

CONTRIBUTIONS TO THE VASCULAR FLORA OF OXFORD COUNTY, MAINE

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Oxford County includes about 5570 sq. km. (2150 sq. mi.) of mostly hilly and mountainous land in the northwest corner of Maine. It is bordered to the north by Frontenac County of the Province of Quebec, Canada; to the east and south by Franklin, Androscoggin, Cumberland and York Counties of Maine; and to the west by Carroll and Coos Counties of New Hampshire. Oxford County, which has a population of 45,000, resembles the state of Delaware in size and shape.

In 1824 Thomas Nuttall collected *Subularia aquatica* L. in the town of Waterford. This was the first known collection of a vascular plant in Oxford County as well as the first of this species in North America. Since that time many keen-eyed botanists have collected extensively here. The most notable contributors to the knowledge of the local flora were John C. Parlin, Kate Furbish, Leston A. Wheeler, Arthur S. Pease and Ralph C. Bean. Over the past few years our botanizing has added many new species sites to the county and the state. The most fruitful localities are the northern and southern ends of the county where relatively little collecting of herbarium specimens of vascular plants had been done.

Our distribution records are based on the collections in the herbaria of the New England Botanical Club, the University of Maine, and the University of New Hampshire. In the following account, the species followed by an asterisk (*) are first collections for Oxford County while those followed by a double asterisk (**) are new for the state. Voucher specimens have been donated to the University of Maine Herbarium. Except where indicated, nomenclature follows Fernald (1950).

On the basis of topography and climate, Oxford County may be divided into a northern and a southern half (Toppan, 1935). Mountain ranges interspersed with some lowlands fill the northern half. On the other hand, the southern half, or the southern interior to distinguish it from the coastal region of Maine, has a lower relief with a warmer, wetter climate and a longer growing season.

A boreal forest of *Picea* spp. and *Abies balsamea* (L.) Mill. covers higher elevations and cold valleys on the northern uplands. On midslopes northern hardwoods (*Acer saccharum* Marsh., *Betula alleghaniensis* Britton [Brayshaw, 1966; *B. lutea* Michx. f. of Fernald, 1950], and *Fagus grandifolia* Ehrh.) predominate over a flora considerably more diverse than that of the boreal forest. In favorable conditions, such as east-facing midslopes of the Boundary Mountain Range at the very northern end of Oxford County, several species of pteridophytes are prominent. *Adiantum pedatum* L., *Diplazium acrostichoides* (Sw.) Butters (Butters, 1917; *Athyrium thelypteroides* (Michx.) Desv. of Fernald, 1950), and *Polystichum braunii* (Spencer) Fee form large populations. The northern *Botrychium virginianum* (L.) Sw. var. *europaeum* Anstr.* and *Dryopteris goldiana* (Hook.) Gray* are less prominent. The only other station for the latter species is a very similar stand of pure hardwoods in Haystack Notch (549 m., 1800 ft.) near the southern end of the northern uplands. The same three common ferns also dominate the slopes of Haystack Notch.

Galium kamtschaticum Steller* and *Milium effusum* L.* are infrequent and frequent respectively in these northern hardwoods. *Impatiens pallida* Nutt.* grows in the hardwoods of the Boundary Mountains and, again, Haystack Notch, but it is most characteristic of the borders of woods and roadside thickets in the northernmost township of Bowmantown.

One of the Boundary Mountains, Twin Peaks (917m, 3010 ft.) in Bowmantown has a remarkable flora. Above the rich hardwoods on the eastern midslope, at about 793 m., 2600 ft., a band of wet cliffs traverses the mountain and supports a northern, calciphytic flora. *Woodsia glabella* R. Br.* is frequent here, and we found one small colony of what we are calling *W. alpina* (Bolton) S. F. Gray*. It may also be a hybrid of *W. glabella* and *W. ilvensis* (L.) R.Br. which occurs nearby on drier rocks. Three northern sedges *Carex capillaris* L. var. *Major* Blytt.*, *C. atratifomis* Britt.*, and *C. media* Br.** grow on moist ledges or in the boulders at the base of the cliff. The first two sedges are infrequent or rare in Maine and the third, which enters the United States from Canada only in the northern midwest, is a new record for New England. Just under the summit of the mountain there is a large dry cliff, presumably formed by glacial plucking and now surrounded by boreal forest. Growing on shelves and in crevices

amongst the three dominant species of the cliff — *Thuja occidentalis* L., *Potentilla fruticosa* L., and *P. tridentata* Ait. — is a mixture of northern and subalpine calcyphiles: *Lycopodium selago* L.*, *Dryopteris fragrans* (L.) Schott, *Poa glauca* Vahl.*, *Trisetum spicatum* (L.) Richter var. *pilosiglume* Fern.*, *Carex aurea* Nutt., *C. capillaris***, and *Juncus trifidus* L. Of particular note in this assemblage are three considerable range extensions. First, *Carex eburnea* Boott** was previously known in New England only from calcareous rocks of western New England. *Saxifraga aizoon* Jacq. var. *neogaea* Butters* is found in several localities in Vermont and has recently been added to the flora of the White Mountains (Churchill, 1967). In Maine it grows elsewhere only on the ledges of the South Basin of Mt. Katahdin. Finally, the only other localities in New England for *Antennaria rupicola* Fern.* are the rocky shores of the St. John River and Mattawamkeag River (the type locality) in Aroostook County, Maine.

Eight other species of the northern uplands had not previously been reported from Oxford County. *Geum macrophyllum* Willd.* is frequent in moist, open woods. *Veronica tenella* All.* we found on a rocky brookbank. *Aster junciformis* Rydb.* and *Senecio aureus* L. var. *intercurus* Fern.* were both found in alluvial woods of the Magalloway River. Three native ruderals occur in disturbed soil bordering dirt roads in the northern uplands, *Euphrasia canadensis* Townsend*, *Rhinanthus crista-galli* L.*, and *Gnaphalium sylvaticum* L.* *Carex bigelowii* Torr.* from the summit of Baldpate Mt. (1244 m., 4080 ft.) joins 14 other species of the flora defined as alpine (Pease, 1964).

In contrast to the flora of predominantly northern affinities of the northern uplands, there is a strong southern element in the flora of the southern interior. This is especially the case in the drainage of the Saco River where *Juniperus virginiana* L. var. *crebra* Fern. & Grisc., *Betula lenta* L., *Quercus alba* L., *Q. velutina* Lam., *Q. ilicifolia* Wang., *Ceanothus americanus* L., and *Kalmia latifolia* L. all reach the northern limits of their ranges. Of the 28 additions to the county and state that we report from this region, the majority are also at the northern limits of their ranges.

The two most prominent physiographic features of the region are the extensive Wisconsin glacial deposits and the numerous low, rounded hills. Sand and gravel carried by the melt waters of the receding glacier were deposited on the bottom of a large lake cov-

ering the valley of the present Saco River in the towns of Fryeburg, Stow, Lovell, Sweden, Denmark, Brownfield, and Hiram. At present, what remains of this glacial lake are many lakes and ponds and extensive sand plains cut by the meandering Saco.

On the sandy shores of Kimball Pond in Fryeburg grow *Eleocharis engelmannii* Steud. f. *detonsa* (Gray) Svenson* and *E. tuberculosa* (Michx.) R. & S.* Other notable plants found around this pond are *Carex michauxiana* Boeckl. (swale), *Utricularia gibba* L. (muddy shore), and *U. resupinata* B. D. Greene (shallow water, apparently only blooming during years when the water is sufficiently shallow).

In the same town centuries of flooding by the Saco have created the largest farming acreage of contiguous alluvial soils in Maine (Rourke & Hardesty, 1966). Where the woods along the river have been allowed to grow up to *Acer saccharinum* L. and *Tilia americana* L., as at Snow Falls, a diverse flora persists including *Leersia virginica* Willd. var. *ovata* (Poir.) Fern.*, another southern species.

The sand plains of the region are an outpost for a small maritime element in the flora: *Myrica pennsylvanica* Loisel*, *Hudsonia tomentosa* L. and var. *intermedia* Peck, and *Lechea maritima* Leggett. Also in the sandy outwash of the area and previously not collected are two rather common species, *Lysimachia quadrifolia* L.* and *Aster vimineus* Lam.*

Many northerly range extensions come from the low rounded hills of the Saco River valley. The most important of these are Frost Mt. (373 m., 1225 ft.) in Brownfield, Peaked Mt. (329 m., 1080 ft.) and Bill Merrill Mt. (488 m., 1600 ft.) in Hiram, and Rattlesnake Mt. (359 m., 1179 ft.) in Porter (Eastman, 1977). In the dry, mixed woods on the lower slopes of these hills, we found *Phytolacca americana* L.*, *Chimaphila maculata* (L.) Pursh*, *Corallorhiza odontorhiza* (Willd.) Nutt.* and *Triphora trianthophora* (Sw.) Rydb. The spotted wintergreen has recently been collected in Maine from four widely scattered and very small populations. Unlike *Chimaphila*, the two orchids are rare in New England. Our station for the *Corallorhiza* collection is the second in the state, the first being from a similar habitat about 64 km. (40 mi.) due south, in South Berwick, where John Parlin found it in 1898. *Triphora trianthophora* was first discovered in Maine and Oxford County in 1899 on Frost Mt. (Harvey, 1900). This station was apparently destroyed by fire in 1947, but the plant also occurs in nearly pure

stands of beech at the base of Bill Merrill Mt. and in several localities and sometimes in large populations in the Evans Notch region of the County (Eastman, 1969, 1972; Campbell, 1975).

In the rocky woods above the dry woods at the bases of these low hills, we added *Bromus pubescens* Willd.** (Wagnon, 1950; *B. purgans* L. of Fernald, 1950), *Muhlenbergia sobolifera* (Muhl.) Trin.**, *Carex cephalophora* Muhl.*, and *C. virescens* Muhl.* Where the rocky woods turn to open or shaded ledges there are plants such as *Woodsia obtusa* (Spreng.) Torr.*, *Panicum latifolium* L., *Chenopodium boscianum* Moq.*, *Ranunculus fascicularis* Muhl.**, *Arabis missouriensis* Greene, *Geranium carolinianum* L.*, *Ceanothus americanus* L., *Vitis aestivalis* Michx. var. *argenteifolia* (Munson) Fern.**, *Cerastium arvense* L.*, *Epilobium ciliatum* Raf.*, *Antennaria petaloidea* Fern.*, and *A. plantaginifolia* (L.) Hook.* Of particular note in this group of plants are the *Bromus*, *Muhlenbergia*, and *Ranunculus* collections. The nearest localities for all three are one or two stations in southern New Hampshire.

Five other species from the Saco River drainage are also new county records: *Carex incompta* Bickn.* (swale in Porter), *C. artiteca* Mackenz.* (dry bank in Porter), *Isotria verticillata* (Willd.) Raf.* (under *Pinus strobus* in Waterford), *Nyssa sylvatica* Marsh* (mixed woods in Denmark), and *Vaccinium atrococcum* (Gray) Heller* (heath bog in Stow).

Carex sparganioides Muhl.* (reported from Franklin County, Maine, but otherwise not known north of southern New Hampshire) and *Rhododendron viscosum* (L.) Torr.* (rare in southern York County, Maine) were collected within two and one half miles of one another in northwestern Woodstock. These stations appear to be isolated populations far removed from the main part of their ranges.

Carex is the largest genus in the flora with 107 species, 23 varieties, and four forms. In addition to the ten new records reported so far, five others have been added, all growing in full sun in moist to dry soil: *C. annectans* Bickn.*, *C. alopecoidea* Tuckerm.*, *C. echinata* Murr.*, *C. wiegandii* Mackenz.* and *C. granularis* Muhl. var. *haleana* (Olney) Porter*. The latter two species were both found growing near *C. aurea*, a good indicator of neutral or alkaline soil. Another calciphile found associated with *C. aurea* is *Equisetum variegatum* Schleich.* from a moist bank in Hebron.

Caltha palustris L.*, *Amelanchier intermedia* Spach* (vel aff.), and *Aster novae-angliae* L.* are all more or less frequently occurring species which had not previously been collected in Oxford County. On several rocky, wooded slopes, we saw non-reproductive plants of what we suspected to be *Clematis verticillaris* DC.* We saw only one plant in flower in a recently cleared roadside thicket in Albany. *Typha angustifolia* L.* in a roadside ditch in West Paris has perhaps recently come this far inland in response to the presence of roadside salts.

The genus *Crataegus* is not prominent in the Oxford flora. There are seven infrequent to rare species of roadsides, hedgerows, old fields, and ledges. Two of these are new: *C. anomala* Sarg.* and *C. compta* Sarg.*

Two of the nine additions to the aquatic flora are common species, *Lemna minor* L.* and *Spirodela polyrhiza* (L.) Schleid.* The others are rare or infrequent: *Potamogeton confervoides* Reichenb.*, *P. obtusifolius* Mert. & Koch*, *P. praelongus* Wulfen.*, *Elodea canadensis* Michx., *Ceratophyllum demersum* L.*, *Myriophyllum humile* (Raf.) Morong*, and *M. exalbescent* Fern.*

Anemone riparia Fern.* from coniferous woods in Hebron is the last of 74 indegenes reported here as new for Oxford County.

Additions to the adventive flora number 88 species. They are for the most part weedy and closely associated with man's alteration of the environment. Some species are characteristically found in railroad ballast: *Eragrostis poaeoides* R. & S.*, *E. pectinacea* (Michx.) Nees*, *Hordeum jubatum* L.*, *Triticum aestivum* L.*, *Avena sativa* L.*, *Sporobolus vaginiflorus* (Torr.) Wood var. *inaequalis* Fern.*, *Kochia scoparia* (L.) Roth*, *Silene cserei* Baumg.*, *Diploaxis tenuifolia* (L.) DC.**, *Plantago indica* L.*, and *Lactuca scariola* L. f. *integrifolia* (Bogenh.) G. Beck.*

Alopecurus pratensis L.*, *Lupinus polyphyllus* Lindl.*, *Veronica chamaedrys* L.*, *Galium erectum* Huds.*, and *Achillea ptarmica* L.* have become more or less prominent in old fields.

Abutilon theophrasti Medic.* has established itself sparingly on the sand plains of Brownfield. *Epipactis helleborine* (L.) Crantz* has invaded vacant lots but is more characteristically found in rich hardwoods in populations of one or two individuals where its capacity for self-fertilization will allow it to spread itself from one parent plant.

Eighteen new adventive species are garden escapes, persisting and spreading only near their cultivation: *Allium schoenoprasum* L.*, *Iris germanica* L.*, *Lychnis chalcedonica* L.*, *Dianthus plumarius* L.*, *Aquilegia vulgaris* L.*, *Delphinium exaltatum* L.*, *Sedum acre* L.*, *S. sarmentosum* Bunge**, *S. spurium* Bieb*, *Filipendula rubra* (Hill) Robins.*, *Rosa multiflora* Thunb.*, *R. spinosissima* L.*, *R. rugosa* Thunb.*, *Thermopsis mollis* (Michx.) M. A. Curtis*, *Geranium sanguineum* L.*, *Ajuga reptans* L.*, *Digitalis purpurea* L.*, *Echinops sphaerocephalus* L.*, and *Valeriana officinalis* L.*

The majority of the additions to the adventive flora are from waste places, roadsides, dumps, and vacant lots: *Eragrostis neomexicanus* Vasey*, *Lolium multiflorum* Lam.*, *Secale cereale* L.*, *Panicum miliaceum* L.*, *P. dicotomiflorum* Michx.*, *Lilium tigrinum* L.*, *Convallaria majalis* L.*, *Iris pseudoacorus* L.* (also on muddy shores), *I. sibirica* L.*, *Populus nigra* L. var. *italica* Muenchh.*, *Cannabis sativa* L.*, *Rumex domesticus* Hartm.*, *Stellaria media* (L.) Cyrillo*, *Lychnis dioica* L.*, *L. alba* Mill.* (the last two frequent to common), *L. coronaria* (L.) Desr.*, *Dianthus armeria* L.*, *Berberis thunbergii* DC.*, *Chelidonium majus* L.* (a common weed), *Lepidium sativum* L.*, *Conringia orientalis* (L.) Dumort*, *Armoracia lapathifolia* Gilib.*, *Physocarpus opulifolius* (L.) Maxim.*, *Rosa cinnamomea* L.*, *Robinia viscosa* Went.*, *R. hispida* L.*, *Lathyrus tuberosus* L.*, *Geranium molle* L.*, *G. maculatum* L.*, *Celastrus orbiculatus* Thunb.*, *Acer platanoides* L.*, *Oenothera pilosella* Raf.*, *Aegopodium podagraria* L.*, *Vinca minor* L.*, *Convolvulus arvensis* L.*, *Phlox paniculata* L.*, *Borago officinalis* L.*, *Lamium purpureum* L.*, *Mentha alopecuroides* Hull**, *Physalis alkekengi* L.*, *Datura stramonium* L.*, *Petunia violacea* Lindl.*, *Campanula rapunculoides* L.*, *C. linifolia* Jacq.***, *C. latifolia* L.*, *Helianthus annuus* L.*, *H. laetiflorus* Pers.*, *Artemisia ludoviciana* Nutt. var. *brittonii* (Rydb.) Fern.*, *Centauria maculosa* Lam.*, *Tragopogon pratensis* L.*, and *Sonchus arvensis* L.*

In summary, the vascular flora of Oxford County includes 1345 native and adventive species (Campbell & Eastman, manuscript in preparation). One hundred and sixty-two of these are reported here as new records.

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