palustris* is essentially more northern and is unknown from the province. (*E. palustris* var. *vigens* Bailey).

Lab. to B.C. south to Penn. & Calif.

9. *E. calva* Torr. See Fernald & Brackett, *Rhodora* 31: 68-70. 1929.

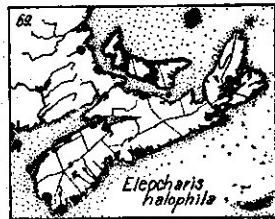
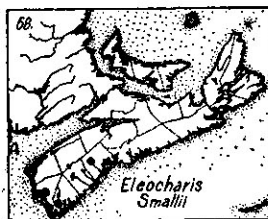
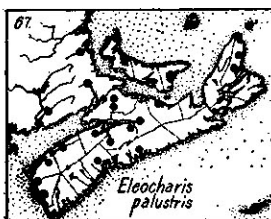
Rare; known for certainty only from McDonald's Barren, Northeast Margaree, C.B., where it was collected by C.B. Robinson.

N.S. to Alta. south to Fla. & Mex.

10. *E. Smallii* Britt. Map 68.

This species reaches Canada in the southwestern parts of N.B. & N.S. where in both places it is associated with other southern species. Scattered from Yarmouth to New Germany in Lunenburg Co., with an isolated station at Pic-tou; peaty and wet sandy swamps, shores, and pond and river margins.

N.S. to Wisc. & Nebr. south to Dela. & Mo.



11. ***E. halophila*** Fern. & Brackett, *Rhodora* **37**: 395. 1935. Map 69.

Brackish shores, salt marshes, and damp spots behind shore dunes; scattered around the coast. (*E. uniglumis*, var. *halophila* Fern. & Brackett).

Nfld. to Que. and south to Dela.

12. ***E. elliptica*** Kunth, see Svenson, *Rhodora* **41**: 65. 1939. Map 70.

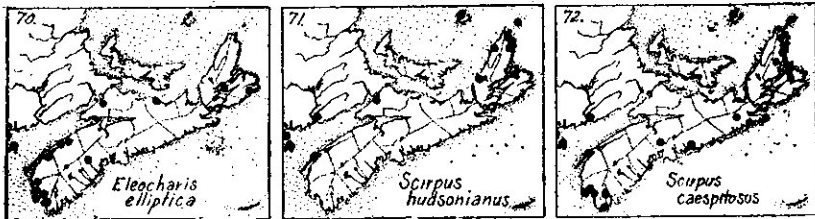
Cool swamps, bogs and brackish marshes; scattered throughout. (*E. capitata*, var. *borealis* Svenson).

Nfld. to N.J. & Ill; sparingly westward to B.C.

13. ***E. tenuis***. (Willd.) Schultes, see Svenson, *Rhodora* **34**: 199. 1932; and **41**: 65. 1939. Fig. 16, c.

Gravelly banks, peaty pastures and open moist fields scattered throughout.

N.S. to S.C. west to western Penn.



14. ***E. nitida***. Fern.

Moist places, chiefly in acid peat; known in N.S. only from an exsiccated roadside gutter, North Mt., Belle Isle, Annapolis Co. (Fernald, 1922).

Nfld. south to N.S. & N.H. west to Que., Wisc., and the Aleutians.

15. ***E. tuberosa*** (Michx.) R. & S.

A collection from the wet or peaty beach of Harper's Lake, Shelburne, Co., has the bristles downwardly barbed and is named forma ***retrorsa*** Svenson, *Rhodora* **39**:250. 1937.

A collection from a boggy savannah and sandy beach at Great Pubnico Lake in Yarmouth Co. has the bristles smooth. This is named forma ***pubnicoensis*** (Fern), Svenson, *Rhodora* **39**: 250. 1937, and is known from no other region.

The species occurs on the coastal plain from central

Mass. south to Fla. & Tex. Forma *retrorsa* is also scattered in Mass.

4. SCIRPUS (Tourn.)L. BULRUSH

- a. Spikelets terminal, solitary; involucre none or merely an outer scale of the spikelet; plants erect, with the leaf-blades reduced to short awl-like bracts.
 - b. Plants densely caespitose; culms terete, smooth above; bristles of the spikelets barely longer than the achene. (Fig. 16, e) 1. *S. caespitosus*
 - b. Plants with running rootstocks; culms triangular and scabrous above; bristles 2-3 cm long, silky and conspicuous (Fig. 16, d).
 - 2. *S. hudsonianus*
- a. Spikelets not terminal, usually numerous; involucre varying from a short continuation of the stem to numerous leafy bracts; plants with definite leaf-blades (Fig. 17).
- c. Spikelet solitary; involucre green, 5-15 mm long; plant usually floating or submersed in water, with long weak filiform leaves.
 - 3. *S. subterminalis*
- c. Spikelets several to many, rarely one; plants normally erect.
 - d. Involucre short, appearing to be a continuation of the stem (Fig. 17, a, b).
 - e. Spikelets 2-5-flowered, crowded in a 2-ranked subterminal spike; plant 1-6 dm high.
 - 4. *S. rufus*
 - e. Spikelets many-flowered, plainly lateral, not 2-ranked; plants 2-25 dm high.
 - f. Stems sharply 3-angled, to 12 dm high; spikelets in a sessile cluster, occasionally solitary.
 - g. Involucral leaf 4-15 cm long; upper sheath with a long narrow leaf; spikelets pointed (Fig. 17, a).
 - 5. *S. americanus*
 - g. Involucral leaf 1-3 cm long; upper sheath with a short triangular leaf or none; spikelets blunt (Fig. 17, b).
 - 6. *S. Olneyi*
 - f. Stem round, 0.5-2.5 m high (Fig. 16, f).
 - 7. *S. validus*
 - d. Involucre consisting of several to many leafy bracts.
 - h. Spikelets large, 1-2 cm long, 6-10 mm thick; salt-marsh plants (Fig. 17, c).
 - i. Spikelets mostly sessile in a dense glomerule, or occasionally a few in a secondary one; leaves 1.5-9 mm wide, borne chiefly below the middle of the stem; achenes compressed trigonous.
 - 8. *S. paludosus*
 - i. Spikelets mostly on elongate rays, very rarely sessile; leaves 6-15 mm wide, their sheaths covering more than one-half the length of the stem; achenes sharply triangular to nearly lenticular.
 - 9. *S. maritimus*
 - h. Spikelets smaller, 2-15 mm long, 1-3 mm thick, numerous in a compound inflorescence; plants of non-brackish habitats (Fig. 17, d-g).

- j. Bristles retrorsely barbed; stems solitary or loosely clustered, with thick scaly stolons; spikelets in glomerules.
- k. Lower sheaths reddish-tinged; bristles barbed almost to the base, longer than the achene; spikelets 4-8 mm long (Fig. 17, g).
10. *S. rubroinctus*
- k. Lower sheaths green; bristles barbed only above the middle, shorter than the achene; spikelets 2-4 mm long (Fig. 17, d).
11. *S. atrovirens*
- j. Bristles smooth or sparingly barbed upward; stems loosely or densely clumped, without stolons; spikelets separate or in glomerules.
- l. Spikelets nearly all in glomerules of 3-15.
- m. Involucels reddish-brown (Fig. 17, e). 12. *S. cyperinus*
- m. Involucels dull brown with blackish bases.
S. cyperinus var. *pelius*
- l. Spikelets nearly all single and pedicelled.
- n. Spikelets 3-6 mm long; base of the involucre not glutinous; achenes whitish to light-colored.
- o. Plant stout, with leaves 5-8 mm wide; involucels and scales brownish; rare.
13. *S. pedicellatus*
- o. Plant slender with leaves 3-5 mm wide; involucels and scales blackish-green; scales 1-2 mm long; common (Fig. 17, f).
14. *S. atrocinctus*
- n. Spikelets 6-10 mm long; base of the involucre glutinous. blackish; achenes reddish-brown; scales 2-3 mm long.
15. *S. Longii*

1. ***S. caespitosus* L., var. *callosus* Bigelow.** See Fernald, *Rhodora* 23: 21-25. 1921. Map 72. Fig. 16, e.

General on the Atlantic slope of the province where it is often abundant on the dryish, peaty barrens from Digby Co. to Northern C.B.; scattered to rare inland and in the north-central region; characteristic of bogs, poorly-drained swamps, and sedge heaths.

Ireland to the Aleutians south to Me., Wisc. & Utah.

2. ***S. hudsonianus* (Michx.) Fern.** Map 71. Fig. 16, d.

Occasionally along the Atlantic coastal region from C.B. to Digby Neck; common in northern C.B. where it is found in poorly-drained swamps and bogs; scattered to rare elsewhere in bogs.

Lab. to the Yukon south to R.I. & Mont.

3. ***S. subterminalis* Torr.** Map 73.

This species is somewhat general but often overlooked. Fernald (1923) records it from sandy and peaty pools and lake margins, Yarmouth to Hants Co; oxbow ponds in northern C.B. (Nichols); swamps in Guysborough Co., and

occasionally seen elsewhere.

Nfld. to B.C. south to N.J., Mo. & Idaho.



Fig. 17.—*Scirpus*. a, *S. americanus*, x 1/3. b, *S. Olneyi*, x 1/3. c, *S. paludosus*, x 1/2. d, *S. atrovirens*, x 1/2; achene, x 10. e, *S. cyperinus*; part of the inflorescence, x 1/2; achene, x 12. f, *S. atrocinctus*, part of inflorescence, x 1/2. g, *S. rubrotinctus*, part of inflorescence, x 1/2; achene, x 12.

4. *S. rufus* (Huds.) Schrad. var *neogaeus* Fern., *Rhoda* 45: 287. 1943. Map 74.

Typical of brackish marshes in northern C.B. (Nichols); brackish or saline marsh, Sand Beach, Yarmouth Co. (Fernald, 1921).

Rare; Nfld to the Gaspé, the Maritime Provinces, Me. and isolated stations on Hudson Bay.

5 *S. americanus* Pers. Map 75. Fig. 17, a.

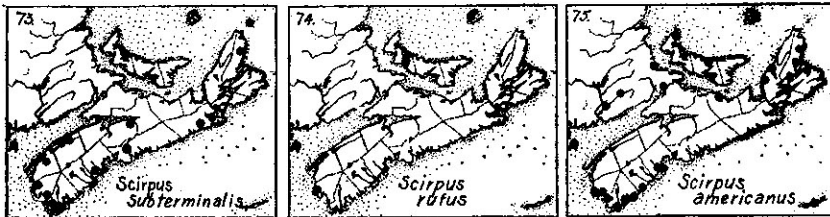
Common on brackish marshes, and occasionally in bogs near the coast; common in the dune hollows of Sable Island; around the coast of the mainland and C. B.

Temperate N.A., in fresh water inland; S.A. & Eu.

6. *S. Olneyi* Gray. Fig. 17, b.

Recorded from Canada only from salt and brackish marshes and swales of Yarmouth Co.: Sand Beach, Chebogue, Arcadia, Tusket, and Eel Lake; extensive sloughs along Abram River were full of it (Fernald, 1921).

Salt marshes, N.S. to the Gulf of Mexico; rarely inland; on the Pacific coast.



7. *S. validus* Vahl. Including *S. acutus* Muhl. or *S. occidentalis* (Wats.) Chase. Fig. 16, f.

For discussions of the variability, varieties and forms of this group see: St. John, Contrib. Gray Herb. 62: 65 for the Sable Island plants; Res. Studies State Coll. Wash. I: 90-91. 1929, for further comment; Fernald, Rhodora 45: 283-286. 1943. The plants are so variable throughout their range and there is such difference of opinion regarding the specific characters that it seems advisable to consider them together until extensive field studies have been made.

Brackish or calcareous pools, lake margins near the coast; sandy pond-shores and estuaries; common throughout and on Sable Is. Throughout N.A.

8. *S. paludosus* Nels., var. *atlanticus* Fern., Rhodora 45: 291-292. 1943. Fig. 17, c.

Common around the coast; brackish marshes, bare areas on the marshes or dyke-lands, often dominant on the shoreward reaches of the salt meadows; brackish ponds on Sable Is. Along the coast from the Gulf of St. Lawrence to northern N.J.; salt springs in N.Y.

9. *S. maritimus* L., var. *Fernaldi* (Bickn.) Beetle. See Fernald, Rhodora 45 288-291. 1943.

Scattered at various places around the coast; including var. *novae-angliae* into which it grades. Collections from Baddeck have been listed under *S. robustus* Pursh (Beetle,

Amer. Jour. Bot. **29**: 86. 1942). The species is very luxuriant along the Annapolis R. above Annapolis, there producing plants that are very similar to the more inland *S. fluviatilis* (Torr.) Gray of fresh-water habitats.

Forma **agonus** Fern., Rhodora **45**: 288. 1943, with plano-convex instead of trigonous achenes, is about as common as the variety. This was treated by Beetle, l.c page 84, 85, as *S. maritimus* of Eu.

Gulf of St. Lawrence along the coast to Va.

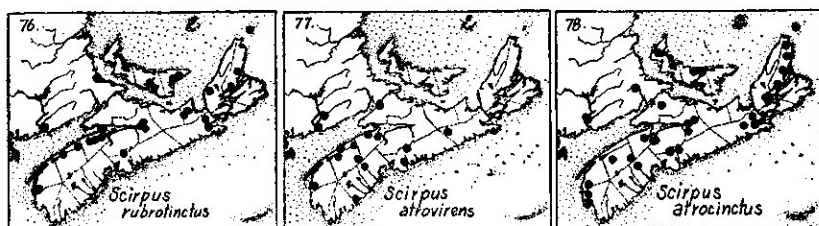
10. **S. rubrotinctus** Fern. Map 76. Fig. 17, g.

Throughout; abundant in swamps, well-drained swamps, low haylands, meadows and along ditches and streams. Forma **radiosus** Fern., Rhodora **45**: 295. 1943, with the spikelets linear-cylindrical, 7-13 mm long, and aggregated, has been collected in swales near Aylesford, Kings Co.

Nfld. to Man. south to Conn., N.Y. & Minn.

11. **S. atrovirens** Muhl., var. **georgianus** (Harper) Fern., Rhodora **23**: 134. 1921. Map 77. Fig. 17, d.

Swales and damp thickets; occasional through the Annapolis Valley to Cumberland Co; abundant along the basaltic North Mt. from Digby Neck to Cape Blomidon; common to



rather scattered from Yarmouth to Guysborough Co., growing in moister areas. Earlier records of *S. atrovirens* are placed here.

Nfld. to Wisc. south to Ga. & Ark.

12. **S. cyperinus** (L.) Kunth. Fig. 17, e.

Rare; known from but one collection: peaty and cobbly beach of a large lake, Kemptville, Yarmouth Co. (Fernald, 1921). N.S. to Sask. south to Fla. & La.

Var. **pellus** Fern. is common to abundant throughout; sandy shores, bogs, meadows, ditches, edges of streams, etc. Forma **condensatus** (Fern.) Blake, with the panicle very condensed, is occasionally seen.

Nfld. to Conn., west to Minn.

13. **S. pedicellatus** Fern.

Known from but a single collection; wooded bank of the Sissiboo R., Weymouth (Fernald, 1921).

N.S.; and Que. to Conn., Penn. & Iowa.

14. **S. atrocinctus** Fern. Map 78. Fig. 17, f.

Very common throughout; poorly-drained soil, swamps, bogs, beside streams and in ditches, often characteristic of areas that are inundated early in the season.

Nfld. to Sask. south to Conn. & Iowa.

15. **S. Longii** Fern., *Rhodora* 13: 6. 1911.

Rare; peaty marsh, shore of Ponhook Lake, Queens Co.; also one battered individual, probably of this species, at Moosehorn Lake, in the same region (Weatherby, 1942).

N.S.; Que., to N.J., N.C.

5. **ERIOPHORUM** L. COTTON-GRASS

- a. Spikelets solitary and terminal without a leafy involucre bract; leaves of the stem mostly reduced to bladeless sheaths (Fig. 18, a).
- b. Stems solitary from underground rootstocks; spikelets with 7 or fewer empty basal scales.
 - 1. *E. Chamissonis*
- b. Stems densely tufted, without rootstocks; spikelets with 10-15 empty scales at the base; bristles shining white.
 - 2. *E. spissum*
- a. Spikelets 2-several in a head or umbel, with an involucre of 1 or more leafy bracts (Fig. 18, b-e).
- c. Involucre bract 1; leaves 1-2 mm wide, triangular-channelled.
 - d. Plant weak and slender, with no basal leaves at flowering time; upper leaf-blade smooth and round-tipped, 1-4 cm long; base of involucre and scales of spikelets dark; achenes 1.5-2 mm long. (Fig. 18, c).
 - 3. *E. gracile*
 - d. Plant stiff and erect with long, slender, pointed basal leaves; uppermost leaf-blade rough, sharp, 3-18 cm long; base of involucre and scales of spikelets brownish; achenes 2.5-3 mm long (Fig. 18, b).
 - 4. *E. tenellum*
- c. Involucre bracts 2 or more; leaves flat, 1.5-8 mm wide.
- e. Spikelets loosely umbellate; bristles white or rarely buff; scales of the spikelet with but one prominent rib; stamens 3 (Fig. 18, e).
- f. Scales of the spikelets with a wide, blunt, whitish tip, and indistinct midrib (Fig. 18, f); upper leaf-sheaths ringed with black at the apex.
 - g. Leaves 1.5-4 mm wide.
 - 5. *E. angustifolium*
 - g. Leaves 5-8 mm wide.
 - E. angustifolium* var. *majus*
- f. Scales of the spikelet with a sharp, thick tip, and the midrib prominent to the tip (Fig. 18, g); upper leaf-sheaths usually not dark-ringed.
 - 6. *E. viridi-carinatum*

- e. Spikelets in a dense head; bristles tawny or copper-colored, rarely whitish; scales of the spikelet with several prominent ribs; stamen 1 (Fig. 18, d).
7. *E. virginicum*

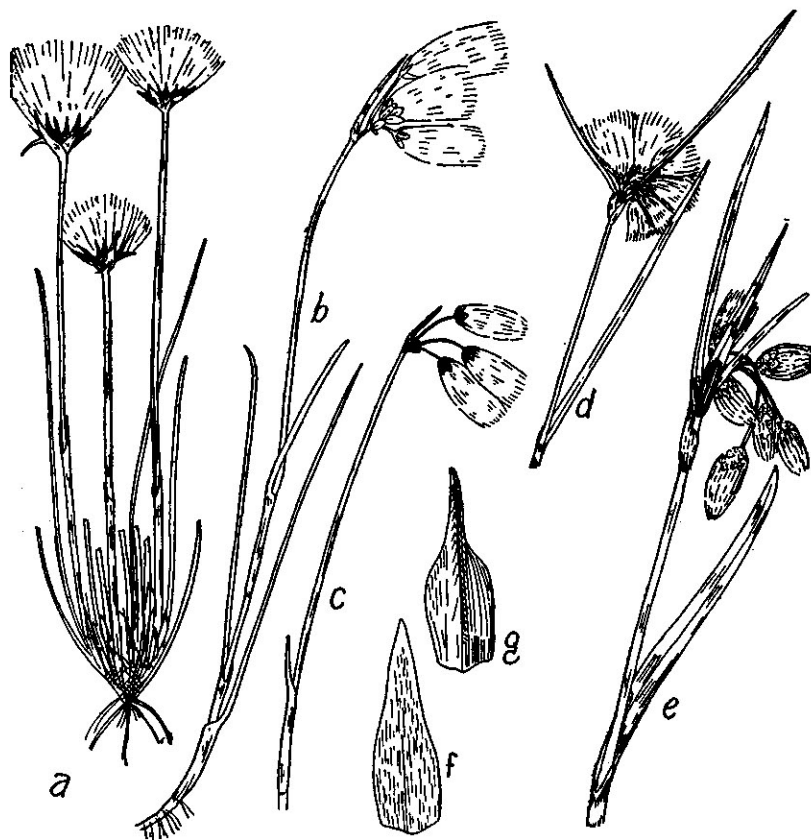
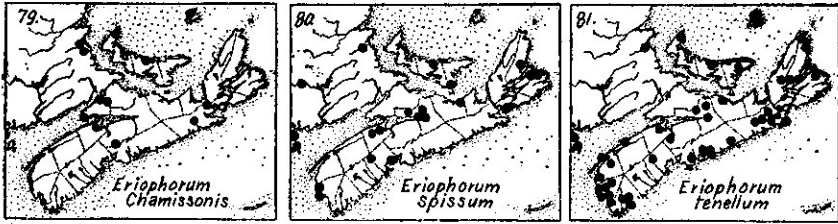


Fig. 18.—*Eriophorum*. a, *E. spissum*, $\times 1/3$. b, *E. tenellum*, $\times 1/3$. c, *E. gracile*, $\times 1/3$. d, *E. virginicum*, $\times 1/3$. e, *E. angustifolium* young plant, $\times \frac{1}{2}$. f, scale of spike of *E. angustifolium*. g, scale of *E. viridi-carinatum*.

1. *E. Chamissonis* C. A. Mey. RUSTY COTTON-GRASS.
Map 79.

Scattered, not uncommon near the coast; bogs, muskegs, and swamps; Cumberland and Hants Cos. to C.B. Forma *albidum* (F. Nylander) Fern., *Rhodora* 23: 131, 1921, is a form with white bristles found in many parts of the range of the species. Bog south of Amherst.

Lab. to Alaska south to N. S., N. B. and down the Rockies.



2. **E. spissum** Fern., *Rhodora* 27: 203-210. 1925. Map 80. Fig. 18, a.

Throughout; flowering very early and forming white clumps before the end of May in dryish bogs, swales and muskegs; common on sphagnum mats in wet, or dry and mature bogs in northern C.B. (*E. callitrix* Cham. of American authors).

Lab. to Athabaska south to N. Eng., Ind. & Wisc.

3. **E. gracile** Roth. Fig. 18, c.

Scattered, and probably the rarest member of the genus in N.S.; cold bogs and swamps, usually near the coast; near Two Rivers, Truro, and on the Magdalens. June-July.

Lab. to B.C. south to Conn., Mich. & Calif.; Eurasia.

4. **E. tenellum** Nutt. Map 81. Fig. 18, b.

Common throughout; our most abundant late summer species; grassy swamps, peat bogs and swales. (*E. paucinervum* (Engelm.) A.A. Eaton). July-Sept.

Nfld. to Ont. south to N.J. & Ill.

5. **E. angustifolium** Roth. COTTON-GRASS. Map 82. Fig. 18, e.

Common throughout; bogs, swamps, wet meadows cranberry bogs and sphagnum areas. Places in the Annapolis Valley turfed for cranberry bogs often come into a dense mat of this species. In the Cobequids and northward the following species seems to replace it to a great extent, although *E. angustifolium* is also common in northern C.B. June-July.

Nfld. to B.C. south to Me., the Great Lakes & Colo.; Eurasia.

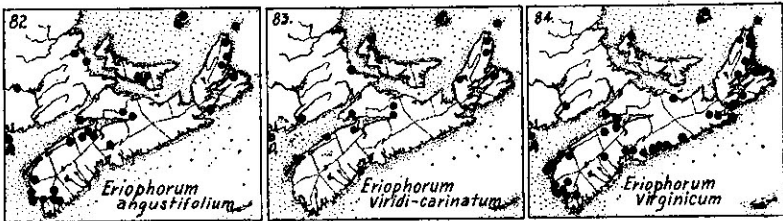
6. **E. viridi-carinatum** (Engelm.) Fern. Map 83.

Common in C.B. and in the Cobequids, scattered west to Digby Neck; in bogs, wet meadows, and swamps. June-July.

Nfld. to Sask. & B.C. south to N.Y., Ga., Wisc. & Ore.

7. *E. virginicum* L. Map 84. Fig. 18, d.

Very common throughout; bogs, swamps, and on the sphagnum mat around lakes or ponds. It is conspicuous in late summer, and is stouter and more restricted to bogs than is *E. tenellum*. The bristles of the species are typically tawny, but often verge towards white as they get older. Plants with white bristles occasionally occur, and have been named forma **album** (Gray) Wieg., *Rhodora* 26: 2. 1924. Bog near North Sydney, and on Digby Neck. July 15-Sept. Nfld. to Man. south to Fla. & Nebr.



6. **RYNCHOSPORA** Vahl. BEAK RUSH

Gale, Shirley. *Rynchospora*, Section *Eurynchospora* in Canada, the United States and the West Indies. *Rhodora* 46: 89-134, 207-249, 255-278. 1944.

- a. Scales of the spikelets white, becoming tawny when mature; spikelets usually 2-flowered, 3.5-5 mm long; stamens usually 2; bristles 9-12 (-20), (Fig. 19, a). 2. *R. alba*
- a. Scales of the spikelet chestnut-colored; spikelets with several flowers and fruits; bristles 6.
- b. Bristles upwardly barbed; spikelets 4-6 mm long, few and ascending in the inflorescence; leaves about 1 mm wide, flat or involute (Fig. 19, c). 1. *R. fusca*
- b. Bristles downwardly barbed or smooth; spikelets 3.5-5 mm long, crowded in the inflorescence with the lower spreading or reflexed; leaves 1.5-3 mm wide, flat (Fig. 19, b). 3. *R. capitellata*

1. *R. fusca* (L.) Ait. Map 85. Fig. 19, c.

Common in southwestern N.S., east at least to Lunenburg and Hants Cos. (Fernald, 1922); scattered east of Halifax (Rousseau, 1935); found in various situations in northern C.B.; wet peaty, sandy or gravelly shores and bogs, poorly drained swamps, or sphagnum mats, much rarer than the following species.

Nfld. to Ont. south to Dela. & Mich.

2. *R. alba* (L.) Vahl. Fig. 19, a.

Common throughout bogs, sphagnum mats, poorly drained swamps, or even in wet meadows.

Nfld. to Alaska south to Fla.; the Great Lakes and Calif.



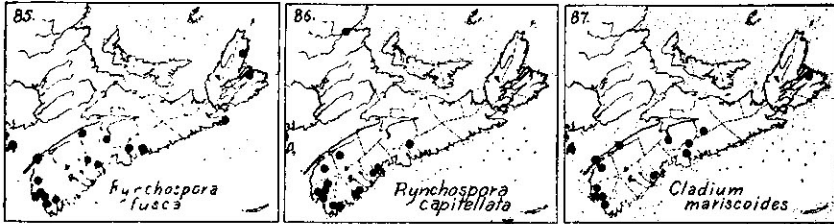
Fig. 19.—*Rynchospora*. a, *R. alba*, $\times \frac{1}{2}$; achene, $\times 10$. b, *R. capitellata*. c, *R. fusca*. *Cladium*. d, *C. mariscoides*, plant. $\times \frac{1}{2}$; achene, $\times 10$. *Carex*. e, *C. convoluta*, inflorescence, $\times \frac{1}{2}$; perigynium and pistillate scale, $\times 5$.

3. *R. capitellata* (Michx.) Vahl. Map 86. Fig. 19, b.

This northern relative of *R. glomerata* with retrorsely-barbed bristles is frequent on lake shores, savannahs, and peaty openings in the southwestern counties, and scattered east to Annapolis and Halifax Cos. Forma **discutiens** (Clarke) Gale, with smooth bristles, is less common than the species but is local in Yarmouth, Shelburne and Lunenburg Cos. (*R. glomerata* var. *minor* (L.) Vahl.).

Fla. to Tex. north to N.S., N.B., southern Ont. & Wisc.

7. **CLADIUM** R. Br. TWIG RUSH



1. **C. mariscoides** (Muhl.) Torr. Map 87. Fig. 19, d.

Rather local, throughout and often abundant where found; boggy swales, inundated lake margins, marshes, or swales in the gypsum areas. Forma **congestum** Fern., Rhodora **23**: 234. 1921, has the inflorescence compacted with the branches short or suppressed. This occurs scattered with the typical form; first described from Tiddville, Digby Co., but also common in low areas outside of Windsor in the gypsum area.

N.S. to Ont. & Minn. south to Fla. & Iowa.

8. **CAREX** (Dill.) L. SEDGE

The most recent and comprehensive treatment of Carex is K. K. MacKenzie's monograph in the North American Flora **18**: 1-478. 1931-35. This has been freely used in the following account in the preparation of keys and ranges of the species.

- a. Stigmas two and achenes lenticular; spikes usually bi-sexual, the lateral ones sessile. Subgenus *Vignea*
- a. Stigmas three and achenes triangular or, if stigmas two achenes lenticular, the lateral spikes stalked; spikes mostly unisexual. Subgenus *Eu-Carex*

SUB-GENUS VIGNEA

- a. Spikes solitary on each culm.
 - b. Plants loosely stoloniferous, 4-30 cm high; pistillate spike without empty scales at the base; perigynia spreading to reflexed, finely nerved dorsally. 12. *C. gynocrates*
 - b. Plants densely caespitose, 15-70 cm high; spikelet with empty scales at the base; perigynia ascending to spreading, coarsely 3-5 ribbed on the back (Fig. 20). 13. *C. exilis*
- a. Spikes more than one.
 - c. Spikes with the staminate flowers terminal, and the lower flowers

pistillate; perigynia not sub-terete.

- d. Spikes few, usually less than 10, widely separated (Fig. 19, e).

Sect. I. **BRACTEOSAE**

- d. Spikes numerous, more than 10, closely crowded into a terminal spike-like inflorescence (Fig. 21).

e. Perigynia 2.0-2.75 mm long, olive to brown, abruptly narrowed to the beak; culms not weakly cellular; leaves 1-4 mm wide.

f. Inflorescence 3-10 cm long, with many setaceous bracts; spikes more or less separated and oblong-ascending; perigynia yellowish-green.

4. *C. vulpinoidea*

f. Inflorescence 2-5 cm long, without setaceous bracts; spikes closely crowded, spreading-orbicular; perigynia shining-brown.

5. *C. diandra*

e. Perigynia 4-5 mm long, straw-colored, gradually narrowed from the base to the end of the beak; culms weakly cellular, flattening in drying; leaves 4-8 mm wide.

6. *C. stipata*

- c. Spikes with the pistillate flowers terminal; if otherwise, with the perigynia sub-terete and the spikes 1-3-flowered.

g. Perigynia without winged margins, at most thin-edged, the lower part of the body spongy-thickened; culms not hollow.

h. Perigynia 2-4 mm long, ascending to reflexed (Fig. 20).

i. Perigynia elliptic, ascending or appressed, not thin-edged.

Sect. 5. **HELEONASTES**

i. Perigynia spongy and widest near the base, widely spreading or reflexed, thin edged.

Sect. 7. **STELLULATAE**

h. Perigynia 4-5 mm long, appressed (Fig. 22, a).

Sect. 8. **DEWEYANAE**

g. Perigynia winged, the lower part not spongy-thickened; spikes oval with the perigynia usually closely appressed; culms hollow (Fig. 22, b-d).

Sect. 9. **OVALES**

SUBGENUS EU-CAREX

- a. Spikes solitary on each culm.

Perigynia 1-10, glabrous.

Perigynia oval, rounded at the tip, appressed-ascending, greenish (Fig. 22, e).

34. *C. leptalea*

Perigynia tapering to a long acute tip, strongly reflexed, yellowish (Fig. 28, b).

83. *C. pauciflora*

Perigynia many, pubescent, in a dense cylindrical spike 1.5-3 cm long; staminate plant with one spike only.

43. *C. scirpoidea*

- a. Spikes more than one per culm.

b. Stigmas 2; achenes lenticular; lateral spikes stalked, or if sessile, elongate; terminal spike usually staminate.

Lowest bract long-sheathing; perigynia orbicular, becoming golden-yellow at maturity (Fig. 24, a).

47. *C. aurea*

Lowest bract sheathless, or very rarely short-sheathing; perigynia not orbicular.

Achenes not constricted in the middle; pistillate scales not long-awned, shorter or about the same length as the perigynia, 1-nerved (Fig. 27). Sect. 29. **ACUTAE**

Achenes constricted in the middle; scales long-awned or acute and much longer than the perigynia, 3-nerved.

Sect. 30. **CRYPTOCARPAE**

b. Stigmas 3; achenes trigonous.

c. Perigynia pubescent or scabrous (*C. tonsa* with short leaves and crowded basal spikelets may be nearly glabrous).

d. Beak of the perigynia absent or nearly so.

Upper sheath of the fertile culm bladeless; spikes with 1-8 perigynia; plant glabrous; lowest bract long-sheathed.

44. *C. pedunculata*

Upper sheath of the fertile culm with long blades; perigynia numerous; lowest bract sheathless or nearly so.

Perigynia 10-30; culm and leaf-blades finely pilose.

65. *C. Swanii*

Perigynia 50-100; culms and leaves glabrous and glaucous (Fig. 26, e).

70. *C. flacca*

d. Beak of the perigynia prominent, or if short then the lower bract being sheathless.

e. Leaf-blades glabrous; or if soft-hairy (*C. hirta*) the teeth of the beak long, widely spreading and hispidulous.

Perigynia strongly-ribbed; the teeth long, spreading, and hispid or scabrous within (Fig. 25, e; 26, a). Sect. 24. **HIRTAE**

Perigynia more obscurely nerved, the teeth small, short, erect, smooth within.

Culms 0.2-4 dm high, about equalled by the leaves; of dry situations (Fig. 23, a-c). Sect. 11. **MONTANAE**

Culms 3-12 dm high, the leaves 2-6 dm long; of bogs and swamps. Sect. 24. **HIRTAE**

e. Leaf-blades hirsute or scabrous above; teeth of the perigynia short, not spreading.

Bracts leafy, at least twice as long as the inflorescence; perigynia and blades scabrous; perigynia strongly nerved (Fig. 26, b).

69. *C. scabrata*

Bracts not exceeding the inflorescence; perigynia and blades hirsute; perigynia nerveless (Fig. 23, d). 45. *C. hirtifolia*

c. Perigynia glabrous.

f. Style articulated with the achene, at length deciduous; perigynia membranous, with beak absent or if present the teeth small and erect; spikes either long and slender, or else up to 1.5 cm. wide and barely longer than wide; plants relatively small.

g. Beak of the perigynium absent, or very short and lacking teeth.

h. Pistillate spikes plainly stalked.

- i. Pistillate spikes loosely-flowered, 1-5 cm long, to 5 mm wide; lowest bract long-sheathing.

Spikes long-peduncled, drooping, the terminal with pistillate flowers above; perigynia beakless (Fig. 24, e).

54. *C. gracillima*

Spikes short-peduncled, erect, the terminal staminate; perigynia more or less short-beaked.

Plants from elongated rootstocks, often with stolons, glaucous or bluish-green; edges of the lower sheath smooth (Fig. 24, b).

Sect. 17. **PANICEAE**

Plants without elongated rootstocks and stolons, not glaucous; sheath with the edges serrulate, or smooth with the ventral side prolonged upwardly.

Sect. 18. **LAXIFLORAE**

- i. Pistillate spikes very small or else ovoid to oblong, 4-12 mm thick.

Lower sheath bladeless; pistillate spikes 4-8 mm long; perigynia 2-6, 2 mm long, very persistent (Fig. 23, e).

46. *C. eburnea*

Lower sheath with a blade; perigynia more numerous.

Lower bract long sheathing, serrulose upwardly on the margin (Fig. 24, d).

53. *C. conoidea*

Lower bract very shortly if at all sheathing.

Leaves soft-pubescent below, 2-3 mm wide, flat; pistillate scales not longer than the perigynia; fields and meadows (Fig. 25, d).

64. *C. pallescens*

Leaves glabrous, 1-4 mm wide; pistillate scales longer than the perigynia; bogs (Fig. 26, c,d).

Sect. 27. **LIMOSAE**

- h. Pistillate spikes sessile, or the lower very short-peduncled, the scales dark; basal sheaths fibrillose.

73. *C. Burbaumii*

- g. Beak of the perigynia conspicuous and toothed.

Spikes loosely-flowered, oblong to linear on long peduncles.

Sect. 21. **SYLVATICAE**

Spikes dense, short-cylindrical to globose, sessile (Fig. 25, b, c).

Sect. 22. **EXTENSAE**

- f. Style continuous with the achene and of the same texture, persistent; perigynia with beak conspicuous, toothed, the teeth stiff and 0.3-1 mm long or longer, often spreading; spikes 5-25 mm thick; plants stout, 4-12 dm high.

- j. Pistillate spike ovoid to cylindrical with 20-75 perigynia.

Perigynia very closely and coarsely nerved, strongly reflexed when mature; scales long-awned with the awns serrulate (Fig. 29, a).

86. *C. Pseudo-Cyperus*

Perigynia with widely spaced ribs, or not reflexed and the nerves many but weak.

Perigynia coriaceous, closely overlapping, elliptical, the

beak rather short and with weak teeth; scales not serrulate. acute to short-awned (Fig. 29, b).

87. *C. lacustris*

Perigynia membranous more spreading, contracted to a beak; beak with prominent teeth.

Spike cylindrical; perigynia less than 12 mm long, contracted into prominent teeth.

Sect. 35. **VESICARIAE**

Spike ovoid; perigynia 13-20 mm long, tapering evenly into a serrulate beak (Fig. 30, d). 95. *C. lupulina*

j. Pistillate spikes globose with 1-15 perigynia.

Leaves 1-3 mm wide, involute; pistillate spikes 7-9 mm thick, sessile, widely separated (Fig. 30, a).

92. *C. oligosperma*

Leaves 2-15 mm wide; pistillate spikes over 1 cm thick, peduncled, or sessile on the plant having wide leaves.

Beak of the perigynia serrate; pistillate spikes short-cylindrical, with the mature perigynia straw-colored (Fig. 28, d, e).

Sect. 32. **FOLLICULATAE**

Beak of the perigynia smooth; pistillate spikes dense, ovoid or round, with the mature perigynia green (Fig. 30, c).

Sect. 94. *C. intumescens*

SECT. I. BRACTEOSAE

a. Perigynia with the lower third to half corky-thickened; spikes separated in a slender inflorescence 3-6 cm long; scales of pistillate spike about half as long as the perigynia.

b. Stigmas long, slender, usually not twisted, light reddish; perigynia 2.5-3.5 mm long; leaf-blades 1-2 mm wide. 1. *C. rosea*

b. Stigmas short, stout, strongly twisted or contorted; perigynia 3.25-4.5 mm long; leaf-blades 1.5-3 (averaging 2.5) mm wide.

2. *C. convoluta*

a. Perigynia with the body inconspicuously corky-thickened, often spongy at the base, 4-4.5 mm long; spikes aggregated in a head 1.5-3 cm long; scales acuminate, nearly as long as the perigynia.

4. *C. spicata*

1. *C. rosea* Schkuhr.

Alluvial woods and damp thickets, rare; along the 5-Mile River, Hants Co.; damp thickets and clearings, North Mt., Granville, Annapolis Co.; Big Intervale, Inverness Co.

Dry woodlands; N.S. to N.D. south to Ga. and La.

2. *C. convoluta* Mack., Bull. Torrey Bot. Club 43: 428. 1916. Fig. 19, e.

Scattered from Annapolis to Pictou and Cumberland

Cos.; grassy intervalles, rich open woods, near gypsum cliffs, etc. *C. radiata* (Wahl.) Dewey has been reported from the province, but I believe that these plants should be placed in the preceding species.

Dry woods; N.S. to Man. south to Ala. and Ark.

3. *C. spicata* Huds.

Common along the roadsides in the gypsum area around Windsor, Newport and Brooklyn in Hants Co., growing in large stools (Fernald, 1922); Liverpool. (*C. muricata* L. of earlier authors).

Locally naturalized from Eu.: N.S. to Ohio and Va.

SECT. 2. MULTIFLORAE

4. *C. vulpinoidea* Michx. Map 110. Fig. 21, a.

Common along roadside ditches between Berwick and Middleton in the Annapolis Valley; often abundant on damp slopes along the North Mt. in the same area; a few stools in moist ground in an abandoned saw-mill clearing, Lake Rossignol Reservoir, Queens Co. (Weatherby, 1942).

Swampy places Nfld. to B.C. south to Fla. and Tex.

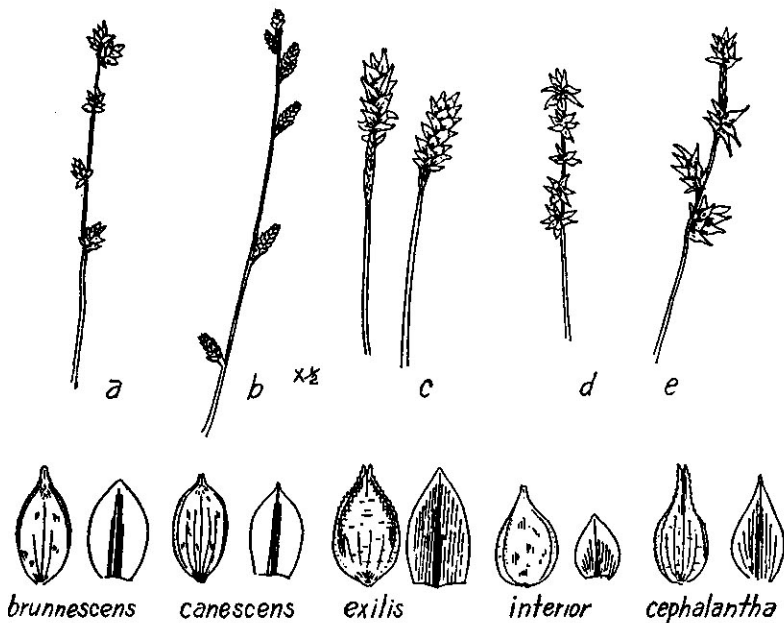


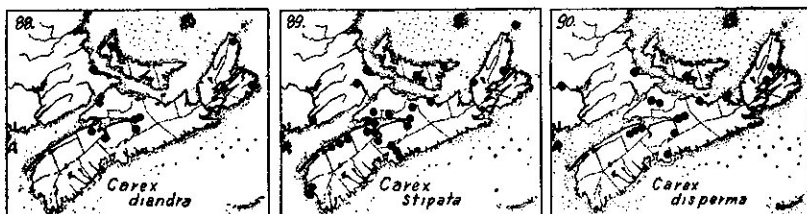
Fig. 20.—*Carex*: inflorescences, $\times 1$; perigynia and scales, $\times 5$.

SECT. 3. PANICULATAE

5. *C. diandra* Schrank Map 88. Fig. 21, b.

Common and locally abundant in bogs, cat-tail swales, and marshes along the northern part of the province; common in the extensive areas above Kentville, near Truro and at Amherst.

Wet meadows; Nfld. to Yukon south to N.J., Ind. and Calif.; Eurasia; N.Z.



SECT. 4. VULPINAE

6. *C. stipata* Muhl. Map 89. Fig. 21, c.

Swamps, swales, damp meadows, roadside ditches; general throughout, often abundant.

Swamps and wet meadows; Nfld. to Alaska south to N.C., and N.M.; Japan.

Sect. 5. HELEONASTES

a. Spikes with the staminate flowers terminal, mostly with 1-3 fertile flowers; perigynia unequally biconvex, almost terete (Fig. 21).

7. *C. disperma*

a. Spikes with the staminate flowers basal; perigynia flattened and plano-convex.

b. Lowest bract of the inflorescence bristle-like, many times exceeding the 1-5-flowered spike; spikes widely separated.

c. Leaves 1-2 mm wide; spikes 2-3, 2-5-flowered; perigynia 3.3-4.8 mm long (Fig. 21).

8. *C. trisperma*

c. Leaves 0.3-0.5 mm wide; spikes 1-2, 1-3-flowered; perigynia 2.5-3.5 mm long.

C. trisperma var. *Billingsii*

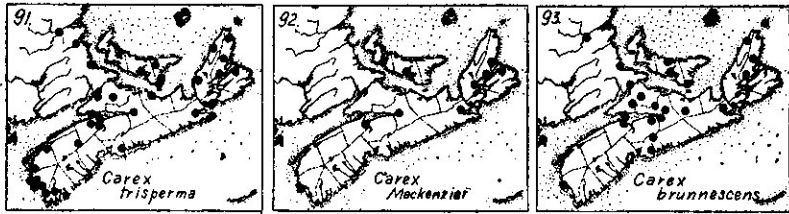
b. Lowest bract of the inflorescence lacking or to about twice as long as the spike; spikes several to many-flowered, the upper approximate.

d. Scales reddish-brown, larger than the perigynia; culms smooth; perigynia coriaceous, obscurely beaked, enveloped by the scales; salt marshes.

9. *C. Mackenziei*

- d. Scales light-colored, smaller than the perigynia; culms rough above perigynia membranous, distinctly short-beaked, not enveloped by the scales; not salt-marsh plants.
- e. Perigynia loosely spreading, 5-10 to a spike; leaves green, 1-2.5 mm wide (Fig. 20). 10. *C. brunnescens*
- e. Perigynia appressed-ascending, 10-30 to a spike; leaves glaucous, 2-4 mm wide (Fig. 20).
- f. Inflorescence 2-5 cm long; spikes 4-7 mm long; perigynia to 2 mm long. 11. *C. canescens*
- f. Inflorescence 5-10 cm long; spikes 6-12 mm long, the lower remote; perigynia 2.3-3 mm long, the books serrate.

C. canescens var. *disjuncta*



7. ***C. disperma*** Dewey Map 90. Fig. 21.

Mossy woods, shaded swamps and wet to sphagnum shaded areas; Kings and Halifax Cos. to C. B. (*C. tenella* Schkuhr).

Nfld. to the Yukon south to N.J., Ind. & Calif.

8. ***C. trisperma*** Dewey Map 91. Fig. 21.

Mossy woods and wet thickets, throughout. Nfld. to Que. south to N.J. & Penn.

Var. ***Billingsii*** Knight is characteristic of dryish knolls in bogs and peaty barrens throughout; often abundant and sometimes covering the ground in open woods or cut-over areas near the coast.

Acid soils, swampy woods or bogs, Nfld. to Sask. south to Md., Ill. & Minn.

9. ***C. Mackenziei*** Krecz. Map 92.

Scattered around the coast; brackish soil, sometimes forming a band with other plants about the heads of the marshes or about salt ponds; little collected, but probably general. (*C. norvegica* Willd. See Flora U.R.S.R., 3: 183. 1935).

Lab. to Me.; Hudson Bay; Alaska; Eurasia.

10. ***C. brunnescens*** (Pers.) Poir, var ***sphaerostachya*** (Tuckerm.) Kukenth. See Fernald, *Rhodora* 28: 163. 1926. Map 93. Fig. 20.

Common from Halifax and Kings Cos. to northern C.B.; scattered west to Yarmouth. This species is characteristic of open moist woods and thickets in acid soil. The variety is the southern extreme and may be an ecological form.

Nfld. to Alaska south to N.J., N.C. & Wash.; Eurasia.

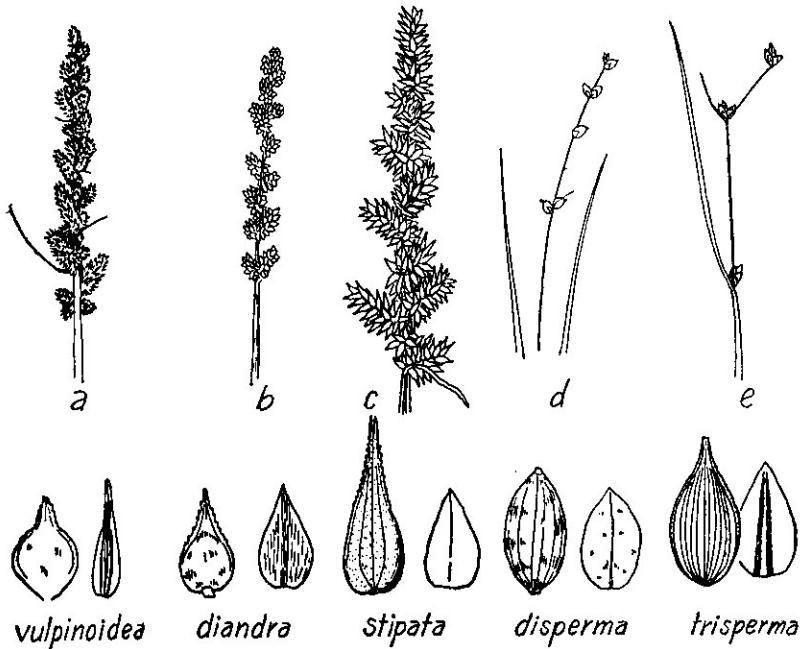


Fig. 21.—*Carex*: inflorescences, x 1; perigynia and scales, x 5.

11. *C. canescens* L. Fig. 20.

Common throughout and very variable; grading into and represented mostly by the following variety.

Var. **disjuncta** Fern. Common throughout; lake margins, marshes, swamps, sphagnum mats, and wet meadows.

Greenland to Alaska south to Va., Ariz. & Calif.; Eurasia; S.A. & Australia.

SECT. 6. **DIOICAE**

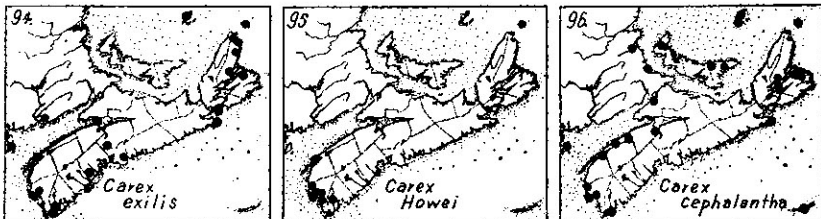
12. *C. gynocrates* Wormsk.

The only collection from the province is from a bog on St. Paul Is., northern C.B. (Perry, 1931).

Greenland to Yukon south to N.Y., Mich. & B.C.; Siberia.

SECT. 7. STELLULATAE

- a. Spike one to a culm; leaves narrow, involute and rigid (Fig. 20).
13. *C. exilis*
- a. Spikes more than one; leaf-blades not rigid, 0.5-4 mm wide.
- b. Perigynia 2.25-3.25 mm long, the beak very shallowly bi-dentate, one-quarter to one-third the length of the body; scales one-half to two-thirds the length of the body (Fig. 20, d).
- c. Perigynia nerveless ventrally or few-nerved at the base, yellowish-brown, the beak with the ventral false suture inconspicuous; scales obtuse; leaves 1-3 mm wide. 14. *C. interior*
- c. Perigynia strongly nerved ventrally, deep green, the beak with the ventral false suture conspicuous; scales subacute; leaves 0.25-1 mm wide. 15. *C. Howei*
- b. Perigynia 2.75-4.75 mm long, the beak deeply bidentate and the ventral suture conspicuous.
- d. Body of the perigynia sub-orbicular or widely ovate, deep-green at maturity; beak less than half as long as the body; scales obtuse, one-half the length of the perigynia, almost orbicular. 16. *C. atlantica*
- d. Body of the perigynia ovate to lanceolate, yellowish at maturity; beak half the length of the body or more; scales acute.
- e. Staminate flowers terminal, basal or in separate spikes; culms very rough above; upper part of the perigynium body serrulate; scales chestnut-brown with shining-white margin, acute, as long or longer than the perigynium body. 17. *C. sterilis*
- e. Staminate flowers mostly basal in the terminal spikes; upper part of the perigynium body serrulate or smooth; culms little or not roughened above; scales two-thirds the length of the perigynium body.
- f. Mature perigynia lanceolate, 2.5-3.5 mm long, nerveless or impressed-nerved towards the base; culms slender; achenes much longer than wide; leaves 0.75-2 mm wide. 18. *C. angustior*
- f. Mature perigynia ovate, 3.5-4 mm long, with raised nerves ventrally; culms stouter; achenes about as long as wide; leaves 1.5-2.5 mm wide (Fig. 20). 19. *C. cephalantha*



13. *C. exilis* Dewey Map 94. Fig. 20.
Bogs and peaty barrens; scattered throughout.

Lab. to Dela., mostly near the coast; locally inland to Minn.

14. **C. interior** Bailey Fig. 20.

Spruce swamps, wet or swampy meadows, widely distributed throughout.

Nfld. to B.C. south to Penn., Ind. & N. Calif.

15. **C. Howei** Mack. Map 95.

Spruce swamps, wet woods, thickets and boggy swales; abundant in Yarmouth and Digby Cos. (Fernald, 1921); peat bog on St. Paul Is. (Perry, 1931). (*C. scirpoides* Schkuhr, var. *capillacea* (Bailey) Fern.).

Fla. to La. north to N.S.; locally west to Ohio & Mich.

16. **C. atlantica** Bailey Map 63.

Common on bogs and peaty barrens; Yarmouth to Annapolis Co., and Guysborough (Fernald, 1921); probably throughout. It is very common near the Atlantic Coast; and is characteristic of the *Polytrichum* areas in the sand-barrens near Middleton. *C. sterilis* in Gray's Man.).

Near the coast, N.S. to Fla. & Tex.

17. **C. sterilis** Willd.

Mackenzie does not list this species from N.S., but gives the range as more inland. Older records then must be critically examined. The northern part of the province would seem to be within the range of the plant.

Nfld. to Minn. south to N.J., N.Y. & Wisc. in swampy meadows in calcareous regions.

18. **C. angustior** Mack.

Swampy meadows; apparently not at all common. (*C. stellulata* var. *angustata* Carey).

Nfld. to Wash. south to D.C., N.C. & Calif.

19. **C. cephalantha** (Bailey) Bickn. Map 96. Fig. 20.

Swamps, sphagnum mats, and bogs; common in northern C. B., and probably throughout. (*C. stellulata*. var. *cephalantha* (Bailey) Fern.).

Nfld. to Wisc. south to Md.; Vancouver to Wash.

SECT. 8. DEWEYANAE

- a. Culms very rough above, with the spikes aggregated, terminal and closely appressed, the lower bracts much shorter than the spikes; perigynia narrowly lanceolate, with the achenes linear-lanceolate.

20. *C. bromoides*

- a. Culms smooth to more or less roughened above, with the spikes separated, spreading, the lower bracts much longer than the spikes; perigynia oblong-lanceolate with the achenes sub-orbicular.

21. *C. Deweyana*

20. *C. bromoides* Schkuhr

Known from a marsh near Truro; specimens were collected by Macoun and identified by Mackenzie.

Swampy woods; N.S. to Wisc. south to Fla. & La.

21. *C. Deweyana* Schwein. Map 97. Fig. 22.

Annapolis and Lunenburg Cos. to C.B.; rich woods, more frequent in gypsum or limestone areas; common in hemlock woods on gypsum near Windsor.

Dry woods; Lab. to Mackenzie and B.C. south to Penn. & Colo.

SECT. 9. OVALES

- a. Perigynia widely lanceolate, serrulate above, with a long slender terete beak the upper 1-2 mm of which are little if at all serrulate, concealed by scales of the same shape; leaves 2-4 mm wide.

22. *C. leporina*

- a. Perigynia with the beak flattened, margined and serrulate to the apex.

b. Scales shorter than the perigynia, lanceolate and tapering above to expose the tops of the perigynia (Fig. 22, b,c).

c. Perigynia lanceolate, 3.5-6.5 mm long, 0.5-2 mm wide, widest near the base; scales acute to acuminate (Fig. 22, b).

d. Spikes usually crowded; perigynia appressed; leaves 1-3 mm wide, those of the sterile culms ascending, usually clustered at the apex, the sterile culms poorly developed.

e. Winged margin of the perigynia (not the whole area outside the achene) nearly obsolete at the base; plant 1-6 dm high, leaves 7-15 cm long, perigynia 3.5-4 mm long. 23. *C. Crawfordii*

e. Winged margin of the perigynia plainly visible to the base; plant 1.5-10 cm high, leaves 5-50 cm long, perigynia 4-6.5 mm long (Fig. 22, b).

f. Plant to 10 dm high; spikes 4-12; perigynia lanceolate, 1.2-2 mm wide; scales light brownish. 24. *C. scoparia*

f. Plant 2-4.5 dm high; spikes 3-6; perigynia broadly elliptical, 2 mm wide; scales dark brown. *C. scoparia* var. *tessellata*

- d. Spikes separated in a moniliform inflorescence; perigynia ascending-spreading; leaves 3-7 mm wide, those of the sterile culms widely spreading, well-developed, numerous and not clustered.

31. *C. projecta*

- c. Perigynia elliptical to obovate, at most twice as long as they are wide (Fig. 22, c).

- g. Upper leaf-sheath green and strongly nerved ventrally nearly to the mouth; perigynia widely lanceolate; bracts often several times the length of the spikes; on or near salt marshes.

26. *C. hormathodes*

- g. Upper leaf-sheath strongly white-hyaline ventrally; perigynia wider, often obovate and widest above the middle.

- h. Spikes approximate to closely aggregated, rarely distant, the lateral rounded or truncate to the base.

- i. Perigynium body almost orbicular, 2.5 mm wide; culms stiff and rigid; sheaths strongly prolonged on the ventral side to nearly truncate across top (Fig. 22, c).

27. *C. cumulata*

- i. Perigynium body elliptical, 1.5-2 mm wide; culms slender, sheath very slightly prolonged at the base of the blade.

25. *C. Bebbii*

- h. Spikes approximate to distant, the lateral strongly clavate at the base.

- j. Spikes silvery-greenish or brownish in a moniliform flexuous inflorescence; leaf-blades knobbed on either side of the junction with the sheath; sheaths very strongly prolonged and truncate.

28. *C. silicea*

- j. Spikes greenish, in a head 2-6 cm long; leaf-blades not knobbed at the base; sheaths very slightly prolonged, the ventral side v-shaped.

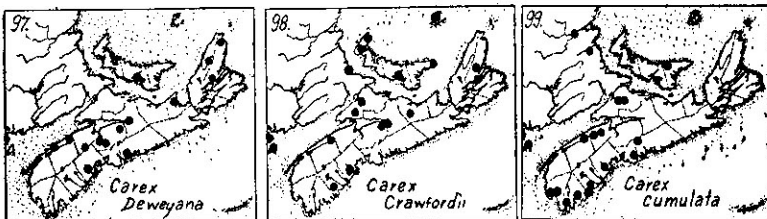
29. *C. albolutescens*

- b. Scales about the length of the perigynia and about the same width above, hiding the tips of the perigynia; perigynia widely lanceolate to ovate (Fig. 22, d).

- k. Inflorescence stiff, the spikes approximate to aggregated; lower bract dilated and longer than the inflorescence.

31. *C. adusta*

- k. Inflorescence not stiff, but flexuous or moniliform; lower bract shorter than the spike.



1. Perigynium body widest near the base, nerveless or occasionally few-nerved ventrally, the beak reddish-brown tipped; scales dull- or yellowish-brown (Fig. 22, d). 32. *C. aenea*

1. Perigynium body widest near the middle, strongly nerved ventrally, the beak hyaline-tipped; scales silvery-green.

33. *C. argyrantha*

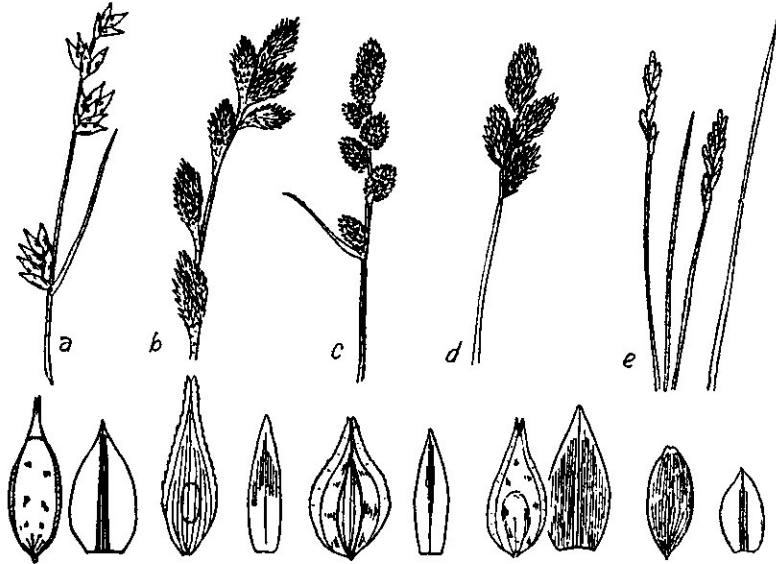
22. *C. leporina* L.

Common in springy or seepy fields or along roadsides; Digby, Yarmouth and Shelburne Cos. (Fernald, 1921).

2 Naturalized from Eu.; Nfld. & P.E.I. to Mass. & N.Y.

3. *C. Crawfordii* Fern. Map 98.

Swales and damp peaty barrens; Annapolis and Queens Cos. to C.B. (Fernald, 1921).



Deweyana scoparia cumulata aenea leptalea

Fig. 22.—*Carex*: inflorescences, x 1; perigynia and scales, x 5.

Open places; Nfld. to B.C. south to Conn., Mich. & Wash.

24. *C. scoparia* Schkuhr Fig. 22.

Very common throughout; in ditches, and poorly-drained soil. Some plants have the inflorescence more elongate, with the spikes obovoid or top-shaped. These grade into the typical plants and have been named forma *subturbinata* (Fern. & Wieg.) Fern., Rhodora 44:284. 1942

Var. *tessellata* Fern. & Wieg., *Rhodora* 12: 135. 1910, has been found in wet sandy and gravelly swales and roadsides, Belleville, Yarmouth Co. (Fernald, 1921). N.S. & Me. Nfld. to B.C. south to S.C., N.M. & Ore.

25. **C. Bebbii** Olney

Local: boggy swale on a hillside near limestone quarries, George R., C.B. Co. (Fernald, 1921); dryish swales near the Wentworth gypsum quarries, Windsor (Fernald, 1922).

Swampy meadows in calcareous or neutral soils; Nfld. to B.C. south to N.J., Ill. & Wash.

26. **C. hormathodes** Fern.

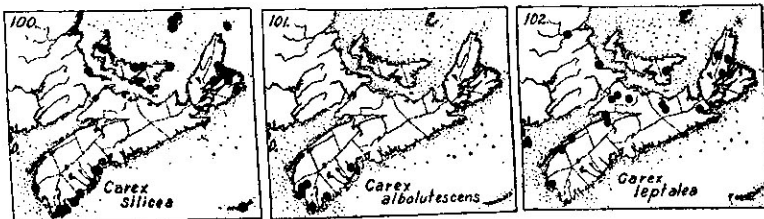
Common near the coast on poorly-drained soils and around the salt marshes; around the province. Macoun's record of *C. straminea* var. *festucea* from Baddeck belongs here.

Salt marshes and their borders; Nfld. & Que. to Va.

27. **C. cumulata** (Bailey) Mack., Bull. Torrey Bot. Club 49: 366. 1922. Map 99. Fig 22.

Dry or moist open barrens; frequent from Yarmouth to Halifax and Cumberland Cos.; common on the cranberry bogs of the Annapolis Valley. A collection from Broad R., Queens Co., with the spikes 7-20 mm apart, has been named forma *soluta* Fern., *Rhodora* 44: 285. 1942. A hybrid with *C. scoparia* was found on damp *Polytrichum*-covered plains at Middleton, Annapolis Co., growing with the parents and more abundant than either of them (Fernald, 1921). (*C. albolutescens*, var. *cumulata* Bailey).

Acid soils; N.S. to the pine barrens of N.J. west to Sask.



28. **C. silicea** Olney Map 100.

Sands, barrier beaches and rocks of the outer coast from Yarmouth Co. to northern C.B.; seldom absent on the

shingle beaches in C.B.; common on the dunes and drier sand flats of Sable Is.

Acid soils; N.S. to Nfld. & south to Dela.

49. **C. albolutescens** Schwein. See Svenson, *Rhodora* 20: 329-331. 1938. Map 101.

Somewhat general on the borders of the savannahs along the east branch of the Tusket R., Yarmouth Co.; rare in low woods and thickets by Butler's L., Gavelton; thicket bordering salt marsh, Villagedale, and moist *Polytrichum*-covered barrens near Clement Pond, Barrington, Shelburne Co. (*C. straminea* Willd. of Mackenzie, not of Gray's Man.).

La. near the coast to Mass, southern N.H. & N.S.; in the Mississippi Valley to Ind.

30. **C. projecta** Mack., Bull. Torrey Bot. Club 35: 264. 1908.

Meadows, damp thickets and shaded swamps; scattered throughout. (*C. tribuloides* var. *reducta* Bailey, and including var. *cristata* Bailey of Macoun's Cat.).

Nfld. to B.C. south to D.C. & Iowa.

31. **C. adusta** Boott

A single plant was found growing among disturbed rocks by the roadside, Armdale, Halifax Co. (Fernald, 1922); not mentioned by Mackenzie as occurring in N.S. Plants from Truro belong here.

Dry acid soils; Nfld. to southern Me., northern N.Y. & west to Minn., Sask & Mackenzie; adventive in B.C.

32. **C. aenea** Fern. Fig. 22.

Apparently rare; dry *Polytrichum*-covered barren near the head of Abram R., Yarmouth Co.; dry open barrens, Springhill Junction, Cumberland Co.; and collected by Macoun in Point Pleasant Park, Halifax, the specimen being referred to *C. pratensis* in 1902 (Fernald, 1921).

Dry places; Lab. to Conn. west to B.C. & Yukon.

33. **C. argyrantha** Tuckerm., see *Rhodora* 40: 328. 1938.

Sandy thicket, Middleton, Annapolis Co.; sand plains in the center of Kings Co. (*C. foenea* Willd including var. *perplexa*).

Dry woods; Que. & N.S. to Mich. south to Va.

SECT. 10. POLYTRICHOIDEAE

34. **C. leptalea** Wahl. Map 102. Fig. 22.

Wooded swamps; throughout the northern half of the province from Yarmouth to northern C.B.

Bogs and wet meadows; Lab. to Alaska south to Fla. & Calif.

SECT. 11. MONTANAE

- a. Staminate and pistillate spikes at most moderately separate, both near the top of an erect culm (Fig. 23, a, b).
- b. Culms slender and very loosely cespitose, the individual ones separated by 2 cm or more; staminate spike 0.5-1 mm wide; scaly stolons present. 35. *C. novae-angliae*
- b. Culms densely cespitose.
- c. Perigynium-body elliptical; staminate spikes narrow, 0.75-2 mm wide; culms without horizontal stolons; pistillate scales straw-colored or merely purple-tinged (Fig. 23, b).
- d. Culms 3-25 cm high, slender; leaves 0.5-1.5 mm wide, often overtopping the culms. 36. *C. albicans*
- d. Culms 15-50 cm high, erect; leaves 2-4 mm wide, shorter than the culms. 37. *C. communis*
- c. Perigynium-body orbicular or nearly so; staminate spikes 2-3.5 mm wide; culms very fibrillose at the base, with long horizontal stolons; pistillate scales reddish-brown.
- e. Beak of the perigynia less than half the length of the body; staminate spike 2-3 mm wide. 38. *B. pensylvanica*
- e. Beak of the perigynia nearly as long as the body; staminate spike 2.5-3.5 mm wide. 39. *C. lucorum*
- a. Lower pistillate spikes widely separated, the peduncles arising from near the base of the culm; or all the spikes crowded near the base of the plant (Fig. 23, c).
- f. Bract of the lowest non-basal pistillate spike leaflike, normally exceeding the culm; leaves thin and narrow; perigynia 2.5 mm long, short-beaked. 40. *C. deflexa*
- f. Bract of the lowest non-basal pistillate spike scale-like and shorter than the culm, if rarely longer then auriculate and reddish-brown-tinged at the base; perigynia 3.2-4.7 mm long, the beak about as long as the body.
- g. Perigynia subcoriaceous, the body glabrous to very sparsely short-pubescent above; leaf-blades short, thick, stiff and deep-green, 2.0-4.5 mm wide. 42. *C. tonsa*
- g. Perigynia membranous, the body short-pubescent above; leaf-blades thinnish, light-green, erect or ascending, not stiff, 1.5-3 mm wide. 41. *C. umbellata*

35. *C. novae-angliae* Schwein. Fig. 23.

Common to scattered throughout; damp woods, pasture knolls and recent clearings.

Nfld. to Wisc. and locally south to Conn. & Penn.

36. *C. albicans* Willd.

Abundant in dry or moist peaty soil, even on knolls in sphagnum bogs; Yarmouth and Shelburne Cos. (Fernald,

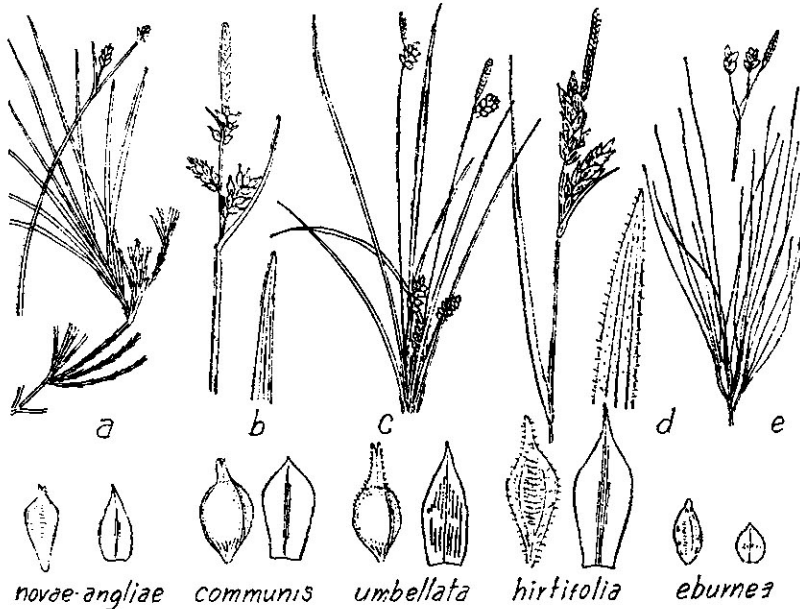


Fig. 23.—*Carex*: inflorescences, x 1; perigynia and scales, x 5.

1921); scattered east to Halifax and Cumberland Cos., the distribution here poorly known. (*C. varia* in part).

Dry woodlands and acid soil; P.E.I. to Fla.; around the Great Lakes.

37. *C. communis* Bailey Fig. 23.

Very common throughout: dry woodlands, roadsides and clearings.

N.S. to Minn. south to Ga., Ky. & Ark.

38. *C. pensylvanica* Lam.

Rare: a specimen from Bridgewater collected by Macoun and determined by Mackenzie is in the National Museum, Ottawa. No other collections are known.

Dry, often sterile soil; N.S. to N.D. south to S.C. & Iowa.

39. *C. lucorum* Willd.

Dry rocky and gravelly soil west of Bridgewater (Fernald, 1921); distribution otherwise unknown, but pro-

bably the plant is scattered. [*C. Pennsylvanica*, var. *luco-
rum* (Willd.) Fern.].

Dry open woodlands; N.S. to Wisc. south to N.C.

40. *C. deflexa* Hornem.

Scattered, probably throughout on light soils; Yar-
mouth, Liverpool & Truro. (Including *C. deflexa* var.
Deanei Bailey of Macoun's Cat.).

Dry open woodlands; Greenland to Alaska south to
Mass. & B.C.

41. *C. umbellata* Schkuhr, see Fernald, *Rhodora* 44:
288-290. 1942. Fig. 23.

Sterile, sandy fields and roadsides in the Annapolis
Valley and in Cumberland Co.; probably scattered elsewhere.
(*C. rugosperma* Mack.).

N.S. & P.E.I. to Minn. south to Md.

42. *C. tonsa* (Fern.) Bickn., Bull. Torrey Bot. Club 35:
492. 1908.

A specimen from Truro was identified by Mackenzie;
it is scattered to common in the Annapolis Valley and in
Cumberland Co. along sandy roadsides. (*C. umbellata*, var.
tonsa Fern.).

N.S. to Minn. & Alta. south to D.C. & Ind.

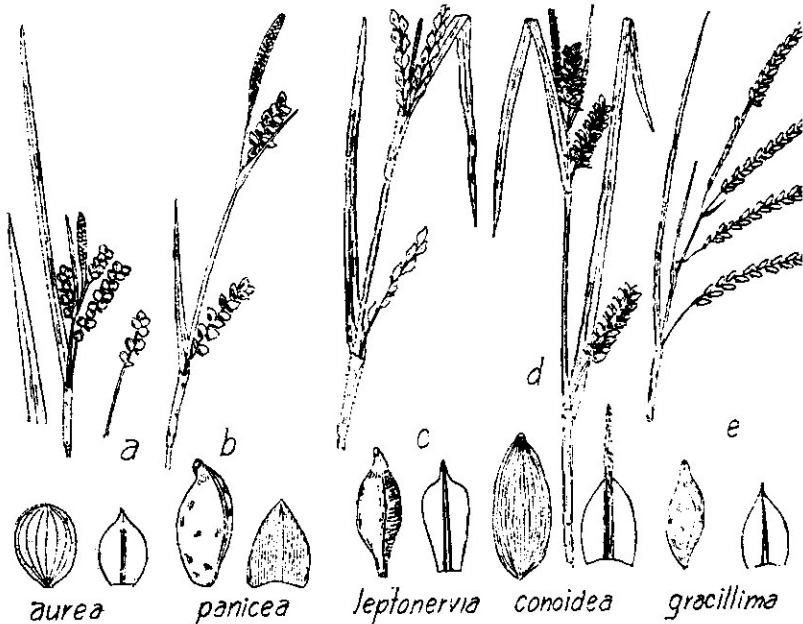


Fig. 24.—*Carex*: inflorescences, $\times 1$; perigynia and scales, $\times 5$.

SECT. 12. **SCIRPINAE**43. **C. scirpoidea** Michx.

A specimen in the Canadian National Museum was collected by Macoun on the coast of northern C.B. near Glace Bay.

Dry open places in calcareous districts; Greenland to Alaska south to N.H., Colo., & B.C.; rare in arctic Eurasia.

SECT. 13. **DIGITATAE**44. **C. pedunculata** Muhl.

Rare; collected on the North Mt. north of Annapolis and on the talus slopes of Cape Blomindon.

Dry woodlands in calcareous districts; Nfld. to B.C. south to Va., Iowa & S.D.

SECT. 14. **TRIQUETRAE**45. **C. hirtifolia** Mack. Fig. 23.

Scattered to common on the intervalles, rich alluvial meadows and grassy thickets in the calcareous districts near Shubenacadie and Brookfield.

N.S. to Minn. south to D.C. & Kans.

SECT. 15. **ALBAE**46. **C. eburnea** Boott Fig. 23.

Rare on cliffs, talus slopes, or slopes under coniferous woods on gypsum; apparently found wherever gypsum exists in any amount in the province.

Nfld. to B.C. south to Va., Tenn. & Nebr.

SECT. 16. **BICOLORES**47. **C. aurea** Nutt. Map 105. Fig. 24.

Common in the northern, more alkaline districts of the province from Annapolis Co. and Cumberland Co. to northern C.B. It is common along the basaltic North Mt.; often abundant in fields and low areas in Cumberland Co.; and in intervalles and hillsides eastward.

Wet meadows and banks; Nfld. to B.C. south to Conn., Mich. & Calif.

SECT. 17. PANICEAE

- a. Leaves and perigynia strongly glaucous; leaves quickly becoming plicate or involute; perigynia without a beak, filled by the achene.

48. *C. livida*

- a. Leaves and perigynia not glaucous, bluish-green; leaves flat; perigynia with a minute beak, loose over the achene.

- b. Perigynia 3.5-5 mm long.

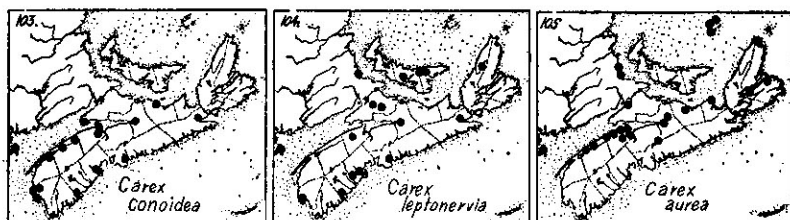
49. *C. panicea*

- b. Perigynia about half as long.

C. panicea var. *microcarpa*48. *C. livida* (Wahl.) Willd.

Mackenzie does not mention this species from N.S. Macoun lists it from Louisburg and from near Windsor. No specimens have been seen.

Sphagnous bogs or wet places; Lab. & Nfld. to Alaska south to Conn., Mich. & Calif.

49. *C. panicea* L. Fig. 24.

Damp, grassy or peaty slopes; local and perhaps introduced; abundant in Yarmouth Co.; scattered in other places east to Antigonish Co.

Var. *microcarpa* Sonder is known from thin, open humus by a roadside on the North Mt., above Belle Isle, Annapolis Co. (Fernald, 1922); Eu.

N.S. to Conn.; Eu. & western Asia.

SECT. 18. LAXIFLORAE

- a. Leaves 3-10 mm wide; sterile shoots forming short culms; beak of perigynia very short, usually twisted.

- b. Lowest bract almost smooth on the edges; perigynia 2.5-3.5 mm long, with numerous conspicuous nerves. 50. *C. ormostachya*

- b. Lowest bract serrulate on the edges; perigynia 3.5-4.5 mm long, the nerves absent or very faint. 52. *C. leptonevia*

- a. Leaves 7-20 mm wide; sterile shoots merely a tuft of leaves; perigynia 3-4.25 mm long, the beak conspicuous and nearly straight.

51. *C. laxiflora*50. *C. ormostachya* Wieg., Rhodora 24: 196. 1922.

Scattered in beech woods, South Mt., in Kings Co.

Woods, mostly in dry soil; N.S. & Que. to Minn. south to Mass. & Penn.

51. *C. laxiflora* Lam., see Fernald, *Rhodora* 44: 315-318. 1942.

Annapolis Co.; damp clearings and open rocky woods, North Mt., Granville; the first authentic record from east of southern Maine (Fernald, 1922). Earlier records belong to the following species. (*C. anceps* Muhl.).

N.S. to Mich. south to N.C. & Ky.

52. *C. leptonervia* Fern., *Rhodora* 16: 214. 1914. Map 104. Fig. 24.

Throughout, but rarer southwestward; rich woods and thickets. (*C. laxiflora* var. *leptonervia* Fern.).

Nfld. to Minn. south to N.J., N.C. & Wisc.

SECT. 19. GRISEAE

53. *C. conoidea* Schkuhr. Map 103. Fig. 24.

Sterile or peaty fields and meadows, often near the coast; frequent from Yarmouth to Antigonish and Pictou Cos.; probably throughout, but not yet collected in C.B.

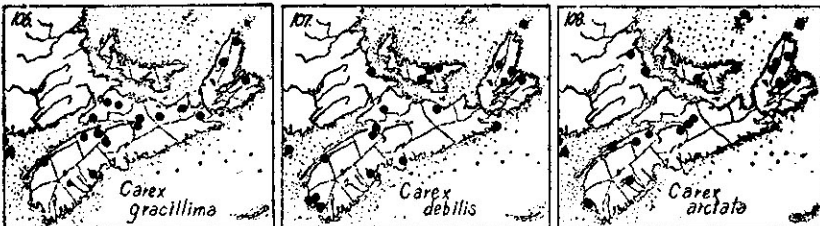
Nfld. to Minn. south to Dela., N.C., Ohio & Iowa.

SECT. 20. GRACILLIMAE

54. *C. gracillima* Schwein. Map 106. Fig. 24.

Dry or moist woods and thickets, wet meadows and roadsides; throughout. It is common in the northern counties and becomes rarer southwestward.

Nfld. to Man. south to Va., Ky. & Mo.



SECT. 21. SYLVATICAE

- a. Pistillate spikes oblong-cylindric, 8-25 mm long; leaves soft-hairy; pistillate scales light-chestnut-brown. 55. *C. castanea*
- a. Pistillate spikes linear, the larger 2.5-8 cm long; leaves not pubescent, except sometimes towards the base and at the mouth of the sheaths; pistillate scales greenish (Fig. 25, a).
- b. Achenes slenderly stalked; pistillate scales mostly obtuse, the mid-vein not extending to the tip, about half as long as the perigynia. 56. *C. debilis*
- n. Achenes sessile or barely stalked; pistillate scales cuspidate or aristate with the mid-vein extending to the tip, usually more than half the length of the perigynia. 57. *C. arctata*
55. *C. castanea* Wahl.

Mackenzie reports this plant from N.S.; a specimen was collected by Macoun near Black Brook, C.B.; and it is also known from near Aspy Bay, and from Bass R., N.B.

Dry thickets and on banks in calcareous regions; Nfld. to Minn. south to Conn., N.Y. and the Great Lakes region.

56. *C. debilis* Michx., var. *Rudgei* Bailey, see Fernald, *Rhodora* 44: 310. 1942. Map 107.

Scattered to common throughout; in open thickets and meadows. (*C. flexuosa* Muhl.).

Dry woods and acid soils; Nfld. to Wisc. south to Va. & Mo.

57. *C. arctata* Boott. Map 108. Fig. 25.

Common from Digby and Cumberland Cos. to C.B.; rare in Digby and Yarmouth Cos.; woods and rich thickset, shaded banks.

Nfld. to Minn. south to Penn., Ohio. & Wisc.

SECT. 22. EXTENSAE

- a. Perigynia 2-3.5 mm long, not at all or but little deflexed, the beak markedly shorter than the body, smooth or nearly so; culms bluntly triangular; plants small (Fig. 25, b).
- b. Sheath of the lowest bract convex and prolonged upward at the mouth opposite the blade; perigynia with the beak nearly half as long as the broadly ovoid body. 58. *C. serotina*
- b. Sheath of the lowest bract concave or truncate and not prolonged upward at the mouth; perigynia with the beak about one-third the length of the obovoid body. 59. *C. viridula*
- a. Perigynia 3.5-6 mm long, at least the lower conspicuously deflexed, the beak about as long as the body; culms sharply triangular above (Fig. 25, c).

- c. Beak of the perigynia smooth or nearly so, whitish or with age slightly tawny-tinged at tip; perigynia 3.5-4.5 mm long, concealing the scales. 60. *C. cryptolepis*
- c. Beak of the perigynia serrulate, reddish-tinged at the tip; scales conspicuous.
- d. Perigynia little inflated, 4-6 mm long; staminate spike normally sessile or nearly so.
- e. Perigynia 4 mm long, the middle and upper not deflexed; leaves 2-4 mm wide; ligule mostly wider than long; achenes short-apiculate. 61. *C. laxior*
- e. Perigynia 4.5-6 mm long, all except the uppermost deflexed; leaves 3-5 mm wide; ligule mostly longer than wide; achenes strongly apiculate. 62. *C. flava*
- d. Perigynia markedly inflated, 4 mm long, not deflexed except the lower; staminate spike conspicuously long-peduncled; achenes strongly apiculate. 63. *C. lepidocarpa*

58. *C. serotina* Merat, see Nelmes, Jour. Bot. **77** 301-304. 1939.

Sphagnous swales, gravelly and rocky shores, and low pastures near the sea, often at the borders of rather brackish ponds or inlets; scattered around the province. A long spiked form has been collected at Margaretsville, Annapolis

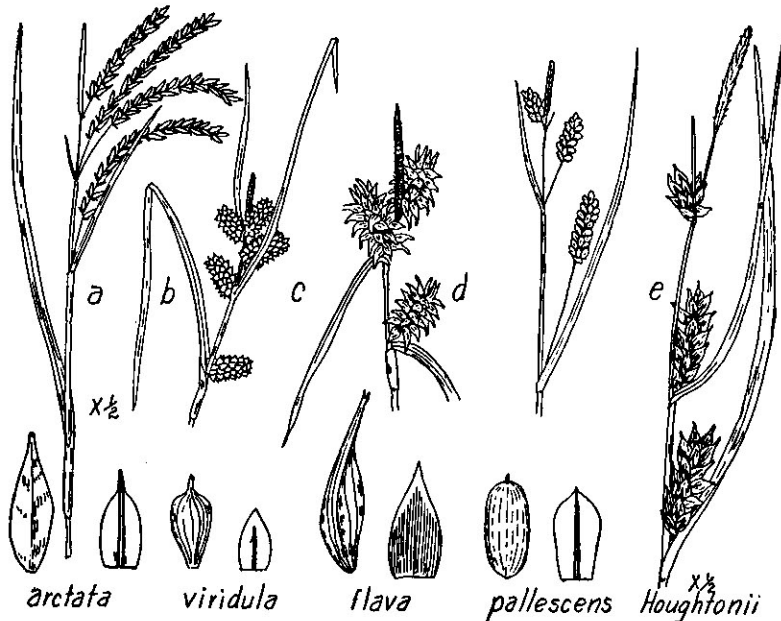


Fig. 25.—*Carex*: inflorescences, x 1; perigynia and scales, x 5.

Co., along the Bay of Fundy, and by Macoun at Baddeck (Fernald 1921). (*C. Oederi* Retz.).

Nfld. to Que. & N.S.

59. *C. viridula* Michx. Map 109. Fig. 25.

Common throughout; often growing in brackish marshes; frequent in bogs; typical of rocky or sandy beaches in the highlands and northern part of C.B.; frequently hybridizing with *C. flava* (Fernald, 1921). (*C. Oederi* var. *pumila*).

Seepy lake and river banks in calcareous areas; Nfld. to Alaska south to N.J., Ind. & Calif.; Japan.

60. *C. cryptolepis* Mack., *Torreyia* 14: 157. 1914.

Scattered; edges of ponds, bogs and swales; Lunenburg and Kings Co. east to Guysborough Co.

Wet meadows; Nfld. to Minn. south to N.J. & Ind.

61. *C. laxior* (Kukenth.) Mack., *N.A. Flora* 18: 306. 1935

Probably local, very similar to the following species and doubtfully distinct; reported from a gravelly shore at Guysborough (Rousseau); and from N.S. by Mackenzie.

Swampy meadows in calcareous areas; N.S. & Que. to Me. & N.Y.

62. *C. flava* L. Fig. 25.

Frequent to common throughout; well-drained swamps, bogs, meadows, around the outside of the salt marshes, and in ditches and low areas.

Wet meadows; Nfld. to B.C. south to N.J., Penn. & Mont.

63. *C. lepidocarpa* Tausch

Mentioned by Mackenzie from N.S.; no specimens have been seen. (*C. flava* var. *elatior* Schlecht.).

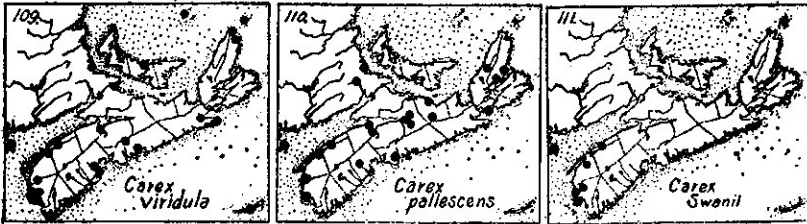
Swamp-meadows in calcareous districts; Nfld., St. Pierre and the Magdalens to Que., N.B. & N.S.; Eu.

SECT. 23. VIRESCENTES

a. Terminal spike staminate; perigynia glabrous. 64. *C. pallescens*

a. Terminal spike pistillate above and staminate at the base; perigynia white-hirsute. 65. *C. Swanii*

64. *C. pallescens* L., var. *neogaea* Fern., *Rhodora* 44: 306.1942. Map 110. Fig. 25.



Common throughout; grassy meadows, sunny banks, fields and open thickets.

Nfld. to Wisc. south to N.J., Penn. & Ill.

65. *C. Swanii* (Fern.) Mack., Bull. Torrey Bot. Club **37**: 246: 1910. Map 111.

Local in Yarmouth Co.; dryish peaty barrens, Yarmouth; boggy pasture, Central Chebogue; scattered east to Annapolis Co. (*C. virescens* var. *Swanii* Fern.).

Dry woodlands and thickets; N.S. to Wisc. south to Tenn. & Ark.

SECT. 24. HIRTAE

a. Staminate scales not long-ciliate; foliage glabrous; leaf-sheaths not pilose at the mouth.

b. Perigynia 5-6 mm long, conspicuously 15-20-ribbed, with the beak half as long as the body; teeth prominent, strongly pubescent within; leaves 2.5-4 mm wide; sandy soils. 66. *C. Houghtonii*

b. Perigynia 2.5-5 mm long, the ribs obscured by dense pubescence; teeth of the short beak erect, glabrous within; leaves less than 2 mm wide, involute; wet or swampy places. 67. *C. lasiocarpa*

a. Staminate scales long-ciliate; foliage usually soft-hairy; leaf-sheaths pilose at the mouth. 68. *C. hirta*

66. *C. Houghtonii* Torr. Fig. 25.

Sandy road-shoulders, abundant along the pavement south of Truro; common on sandy soil in Cumberland Co.

Nfld. to Sask. south to Me., Mich. & Minn.

67. *C. lasiocarpa* Ehrh., var. *americana* Fern., Rhodora **44**: 304. 1942. Map 112. Fig. 26.

Common throughout; peaty meadows, swales, borders of lakes and bogs; characteristic of bog-marsh formations about the head of the Fundy Marshes (Ganong); typical of lakes, ponds and swamps in northern C. B. (*C. filiformis* L.).

Nfld. to B.C. south to N.J., Iowa, Man. & Wash.

68. *C. hirta* L.

Abundantly naturalized on a sandy railway bank,

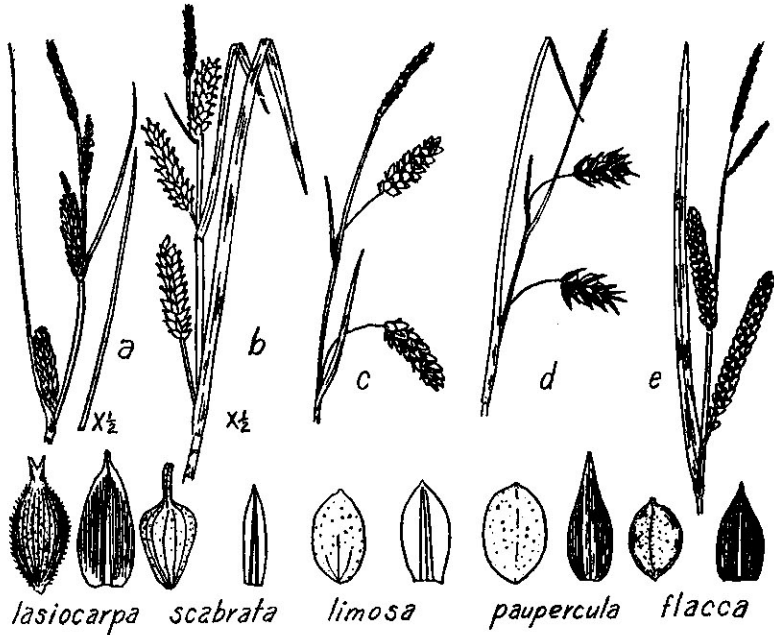


Fig. 26.—*Carex*: inflorescences, $\times 1$ and $\frac{1}{2}$; perigynia and scales, $\times 5$.

Annapolis Royal; formerly collected in a pastured field at Charlottetown, P.E.I. (Fernald, 1922).

Introduced from Eu.; locally established in P.E.I. to N.Y. & Penn.; Ore.

SECT. 25. ANOMALAE

69. *C. scabrata* Schwein. Map 113. Fig. 26.

Throughout the northern part of the province from Digby Co. to northern C.B.; alluvial woods, rich thickets, along woodland streams, and in well-drained swamps, usually in mucky soil or in seepage areas.

N.S. to Mich. south mostly in the mts. to S.C. & Tenn.

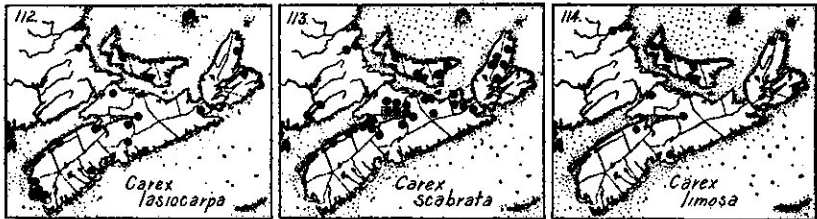
SECT. 26. PENDULINAE

70. *C. flacca* Schreb. Fig. 26.

This species, reported by Macoun in 1888 from dry, clay banks on the railway cutting just outside of Windsor, is now a very abundant and variable species throughout this gyp-

siferous region, often growing in grassy pastures near the gypsum cliffs. (*C. glauca* Murr.).

Naturalized; N.S., Que., Ont. & Jamaica; Asia, Eu. & Africa.



SECT. 27. LIMOSAE

a. Plant strongly stoloniferous; leaves glaucous, 1-3 mm wide; pistillate scales ovate to sub-orbicular, equalling the perigynia.

71. *C. limosa*

a. Plant loosely cespitose; leaves deep-green, 2-4 mm wide; pistillate scales lanceolate or ovate-lanceolate, exceeding the perigynia.

72. *C. paupercula*

71. *C. limosa* L. Map 114. Fig. 26.

Common in C.B. and scattered east to Cumberland and Kings Cos.; floating mat at the edge of ponds, in sphagnum swamps, or in poorly-drained bogs.

Nfld. to Yukon south to Dela., Iowa & Calif.

72. *C. paupercula* Michx., including vars. *irrigua* and *pallens*. Map 115. Fig. 26.

Common throughout; swampy areas, bogs and wet sphagnum; often in spruce or open bogs about the heads of the salt marshes or near the sea. The two varieties are considered to be merely trivial forms. (*C. Magellanica* acc. Ganong).

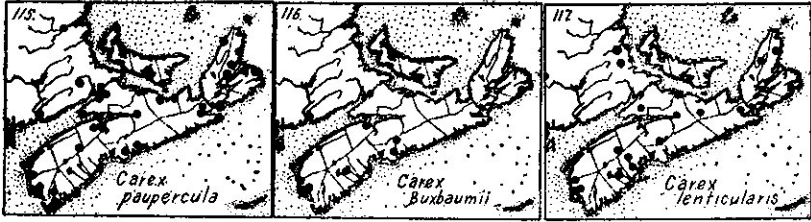
Nfld. to Alaska south to Penn., Minn. & Utah.

SECT. 28. ATRATAE

73. *C. Buxbaumii* Wahl. Map 116.

Local and rare; swamps, swales and in marshes, mostly near the sea. (*C. polygama* Schkuhr).

Swamps and meadows in calcareous places; Nfld. to Alaska south to Ga., Colo & Calif.; Eurasia.



SECT. 29. ACUTAE

- a. Culms aggregated close to the summit of the culm, the lower progressively longer, producing a broom-like effect; scales obtuse; perigynia conspicuously nerved ventrally (Fig. 27, a).
- b. Spikes dense, 2-4 cm long; perigynia oval, 1.75-2.0 mm long.
74. *C. lenticularis*
- b. Spikes loose, 2.5-5 cm long; perigynia tapering, 2.0-2.8 mm long.
C. lenticularis var. *Blakei*
- a. Culms not closely aggregated or not producing a broom-like effect.
- c. Lower sheaths conspicuously fibrillose with a net-work of fibrous lines across the ventral side; plants tall (Fig. 27, c). 77. *C. stricta*
- c. Lower sheath not conspicuously fibrillose.
- d. Spikes erect; staminate spike one and the pistillate ones stout and 1-4 cm long, or several and the pistillate spikes slender; beak of the perigynia usually not twisted.
- e. Perigynia with strongly-raised nerves on the ventral face; leaves 1.5-2.5 mm wide (Fig. 27, b).
- f. Plants loosely cespitose; pistillate spikes crowded, 1-4 cm long, densely-flowered.
75. *C. nigra*
- f. Plants densely cespitose, to 7.5 dm high; pistillate spikes scattered, relatively loosely-flowered, about 4 cm or more in length.
C. nigra var. *strictiformis*
- e. Perigynia nerveless ventrally or only obscurely impressed-nerved.
- g. Plant slender, 2-8 dm high; spikes 1-4 cm long; upper part of culm obtusely angled and smooth; perigynia mostly elliptic and broadest below the apex.
76. *C. aquatilis*
- g. Plant coarse, to 1.5 m high; spikes to 10 cm long; upper part of culm sharply angled, smooth or scabrous; perigynia mostly ovate and broadest towards the apex.
C. aquatilis var. *altior*
- d. Spikes widely spreading or drooping; staminate spikes solitary, the pistillate ones slender, 2-7.5 cm long; beak of the perigynia usually prominent and twisted (Fig. 27, d). 78. *C. torta*

74. *C. lenticularis* Michx. Map. 117. Fig. 27.

Gravelly and sandy lake shores; throughout the province wherever the proper habitat occurs; commonest from Yarmouth to Halifax Co.

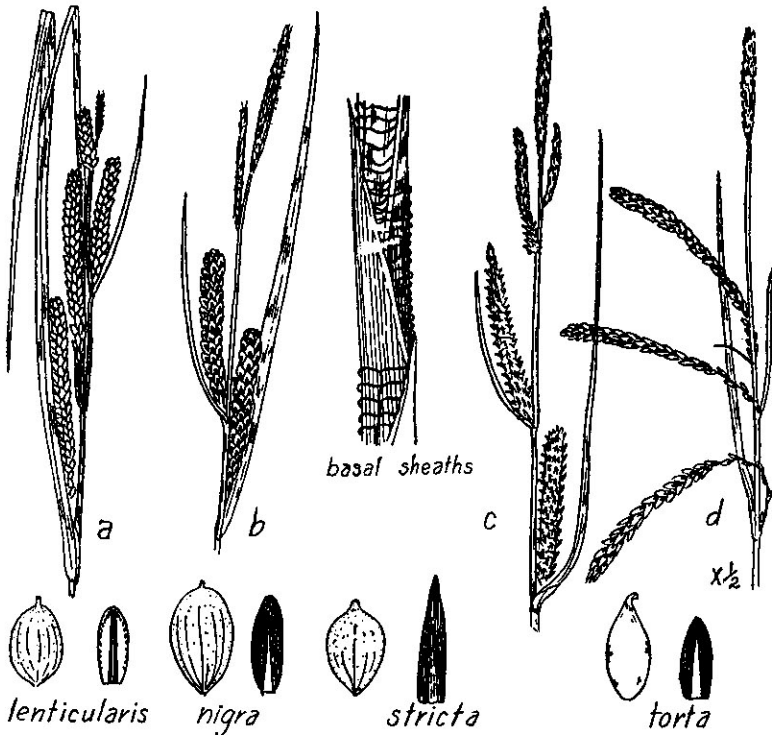


Fig. 27.—*Carex*: inflorescences, $\times 1$ and $\frac{1}{2}$; perigynia and scales, $\times 5$.

Var. **Blakei** Dewey, in Wood, Class-Book, ed. 1861: 755, was first described from Me. It is known in Canada from scattered areas in N.S. & N.B. cobbly beach of Wentzell L., Lunenburg Co. and at Ingonish, C.B. (Fernald, 1922); stony strand of First Christopher Lake, South Brookfield, Queens Co. (Weatherby, 1942).

Lab. & Nfld. to Mackenzie south to Mass. & Minn.

75. **C. nigra** (L.) Reich., see Fernald, *Rhodora* 44: 300-302. 1942. Map 118. Fig. 27.

Common throughout; poorly-drained soil, near the coast, in meadows, along streams and low areas in fields, often growing in large pure colonies in cut-over meadows where the taller grasses or sedges have been eliminated. (*C. acuta* L. *C. Goodenowii*). Var. **strictiformis** (Bailey) Fern. *Rhodora* 44: 299. 1942 is the larger extreme, widely distributed in brackish or fresh habitats in the province.

Greenland to R.I.; Eu.