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Oklahoma Native Plant Society

The purpose of the ONPS is to encourage the study, protection, propagation, appreciation and use of the native plants of Oklahoma. Membership in ONPS shall be open to any person who supports the aims of the Society. ONPS offers individual, student, family, and life membership.

Cover: ***Cercis canadensis (Redbud)***
Photo courtesy of Charles Lewallen.
"That man is truly ethical who shatters no ice crystal as it sparkles in the sun, tears no leaf from a tree…"
Albert Schweitzer

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Volume 1, Number 1

Table of Contents

Foreword

The Oklahoma Biological Survey is in the process of making an inventory of the plant specimens that have made their way into the herbaria housed at our universities. They will eventually make that information available on the World Wide Web. All kinds of information will be available, electronically, from those dried specimens. They are a priceless treasure, recording our past and the efforts made to understand it. Putting that data on the Web will be a way of making it accessible to people who have no physical access to the herbaria, and little time to extract it.

Other kinds of plant information are stored in the minds of our members and scientists. Possibly, the files stored in computers will outlast them, maybe not. Who knows? One thing we do know: people have been interested in the flora of Oklahoma for more than a hundred years. Some of their observations have been recorded but, for the most part, not in published form. Believing that those records are important for the understanding of our current flora, The Oklahoma Native Plant Society has determined to bring some of those records to your eye in a more durable form.

For many years, Dr. U. T. Waterfall's *Keys to the Flora of Oklahoma* has been the only statewide source of identification keys. Few know that his first attempt to catalog the plants of Oklahoma was a master's thesis that includes a list of the plants he found in Oklahoma County in the 1930's. What a difference there is in Oklahoma County between that time and this! To put that survey into perspective, we are including a working copy of the Biological Survey's list for Oklahoma County, made in the year 2000. This journal intends to publish in each issue, a previously unpublished historic study, which may serve as a baseline for your own investigations into your local flora. We will also include recent studies, student papers, current plant lists, and essays of permanent value.

In the future, we hope to be able to publish either Little's or Bebb's catalog of plants of Muskogee County, and other such lists as may be discovered. For that purpose, we challenge the members of Oklahoma Native Plant Society to offer records and observations which they may have available. Not that there will ever be a complete record of the life in any one place, because life refuses to be reduced to a score-card, but because we believe that a knowledge of the plants of a specific location is a fundamental part of understanding other life that may be found there, including our own. You, our readers, will know of current or historic information that should be included in future issues. We hope you will share those with us.

Patricia Folley, President
Oklahoma Native Plant Society
April, 2001

THE SPERMATOPHYTA OF OKLAHOMA COUNTY, OKLAHOMA EXCLUSIVE OF THE GRASSES, SEDGES AND RUSHES

A THESIS APPROVED FOR THE DEPARTMENT OF BOTANY AND BACTERIOLOGY
UNIVERSITY OF OKLAHOMA GRADUATE SCHOOL

BY
U. T. WATERFALL
Norman, Oklahoma, 1942

CHAPTER I INTRODUCTION

This paper represents a preliminary taxonomic study of the flowering plants indigenous to Oklahoma County. Collections during the springs, summers and falls of 1939, 1940, and 1941 and also during the spring of 1942.

After the first general but extensive collections were made a number of special stations of widely varying ecological structures were selected. Collections were made from these at regular intervals of about two weeks throughout the growing season, or at a corresponding time during the next year. In addition a search was made for stations containing different, ecological elements. Thus the finding of a maximum number of species over a limited period of time was assured by a combination of extensive and intensive methods of collection. The specimens were pressed in the standard way used in the leading herbaria. Duplicates were obtained in nearly every case and were deposited in the Bebb Herbarium of the University of Oklahoma.

Among the most outstanding of the recent investigations, which may be applied to the flora of this region, are Fernald's series of "Virginia" papers published annually in Rhodora since 1935. Fernald reported[1] that a number of wide-ranging continental plants were first collected in Virginia by John Clayton. They were described by the Italian botanist Gronovius in his *Flora Virginica* (1739), and later given binomial designation by Linneas in the *Species Plantarum*. Thus the type locality for these Linnean species, which are based on Clayton's material, is in southeastern Virginia. Collections from that region were often found to differ from the wider-ranging inland plants referred erroneously, by most botanists, to the Linnean species. Fernald’s restudy of many of these types has shown that the variety occurring in a restricted range along the coast is usually the typical one, i.e., the variety which Gronovius had before him when writing the description upon which Linneas based his generic and specific name, while the wide-ranging plant of the interior must, in the large majority of cases, be given a new varietal name. A similar situation has been found to be true for plants collected along the coast and named by other botanists. This will help to account for the appearance of many of the varietal designations in this paper that are not found in the existing floras and manuals pertaining to Oklahoma.

[1]Fernald and Griscom, Three Days of Botanizing in Southwestern Virginia, *Rhodora* 37, pp. 129-131, 1935.

https://doi.org/10.22488/okstate.17.100003

CHAPTER II HISTORY

One of the first Americans to traverse what is now Oklahoma County was Washington Irving, who with Charles Latrobe and his fellow travelers, made a trip through this region in the fall of 1832. Irving, in his Tour on the Prairies, recorded the events and his impressions of this trip. His companion, Latrobe[1], may have had some botanical training as he mentioned various genera of plants seen on the journey.

The Party approached the present site of Edmond on the 23rd of October. Their line of search took them past the sites Arcadia, Spencer, Oklahoma City and, on the 28th, over what is now the southern boundary of Oklahoma County in the direction of Moore[2]. Irving gave a good description of the post oak-blackjack woods, even mentioning the dwarf oak, Quercus prinoides, although not by name[3], and of the prairies he saw when emerging from the woodland near Oklahoma City[4]. He also tells of the cottonwoods, sycamores and willows found along the streams[5].

Josiah Gregg, a Santa Fe trader, in Commerce of the Prairies (1844), told of eight expeditions across the prairies. Two of these were along the course of the Canadian River, hence probably through Oklahoma County. He also described the "Cross Timbers" (post oak-blackjack associes), dwarf oaks and prairie fires.[6] [See editor's note at end.]

Sitgraves and Woodruff, with S. W. Wodehouse as naturalist, surveyed the northern boundary of the Creek Indian country in 1849 and 1850, returning to Ft. Gibson by way of the North Canadian.[7]

Bigelow (1856) discussed the vegetation of Oklahoma as seen in traveling from east to west. He also mentioned briefly the "Cross Timbers."[8]

A large number of plants from Oklahoma County have undoubtedly been collected by Thomas R. Stemen and W. Stanley Meyers in the course of their investigations on which the *Oklahoma Flora*[9] is based. These have not been available for study by the author.

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[1]Charlee Latrobe, *Rambler in North America*, (excerpts in Irving's *Tour on the Prairies*, edited by Joseph B. Thoburn and George C. Wells. xxv. Harlow Pub1ishing Company, Oklahoma City, Oklahoma, 1930).

[2]Washington Irving, *Tour on the Prairies*, (1.c.), pp. 240-243.

[3]*Ibid*., p 145.

[4]*Ibid*., p. 173.

[5]*Ibid., p.* 151.

[6]W. E. Bruner, The Vegetation of Oklahoma, *Ecological Monographs* Vol. 1., No. 2, p. 128, April, 1931.

[7]*Ibid.*

[8]*Ibid.*

[9]Thomas R. Stemen and W. Stanley Myers, *Oklahoma Flora*, Harlow Publishing Corporation, Oklahoma City, Oklahoma, 1937.

CHAPTER III PHYSICAL FEATURES

Location and Size

Oklahoma County is in Central Oklahoma, being a part of the region known before the run as "Old Oklahoma". It is bounded on the north by Logan County, on the east by Lincoln and Pottawatomie Counties, on the south by Cleveland County and on the west by Canadian County. It is rectangular in shape, extending thirty miles from east to west, and twenty-four miles from north to south. It covers an area of 720 square miles.

The total population of the county is 224,159. Oklahoma City has a population of 204,424.

Edmond is next with 4,002, while Bethany has 2,590 and Britton 2,239. Other towns in the county, all under 1,000 in population, are Harrah, Arcadia, Luther, Nicoma Park, Newalla and Marion.

Topography

The county is drained chiefly by the North Canadian River and its tributaries. The majority of the creeks, especially the small ones in this drainage system have water running in them only during the spring and after rains during the rest of the year. Especially in the hot summer and early fall months one is apt to find them dried up.

A tier of sections along the southern boundary south and southwest of Oklahoma City are in the watershed of the South Canadian River. The North Canadian enters the county west of Oklahoma City. Here it has been dammed to form Lake Overholser, which furnishes the city's water supply. It runs through the southern part of Oklahoma City, then swings northeast, through Spencer into the central part of the county. It then bends southeast, to leave the county near Harrah, l8 miles east of Oklahoma City, having curved 10 miles north between these two places.

The eastern part of the county is made up of sandy oak-covered hills and small prairies, together with outcroppings of red sandstone. The western townships are, for the most part, rolling prairie. Near Bethany there is a region of aeolian sand hills[1], which support a vegetation similar to that found on the sandy soils in the eastern part of the county.

Geology and Soils

Oklahoma County is in the Permian System of rocks,[2] which has been called the Permian Redbeds. The western half of the county is in the lower part of the Enid formation of the Permian system.[3] This system consists of layers of thin red sandstones and soft red shales.

The soil in the western part of the county is a prairyerth[4], which is a mature soil composed mostly of clay, but containing some sand. Near Bethany and the northern part of Lake Overholser there is a small area of aeolian sandhills.[5] The eastern part of the county is covered with a residual sandy soil.[6] Running through the prairyerths and the sandy soils is another type of transported soil. This is alluvial soil[7] found chiefly along the North Canadian River and its tributary creeks.

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[1]C. E. Thornwaite, *Map of Soils*, University of Oklahoma (unpublished).
[2]Hugh D. Miser, *Geologic Map of Oklahoma*, U.S. Geologic Survey, 1926.
[3]*Ibid*.
[4]C. W. Thornwaite, *op. cit*.
[5]*Ibid*.
[6]*Ibid*.
[7]Ibid.

CHAPTER IV CLIMATE

The Climate of Oklahoma County is of the continental type modified to some extent by winds from the Gulf of Mexico. The annual range in temperature is, therefore, rather marked. The summer temperatures are quite high, while in winter there are often cold spells when the thermometer hovers near zero for several days. In summer there are often droughts of several weeks duration.

The prevailing winds are from the south with an average velocity at Oklahoma City of 11.3 miles per hour.[1] The monthly average at this station varies from slightly more than 9 miles per hour in August to nearly 14 miles per hour in March and April. The highest wind velocity recorded here for a five-minute period was 57 miles per hour on June 24, 1915, and again on June 29, 1918.

Temperature records have been kept in Oklahoma City since 1891. Between that year and 1941 inclusive, the average temperature for January was found to be 37.5 degrees F. For July it was 81.3 degrees. The maximum temperature recorded over this fifty-one year period was 113 degrees on August 11, 1936, and the minimum was -17 on February l2, 1899. The average date of the last, killing frost is March 29, while in the fall the average date of the first killing frost is November 5, giving a growing season of 221 days.

The average annual precipitation is 31.37 inches. February is the driest month of the year, having an average precipitation of 1.13 inches, while May is the wettest month with an average of 4.89 inches. The largest total monthly precipitation was in June 1932, when 14.12 inches were recorded. This was 10.40 inches more than the average for this month, and 2.13 inches more than May 1902, the wettest month previous to this time. The wettest year was 1902 when there were 52.03 inches of precipitation.

[1]*Annual Meteorological Summary with Comparative Data, 1941,* Compiled under the direction of H.F. Walgren, Weather Bureau Office, Oklahoma City. Published in Oklahoma City, 1942.

CHAPTER V ECOLOGY

Oklahoma County has two principal vegetational regions. The eastern three-fifths of the county is occupied by a post oak-black jack post [sic] climax, while the western part supports a mixed grass formation. In addition there is to be found a flood-plain forest of a distinct nature running along the streams through both the prairie and the savanna. The range of the latter two is determined by the type and texture, as well as by the pH of the soil. The oak savanna is found in sandy soil, which would show a high pH value, while the mixed-grass prairie begins abruptly in the finer-textured clay soils of a lower pH value. Since these soils occur in intermixed spots, zones and belts where they merge together, their resulting vegetational expressions are similarly interrupted, although separated from one another.

The dominants in the savanna are *Quercus marilandica* and *Q. Stellata*. There is not much hickory associated with these two oaks although some plants of *Carya Buckleyi* var. *arkansana* may befound.

The association of grasses in the true prairie in the western part of the county has been called by Bruner[1] the *stipa-Koeleria* association after the grasses that are dominant in the prairie states farther north. In our area, however, their places have been taken to a large extent by the bluestems of southern origin.[2] The chief dominants are species of *Andropogon* and *Bouteloua*.

The flood-plain forests are characterized by a *Populus-Salix* associes*. In association with these is often found *Cephalanthus occidentalis*, while farther from the water *Ulmus americana* and *U. fulva* always occur, often with *Celtis laevigata* and rather scattered specimens of *Prunus mexicana*.

The forests often merge into the prairie with a narrow band of chaparral consisting of characteristic shrubs. Between the flood-plain forests and the grassland these are usually *Rhus glabra*, *R. copallina* var. *latifolia*, *Diospyros virginiana*, *Symphoriocarpos orbiculatus,* and Prunus *augustifolia* if any sand is present.

The ecotone between the post oak-black jack associes and the prairie is characterized by *Quercus prinoides*, *Symphoriocarpos orbiculatus*, *Rhus copallina* var. *latifolia*, *Rhus glabra*, and *Prunus angustifolia* var. Watsoni. Some of these shrubs are common to both ecotones, but *Sambucus canadensis* is characteristic of the transition from flood-plain forest to prairie, while *Quercus prinoides* is found only in the ecotone between the post oak-black jack associes and the prairie.

There are two common disclimaxes, or disturbance climaxes, present. One is made up of cultivated crops.[3] Here man determines what the climax vegetation shall be. The second consists of overgrazed pasturelands. Where this condition exists in the prairies the taller grasses are replaced by *Bouteloua hirsuta* and *B. gracilis* associated with *Buchloe dactyloides*. Thus the pasture assumes the aspect of the short-grass plains farther west.

Between the two disclimaxes there is often very little of the original vegetation left. The botanist is often confined to following railroad tracks or searching for out-of-the-way corners if he is to find much of interest. Even in the post oak-black jack woods overgrazing has played a destructive part. In some cases about all that remains is buck brush.

The overgrazed prairies are characterized not only by the short grass species already mentioned, but also by such weedy inedible species as *Vernonia Baldwinii* var. *interior*, *Achillea lanulosa*, *Gutierrezia dracunculoides*, *Artemesia gnaphalodes*, and *Cirsium undulatum*. In fact these species always serve as indicators of overgrazing. Their prominence in a pasture or field should be a warning to the farmer or cattleman to decrease the number of cattle pastured in a given area, or to change pastures long enough to allow the original vegetation to assume its normal dominance.

It is interesting to note that different species of the same genus may be used as indicators of soil types. Thus *Tradescantia occidentalis* is found, in the prairyerths while *T. canaliculata* grows in the sands. *Liatrus punctata* may grow in clay soil, but *L. squarrosa* var. *intermedia* is found in sandy soil or on sandstone outcroppings of soils that may contain some clay. *Lithospermum incisum* is found in clay, but *L. caroliniense* grows only in sandy soil in the post oak-black jack associes. Other species, characteristic of sandy soil, are *Psoralea cuspidata*, *P. villosum*, *Ipomoea leptophyllum*, and *Penstemon laxiflorus*.

Prevernal societies on the prairies include *Anemone caroliniana*, *Claytonia virginica, Houstonia minima*, *Lithospermum incisum*, *Draba brachycarpa*, *D., reptans, Northoscordum bivalve*, and *Androsace occidentalis*. Forming a succession on previously cultivated soil one finds *Stel1aria media*, *Viola Kitabeliana* var. *Rafinesquii*, *Capsella Bursa-pastoris*, *Taraxacum laevigatom*, and L*amium amplexicaule*. In the post oak-black jack region the common plants of this society are *Antennaria fallax*, *Sagina decumbens*, and a small sedge, *Carex microrynchia*. Scattered

individuals of *Viola papilionacea* grow along the creeks through such environments but there is not the abundance of forbs which may be found in the prairie.

Some of the conspicuous components of the vernal societies on the prairies are *Sisyrinchium Bushii*, *Baptisia leucophaea*, B.*australis* var. *minor*, *Senecio plattensis*, *Valerianella stenocarpa* var. *parviflora*, *Tradescantia occidentalis*, *Callirhoe involucrata*, *Specularia biflora*, *Linum Lewisii* var. *pratense*, and *Achillea lanulosa*. Forbs now form a more conspicuous component of the postoak-black jack flora. They include *Lithospermum caroliniense* and *Astranthium integrifolium* var. c*iliatum*. In more open spots and along fields and roadways *Coreopsis grandiflora*, *Schrankia unciniata*, *Penstemon laxiflorus* and *Tradescantia canaliculata* are often found abundance. In succession on disturbed soils often occur *Linaria canadensis* var. *texana*, *Lepidium densiflorum*, *L. virginicum*, *Silene antirrhina*, *Descurainia pinnata* var. *brachycarpa*, and *Chaerophyllum Tainturieri* var. *floridanum*.

Prairie aestival societies include *Petalostemum purpureum*, *P. candidum*, *Psoralea floribunda, Sabatia campestris*, *Coreopsis tinctoria*, *Rudbeckia hirta* var. *sericia, Rudbeckia amplexicaulis*, *Oenothera serrulata, Ruellia caro1iniensis*, *Krameria secudiflora*, *Amorpha canescens*, *Acacia angustissima* var. *hirta*, *Ratibida columnifera*,[4] *Asclepiodora decumbens*, *Thelesperma trifidum*, *Physalis mollis*, *Solanum eleaegnifolium* and *Solanum Torreyi*. In the oak postclimax are found *Petalostemum villosum*, *Psoralea cuspidata*, *Galium pilosum* var. *puncticulosum*, and *Ruellia caroliniensis*. In succession on disturbed areas are found *Helianthus annuus*, *H. petiolaris*, *Croton monanthogynous*, C. *capitatus,* C. *texense* and several species of *Polygonum* including *P. punctatum*, *P. opelousanum*, and *P. Muhlenbergii. Cardiospermum Halicacibum* is also abundant here. Several species of *Vitis* in combination with *Ampelopsis cordata*, and *Parthenocissus quinquefolia* form *lianas*. *Commelina erecta* var. *typica* is a species tolerant of shade, which can be found under those layers.

Some of the serotinal prairie dominants are *Euphorbia marginata*, *Gutierrezia dracunculoides*, *Liatrus punctata*, *Chrysopsis Berlandieri*, *Aster ericoides*, *Aster oblongifolius* var. *rigidulus*, *Vernonia Baldwinii* var. *interior*, *Solidago radula*, *Artemisia gnaphalodes*, *Ambrosia Coronopifolia*, *Helianthus Maximi1ianus* and *Heterotheca aubaxillaria*. Growing in the post oak-black jack associes one finds *Desmondium marilandicum*, *D. paniculatum*, *Aster patens* var. *gracilis* and *Acalypha gracilens*. Common along the wooded creek sides are *Acalypha rhomboidea*, *Ambrosia trifida* var. *texana*,*Aster Drummondii*, *Aster exilis*, *Verbesina virginica*, *Solidago petiolaris, Irensine rhizomatosa* and *Euphorbia heterophylla*.

In summing up the ecological aspects of the county one finds that it lies in a climate favorable to the development of a grassland formation, but due to the presence of sand the eastern three-fifths of the area is largely covered by a post oak-black jackpost climax. A second post climax is the flood- plain forest found along the North Canadian River and its tributaries. Two disclimaxes are present, one caused by overgrazing, the other by cultivation.

[1]W. E. Bruner, The Vegetation of Oklahoma, *Ecological Monographs*, Vol. 1, No. 2, pp. 110-111, April, 1931.

[2]W.E. Bruner, *The Vegetation of Oklahoma*, Ecological Monographs, Vol. 1, No. 2, l.c.

[3]Weaver and Clements, *Plant Ecology*, pp. 86-89, McGraw-Hill Book Company, Inc, New York, 1938.

[4]W. W. Fernald, New Species, Varieties and Transfers, *Rhodora* 40: 353, 1938.

CHAPTER VI RANGE EXTENSIONS AND PLANTS NEW TO THE COUNTY

In the course of the investigations on which this study is based several plants were collected which have been previously unrecorded from the state. These include *Typha truxillensis*,[1] *Medicago minima*, *Gaura filiformis* var. *typica*[2], *Achillea lanulosa* forma *rubicunda* and *Tragopogon major*.[3] The latter has since been found in several sections of the state. The pink-rayed form of *Achillea lanulosa* is fairly common, but apparently has escaped previous notice.

Eloecharis parvula, var. *anachaeta* was collected near Oklahoma City, definitely establishing its occurrence within the state. In his monograph[4] Svenson included Oklahoma in the mapped range of var. anachaeta (Map 3, page 387) but no specimens we recited from our area. This leads one to conclude that Svenson assumed the presence of the variety in Oklahoma, but had no actual specimens from the state. Herbarium sheets were cited by him from Iowa, Colorado, New Mexico and Texas, but from Kansas, Nebraska, Missouri and Oklahoma he had seen no material.

Cyperus rivularis was found in the eastern portion of the county. It seems to be a rarely collected species. Dr. F. J. Hermann of the U.S. Department of Agriculture has seen no material from Oklahoma. Dr. Hugh O'Neill of the Catholic University of Washington, D.C., writes[5] that he has seen only two sheets from the state, both of which are in the Gray Herbarium of Harvard University. This station is west of the range as given in all the published floras and manuals.

Xyris torta was an unusual "find". My station in the southeastern part of the county seems to be the identical one from which Dr. Milton Hopkins of the University of Oklahoma collected this species two years earlier. At any rate this appears to be the most northwestern station in the state.

Acer Negundo var. *interior*, previously unrecorded from the state was found along the North Canadian River in the extreme eastern part of the county near Harrah.

Bergia texana, collected north of Oklahoma City, is neither listed by Jeffs and Little in their *Check List*, nor by Stemen and Myers in the *Oklahoma Flora*. However, its occurrence was to be expected as it falls within the range as given by Rydberg's *Flora*. Professor M. L. Fernald wrote[6] that there is a sheet in the Gray Herbarium "from Arkansas, Indian Territory, September 28, 1894, B.F. Bush, No. 33".

In an investigation of *Ambrosia aptera* and *Ambrosia trifida*[7] the author came to the conclusion that all of our specimens should be reduced to varietal rank. Professor Fernald[8] agreed that this entity should be accorded varietal status as *Ambrosia trifida* var. *texana* Scheele, the first available varietal designation.

Some highly localized species were found in the southeastern part of the county. One station where several were found was in marshy springy soil surrounding a small lake about three miles south of Harrah. The lake had been made by damming a small creek, but presumably the spring and marsh, and hence the species characterizing them, were inexistence previously. Here were found *Cyperus rivularia*, *Agrimonia parviflora*, *Rotala ramosier* var. *interior*, *Prunella vulgaris* var. *lanceolata*, *Mimulus ringens*, and *Mimulus glabratus* var. *oklahomensis*.

Growing in alluvial soil in the wooded valley of the North Canadian River about a mile south of Harrah were found *Acer Negundo* var. *interior*, *Ampelopsis arborea*, *Polymnia Uvedalia* var. *densipilis*, *Pluchea purpurascens*, and again *Prunella vulgaris* var. *lanceolata*.

Most of these were probably at the western limit of their range. *Mimulus glabratus* var. *oklahomensis* however is found farther west[9], but this is the only station the author has found in the county. *Pluchea purpurascens* may be found elsewhere. In their extreme forms, it and *P. camphorata* (*P. petiolata*) seem distinct, but there are several sheets in the Bebb Herbarium of the University of Oklahoma which appear difficult positively to assign to either species.

[1]M. L. Fernald, Midsummer Vascular Plants of Virginia. *Rhodora* 37: 385-387, 1935.

[2]U. T. Waterfall, Interesting Plants of Oklahoma. *Rhodora* 42: 499-502, 1940.

[3]*Ibid*.

[4]H. K. Svenson, Monographic Studies in Eleocharis III. *Rhodora* 36: 386-389, 1934.

[5]Correspondence with the author.

[6]Correspondence with Dr. Milton Hopkins.

[7]U. T. Waterfall. *Interesting Plants of Oklahoma*, l. c

[8]M. L. Fernald, as editor of *Rhodora*, in editor's footnote to Waterfall's paper.

[9]Norman C. Fassett, Notes from the Herbarium of the University of Wisconsin - XVII. *Rhodora*, 41: 525, 1939

**Ed. Note:*

According to J.E. Clements and F.E. Weaver, Plant Ecology (p46) McGraw Hill 1929; the term associes is "the developmental equivalent of the association … used where the community is not permanent but is replaced by another in the process of development of succession". [B.H.]

CHAPTER VII SPERMATOPHYTA OF OKLAHOMA COUNTY, OKLAHOMA EXCLUSIVE OF THE GRASSES, SEDGES AND RUSHES

(Based on Collections of the Author)

ANGIOSPERMAE

Monocotyledonae

Typhaceae

Typha truxillensis HBK
Typha latifolia L.

Alismaceae

Echinodorus cordifolius (L.) Griseb. forma lanceolatus Engelm.) Fernald.

Xyridaceae

Xyris torta J. E. Smith

Commelinaceae

Commelina communis L. var. *ludens* (Miquel) Clark.
Commelina diffusa Burm. F. (*C.nudiflora* of authors, *C. longicaulis* Jacq.).
Commelina erecta L. var. *typica* Fern.
Commelina erecta L. var. *typical* Fern., forma *intercursa* Fern.
Commelina erecta L. var. *angustifolia* (Michx.)Fern. forma *crispa* (Wooton) Fern

Pontederiaceae

Heteranthera limosa (Sw.) Willd.

Liliaceae

Allium canadense L.
Allium mutabile Michx.
Allium Nuttallii Wats.
Androstephium coeruleus (Scheele) Greene.
Asparagus Officinalis L.
Nothoscordium bivalve (L.) Britton
Smilax Bona-nox L.
Smilax hispida Muhl.
Yucca glauca Nutt.

Amaryllidaceae

Cooperia Drumondii Herb.

Iridaceae

Sisyrinchium Bushii Bickn.
Sisyrinchium campestre Bickn.
Sisyrinchium graminoides Bickn.
Sisyrinchium varians Bickn.

Orchidaceae

Spiranthea cernuus L.

Dicotyledoneae

Salicaceae

Populus deltoides Marsh.
Salix interior Rowlee.
Salix interior Rowlee var. *Wheeleri* Rowlee.
Salix nigra Marsh.

Juglandaceae

Carya Buckleyi Durand var. *arkansana* Sarg.
Carya Pecan (Marsh) Engler and Graebner.
Juglans nigra L.

Fagaceae

Quercus bicolor Willd.
Quercus macrocarpa Michx.
Quercus Marilandica Moench.
Quercus prinoides Willd.
Quercus stellata Wang.

Urticaceae

Boehmeria cylindrica (L.) Sw. var. *Drummondiana* Weddell.
Celtis laevigata Willd.
Celtis reticulata Torr.
Maclura pomifera (Ref.) Schneider.
Morus Alba L., var. tatarica (L.) Loud.
Morus rubra L.
Parietaria pennsylvanica Muhl.
Ulmus americana L.
Ulmus fulva Michx.

Loranthaceae

Phoradendron flavescens (Pursh) Nutt.

Polygonaceae

Eriogonum annuum Nutt.
Eriogonum longifolium Nutt.
Polygonum buxiforme Small.
Polygonum convolvulus L.
Polygonum cristatum Engelm. & Gray.
Polygonum dumetorum L.

Polygonum exsertum Small.
Polygonum lapathifolium L.
Polygonum longistylus Small.
Polygonum Muhlenbergii (Meisn.) Wats.
Polygonum opelousanum Riddell.
Polygonum pennsylvanicus L. var. *laevigatum* Fernald.
Polygonum punctatum Ell.
Polygonum scandens L.
Polygonum tenue Michx.
Tovaria virginiana (L.) Adams.

Chenopodiaceae

Atriplex argentea Nutt.
Chenopodium ambrosioides L., ss. *Eu-ambrosioides* Aellen.
Chenopodium gigantospermum Aellen. (C. hybridum of Am. Authors).
Chenopodium pratericola Rydb. (C. leptophyllum of most authors).
Chenopodium Standleyanum Aellen. (C. Boscianum moq.in part).
Cycloloma atriplicifolium (Spreng.) Coult.
Monolepis Nuttalliana (R. & S.) Wats.
Salsola kali L. var. *tenuifolia* G.F.W. Mey
Saueda linearis (Ell.) Moq.

Amaranthaceae

Acnida tamariscina (Nutt.) Wood.
Amaranthus blitoides Wats.
Amaranthus graeciszans L.
Amaranthus Palmeri S. Wats.
Amaranthus spinosus L.
Amaranthus Torreyi (Gray) Benth.
Froelichia floridana (Nutt.) Moq. var. *campestris* (Small) Fern.
Froelichia gracillis Moq.
Iresine rhizomatosa Standley.

Phytolaccaceae

Phytolacca americana L.

Nyctaginaceae

Oxybaphus albidus (Walt.) Sweet.
Oxybaphus floribundus Chois.
Oxybaphus hirsutus (Pursh.) Robinson.

Illecebraceae

Paronychia Jamesii T. & G.
Paronychia Wardii Small.

Aizoaceae

Mollugo verticillata L.

Caryophyllaceae

Cerastium brachypodum (Engelm.) Robinson
Cerastium nutans Raf.
Sagina decumbens (Ell.) T. & G.
Silene antirrhina L.
Silene antirrhina L. var. *divericata* Robinson.
Stellaria media (L.) Cyrill.

Portulacaceae

Claytonia virginica L.
Claytonia virginica L. forma *robusta* (Somes) Palmer & Steyermark.
Portulaca oleraceae L.
Portulaca parvula Gray. (*P. pilosa*)
Talinum parviflorum Nutt.

Nymphaeaceae

Castalia odorata (Ait.) Woodville & Wood.
Nelumbo pentapetala (Walt.) Fernald.

Ranunculaceae

Anemone caroliniana Walt.
Clematis Pitcheri T. & G.
Delphinum virescens Nutt. Var. *camporum* (Greene) Martin.
Myosurus minimus L.
Ranunculus pusillus Poir.
Ranunculus sceleratus L.

Menispermaceae

Cocculus carolinus (L.) DC.
Menispermum canadense L.

Papaveraceae

Argemone intermedia Sweet.

Fumariaceae

Corydalis aurea Willd. Var. *ocidentalis* Engelm.
Corydalis campestris (Britton) Buckholz & Plamer.

Cruciferae

Arabis virginica (L.) Poir.
Brassica campestrus L.
Camelina microcarpa Andrz.
Capsella Bursa-pastoris (L.) Medic.
Cardamine parviflora L. var. *arenicola* (Britt.) O.E. Schultz.
Chorispora tenella DC.
Descursinia pinnata (Walt.) Britton. var. *brachycarpa* (Richardson) Fern.
Draba brachycarpa Nutt.
Draba cuneifolia Nutt. var. *Helleri* (Small) O. E. Schultz.
Draba reptans (Lam.) Fernald.
Erysimum repandum L.
Lepidium densiflorum Schrad. (L. apetalum)
Lepidium oblongum
Small. Lepidium virginicum L.
Rorippa islandica (Oeder ex Murr) Borbas.
Rorippa sessiliflora *(Nutt.) Hitchc.*
Rorippa sinuata (Nutta.) Greene.
Sisymbrium altissima L.
Sisymbrium officinale Scop.
Streptanthus hyacinthoides Hook.
Thlaspi arvense L.

Capparidaceae

Cleomella angustifolia Torr.
Polansia trachysperma T. & G.

Saxifragaceae

Ribes odoratum Wendl.

Platanaceae

Platanus occidentalis L.

Rosaceae

Agrimonia parviflora Ait.
Crataegus sp.
Fragaria virginiana Duchesne, var. *illinoensis* (Prince) Gray.
Geum canadense Jacq.
Prunus angustifolia Marsh. var. *Watsoni* (Sarg.) Waugh.
Prunus gracilis Engelm. Gray.
Prunus mexicana Wats.
Rosa foliosa Nutt.
Rubus sp.
Sanguicorba annua Nutt.

Leguminosae

Acacia angustissima (Will.) Kuntze. var. *hirta* (Nutt.)Robinson.
Amorpha canescens Pursh.
Amorpha fruticosa L. var. *angustifolia* Pursh.
Apios americana Medic.
Astragalus canadensis L.
Astragalus Nuttallianus DC.
Astragalus plattensis Nutt.
Baptisia australis (L.) R. Br. var. *minor* (Lehm.) Fernald.
Baptisia leucantha T. & G.
Baptisia leucophaea Nutt. (*B. bracteata)*
Cassia fasciculata Michx. (*C. chamascrista)*
Cassia marilandica L. (*C. Medsgeri)*
Cercis canadensis L.
Desmanthus illinoenis (Michx.) MacM.
Desmodium ciliare DC. (*D. obtusum*).
Desmodium Dillenii Darl.
Desmodium illinoense Gray.
Desmodium paniculatum (L.) DC. var. *pubens* T. & G.
Desmodium sessilifolium (Torrey) T. & G.
Galactia volubillis (L.) Britton. var. *mississippiensis* Vail.
Gleditsia tricanthos L.
Gleditsia tricanthos L.forma *inermis* C.K. Schneider
Glycyrrhiza lepidota (Nutt.) Pursh.
Gymnocladus diocica (L.) Koch.
Hosackia Americana (Nutt.) Piper.
Indigofera leptosepala Nutt.
Krameria lancolata Torr.
Lespedeza capitata Michx.
Lespedeza intermedia (L.) Britton.
Lespedeza intermedia (L.) Britton, forma *Hahnii* (Blake) Hopkins.
Lespedeza procumbens Michx.
Lespedeza repens (L.) Barr.
Lespedeza striata (Thub.) H. & A.
Lespedeza Stuevei Nutt.
Lespedeza Stuevei Nutt, forma *augustifolia* (Britt.) Hopkins.
Medicago lupulina L.
Medicago minima L.
Medicago sativa L.

Melilotus alba Desv.
Melilotus officinalis (L.) Lam.
Neptunea lutea (Leavenw.) Benth.
Oxytropus Lambertii Pursh.
Parosela aurea (Nutt.) Britton.
Parosela enneandra (Nutt.) Britton.
Petalostemum candidum Michx.
Petalostemum occidentale (Gray) Fernald.
Petalostemum purpureum (Vent.) Rydb.
Petalostemum purpureum (Vent.) Rydb. Forma *pubescens* Fassett.
Petalostemum villosum Nutt.
Psoralea digitata Nutt.
Psoralea floribunda Nutt.
Rhynchosia latifolia Nutt.
Robinia pseudo-acacia L.
Schrankia Nuttallii (DC.) Standley.
Strophostyles helvola (L.) Britton
*Strophostyles pauciflora (*Benth.) Wats.
Stylosanthes biflora (L.) BSP. var. *hispidissma* (Michx.) Pollard & Ball.
Tephrosia virginiana (L.) Pers.
Tephrosia virginiana (L.) Pers. var. *holosericia* (Nutt.) T. & G.
Trifolium carolinianum Michx.
Trifolium pratense L.
Vicia caroliniana Walt.
Vicia ludoviciana Nutt.
Vicia villosa Roth.

Linaceae

Linum Berlandieri Hook.
Linum Lewisii Pursh. var. *pratense* Norton.
Linum rigidum Pursh.
Linum sulcatum Riddell.

Oxalidaceae

Oxalis stricta L.
Oxalis violaceae L.

Geraniaceae

Geranium carolinianum L.

Zygophyllaceae

Kallstroemia intermedia Rydb.
Tribulus terrestris L.

Rutaceae

Ptelea trifoliate L.
Zanthoxylum americanum Mill.

Polygalaceae

Polygala alba Nutt.
Polygala incarnata L.
Polygala verticillata L. var. *isocycla* Fernald.

Euphorbiaceae

Acalypha gracilens Gray
Acalypha ostryaefolia Ridd.
Acalypha rhomboidea Raf. (*A. virginica* L.)
Croton capitatus Michx.
Croton glandulosis L. var. *septentrionalis* Muell. Arg.
Croton Lindheimerianus Scheele.
Croton monanthogyhous Michx.
Croton texenis (Klotzsh) Muell. Arg.
Euphorbia arkansana Engelm. & Gray.
Euphorbia Chamaesyche L. (*E. malaca* (Small) Little).
Euphorbia corollata L.
Euphorbia corollata L. var. *mollis* Millsp.
Euphorbia Geyeri Engelm.
Euphorbia heterophylla L.
Euphorbia hexagona Nutt.
Euphorbia humistrata Engelm. ex. Gray.
Euphorbia maculata L. (E. Preslii Guss.)
Euphorbia marginata Pursh.
Euphorbia missurica Raf. (*E. zygophylloides* Boiss.)
Euphorbia missurica Raf. Var. *intermedia* (Engelm.) L. C.Wheeler. (*E. petaloidea* (Engelm.) L. C.
Euphorbia obtusata Pursh.
Euphorbia serpens HBK.
Euphorbia strictospora Engelm.
Euphorbia supine Raf. (E. *maculata* L.)
Jatropha texana Muell Arg.
Stillingia sylvatica L.

Anacardiaceae

Rhus copallina L. var. *latifolia* Engelm.
Rhus glabra L.
Rhus radicans L.

Celastraceae
Celastrus scandens L.
Evonymis atropurpureus Jacq.

Aceraceae
Acer Negundo L.
Acer Negundo L. var. *interior* (Britton) Sarg.
Acer Negundo L. var. *texanum* Pax.

Sapindaceae
Cardiospermum Hallicacabum L.
Sapindus Drummondii H. & A.

Rhamnaceae
Ceanothus evatus Desf. var. *pubescens* Wats.

Vitaceae
Ampelopsis arborea (L.) Rusby.
Ampelopsis cordata Michx.
Parthenocissus quinquefolia (L.) Planchl.
Vitis cinerea Engelm.
Vitis palmata Vahl.
Vitis riparia Michx. (*V. vulpina* auth.)
Vitis vulpina L. (*V. cordifolia* Michx.)

Malvaceae
Callirhoe alcaeoides (Michx.)Gray.
Callirhoe involucrate (T.& G.) Gray.
Hibiscus trioneum L.
Sida spinosa L.
Sphaeralcea coccinea (Pursh.) Rydb.

Hypericaceae
Ascyrum hypericoides L. var. *multicaule* (Michx.) Fern.
Hypericum multilum L.
Hypericum punctatum Lam.var. *pseudomaculatum* (Bush) Fern.

Elatinaceae
Bergia texana (Hook.) Seubert.

Cistaceae
Lechea tenuifolia Michx. var. *occidentalis* Hodgdon.
Lechea villosa Ell.

Violaceae
Viola Kataibeliana Roem. & Schultes, var. *Rafinesquii* Greene) Fern.
Viola missourienses Greene.
Viola papilionaceae Pursh.
Viola primulifolia L. var. *villosa* A. Eaton.

Passifloraceae
Passiflora incarnata L.

Loasaceae
Mentzelia oligosperma Nutt.

Cactaceae
Mamillaria similes Engelm.
Opuntia humifusa Raf.

Lythraceae
Ammannia coccines Rottb.
Lythrum lanceolatum Ell.
Rotala ramosior (L.) Koehne.

Onagraceae
Gaura filiformis Small. Var. *typica* Munz.
Gaura parviflora Dougl. Var. *typica* Munz.
Garua parfiflora Dougl. var *typica* Munz. forma *glabra* Munz.
Gaura tripetala Cav. var. *triangulata* (Buckl.) Munz.
Jussiaea diffusa Forsakal.
Ludwigia alternifolia L.
Ludwigia palustris (L.) Ell. var. *Americana* (DC.) Fern. & Grisc.
Oenothera canovirens Steele (Oe. biennis in part).
Oenothera lacinata Hill.
Oenothera lacinata Hill, var. *grandiflora* (Walt.) Robinson.
Oenothera linifolia Nutt. Var. *typica* Munz.
Oenothera missourienses Sims. Var. *oklahomensis* (Norton) Munz.
Oenothera rhombipetala Nutt.
Oenothera serrulata Nutt. Var. *typica* Munz.
Oenothera serrulata Nutt. Var. *Drummondii* T.& G. forma *flava* Munz.
Oenothera speciosa Nutt.

Oenothera triloba Nutt.
Stenosiphon linofolium (Nutt.) Britton.

Umbelliferae
Ammoselinum Butleri (Engelm.) Coult & Rose.
Chaerophyllum Tainturieri Hook. var. *floridanum* Coult. & Rose.
Chaerophyllum texanum Coult. & Rose
Cicuta maculata L.
Daucus pusillus Michx.
Lomatium daucifolium (Nutt.) Coutl. & Rose.
Lomatium foeniculaceum (Nutt.) Coult. & Rose.
Pastinaca sativa L.
Polytaenia Nuttallii (DC.) Britton.
Ptilimnium capillaceum (Michx.) Raf.
Sanicula Canadensis L.
Spermolepis divericata (Watt.) Britton.
Spermolepis echinata (Nutt.) Heller.
Spermolepis inermis (Nutt.) Mathias & Constance (*S. patens*).
Torilis japonicus (Houtt.) DC. (*T. anthriscus* (L.) Bernh.)

Cornaceae
Cornus Drummondii Meyer. (*C. asperifolia* of authors).

Primulaceae
Androsace occidentalis Pursh.
Samolus pauciflorus Raf. (S. *floribundus HBK.)*

Sapotaceae
Bumelia lanuginose (Michx.) Pers.

Ebenaceae
Diospyros virginiana L.
Diospyros virginiana L. var. p*latycarpa* Sarg.

Oleaceae
Fraxinus pennsylvanica Marsh. var. *Americana* (Borkh.) Sarg.

Loganiaceae
Polypremum procumbens L.

Gentianaceae
Sabatia angularis (L.) Bursh.
Sabatia campestris Nutt.

Apocynaceae
Apocynum cannabium L. var. *glaberrimum* A. DC.
Apocynum cannabium L. var. *pubescens* (R. Br.) A. DC.
Apocynum sibiricum Jacq.
Apocynum sibiricum Jacq. Var. *Farwellii* (Greene) Woodson.

Asclepiadaceae
Acerates auriculata Engelm.
Acerates viridiflora (Rar.)Eaton.
Ampelamus albidus (Nutt.) Britt. (*Gonolobus laevis* sensu Vail).
Asclepias amplexicaulis J.E. Smith.
Asclepias galioides HBK.
Asclepias incarnata L.
Asclepias speciosa Torr.
Asclepias stenophylla Gray.
Asclepias tuberosa L.
Asclepias tuberosa L. forma *lutea* Clute.
Asclepiodora decumbens (Nutt.) Gray.
Asclepiodora viridis (Walt.) Gray.
Gonolobus gonocarpos (Walt.) Perry.

Convolvulaceae
Convolvulus ambigens House.
Convolvulus sepium L.
Cuscuta arvensis Bevrich.
Evolvulus Nuttallianus Schultze. *(E. pilosus* Nutt.)
Ipomoea lacunosa L.
Ipomoea leptophylla Torr.
Ipomoea longifolia Benth.

Hydrophyllaceae
Ellisia nyctelea (L.)
Nemophila phacelioides Nutt.
Phacelia hirsute Nutt.

Boraginaceae
Hackelia virginiana (L.) I. M. Johnston. *(Lappula virginiana* (L.) Greene.
Heliotropum tenellum (Nutt.) Torr.
Lappula texana (Scheele) Britton.
Lithospermum arvense L.

Lithospermum caroliniense (Walt.) MacM. (*L. Gmeleni* in part).
Lithospermum incisum Lehm. (*L. angustifolium* Michx.)

Verbenaceae

Lippia cuneifolia (Torr.) Steud.
Lippia lanceolata Michx. var. *recognita* Fern. & Grisc.
Verbena bipinnatifida Nutt.
Verbena bracteata Lag. & Rodr.
Verbena canadensis (L.) Britton.
Verbena hastate L.
Verbena pumila Rydb.
Verbena stricta Vent.
Verbena urticaefolia L.

Labiateae

Hedeoma camporum Rydb.
Hedeoma hispida Pursh.
Lamium amplexicaule L.
Lycopsus americanus Muhl.
Mondarda clinopodioides Gray.
Monarda mollis L.
Prunella vulgaris L. var. *lanceolata* (Barton) Fern.
Salvia Pitcheri Torr.
Scutellaria lateriflorus L.
Scutellaria parvula Michx. var. *australis* Fassett.
Teucrium canadense L. var. *virginicum* (L.) Eaton.

Solanaceae

Datura Stramonium L.
Physalis heterophylla Nees.
Physalis ixiocarpa Brot.
Physalis lobata Torr.
Physalis macrophysa Rydb.
Physalis mollis Nutt.
Physalis pendula Rydb.
Physalis pumila Nutt.
Physalis subglabrata Mack. & Bush.
Solanum carolinense L.
Solanum elaeagnifolium Cav.
Solanum nigrum L.
Solanum rostratum Dunal.
Solanum Torreyi Gray.

Scrophulariaceae

Buchnera americana L.
Gerardia densiflora Benth.
Gerardia grandiflora Benth. var. *serrata* (Torr.) Robinson.
Gerardia heterophylla Nutt.
Llysanthes anagallidea (Michx.) Robinson.
Leucospora multifida (Michx.) Nutt. (*Conobea multifida*).
Linaria canadensis (L.) Dumont. Var. *texana* Pennell.
Mimulus glabratus HBK. var. *Oklahomensis* Fassett.
Mimulus ringens L.
Penstemon cobaea Nutt.
Penstemon laxiflorus Pennell.
Penstemon oklahomensis Pennell.
Verbascum Thapsus L.
Veronica arvensis L.
Veronica peregrina L. var. *xalapensis* (HBK.) Pennell.

Bignoniaceae

Catalpa speciosa Warder

Acanthaceae

Dicliptera brachiata (Pursh) Spreng.
Ruellia caroliniensis (Walt.) Steud. (*R. ciliosa* Pursh.)
Ruellia strepens L.

Plantaginaceae

Plantago aristata Michx.
Plantago Purshii R. & S.
Plantago pusilla Nutt.
Plantago rhodosperma Dcne.
Plantago Rugelii Dcne.
Plantago virginica L.

Rubiaceae

Cephalanthus occidentalis L.
Cephalanthus occidentalis L. var. p*ubescens* Raf.
Diodia teres Walt. var. *setifera* Fern. & Grisc.
Galium aparine L. var. *Vaillantii* (DC.) Koch.
Galium circaezans Michx. var. *hypomalacum* Fern.
Galium obtusum Bigel.
Galium pilosum Ait. var. *puncticulosum* (Michx.) T. & G.
Galium virgatum Nutt.
Houstonia nigricans (Lam.) Fern. *H. angustifolia* Michx.)
Houstonia minima Beck.

Caprifoliaceae

Sambucus canadensis L.
Symphoriocarpos orbiculatus Moench.
Virburnum rufidulum Raf.

Valerianaceae

Valerianella amarelle (Lindl.) Krok.
Valerianella radiata (L.) Dufr.
Valerianella stenocarpa (Engelm) (Krok.) var. *parviflora* Dyall.

Cucurbitaceae

Cucurbita foetidissima HBK.
Melothria pendula L.

Campanulaceae

Specularia biflora (R.& P.) F. & M.
Specularia leptocarpa (Nutt.) Gray.
Specularia perfoliata (L.) A. DC.

Lobeliaceae

Lobelia splendens Willd.

Compositae

Achillea lanulosa Nutt.
Achillea lanulosa Nutt. forma *rubicunda* Farwell.
Actinea linearifolia (Hook.) Kuntze.
Actinomeris alternifolia (L.) DC.
Agoseris cuspidata (Pursh) Steud.
Ambrosia artemesifolia L. var. *elatior* (L.) Descourtils.
Ambrosia coronopifolia T. & G.
Ambrosia trifida L. var. *texana* Scheele (*A. aptera* DC.)
Antennaria fallax Greene.
Anthemis Cotula L.
Aphanostephus skirrobasis (DC.) Trel.
Aplopappus ciliatus (Nutt.) DC.
Aplopapous divericatus (Nutt.) Gray
Artemisia gnaphalodes Nutt.
Aster azureus Lindl.
Aster Drummondii Lindl.
Aster ericoides L. (*A. multiflorus*)
Aster exilis Ell.
Aster oblongifolius Nutt. Var. *rigidulus Gray.*
Aster patens Ait. Var. *gracilis* Hook.
Aster praealtus Poir. (*A. salicifolius)*
Astranthium integrifolium (Michx.) Nutt. Var. *ciliatum* Larsen.
Baccharis salicina T. & G.
Bidens bipinnata L.
Bidens cernua L.
Bidens involucrate (Nutt.)Britton.
Bidens vulgata Greene.
Chaetopappa asteroids DC.
Chrysopsis Berlandieri Greene.
Chrysopsis pilosa Nutt.
Cirsium undulatum (Nutt.) Spreng.
Cirsium virginianum (L.) Michx.
Coreopsis cardaminefolia (DC.) T.& G.
Coreopsis grandiflora Hogg. ex Sweet.
Coreopsis tinctoria Nutt.
Echinacea angustifolia DC.
Eclipta alba (L.) Hassk.
Elephantopus carolinianus Raeuschel.
Erigeron canadensis L.
Erigeron diverticatus Michx.
Erigeron philadelphicus L.
Erigeron ramosus (Walt.) BSP.
Eupatroium coelestinum L.
Eupatorium perfoliatum L.
Eupatorium serotinum Michx.
Evax multicaulis DC.
Gaillardia lanceolata Michx.
Gaillardia suavis (Gray) Britt. & Rusby.
Gaillardia trinervata Small
Gnaphalium obtusifolium L.
Gnaphalium purpureum L.
Gutierrezia dracunculoides (DC.) Blake. *Amphiachyris dracunculoides*).
Helenium tenuifolium Nutt.
Helianthus annus L.
Helianthus hirsutus Raf.
Helianthus Maximiliani Schrad.
Helianthus mollis Lam.
Helianthus petiolaris Nutt.
Helianthus tuberosus L.
Heterotheca subaxillaris (Lam.) Britt. & Rusby.
Hieracium Gronovii L.
Hieracium longipilum Torr.
Hymenopappus tenuifolius Pursh.

Iva ciliata Willd.
Krigia occidentalis Nutt.
Kuhnia eupatorioides L.
Kuhnia eupatorioides L. var. *corymbulosa* T. & G.
Lactuca campestris Greene.
Lactuca canadensis L. var. *latifolia* O. Ktze.
Lactuca Canadensis L. var. *longifolia* (Michx.) Farwell.
Lactuca floridana (L.) Gaertn.
Lactuca scariola L.
Liatrus acidota Engelm. & Gray.
Liatrus punctata Hook.
Liatrus squarrosa Willd. var. *intermedia* (Lindl.) DC.
Matricaria matricarioides (Less.) Porter.
Parthenium Hysterophorus L.
Pluchea marilandica (Michx.) Cass.
Pulchea purpurascens (Sw.) DC.
Polymnia Uvedalia L. var. *densipilis* Blake.
Polypteris macrolepis (Rydb.)
Pyrrhopappus carolinianus (Walt.) DC.
Pyrrhopappus scaposus DC.
Ratibida columnifera (Nutt.) Woot. & Standl.
Ratibida columnifera (Nutt.) Woot. & Standl. forma *pulcherrima* (DC.) Fern.
Ratibida columnifera (Nutt.) Woot. & Standl. forma *pulcherrima* (DC.) Fern.
Rudbeckia hirta L. var. *sericea* (T.V. Moore) Fernald.
Senecio glabellus Poir.
Senecio plattensis Nutt.
Serinia oppositifolia *(Raf.) Kuntze.*
Silphium asperrimum Hook.
Silphium laciniatum L.
Solidago Canadensis L.
Solidago Hellari Small.
Solidago leptocephala T. & G.
Solidago petiolaris Ait.
Solidago radula Nutt.
Solidago rigida L.
Solidago serotina Ait.
Solidago ulmifolia Muhl.
Sonchus asper (L.) Hill.
Taraxacum laevigatum (Willd.) DC.
Taraxacum palustre (Lyons) Lam. & DC. var. *vulgare* (Lam.) Fern.
Thelesperma trifidum (Poir) Britton.
Tragopogon major Jacq.
Verbesina encelioides (Cav.) Gray.
Verbesina virginica L.
Vernonia Baldwinii Torr. var. *interior* (Small) Schuberr.
Xanthisma texanum DC.
Xanthium italicum Moretti.

CHAPTER VIII TABULAR VIEW OF THE FAMILIES OF THE SPERMATOPHYTA

Classes, Families, etc.	Genera	Species/ Var-form
Monocotyledonae		
1. Typhaceae	1	2
2. Alismaceae	1	1
3. Xyridaceae	1	1
4. Commelinaceae	2	5/3
5. Pontederiaceae	1	1
6. Liliaceae	6	9
7. Amaryllidaceae	1	1
8. Iridaceae	1	4
9. Orchidaceae	1	1
Dicotyledonae		
10. Salicaceae	2	3/1
11. Juglandaceae	2	3
12. Fagaceae	1	5
13. Urticaceae	6	7/2
14. Loranthaceae	1	1
15. Polygonaceae	3	15/1
16. Chenopodiaceae	6	9/1
17. Amaranthaceae	4	9/1
18. Phytolaccaceae	1	1
19. Nyctaginaceae	1	3
20. Illecebraceae	1	2
21. Aizoaceae	1	1
22. Caryophyllaceae	4	5/1
23. Portulacaceae	3	4/1
24. Nymphaceae	2	2
25. Ranunculaceae	5	5/1
26. Menispermaceae	2	2/1
27. Papaveraceae	1	1
28. Fumariaceae	1	1/1
29. Crucifera	14	18/3
30. Capparidaceae	2	2
31. Saxifragaceae	1	1
32. Platanaceae	1	1
33. Rosaceae	8	8/2
34. Leguminosae	31	52/12
35. Linaceae	1	3/1
36. Oxalidaceae	1	2
37. Geraniaceae	1	1
38. Zygophyllaceae	2	2
39. Rutaceae	2	2
40. Polygalaceae	1	2/1
41. Euphorbiaceae	5	23/3
42. Anacardiaceae	1	2/1
43. Celastraceae	2	2
44. Aceraceae	1	1/2
45. Sapindaceae	2	2
46. Rhamnaceae	1	1/1
47. Vitaceae	3	7
48. Malvaceae	4	5
49. Tamaricaceae	1	1
50. Hypericaceae	2	1/2

51. Elatinaceae	1	1
52. Cistaceae	1	1/2
53. Violaceae	1	2/2
54. Passifloraceae	1	1
55. Loasaceae	1	1
56. Cactaceae	2	2
57. Lythraceae	3	3
58. Onagraceae	5	12/6
59. Umbelliferae	11	14/1
60. Cornaceae	1	1
61. Primulaceae	2	2
62. Sapotaceae	1	1
63. Ebenaceae	1	1/1
64. Oleaceae	1	1/1
65. Loganiaceae	1	1
66. Gentianaceae	1	2
67. Apocynaceae	1	1/3
68. Asclepidaceae	4	12/1
69. Convolvulaceae	5	7
70. Hydrophyllaceae	3	3
71. Boraginaceae	4	6
72. Verbenaceae	2	8/1
73. Labiateae	8	8/3
74. Solanaceae	3	14
75. Scrophulariaceae	9	11/4
76. Bignoniaceae	1	1
77. Acanthaceae	2	3
78. Plantaginaceae	1	6
79. Rubiaceae	4	5/5
80. Caprifoliaceae	3	3
81. Valerianaceae	1	2/1
82. Cucurbitaceae	2	2
83. Campanulaceae	1	3
84. Lobeliaceae	1	1
85. Compositae	60	95/15
Total** Monocotyledonae	15	26/3
Total** Dicotyledonae	283	449/84
Total** ANGIOSPERMAE	298	475/87
Total** SPERMATOPHYTA	298	475/87

**Ed. Note: While numbering of species in the chart has been edited, errors in totals have not been corrected. Editor counts 25 species of monocots and 456 species of dicots making angiosperm and spermatophyte totals of 481. Also, a total of 85 varieties or forms of dicots and 3 monocot varieties total 88 varieties and forms. Author did not have the benefit of an electronic calculator. [S.S.]

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**Ed. Note:*
For historical purposes much of Waterfall's original format has been retained. Species epithets derived from a person's name are capitalized and margins are left-justified only. A similar font has been used. However, we have edited the thesis for readability. Footnotes have been moved from the bottom of each page to the end of each chapter. Italics have been substituted for underscoring of scientific names and the text has been formatted in two columns. [S.S.]

Floristic List for Oklahoma County

From Hoagland, B. W. 2001, Atlas and Catalog of Flora of Oklahoma

Bruce W. Hoagland
Director, Oklahoma Natural Heritage Inventory
University of Oklahoma
Norman, Oklahoma

This list, generated on 19 February 2001, is an ongoing project. The most complete records at this time are from the Robert Bebb Herbarium at the University of Oklahoma. Others [indicated with *] are from Oklahoma State University, University of Science and Arts of Oklahoma, Southeastern Oklahoma State University and Northwestern Oklahoma State University.

ACANH Acacia angustissima var. hirta
Prairie acacia
ACMO4 Acalypha monococca
slender threeseed mercury
ACOS Acalypha ostryifolia
pineland threeseed mercury
ACVI Acalypha virginica
Virginia threeseed mercury
ACNE2 Acer negundo
boxelder
ACNEI2 Acer negundo var. interius
boxelder
AECY Aegilops cylindrica
jointed goatgrass
AGAS2 Agalinis aspera
tall false foxglove
AGDE6 Agalinis densiflora
Osage false foxglove
AGFA2 Agalinis fasciculata
beach false foxglove
AGHE4 Agalinis heterophylla
prairie false foxglove
AGRO3 Agrimonia rostellata
beaked agrimony
AGHY Agrostis hyemalis
winter bentgrass
AGPE Agrostis perennans
upland bentgrass
ALCA3 Allium canadense
meadow garlic
ALCAF Allium canadense var.fraseri
Fraser meadow garlic
ALCAH Allium canadense var. hyacinthoides
hyacinth meadow garlic
ALCAL Allium canadense var. lavandulare
meadow garlic
ALCAM Allium canadense var. mobilense meadow garlic
ALDR Allium drummondii
Drummond's onion
ALPE2 Allium perdulce* plains onion
ALCA4 Alopecurus carolinianus
Carolina foxtail
AMAL Amaranthus albus
prostrate pigweed
AMHY Amaranthus hybridus
slim amaranth
AMPA Amaranthus palmeri
carelessweed
AMRE Amaranthus retroflexus
redroot amaranth
AMRU Amaranthus rudis tall amaranth
AMSP Amaranthus spinosus
spiny amaranth
AMTRT Ambrosia trifida var. texana
Texan great ragweed
AMCO Ammannia coccinea
valley redstem
AMRO3 Ammannia robusta
grand redstem
AMCA6 Amorpha canescens
leadplant
AMFR Amorpha fruticosa
desert false indigo
AMAR5 Ampelopsis arborea
peppervine
AMCO2 Ampelopsis cordata
heartleaf peppervine
AMLY Amsinckia lycopsoides
tarweed fiddleneck

Hoagland, B.W.
https://doi.org/10.22488/okstate.17.100004

ANGE Andropogon gerardii
big bluestem
ANGL2 Andropogon glomeratus
bushy bluestem
ANTE2 Andropogon ternarius
splitbeard bluestem
ANOC2 Androsace occidentalis
western rockjasmine
ANCA45 Androstephium caeruleum
blue funnel lily
ANCA9 Anemone caroliniana
Carolina anemone
APSK Aphanostephus skirrhobasis
Arkansas dozedaisy
APAM Apios americana
groundnut
APCA Apocynum cannabinum
Indianhemp
ARSE2 Arenaria serpyllifolia
thymeleaf sandwort
ARPO2 Argemone polyanthemos*
crested pricklypoppy
ARBA2 Aristida basiramea
forked threeawn
AROL Aristida oligantha
prairie threeawn
ARPU8 Aristida purpurascens
arrowfeather threeawn
ARPUL Aristida purpurea var. longiseta
Fendler threeawn
ASAM Asclepias amplexicaulis
clasping milkweed
ASASC Asclepias asperula ssp. capricornus
antelopehorns
ASSP Asclepias speciosa
showy milkweed
ASST Asclepias stenophylla
slimleaf milkweed
ASTU Asclepias tuberosa
butterfly milkweed
ASTUI Asclepias tuberosa ssp. interior
butterfly milkweed
ASVE Asclepias verticillata
whorled milkweed
ASVI Asclepias viridiflora
green comet milkweed
ASVI2 Asclepias viridis
green antelopehorn
ASOF Asparagus officinalis
garden asparagus
ASCA11 Astragalus canadensis
Canadian milkvetch
ASCRC3 Astragalus crassicarpus var. crassicarpus
groundplum milkvetch
ASLO4 Astragalus lotiflorus
lotus milkvetch
ASPL2 Astragalus plattensis
Platte River milkvetch
ATPR Atriplex prostrata
triangle orache
AUGRS Aureolaria grandiflora var. serrata
largeflower yellow false
BASA Baccharis salicina
Great Plains false willow
BAALM Baptisia alba var. macrophylla
Largeleaf wild indigo
BAAUM Baptisia australis var. minor
blue wild indigo
BABRL2 Baptisia bracteata var. leucophaea
longbract wild indigo
BETE Bergia texana*
Texas bergia
BIBI7 Bidens bipinnata
Spanish needles
BICE Bidens cernua
nodding beggartick
BIFR Bidens frondosa
devil's beggartick
BITR Bidens tripartita
threelobe beggarticks
BOCY Boehmeria cylindrica*
smallspike false nettle
BOASL Boltonia asteroides var. latisquama
white doll's daisy
BOIS Bothriochloa ischaemum
yellow bluestem
BOSA Bothriochloa saccharoides
silver bluestem
BOCU Bouteloua curtipendula
sideoats grama
BOGR2 Bouteloua gracilis
blue grama
BOHI2 Bouteloua hirsuta
hairy grama
BOHIP Bouteloua hirsuta var. pectinata
tall grama

BRNI Brassica nigra
black mustard
BRMI2 Briza minor
little quakinggrass
BRCA6 Bromus catharticus
rescuegrass
BRCO4 Bromus commutatus
meadow brome
BRJA Bromus japonicus
Japanese brome
BRRA2 Bromus racemosus
bald brome
BRSE Bromus secalinus
rye brome
BRST2 Bromus sterilis
poverty brome
BRTE Bromus tectorum
cheatgrass
BRPA4 Broussonetia papyrifera
paper mulberry
BUAM Buchnera americana
American bluehearts
BUAR3 Buglossoides arvensis
corn gromwell
CAAL Callirhoe alcaeoides
light poppymallow
CADI2 Callirhoe digitata
winecup
CAIN2 Callirhoe involucrata
purple poppymallow
CABE6 Calylophus berlandieri
Berlandier's sundrops
CABEP2 Calylophus berlandieri
ssp. pinifolius
Berlandier's sundrops
CASE12 Calylophus serrulatus
yellow sundrops
CASE13 Calystegia sepium
hedge false bindweed
CASIF Calystegia silvatica
ssp. fraterniflora
shortstalk false bindweed
CAMI2 Camelina microcarpa
littlepod false flax
CARA2 Campsis radicans
trumpet creeper
CABU2 Capsella bursa-pastoris
shepherd's purse
CAPAA2 Cardamine parviflora
var. arenicola
sand bittercress
CADR Cardaria draba
whitetop
CADRD Cardaria draba ssp.
draba
heartpod hoarycress
CAHA13 Cardiospermum
halicacabum
love in a puff
CACO15 Carya cordiformis
bitternut hickory
CAIL2 Carya illinoinensis
pecan
CEAM Ceanothus americanus
New Jersey tea
CESC Celastrus scandens
American bittersweet
CELAR Celtis laevigata
var. reticulata*
netleaf hackberry
CEOC Celtis occidentalis*
common hackberry
CETE Celtis tenuifolia*
dwarf hackberry
CESP4 Cenchrus spinifex
coastal sandbur
CEOC2 Cephalanthus
occidentalis
common buttonbush
CEBR3 Cerastium brachypodum
shortstalk chickweed
CEFOV2 Cerastium fontanum
ssp. vulgare
big chickweed
CENU2 Cerastium nutans
nodding chickweed
CHPR Chaerophyllum
procumbens
spreading chervil
CHTA Chaerophyllum
tainturieri
hairyfruit chervil
CHTAT Chaerophyllum
tainturieri
var. tainturier
hairyfruit chervil
CHFA2 Chamaecrista
fasciculata
sleepingplant
CHGL13 Chamaesyce
glyptosperma
ribseed sandmat
CHHU3 Chamaesyce humistrata
spreading sandmat
CHMA15 Chamaesyce maculata
spotted sandmat
CHMI8 Chamaesyce missurica
prairie sandmat
CHNU9 Chamaesyce nutans
eyebane
CHPR6 Chamaesyce prostrata

prostrate sandmat
CHSE4 Chamaesyce serpens
matted sandmat
CHLA5 Chasmanthium latifolium
Indian woodoats
CHAL7 Chenopodium album
lambsquarters
CHALM2 Chenopodium album var. missouriense
Missouri lambsquarters
CHAMA1 Chenopodium ambrosioides var. ambrosioides
Mexican tea
CHPR5 Chenopodium pratericola
desert goosefoot
CHSI2 Chenopodium simplex
mapleleaf goosefoot
CHST2 Chenopodium standleyanum
Standley's goosefoot
CHVE2 Chloris verticillata
tumble windmill grass
CHTE2 Chorispora tenella
crossflower
CLVI3 Claytonia virginica
Virginia springbeauty
CLPI Clematis pitcheri
bluebill
CLAN Cleomella angustifolia
narrowleaf rhombopod
CLMA4 Clitoria mariana
Atlantic pigeonwings
CNTE Cnidoscolus texanus
Texas bullnettle
COCA Cocculus carolinus
Carolina coralbead
COCO3 Commelina communis
Asiatic dayflower
COCOL Commelina communis var. ludens
Asiatic dayflower
COER Commelina erecta
whitemouth dayflower
COERA Commelina erecta var. angustifolia
whitemouth dayflower
COERE Commelina erecta var. erecta
whitemouth dayflower
COOR Conringia orientalis
hare's ear mustard
COAR4 Convolvulus arvensis
field bindweed
CODR2 Cooperia drummondii
evening rainlily
CODR Cornus drummondii
roughleaf dogwood
COCUO Corydalis curvisiliqua ssp. occidentalis
curvepod fumewort
COMIA2 Corydalis micrantha ssp. australis
smallflower fumewort
COMIM2 Corydalis micrantha ssp. micrantha
smallflower fumewort
CRMO2 Crataegus mollis
Arnold hawthorn
CRVI2 Crataegus viridis
green hawthorn
CRSA4 Crotalaria sagittalis
arrowhead rattlebox
CRCA6 Croton capitatus
hogwort
CRGL2 Croton glandulosus
vente conmigo
CRGLS Croton glandulosus var. septentrionalis
vente conmigo
CRLI2 Croton lindheimerianus
threeseed croton
CRMO6 Croton monanthogynus
prairie tea
CRTE4 Croton texensis
Texas croton
CUFO Cucurbita foetidissima
Missouri gourd
CUPE3 Cuscuta pentagona
fiveangled dodder
CYAT Cycloloma atriplicifolium
winged pigweed
CYLA Cynanchum laeve
honeyvine
CYDA Cynodon dactylon
Bermudagrass
CYBI6 Cyperus bipartitus
slender flatsedge
CYCR6 Cyperus croceus
Baldwin's flatsedge
CYER2 Cyperus erythrorhizos
redroot flatsedge
CYES Cyperus esculentus
chufa flatsedge
CYLUL Cyperus lupulinus ssp. lupulinus
Great Plains flatsedge
CYOD Cyperus odoratus
fragrant flatsedge
CYPO Cyperus polystachyos*

manyspike flatsedge
CYSQ Cyperus squarrosus
bearded flatsedge
DAAU Dalea aurea
golden prairie clover
DACAC Dalea candida var. candida
white prairie clover
DACAO Dalea candida var. oligophylla
white prairie clover
DAEN Dalea enneandra
nineanther prairie clover
DALAL Dalea lanata var. lanata
woolly prairie clover
DAMU Dalea multiflora
roundhead prairie clover
DAPU5 Dalea purpurea
violet prairie clover
DAPUP Dalea purpurea var. purpurea
violet prairie clover
DAVIV Dalea villosa var. villosa
silky prairie clover
DAST Datura stramonium
jimsonweed
DACA6 Daucus carota
Queen Anne's lace
DAPU3 Daucus pusillus
American wild carrot
DECA3 Delphinium carolinianum*
Carolina larkspur
DECAV2 Delphinium carolinianum ssp. virescens
Carolina larkspur
DEIL Desmanthus illinoensis
prairie bundleflower
DELE2 Desmanthus leptolobus
slenderlobe bundleflower
DECA8 Desmodium canescens
hoary ticktrefoil
DECI Desmodium ciliare
hairy small-leaf ticktrefoil
DECUC Desmodium cuspidatum var. cuspidatum
largebract ticktrefoil
DEIL2 Desmodium illinoense
Illinois ticktrefoil
DEMA2 Desmodium marilandicum
smooth small-leaf ticktrefoil
DEPA6 Desmodium paniculatum
panicledleaf ticktrefoil
DEPAP2 Desmodium paniculatum var. paniculatum
panicledleaf ticktrefoil
DESE Desmodium sessilifolium
sessileleaf ticktrefoil
DIAR Dianthus armeria
Deptford pink
DIAC2 Dichanthelium acuminatum
tapered rosette grass
DIACL Dichanthelium acuminatum var. lindheimeri
Lindheimer panicgrass
DILA9 Dichanthelium laxiflorum
openflower rosette grass
DIOL Dichanthelium oligosanthes
Heller's rosette grass
DIOLS Dichanthelium oligosanthes var. scribnerianum
Scribner's rosette grass
DISC3 Dichanthelium scoparium
velvet panicum
DISPS3 Dichanthelium sphaerocarpon var. sphaerocarpon
roundseed panicgrass
DIBR2 Dicliptera brachiata
branched foldwing
DICO6 Digitaria cognata
Carolina crabgrass
DIFI Digitaria filiformis
slender crabgrass
DISA Digitaria sanguinalis
hairy crabgrass
DITE2 Diodia teres
poorjoe
DITET Diodia teres var. teres
poorjoe
DIVI5 Diospyros virginiana
common persimmon
DRBR Draba brachycarpa
shortpod draba
DRCU Draba cuneifolia
wedgeleaf draba
DRCUC Draba cuneifolia var. cuneifolia
wedgeleaf draba
DRRE2 Draba reptans
Carolina draba
ECCR Echinochloa crus-galli
barnyardgrass

ECBE2 Echinodorus berteroi
upright burrhead
ECPR Eclipta prostrata
false daisy
ELAT Eleocharis atropurpurea
purple spikerush
ELCO2 Eleocharis compressa
flatstem spikerush
ELEN Eleocharis engelmannii
Engelmann's spikerush
ELMO2 Eleocharis montevidensis
sand spikerush
ELPA3 Eleocharis palustris
common spikerush
ELPA5 Eleocharis parvula
dwarf spikerush
LIN3 Eleusine indica
Indian goosegrass
ELNY Ellisia nyctelea
Aunt Lucy
EQHY Equisetum hyemale
scouringrush horsetail
EQHYA Equisetum hyemale
var. affine
scouringrush horsetail
EQFE Equisetum X ferrissii
ERCI Eragrostis cilianensis
stinkgrass
ERCU Eragrostis
curtipedicellata
gummy lovegrass
ERFR Eragrostis frankii
sandbar lovegrass
ERPE Eragrostis pectinacea
tufted lovegrass
ERPI2 Eragrostis pilosa
Indian lovegrass
ERSE Eragrostis secundiflora
red lovegrass
ERSEO Eragrostis secundiflora
ssp. oxylepis
red lovegrass
ERSP Eragrostis spectabilis
purple lovegrass
ERTR3 Eragrostis trichodes
sand lovegrass
ERCO8 Eriochloa contracta
prairie cupgrass
ERLOL4 Eriogonum longifolium
var. longifolium
longleaf buckwheat
ERCI6 Erodium cicutarium
redstem stork's bill
ERCAC Erysimum capitatum
var. capitatum
sanddune wallflower
ERRE4 Erysimum repandum
spreading wallflower
ERME15 Erythronium
mesochoreum
midland fawnlily
EUAT3 Euonymus atropurpurea
eastern wahoo
EUCO10 Euphorbia corollata
flowering spurge
EUDE4 Euphorbia dentata
toothed spurge
EUHE4 Euphorbia heterophylla
Mexican fireplant
EUHE5 Euphorbia hexagona
sixangle spurge
EUMA8 Euphorbia marginata
snow on the mountain
EUPU7 Euphorbia pubentissima
false flowering spurge
EUSP Euphorbia spathulata
warty spurge
EVNU Evolvulus nuttallianus
shaggy dwarf morning-glory
FIPU Fimbristylis puberula
hairy fimbry
FIVA Fimbristylis vahlii
Vahl's fimbry
FRVIG3 Fragaria virginiana
ssp. grayana
Virginia strawberry
FRPE Fraxinus pennsylvanica
green ash
FRFL Froelichia floridana
plains snakecotton
FRGR3 Froelichia gracilis
slender snakecotton
FUSI Fuirena simplex
western umbrella-sedge
GAVO Galactia volubilis
downy milkpea
GAAP2 Galium aparine
stickywilly
GAPIP Galium pilosum var.
puncticulosum
hairy bedstraw
GAVI Galium virgatum
southwestern bedstraw
GALO3 Gaura longiflora
longflower beeblossom
GAMO5 Gaura mollis
velvetweed
GASI Gaura sinuata
wavyleaf beeblossom
GASU2 Gaura suffulta
kisses
GATR5 Gaura triangulata

prairie beeblossom
GAVI2 Gaura villosa
woolly beeblossom
GECA5 Geranium carolinianum
Carolina geranium
GECA7 Geum canadense
white avens
GECAC5 Geum canadense
var. camporum
white avens
GLBIB Glandularia bipinnatifida
var. bipinnatifida
Dakota mock vervain
GLCA2 Glandularia canadensis
rose mock vervain
GLPU4 Glandularia pumila
pink mock vervain
GLHE2 Glechoma hederacea
ground ivy
GLLE3 Glycyrrhiza lepidota
American licorice
HAVI2 Hackelia virginiana
beggarslice
HEDR Hedeoma drummondii
Drummond's false
HEHI Hedeoma hispida
rough false pennyroyal
HENI4 Hedyotis nigricans
diamondflowers
HENIN Hedyotis nigricans
var. nigricans
diamondflowers
HEAN3 Helianthus annuus
common sunflower
HEGR4 Helianthus grosseserratus
sawtooth sunflower
HEMA2 Helianthus maximiliani
Maximilian sunflower
HEMO2 Helianthus mollis
ashy sunflower
HEPE Helianthus petiolaris
prairie sunflower
HETU Helianthus tuberosus
Jerusalem artichoke
HELA Helianthus X laetiflorus
cheerful sunflower
HETE3 Heliotropium tenellum
pasture heliotrope
HILA2 Hibiscus laevis
halberdleaf rosemallow
HITR Hibiscus trionum
flower of an hour
HOPU3 Houstonia pusilla
tiny bluet
HYDR Hypericum drummondii
nits and lice
HYHY Hypericum hypericoides
St. Andrew's cross
HYHYM Hypericum hypericoides
ssp. multicaule
St. Andrew's cross
HYMU Hypericum mutilum
dwarf St. Johnswort
HYPR Hypericum prolificum
shrubby St. Johnswort
HYPS Hypericum
pseudomaculatum*
false spotted St. Johnswort
HYPU Hypericum punctatum
spotted St. Johnswort
HYHI2 Hypoxis hirsuta
common goldstar
INMIL Indigofera miniata
var. leptosepala
western indigo
IPLA Ipomoea lacunosa
whitestar
IPLE Ipomoea leptophylla
bush morning-glory
IPPA Ipomoea pandurata
man of the earth
IRRH Iresine rhizomatosa
Juda's bush
IVANA Iva annua var. annua
annual marshelder
JUNI Juglans nigra
black walnut
JUBI Juncus biflorus
bog rush
JUBR Juncus brachycarpus
whiteroot rush
JUDI2 Juncus diffusissimus
slimpod rush
JUDU2 Juncus dudleyi
Dudley's rush
JUIN2 Juncus interior
inland rush
JUMA4 Juncus marginatus
grassleaf rush
JUSC Juncus scirpoides
needlepod rush
JUTO Juncus torreyi
Torrey's rush
JUVAV Juncus validus
Var. validus
roundhead rush
JUVI Juniperus virginiana
eastern redcedar
KAPA Kallstroemia parviflora
warty caltrop
KRLA Krameria lanceolata
trailing krameria

KUST Kummerowia stipulacea
Korean clover
LASA Lactuca saligna*
willowleaf lettuce
LAAM Lamium amplexicaule
henbit deadnettle
LAPU2 Lamium purpureum
purple deadnettle
LALA4 Lathyrus latifolius
perennial pea
LEMU3 Lechea mucronata
hairy pinweed
LETE Lechea tenuifolia
narrowleaf pinweed
LEOR Leersia oryzoides
rice cutgrass
LEAU3 Lepidium austrinum
southern pepperwort
LEDE Lepidium densiflorum
common pepperweed
LEDED Lepidium densiflorum var. densiflorum
common pepperweed
LEOB Lepidium oblongum
veiny pepperweed
LEVI3 Lepidium virginicum
Virginia pepperweed
LEFUF Leptochloa fusca ssp. fascicularis
bearded sprangletop
LEPAM Leptochloa panicea ssp. mucronata
mucronate sprangletop
LECA8 Lespedeza capitata
roundhead lespedeza
LECU Lespedeza cuneata
Chinese lespedeza
LEPR Lespedeza procumbens
trailing lespedeza
LEST5 Lespedeza stuevei
tall lespedeza
LEVI7 Lespedeza virginica
slender lespedeza
LEMU Leucospora multifida
narrowleaf paleseed
LIVU2 Linaria vulgaris
butter and eggs
LIBEB2 Linum berlandieri var. berlandieri
Berlandier's yellow flax
LIPR Linum pratense
meadow flax
LIRIR Linum rigidum var. rigidum
stiffstem flax
LISU4 Linum sulcatum
grooved flax
LIDR3 Lipocarpha drummondii
Drummond's halfchaff sedge
LIST2 Liquidambar styraciflua
sweetgum
LICA13 Lithospermum caroliniense
Carolina puccoon
LICAC9 Lithospermum caroliniense var. croceum
Carolina puccoon
LIIN2 Lithospermum incisum
narrowleaf stoneseed
LOCA2 Lobelia cardinalis
cardinalflower
LOFOD Lomatium foeniculaceum ssp. daucifolium
desert biscuitroot
LOJA Lonicera japonica
Japanese honeysuckle
LOUNU Lotus unifoliolatus var. unifoliolatus
American bird's-foot trefoil
LUAL2 Ludwigia alternifolia
seedbox
LUPA Ludwigia palustris
marsh seedbox
LUTE Lupinus texensis
Texs lupine
LYAM Lycopus americanus
American water horehound
LYAL4 Lythrum alatum
winged lythrum
LYALL Lythrum alatum var. lanceolatum
winged lythrum
MAPO Maclura pomifera
osage orange
MATR Magnolia tripetala*
umbrella-tree
MARO11 Malva rotundifolia
low mallow
MELU Medicago lupulina
black medick
MEMI Medicago minima
burr medick
MESA Medicago sativa
alfalfa
MEOF Melilotus officinalis
yellow sweetclover
MEPE3 Melothria pendula
Guadeloupe cucumber
MECA3 Menispermum canadense

common moonseed
MESP3 Mentha spicata
spearmint
MINU6 Mimosa nuttallii
Nuttall's sensitive-briar
MIDR Minuartia drummondii
Drummond's stitchwort
MIPA6 Minuartia patula
pitcher's stitchwort
MIAL4 Mirabilis albida
white four o'clock
MILI3 Mirabilis linearis
narrowleaf four o'clock
MINY Mirabilis nyctaginea
heartleaf four o'clock
MOVE Mollugo verticillata
green carpetweed
MOCL2 Monarda clinopodioides
basil beebalm
MOFI Monarda fistulosa
wild bergamot
MOFIM3 Monarda fistulosa
ssp. fistulosa var. mollis
wild bergamot
MONU Monolepis nuttalliana
Nuttall's povertyweed
MOAL Morus alba
white mulberry
MORU2 Morus rubra
red mulberry
MURA Muhlenbergia racemosa
marsh muhly
MUSY Muhlenbergia sylvatica
woodland muhly
MYVE Myosotis verna
spring forget-me-not
NELU Nelumbo lutea
American lotus
NEPH Nemophila phacelioides
largeflower baby blue eyes
NELU2 Neptunia lutea
yellow puff
NOBI2 Nothoscordum bivalve
crowpoison
NUCA Nuttallanthus
canadensis
Canada toadflax
NUTE Nuttallanthus texanus
Texas toadflax
NYOD Nymphaea odorata
American white waterlily
NYODT Nymphaea odorata
ssp. tuberosa*
American white waterlily
OEBI Oenothera biennis
common evening-primrose
OELA Oenothera laciniata
cutleaf evening-primrose
OELI Oenothera linifolia
threadleaf evening-primrose
OEMAO2 Oenothera macrocarpa
ssp. oklahomensis
Oklahoma evening-primrose
OERH Oenothera rhombipetala
fourpoint evening-primrose
OESP2 Oenothera speciosa
pinkladies
OETR2 Oenothera triloba
stemless evening-primrose
OEVIV Oenothera villosa
ssp. villosa
hairy evening-primrose
ONMOO2 Onosmodium molle
ssp. occidentale
western marbleseed
OPEN Ophioglossum
engelmannii
limestone adderstongue
OXCO Oxalis corniculata
creeping woodsorrel
OXST Oxalis stricta
common yellow oxalis
OXVI Oxalis violacea
violet woodsorrel
OXLA3 Oxytropis lambertii
purple locoweed
PAAN Panicum anceps
beaked panicgrass
PADI Panicum
dichotomiflorum
fall panicgrass
PAHI3 Panicum hillmanii
Hillman's panicgrass
PAOB Panicum obtusum
vine mesquite
PAVI2 Panicum virgatum
switchgrass
PAJA Paronychia jamesii
James' nailwort
PAQU2 Parthenocissus
quinquefolia
Virginia creeper
PASM Pascopyrum smithii
western wheatgrass
PADI6 Paspalum distichum
knotgrass
PAPU5 Paspalum pubiflorum
hairyseed paspalum
PAIN6 Passiflora incarnata
purple passionflower
PECU3 Pediomelum
cuspidatum

largebract Indian breadroot
PEDI9 Pediomelum digitatum
palmleaf Indian breadroot
PEES Pediomelum esculentum
large Indian breadroot
PEAT2 Pellaea atropurpurea
purple cliffbrake
PEBU Penstemon buckleyi
Buckley's beardtongue
PECO4 Penstemon cobaea
cobaea beardtongue
PEFE Penstemon fendleri
Fendler's penstemon
PELA10 Penstemon laxiflorus
nodding beardtongue
PEOK Penstemon oklahomensis
Oklahoma beardtongue
PETU Penstemon tubiflorus
white wand beardtongue
PHST Phacelia strictiflora
prairie phacelia
PHSTL Phacelia strictiflora var. lundelliana
Lundell's phacelia
PHCA6 Phalaris caroliniana
Carolina canarygrass
PHPI Phlox pilosa
downy phlox
PHPIO2 Phlox pilosa ssp. ozarkana
Ozark phlox
PHLE14 Phoradendron leucarpum
oak mistletoe
PHLE5 Phryma leptostachya
American lopseed
PHAN5 Physalis angulata
cutleaf groundcherry
PHCIC3 Physalis cinerascens var. cinerascens
smallflower groundcherry
PHHE5 Physalis heterophylla
clammy groundcherry
PHHI8 Physalis hispida
prairie groundcherry
PHPU8 Physalis pumila
dwarf groundcherry
PHVIV3 Physalis virginiana var. virginiana
Virginia groundcherry
PHAM4 Phytolacca americana
American pokeweed
PHAMA3 Phytolacca americana var. americana
American pokeweed
PISA6 Pisum sativum
garden pea
PLAR3 Plantago aristata
largebracted plantain
PLLA Plantago lanceolata
narrowleaf plantain
PLPA2 Plantago patagonica
woolly plantain
PLPU Plantago pusilla
dwarf plantain
PLRH Plantago rhodosperma
redseed plantain
PLRU Plantago rugelii
blackseed plantain
PLVI Plantago virginica
Virginia plantain
PLOC Platanus occidentalis
American sycamore
PLCA7 Pluchea camphorata
camphor pluchea
PLODO Pluchea odorata var. odorata
sweetscent
PODOT Polanisia dodecandra ssp. trachysperma
sandyseed clammyweed
POAL4 Polygala alba
white milkwort
POIN4 Polygala incarnata
procession flower
POVE Polygala verticillata
whorled milkwort
POVEI Polygala verticillata var. isocycla
whorled milkwort
POBIC Polygonatum biflorum var. commutatum
smooth Solomon's seal
POAME Polygonum amphibium var. emersum
longroot smartweed
POAV Polygonum aviculare
prostrate knotweed
POCO10 Polygonum convolvulus
black bindweed
POHY Polygonum hydropiper
marshpepper knotweed
POHY2 Polygonum hydropiperoides
swamp smartweed
POLA4 Polygonum lapathifolium
curlytop knotweed
POPE2 Polygonum pensylvanicum
Pennsylvania smartweed

POPE3 Polygonum persicaria
spotted ladysthumb
POPU5 Polygonum punctatum
dotted smartweed
PORA3 Polygonum ramosissimum
bushy knotweed
POSC3 Polygonum scandens
climbing false buckwheat
POSCS Polygonum scandens var. scandens
climbing false buckwheat
POTE2 Polygonum tenue
pleatleaf knotweed
POVI2 Polygonum virginianum
jumpseed
PONU4 Polytaenia nuttallii
Nuttall's prairie parsley
POOL Portulaca oleracea
little hogweed
POPI3 Portulaca pilosa
kiss me quick
PORE5 Potentilla recta
sulphur cinquefoil
PRVU Prunella vulgaris
common selfheal
PRAN3 Prunus angustifolia
Chickasaw plum
PRANW Prunus angustifolia var. watsonii
Watson's plum
PRGR Prunus gracilis
Oklahoma plum
PRME Prunus mexicana
Mexican plum
PRPE3 Prunus persica
peach
PRSE2 Prunus serotina
black cherry
PRVI Prunus virginiana*
chokecherry
PSTE5 Psoralidium tenuiflorum
slimflower scurfpea
QUMA2 Quercus macrocarpa
bur oak
QUMA3 Quercus marilandica
blackjack oak
QUMU Quercus muehlenbergii
chinkapin oak
QUPR Quercus prinoides
dwarf chinkapin oak
QURU Quercus rubra
northern red oak
QUST Quercus stellata
post oak
QULO2 Quincula lobata
Chinese lantern
RASC3 Ranunculus sceleratus*
cursed buttercup
RHCOL2 Rhus copallinum var. latifolia
winged sumac
RHGL Rhus glabra
smooth sumac
RHLA5 Rhynchosia latifolia
prairie snoutbean
RHGL2 Rhynchospora globularis
globe beaksedge
RHHA Rhynchospora harveyi
Harvey's beaksedge
RIAUV Ribes aureum var. villosum
golden currant
ROPS Robinia pseudoacacia
black locust
RONA2 Rorippa nasturtium-aquaticum
watercress
ROPAF2 Rorippa palustris ssp. fernaldiana
Fernald's yellowcress
ROSE Rorippa sessiliflora
stalkless yellowcress
ROSI2 Rorippa sinuata
spreading yellowcress
ROTE2 Rorippa teres
southern marsh yellowcress
ROFO Rosa foliolosa
white prairie rose
ROMU Rosa multiflora
multiflora rose
RORA Rotala ramosior
lowland rotala
RUAB Rubus aboriginum
garden dewberry
RUAR2 Rubus argutus
sawtooth blackberry
RUOK Rubus oklahomus
Oklahoma blackberry
RUTR Rubus trivialis
southern dewberry
RUHU Ruellia humilis
fringeleaf wild petunia
RUST2 Ruellia strepens
limestone wild petunia
RUAL4 Rumex altissimus
pale dock
RUCR Rumex crispus*
curly dock
RUHA2 Rumex hastatulus
heartwing sorrel

RUVE2 Rumex venosus
veiny dock
SAAN Sabatia angularis
rosepink
SACA3 Sabatia campestris
Texas star
SADE Sagina decumbens
trailing pearlwort
SAEX Salix exigua
sandbar willow
SATR12 Salsola tragus
prickly Russian thistle
SAAZ Salvia azurea
azure blue sage
SANIC4 Sambucus nigra
ssp. canadensis
common elderberry
SAVAP Samolus valerandi s
sp. parviflorus
seaside brookweed
SAAN2 Sanguisorba annua
prairie burnet
SACA15 Sanicula canadensis
Canadian blacksnakeroot
SAOF4 Saponaria officinalis
bouncingbet
SCSC Schizachyrium
scoparium
little bluestem
SCACA Schoenoplectus acutus
var. acutus
hardstem bulrush
SCAM6 Schoenoplectus
americanus
chairmaker's bulrush
SCLI5 Scirpus lineatus
rusty bulrush, drooping
SCCI Scleria ciliata
fringed nutrush
SCTR Scleria triglomerata
whip nutrush
SCLA2 Scutellaria lateriflora
blue skullcap
SCPA7 Scutellaria parvula
small skullcap
SEMA11 Senna marilandica
Maryland senna
SIVI2 Sibara virginica
Virginia winged rockcress
SISP Sida spinosa
prickly fanpetals
SIAN2 Silene antirrhina
sleepy silene
SIAL2 Sisymbrium altissimum
tall tumblemustard
SIOF Sisymbrium officinale
hedgemustard
SIAN3 Sisyrinchium
angustifolium
narrowleaf blue-eyed grass
SICA9 Sisyrinchium campestre
prairie blue-eyed grass
SILA5 Sisyrinchium langloisii
roadside blue-eyed grass
SMBO2 Smilax bona-nox
saw greenbrier
SMHE Smilax herbacea
smooth carrionflower
SMRO Smilax rotundifolia
roundleaf greenbrier
SMTA2 Smilax tamnoides
bristly greenbrier
SOCA3 Solanum carolinense
Carolina horsenettle
SODI Solanum dimidiatum
western horsenettle
SOEL Solanum elaeagnifolium
silverleaf nightshade
SOPT3 Solanum ptychanthum
West Indian nightshade
SORO Solanum rostratum
buffalobur nightshade
SOGI Solidago gigantea
giant goldenrod
SOAF Sophora affinis
Eve's necklacepod
SONU Sophora nuttalliana
silky sophora
SPPE Spartina pectinata
prairie cordgrass
SPDI2 Spermolepis divaricata
roughfruit scaleseed
SPEC2 Spermolepis echinata
bristly scaleseed
SPIN Spermolepis inermis
Red River scaleseed
SPCO Sphaeralcea coccinea
scarlet globemallow
SPCE Spiranthes cernua
nodding ladies'-tresses
SPLA4 Spiranthes lacera*
northern slender
SPMA5 Spiranthes
magnicamporum
Great Plains ladies'-tresses
SPOV Spiranthes ovalis
October ladies'-tresses
SPVE Spiranthes vernalis
spring ladies'-tresses
STME2 Stellaria media
common chickweed
STMEM Stellaria media ssp.

media
common chickweed
STLI2 Stenosiphon linifolius
false gaura
STSY Stillingia sylvatica
queen's-delight
STHY Streptanthus hyacinthoides
smooth jewelflower
STHE4 Strophostyles helvula
trailing fuzzybean
STLE6 Strophostyles leiosperma
slickseed fuzzybean
STBI2 Stylosanthes biflora
sidebeak pencilflower
SYOR Symphoricarpos orbiculatus
coralberry
SYDI2 Symphyotrichum divaricatum
southern annual saltmarsh
TACA Talinum calycinum
largeflower fameflower
TAPA3 Talinum parviflorum
sunbright
TAGA Tamarix gallica
salt cedar, French tamarisk
TEVI Tephrosia virginiana
Virginia tephrosia
TECA3 Teucrium canadense
Canada germander
TECAC Teucrium canadense var. canadense
Canada germander
TECAO Teucrium canadense var. occidentale
western germander
THAR5 Thlaspi arvense
field pennycress
TOAR Torilis arvensis
spreading hedgeparsley
TROC Tradescantia occidentalis
prairie spiderwort
TROH Tradescantia ohiensis
bluejacket
TRTE Tribulus terrestris
puncturevine
TRDU2 Trifolium dubium
suckling clover
TRPR2 Trifolium pratense
red clover
TRRE3 Trifolium repens
white clover
TRLE3 Triodanis leptocarpa
slimpod Venus'
TRPEB Triodanis perfoliata var. biflora
clasping Venus'
TRDA3 Tripsacum dactyloides
eastern gamagrass
TYDO Typha domingensis
southern cattail
TYLA Typha latifolia
broadleaf cattail
ULAM Ulmus americana*
American elm
ULRU Ulmus rubra*
slippery elm
URTE2 Urochloa texana
Texas signalgrass
VAAM2 Valerianella amarella
hairy cornsalad
VARA Valerianella radiata
beaked cornsalad
VETH Verbascum thapsus
common mullein
VEBR Verbena bracteata
bigbract verbena
VEST Verbena stricta
hoary verbena
VEUR Verbena urticifolia
white vervain
VEURL Verbena urticifolia var. leiocarpa
white vervain
VEAL Verbesina alternifolia
wingstem
VEAR Veronica arvensis
corn speedwell
VEPE2 Veronica peregrina
neckweed
VEPEP Veronica peregrina ssp. peregrina
neckweed
VEPEX2 Veronica peregrina ssp. xalapensis
hairy purslane speedwell
VIRU Viburnum rufidulum
rusty blackhaw
VIAMM3 Vicia americana ssp. minor
mat vetch
VISA Vicia sativa
garden vetch
VIVI Vicia villosa
winter vetch
VIVIV8 Vicia villosa ssp. varia
winter vetch
VIBI Viola bicolor
field pansy

VIPA3 Viola palmata
early blue violet
VISA2 Viola sagittata
arrowleaf violet
VISO Viola sororia
common blue violet
VITR Viola tricolor
johnny jumpup
VICI2 Vitis cinerea
graybark grape
VIVU Vitis vulpina
frost grape
VUOC Vulpia octoflora
sixweeks fescue
WOOB2 Woodsia obtusa
bluntlobe cliff fern
XASTC Xanthium strumarium
var. canadense
Canada cockleburr
XASTG Xanthium strumarium
var. glabratum
rough cockleburr
YUGL Yucca glauca
soapweed yucca
YUGLG2 Yucca glauca var.
glauca*
soapweed yucca
ZAAM Zanthoxylum
americanum
common pricklyash
ZINU Zigadenus nuttallii
Nuttall's deathcamas

Native Orchids of Oklahoma

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As of the publication of this paper Oklahoma is known to have orchids of 33 species in 18 genera, which compares to 20 species and 11 genera reported by Waterfall (1969). Four of the 33 species are possibly extinct in the state based on current survey work. The greatest concentration of orchid species is in the southeastern corner of the state (Atoka, Bryan, Choctaw, LeFlore, McCurtain and Pushmataha Counties).

INTRODUCTION

The family Orchidaceae is the largest of the families of flowering plants with somewhere between 25,000 and 35,000 species, with new species continually being described. There are also numerous natural and artificial hybrids. The only place where orchids are not known to occur is Antarctica.

Orchids fascinate us because of the seemingly infinite combinations of colors and forms that are found in orchid flowers from the Arctic to the tropical rain forests. Many have incredibly complex pollination processes, most involving insects. Pollination complexity reaches a zenith with the development of "pseudo-copulation", a process where the orchid flower mimics the form, shape, movements and often the odor of a female wasp or bee. The flower in effect "seduces" the male wasp or bee into trying to copulate with it and in the process uses the male to transfer pollen from one flower to another. While pseudocopulation is highly efficient, it comes with a price -- if the pollinator becomes extinct, then the plant depending on it will probably become extinct, also.

"Orchids range vegetatively from Lilliputian plants a few millimeters long (some *Bulbophyllum* and *Platystele* species) to as tall as 13.4 meters (44 feet) (*Sobralia altissima* Bennett and Christenson, a recently described species from Peru)" (Romero-Gonzalez, Fernandez-Concha, Dressler & Magrath, in ed.) or gigantic clusters weighing several hundred kilograms (*Grammatophyllum*).

Orchids have been cultivated and used for over 2000 years. Lawler (1982) reported that orchids have long played a part in the life of the Chinese. Since the time of Confucius (551-479 BCE) who mentioned *lan* in his writings, "acquaintance with good men was like entering a room full of *lan* or fragrant orchids" (Withner, 1959), orchids have been important in many facets of Chinese life including literature, painting, horticulture, and not least, medicine". They are mentioned in the *materia medica*, "Sheng nung pen ts'ao ching", tracing back to the legendary emperor Sheng Nung (ca. 28th century BCE). The term "*lan hua*" in early Chinese records refers to species of the genus *Cymbidium* (Withner, 1959), most likely *Cymbidium densifolium*, which is very pleasantly fragrant.

William Shakespeare in "Hamlet" Act IV, Scene VII has Queen Gertrude describing Ophelia's death to Laertes "There with fantastic garlands did she come of crow-flowers, nettles, daisies, and long purples, that liberal shepherds give a grosser name, but our cold maids do dead men's fingers call them." The "long purples/dead men's fingers" refer most likely to species in either the genus *Orchis* or *Dactylorhiza*. Economically, orchids are important as both cut flowers and as pot plants. And with modern propagation techniques, orchids have moved from being almost solely the province of the wealthy to flowering pot plants that nearly everyone can afford.

The earliest reference to orchids in the Americas is the Badianus Manuscript, which is an Aztec herbal of 1552 (Emmart, 1940). In it are references to the use of orchids for flavorings, perfume, a lotion against fatigue, and glue. The glue flower, *tzaconhxochitl*, "has been associated with *Bletia campanulata*, and *Epidendrum pastoris*, or possibly *Catasetum maculatum*, from which an excellent glue for wood was obtained."

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In Meso-America orchids were highly regarded by the Aztec and their predecessors to the southeast, the Maya. Both the Aztec ruler Montezuma II and Nezhualcoyotl,King of Texcoco, a Toltec derived state, were noted for the orchids cultivated in their gardens. The Maya cultivated members of the genus *Vanilla* Miller (*sisbic* in Mayan) for their seedpods or "beans", which were a source of flavoring for foods and as perfume. The "beans" were fermented to produce vanilla. The Aztecs used *tlilxochitl* (literally "black flower" or "black pod") was used as a flavoring agent in *chocolatl* (chocolate).

In the Middle East from the time of the Assyrians to present day Turkey (Hanson, 2001), a food material called *salep*, a complex starch flour that is used in confections, has been made from the dry roots of several species of *Dactylorhiza* Necker ex Nevski, *Eulophia* R. Br., and *Orchis* L. The roots of these same plants have also been used as aphrodisiacs for both humans and animals.

The leaves of a few species of lady's-slipper orchids in the genus *Cypripedium* (*C. candidum, C. parviflorum, C. reginae* and *C. pubescens*) have been reported as causing contact dermatitis in some people (Lawler, 1982), and it has also been noted that the plants are avoided by cattle, presumably owing to irritation from the hairs.

ORCHID HABITATS IN OKLAHOMA:

Some of the more important orchid habitats in Oklahoma are: native prairies throughout the state, excluding the panhandle region; wet pimple mound prairies in the eastern third of the state; moist woodlands in the eastern half of the state; sphagnum bogs in the southeastern part of the state.

TECHNICAL DESCRIPTION OF THE ORCHIDACEAE FAMILY IN OKLAHOMA:

Plants herbs; perennial; from rhizomes or tuberoids or corms or fleshy roots or pseudobulbs; autophytic or saprophytic or mycotrophic; caulescent or acaulescent. **Root Systems** absent or present; fibrous. **Leaves** basal or forming a basal rosette or cauline or tubular sheaths; simple; alternate or opposite or whorled; with basal sheaths; venation parallel or parallel-convergent; margins entire; stipules absent. **Inflorescences** solitary flowers or spikes or racemes; terminal or axillary; bracts present. **Flowers** perfect; chasmogamous or cleistogamous; perianths in 2-series; resupinate or not resupinate. **Calyces** bilaterally symmetrical or bilaterally asymmetrical. **Sepals** 3 (may appear to be two); free or fused; petaloid; green or white or brightly colored. **Corollas** bilaterally symmetrical or bilaterally asymmetrical; imbricate. **Petals** 3; of 2 forms; 1 larger, modified into a lip (labellum); 2 smaller, resembling the sepals; free or fused; of various colors. **Stamens** 1 or 2; fused to style and stigma forming a column (gynostegium); pollen in pollinia. **Pistils** 1; compound, carpels 3; stigmas 3, 3-lobed (all fertile), or 2 fertile and 1 sterile and enlarged (rostellum); styles 1; ovaries inferior; locules 1; placentation parietal. **Nectaries** present; 1; petaliferous; often modified into elongate spurs. **Fruits** capsules; usually dehiscent by 3 longitudinal slits but remaining closed at top and bottom. **Seeds** usually several thousand; minute. The family description is taken from "Keys and Descriptions for the Vascular Plants of Oklahoma" (Tyrl et al, 2001)

KEY TO GENERA OF OKLAHOMA ORCHIDS:

1. Leaves absent at flowering time or reduced to sheaths 2
    2. Plants without chlorophyll (not green) 3
        3. Rhizomes with annular scale scars, not coral-like. Lips 16-18 mm long ..... ***Hexalectris***
        3. Rhizomes without annular scale scars, coral-like. Lips 4-7 mm long ..... ***Corallorhiza***
    2. Plants with chlorophyll (green) 4
        4. Inflorescences racemes. Flowers with pedicels. Perianths with combinations of brown or maroon or green or greenish yellow 5
            5. Mature flowers bilaterally asymmetrical. Lips 4-8 mm long; spurs present. Capsules 0.8-1.4 mm long; 0.4-0.5 mm in diameter ..... ***Tipularia***
            5. Mature flowers bilaterally symmetrical. Lips 10-15 mm long; spurs absent. Capsules 1.7-2.2 mm long; 0.8-0.9 mm in diameter ..... ***Aplectrum***

4. Inflorescences spikes. Flowers sessile. Perianths white to creamy white ..... ***Spiranthes***

1. Leaves present at flowering time 6
   6. Leaves one 7
      7. Leaves basal; linear to linear-lanceolate. Flowers not resupinate (column lowermost in flower) ..... ***Calopogon***
      7. Leaves cauline; lanceolate to ovate or elliptic. Flowers resupinate (column uppermost in flower) 8
         8. Perianths pink to rose or white ..... ***Pogonia***
         8. Perianths green ..... ***Malaxis***
   6. Leaves two or more 9
      9. Leaves basal 10
         10. Leaves 2. Inflorescences racemes. Perianths maroon or green ..... ***Liparis***
         10. Leaves 3 or more. Inflorescences spikes. Perianths white or creamy white...11
            11. Leaves with white veins or markings. Lips saccate ..... ***Goodyera***
            11. Leaves without white veins or markings. Lips not saccate ..... ***Spiranthes***
      9. Leaves cauline 12
         12. Leaves opposite or whorled 13
            13. Leaves 5-6; whorled. Sepals 35-60 mm long ..... ***Isotria***
            13. Leaves 2; opposite. Sepals 1.5-2 mm long ..... ***Listera***
         12. Leaves alternate ..... 14.
            14. Lips saccate. Anthers 2 ..... ***Cypripedium***
            14. Lips not saccate. Anthers 1 15
               15. Lips without spurs 16
                  16. Perianths greenish maroon. Leaves plicate……..…..***Epipactis***
                  16. Perianths white or pink. Leaves not plicate 17
                     17. Flowers 1-3 (-5); pedicellate ..... ***Triphora***
                     17. Flowers 6-numerous; sessile ..... ***Spiranthes***
               15. Lips with spurs .....18.
                  18. Lips entire 19
                     19. Flowers lavender and white ..... ***Galearis***
                     19. Flowers white or green or greenish yellow .... ***Platanthera***
                  18. Lips 3 parted or fringed or both. 20
                     20. Lips or lip parts fringed ..... ***Platanthera***
                     20. Lips or lip parts not fringed ..... ***Habenaria***

ALPHABETIC LISTING OF GENERA:

Aplectrum Nuttall, Gen. 2:197. 1818. The genus name comes from the Greek *a "without"* and *plectron "spur"* in reference to the flower's lack of a spur. The species name is from the Latin *hiems, hiemalis/hyemalis "of or belonging to the winter"* in reference to the production of an over-wintering leaf in late fall. The genus is composed of two species; ***Aplectrum hyemale*** (Muhl. ex Willd.) Torr., occurring in eastern North America, and *A. unguiculatum* (Finet) Maekawa occurring in Japan. The latter species had previously been included in the closely related genus *Cremastra* (Luer, 1975).

Common Names: Putty-root, Adam & Eve.

Flowering Time: mid-May to mid-June.

Description: This terrestrial orchid is one of two in Oklahoma that produces an evergreen over-wintering leaf in late fall which persists until late spring when it withers before producing a flower stalk. The leaf is elliptical in shape and may be up to 17-20cm (7-8 inches) long and 6-8.5 cm (21/2 to 3 1/2 inches) wide. It is dark green above, purple on the underside, and it is pleated with silver-white ribs. The flower stalk is a raceme with 6-20 white lipped, greenish-yellow and purple flowers, which are about 1.2 cm (1/2 inch) long. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. Both the leaf and later the flower stalk arise from a modified underground stem called a corm. The corms are connected by slender rhizomes and there may be several corms attached together. This orchid is apparently rare in Oklahoma and has been collected only twice. Magrath and Lavallee collected it in fruiting condition in McCurtain County near Little River south of Broken Bow in October 1973. A small colony of 20-25 plants was found; unfortunately construction of a new 4-lane highway between Idabel and Broken Bow destroyed this particular colony. Hopefully it is still present in the immediate area. The second collection was by Paul Buck on a north-facing slope of Rich Mountain in LeFlore County just west of the Arkansas state line in December 1988. He observed 10-15 plants. It is to be hoped that this plant may actually be more common than our current records indicate.

Habitat: In Oklahoma the habitat is deciduous woodlands in decaying leaf litter and rich organic loam soil. One site was an alluvial flood plain, the other a mesic, north-facing slope near the top of Rich Mountain.

Distribution: southeastern Oklahoma (: Map 1).

Calopogon R. Brown in Aiton, Hort. Kew. ed. 2:5:204. 1813, Nom. Cons. The genus name comes from the Greek *kalos "beautiful"* and *pogon "beard"* thus a "beautiful beard" in reference to the clusters of colorful hairs on the lip. According to Catling, Goldman & Magrath (2001) the genus is composed of 5 species, all native to eastern North America and Cuba. This is the only genus of orchids in Oklahoma that has non-resupinate flowers with the lip uppermost in the flower. Both species are in decline in Oklahoma due to changes in land use.

Key to Species:

1. Flowering stem and leaf about the same length; flowers opening simultaneously, (not having buds, flowers, and young fruits present at the same time), pale pink to magenta or occasionally white, the club shaped hairs closest to the tip of the lip pale pink, (hairs closer to the base of the lip yellow) ..... ***C. oklahomensis***
1. Flowering stem much longer than the leaf; flowers opening sequentially, (often having buds, flowers, and young fruits present simultaneously), magenta to rose-pink, the club shaped hairs closest to the tip of the lip golden yellow, (hairs closer to the base magenta to rose pink) ..... ***C. tuberosus***

Calopogon oklahomensis D. H. Goldman; Lindleyana 37: 42. 1995.

Common Names: Oklahoma Grass-pink

Flowering Time: early May to early June.

Description: Plants consist of a single leaf and a flower stalk that is 20-30 cm [8-12 (-14) inches] tall that arise from an oblong or forked corm. The leaves are linear to lanceolate 15-32 cm long and 0.3-1.1 cm wide. They are about the same height as the inflorescence. The inflorescence is a terminal raceme of 2-8 flowers, all of which open nearly simultaneously. Flowers are 2.5-4 cm (1-1/2 inches) in diameter and color ranges from deep pink to pure white in alba forms. The lip is uppermost

(non-resupinate) in the flower and has a tuft of white hairs with golden-yellow tips. The fruit is an erect capsule with the column persisting. This is one of the showiest of our native orchids, especially so if one happens to find a colony of several hundred to several thousand plants in bloom at the same time. *Calopogon oklahomensis* was reported by Waterfall (1969) as *C. pulchellus* (Salisb.) R. Br. and as. *C. tuberosus* var. *tuberosus* by Magrath & Norman (1989).

Habitat: Moist to moderately dry sandy to loamy native prairies and in moist slightly acidic "pimple mound" prairies.

Distribution: eastern third of Oklahoma (Map 2).

Calopogon tuberosus (L.) Britton, Stern, and Poggenberg, Prel. Cat. Anth. Pterid. N.Y. 52. 1888.

Common Names: Grass-pink, Swamp-pink.

Flowering Time: mid-late June.

Description: Plants consist of a single leaf and a flower stalk that is 51- 94 cm (18-37 inches) tall that arise from a globose to elongate corm. The leaves are linear to lanceolate, 25-65 cm long and 0.5-2.2 cm wide. They are about one-half to two-thirds the height of the inflorescence. The inflorescence is a terminal raceme of 2-8 flowers, which open sequentially so that there may be buds, open flowers and young fruit on the same inflorescence at the same time. Flowers are 2.5-5 cm (1 1/2-2 inch) and color ranges from deep pink to magenta or rose. The lip is uppermost (non-resupinate) in the flower and has a tuft of white hairs with golden-yellow tips. The fruit is an erect capsule 1-2 cm long and 0.5-1.0 cm in diameter, with the column persisting. This is one of the showiest of our native orchids, and also one of the rarer ones. Our populations are all *Calopogon tuberosus* (L.) BSP. var. *tuberosus,* previously reported as *C. pulchellus* (Salisb.) R. Br. by Waterfall (1969) and as *C. tuberosus* (L.) BSP. var. *simpsonii* (Chapman) Magrath (Magrath & Norman 1989).

Habitat: In Oklahoma this species is known only from three acidic sphagnum bogs: Harrison/Doshier Bog, Bennington Bog, and the Hugo/Speer/Railroad Bog, all of which are on sandy soil.

Distribution: southeastern Oklahoma (Map 3).

Corallorhiza Gagnebin, Acta Helv. Phys.-Math. 2:57. 1755. The genus name is from the Greek *korallion* "coral" and *rhiza* "root" in reference to the coral-like appearance of the branching underground rhizome.

Description of genus: plants terrestrial, mycotropic, solitary or colonial herbs, consisting of underground coralloid rhizomes and racemose flowering stems with leaf sheaths, but not leaf blades. Plants lacking chlorophyll, stems yellow (alba forms) to reddish-purple to dark maroon. Flowers small, yellow with white lip (alba form) to purplish-green with white lip usually with magenta spots. Occasionally the previous year's inflorescence and fruit capsules will be present at the next year's flowering.

Key to species

1. Flowering in early-mid fall; lip 2.2-3.5 mm long; column 1.4-2.4 mm long; sepals 3.0-4.5 mm long ..... ***C. odontorhiza***
1. Flowering in early spring; lip 4.0-7.5 mm long; column 2.4-5.0 mm long; sepals 4.5-10.0 mm long ..... ***C. wisteriana***

Corallorhiza odontorhiza (Willd) Poiret, Dict. Sci. Nat. X:375, 23 May 1818. The species name is from the Greek *odonto* "tooth" and *rhiza* "root" in reference to the tooth-like appearance of the swollen base of the stem.

Common Names: Autumn coral-root.

Flowering Time: September-October.

Description: Plants terrestrial, mycotropic, lacking chlorophyll, racemose flower stems with leaves reduced to sheathing bracts, 7.6-28 cm (3-11 inches) tall. The stems are strongly thickened and bulbous at the base where they join the rhizomes. Flowers 2-16 in loose racemes, purplish-brown with a white magenta spotted lip. In most of the Oklahoma specimens, the flowers do not appear to fully open and are probably cleistogamous. Capsules pendent, ellipsoidal, 6-8 mm long and 3-5 mm in diameter.

Habitat: Rich deciduous woods in decaying leaf litter. In the eastern part of Oklahoma this plant frequently blooms at the same time as the Indian (Ghost) Pipe, *Monotropa uniflora*. In both Oklahoma and Kansas any place where *Monotropa*

uniflora occurs, if you look carefully enough you will almost inevitably find *C. odontorhiza*.

Distribution: most frequent in the eastern part of the state, but also occurs in the "Caddo Canyons" of central Oklahoma (Widowmaker Canyon in Canadian County), (Map 4).

Corallorhiza wisteriana Conrad, Jour. Acad. Phila. 6:145. 1829. The species was named in honor of Charles J. Wister, an American botanist who first collected the species in Pennsylvania.

Common Names: Wister's Coral-root; Early Coral-root.

Flowering Time: mid March - mid May.

Description: Plants terrestrial, mycotropic, lacking chlorophyll, racemose flower stems with leaves reduced to sheathing bracts, 12.7-38 cm (5-15 inches) tall. The stems are thickened at the base where they join the rhizomes. Flowers 5-16 in loose racemes, purplish-brown with a white magenta spotted lip. Capsules are pendent, ellipsoidal, 6-10 mm long and 3-5 mm in diameter. Reports of *C. trifida* for Oklahoma in the literature have apparently been based on *alba* forms that are known to occur in Pontotoc County (Byrd's Mill near Fittstown).

Habitat: Rich deciduous woods in decaying leaf litter.

Distribution: central and eastern Oklahoma (Map 5).

Cypripedium Linnaeus, Species Plantarum 2:951. 1753. The genus name comes from the Greek *Kypris* "goddess of love and beauty," who was supposed to have been born on Cyprus, and *podion* "little foot."

Description of genus: Plants terrestrial, from a short rhizome with fibrous roots, caulescent (Oklahoma plants), pubescent, stems 25-71 cm (-97) [10-28 (-38)] inches tall with 3-6 alternating, lanceolate to elliptical (rarely nearly orbicular) leaves. Flowers showy, 1-3 in a racemose inflorescence. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. According to Cribb (1997) the center of diversity of the genus is China where 30 of the 45 known species have been reported, North America is the second richest area with 11 species. The genus is represented in Oklahoma by 2 species.

Key to species:

1. Lip 5.0-6.3 cm long, pale yellow to ivory; dorsal sepal 7.0-9.3 cm long; capsules 3.5-5.5 cm long ..... ***C. kentuckiense***
1. Lip 2.0-3.0 cm long, bright yellow or white; dorsal sepal 3.5-4.7 cm long; capsules 2.5-3.3 cm long ... 2
    2. Lip bright yellow ..... ***C. parviflorum f. parviflorum***
    2. Lip white or white with light pink veining ... ***C. parviflorum f. albolabium***

Cypripedium kentuckiense C.F. Reed, Phytologia 48:426. 1981. The species is named after the state where it was originally collected. It was reported by Waterfall (1969) as *C. calceolus* L. var. *pubescens* (L.) Correll.

Common Names: Kentucky Lady's-slipper.

Flowering Time: late April - mid May.

Description: Plants terrestrial, pubescent with 3-6 elliptical to ovate to nearly sub orbicular leaves. Flowers typically solitary, rarely two. Petals and sepals greenish to yellowish with reddish-brown spots, reticulations or nearly solid markings; lip pale yellow, obovoid, 5-6.3 cm (2-2 1/2 inches) long. Capsules erect, ellipsoidal, 3-5 cm (1 1/5-2 inches) long and 1-1.5 cm (2/5-3/5 inches) in diameter.

Habitat: Rich mesic deciduous forests on river flood plains and bases of slopes and wet seep areas. This plant is in decline in Oklahoma due mainly to changes in land use. The Mountain Fork colony, which in 1989 numbered over 214 plants, has been completely destroyed, as has another on the Arkansas/Oklahoma border on the southern slope of Rich Mountain. Additionally because of the showy flowers it is vulnerable to flower lovers who may pick the flowers (preventing seed production for the year) or try to dig the plant up and transplant it into their gardens.

Distribution: southeastern Oklahoma (Map 6).

Cypripedium parviflorum Salisb., Trans. Linn. Soc. I: 77. Pl. 2, Fig. 2. 1791.

Common Names: Southern Small Yellow Lady's-slipper.

Flowering Time: late April - mid May.

Description: Plants terrestrial, pubescent with 3-5 lanceolate to elliptical to ovate leaves. Flowers solitary, to typically two or rarely 3. Petals and sepals greenish to yellowish with reddish-brown spots usually appearing uniformly dark solid

markings, or rarely with dark reticulations; lip bright yellow or white with pink veins, oblanceolate-ovoid, 2-3.2 cm (1/2 -1 1/3 inches) long. Capsules erect, ellipsoidal, 2-3.5 cm (4/5 - 1 2/5 inches) long and 0.6-1 cm (1/5-2/5 inches) in diameter. All of our plants in Oklahoma are var. *parviflorum*.

Habitat: Rich mesic deciduous forests on gravelly soil covered by decaying leaf litter, most commonly on north facing slopes of mountain ridges. This plant is in decline in Oklahoma due mainly to changes in land use. Additionally because of the showy flowers it is vulnerable to flower lovers who may pick the flowers (preventing seed production for the year) or try to dig the plant up and transplant it into their gardens.

A white-lipped form has been found at the Tate Ranch site in Adair County among the more typical bright yellow-lipped plants. This plant was described as *C. parviflorum* Salisb. var. *parviflorum* f. *albolabium* Magrath & Norman (1989).

Distribution: northeastern and eastern Oklahoma as far south as Rich Mountain (Map 6).

Epipactis Swartz, Kongl. Svensk. Vetensk. Acad. Nya Handl. 21:231. 1800, in part; emend. L.C. Richard, De Orch. Europ. Annot. 29. 1817; Mem. Mus. Hist. Nat. Par. 4:51. 1818. nom. con. The genus name comes from the Greek *epipactis* a name used by Theophrastus, ca 350 BCE to describe a plant used to curdle milk. The genus is composed of about 20 species in Eurasia, with only one native to North America.

Epipactis gigantea Dougl. ex Hook, Fl. Bor.-Am. 2:202. pl. 202. 1839. The genus name is from the Latin *giganteus* "gigantic" relating to the large size of both plants and flowers in this species.

Common Names: Stream Orchid, Chatterbox, Giant Helleborine.

Flowering Time: mid May - mid June.

Description: Plants terrestrial, glabrous, caulescent, stems 40-79 (-100) cm [16-31 (-39) inches] tall, with 4-11 alternating, ovate-lanceolate leaves. The inflorescence is a raceme of 3-15 relatively showy flowers. The sepals are greenish-yellow with purple veins, petals greenish becoming rose apically with purple veins, the lip is yellowish to rosy apically, with purple to brown veins. The lip is divided into two parts, an hypochile and an apical epichile which articulates with the hypochile and is easily moved by the faintest of air movements; hence the common name "chatterbox" because the flowers look as if they are talking to each other. The capsules are pendent and ellipsoidal, 2.3 cm (9/10-1 1/5 inches) long and 0.6-0.9 cm (1.5-2/5 inches) in diameter. This species varies from uncommon to locally common and is most easily found in the Turner Falls area in the Arbuckle Mountains.

Habitat: Occurs in cracks in limestone bedrock in spring fed streams in Arbuckle Mountains.

Distribution: south central Oklahoma in Arbuckle Mountains (Map 8).

Galearis Rafinesque, Herb. Raf. 71. 1833, Fl. Tellur. 2:39. 1836. The genus name is from the Latin *galea* "helmet" in reference to the hood formed by the connivent sepals and petals over the column. The genus is composed of two species *Galearis spectabilis* (L.) Raf. and *G. cyclochila* (Fr. & Sav.) Maxim. in Japan and Korea.

Galearis spectabilis (L.) Raf., Herb. Raf. 71. 1833. The species name is from the Latin *spectabilis* "notable" or "remarkable" in reference to the showy lavender and white flowers.

Common Names: Showy Orchis.

Flowering Time: late April - mid May.

Description: Plants terrestrial, glabrous, with slender fleshy roots from a short rootstock, two basal fleshy dark green elliptical to sub orbicular leaves, a third leaf rarely present on the stem; stems slightly 4-5 angled (fluted), fleshy, 17-25.5 cm (7-10 inches) long. The 3-6 (-15) flowers are born in a lax raceme. They are showy with the sepals and petals lavender and the lip white with a blunt club-shaped down-turned spur that is as long as the lip. Capsules are erect, ellipsoidal and 1.5-2 cm (1/2-7/8 inches) long and 0.5-0.7 cm (1/5-1/4 inches) in diameter. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. This species has been collected once at Battiest in McCurtain County and reported and photographed by Jim Norman on Polecat Peak in LeFlore County

Habitat: Rich mesic deciduous woods in decaying leaf mold.

Distribution: southeastern Oklahoma (Map 9).

Goodyera R. Brown in Aiton, Hort. Kew. ed. 2. 5:197. 1813. The genus is named for John Goodyer, a seventeenth century English botanist. There are about 25 species in this worldwide genus, with 4 in North America and 1 in Oklahoma. ***Goodyera pubescens*** (Willd.) R. Brown in Aiton, Hort. Kew. ed 2. 5:198. 1813.

Common Names: Downy Rattlesnake Orchis.

Flowering Time: August.

Description: Plants terrestrial, densely pubescent, stems 15-35 (-46) cm [6-14 (-18) inches] long; from fleshy creeping rhizomes which may produce small to fairly extensive colonies. The 3-8 petiolate leaves form a basal rosette. Leaves oblong-elliptic, dark green to blue-green with a prominent network of white veins. The inflorescence is a densely flowered cylindrical spike, the sessile flowers are spirally arranged. Flowers are white, the sepals have a green central vein, the lip is a pouch with a strongly recurved apex like the spout on a pitcher. The capsules are sub-erect and globose and about 5-6 mm (1/4 inch) in diameter. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. This species has been found at two locations -- once in McCurtain County about 3 miles southeast of Smithville, and on Polecat Peak in LeFlore County. The Polecat Peak population is quite extensive.

Habitat: Rich mesic deciduous woods in decaying leaf mold.

Distribution: eastern Oklahoma in the Ouachita Mountains.

Habenaria Willdenow, Sp. Pl. 4:44. 1805. The genus name comes from the Latin *habena* "strap," \"thong," or "rein" in reference to the rein-like spur and appendages of the petals and lip that are characteristic of the genus. The genus consists of about 600 species (Pridgeon, Crib, Chase & Rasmussen, 2001) that are mainly tropical or subtropical and worldwide in distribution. Correll (1950) recognized 39 species and varieties of *Habenaria (sensu lato)*, however Luer (1975; *sensu stricto*) recognized 4 species in North America, with 1 occurring in Oklahoma.

Habenaria repens Nuttall, Gen. N. Am. Pl. 2:190. 1818. The species name is from the Latin *repo* "to creep," hence *repens* "creeping."

Common Names: Water Spider Orchid.

Flowering Time: September – October.

Description: Plants terrestrial to aquatic, glabrous, the leafy stems 40-66 cm (16-26 inches) tall. The 5-9 alternating leaves sessile with linear-lanceolate shape. The 10-50 plus flowers are born in a spicate raceme. The flowers are light green to greenish-white with a greenish-white to greenish-yellow lip. The flowers are relatively inconspicuous and have the appearance of a spider, hence the name "water spider" orchid. It forms small colonies by sending out rhizomes, which produce new plants. This plant was first located by John Taylor in 1974 at the Boehler Seeps area where the colony persisted for many years and grew to consist of several thousand plants. However a series of several early freezes a few years ago appears to have caused this plant to become extirpated in Oklahoma at the present time.

Habitat: Known only from two spring fed acidic sphagnum bogs over sandy soil (Boehler Seeps in Atoka County and the Speer Bog in Choctaw County).

Distribution: southeastern Oklahoma (Map 11).

Hexalectris Rafinesque, Neogenyton 4. 1825. The genus name is from the Greek *hex* "six" and *alectryon* "cock" in reference to the six fleshy lamellae resembling a cock's-comb, which occur on the lip. In actuality the lip usually has either 5 or 7 lamellae. The genus as treated by Catling & Magrath (2001) consists of 7 species, mainly Mexican, with 5 occurring in the United States and 1 in Oklahoma.

Hexalectris spicata (Walt.) Barnh., Torreya 4:121. 1904. The species name is from the Latin *spicatus* "spiked" in reference to the spicate inflorescence.

Common Names: Crested Coralroot.

Flowering Time: late June – July.

Description: Plants terrestrial, mycotropic, lacking chlorophyll, flowering stems 22-56 (-80 cm) [9-22 (-32)] inches tall, produced from stout, branching, annulate, jointed rhizomes; the leaves reduced to a few tubular sheaths on the stems. The 5-25 pedicellate flowers produced on scapose racemes. Flowers large, showy, sepals yellow-brown with brownish-purple veins, petals yellow with purple veins, the lip white to light yellow with purple veins and lamellae. Capsule pendent, ellipsoidal, 5/8-1 inches (2-2.5 cm) long and 1/5-3/5 inches (1.2-1.5 cm) in diameter. All Oklahoma specimens seen to date are var. *spicata*, however var. *arizonica* occurs in north central Texas (Liggio & Liggio 1999)

Habitat: Ranges from leaf mold in deep shade of mixed hardwoods and conifers on well-drained knolls and stream banks, sometimes on rotting logs, tends to prefer limestone soil. In Oklahoma populations growing in decaying juniper needle litter over sandstone at William's Wilderness near Cyril in Caddo County are far more robust than those growing in regular leaf mold.

Distribution: eastern Oklahoma in the Ouachita Mountains.

Key to varieties:

1. Flowers pale yellow to pinkish, usually closed, cleistogamous; column without a rostellar flap separating the pollen masses from the stigmatic surface; the 5 central veins of lip with lamellae 0.2-0.7 mm above lip surface.....***Hexalectris spictaa*** var. ***arizonica***
1. Flowers yellowish- or purplish-brown, usually open, chasmogamous; column with a rostellar flap separating the pollen masses from the stigmatic surface; the 5 central veins of lip with lamellae 0.7-1 mm above lip surface.....***Hexalectris spicata*** var. ***spicata***

Variety ***arizonica*** (S. Watson) Catling & Engel. Lindleyana 8 (3): 122. 1993, is called the Arizona Crested Coral-Root.

Habitat: Ranges from leaf mold in deep shade of mixed hardwoods and conifers on well-drained knolls and stream banks, sometimes on rotting logs, tends to prefer limestone soil. In Oklahoma, populations growing in decaying juniper needle litter over sandstone (e.g. William's Wilderness near Cyril in Caddo County) are far more robust than those growing in leaf mold that originates from deciduous tree leaves and/or pine needles.

Distribution: central and eastern Oklahoma (Map 12).

Isotria Rafinesque, Med. Repos. 2(5):357. 1808. The genus name is from the Greek *isos* "equal" and *treis, tria* "three" in reference to the three sepals, which are equal size and shape. The genus consists of two species both North American, with 1 species occurring in Oklahoma.

Isotria verticillata (Muhlenberg ex Willdenow) Rafinesque, Med. Repos. 2(5):357. 1808. The species name is from the Latin *verticillatus* "whorled" in reference to the whorl of leaves at the top of the stem.

Common Names: Large Whorled Pogonia; Whorled Pogonia.

Flowering Time: mid April - early May.

Description: Plants terrestrial, glabrous, long hollow stems 5-13 inches (12-33 cm) tall, topped by a whorl/verticil of 5-6 lanceolate to ovate to nearly rhombic-ovate green leaves. The inflorescence is terminal with a solitary flower or rarely two. The sepals are purplish brown, the petals are yellow-green and the lip is yellow with purple edges and a white mid-lobe. The capsule is erect and ellipsoidal, 1/2-1 inch (1.4-2.5 cm) long and 1/45-16 inch (0.6-0.9 cm) in diameter. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. This species was first found by Albert Lavallee on an Oklahoma Orchid Society field trip in 1976 at the McKinney Creek site near Tom in McCurtain County. It is presently known from 5 locations in McCurtain and LeFlore Counties. This seems to be a relatively rare plant, but populations of up to 200 plants have been found. It is potentially vulnerable to changes in land use.

Habitat: Rich mesic mixed deciduous and pine woodlands in the Ouachita Mountains and the Gulf Coastal Plain in the Ouachita National Forest.

Distribution: southeastern Oklahoma (Map 13).

Liparis L.C.Richard, Mem. Mus. Paris 4:43, 52. 1818. The genus name is from the Greek *liparos* "fat," "greasy," or "shining" in reference to the almost oily feel and lustre of the leaves in this genus. The genus is nearly worldwide in distribution and has about 250 species. Magrath (2001) recognized 3 occurring in North America, with 1 in Oklahoma.

Liparis liliifolia (L.) L. C. Richard ex Lindley, Bot. Reg. 11:pl.882. 1825. The species name is from the Latin *lilium* "a lily" and *folius* "leaved" referring to the lily-like foliage of this species.

Common Names: Lily-leaved Twayblade.

Flowering Time: late May – June.

Description: Plants terrestrial, glabrous, fleshy, with two elliptic-ovate shiny green leaves subtending a scapose raceme arising from a small ovoid pseudobulb. The stem is 3 1/2-10 inches ((9-) 15 (-25) cm) tall. The 5 (-31) flowers with pale green sepals, purple filiform petals and a translucent pale purple to maroon lip are in an open raceme. The obovate lip is the showy part of the flower. The capsules are ellipsoid, and about 5/8 inches (1.5 cm) long and 3/16 inches (0.5 cm) in diameter. This species has only been collected once, at the McKinney Creek site near Tom in McCurtain County in 1975.

Habitat: Rich mesic mixed deciduous and pine woodlands in the Gulf Coastal Plain area in the Ouachita National Forest.

Distribution: southeastern Oklahoma (Map 14).

Listera R. Brown in Aiton, Hort. Kew. ed 2. 5:201. 1813. nom. cons. The genus name is in honor of Martin Lister, a noted English physician and naturalist. The genus consists of 25 species; Coleman & Magrath (2001) recognized 8 in North America with 1 in Oklahoma, occurring in cool temperate regions of both the northern and southern hemispheres.

Listera australis Lindl., Gen. Sp. Orchid. 456. 1840. The genus name is from the Latin *australis* "southern" in reference to the more southern distribution of the species.

Common Names: Southern Twayblade.

Flowering Time: late April - mid May.

Description: Plants terrestrial, arising from a minute rhizome with a few long slender fibrous roots, the stem is glabrous with a pair of terminal leaves, stem and inflorescence 4-9 inches (9-23 cm) tall. The 6-25 pedicellate flowers are born in an open terminal raceme that is pubescent. The flowers are marcescent maroon-purple with the showy linear lip deeply divided into two filamentous lobes. The capsules are globose to ovoid 1/16-3/16 inches (2-4 mm) long and 1/16-2/16 inches (2-3 mm) in diameter, and are born in a horizontal position. This species was originally collected by Magrath at the McKinney Creek site near Tom in McCurtain County in 1979 during an Oklahoma Academy of Science Spring Field Meeting while on a field trip.

Habitat: Plants occur in "hanging" sphagnum bogs in mixed deciduous and pine wooded areas. In Oklahoma they are usually associated with the rhizomes of cinnamon fern.

Distribution: southeastern Oklahoma. It is presently known from Bryan, Choctaw and McCurtain Counties (Map 15).

Malaxis Solander ex Swartz, Nov, Ge. Sp. Pl. Prodr. 119. 1788. The name is from the Greek *malaxis* "a softening" in reference to the soft, succulent consistency of the leaves of the plants in this genus. The genus is composed of about 250 species. Catling & Magrath (2001) recognized 9 species in North America with 1 in Oklahoma. It is widespread mostly in Asia and the East Indies.

Malaxis unifolia Michx., Fl. Bor.-Am. 2:157. 1803. The species name is from the Latin *unifolium* "one leaf" in reference to the solitary leaf of this species.

Common Names: Green Adder's Mouth.

Flowering Time: late April - mid June.

Description: Plants terrestrial, glabrous, inflorescence and solitary leaf (rarely 2) arises from a pseudobulb, roots are few and fibrous. The leaf is narrowly to broadly ovate and encloses the base of the inflorescence in a sheath. The stem is 4-9 1/2 inches (10-24 cm) tall. The 25-100 green flowers are born in an open raceme, which appears umbellate before elongation of the rachis. The capsules are ellipsoid 1/8-1/4 inches (3-6 cm) long and 1/16-1/8 inches (2-3.5 cm) in diameter are held on filiform pedicels in a horizontal to sub-horizontal position. It is not uncommon to find a previous year's inflorescence and seeds pods persisting through the current flowering period and frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. This orchid, once thought to be rare in the state, can become locally abundant in an appropriate habitat.

Habitat: Plants occur in pine and mixed deciduous woods, growing in the layer of decomposing leaf and needle litter, also in shaded "hanging" sphagnum bogs.

Distribution: eastern and southeastern Oklahoma (Map 16).

Platanthera L. C. Richard, Mem. Mus. Paris 4:48. 1818. The genus name is from the Greek *platys* "wide, broad" and *anthera* "anther" in reference to the unusually wide anther. According to the Flora North America treatment by Sheviak (2001) there are about 200 species (mainly north temperate), with 32 species in North America, and 6 in Oklahoma.

Description: Plants terrestrial, glabrous, rather succulent, erect. The roots are fasciculate, fleshy and often enlarged into lance-fusiform tuberoids. The stems leafy or leafless with the leaves either basal or gradually reduced to bracts toward the inflorescence. The inflorescences solitary, terminal, lax to dense spikes, some spikes appear to be racemose due to the elongated slender ovary. Flowers often showy, colors include green or white or yellow or orange in our species. The lips have a spur at the base and may be entire, fringed, lobed or parted. Occasionally the previous year's inflorescence and fruit capsules will be present at the next year's flowering.

Key to species:

1. Lip fringed or lacerate 2
   2. Lip not in 3 divisions; flowers golden-yellow to apricot orange ..... ***P. ciliaris***
   2. Lip in 3 divisions; flowers white to creamy white or light green to greenish white or yellowish green 3
      3. Flowers light green to greenish white or yellowish green ..... ***P. lacera***
      3. Flowers white to creamy white 4
         4. Rostellum lobes spreading, viscidia separated by 6-7.5 mm, angular in lateral view .... ***P. praeclara***
         4. Rostellum lobes parallel, viscidia separated by 1-3.5 mm, rounded in lateral view ..... ***P. leucophaea***
1. Lip not fringed or lacerate 5
   5. Flowers greenish white to white; leaf 1 (rarely 2), cauline; lip 6 mm long, basal lobes absent, apex obscurely 3-lobed ..... ***P. clavellata***
   5. Flowers greenish yellow; leaves 2 to 6, cauline; lip 4 mm long, basal lobes present, apex entire ..... ***P. flava***

Platanthera ciliaris (L.) Lindl., Gen. Sp. Orchid. 292. 1835. The species name is from the Latin *cilium* "eyelashes" in reference to the finely fringed lip. This species was reported by Waterfall (1969) as *Habenaria ciliaris*

Common Names: Golden Plume; Orange Fringed Orchis; Yellow Fringed Orchid.

Flowering Time: August - early September.

Description: Plants 15-37 inches (38-94 (-100) cm) tall, usually with 3-5 glossy green lanceolate leaves. The 30-60 flowers in a racemose appearing spike. Flowers are typically an apricot orange and are very showy; the lip has a copiously fringed margin and a long slender spur. The capsules are ellipsoidal, 1/2-5/8 inches (13-15 mm) long and 2/16-3/16 inches (3-4 mm) in diameter, and are semi-erect at maturity. This is one of the showiest native orchids. It may occur as a few isolated plants or in colonies of up to 2000 plants.

Habitat: This species grows in shaded sphagnum bogs or "hanging" sphagnum bogs in mixed deciduous and pine woodlands. It sometimes occurs in full sunlight, but usually in more shaded habitats.

Distribution: southeastern Oklahoma (Map 17).

Platanthera clavellata (Michx.) Luer, Nat. Orchids Fla., 148. 1972. The species name is from the Latin *clavellatus* "club shaped" in reference to the small club-shaped spur. It was reported by Waterfall (1969) as *Habenaria clavellata*.

Common Names: Little Club-spur Orchis; Small Green Wood Orchid.

Flowering Time: late May - early July.

Description: Plants 8-17 inches (20-43 cm) tall, usually with one large oblanceolate leaf and one or two small bracts. The 3-17 flowers are produced in a relatively dense spike. Flowers are typically white or greenish white or light yellow green. The lip is oblong and obscurely lobed at the apex, the spur is about twice the length of the lip and club-shaped. The capsules are ellipsoidal, 5/16-6/16 inches (7-10 mm) long, not counting the persistent perianth, and 1/8-1/4 inches (3-5 mm) in diameter and are semi-erect to horizontal at maturity. This is one of the less showy orchids in the state. It usually occurs as scattered plants but may form sizeable colonies. It is strictly a "shade" plant. This particular orchid seems to have an extremely high capsule set, frequently with 80-90% of the flowers producing a capsule.

Habitat: This species grows in shaded sphagnum bogs or "hanging" sphagnum bogs in mixed deciduous and pine woodlands.

Distribution: southeastern Oklahoma (Map 18).

Platanthera flava (L.) Lindl., Gen. Sp. Orchid. 293. 1835. var. *flava*. The species name is from the Latin *flavus* "yellow" in reference to yellowish-green flowers. Reported by Waterfall (1969) as *Habenaria flava*.

Common Names: Southern Tubercled Orchis.

Flowering Time: mid May – August.

Description: Plants 8-22 inches (20-56 cm) tall, usually with one or two large lanceolate leaves and one or two small bracts. The 5-44 flowers are produced in a relatively dense spike. The flowers are typically green with a greenish-yellow lip. The lip is ovate with two side lobes near the base, the mid-lobe is strongly recurved, the spur is about twice the length of the lip and club-shaped. The capsules are ellipsoidal, 4/16-7/16 inches (5-9 mm)

long, not counting the persistent perianth, and 1/16-1/4 inches (2-4 mm) in diameter and are semi-erect to nearly erect at maturity. This is one of the least attractive orchids in the state, but the flower is none-the-less interesting and is apparently pollinated by mosquitoes. It usually occurs as scattered plants but may form sizeable colonies. It is strictly a "shade" plant. This particular orchid seems to have a relatively high capsule set, frequently with 30-70% of the flowers producing a capsule. In shallow spring fed springs, such as occur at the Battiest site in McCurtain County, extensive colonies sometimes form as a result of vegetative propagation by underground rhizomes that will periodically produce new plants every 2-6 inches (5-15 cm) apart. At this location in 1982 over a thousand plants were observed. Also at this location this orchid shares its habitat with quillworts, *Isoetes melanospora*, which are also rather uncommon plants. Variety *flava* has the lower floral bracts equal to or shorter than the flowers and a suborbicular lip, which differs from variety *herbiola* which has the lower floral bracts longer than the flowers and the lip longer than wide.

Habitat: This species grows in shaded sphagnum bogs or "hanging" sphagnum bogs in mixed deciduous and pine woodlands or in shallow spring fed streams.

Distribution: southeastern Oklahoma (Map 19).

Platanthera lacera (Michx.) G. Don. in Sweet, Hort. Brit. ed 3, 650. 1839. The species name is from Latin *lacer* "torn" or *lacerere* "to tear" in reference to the deeply fringed lip. It was reported by Waterfall (1969) as *Habenaria lacera.*

Common Names: Green Fringed Orchis.

Flowering Time: mid May - mid June.

Description: Plants 12-34 inches (30-86 cm) tall, usually with two large lanceolate leaves and one or two smaller bracts. The 9-33 pale green to greenish-white flowers are produced in a lax to dense racemose appearing spike. The lip is deeply three parted with each of these divisions parted one to 3 times to create a lacerate appearance, the spur is slightly longer than the length of the lip and either slender to club-shaped. The capsules are ellipsoidal, 1/2-3/4 inches (12-20 mm) long, not counting the persistent style, and 2/16-3/16 inches (2-5 mm) in diameter, and are erect at maturity.

Habitat: This species has the most diverse set of habitats of any orchid in the state. It occurs in open sunlit sphagnum bogs, moist "pimple mound" prairies, occasionally in relatively dry prairies, in deep mixed deciduous and pine woodlands either in "hanging" sphagnum bogs or growing through the decaying leaf litter.

Distribution: eastern Oklahoma (Map 20).

Platanthera leucophaea (Nutt.) Lindl., Gen. Sp. Orchid. 294. 1835. The species name is from the Greek *leucon* "white" and *phaios* "gray or dusky" implying an off-white colour, usually a creamy or greenish white. This species was reported as *Habenaria leucophaea* by Waterfall (1969). It is known in Oklahoma only from the type specimen.

Common Names: Eastern Prairie Fringed Orchis.

Flowering Time: June.

Description: Plants up to nearly 3 feet (ca 91 cm) tall with 2-5 elliptic to lanceolate leaves. The 15-25 flowers are produced in a lax racemose appearing spike. The lip is deeply three parted and each of these parts is deeply fringed, the spur is about twice as long as the lip and is slender and club-shaped. The capsules are ellipsoidal and about 7 inches (18 mm) long and 3 1/2 inches (9 mm) in diameter, and semi-erect at maturity. According to Nuttall (1837) the type location seems to be in Choctaw County along the Red River at the junction of the Kiamichi River. Marlin Bowles and I looked for the original location that was supposed to be a place called the "Running Horse Prairie" and never could satisfactorily find this location.

Habitat: This plant appears to prefer moist to wet limestone based prairies or marshy areas.

Distribution: southeastern Oklahoma (Map 21).

Platanthera praeclara Sheviak & Bowles, Rhodora 88:278. 1986. The species name is from the Latin *prae* "before" or "in front" and *clarus* "clear, brilliant, shining" in reference to the series of translations: very bright, beautiful, splendid, glorious, distinguished, noble. Originally reported as *Habenaria leucophaea* by Magrath & Taylor (1978).

Common Names: Western Prairie Fringed Orchis.

Flowering Time: June.

Description: Plants 11-20 inches (28-51 cm) tall, usually with three to five large lanceolate leaves and several smaller bracts. The 6-10 flowers are produced in a relatively open racemose appearing spike. The flowers are creamy white. The lip is deeply three parted and each of the parts deeply lobed and fringed, the spur is about two to three times the length of the lip and slender club-shaped and curved. The capsules are ellipsoidal, 3/4- 1 inch (20-25 mm) long, not counting the persistent perianth, and 3/16-1/4 inches (5-8 mm) in

diameter and are semi-erect to erect at maturity. The flowers of this species are about 25-30% larger than those of *P. leucophaea* (Sheviak & Bowles 1986). This species was collected in two different prairies in northeastern Oklahoma by Magrath in 1975. Since that time one of the prairies has come under Nature Conservancy protection, and the other has been essentially destroyed by changes in land use.

Habitat: Rich loamy relatively moist prairies.

Distribution: northeastern Oklahoma (Map 22).

Pogonia Jussieu, Gen. Pl. 65. 1789. The genus name is from the Greek *pogon* "beard" in reference to the bearded crest of the lip. There are apparently 5 species in this genus *P. japonica* Reichenb. f. and *P. minor* (Makino) Makino in Japan and *P. japonica* Reichb. f. and *P. yunnanensis* Finet in China and *P. ophioglossoides* in North America.

Pogonia ophioglossoides (L.) Ker-Gawl., Bot. Reg. 2: t. 148. 1816. The species name is from the Greek *ophis* "snake" and *glossa* "tongue" and *eidos* "like" or "resembling" in reference to the plant's resemblance to the adder's-tongue fern (*Ophioglossum)* and its solitary leaf.

Common Names: Rose Pogonia.

Flowering Time: mid May - mid June.

Description: Plants terrestrial, arising from a minute rhizome with a few long slender fibrous roots. The stem is glabrous with a single lanceolate to elliptic to ovate leaf. The stem and inflorescence is 9-19 inches (23-48 cm) tall. The pedicellate flowers are usually solitary, occasionally a second flower occurs in an open terminal raceme. The flowers are pink to rose (rarely white). The lip is spathulate, pink to nearly red, the disc with three rows of tightly packed greenish-yellow hairs becoming three deeply reddish crests towards the apex. The capsules are ellipsoidal, 3/4-1 inches (20-25 mm) long and 1/8-1/4 inches (4-7 mm) in diameter, and are born in an erect position. This species was originally collected at the Hugo/Speer Bog and the Harrison/Doshier Bog in 1977 by John and Connie Taylor. This species can form quite extensive colonies by producing slender stoloniferous rhizomes which will produce new plants at about 4 inch (10 cm) intervals.

Habitat: Found only in three different (Bennington Bog, Harrison/Doshier Bog, and Speer/Hugo/Railroad Bog)sphagnum bogs, growing in sphagnum moss.

Distribution: southeastern Oklahoma. It is presently known from Bryan, Choctaw and Pushmataha Counties. (Map 23).

Spiranthes L. C. Richard, Mem. Mus. Paris 4:50. 1818. Nom. Cons. The genus name is from the Greek *speira* "coil" or "spiral" and *anthos* "flower" in reference to the coiled or twisted spike of flowers. The genus as presently recognized by Sheviak & Brown (2001) consists of 45 species, 23 in North America with 8 in Oklahoma, occurring in North America, South America, Eurasia and Australia.

Description of genus: Plants terrestrial, glabrous to pubescent and often glandular, with fleshy, fasciculate, slender to tuberoidal roots, stems with foliaceous sheaths. The inflorescences are terminal spikes, with the flowers laxly to densely crowded, secund (on one side) or in a spiral. The sessile flowers are relatively small, but usually showy and in one or two species quite pleasantly fragrant. Capsules ellipsoidal and semi-erect to erect at maturity, the perianth parts usually persisting on the mature capsule.

Key to species:

1. Lip with green markings 2
   2. Lip with central green spot; flowering September-October ..... ***S. lacera var. gracilis***
   2. Lip with green veins; flowering late April-May ..... ***S. praecox***
1. Lip without green markings
   3. Flowers pure white; glabrous; sepals 2.5-3 mm long ..... ***S. tuberosa***
   3. Flowers creamy white, or if white with cream to creamy yellow area on lip; pubescent with pointed, knobby or capitate hairs; sepals 3.5-12 (-14) mm long 4
      4. Hairs pointed; flowering late May to early July ..... ***S. vernalis***
      4. Hairs capitate, knobby or slightly clavate; flowering late August to early November ... 5
         5. Sepals 3.5-4.5 (-5) mm long ..... ***S. ovalis var. erostellata***
         5. Sepals 6.5-14 mm long 6

6. Basal leaves present, cauline leaves present or reduced to sheathing bracts at flowering 7
   7. Lip ovate oblong, slightly constricted near middle, dilated at apex ..... ***S. cernua***
   7. Lip broadly rhombic-ovate, basal half dilated, tapering to obtuse or subacute apex ..... ***S. odorata***
6. Basal leaves absent, cauline leaves reduced to sheathing bracts at flowering 8
   8. Lip ovate-oblong, slightly constricted near middle, dilated at apex; lateral sepals appressed, not arching over the dorsal sepal and petals; basal callosities longer than wide ..... ***S. cernua***
   8. Lip oblong-ovate, without a slight constriction near middle, apex subacute; lateral sepals free, spreading with incurved tips, often arching over the dorsal sepal and petals (not always obvious in pressed specimens); basal callosities short, conical, as wide as high ..... ***S. magnicamporum***

Spiranthes cernua (L.) L. C. Richard, Orch. Eur. Annot., 37. 1817. The species name is from the Latin *cernuus* "faced to the ground" or "inclined forward" in reference to the nodding position of the flowers.

Common Names: Nodding Ladies'-tresses

Flowering Time: late September-mid November

Description: Plants are 4-21 inches (10-53 cm) tall, the prairie form usually lacking basal leaves at flowering, the woodland/bog form usually has 2-4 linear-lanceolate to obovate leaves at flowering. The 5-50(-60) flowers, white to creamy white, are produced in very tight spirals (prairie form) to loose spirals (woodland/bog form). The lip usually cream to creamy-yellow centrally. The rachis is moderately to densely pubescent with some hairs capitate. The capsules are ellipsoidal, 3/16-6/16 inches (5-9 mm) long, not counting the persistent perianths, and 1/8-1/4 inches (2-6 mm) in diameter and semi-erect to erect at maturity. The prairie form vegetatively reproduces by means of basal off-shoots near the stem, while the woodland/bog form often produces long stoloniferous rhizomes up to at least 6 inches (16 cm) long that produce new plants at their tips, as well as basal off-shoots. This is one of the most wide spread orchid species in Oklahoma and has both a woodland/bog form with long oblanceolate leaves at flowering and a more compact prairie form which may or may not have leaves present at flowering. The prairie form is very similar to *S. magnicamporum* and is often confused with it.

Habitat: This species occurs in native prairies and pastures throughout most of the state. It also occurs in sphagnum bogs, marshy areas and densely wooded areas in the southeast part of the state.

Distribution: eastern half of Oklahoma with a few scattered records in western and northwestern part of the state (Map 24).

Spiranthes lacera (Rafinesque) Rafinesque, Herb. Raf., 44. 1833. The species name is from the Latin *lacer* "torn" or *lacere* "to tear" in reference the fringed lip. It was reported by Waterfall (1969) as *Spiranthes gracilis*. This is one of our most common native orchids and can occur in populations of several thousand plants.

Common Names: Northern Slender Ladies-tresses (var. *lacera*); Southern Slender Ladies-tresses (var. *gracilis*).

Flowering Time: September – October.

Description: Plants 5-23 inches (12-58 cm) tall, basal rosette of leaves withered or absent at flowering, sheathing leaves present on stem, stem glabrous, rachis glabrous to sparsely pubescent with capitate to clavate hairs. The 14-60 white flowers are produced on secund to laxly spiraled to densely tightly spiraled spikes. The lip is white with a central green spot. The capsules are ellipsoidal to sub-globose, 1/8-1/4 inches (3-5 mm) long, not counting the persistent perianth, and 2/16-3/16 inches (3-4 mm) in diameter and sub-erect at maturity. There are two varieties that have been segregated out in this species, var. *lacera* and var. *gracilis*.

Key to the varieties:

1. Flowers laxly arranged on spike, lower flowers distantly spaced; inflorescence capitate-pubescent; leaves usually persisting through anthesis ..... ***Spiranthes lacera*** var. ***lacera***
1. Flowers densely arranged on spike, lower flowers closely spaced; entire plant essentially glabrous, leaves usually absent at anthesis ..... ***Spiranthes lacera*** var. ***gracilis***

Variety ***lacera*** is called the Northern Slender Ladies'-tresses, and var. *gracilis* (Bigel.) Luer, Nat. Orchid. US & Can., 112. 1975 is called the Southern Slender Ladies'-tresses. The variety name is from the Latin *gracilis* "thin" or "slender" in reference to slender stem.

Habitat: Open prairies and mixed deciduous woods in either loamy or sandy soil.

Distribution: eastern two-thirds of Oklahoma (Map 25).

Spiranthes magnicamporum Sheviak, Bot. Mus. Leafl. Harvard, 23:287. 1973. The species name is from the Latin *magnus* "large" and *campus* "plain" thus "great plain" and *magnicamporum* "of the Great Plains," in reference the prairies of the Mid-west and Central Plains region where this species occurs.

Common Names: Great Plains Ladies'-tresses.

Flowering Time: mid September – October.

Description: Plants 6-15 1/5 inches (15-40 cm) tall, leaves normally absent at flowering. The 13-50 white to ivory to creamy-white flowers in dense spikes in 3-4 ranks (3-4 flowers per cycle of spiral). The rachis is moderately pubescent with some capitate hairs. The lip is centrally yellow to creamy yellow. In fresh material the lateral sepals are wide spreading and ascend above the rest of the flower, while in *S. cernua* they usually are not spreading and are parallel to the other flower parts. The capsules are ellipsoidal, 1/4-3/8 inches (5-9 mm) long, not counting the persistent perianth, and 1/8-1/4 inches (3-5 mm) in diameter, sub-erect at maturity. This species can be scattered to locally abundant, and occasionally occurs in mixed populations with *S. cernua* (prairie form).

Habitat: Occurs in dry to wet prairies with loamy or sandy soil.

Distribution: central and south central Oklahoma (Map 26).

Spiranthes odorata (Nutt.) Lindl., Gen. Sp. Orchid. 467. 1840. The species name is from the Latin *odoratus* "with an odor," in reference to the strong pleasant fragrance of this flower.

Common Names: Fragrant Ladies'-tresses.

Flowering Time: October.

Description: Plants 12-27 inches (30-69 cm) tall, the lanceolate leaves present at flowering, up to 14 inches (35.5 cm) long. The 21-62 white to creamy-white flowers in a dense spike in 3-4 ranks (3-4 flowers per cycle of spiral). The rachis is moderately pubescent with some capitate hairs. The lip is centrally yellow to creamy yellow. The flowers are highly fragrant with a fragrance that has been compared to vanilla, cumarin or jasmine. The capsules are ellipsoidal, 1/4-3/8 inches (6-10 mm) long, not counting the persistent perianth, and 3/16-1/4 inches (4-6 mm) in diameter and sub-erect at maturity. This species is extremely rare and is known only from the Speer Bog.

Habitat: sphagnum bog over sand near Speer.

Distribution: southeastern Oklahoma (Map 27).

Spiranthes ovalis Lindley, Gen. Sp. Orchid. 466. 1840. The species name is from the Latin *ovalis* "shaped like an egg," in reference to the inflorescence, which tends to taper at both ends.

Common Names: Oval Ladies'-tresses.

Flowering Time: mid September – October.

Description: Plants 4 1/2-10 inches (11-25.4 cm) tall, 1-3 oblanceolate leaves present at flowering, stem glabrate to pubescent, rachis pubescent with some hairs clavate to capitate. The 7-23 white tubular flowers tightly spiraled (usually 3 flowers per cycle of spiral) in the spike. The capsules are ellipsoidal, 3/16-5/16 inches (4-7 mm) long, not counting the persistent perianth, and 2/16-3/16 inches (3-4 mm) in diameter, and sub-erect at maturity. This species appears to be relatively rare, but this may be due to the fact that this small plant can be easily overlooked. There are two varieties recognized for this species, var. *ovalis* and var. *erostellata*. Most of the Oklahoma material seems to best fit in var. *erostellata*, however at least one specimen may be better treated as var. *ovalis*.

Key to the varieties:

1. Flowers fully open, sepals and petals not connivent; rostellum and viscidium present; ovaries swell progressively ..... ***Spiranthes ovalis*** var. ***ovalis***
1. Flowers never fully open, sepals and petals connivent; rostellum and viscidium absent; ovaries swell simultaneously.....***Spiranthes ovalis*** var. ***erostellata***

Variety ***erostellata*** P. M. Catling, Brittonia 35:120-125. 1983; derives its name from the Latin *ex* "out" or "beyond" and *rostellum* "beaked, hooked" hence "lacking a beak" in reference to the absent rostellum.

Habitat: Occurs in mixed deciduous and pine woods in loam, sandy or gravelly soil.

Distribution: southeastern Oklahoma (Map 28).

Spiranthes praecox (Walter) S. Watson in A. Gray, Man. Bot. North. U.S. ed. 6, 503. 1890. The species name is from the Latin *praecox* "precocious" in reference to its flowering early in the season.

Common Names: Giant Ladies'-tresses.

Flowering Time: mid April – May.

Description: Plants 14-21 inches (36-91 cm) tall, the linear lanceolate leaves mostly reduced to sheathing bracts. The 17-41 white to creamy white flowers occur in nearly secund to laxly to tightly spiraled spikes with 4-7 flowers per cycle of spiral. The rachis is sparsely pubescent with some capitate hairs. The lip is white with several green veins. The central part of the lip is white to creamy yellow. The capsules are ellipsoidal, 5/16-6/16 inches (7-8 mm) long (not including the persistent perianth) and 3/16-4/16 inches (5-6 mm) in diameter, sub-erect at maturity. This species has been collected only at the McKinney Creek site near Tom in McCurtain County by Magrath and at the Schooler Bog in Choctaw County by Sidney Carpenter. It should probably be considered as rare at this point in time.

Habitat: Growing at edge of mixed deciduous and pinewoods in sandy soil and also near edges of sphagnum bogs in sunlit areas.

Distribution: southeastern Oklahoma (Map 29).

Spiranthes tuberosa Rafinesque, Herb. Raf. 45. 1833. The species name is from the Latin *tuberosus* "with or swollen into tubers" (actually tuberoids) in reference to the solitary swollen fusiform tuberoidal root. It was reported by Waterfall (1969) as *Spiranthes grayi*.

Common Names: Little Ladies'-tresses, Little Pearl-twist.

Flowering Time: mid August – October.

Description: Plants 5-17 inches (12.7-43 cm) tall, glabrous, arising from a single fusiform tuberoid, occasionally the previous years tuberoid will persist, the basal leaves absent at flowering. The 5-35 minute pure white flowers in secund to laxly to rarely tightly spiraled spikes with 4-7 flowers per cycle of spiral. The capsules are ellipsoidal, 1/8-1/4 inches (3-5 mm) long, not counting the persistent perianth and 1/16-1/8 inches (2-3 mm) in diameter, sub-erect at maturity. This is a truly beautiful flower; under 5-10X magnification it appears crystalline. It is frequently rather scattered in local distribution, but occasionally substantial populations occur.

Habitat: In Oklahoma it typically occurs in mixed deciduous and pine woods in sandy or loam soils, occasionally it occurs in meadows in full sunlight.

Distribution: eastern half of Oklahoma (Map 30).

Spiranthes vernalis Engelmann & Gray, Bost. J. Nat. His. 5:236. 1845. The species name is from the Latin *vernalis* "of or belonging to spring" in reference to the early time of the year when it flowers.

Common Names: Grass-leaved Ladies'-tresses, Spring Flowering Ladies'-tresses.

Flowering Time: June - late July.

Description: Plants 14-37 inches (35.5-94 cm) tall, pubescent with articulate pointed hairs and no capitate hairs, arising from numerous stout roots, 2-5 leaves and 5-7 sheathing bracts present at flowering. The 7-50 creamy white flowers in secund to laxly to tightly spiraled spikes with 3-7 flowers per cycle of spiral. The capsules are ellipsoidal, 1/4-3/8 inches (6-8 mm) long, not counting the persistent perianth, and 1/8-1/4 inches (3-5 mm) in diameter, sub-erect at maturity. This species often occurs in populations in the thousands in one year and the next have only a very few scattered blooming plants, this is in part due to weather conditions. It also means that population samples taken in any one season may not really be representative of the actual frequency of occurrence in a given location.

Habitat: Native prairies, roadside ditches, disturbed areas in sandy to clay loam. In the Kiamichi Mountains they are often abundant in the roadside ditches growing in gravelly soil.

Distribution: eastern two-thirds of Oklahoma (Map 31).

Tipularia **Nuttall**, Gen. N. Am. Pl. 2:195. 1818. The genus name is from *Tipula* the genus of insects to which the crane flies belong in reference to the resemblance of the flowers to crippled crane flies in flight. *Tipula* from the Latin *tippula* "water-spider." There are three species in the genus, *T. josephi* in the Himalaya Mountains, *T. japonica* in Japan and *T. discolor* in the eastern United States.

Tipularia discolor (Pursh) Nuttall, Gen. N. Am. Pl. 2:195. 1818. The species name from the Latin *discolor* "of different colors" or "faded" in reference to the dull colors of the flowers.

Common Names: Crane-fly Orchid.

Flowering Time: August - early September.

Description: This terrestrial orchid is one of two in Oklahoma that produces an evergreen over-wintering leaf in late fall which persists until spring when it withers. Flowering is in late summer. Plants scapose, glabrous, 9-25 inches (23-64 cm) tall, the solitary leaf is long-petiolate and ovate, dark green above and purple underneath. The leaf and flower stock arise from an oval corm 5/8-1 3/16 inches (15-30 mm) long and 3/8-3/4 inches (10-20 mm) wide, the corms develop at the ends of slender rhizomes and it is not uncommon to find 3-7 or 8 corms attached together. The 17-41 greenish to greenish-yellow to greenish-maroon flowers born in an open raceme. The spur is 3-4 times the length of the lip. As the flower first opens it is essentially bilaterally symmetrical, however as the flower matures it twists so that it becomes bilaterally asymmetrical. The capsules are ellipsoidal, 5/16-1/2 inches (8-13 mm) long (not counting the persistent perianth) and 3/16-1/4 inches (4-5 mm) in diameter, pendant on slender pedicels. Capsule set in this species is fairly high with some plants having over 90% of the flowers being pollinated by noctuid moths. Frequently the previous year's inflorescence and fruit capsules will be present at the next year's flowering. This plant was first collected in Oklahoma by Steve Stephens from the University of Kansas in August 1968. He found one plant 2 miles south of Honobia. A revisit of this site by Magrath and Albert Lavallee revealed a population of several hundred plants.

Habitat: Occurs in mixed deciduous and pine woodlands, growing in the layer of decaying leaf litter.

Distribution: southeastern Oklahoma (Map 32).

Triphora Nuttall, Gen. N. Amer. Pl. 2:192. 1818. The genus name from the Greek *tri* "three" and *phoros* "bearing," in reference to the small number of flowers, often three or perhaps to the three crests on a three-lobed lip. There are about 25 species in North America, West Indies, Central and South America. Medley (2001) recognized 5 species in North America, with 1 in Oklahoma.

Triphora trianthophora (Swartz) Rydberg in Britton, Man. Fl. N. States, 298. 1901.

Common Names: Three Birds' Orchid, Nodding Pogonia.

Flowering Time: mid August -mid October.

Description: Plants 1 1/2 - 10 inches (4-25 cm) tall, stems glabrous, fleshy and green to purple, with 2-6 ovate green leaves. Plants arising from fleshy roots which produce spheroidal to ovoid to cylindrical tuberoids. The 1-6 white fading to pale pink flowers in an open raceme. Flowering tends to be synchronous and ephemeral, with individual flowers usually lasting only one day, very rarely 2-3 days. The lip is obovate and white with 3 bright green papillose crests. The pollinia are magenta. The capsules are ellipsoidal, 3/8-5/8 inches (9-15 mm) long and 1/8-5/16 inches (4-7 mm) in diameter. The capsules are held erect when they first begin to develop but normally become pendant as the capsule matures and opens. Plants may occur as scattered individuals or form crowded colonies well over 4 feet (1.2 meters) in diameter, such as the one at the Battiest site.

Habitat: Occurs in mixed deciduous and pine woodlands and shaded sphagnum bogs, usually growing in the layer of decaying leaf litter, sometimes penetrating into the soil underneath.

Distribution: central and southeastern Oklahoma. There is a population in the Caddo Canyons (Widowmaker Canyon) in Canadian County. The late Dr. George Goodman told me that he had seen it in one of the moist canyons near Turner Falls in the Arbuckle Mountains in Murray County (Map 33).

Number of Orchid Taxa Recognized for Oklahoma:

Year	Genera	Species	Varieties	Forms	Total Taxa
1972	11	20	0	0	20
2001	18	33	2	1	36
New taxa since 1972	7 (38%)	15 (43%)			
Possibly extinct in Oklahoma	4 (22%)	6 (18.2%)			

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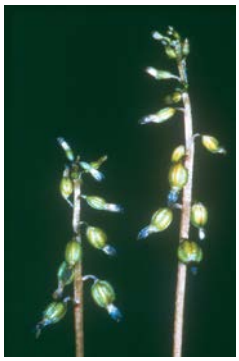
1. *Aplecturm hyemale* (over wintering leaves)
Photographer: Carlyle Luer

2. *Aplecturm hyemale*
Photographer: Carlyle Luer

3. *Calopogon oklahomensis*
Photographer: Charles S . Lewallen

4. *Calopogon tuberosa*
Photographer: Carlyle Luer



5. *Corallorhiza odontorhiza*
Photographer: Carlyle Luer

6. *Cypropedium kentuckiense*
Photographer: Larry Magrath

7. *Cypropedium kentuckiense*
Photographer: Charles S . Lewallen

8. *Cypripedium parviflorum*
Photographer: Jim Norman

9. *Cypripedium parviflorum*
Photographer: Jim Norman

10. *Cypripedium parviflorum f. albolabium*
Photographer: Jim Norman

11. *Cypripedium parviflorum f. albolabium*
Photographer: Jim Norman

12. *Cypripedium parviflorum f. albolabium*
Photographer: Larry Magrath

13. ***Epipactis gigantea***
Photographer: Carlyle Luer

14. ***Galearis spectabilis***
Photographer: Larry Magrath

15. ***Goodyera pubescens***
Photographer: Charles M. Mather

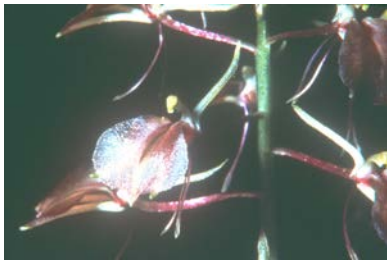
16. ***Habenaria repens***
Photographer: Charles M. Mather

17. ***Hexalectris spicata***
Photographer: Larry Magrath

18. ***Isotria verticillata*** **(early fruit)**
Photographer: Larry Magrath

19. ***Isotria verticillata***
Photographer: Carlyle Luer

20. ***Liparis lillifolia***
Photographer: Carlyle Luer



21. ***Liparis lillifolia***
Photographer: Carlyle Luer

22. ***Malaxis unifolia***
Photographer: Larry Magrath

23. ***Platanthera ciliaris***
Photographer: Larry Magrath

24. ***Platanthera ciliaris***
Photographer: Larry Magrath

25. *Platanthera clavellata*
Photographer: Larry Magrath

26. *Platanthera flava v. flava*
Photographer: Larry Magrath

27. *Platanthera flava v. flava*
Photographer: Charles M. Mather

28. Platanthera lacera
Photographer: Larry Magrath

29. *Platanthera leucophae*
Photographer: Carlyle Luer

30. Platanthera praeclara
Photographer: Carlyle Luer

31. Pogonia ophioglossoides
Photographer: Charles S . Lewallen

32. *Spiranthes lacera*
Photographer: Charles S . Lewallen

33. *Spiranthes cemua*
Photographer: Charles M. Mather

34. Spiranthes magnicamporum
Photographer:Carlyle Luer

35. *Spiranthes cemua*
Photographer: Charles M. Mather

36. Spiranthes magnicamporum
Photographer: Albert Lavallee

37. ***Spiranthes odorata***
Photographer: Carlyle Luer

38. Spiranthes ovalis v. erostellata
Photographer:Larry Magrath

39. ***Spiranthes praecox***
Photographer: Carlyle Luer

40. Spiranthes tuberosa
Photographer: Larry Magrath

41. ***Spiranthes vernalis***
Photographer: Carlyle Luer

42. ***Tipularia disclor*** **(in fruit)**
Photographer: Larry Magrath

43. ***Triphoria trianthrophoria***
Photographer: Charles S . Lewallen

Map 1. ***Aplectrum hyemale***

Map 2. ***Calopogon oklahomensis***

Map 3. ***Calopogon tuberosus v. tuberosus***

Map 4. ***Corallorhiza odontorhiza***

Map 5. ***Corallorhiza wisteriana***

Map 6. ***Cypripedium kentuckiense***

Map 7. ***Cypripedium parviflorum v. parviflorum***

Map 7a. ***Cypripedium parviflorum v. parviflorum v. f.albolabium***

Map 8. ***Epipcatis gigantea***

Map 9. ***Galearis spectabilis***

Map 10. ***Goodyera pubescens***

Map 11. ***Habenaria repens***

Map 12. ***Hexalectris spicata v. spicata***

Map 13. ***Isotria verticillata***

Map 14. ***Liparis liliifolia***

Map 15. ***Listera australis***

Map 16. ***Malaxis unifolia***

Map 17. ***Platanthera ciliaris***

Map *18. Platanthera clavellata*

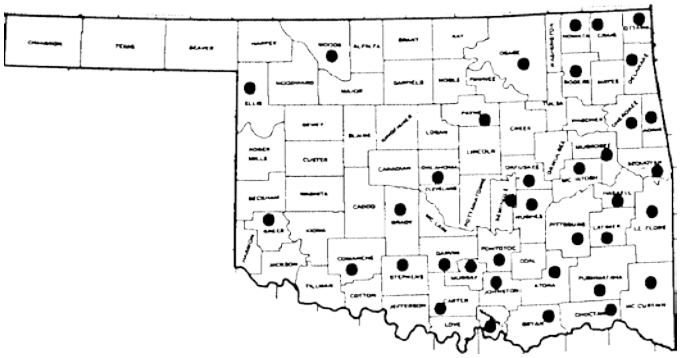
Map 19. *Plathanthera flava v. flava*

Map 20. *Plathanthera lacera*

Map 21. *Plathanthera leucophaea*

Map 22. *Plathanthera praeclara*

Map 23. *Pogonia ophioglossoides*



Map 24. *Spiranthes cernua*

Map 25. *Spiranthes lacera v. gracilis* & *v. lacera*

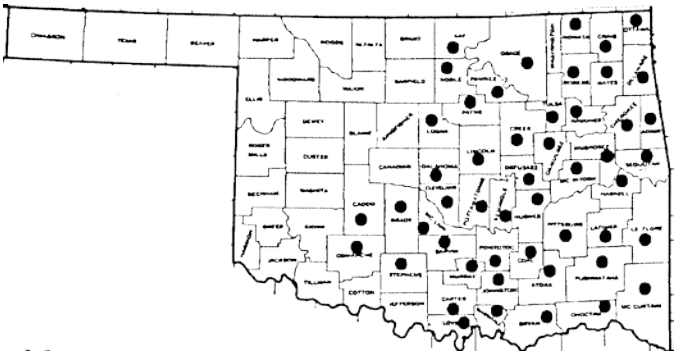
Map 26. *Spiranthes magnicamporum*

Map 27. *Spiranthes odorata*

Map 28. *Spiranthes ovalis v erostellata*

Map 29. *Spiranthes praecox*

Map 30. *Spiranthes tuberosa*



Map 31. *Spiranthes vernalis*

Map 32. *Tipularia discolor*

Map 33. *Triphora trianthophora*

Galium parisiense var. *leiocarpum* Tausch, New for Oklahoma

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While doing some routine plant collecting in Chickasha in June of 1999 I found a *Galium* with which I was not familiar. However, when I tried to key it out in Smith (1994) it immediately keyed to *Galium parisiense* L. var. *leiocarpum* Tausch. It also keyed out in Fernald (1950), Britton (1907), and Munz and Keck (1963) and Hickman (1993). This species is originally from Europe.

OKLAHOMA: GRADY COUNTY: Chickasha, Walmart Plaza on Ponderosa Drive; T6N, R7W, SW 1/4 Sec 3; open disturbed grassy area on west side of street, red clay and some sand; elevation ca 1100 ft; scattered to locally abundant in ca 5 acre area; flowers greenish-white, some with red-brown corolla lobes; 9 June 1999; L.K. Magrath 20590 (OCLA). Additional collections at same site: 25 June 1999; L.K. Magrath, Pete Taylor, et al 20693 (OCLA). 27 May 2001; L.K. Magrath 21449 (OCLA). 24 June 2001; L.K. Magrath 21452 (OCLA). Plants dead but with some seeds persisting.

OKLAHOMA: OKLAHOMA COUNTY: Oklahoma City, Will Rogers Park and Garden Center at NW 36th Street and I-240; grassy area near edge of wooded area southeast of Rose Garden; scattered; most plants already dead, but with some seeds persisting; 16 June 2001; L.K. Magrath 21451 (OCLA)

Also found at the same site: *Galium pedemontanum* (Bell.) All. OKLAHOMA: GRADY COUNTY: Chickasha, Walmart Plaza on Ponderosa Drive; T6N, R7W, SW 1/4 Sec 3; open disturbed grassy area on west side of street, red clay and some sand; elevation ca 1100 ft; scattered to locally abundant in ca 5 acre area; flowers yellow to greenish-yellow; 25 April 2001; L.K. Magrath, Stephen Garvin, Val Maseykin et al. 21344 (OCLA); another collection at same site: 27 May 2001; L. K. Magrath 21448 (OCLA).

Significance: *Galium parisiense* L. var. *leiocarpum* Tausch represents an extension west from north central Arkansas (Baxter, Fulton, Newton & Pope Counties). This is a rather significant jump to the west from Ozarkian woodlands habit to a relatively open mid-grass prairie habitat. The *Galium pedemontanum* (Bell.) All. is an extension northward and westward from southern and eastern Oklahoma (Taylor & Taylor 1994). I would guess that both species arrived in Chickasha via freight being delivered to the WalMart Shopping Center. The Oklahoma City location is near an area with numerous visitors, and next to an interstate highway, so there are several possibilities that might account for its presence at this location. It may be worth checking similar locations in other cities in Oklahoma for these species and other possible introductions.

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https://doi.org/10.22488/okstate.17.1000066

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CHECKLIST OF THE FERNS, NATURAL FALLS STATE PARK

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Natural Falls State Park, formerly known as Dripping Springs is located in northeast Oklahoma. The park's natural beauty and flora have attracted visitors since 1907. In a 1988 visit to the Oklahoma State University Herbarium, I noticed that several herbarium sheets of ferns were collected from Dripping Springs. This was intriguing and made me want to visit the area. Due to my interest in floristics and taxonomy, Natural Falls State Park seemed the perfect place to create a checklist of ferns. Thus, the objective of this study was to create an inventory of the ferns of Dripping Springs using my collection and the collections and observations from earlier botanists. A systematic collection of the ferns of Dripping Springs was conducted on August 7, 1998, October 15, 1998, and October 20, 2001. Using standard taxonomic methods, each plant was identified to species and subsequently inventoried. In three days of collecting, 17 species from 6 families and 12 genera were encountered. Since 1925 a total of 19 species from 6 families and 12 genera have been reported to occur.

INTRODUCTION

Natural Falls State Park, formerly known as Dripping Springs is located in northeast Oklahoma. The Park's natural beauty and flora have attracted visitors since 1907. Botanists such as Harriet Barclay, Charles Wallis, Edgar Wherry and several others have taken a special interest in the park because of its interesting flora, especially the ferns. In the 1980's the privately owned park was closed due to the poor condition of the buildings on the property (1). In 1990 Dripping Springs was purchased by the Oklahoma Tourism and Recreation Department with plans to make it once again accessible to the public (2).

In a 1988 visit to the Oklahoma State University Herbarium I noticed that several herbarium sheets of ferns were collected from Dripping Springs. This was intriguing and made me want to visit the area. In July 1989, while on vacation in northeast Oklahoma my family and I visited the park only to find that it had closed. In 1998 I learned through a fellow botanist that the area was once again open to the public. Due to my interest in floristics and taxonomy, Natural Falls State Park seemed to be the perfect place to create a checklist of ferns. Thus, the objective of this study was to create an inventory of the ferns of Dripping Springs by using my collection and the collections and observations from earlier botanists.

THE STUDY AREA

Dripping Springs is located west of Siloam Springs in the southeast corner of Delaware County R25E, T20N, Sec. 32 (3). The most eye-catching feature in the park is the 25-meter waterfall (2). The surrounding area above the waterfall and ravine below was the site of this study and past studies by other botanists. As is common in the Ozarks, the surface rock contains chert that gives rise to acid soils. Underlying the spring is a stratum of limestone of both Fernvale and Fite Formations. Thus the soils at the lower levels (ravine) are somewhat alkaline (4). Soils in the sampling areas include Clarkesville very cherty silt loam, Clarkesville stony silt loam, and Staser gravelly loam. Climate of the area is moist and warm temperature (5).

Smith, B.A.
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INVENTORY OF FERNS

A systematic collection of the ferns of Dripping Springs was conducted on August 7, 1998 and October 20, 2001. Collecting focused on the ferns that grew in the ravine floor and rock surfaces. Using standard taxonomic methods, each plant was identified to species and subsequently inventoried. Specimens typically were collected in fertile condition with the exception of Botrychium virginianum. Nomenclature for the taxa follows Flora of North America (6). Vouchers will be deposited in the Oklahoma State University Herbarium (OKLA).

FLORA OF NATURAL FALLS STATE PARK (DRIPPING SPRINGS)

In three days of collecting, 17 species from 6 families and 12 genera were encountered (Table 1). Fern collections and recordings from 1925-1977 are listed in Tables 2 and 3. From 1925-2001 a total of 19 species from 6 families and 12 genera have been reported to occur. Ferns designated as rare by the Oklahoma Natural Heritage Inventory (7) were *Asplenium bradleyi* (S1).

ACKNOWLEDGEMENTS

A special thanks to the staff at Natural Falls State Park and Tom Crider for allowing me to have this opportunity. I hope the checklist will be useful. I also thank Dr. Ron Tyrl for his advice on this study. Finally I want to thank the McLoud High school Botany Class for accompanying me on the October 20, 2001 field trip

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TABLE 1. CHECKLIST OF FERNS, NATURAL FALLS STATE PARK (DRIPPING SPRINGS)
Collected by Bruce Smith August 7, 1998 and October 15, 1998, and October 20, 2001

ASPLENIACEAE

Asplenium bradleyi D.C. Eaton.
Bradley's Spleenwort, August 7, 1998 3590 (OKLA)
Asplenium platyneuron (L.) Britton, Sterns, & Poggenb.
Ebony Spleenwort, 3578 (OKLA)
Asplenium rhizophyllum L.
Walking Fern 3562 (OKLA)
Asplenium trichomanes L.
Maidenhair Spleenwort 3619 (OKLA)

DRYOPTERIDACEAE

Cystopteris bulbifera (L.) Bernh.
Bulblet Bladder Fern 3589 (OKLA)
Cystopteris tennesseensis Shaver
Tenessee Bldder Fern 3573 (OKLA)
Dryopteris marginalis (L.) A. Gray
Marginal Shield Fern 3568 (OKLA)
Onoclea sensibilis L.
Sensitive Fern 3774 (OKLA)
Polystichum acrostichoides (Michx.) Schott.
Christmas Fern 3580 (OKLA)
Woodsia obtusa (Spreng.) Torr.
Blunt Lobed Woodsia 3622 (OKLA)

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Sw.
Rattlesnake Fern 3773 (OKLA)

POLYPODIACEAE

Pleopeltis polypodioides (L.) E.G. Andrews & Windham
Resurrection Fern 3772 (OKLA)

PTERIDACEAE

Adiantum capillus-veneris L.
Southern Maidenhair Fern 3565 (OKLA)
Adiantum pedatum L. Northern Maidenhair Fern3576 (OKLA)
Cheilanthes lanosa (Michx) D.C. Eaton.
Hairy Lip Fern 3584 (OKLA)
Pellaea atropurpurea (L.) Link
Purple Cliff Brake Fern 3582 (OKLA)

THELYPTERIDACEAE

Phegopteris hexagonoptera (Michx.) Fee Broad Beech Fern 3571 (OKLA)

TABLE 2. CHECKLIST OF FERNS NATURAL FALLS STATE PARK (DRIPPING SPRINGS)
Reported by John K. Small and Edgar T. Wherry May 3,1925 (4)

ASPLENIACEAE

Asplenium bradleyi D.C. Eat.
Bradley's Spleenwort
Asplenium platyneuron (L.) Britton, Sterns, & Poggenb.
Ebony Spleenwort
Asplenium resiliens Kunze
Little Ebony Spleenwort
Asplenium rhizophyllum L.
Walking Fern
Asplenium trichomanes L.
Maidenhair Spleenwort

DRYOPTERIDACEAE

Cystopteris bulbifera (L.) Bernh.
Bulblet Bladder Fern
Cystopteris fragilis (L.) Bernh.
Brittle Fern
Dryopteris marginalis (L.) A. Gray
Marginal Shield Fern
Polystichum acrostichoides (Michx.) Schott.
Christmas Fern

PTERIDACEAE

Adiantum capillus-veneris L.
Southern Maidenhair Fern
Cheilanthes lanosa (Michx.) D.C.Eaton
Hairy Lip Fern

TABLE 3. CHECKLIST OF FERNS NATURAL FALLS STATE PARK (DRIPPING SPRINGS) Collected from 1928-1977

ASPLENIACEAE

Asplenium platyneuron (L.) Britton, Sterns & Poggenb. June 30, 1957 Charles Wallis 4454 (OKLA)

Asplenium rhizophyllum L.
May 4, 1928 Robert Stratton 798 (OKLA)
July 17, 1929 Robert Stratton (OKLA)
July 7, 1950 U.T. Waterfall 9571 (OKLA)
June 30, 1957 Charles Wallis 4456 (OKLA)
June 16, 1972 John and Connie Taylor 10792 (OKLA)

Asplenium trichomanes L.
May 7, 1938 Milton Hopkns 3250 (OKLA)
July 7, 1950 U.T. Waterfall 9561 (OKLA)

DRYOPTERIDACEAE

Cystopteris bulbifera (L.) Bernh.
June 30, 1957 Charles Wallis 4449 (OKLA)

Cystopteris tennesseensis Shaver
July 7, 1950 U.T. Waterfall 9569 (OKLA)
June 16, 1972 John and Connie Taylor 10791 (OKLA)

Dryopteris marginalis (L.) A. Gray
May 4, 1928 T.A. Tripp 137 (OKLA)
May 7, 1938 Milton Hopkins 3235 (OKLA)
June 16, 1972 John & Connie Taylor 10794 (OKLA)
September 4, 1977 T.A. Zanoni 3349 (OKLA)

Polystichum acrostichoides (Michx.) Schott
June 30, 1957 Charles Wallis 4451 (OKLA)

Woodsia obtuse (Spreng.) Torr.
July 16, 1929 Robert Stratton 1722 (OKLA)
July 8, 1957 Charles Wallis 4724 (OKLA)

POLYPODIACEAE

Pleopeltis polypodioides (L.) E.G. Andrews & Windham
June 30, 1957 Charles Wallis 4455 (OKLA)

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Sw.
April 28, 1957 Charles Wallis 3660 (OKLA)

PTERIDACEAE

Adiantum capillus-verneris L.
June 2, 1963 Charles Wallis 8760 (OKLA)
July 7, 1950 U.T. Waterfall 9570 (OKLA)
June 16, 1972 John and Connie Taylor 10788 (OKLA)

Adintum pedatum L.
May 4, 1928 Robert Stratton 804 (OKLA)
May 7, 1938 Milton Hopkins 3254 (OKLA)

Cheilanthes lanosa (Michx.) D.C. Eaton
August 11, 1932 Featherly and Still (OKLA)
May 7, 1938 Milton Hopkins 3251 (OKLA)

Pellaea atropurpurea (L.) Link
July 7, 1950 U.T. Waterfall 9560 (OKLA)

THELYPTERIDACEAE

Phegopteris hexagonoptera (Michx.) Fee
July 18, 1929 Robert Stratton (OKLA)

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Critic's Choice Essay

23 May 1991: The Limestone Glade

Jim Norman

Today, we're going to have a look at a rather special place I refer to as "my limestone glade". A glade is defined as a "grassy open area in a woods." Now, add to this a thin cover of poor soil on a solid, limestone base, a scattering of stunted elms, hackberries and scrub oaks and a handful of ticks and chiggers. You have a habitat for a surprising variety of wildflowers.

Just to be on the safe side, I went up there Wednesday to make sure I had a name for all the 35 or so species in bloom. To reach this botanical hot spot, drive 4 miles east of Fort Gibson on U.S. 62 to Four Mile Road. Turn north toward Hulbert and go 9 miles. At an old lane on the right, park and get out. Almost immediately you'll be aware of a deliciously minty aroma. The lane is carpeted with tiny lavender flowers on 6-inch stems. This is wild pennyroyal [*Hedeoma drummondii or H. pulegioides]* – a real olfactory treat!

The strange-looking flower with the stem running up through the tiered white and purple blooms is lemon mint *[Monarda citriodora]*, a not-so-aromatic relative of the pennyroyal. For the nature nut, this place has a lot to offer – including thorny patches of yellow-flowered prickly pear cacti *[Opuntia compressa]*. There also are many scorpions and tarantulas: just look under a few of the loose, flat rocks to find them.

This area is also the most dependable place I know for finding choice birds such as the painted bunting. Roger Tory Peterson describes this bird as "The most gaudily colored North American songbird". There is a pair in this area each summer; the male perched in a tree and singing his bright little warble, and the dull-greenish female on her nest in a nearby bush.

Just to the left of the trail are some low, shrubby plants called stickleaf [*Mentzelia oligosperma]*. The leaves are the original Velcro and will stick to your jeans so thoroughly it's difficult to scrape them off, even with a knife. Like stick-tights, beggars' lice, and others, they've evolved with dispersal in mind.

Toward the end of the trail there is an area of flat rock with hardly any soil on it. Sedum, called pink stonecrop *[Sedum pulchellum]*, and flameflower *[Talinum calycinum]* grow here and thrive in this bare-bones situation. Both of these plants have thick, fleshy leaves that enable them to withstand long dry spells. Another plant here on the glade is agave, or American aloe *[Manfreda virginica]*. Not quite in bloom yet, you can recognize it by the rosettes of thick, fleshy, sharp-pointed leaves. In a couple of weeks the 6- or 7-foot blooming stalks will make them more conspicuous.

And finally, I would say the rarest plant – the one I've found only here in all my searches for plants in eastern Oklahoma – is the western marbleseed *[Onosmodium molle]*. Not very showy, the blooms are a dull whitish color and not anything to write home about. It's the seeds that make the impression. They are like small, whitish-pink pearls – round, shiny and just as hard. Marbleseed is the perfect name.

Ed. Note: I found this spot to be about three miles north of the road from Ft. Gibson dam, or ½ mile south of SH 80 as it turns west on the south side of Hulbert. If you go, remember that this is private land, unfenced because the owner knows that it is used by birders and school groups. [P.F.]

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Papers must not have been published previously or accepted for submission elsewhere and should represent research conducted in accordance with accepted procedures and scientific ethics. Submission of the article implies the granting of copyright permission to Oklahoma Native Plant Society.

Manuscripts will be reviewed for content and appropriateness by at least two reviewers. The title page should state the affiliation and complete addresses of all authors and telephone numbers for the corresponding author. Research and technical papers should include a one-paragraph abstract of not more than 250 words. It should concisely state the goals, principal results, and major conclusions of the paper. All references, figures, and tables should be cited in the text. Common names should be referenced to a scientific name. Abbreviations of authorities for scientific names should follow Authors of Plant Names (Brummitt and Powell, 1992). Titles of periodicals should be abbreviated following Botanico-Peridoicum-Huntianum and its supplement - except in historic publications when original format will be used.

Authors with access to IBM-compatible microcomputers are encouraged to send a copy of the manuscript on diskette in rtf (rich text format). If the manuscript is typed, manuscripts should be double-spaced on $8^{1/2}$ x 11 inch paper with minimum one-inch margins and should be submitted in duplicate. Diskette or hardcopy manuscripts should be sent to the managing editor at the ONPS address on the back cover by June 1.

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