



The Ranunculaceae of Montana
by Charles R King

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the degree of Master of Science in Botany at Montana State College
Montana State University
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Abstract:

A critical monographical study was made of the Ranunculaceae of Montana. This study included examination of Montana plant specimens, as well as of those thought to be within the state.

This paper is the result of reviewing all literature which was available pertaining to distribution of the members of the family. A key was constructed based upon specimens from the Montana State College Herbarium, freshly-collected specimens, monographs of the genera, and taxonomic keys for the area. A cursory survey was made of the specimens at the Montana State University Herbarium.

Simplified terminology has been employed in the key whenever possible. Specialized botanical terms are avoided, except in such cases where the nomenclature of the family demands their use.

The economic and medicinal importance of the various species is not stressed, except in certain instances, but an attempt has been made to provide students and other interested persons with a knowledge of this colorful group of spring and summer flowers. The origin of many generic names has been given to add interest; the common names, when given to species, will be an aid in recognizing the plants, for these names are usually very descriptive.

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Approved:

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Bozeman, Montana

August 1953

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ACKNOWLEDGMENT

The author wishes to thank Dr. W. E. Booth for his guidance in the correction and suggestions in the wording of these keys, and also to Mr. Homer Metcalf, who has helped by discussing the plants with me, and in obtaining special collections from the higher mountains.

ABSTRACT

A critical monographical study was made of the Ranunculaceae of Montana. This study included examination of Montana plant specimens, as well as of those thought to be within the state.

This paper is the result of reviewing all literature which was available pertaining to distribution of the members of the family. A key was constructed based upon specimens from the Montana State College Herbarium, freshly-collected specimens, monographs of the genera, and taxonomic keys for the area. A cursory survey was made of the specimens at the Montana State University Herbarium.

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The economic and medicinal importance of the various species is not stressed, except in certain instances, but an attempt has been made to provide students and other interested persons with a knowledge of this colorful group of spring and summer flowers. The origin of many generic names has been given to add interest; the common names, when given to species, will be an aid in recognizing the plants, for these names are usually very descriptive.

INTRODUCTION

The family Ranunculaceae is well represented in Montana, with 14 genera and 66 species. Earlier taxonomic keys will show more species, but the latest monographs have grouped together many of the old species, giving them only varietal distinctions.

The family is a difficult group, because, while the genera are easy to identify, the species constitute a problem. For this reason, the family may have been neglected within the state, and this key is therefore an attempt to provide a basis upon which interested persons can more easily identify the species.

The Ranunculaceae is a large, very primitive group of flowering plants. Its members may be annual or perennial herbs, and, rarely, shrubs or woody vines with an acrid, colorless juice. Alkaloids frequently occur, and may be poisonous. Some species are used for medicinal purposes. The family is known for its great contribution to horticultural varieties.

Leaves may be alternate, opposite or whorl, simple or compound, but the base of the petioles is always without stipules. The flowers are regular or irregular, and are hypogynous. The sepals, which may be petal-like, vary from 3 - 15 in number and generally fall before the petals. The petals number from 0 - about 25. The stamens are numerous and spirally arranged. Carpels are distinct, and vary from few to many, being rarely solitary, but one-celled. The fruits are achenes, follicles or berries.

The Montana State College Herbarium is fortunate in having as specimens several species collected in Montana before 1900. In a few cases, these early collections are the only ones available for study at this time.

P. A. Rydberg made good collections in Montana before 1900, and he is credited with naming new species. R. S. Williams, F. Tweedy, L. M. Umbach, and, after the turn of the century, J. W. Blankinship, made numerous collections. About 1917, P. Hawkins made collections of very rare species. In the middle '30 a number of species were collected by D. B. Swingle, and by students under the National Youth Organization. Most of the Herbarium specimens represent a few common species. A more extensive collection of plant specimens is needed to correct some of the taxonomic problems known to remain unsolved in this family of plants.

There are several taxonomic works covering the Ranunculaceae of the Northwest, some of which apply to portions of Montana. P. A. Rydberg, (1900), in his CATALOGUE OF MONTANA AND THE YELLOWSTONE PARK lists about 66 species. Other taxonomic manuals were written by him in 1924, and again in 1932, which covered all or parts of Montana. J. M. Coulter and A. Nelson (1937), NEW MANUAL OF BOTANY OF THE CENTRAL ROCKY MOUNTAINS, supplied a very usable key for this family, but it is now out of print. M. E. Peck (1941), MANUAL OF THE HIGHER PLANTS OF OREGON, included many plants of western Montana. L. Abrams (1944), ILLUSTRATED FLORA OF THE PACIFIC STATES, VOL. II, has been very helpful, although very few plants of the Pacific coast of this family grow in Montana. O. A. Stevens (1950), FLORA OF NORTH DAKOTA, is helpful for eastern Montana. R.J. Davis (1952), FLORA OF IDAHO, has been a most useful book for western and south-central Montana.

Since various taxonomic works deal only with part of the plants in this family, the author has made a key covering all the Ranunculaceae of

Montana. A simplified key has been presented, and characters are used which, in many cases, can be seen with the unaided eye. Vegetative parts are used when consistent, but flowers and fruits are mostly used. Flower color has been used, although dried specimens may lose or change their color. For this reason, in future collections, the flower color should be written on the specimen label.

REVIEW OF LITERATURE

W. C. Gregory (1941) states that "the Ranunculaceae, as a natural group of plants, has been recognized for over 200 years. It was not until 1789 that A. L. Jussieu adequately delineated them as a valid taxonomic unit. Although the family has long been known, and many of its genera are among the oldest recognized native plants of Europe, considerable confusion still persists as to the number of genera and species. In general the family consists of about 30 genera and 1200 species, widely scattered over the earth to the limits of vegetation on high mountains, and toward the poles, but it is comparatively rare in the southern hemisphere and in the tropics."

According to Gregory, a few of the major taxonomic treatments of the Ranunculaceae, after Jussieu, have been those of de Candolle (1824), Bentham and Hooker (1862-1867), Baillon (1863), Prantl (1888 and 1891), Engler and Gilg (1924). Numerous other works on morphology and anatomy, and monographs on individual genera have added considerable knowledge as to form, structure, life habits, geographical distribution, and new species within the family, but have not altered greatly the basic lines of classification from those of Prantl (1888) and Engler and Gilg (1924).

In recent years several North American monographic studies have been completed on certain genera. These, as well as other sources of valuable information are listed here for the convenience of anyone wishing to refer to them.

Aconitum

A recent work on the Aconites is a monograph by P.A. Muntz (1945).

" The Cultivated Aconites ". The genus is represented in Montana by a single species.

Actaea

The recent pertinent literature on Actaea is an article by M. L. Fernald, (1940), " What is Actaea alba ? ". This plant does not occur in Montana, but the reference mentions Actaea rubra which is present.

Aquilegia

A monograph by P. A. Munz, (1946), "Aquilegia, the Cultivated and Wild Columbine", is available. There are 4 species, 2 with varieties, represented in Montana, although some authors have stated that other species occur in the state.

Clematis

Only 1 species from Montana is included in R. O. Erickson's, (1943), "Taxonomy of Clematis Section Viorna".

Delphinium

A monograph by Joseph Ewan, (1945), " A Synopsis of the North American Species of Delphinium", is helpful in the understanding of the species of this area. Mr. Ewan finds that many larkspurs thought to be in Montana do not occur here, especially certain of the so-called "Low larkspurs".

Myosurus

"The genus Myosurus in North America" by G. R. Campbell, (1952), lists 4 species of which two species and 3 varieties are in Montana.

Ranunculus

The largest genus in the family, Ranunculus, has presented many dif-

difficulties which have resulted in confusion in some keys for this area. W. Drew, (1936), worked on the section "Batrachium, The Water Buttercups". Lyman Benson, (1948), completed a study entitled "A Treatise of the North American Ranunculi" listing 26 species in Montana. Mr. Benson has changed several of the old species and has made new species of several varieties.

Thalictrum

"American Thalictrum and their Old World Allies" by Bernard Boivin, (1944); lists 86 species and 114 varieties for North America. Montana has 4 species and 5 varieties.

MATERIALS AND METHODS

In the preparation of this thesis dealing with the Ranunculaceae of Montana, recent monographs of the genera were used whenever available. They were checked for quoted specimens which might be in the Montana State College Herbarium, and whenever such specimens were found, they were used as the basis of a given species determination. Out-of-state species from near-by areas, which were quoted in the monographs, were used in cases where the Herbarium did not have the quoted species from Montana.

The monographs were checked for distribution records, generic, and specific characters, and the key separations were studied. The synonymy in the monographs was used to bring the Herbarium specimen records up-to-date.

All species which had been classified by authorities within the last few years were considered as reliable material. Many specimens had been incorrectly classified by workers. In instances where a genus had not received a monographic treatment, taxonomic manuals were reviewed, and an opinion was formulated as to the identity of the species.

The specimens from the Montana State College Herbarium, which consist of 825 sheets of this family from within the state, were studied. Freshly-collected specimens were secured, and notes concerning distribution were used, in addition to all classification records from the monographs.

The author spent several hours at the Herbarium at Montana State University, checking specimens which were mostly from western Montana. This collection is important, and if more time had been available, distribution records could probably have been extended.

Field notes made during the spring and summer of 1953 were used to supplement the data obtained from Herbarium specimens. Also, interested persons have contributed fresh specimens, and from these, new distribution records have been worked out.

Those species which occur in bordering states, in regions adjacent to Montana, have been included in the key. Collections from Yellowstone National Park were studied. Plants that grow in the very northern part of the Park were considered, but plants from the southern part were regarded as being part of the flora of Wyoming.

In writing these keys, the indented form has been used. The generic key begins on page 15, and the number after each genus in this key refers to the page on which the species key of each genus is located. Subspecific categories are found in keys under some species. The author has followed a policy widely used in the past few years, which involves placing the genera and species in alphabetical order, for the purpose of easier reference.

KEY TO THE GENERA

Pistils becoming follicles or berries with several seeds

Flowers regular

Leaves simple

Leaves heart-shaped or kidney-shaped, entire or
round-toothed; sepals in one whorl, petal-like Caltha 27

Leaves palmately lobed or incised; sepals whorled,
petal-like, with an inner whorl of small petals Trollius 76

Leaves compound

Petals present and spurred Aquilegia 24

Petals when present, not spurred

Flowers in a raceme; fruit a berry; stem leaves
present Actaea 17

Flowers not in a raceme; fruit a follicle;
leaves all basal Coptis 30

Flowers irregular

Upper sepals spurred; petals 4, the upper spurred,
enclosed in spur of sepal Delphinium 31

Upper sepals hooded but not spurred; petals 2,
clawed, enclosed in the hooded sepal Aconitum 17

Pistils becoming achenes, 1-seeded

Stem leaves or involucre opposite, whorled or encircling
the stem

Stem leaves or involucre whorled or encircling the
stem; herbs Anemone 19

- Stem leaves in pairs which are opposite to each other;
herbs or vines
- Flowers yellow or white
- Plants a vine Clematis 28
- Plants not a vine Ranunculus 40
- Flowers blue-purple Clematis 28
- Stem leaves alternate or basal
- Leaves ternately compound; some imperfect plants Thalictum 72
- Leaves mostly simple, rarely compound
- Petals absent; leaves palmately lobed Trautvetteria 75
- Petals present, yellow, white or reddish
- Sepals spurred; small annuals with basal
linear leaves; receptacle in fruit spike-like Myosurus 38
- Sepals not spurred; stem leaves usually present;
receptacle spherical to short-cylindrical
- Petals yellow or white, usually with a
nectary scale on waxy petals; leaves
not greatly dissected but if so, aquatics;
mostly perennials Ranunculus 40
- Petals reddish, without nectary scale on
base; leaves very dissected; terrestrial;
annuals Adonis 18

ACONITUM L.

MONKSHOOD

Aconitum columbianum Nutt.
(A. bakeri Greene)
(A. lutescens A. Nels.)

Columbia Monkshood

Perennial herb; stem erect, 2-5 feet tall, hairless below, glandular-hairy above; leaves 3-5 cleft, the divisions wedge-shaped; flowers few, blue, yellowish, whitish or pinkish, hairy, in a loose raceme; sepals 5, irregular, petal-like, the upper sepal a large hood 15-25 mm. long, longer than broad, with a narrow beak, 6-8 mm. long; petals 2-5, the upper 2 concealed in the hooded sepal, other 3 very small or lacking; follicles 10-15 mm. long. All parts of this plant are poisonous. Moist open woods. May to July.



ACTAEA L.

BANE BERRY

Leaflets thin, margins with many pointed teeth, light green; berries spherical, 5-7 mm. long

A. arguta

Leaflets thicker, margins with a few rounded, short sharp tips, darker green; berries oblong, 10-12 mm. long

A. rubra

Actaea arguta Nutt.
(A. spicata var. arguta Nutt.)

Western Baneberry

Plants hairless or nearly so, erect, bushy-branched, 1-2 feet tall; basal leaves long-petioled, pinnate, leaflets ovate, sharply incised, teeth pointed, light green; flowers white, many, ovoid raceme; sepals with long claws, petal-like; petals ob-ovate; berries 5-7 mm. long, oval or spherical, red or white, seeds 3 mm. long. Rich soils. June and July.



