



QK495

U48C69

The D. H. Hill Library
North Carolina State University



QK495
U48C69

**THIS BOOK IS DUE ON THE DATE
INDICATED BELOW AND IS SUB-
JECT TO AN OVERDUE FINE AS
POSTED AT THE CIRCULATION
DESK.**

--

REVISION
—OF—
North American Umbelliferæ

—BY—
JOHN M. COULTER AND J. N. ROSE.
HERBARIUM OF WABASH COLLEGE,
CRAWFORDSVILLE, IND.

December, 1888.

REVISION

—OF—

North American Umbelliferæ.

[Issued December, 1888.]

The Order *Umbelliferæ* has always been considered a most perplexing one, chiefly because the characters ordinarily used among flowering plants are of no avail, and the attempt to use them has led to confusion. The order must still be considered a difficult one to the ordinary student, inasmuch as it demands careful sections of the fruit and an examination of rather minute structures.

In our revision of the North American species we are much indebted to the hearty co-operation of botanists and desire to make the following acknowledgements: To our lamented leader, Dr. Asa Gray, the inception of the work was due, and his constant encouragement at first made the final loss of it doubly felt. Dr. Sereno Watson has given every assistance that his great knowledge of the order could suggest, besides placing the rich collections of Harvard University at our disposal; and it is but justice to say that the work would have been well nigh impossible had it not been for his masterly Bibliographical Index. Dr. N. L. Britton has also enabled us to study the valuable collections of Columbia College, especially desirable on account of its Torrey collection. The Philadelphia Academy also generously submitted their collection of Umbellifers to our inspection, a very important aid on account of the number of Nuttallian types it contains. The herbarium of the Agricultural Department was also placed at our

D. H. HILL LIBRARY 138819

North Carolina State College

disposal by Dr. Geo. Vasey; while the collections of the California Academy of Sciences, rich in Pacific Coast forms, were sent to us by the curator, Miss Mary Curran. Mr. I. C. Martindale, whose collection of Umbellifers is probably the completest to be found among private collections, and Capt. John Donnell Smith and Mr. William M. Canby, whose collections are especially rich in the more recently collected North American species, have put their entire collections in our hands. Prof. W. W. Bailey has sent us the collections of Brown University, among which the Olney and Bennett collections are very valuable in the older types. Prof. John Macoun has contributed the Canadian species, and his recent explorations in Western British America have brought to light much interesting material. The collections of S. B. Parish, L. F. Henderson and Thomas Howell have also been of great service. Mr. M. S. Bebb has furnished valuable material and notes in the study of *Thaspium* and *Eulophus*. Others who have kindly furnished every assistance in their power are Prof. T. C. Porter, Prof. William Trelease, Mr. Walter Deane, Prof. S. M. Tracy, Prof. Chas. R. Barnes, Dr. J. C. Arthur, Prof. Thomas McBride, Rev. Thomas Morong, Dr. Lester F. Ward, Mr. Frank Tweedy, etc., etc. It would be impracticable to give an account of all the material that has passed under our inspection during some four years of unremitting study, but no pains have been spared in obtaining all the information to be had from the herbaria of this country.

Historical sketch.—The plants of this order were first set apart under the ordinal name *Umbelliferae* by A. L. de Jussieu in his *Genera plantarum*, published in 1789. The subsequent general presentations of the family that may be mentioned are by G. F. Hoffmann, *Genera plantarum Umbelliferarum* (Ed. 2. 1816); A. P. de Candolle, *Mém. Fam. Omb.* (1829), as well as in the *Prodromus* (1830); S. L. Endlicher, *Genera plantarum* (1836-50); J. Lindley, *Vegetable Kingdom* (1846, under the name *Apiaceae*); G. W. Bentham and J. D. Hooker, *Genera plantarum* (1867). Dr. Oscar Drude also has this order in preparation for Engler and Prantl's *Die natürlichen Pflanzenfamilien*.

In reference to North American *Umbelliferae*, their last general presentation was by Torrey and Gray, *Flora North America*, Vol. I. (1838-40). Previous to that time the following works

may be mentioned as those containing our chief information: The *Species plantarum* of Linnæus (1753) of course forms the groundwork; Walter, *Flora Caroliniana* (1788); Michaux, *Flora Boreali-Americana* (1803); Persoon, *Synopsis plantarum* (1805); Pursh, *Flora Septentrionalis* (1814); Rafinesque, in various scattered publications (1815-40); Nuttall, *Genera* (1818), besides much material published in Torrey and Gray's *Fl. N. Am.*; DeCandolle, *Prodromus*, Vol. IV (1830); Hooker (W. J.), *Flora Boreali-Americana* (1833-40).

The list of publications containing descriptions of new species since Torrey and Gray's *Flora N. Am.* Vol. I (1838-40) is as follows:

Hooker and Arnott: Botany Beechey Voyage (1841).

Hooker: London Jour. Bot. vi. (1843).

Buckley: Am. Jour. Sci. I. xlv. (1843); Proc. Philad. Acad. (1861).

Gray: Pl. Fendlerianæ (1848); Pl. Wrightianæ (1850); Pl. Lindheimerianæ (1850); Manual (1856-67); Proc. Amer. Acad. vi., vii. (1868), viii. (1870); Pacif. R. R. Rept. xii. (1860); Ives' Report (1861); Am. Jour. Sci. II. xxxiii. (1862); Proc. Philad. Acad. (1863).

Torrey and Gray: Pacif. R. R. Rept. ii. (1854).

Torrey: Mex. Boundary Survey (1858).

Chapman: Manual Southern States (1860).

Wood: Class-Book (1860).

Watson: Bot. King's Exped. (1871); Am. Naturalist, vii. (1873); Botany of California (1876 and 1880); Proc. Amer. Acad. xi. (1876), xii. (1877), xiv. (1879), xvii. (1882), xviii. (1883), xx. (1885), xxi. (1886), xxii. (1887).

Parry: American Naturalist, ix. (1875).

Kellogg: Proc. Calif. Acad. 1. (1876).

Curran: Bull. Calif. Acad. iii.

Coulter & Rose: Bot. Gazette, xii. (1887), xiii. (1888).

Morong: Bull. Torrey Bot. Club, xiv. (1887).

Geographical distribution.—The order contains about 160 genera and 1300 species, mostly distributed throughout temperate regions and extending into the tropics along mountain systems. Its most abundant representation is in northern Europe and Asia. The genera are usually widely distributed, while most of the species are quite restricted. North America, north of Mexico, contains 59 genera and 233 species; of these, 7 are introduced genera, leaving us 52 native genera, only 22 of which are strictly North American; while of our species 217 are indigenous, and but 13 of these are found at all in other countries. Of our native

genera, six are restricted to North America and Asia, viz: *Cælopleurum*, *Conioselinum*, *Cryptotænia*, *Discopleura*, *Osmorhiza*, and *Phellopterus*; no genus is restricted to North America and Europe; four genera are common to the whole northern hemisphere, not extending southward, viz: *Chærophyllum*, *Cicuta*, *Heracleum*, and *Ligusticum*; three genera extend only into Mexico and South America, viz: *Apiastrum*, *Bowlesia*, and *Velva*; sixteen genera are world-wide in their distribution, viz: *Angelica*, *Apium*, *Berula*, *Bupleurum*, *Carum*, *Caucalis*, *Crantzia*, *Daucus*, *Eryngium*, *Hydrocotyle*, *Oenanthe*, *Peucedanum*, *Pimpinella*, *Sanicula*, *Selinum*, and *Sium*; our twenty-two strictly North American genera are *Aletes*, *Ammoselinum*, *Coloptera*, *Cymopterus*, *Cynosciadium*, *Erigenia*, *Eulophus*, *Eurytenia*, *Harbouria*, *Leptocaulis*, *Leptotænia*, *Muscniopsis*, *Musenium*, *Oreoxis*, *Orogenia*, *Podistera*, *Polytænia*, *Pseudocymopterus*, *Thaspium*, *Tiedemannia*, *Tropocarpus*, and *Zizia*. It will be seen that so far as North American Umbelliferæ have received any impress from other continents the dominant influence has been Asiatic, at least 25 of the genera being common to that continent. In regard to the 13 native species found also in other countries, 10 are found in Asia, viz: *Phellopterus littoralis* (common to W. North America and E. Asia), *Osmorhiza longistylis* and *Cryptotænia Canadensis* (common to E. North America and E. Asia), *Sium cicutæfolium* and *Cælopleurum Gmelini* (widely distributed throughout North America and Asia), *Ligusticum Scoticum* and *Berula angustifolia* (extending also into Europe), and *Hydrocotyle Asiatica* and *H. verticillata* (extending from Asia and the Polynesian Islands into Africa). The three remaining species, viz: *Apium leptophyllum*, *Crantzia lineata*, and *Hydrocotyle Americana*, are distributed throughout the southern hemisphere, extending north only in North America. This, of course, only represents the present view regarding species. When those of different continents are more thoroughly compared, doubtless many more species will be merged.

Comparing the North American Umbelliferæ with the foreign representatives of the order, the North American east is furnished by such forms as the abundant western display of acaulescent dry ground Peucedanums and their allies, species of *Cymopterus* and their allies, as well as the peculiar western *Saniculas*.

In reference to the distribution of genera and species in North America, the fact of their uniform distribution is brought out by the following data: in N. E. United States (the range covered by Gray's Manual¹) there are 27 genera and 44 species; in S. E. United States (range of Chapman's Manual) there are 27 genera and 49 species; in the Rocky Mountain region within the United States (range of Coulter's Manual) there are 21 genera and 43 species; in California (Botany of California) there are 26 genera, 65 species; in British North America (Macoun's Catalogue) there are 28 genera and 55 species; in the Great Basin (Watson in Bot. King's Report) there are 17 genera and 33 species.

Contrasting the Umbelliferae of eastern and western North America, the latter not only gives the greater display, but also presents the characteristic forms of the continent, differing far more from the Umbelliferae of every other continent than do those of E. North America. Twenty-one genera and about 150 species are restricted to W. North America; while but 7 genera and about 40 species are restricted to E. North America; which shows 23 genera and about 20 species distributed both east and west.

Only 9 species can be considered really alpine, viz: *Peucedanum Sandbergii*, *P. Oregonum*, *P. Cusickii*, *Cymopterus nivalis*, *C. ternatus*, *C. cinerarius*, *Oreoxis humilis*, *Podistera Nevadaensis*, and *Velea Howellii*; although many species extend well up the mountain sides.

The largest genus is *Peucedanum*, with 43 species, being more than one-fifth of our Umbellifers. The next genus in point of numbers is *Eryngium* with 29 species; then *Angelica* with 16 species; *Cymopterus* with 13 species; *Sanicula* with 10 species; and *Ligusticum* with 9 species. It will be seen that these six genera contain more than half of our native species.

Our monotypic genera are *Aletes*, *Crantzia*, *Cryptotenia*, *Erigenia*, *Eurytænia*, *Harbouria*, *Musenioopsis*, *Oreoxis*, *Phellopterus*, *Podistera*, *Polytænia*, and *Trepocarpus*; while the following genera, in addition, are represented within our borders by but a single native species, viz: *Apium*, *Berula*, *Bifora*, *Bowlesia*, *Bupleurum*, *Caucalis*, *Chorophyllum*, *Conioselinum*, *Daucus*, *He-*

¹ In using the numbers obtained from the various manuals and catalogues it must be remembered that no account is made of the slight changes which have been necessary, but which do not affect the general conclusion.

racicum, and *Ænanthe*. It will be seen that nearly half of our genera are represented by single species.

The following table shows the general distribution of our genera. The first column gives the whole number of species found in North America north of Mexico; the second, the number of introduced species; the third, those species that are strictly eastern, including a single tier of states west of the Mississippi; the fourth, those species that are western, that is, from the plains westward; the fifth, those that are found both east and west, some of which may be of wide range, and others southwestern and so overlapping the boundary between the two regions; the sixth, the number of species accredited to each genus throughout the world, as indicated by Bentham & Hooker, somewhat modified by the more recent changes. The genera marked with an asterisk (*) are endemic.

	I.	II.	III.	IV.	V.	VI.
	Whole no. of N. Am species.	Introduced species.	Eastern species.	Western species.	Species common to E. and W.	No. of species in the world.
<i>Aegopodium</i>	1	1				1
<i>Æthusa</i>	1	1				1
* <i>Aletes</i>	1			1		1
* <i>Ammoselinum</i>	2			2		2
<i>Angelica</i>	16		4	12		30
<i>Anthriscus</i>	1	1				10
<i>Apiastrum</i>	2			1	1	2
<i>Apium</i>	4	3			1	12
<i>Berula</i>	1				1	2
<i>Bifora</i>	1				1	3
<i>Bowlesia</i>	1			1		12
<i>Bupleurum</i>	2	1		1		90
<i>Carum</i>	5	1		4		50
<i>Caucalis</i>	3	2		1		18
<i>Charophyllum</i>	1		1			30
<i>Cicuta</i>	3		1	1	1	3
<i>Cœlopleurum</i>	2			1	1	2
* <i>Coloptera</i>	3			3	1	3
<i>Conioselinum</i>	1		1			2
<i>Conium</i>	1	1				2
<i>Coriandrum</i>	1	1				2
<i>Crantzia</i>	1				1	1
<i>Cryptotenia</i>	1		1			1
* <i>Cymopterus</i>	13			13		13
* <i>Cynosciadium</i>	2		2			2
<i>Daucus</i>	2	1			1	50
<i>Discopleura</i>	2		1	1		2
* <i>Erigenia</i>	1		1			1
<i>Eryngium</i>	22		10	9	3	150
* <i>Eulophus</i>	5		1	4		5
* <i>Eurytenia</i>	1			1		1
<i>Feniculum</i>	1	1				3
* <i>Harbouria</i>	1			1		1
<i>Heracleum</i>	1				1	70
<i>Hydrocotyle</i>	7		4	1	2	70
* <i>Leptocaulis</i>	2		1		1	2
* <i>Leptotenia</i>	7			7		7
<i>Ligusticum</i>	9		2	7		20
* <i>Musenopsis</i>	1			1		1
* <i>Musenium</i>	3			3		3
<i>Enanthe</i>	1			1		35
* <i>Oreoxis</i>	1			1		1
* <i>Orogenia</i>	2			2		2
<i>Osmorhiza</i>	6		2	4		6
<i>Pastinaca</i>	1	1				10
<i>Peucedanum</i>	43			43		100
<i>Phellopterus</i>	1			1		1
<i>Pimpinella</i>	3	1	1	1		65
* <i>Podistera</i>	1			1		1
* <i>Polytenia</i>	1				1	1
* <i>Pseudocymopterus</i>	3			3		3
<i>Sanicula</i>	10		1	9		13
<i>Selinum</i>	7			7		30
<i>Sium</i>	2		1		1	3
* <i>Thaspium</i>	3		2		1	3
* <i>Tiedemannia</i>	4		3	1		4
* <i>Trepocarpus</i>	1				1	1
<i>Velea</i>	6			6		7
* <i>Zizia</i>	2		2			2

Vegetative Organs.—Root. The prevailing umbellifer root is the fleshy, parsnip-like tap-root. Many of the spring bloomers come from deep-seated solitary tubers, as some species of *Peucedanum*, *Erigenia*, and *Orogenia*. These tubers are very

farinaceous and useful for food. In some cases the roots² are fasciculate-tuberous, as in *Eulophus*, *Tiedemannia*, some species of *Carum*, etc. Very few species are fibrous-rooted.

Stem. While some Kamschatkan species attain a gigantic size, and certain S. African forms become shrubs and even small trees, our North American species are at most but coarse herbs. The stems are grooved, more or less swollen at the joints, pithy or hollow, and so uniform in character that none of these features are useful in classification.

Leaf. The leaves are alternate, with very characteristic petioles, which are dilated (sometimes very much so) and more or less sheathing at base. As a rule, they are compound, sometimes simply lobed, very rarely entire.

Inflorescence.—The general plan of inflorescence is a regularly compounded umbel, but in certain genera (as in *Hydrocotyle*) the umbels are simple; while in others they are reduced to heads (as in *Eryngium*). In some genera the umbels are very irregularly compounded, so that it would be almost impossible to draw any satisfactory line between forms with simple and those with compound umbels, although this character has been rather extensively used in generic grouping. Even when this indistinct line has been drawn the genera are thrown into most unnatural relationships. Proliferous umbels are not at all uncommon, and in some forms (as in *Hydrocotyle*) proliferation is a constant character. The involucre (composed of *bracts*) and the involucl (composed of *bractlets*) furnish very important characters in classification. The bracts and bractlets may be wanting, or from minute to very conspicuous, green or scarious, distinct or more or less united.

The flower.—The small epigynous flowers, with five sepals (often obsolete), petals and stamens, and bicarpellary pistil, are so uniform in character that they cannot be considered of much value in classification, unless we except such subordinate characters as the presence or absence of calyx-teeth, and the color of petals.

Sepals. The calyx is blended with the inferior ovary and

² We use "roots" here in the ordinary systematic way. Morphologically these "tuberous roots" are mostly subterranean stems.

may not extend beyond its summit in any form, in which case it is said to be *obsolete*, or it may appear at the top of the ovary as five persistent teeth or lobes, minute or somewhat conspicuous. The presence or absence of these "calyx-teeth" furnishes a character used in generic descriptions.

Petals. The deciduous petals are inserted at the edge of an epigynous disk, and are usually white or yellow, although in some species they are blue, or even pinkish to dark purple. Usually they are concave, with an inflexed tip or acumination; and sometimes at the flexure the acumination becomes so impressed as to give an emarginate or 2-lobed appearance. Much use has been made of these characters in generic descriptions, but among our North American forms we have found such uniformity that characters drawn from the petals are of no value, with the single exception of the genus *Heracleum*.

Stamens. From the 5 alternate distinct introrse stamens no characters are to be drawn. In general, *Umbelliferae* seem to be protandrous, though protgyny has been observed in a few genera, such as *Thaspium*, *Sanicula* and *Eriogonum*.

Pistil. A description of the bicarpellary pistil, surmounted by the disk from which arise two distinct styles either directly or with an intervening *stylopodium*, which is either depressed or more or less conical, is better included under the discussion of the very important fruit structures.

Fruit.—In no family of plants does the fruit furnish more certain diagnostic characters than in the *Umbelliferae*. So definite are they that the fruit alone can be made to determine the genus, and in most cases the species, while in every case it is an essential part of the description. This indicates at once an unusual amount of differentiation in the fruit structures, and great diversity in their display.

The two carpels face each other, and are in contact at first by their commissural or ventral faces, but eventually separate. The fruit is compressed laterally (at right angles to the plane of the commissural faces), or dorsally (parallel with the commissural plane), or not at all. As the two carpels are but repetitions of each other, a description of structure may be confined to a single one. The surface of the carpel is usually marked by five ribs or

wings longitudinally placed. The two nearest the commissure are the *laterals*; a single *dorsal* one occurs on the back of the carpel, while the pair between the dorsal and the laterals are the *intermediates*. In addition to these five primary ribs or wings secondary ones may appear (as in *Hydrocotyle Asiatica*), and even become more prominent than the primary ones (as in *Daucus* and *Trepocarpus*); or occasionally even all external indications of ribs may be lacking (as in *Sanicula*). The presence of these ribs or wings, their varying size and structure, furnish good diagnostic characters.

The general structure of the pericarp wall well represents the typical leaf structure, with under and upper (that is, outer and inner) epidermal layers bounding a more or less developed mesophyll. It is in the mesophyll region that the characteristic fruit structures are developed. The constant occurrence in the outer epidermal region of the two distinct layers of epidermal cells suggests that the outer layer represents the connate calyx, while the inner is the true epidermis of the pericarp. The mesophyll region of the pericarp is naturally separated into three structures: (1) oil-ducts, (2) strengthening cells, and (3) undifferentiated parenchyma.

Oil-tubes. These occur in varying number, size and position in the different genera, and are of such constancy as to furnish most valuable characters. By far the most common position for oil-tubes is in the intervals between the ribs, where they occur singly or in groups. In this position they may occur close against the inner epidermal layer, or centrally in the pericarp section, while in *Cryptotænia* and *Erigenia* they seem to be developed in the inner epidermal layer itself. In *Æthusa*, *Celopleurum* and *Cryptotænia* oil-tubes occur both in the intervals and beneath the ribs. In some cases, as in *Polytænia*, there are two sets of oil-tubes, one forming an almost continuous layer about the seed-cavity, the other composed of smaller tubes, and scattered through the very thick pericarp. In *Zizia* and *Aletes* there are also smaller accessory tubes in the ribs. In *Conium* there is no development of oil-tubes, but the whole inner epidermal layer of the pericarp becomes a secreting layer. In *Hydrocotyle*, on the other hand, in the absence of oil-tubes, groups of secreting cells occur just beneath the outer epidermis of the pericarp, and in some

species eventually break through it, forming superficial oil vesicles. *Anthriscus* and some *Bupleurums* have neither oil-tubes nor secreting cells. In *Osmorhiza* the mature fruit usually gives no trace of oil-tubes, while the immature fruit may show groups of 4 to 6 oil-tubes in the intervals, and 1 to 3 in the ribs themselves. The obliteration of oil-tubes on approach to maturity may account for the discrepancy of opinion concerning the oil-tubes of certain genera. It is an interesting fact that this suppression of oil-tubes seems to involve the formation of an oily layer. In *Osmorhiza* the mature fruit has an oily layer about the seed, a region occupied in the immature fruit by a distinct line of oil-tubes. In *Hydrocotyle*, however, the isolated groups of secreting cells are such as always precede the formation of oil-tubes. In *Hydrocotyle*, therefore, the oil-tubes could be called rudimentary; in most *Umbelliferae* they are oil-tubes proper; in *Conium* a secreting layer has been developed; while the development of the *Osmorhiza* fruit gives us distinctly all three phases. Hence, to summarize: (1) most genera have distinctly developed oil-tubes, variously placed; (2) a few have a layer of secreting cells; (3) some have groups of secreting cells; and (4) others have neither oil-tubes nor secreting cells, in fact, without any representation of this one of the three structures of the mesophyll.

Strengthening cells. Under this name we would define certain groups of cells which are unlike enough in structure, but seem to serve the common purpose of strengthening the pericarp wall or its ribs. They usually occur beneath each rib, and are normally developed about the simple fibro-vascular elements of the pericarp wall. These fibro-vascular elements may eventually become obliterated. The group of strengthening cells may consist of fibrous tissue, sclerenchyma, sclerenchymatous parenchyma, or small-celled parenchyma. It may be well marked off from the surrounding tissues, as in the distinct thick-walled groups of *Osmorhiza*, *Cryptotaenia*, *Conium* and *Cherophyllum*; or it may gradually merge into the surrounding tissue, as in *Angelica*, *Thaspium*, etc. In *Hydrocotyle*, *Bowlesia*, *Pastinaca*, and *Hieracium*, the strengthening cells are developed in a broad continuous band about the seed-cavity, and so completely make up the pericarp wall in *Bifora* and *Coriandrum* as to make it crustaceous; while in *Sanicula*, *Conioselinum*, and *Æthusa* they seem

to be entirely wanting. In the last named genus they may be found in the very tips of the prominent ribs, the position usually held by strengthening cells being occupied by large and loose parenchyma, the other structures remaining normal. Strengthening cells are thus unlike in elements and position, are in groups of varying size and distinctness, or in bands, or may be wanting entirely. From these facts important characters are obtained for generic grouping.

Undifferentiated parenchyma. This has merely the negative character of not being transformed into either strengthening or secreting cells. Its abundance is dependent upon the development of the strengthening cells. It will be seen, however, that although it furnishes no diagnostic characters, it is probably most concerned in the growth of the pericarp.

Each carpel primarily contains two ovules, one of which soon becomes aborted, although it is developed sufficiently to display its nucellus and integuments, as well as its anatropous character. The other ovule eventually occupies the whole space of the ovarian cavity.

The fibro-vascular connection of the ovules with the plant axis is as follows: A fibro-vascular bundle enters each carpel at its base, thus making it a lateral out-growth from the axis, while the axis itself continues its growth in the carpophore. The carpellary bundle almost at once subdivides into five branches, and these branches ascend the carpellary wall beneath the five primary ribs.

The two lateral bundles (that is, those beneath the lateral ribs) are the largest, as they contain the fibro-vascular elements to be distributed to the ovules. These lateral bundles pass in the carpellary wall to the very summit of the carpel, and then send a branch inwards and downwards into the funiculus of the anatropous ovule. The remaining elements of the fibro-vascular bundle pass on to the floral organs and stylopodium. It will be seen that in this case, as in *Compositæ*, the ovules are lateral outgrowths. A point or two in the development of the ovule may be mentioned in this connection. At first both ovules lie in the summit of the ovarian cavity, but soon, by the development of the funiculus, one is thrust toward the bottom, with the micropyle near the center of the cavity. It is in this position that the pollen tubes are seen to

enter the micropyle, and subsequently the ovule develops so as to fill the ovarian cavity. The aborted ovule is retained at the summit of the cavity, its funiculus never developing, and its micropyle out of reach of the pollen-tubes, even if its nucellar structures were developed to receive them.

To recur now to the mature seed, it will be found to consist mainly of a much developed embryo-sac, filled with endosperm and a small embryo. The embryo-sac never entirely replaces the nucellus, more or less of the nucellar tissues being found on the commissural side, either pressed against the flat or concave face of the embryo-sac or embraced in its infolding. Important characters have been obtained from the commissural face of the seed, based upon the fact that it may be convex, plane, concave, or more or less involute. Great care should be exercised, however, to obtain seed of perfect maturity, or a comparison on this basis will amount to nothing. All seeds at first have a convex or plane face, and the amount of concavity or infolding will depend upon the development of the embryo-sac. In some cases the embryo-sac, instead of developing uniformly, develops strongly towards the commissure on the two sides, resulting in a concave or involute seed-face. This variation may occur in the mature fruits of a single species (as in *Eulophus*), so that there may be found plane or concave seed-faces in one and the same plant.

Characters used in classification.—By far the most important characters are obtained from the fruit. The three series of Bentham and Hooker, based upon simple and compound umbels and oil-tubes, we have not found tenable. The compounding of umbels is too irregular in some genera to determine their proper position, and in the first series, with "*vittæ ad valleculas o.*" *Sanicula* and *Eryngium* both have oil-tubes. We have therefore divided our *Umbelliferae* into two series, based upon the development of secondary ribs or not, which grouping practically merges Bentham and Hooker's first and second series. Our second series, which is by far the larger, we have broken into groups based upon the flattening of the fruit, which seems to be a very reliable character, and one which best groups together related genera. Characters which are used in further subdivisions, enumerated in the order of their general importance, are as follows: flattening of the

carpel, nature of the stylopodium, winging of the fruit, character of the seed-face, number of oil-tubes, and general habit. Thus genera are reached, and in a way that seems to express relationship as well as can be done in any lineal arrangement. Occasionally genera will be found grouped together which seem farther apart than is consistent with other groupings. This follows from the fact that we are only dealing with North American plants, and the intermediate forms not being represented in our flora, it hardly seems necessary to multiply subdivisions. It will further be noted that the presentation of genera differs but little from that of Bentham & Hooker, the only radical change being in associating *Hydrocotyle* (Tribe I) with *Erigenia* (Tribe V), which we have done because of the remarkable lateral flattening of the fruit.

Directions for collection and study.—It is very evident that no Umbellifer is fit for determination unless it has mature fruit. That this cannot be too strongly insisted upon is shown by the immense amount of immature and hence well-nigh useless material that encumbers our herbaria. The great confusion in which the order has fallen has in no small degree arisen from the attempt to determine the relationships of these immature specimens. No such attempt should be made, for it will be mere guess-work at the best. When mature fruit has been obtained, it is not safe to depend upon surface inspection. This is deceptive even in the matter of oil-tubes, and has led to confusion, and of course does not reach the inner structures which are fully as important. Nor can a section of the dried fruit be depended upon, for the important characters drawn from the seed-face are more or less disguised by the drying. The only sure method is as follows: Soften and soak the fruit until it has regained its original plumpness³ and then make a series of thin cross-sections in the middle region of the fruit. Submitting such sections to an inch objective the required characters will be easily and clearly seen.

³ This may be done in a moment or two in boiling water, but it is far better to soak the fruit slowly in cold soft water, with a little potash if it is particularly hard, and in a day or two it will regain all its original plumpness gradually, without any of the violent action that is apt to come from boiling.

SYSTEMATIC SYNOPSIS OF GENERA.

A. *Fruit with secondary ribs the most prominent or the only ones: oil-tubes solitary beneath the secondary ribs or wanting: stylopodium conical (except in Daucus).*

I. Fruit with bristly prickles, winged secondary ribs, filiform primary ribs, and small groups of strengthening cells.

1. **Daucus.** Calyx-teeth obsolete. Fruit oblong, flattened dorsally. Carpel with 5 slender bristly primary ribs, and 4 winged secondary ones each bearing a single row of prominent barbed prickles. Stylopodium depressed or wanting. Oil-tubes solitary in the intervals (that is, under the secondary ribs), 2 on the commissural side. Seed flattened dorsally; the face somewhat concave or almost plane.

2. **Caucalis.** Calyx-teeth prominent. Fruit ovate or oblong, flattened laterally. Carpel with 5 filiform bristly primary ribs (each with a prominent group of strengthening cells), and 4 prominent winged secondary ones (without strengthening cells) with barbed or hooked prickles. Stylopodium thick conical. Oil-tubes solitary in the intervals (that is, under the secondary ribs), 2 on the commissural side. Seed-face deeply sulcate.

II. Fruit smooth, with filiform secondary ribs, no primary ribs, and a broad conspicuous band of strengthening cells about the seed-cavity (making a crustaceous pericarp).

3. **Trepocarpus.** Calyx-teeth prominent, unequal. Fruit linear-oblong, flattened laterally. Carpel somewhat dorsally flattened, with the 4 corky secondary ribs prominent and thick pericarp. Stylopodium conical, with very short style. Oil-tubes solitary beneath the secondary ribs, more or less imbedded in the seed and adhering to it, 2 on the commissural side. Seed-face plane or somewhat concave.

4. **Bifora.** Calyx-teeth evident. Fruit broader than long, flattened laterally, the globose carpels in contact only by a narrow commissure. Carpel with 4 filiform secondary ribs and thin very hard pericarp. Stylopodium conical, with styles recurved over the carpels. Oil-tubes none. Seed-face deeply concave.

5. **Coriandrum.** Calyx-teeth prominent. Fruit globose, with broad commissure. Carpel with inconspicuous secondary

ribs. Stylopodium conical. Oil-tubes beneath the secondary ribs and obscure, the commissural pair larger. Seed dorsally flattened, with face somewhat concave.

B. *Fruit with primary ribs only.*

I. Fruit strongly flattened dorsally, with lateral ribs prominently winged.

* Caulescent branching plants, with solitary oil-tubes (except some species of *Angelica*), depressed stylopodium, filiform to winged dorsal and intermediate ribs, and white flowers

6. **Eurytænia.** Calyx-teeth prominent. Fruit ovate, glabrous. Carpel with dorsal and intermediate ribs approximate and filiform (rarely slightly winged); laterals very prominent, thick-winged (prominently nerved on the commissural side) but with thin margins contiguous with those of the other carpel; all (especially the laterals) with prominent groups of strengthening cells. Oil-tubes very broad, filling the intervals, 2 on the commissural side. Seed-face plane.

7. **Angelica.** Calyx-teeth mostly obsolete. Fruit ovate or oblong, glabrous or pubescent, with prominent crenulate disk. Carpel with strong ribs, each with a group of strengthening cells; laterals broadly winged, distinct from those of the other carpel, forming a double-winged margin to the fruit. Stylopodium sometimes slightly conical. Oil-tubes one to several in the intervals or indefinite, 2 to 10 on the commissural side. Seed-face plane or somewhat concave.

8. **Selinum.** Calyx-teeth obsolete. Fruit oblong to obovate, less flattened than in the last, glabrous or pubescent, with more or less prominent disk. Carpel with prominent winged ribs; laterals usually broadest. Oil-tubes conspicuous, 2 to 4 on the commissural side. Seed sulcate beneath the oil-tubes, with plane face.

** Caulescent branching plants, with solitary oil-tubes (except in *Conioselinum*), conical stylopodium, filiform or stronger dorsal and intermediate ribs, and white flowers.

9. **Conioselinum.** Calyx-teeth obsolete. Fruit oblong, glabrous. Carpel with dorsal and intermediate ribs prominent (but not winged); laterals broadly winged and thickish. Stylopodium slightly conical. Oil-tubes small, 2 or 3 in the intervals

(rarely 1 in a dorsal interval or 4 in a lateral), 4 to 8 on the commissural side. Seed with back almost round and slightly concave face.

10. **Tiedemannia.** Calyx-teeth evident. Fruit ovate to obovate, glabrous. Carpel with dorsal and intermediate ribs filiform; lateral wings closely contiguous to those of the other carpel and nerved dorsally at the inner margin (giving the appearance of 5 filiform ribs on the back of each carpel); strengthening cells beneath the dorsal ribs and nerves of the lateral wings. Stylopodium thick short conical. Oil-tubes 2 to 6 on the commissural side. Seed-face plane.

11. **Heracleum.** Calyx-teeth small or obsolete. Fruit broadly obovate, very much flattened, somewhat pubescent. Carpel with dorsal and intermediate ribs filiform; the broad lateral wings contiguous to those of the other carpel, strongly nerved towards the outer margin; strengthening cells continuous about seed-cavity, and under the nerves. Stylopodium thick conical. Oil-tubes about half as long as the carpel, 2 to 4 on the commissural side. Seed very much flattened dorsally.

* * * Caulescent branching plants, with solitary or numerous⁴ oil-tubes, depressed stylopodium (or none), filiform dorsal and intermediate ribs, and yellow flowers.

12. **Pastinaca.** Calyx-teeth obsolete. Fruit oval, very much flattened, glabrous. Carpel with broad lateral wings contiguous to those of the other carpel, and strongly nerved towards the outer margin; strengthening cells continuous about the seed-cavity and under the nerves. Stylopodium depressed but prominent. Oil-tubes small, solitary in the intervals, 2 to 4 on the commissural side. Seed very much flattened dorsally.

13. **Polytænia.** Calyx-teeth conspicuous. Fruit obovate to oval, much flattened, glabrous. Carpel with dorsal and intermediate ribs small or obscure in the depressed often corky back; laterals forming broad thick corky wings closely contiguous to those of the other carpel and forming the thick margin of the fruit. Stylopodium wanting. Oil-tubes 12 to 18 about the seed (4 to 6 on the commissural side) and many scattered through the

⁴ By "numerous" oil-tubes is always meant more than one.

thick corky pericarp, which also contains 5 small bundles of strengthening cells. Seed-section oval or much flattened.

* * * * Acaulescent or nearly so, with solitary or numerous oil-tubes, no stylopodium, filiform dorsal and intermediate ribs (prominent or even slightly winged in some species of *Coloptera* and in *Pseudocymopterus*) and variously colored flowers.

14. **Coloptera.** Calyx-teeth obsolete or evident. Fruit ovate, glabrous. Carpel with dorsal and intermediate ribs filiform or winged and approximate; lateral wings broad, very thick and corky, with neither nerves nor strengthening cells, coherent till maturity with those of the other carpel, forming a broad corky margin to the fruit usually thicker than the fruit proper, and in cross-section showing a neck-like connection. Oil-tubes very small, 4 to 8 in the intervals, 8 to 14 on the commissural side. Seed very flat, with plane or slightly concave face. Dwarf plants, with small simply pinnate (bipinnate in one species) or lobed leaves.

15. **Leptotænia.** Calyx-teeth obsolete or evident. Fruit oblong-elliptical, glabrous. Carpel as in *Coloptera*, except that the thick corky lateral wings have large groups of thick-walled strengthening cells, and the dorsal and intermediates are always filiform or obscure; commissural face with a prominent central longitudinal ridge left after separation from the carpophore. Oil-tubes 3 to 6 in the intervals, 4 to 6 on the commissural side, mostly small, sometimes obsolete. Seed very flat, with plane or slightly concave face. Tall and stout, with large pinnately decompound leaves.

16. **Peucedanum.** Calyx-teeth obsolete or evident (rarely much enlarged). Fruit oblong to suborbicular, glabrous to tomentose. Carpel with dorsal and intermediate ribs filiform and approximate; lateral wings broad and thin, coherent till maturity with those of the other carpel, forming a broad membranous wing to the fruit; commissural face without a prominent longitudinal ridge after separation from the carpophore; a group of strengthening cells beneath each rib. Oil-tubes 1 to 8 in the intervals, 2 to 10 on the commissural side. Seed flat, with plane or slightly concave face.

17. **Pseudocymopterus.** Calyx-teeth evident. Fruit ovate or oblong. Carpel with dorsal and intermediate ribs very promi-

nent and acute (sometimes slightly winged); lateral wings rather broad and thickish, distinct from those of the other carpel; a group of strengthening cells beneath each rib. Oil-tubes 1 to 4 in the intervals, 2 to 6 on the commissural side. Seed face plane or slightly concave.

II. Fruit not flattened either way, or but slightly.

* Fruit with all the ribs conspicuously winged, stylopodium depressed or wanting, and oil-tubes numerous (except in *Thaspium* and some species of *Cymopterus*).

18. **Cymopterus**. Calyx-teeth more or less prominent. Fruit usually globose, somewhat flattened laterally if at all. Carpel somewhat flattened dorsally, with mostly 5 broad thin equal wings (dorsal or intermediate wings sometimes wanting); lateral wings distinct from those of the other carpel; pericarp with no strengthening cells (indistinctly developed in one species). Stylopodium depressed. Oil-tubes one to several in the intervals, 2 to 8 on the commissural side. Seed-face from slightly concave to deeply sulcate.

19. **Phellopterus**. Calyx-teeth small. Fruit globose, glabrous. Carpel somewhat flattened dorsally, with 5 equal broad and corky-thickened wings; lateral wings distinct from those of the other carpel; pericarp with no strengthening cells. Stylopodium depressed. Oil-tubes 2 to 3 in the intervals (but appearing evenly distributed owing to the narrowness of the intervals), 4 to 6 on the commissural side. Seed-face slightly concave. A low tomentose-villous sea-shore herb.

20. **Thaspium**. Calyx-teeth conspicuous. Fruit ovoid to oblong, slightly flattened dorsally if at all, mostly glabrous. Carpel with 3 or 4 or all the ribs strongly winged. Stylopodium wanting; styles long. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed sulcate beneath the oil-tubes, almost terete or somewhat dorsally flattened, with plane face.

* * Fruit with all the ribs prominent and equal (intervals broad), acute or sometimes slightly winged, conical stylopodium, and numerous oil-tubes.

21. **Ligusticum**. Calyx-teeth obsolete. Fruit oblong or ovate, flattened laterally if at all, glabrous. Carpel with group of strengthening cells beneath each rib. Oil-tubes 2 to 6 (mostly

3 to 5) in the intervals, 6 to 10 on the commissural side. Seed with round or angled back, face from plane to deeply concave, with or without a central longitudinal ridge.

* * * Fruit with broad and equal corky ribs (intervals very narrow), depressed stylopodium, and solitary oil-tubes.

22. **Oreoxis.** Calyx-teeth prominent. Fruit globose, slightly flattened laterally if at all, glabrous. Carpel with very thick and prominent corky ribs, each with a large group of strengthening cells. Oil-tubes 2 on the commissural side, and a small one in each dorsal rib. Seed sulcate beneath the oil-tubes, with somewhat concave face.

23. **Æthusa.** Calyx-teeth obsolete. Fruit ovoid-globose, slightly flattened dorsally, glabrous. Carpel with thick sharp ribs, and no strengthening cells except in their very tips. Oil-tubes 2 on the commissural side. Seed-face plane.

24. **Cœlopleurum.** Calyx-teeth obsolete. Fruit globose to oblong, slightly flattened laterally if at all, glabrous. Carpel with very thick and prominent corky ribs (none of them winged), each with a large group of strengthening cells. Oil-tubes small, 2 to 4 on the commissural side, and 1 or 2 under each rib (in addition to the one in the interval), all adhering to the seed, which is loose in the pericarp, and with plane or somewhat concave face.

* * * * Fruit with very thick and corky lateral ribs, filiform (or somewhat prominent) dorsal and intermediates, depressed stylopodium (except in *Cynosciadium*), and solitary oil-tubes (except in *Orogenia*).

25. **Orogenia.** Calyx-teeth minute. Fruit oblong, very slightly flattened laterally, glabrous. Carpel much flattened dorsally, with filiform dorsal and intermediate ribs; laterals excessively corky thickened, involute (that is, extended towards the other carpel, leaving between the commissural faces a cavity, which is divided longitudinally by a thick corky projection from the middle of each face); all with distinct groups of strengthening cells. Oil-tubes very small, 3 in the intervals, 2 to 4 on the commissural side. Seed-face slightly concave.

26. **Crantzia.** Calyx-teeth small. Fruit globose, slightly flattened laterally, glabrous. Carpel with filiform dorsal and intermediate ribs; laterals very thick and corky next the commissure;

each with a small group of strengthening cells. Oil-tubes 2 on the commissural side. Seed terete.

27. **Ænanthe**. Calyx-teeth rather prominent. Fruit globose, slightly flattened laterally if at all, glabrous. Carpel (section about semi-terete) with broad obtuse corky ribs; laterals the largest; a band of strengthening cells investing seed and oil-tubes. Stylopodium very short-conical, with elongated styles. Oil-tubes 2 on the commissural side. Seed sulcate beneath each oil-tube (commissural as well as dorsal).

28. **Cynosciadium**. Calyx-teeth persistent. Fruit ovoid, glabrous. Carpel with prominent ribs; laterals much the largest, forming a broad corky margin; a large group of strengthening cells in each rib. Stylopodium conical. Oil-tubes 2 on the commissural side. Seed somewhat flattened dorsally, with plane face.

III. Fruit flattened laterally.

* Fruit prickly or with tuberculate scales.

29. **Eryngium**. Calyx-lobes very prominent, rigid and persistent. Fruit ovoid, covered with hyaline scales or tubercles. Carpel with ribs obsolete. Stylopodium wanting; styles short or long, often rigid. Oil-tubes mostly 5 (3 dorsal and 2 commissural). Seed-face plane.

30. **Sanicula**. Calyx-teeth somewhat foliaceous, persistent. Fruit sub-globose, densely covered with hooked prickles, or tuberculate. Carpel with neither ribs nor strengthening cells. Stylopodium depressed. Oil-tubes mostly large, 5 (3 dorsal and 2 commissural), or 3 to 19 irregularly distributed. Seed-face from plane to deeply concave or sulcate.

33. **Leptocaulis** may be looked for here.

* * Fruit neither prickly nor scaly.

† Carpels flattened dorsally.

(1) Fruit with plane seed-face, solitary oil-tubes, conical stylopodium, prominent ribs, and strengthening cells continuous about the seed-cavity (excepting the introduced *Paniculum*).

31. **Ammoselinum**. Calyx-teeth obsolete. Fruit ovate. Carpel with prominent equal more or less scabrous ribs; laterals closely contiguous to those of the other carpel, forming apparently

a single broad rib; pericarp exceedingly hard, composed almost entirely of strengthening cells. Styles very short. Oil-tubes 2 on the commissural side; all rather small and not close to seed-cavity. Seed dorsally flattened.

32. **Fœniculum.** Calyx-teeth obsolete. Fruit oblong, glabrous. Carpel with prominent ribs, each with a group of strengthening cells. Oil-tubes 2 on the commissural side. Seed somewhat dorsally flattened.

(2). Fruit with plane seed-face, numerous oil-tubes, depressed or cushion-like stylopodium, and filiform ribs.

33. **Podistera.** Calyx-teeth prominent. Fruit elliptic-ovate, glabrous. Carpel oblong-pentagonal in cross-section, the ribs slender and distinct. Stylopodium depressed. Oil-tubes 2 or 3 in the intervals, 6 on the commissural side.

34. **Pimpinella.** Calyx-teeth obsolete. Fruit oblong to ovate, glabrous. Carpel with equal slender ribs (sometimes almost obsolete). Stylopodium depressed or cushion-like. Oil-tubes 2 to 6 in the intervals, 4 to 8 on the commissural side. Seed somewhat dorsally flattened, with plane or slightly convex face.

(3). Fruit with concave seed-face, oil-tubes solitary in the intervals and beneath the ribs, depressed stylopodium, and obscure or obsolete ribs.

35. **Apiastrum.** Calyx-teeth obsolete. Fruit ovate or cordate, more or less tuberculate. Carpel with thin pericarp and no strengthening cells. Stylopodium minute, with short style. Oil-tubes 2 on the commissural side. Seed-face narrowly concave or sulcate.

(4). Fruit with concave seed-face, numerous oil-tubes, conical or depressed stylopodium, and filiform ribs.

36. **Musenium.** Calyx-teeth prominent. Fruit ovate or ovate-oblong. Carpel with equal filiform ribs, and thin pericarp with no distinct strengthening cells. Stylopodium depressed. Oil-tubes usually 3 in the intervals, very unequal in size (middle one largest), 2 to 4 on the commissural side. Seed-face broadly concave.

37. **Eulophus.** Calyx-teeth prominent. Fruit ovate to linear-oblong, glabrous. Carpel with equal filiform ribs, and thin pericarp with a very small group of strengthening cells beneath

each rib. Stylopodium conical, with long and recurved styles. Oil-tubes 1 to 5 in the intervals, 4 to 8 on the commissural side, and a small group in the parenchyma of the commissural sulcus. Seed-face broadly concave, with a central longitudinal ridge.

(5). Fruit with concave seed-face, no oil-tubes, conical or depressed stylopodium, and obsolete or filiform ribs.

38. **Anthriscus**. Calyx-teeth obsolete. Fruit linear, notched at base, long-beaked (in ours), glabrous. Carpel without ribs, but beak ribbed; pericarp thin, with neither strengthening cells nor oil-tubes. Stylopodium conical. Seed-face sulcate.

39. **Bupleurum**. Calyx-teeth obsolete. Fruit oblong, with rather broad commissure. Carpel with equal very slender or prominent ribs, each with a very small group of strengthening cells. Stylopodium prominent and flat. Oil-tubes wanting or continuous about seed-cavity. Seed-face plane or somewhat concave.

† † Carpels terete or slightly flattened laterally.

(1). Fruit linear-oblong, with concave seed-face, conical stylopodium, and prominent strengthening cells.

40. **Chærophyllum**. Calyx-teeth obsolete. Fruit narrowly oblong to linear, notched at base, with short beak or none. Carpel with equal ribs, each with a large group of strengthening cells usually occupying the whole thickness of the thick pericarp. Styles short. Oil-tubes small, mostly solitary in the intervals, 2 on the commissural side. Seed-face more or less deeply sulcate.

41. **Osmorhiza**. Calyx-teeth obsolete. Fruit linear to linear-oblong, more or less attenuate at base, acute above, glabrous or bristly on the ribs. Carpel slightly flattened dorsally or not at all, nearly pentagonal in section, with equal ribs, thin pericarp, and a well defined group of strengthening cells beneath each rib. Stylopodium sometimes depressed; styles long or short. Oil-tubes obsolete in mature fruit (often numerous in young fruit). Seed-face from slightly concave to deeply sulcate.

(2). Fruit with concave seed-face and depressed stylopodium.

(a.) Oil-tubes numerous.

42. **Velæa**. Calyx-teeth obsolete or prominent. Fruit oblong to orbicular, glabrous or pubescent. Carpel somewhat

flattened laterally, with prominent equal filiform ribs (the intermediates somewhat distant from the laterals), and a thin pericarp with a very small ill-defined group of strengthening cells beneath each rib. Oil-tubes conspicuous, 3 to 6 in the intervals, 4 to 10 on the commissural side (sometimes almost continuous). Seed terete; the face strongly involute, enclosing a central cavity.

43. **Museniopsis**. Calyx-teeth obsolete. Fruit oblong, glabrous. Carpel somewhat flattened laterally, with equal filiform ribs (the intermediates somewhat distant from the laterals), and a thin pericarp with ill-defined strengthening cells beneath the ribs. Oil-tubes 3 to 4 in the intervals, 4 on the commissural side. Seed terete; the face with a deep and narrow sulcus.

(b). Oil-tubes none.

44.* **Conium**. Calyx-teeth obsolete. Fruit ovate, glabrous. Carpel with prominent wavy ribs, each with a large bundle of strengthening cells. Oil-tubes none, but a layer of secreting cells next the seed. Seed face deeply and narrowly concave.

(3). Fruit with plane seed-face, depressed stylopodium, and numerous oil-tubes.

39. **Bupleurum** may be looked for here.

45. **Sium**. Calyx-teeth minute. Fruit ovate to oblong, glabrous. Carpel with prominent corky nearly equal ribs, each with a prominent group of strengthening cells at tip. Styles short. Oil-tubes 1 to 3 in the intervals (never solitary in all the intervals), 2 to 6 on the commissural side. Seed sub-angular.

(4). Fruit with plane seed-face, depressed stylopodium (or none), and solitary oil-tubes in all the intervals.

(a). Ribs broad and corky, without strengthening cells or nearly so.

46. **Apium**. Calyx-teeth obsolete. Fruit ovate or broader than long, glabrous. Carpel with prominent obtuse nearly equal ribs, and no strengthening cells. Stylopodium wanting or depressed. Oil-tubes 2 on the commissural side. Seed section round.

47. **Harbouria**. Calyx-teeth evident. Fruit ovate, with narrow commissure (carpels appearing nearly distinct), tuberculate-roughened. Carpel (round in section) with equal broad

obtuse very prominent ribs, a small group of strengthening cells in each; the narrow commissure prominently corky-thickened, partly divided by a groove. Stylopodium depressed or wanting. Oil-tubes large, 2 on the commissural side. Seed-section nearly round.

(b). Ribs filiform, with prominent strengthening cells.

48. **Aletes**. Calyx-teeth prominent. Fruit oblong, glabrous. Carpel with equal and prominent ribs. Stylopodium depressed. Oil-tubes large and solitary in the broad intervals, 2 on the commissural side, and a small one in each rib. Seed sulcate beneath the oil-tubes, with face plane or slightly concave. Acaulescent mountain plants.

49. **Zizia**. Calyx-teeth prominent. Fruit ovate to oblong, glabrous. Stylopodium wanting; styles long. Oil-tubes large and solitary in the broad intervals, 2 on the commissural side, and a small one in each rib. Seed terete, sulcate beneath the oil-tubes. Caulescent prairie and meadow plants.

(5). Fruit with plane seed-face, conical stylopodium, and solitary oil-tubes.

50. **Carum**. Calyx-teeth small. Fruit ovate or oblong, glabrous. Carpel with filiform or inconspicuous ribs, without strengthening cells. Oil-ducts 2 to 6 on the commissural side. Seed dorsally flattened, more or less sulcate beneath the oil-tubes; the face plane or slightly concave.

51. **Cicuta**. Calyx-teeth rather prominent. Fruit oblong to nearly orbicular, glabrous. Carpel with strong flattish corky ribs, the laterals largest, without strengthening cells. Oil-tubes 2 on the commissural side. Seed nearly terete or somewhat dorsally flattened.

52. **Cryptotænia**. Calyx-teeth obsolete. Fruit linear-oblong, glabrous. Carpel with obtuse equal ribs, each subtended by a very broad group of strengthening cells (2 groups also on the commissural side). Stylopodium slender conical. Oil-tubes solitary beneath each rib (as well as in the intervals), 2 to 4 on the commissural side. Seed somewhat sulcate beneath the oil-tubes.

53. **Leptocaulis**. Calyx-teeth obsolete. Fruit ovate,

bristly or tuberculate. Carpel with somewhat prominent or obsolete ribs, thickish pericarp, and prominent groups of strengthening cells. Stylopodium somewhat prominent. Oil-tubes 2 on the commissural side.

54. **Discopleura.** Calyx-teeth small or obsolete. Fruit ovate, glabrous. Carpel with dorsal and intermediate ribs filiform to broad and obtuse; the laterals very thick and corky, closely contiguous to those of the other carpel, forming a dilated obtuse or acute corky band; all subtended by strengthening cells. Oil-tubes 2 on the commissural side. Seed nearly terete (somewhat sulcate beneath the oil-tubes) or with a flattish face.

(6). Fruit with plane seed-face, conical stylopodium, and numerous oil-tubes.

55. **Berula.** Calyx-teeth minute. Fruit nearly round, emarginate at base, glabrous. Carpel nearly globose, with very slender inconspicuous ribs, thick corky pericarp, and no strengthening cells. Oil-tubes numerous and contiguous, closely surrounding the seed cavity. Seed terete.

56. **Ægopodium.** Calyx-teeth obsolete. Fruit ovate, glabrous. Carpel with equal filiform ribs (with broad and equal intervals), each containing strong groups of strengthening cells; pericarp with no oil-tubes, but with a layer of large parenchyma cells surrounding the seed-cavity (as in *Cryptotenia*). Stylopodium prominent. Carpel and seed-section nearly round.

(7). Fruit with plane seed-face, depressed stylopodium, no oil-tubes, and continuous band of strengthening cells about the seed-cavity.

57. **Bowlesia.** Calyx-teeth rather prominent. Fruit broadly ovate, with narrow commissure (carpels appearing nearly distinct), and stellate pubescence. Carpel turgid, becoming depressed on the back, with neither ribs nor oil-tubes; the whole dorsal region inflated, the seed-cavity being on the commissural side of the carpel-section. Seed flattened dorsally; the face and back plane or convex.

† † † Carpels (as well as fruit) strongly flattened laterally; stylopodium depressed.

58. **Hydrocotyle.** Calyx-teeth minute or obsolete. Fruit more or less orbicular. Carpel with 5 primary ribs (additional

secondary ones with reticulations in one species); the dorsal marginal, broad or filiform; intermediates filiform (rarely obsolete), usually curved; laterals filiform or broad, distinct from those of the other carpel or confluent; a prominent oil-bearing layer beneath the epidermis, occasionally containing small oil-tubes, usually a thick layer of strengthening cells surrounding the seed-cavity.

59. **Erigenia.** Calyx-teeth obsolete. Fruit nearly orbicular, notched at base and apex, glabrous, thin between the incurved carpels. Carpel with equal filiform ribs, very thin pericarp, and strengthening cells beneath the ribs. Oil-tubes 1 to 3 in the intervals, 9 to 11 on the commissural side (from which extends a prominent corky neck-like projection, meeting its fellow from the other carpel and forming the thin area between the curved carpels). Seed-face narrowly and deeply sulcate.

ARTIFICIAL KEY TO GENERA.

I. *Fruit prickly or scaly.*

* *Fruit prickly along the ribs: umbels compound: leaves pinnately decomposed.*

Stylopodium depressed or wanting.....DAUCUS, 1
Stylopodium conical.....CAUCALIS, 2

* * *Fruit without ribs, prickly or scaly all over.*

Flowers in a globose or oblong head: fruit with tuberculate scales: leaves mostly coriaceous and prickly.....ERYNGIUM, 29

Flowers in irregularly compounded umbels: fruit covered with hooked prickles: leaves mostly palmate, with toothed or incised lobes.....SANICULA, 30

Fruit covered with hooked prickles: leaves finely dissected.....LEPTOCAULIS, 53

II. *Fruit not prickly nor scaly.*

* *Fruit strongly flattened dorsally, with lateral ribs prominently winged.*

Oil-tubes solitary in the intervals.

Stylopodium conical.

- Slender and glabrous: leaves simply pinnate or reduced to petioles.....TIEDEMANNIA, 10
- Stout and pubescent: leaves large and ternately compound.....HERACLEUM, 11
- Stylopodium depressed.
- Caulесcent and branching.
- Flowers white.
- Slender: leaves pinnately dissected: dorsal ribs filiform: Texan.....EURYTENIA, 6
- Stout: leaves ternately or pinnately compound: dorsal ribs prominent.....ANGELICA, 7
- Stout: leaves pinnately decompound: dorsal ribs winged.....SELINUM, 8
- Flowers yellow.....PASTINACA, 12
- Acaulescent or nearly so.....PEUCEDANUM, 16
- Oil-tubes more than one in the intervals.
- Caulесcent and branching.
- Dorsal ribs obsolete; laterals corky thickened: flowers yellow.....POLYTENIA, 13
- Dorsal ribs prominent; laterals not corky thickened: flowers white.
- Leaves ternately or pinnately compound..... ANGELICA, 7
- Leaves much more compounded.... CONIOSELINUM, 9
- Acaulescent or nearly so.
- Lateral wings corky-thickened: dorsal ribs filiform.
- Dwarf, with small pinnate or lobed leaves..... COLOPTERA, 14
- Tall and stout, with large pinnately decompound leaves.....LEPTOTENIA, 15
- Lateral wings membranous: dorsal ribs filiform.....PEUCEDANUM, 16
- Lateral wings thickened; dorsal ribs very prominent or slightly winged..... PSEUDOCYOPTERUS, 17
- * * *Fruit not strongly flattened dorsally (usually somewhat laterally flattened).*
- Oil-tubes none.
- Seed-face concave.
- Stylopodium conical.
- Fruit linear-oblong, glabrous... ANTHRISCUS, 38
- Fruit linear-oblong, bristly.....OSMORHIZA, 41
- Fruit of nearly distinct globose carpels.....BIFORA, 4
- Stylopodium depressed.
- Leaves simple and perfoliate.....BUPLEURUM, 39
- Leaves large and decompound.....CONIUM, 44
- Seed-face plane.
- Leaves simple and lobed: southwestern.....BOWLESIA, 57
- Leaves biternate: introduced at the east.....ÆGOPIDIUM, 56

Oil-tubes solitary in the intervals.

Stylopodium conical.

Leaflets (at least the upper) linear to filiform.

Involucre wanting; introduced.

Flowers white.....CORIANDRUM, 5

Flowers yellow.....FÆNICULUM, 32

Involucre present: flowers white (excepting *Ammose'inum*).

Low and diffuse, with ternately divided leaves...AMMOSELINUM, 31

Leaves finely dissected.

Fruit linear-oblong; involucrel bracts few and

linear.....TREPOCARPUS, 3

Fruit ovate; involucre foliaceous.....DISCOPLEURA, 54

Fruit ovate, tuberculate.....LEPTOCAULIS, 53

Leaves with few leaflets.

Lateral ribs thick and corky; southern.....CYNOSCIADIUM, 28

Ribs all filiform; western.....CARUM, 50

Leaflets broader.

Seed-face concave.....CHÆROPHYLLUM, 40

Seed-face plane.

Fruit oblong to orbicular... ..CICUTA, 51

Fruit linear-oblong... ..CRYPTOTÆNIA, 52

Stylopodium depressed.

Flowers white.

Fruit with all the ribs conspicuously winged.....CYMPTERUS, 18

Fruit with equal, broad and corky ribs, and no strengthening cells.

Fruit small (not over a line long), flattened laterally.....APIUM, 46

Fruit larger, ovoid-globose... ..ÆTHUSA, 23

Fruit with thick corky lateral ribs and filiform dorsals, all with strengthening cells: aquatic.

Leaves reduced to hollow jointed petioles.....CRANTZIA, 26

Leaves pinnate or decomposed; western.....CENANTHE, 27

Fruit with obscure or obsolete ribs... ..APIASTRUM, 35

Flowers yellow.

Fruit with ribs conspicuously winged.

Low and often caespitose, with finely divided

leaves: western.....CYMPTERUS, 18

Tall and branching, with larger, more coarsely

divided leaves... ..THASPIUM, 20

Fruit with equal, broad and corky ribs: Rocky Mts.

Low, caespitose: high alpine.....OREOXIS, 22

Foot or more high: in the foot-hills.....HARBOURIA, 47

Fruit with filiform ribs.

Tall and branching, with broad leaflets: mostly

eastern.....ZIZIA, 49

- Acaulescent and caespitose: Rocky Mts.....ALETES, 48
- Oil-tubes more than one in the intervals.
- Stylopodium conical.
- Fruit oblong or ovate, with prominent equal ribs...LIGUSTICUM, 21
- Fruit ovate to linear-oblong, with equal filiform ribs....EULOPHUS, 37
- Fruit round, with globose carpels, and very slender
inconspicuous ribs.....BERULA, 55
- Stylopodium depressed.
- Seed-face decidedly concave: fruit with all the ribs
filiform.
- Carpels flattened dorsally.....MUSENIUM, 36
- Carpels terete.
- Seed-face involute, enclosing central cavity.....VELÆA, 42
- Seed-face with a deep and narrow sulcus....MUSENIOPSIS, 43
- Seed-face plane or but slightly concave.
- Fruit with all the ribs conspicuously winged....PHELLOPTERUS, 19
- Fruit with prominent equal corky ribs.
- Fruit not flattened either way.....CÆLOPLEURUM, 24
- Fruit flattened laterally.....SIUM, 45
- Fruit with thick corky lateral ribs and filiform
dorsals and intermediates.... OROGENIA, 25
- Fruit with all the ribs filiform.
- Very small, acaulescent, high alpine plant.....PODISTERA, 33
- Caulescent, low ground plants.....PIMPINELLA, 34
- * * * *Fruit strongly flattened laterally.*
- Marsh or aquatic plants, with simple leavesHYDROCOTYLE, 58
- Rich ground vernal plants, with ternately compound
leaves... ..ERIGENIA, 59

SYNOPSIS OF SPECIES.

1. DAUCUS Linn. Gen. n. 333.—Bristly annuals or biennials, with pinnately decomposed leaves, foliaceous and cleft involucrel bracts, involucels of entire or toothed bractlets, and white flowers in concave umbels (connivent in fruit).

1. *D. pusillus* Michx. Fl. i. 164. Stems retrorsely papillate-hispid, from an inch to two feet high: leaves finely dissected into narrowly linear segments; umbels unequally few to many-rayed; rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels very unequal, from 8 lines long to almost wanting: fruit $1\frac{1}{2}$ to $2\frac{1}{2}$ lines long. (Fig. 1.)

Ranging across the continent from the S. Atlantic states to S. California, and along the Pacific coast to Vancouver Island (*Macoun*) and Nootka Sound (*Scouler*).

The varieties *microphyllus* and *scaber* depend entirely upon the varying character of the hairs, a character not to be relied upon. This species is evidently the American representative of the widely distributed *D. Carota* L.

D. CAROTA L., the cultivated carrot, has become extensively naturalized. The stems are bristly, leaves more coarsely divided (the ultimate segments lanceolate and cuspidate), umbels with more numerous and elongated rays and more prominent involucre, and fruit generally larger.

2. **CAUCALIS** Linn. Gen. n. 331.—Mostly hispid annuals, (ours) with pinnately dissected leaves (with very small segments), and white flowers. The primary lateral ribs are pushed around upon the commissural face, making a very narrow commissure, while the adjoining secondary ribs become marginal. Closely resembles *Daucus*.

1. **C. microcarpa** Hook. & Arn. Bot. Beechey, 348. Erect, slender, 3 to 15 inches high, nearly glabrous: leaves much dissected, slightly hispid: umbels at the ends of stem and branches, very unequally 3 to 6-rayed, with involucre of foliaceous divided bracts, and involucels of entire or somewhat divided bractlets; rays slender, 3 inches or less long; pedicels very unequal: fruit oblong, 2 to 3 lines long, armed with rows of hooked prickles; the primary lateral ribs near the margin of commissural face. (Fig. 2.)

Washington Territory (*Saksdorf*), Oregon (*Henderson*), California, and Arizona (*Palmer, Pringle*). Fl. April and May.

C. NODOSA Hudson. Decumbent, branching only at base, stems 1 or 2 feet long, retrorsely hispid: umbels naked, opposite the leaves and nearly sessile, of 2 or 3 very short rays: fruit ovate-oblong, a line long, entirely covered with rough tubercles or usually with stout barbed or hooked prickles; the primary lateral ribs near the very narrow commissure. (Fig. 3.)

Native of Europe and N. Africa, introduced into Chili and Peru, and thence into California; Texas (*Hall*); ballast ground, Port Eads, Louisiana (*Langlois*); near Baltimore (*Foreman*); ballast ground near Philadelphia (*Martindale*); near Ames, Iowa (*Burgess*).

C. ANTHRISCUS Hudson, with 1-2-pinnate leaves and broad

leaflets, and more regularly compounded umbels, seems to be naturalized near Buffalo, N. Y. (*G. W. Clinton*), Cincinnati, Ohio (*C. G. Lloyd*, Bot. Gazette, iv. 148), and Painesville, Ohio (*W. C. Werner*).

C. LATIFOLIA L., with pinnate leaves having few subpinnatifid leaflets, and large spiny fruit, has been found on ballast ground near Philadelphia (*I. C. Martindale*).

3. *TREPOCARPUS* Nutt. in DC. Mem. Umbel. 56.—Glabrous annuals, with thin pinnately decompound leaves and linear segments, lateral few-rayed umbels opposite the leaves, involucre and involucels of few linear entire or divided bracts, and white flowers.

1. *T. Æthusæ* Nutt. l. c. From a few inches to 3 feet high; umbels 2 to 5-rayed; umbellets few-flowered, with very short pedicels: fruit 4 or 5 lines long. (Fig. 4.)

Prairies, from Arkansas to Louisiana, Texas, and Indian Territory. Fl. June and July.

4. *BIFORA* Hoffm. Umb. Gen. 191.—Slender smooth annuals, with leaves pinnately dissected into filiform segments, involucre and involucels of few small bracts, and white flowers in few-rayed umbels.

1. *B. Americana* Benth. & Hook. Gen. Pl. i. 926. A foot or more high, branching above, rays and angles of stems (especially summit of internodes) roughened with minute callous points: umbels 5 to 8-rayed; rays 6 to 9 lines long; pedicels about a line long: fruit $1\frac{1}{2}$ lines long, $2\frac{1}{2}$ lines broad. (Fig. 5.)—*Atrema Americana* DC.

Dry ground, mostly in Texas, and extending into Arkansas. The reference of this species to Missouri (*Tracy*), in Bot. Gazette, xii. 295, was a mistake.

B. RADIANS Bieb, from the Mediterranean region, has been collected on ballast near Philadelphia, Penn. (*Martindale*) and Providence, R. I. (*Bennett*)

5. *CORIANDRUM* Linn. Gen. n. 356.—Annual slender branching glabrous herbs, with pinnately compound leaves, no

involucre, involuclcs of several small narrow bractlets, and white flowers.

C. SATIVUM L., the common coriander, native of the E. Mediterranean region, and extensively cultivated. Lowest leaves with broadly ovate or cuncate deeply cut segments.

Said to be "naturalized" around Santa Fe, New Mexico (*Gray*, Plant. Fendl. 57) and "introduced" in Unionville Valley, Nevada (*Watson*, Bot. King's Exped. 131). Also collected in foothills of Rocky Mts., in Colorado (*Parry*), and in San Diego county, California (*Lyon*). Commonly escaped from cultivation. Also collected on ballast near Philadelphia, Penn. (*Martindale*), and Portland, Oregon (*Henderson*).

6. *EURYTÆNIA* Torr. & Gray, Fl. i. 633.—Glabrous branching herbs, with pinnately dissected leaves, involucre and involuclcs of cleft bracts, and white flowers.

This genus closely resembles *Discopleura*, but seems sufficiently distinct in its more flattened carpels, thick winged lateral ribs, depressed stylopodium, and remarkably broad oil-tubes, which on the commissural face are not tubes at all, but broad reservoirs. The fruit characters also resemble those of *Peucedanum*, but the thick lateral wings easily distinguish it, while the general habit is very different from that of our American species of *Peucedanum*. In the thick lateral wings it approaches *Leptotænia*, but the prominent dorsal and intermediate ribs, as well as the broad and solitary oil-tubes, separate it from that genus.

1. *E. Texana* Torr. & Gray, l. c. From 1 to 2½ feet high: leaflets long, narrowly linear to oblong, serrate or toothed: umbels 8 to 15-rayed; rays 1 or 2 inches long; pedicels very short: fruit two lines long. (Fig. 6.)—*E. macrophylla* Buckl. Proc. Acad. Philad. 1861, 455.

Texas (*Drummond*, Hall 256, *Reverchon* 1029). Fl. June.

7. *ANGELICA* Linn. Gen. n. 347.—Stout perennials, with ternately or pinnately compound leaves, scanty involucre or none, involuclcs of small bractlets or none, and large terminal umbels of white (greenish-yellow in *A. pinnata*) flowers.—Incl. *Archangelica* Hoffm., excl. *A. Gmelini* DC.

Archangelica is referred to this genus by Maximowicz, Bull. Acad. Petersb. xix. 273. The characters used to separate *Angelica* from *Archangelica* are its solitary oil-tubes and adherence of the seed to the pericarp, and these are found to be unreliable (for details as to eastern species see Botanical Gazette, xii. 60), especially among western species, nearly half of which have two oil-tubes in the intervals.

* *Oil-tubes solitary in all the intervals: western species.*

1. **A. pinnata** Watson, King's Rep. v. 126. Glabrous: stem 2 to 3 feet high: leaves simply pinnate, with 2 to 4 pairs of ovate to narrowly lanceolate sharply serrate to entire leaflets (lowest pair sometimes pinnate): umbels 10 to 20-rayed, with neither involucre nor involucels; rays 2 to 4 inches long; pedicels 2 lines long; flowers greenish-yellow or dull purple: stylopodium slightly conical: fruit oblong, glabrous (at maturity), 2 to 3 lines long; dorsal and intermediate ribs thick and prominent; laterals with wings hardly as broad as body: oil-tubes 4 on the commissural side: seed-face somewhat concave. (Fig. 7.)

In the Wahsatch and Uinta Mountains, 7-10,000 feet altitude, and Yellowstone Park (*Tweedy* 3). Fl. July and August.

A doubtful *Angelica*, its pinnate leaves, thick dorsal ribs, and greenish-yellow or dull-purple flowers, all contradicting the usual characters of the genus.

2. **A. genuflexa** Nutt. Torr & Gray, Fl. i. 620. Glabrous, except the more or less rough pubescent inflorescence, 2 to 4 feet high: leaves once to twice ternate, the divisions often deflexed; leaflets ovate to lanceolate, more or less acuminate, irregularly and sharply serrate: umbel equally many-rayed, with no involucre, and involucels of numerous linear bractlets; rays an inch or more long; fruiting pedicels 4 to 6 lines long: fruit nearly round, emarginate at base and apex, glabrous; lateral wings broader than body: oil-tubes 2 on the commissural side: seed-face plane (Fig. 8).—*Archangelica peregrina* Nutt.

In wet places, Oregon, Washington Territory, and Vancouver Island (*Macoun*). Fl. July and August.

Upon consulting Nuttall's type specimens of this species, and of his *Archangelica peregrina*, the latter being in especially good condition in the Torrey Herbarium, it becomes very evident that they are the same and that *A. peregrina* is not a synonym of *Colopleurum Emelini*, as has been supposed. They are both from his "Wappatoo Island" station. This is also *Tweedy* 280 from the Cascade Mts., Wash. Terr., distributed as a probable form of *A. tomentosa*, and mixed with fruit of *A. arguta*.

3. **A. Lyallii** Watson Proc. Am. Acad. xvii. 374. Glabrous throughout, stout, 4 or 5 feet high: leaves once or twice ternate then quinate, the uppermost reduced to large inflated petioles; leaflets ovate to lanceolate, acute or acutish, unequally dentate: umbel (sometimes puberulent) unequally many-rayed,

with neither involucre nor involucels; rays $\frac{1}{2}$ to 4 inches long; fruiting pedicels thick, a line or less long (rarely 2 or 3 lines): fruit oblong to obovate, glabrous, 2 to 3 lines long; dorsal and intermediate ribs as in the last, but even less prominent; lateral wings as broad as body or broader: oil-tubes 2 on the commissural side (distant): seed-face broadly concave. (Fig. 9.)

In the mountains near the British boundary, Washington Territory (*Lyll, Suksdorf* 761, *Henderson* 383, *Brandegee* 796), Idaho (*Leiberg*), and Montana (*Watson* 157, *Cunby* 146, *Scribner* 65); also summit of S. Kootenai Pass, B. C. (*Dawson*), and Oregon (*Nevius*)

4. **A. tomentosa** Watson, Proc. Am. Acad. xi. 141. Stout, hoary-tomentose throughout with rather fine tomentum, or the stem glabrous: leaves quinate then once or twice pinnate; leaflets thickish, ovate, acute, oblique at base, 2 to 4 inches long, unequally and sharply serrate or toothed: umbel somewhat equally many-rayed, with neither involucre nor involucels: rays 1 to 4 inches long; pedicels 4 to 6 lines long; fruit oblong-elliptical, glabrous or nearly so, 3 to 4 lines long, 2 to $2\frac{1}{2}$ lines broad; dorsal and intermediate ribs small and acutish; lateral wings thin, about as broad as body: oil-tubes 2 on the commissural side: seed somewhat sulcate beneath the oil-tubes, with plane face.

In the Coast Ranges, from Mendocino county, California, to the San Bernardino Mts. (*Parish* 988). Fl. August.

5. **A. arguta** Nutt. Torr & Gray, Fl. i. 620. Glabrous, except the sometimes minutely puberulent inflorescence, stout, 2 to 4 feet high: leaves ternate then pinnate or bipinnate; leaflets mostly small, ovate to lanceolate, rather acute, serrate: umbel rather equally many-rayed, with neither involucre nor involucels; rays 1 to 3 inches long; pedicels 3 to 5 lines long; fruit oblong-elliptical, glabrous, 3 to 4 lines long; dorsal and intermediate ribs thick and slightly elevated; lateral wings very corky, thick, and as broad as the much flattened body or broader: oil-tubes 2 on the commissural side (distant, or sometimes 4 in 2 distant pairs): seed sulcate beneath the oil-tubes, with plane face. (Fig. 10.)

Oregon and Washington Territory.

This plant was reported by Nuttall from "Fort Vancouver, Oregon," and then lost sight of, being confused with *A. genuflexa*. An examination of the type (in good fruit in the Torrey Herbarium) abundantly confirms

our conclusions given in Botanical Gazette, xiii. 80, and we find the plant to have been discovered by *Howell* in 1882 and *Suksdorf* in 1883 at the base of Mt. Adams, Washington Territory; also by *Henderson* (382) in 1884 along Hood River, Oregon, where it was also collected by *Howell* in 1886. In all these collections the plant was distributed as *A. genuflexa*. A fruiting head of this species, collected by *Tweedy* in the Cascade Mts., Wash. Terr., is mixed with the distribution of his *A. genuflexa*, 280.

6. **A. Hendersoni** C. & R. Bot. Gazette, xiii. 80. Very stout, densely tomentose throughout, especially the inflorescence and whitened lower surfaces of the leaves: leaves quinate then pinnate; leaflets thick, broadly ovate, 3 to 4 inches long, 2 to 3 inches broad, obtuse, serrate: umbel equally many-rayed, with no involucre, and involucels of numerous linear-acuminate bractlets; rays 1 to 2 inches long; pedicels a line or less long: fruit oblong, more or less pubescent, 3 lines long; dorsal and intermediate ribs prominent; lateral wings thick and corky, as broad as body: oil-tubes 2 on the commissural side: seed deeply sulcate beneath the oil tubes, with plane face.

Bluffs moistened by sea spray, Ilwaco (Long Beach), Washington Territory, August 5, 1885 (*Henderson* 2158). Probably near San Francisco (*Kellogg* in 1866), but only in flower.

7. **A. Dawsoni** Watson, Proc. Am. Acad. xx. 369. Glabrous or nearly so, rather slender, 1 to 3 feet high, with simple stem: radical leaves biternate; leaflets lanceolate, 1 to 2 inches long, sharply and finely serrate, acute or acuminate, terminal one sometimes deeply 3-cleft; cauline leaves (1 or 2 or none) similar: umbel solitary, conspicuously involucrate with numerous foliaceous lacerately toothed bracts nearly equalling the rays, involucels similar; rays about an inch long or less: fruit glabrous, $2\frac{1}{2}$ lines long.

In the Rocky Mts. near the British boundary, at 6,500 feet altitude (*Lyll*, in 1861); and on the slopes of N. Kootenai Pass (*Dawson* 2155, in 1883). Fl. July.

This species has not been collected with mature fruit, but in the type specimens the immature fruit indicates that the dorsal and intermediate ribs may become more or less winged. In this case, the species, with dorsal wings and large involucels, is more like *Selinum* than *Angelica*, in which genus the discovery of mature fruit may place it.

* * *Oil-tubes in pairs in some of the intervals: western species (excepting A. Curtisii).*

8. **A. Breweri** Gray, Proc. Am. Acad. vii. 348. Glabrous or somewhat puberulent (especially in the inflorescence), 3 to 4 feet high: leaves ternate or quinate then pinnate; leaflets lanceolate or oblong-lanceolate, acuminate, 2 to 5 inches long, sharply serrate with cuspidate teeth; the lower sometimes lobed at base: peduncles often with dilated bracts: umbel many-rayed, with neither involucre nor involucels (or with a few deciduous bractlets); rays 2 to 3 inches long; pedicels 2 to 4 lines long: stylopodium conical, with long style: fruit oblong, pubescent or becoming glabrous, 4 to 6 lines long, and 2 to 3 lines broad; dorsal and intermediate ribs more or less prominent; lateral wings narrow and as thick as the flattened body: oil-tubes 1 or 2 in the intervals, 2 to 4 on the commissural side: seed deeply sulcate beneath the oil-tubes; the face more or less concave, with sometimes a central longitudinal ridge. (Fig. 11.)

California, in the Sierra Nevada, from Plumas county (*Mrs. R. M. Austin*), and Nevada county (*Jones* 2584), to the Upper Stanislaus (*Hooker & Gray*, in 1877), and Ebbett's Pass and the Big Tree road (*Bolander, Torrey, Brewer*); also N. W. Nevada (*Watson*).

9. **A. leporina** Watson, Proc. Am. Acad. xii. 252. Tall and stout, glabrous: leaves bipinnate; leaflets linear-lanceolate to lanceolate, acuminate, coarsely toothed to entire, 1 to 3 inches long: umbel very unequally 10 to 25-rayed, with neither involucre nor involucels (or with a few deciduous bractlets); rays somewhat scabrous, $\frac{1}{2}$ to 3 inches long; pedicels thick, 2 to 3 lines long: fruit glabrous, about $1\frac{1}{2}$ lines long; dorsal and intermediate ribs prominent; lateral wings narrower than body: oil-tubes solitary in the intervals, or the lateral in pairs, 2 or 4 on the commissural side: seed-face plane. (Fig. 12.)

S. Utah (*Ward, Palmer* 183).

10. **A. lineariloba** Gray, Proc. Am. Acad. vii. 347. Stout, glabrous, 2 to 3 feet high: leaves twice or thrice quinate; leaflets linear, 1 to 2 inches long, cuspidately acuminate, entire or the lower ones 3-parted with the decurrent sometimes coarsely toothed lobes divaricate: umbels with neither involucre nor involucels; rays 1 to 2 inches long: fruit oval-oblong, glabrous, 4 lines long, 2 lines broad; dorsal and intermediate ribs filiform; lateral wings thickish, a little narrower than the body: oil-tubes solitary in the

dorsal intervals, in pairs in the laterals: seed sulcate beneath the oil-tubes, face nearly plane.

California, Mono Pass (*Bolander*), and in the S. Sierra Nevada (*Rothrock*).

11. **A. Wheeleri** Watson, Am. Naturalist, vii. 301. Tall and stout, roughly pubescent: leaves biternate; leaflets ovate-oblong, 2 to 3 inches long, acute, incisedly serrate, the teeth broad and mucronulate, middle leaflet petiolulate: umbel unequally many-rayed, with neither involucre nor involucels; rays becoming 2 to 5 inches long; pedicels hispid: fruit broad-elliptical, 3 lines long, somewhat pubescent; the dorsal and intermediate ribs thick, narrower than the lateral ones: oil-tubes solitary in dorsal intervals, in pairs in the laterals, 4 on the commissural side: seed-face deeply concave (more so than usual in *Angelica*). (Fig. 13.)

Utah (*Wheeler*).

12. **A. Canbyi**. Glabrous throughout except the puberulent inflorescence, 2 to 3 feet high: leaves bipinnate; leaflets lanceolate to ovate-lanceolate, 1 to 2 inches long, acute or acuminate, laciniately toothed: umbel rather equally 10 to 20-rayed, with neither involucre nor involucels; rays 1 to 2 inches long; pedicels slender, 3 to 4 lines long; flowers pinkish: stylopodium conical: fruit oblong, glabrous at maturity (pubescent when young), $2\frac{1}{2}$ lines long; dorsal and intermediate ribs thin and very prominent, somewhat winged; lateral wings rather thin, half as broad as body: oil-tubes solitary in dorsal intervals, in pairs in the laterals, 4 on the commissural side: seed-face plane. (Fig. 14.)

Washington Territory, August, 1883 (*Brandege* 796 $\frac{1}{2}$ in Canby's N. Transcontinental Survey), low grassy grounds along streams, Klickitat River, near Mt. Adams, June 26, 1885, in flower, August in fruit (*Suksdorf* 638 and 763); Oregon, Waldo (*Howell* 706).

Mr. Suksdorf writes that this species is a much earlier bloomer than *A. genuflexa* or *A. Lyallii*.

13. **A. Curtisii** Buckley, Am. Jour. Sci. 1. xlv. 173. Glabrous, 2 to 3 feet high: leaves twice ternate or the divisions pinnate, the uppermost mostly reduced to large inflated petioles; leaflets thin, ovate-lanceolate (1 to 3 inches broad), sharply and irregularly toothed: umbel (somewhat pubescent) equally 15 to 25-rayed, with no involucre, and involucels of subulate bractlets; rays 2 to 3 inches long; pedicels 4 to 6 lines long: fruit broadly

oblong, glabrous, 2 to 4 lines long, emarginate at base; dorsal and intermediate ribs acute and prominent, often somewhat winged; lateral wings thin, broader than body: oil-tubes mostly solitary in the intervals (sometimes 2 or 3), 2 to 6 on the commissural side: seed-face plane. (Fig. 15.)

Along the Alleghanies, from Pennsylvania to North Carolina. Fl August.

* * * *Oil-tubes three to many in the intervals: eastern species.*

14. **A. hirsuta** Muhl. Cat. 2 ed. 30. Tomentose above, 2 to 5 feet high: leaves twice or thrice pinnately or ternately divided (the uppermost mostly reduced to large inflated petioles); leaflets thickish, lanceolate to oblong (half to about an inch broad), serrate: umbel equally many-rayed, with no involucre, and involucels of linear bractlets; rays 1 to 2 inches long; pedicels 2 lines long: fruit nearly round, pubescent, 2 lines in diameter; dorsal and intermediate ribs prominent; lateral wings thin, as broad as body: oil-tubes 3 to 6 in the intervals (sometimes 1 or 2), 6 to 10 on the commissural side: seed-face plane. (Fig. 16.) *Archangelica hirsuta* Torr. & Gray, i. 622.

Dry ground, Canada to Florida, and westward to Minnesota and Tennessee.

15. **A. dentata** C. & R. Bot. Gazette, xii. 61. Slender, glabrous, 1 to 3 feet high: leaves ternate, with long slender petioles and few leaflets, which are small ($\frac{1}{2}$ to 1 inch long), lanceolate, coarsely toothed or lobed: umbel (slightly pubescent) equally 5 to 10-rayed, with no involucre, and involucels of subulate bractlets; rays about an inch long; pedicels 3 to 4 lines long: fruit broadly oblong, glabrous or pubescent, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines long; dorsal and intermediate ribs more or less prominent; lateral wings thin, as broad as body: oil-tubes about 20 and continuous, 8 of them on the commissural side: seed-face plane. (Fig. 17.)—*Archangelica dentata* Chapman, Torr. & Gray, Fl. i. 622.

Dry pine barrens, Florida. Fl. July to November.

16. **A. atropurpurea** L. Spec. 251. Very stout, smooth, with dark purple stem, 4 to 6 feet high: leaves ternate then pinnate; leaflets ovate to lanceolate (1 to 3 inches long), sharply cut mucronate-serrate: umbel (glabrous) equally 15 to 25-rayed, with

no involucre, and involucels of few short subulate bractlets; rays 1 to 3 inches long; pedicels 5 to 8 lines long: fruit oblong, glabrous, 3 lines long; dorsal and intermediate ribs very prominent, lateral wings thin, about half as broad as body: oil-tubes 25 to 30 and continuous, 8 to 10 of them on the commissural side: seed-face plane. (Fig. 18.)—*Archangelica atropurpurea* Hoffm. Umbel. 161.

Low river banks, from Labrador to Delaware, and westward to Illinois and Minnesota. Fl. June.

A. LUCIDA L. is referred to Canada by Cornuti, upon whose authority alone it stands as a North American species. It has long been cultivated in Europe, but its existence as a member of our flora is so very improbable that we do not include it. See Torr. & Gray, Fl. i. 621.

A. VERTICILLATA Hook. is a very uncertain species, and judging from the description given (which is the only information accessible) Mr. Watson thinks it probably belongs to some other genus. See Watson Proc. Am. Acad. xvii. 374.

8. SELINUM Linn. Gen. n. 337.—Tall stout branching perennials, with pinnately decomposed leaves, few-leaved involucre, involucels of numerous narrow or broad bractlets, and white flowers.

This genus is considered hard to distinguish from *Ligusticum*, but with our own species there is no such trouble. *Ligusticum* is characterized by its fruit having equal ribs, numerous small oil-tubes, and prominent conical stylopodium, as well as by its leaves being always ternate in their primary divisions. *Selinum*, on the other hand, has fruit more winged, the lateral wings being the broadest, prominent solitary oil-tubes, usually depressed stylopodium, and mostly pinnately compound leaves. The genus seems more nearly allied to *Angelica*, through such a species as *Selinum Hookeri*. The important distinctions are that the dorsal and lateral ribs of *Selinum* are decidedly and equally winged, sometimes nearly as much so as the laterals; while the dorsal ribs of *Angelica* are not at all winged, except such irregular winging as occurs in *A. Curtisii*. The leaves of *Selinum* are, as a rule, pinnate; while those of *Angelica* (with the single exception of *A. pinnata*, which can hardly be considered a typical *Angelica*) are ternate, at least in their primary divisions. In *Angelica* the bractlets, if any, are small and very narrow; while in *Selinum* they are frequently prominent and sometimes broad. *Selinum* usually has, also, a less flattened carpel, and always strictly solitary oil-tubes.

1. **S. capitellatum** Benth. & Hook. Gen. Plant. i. 915. Very stout, 1 to 5 feet high, smooth except the tomentose inflorescence: leaves large, with much dilated petioles, bipinnate, the few leaflets oblong to linear-lanceolate, an inch or two long, coarsely laciniately toothed or lobed: umbel equally 6 to 15-rayed, with globose umbellets of sessile pubescent flowers having involucels of a few deciduous bractlets; rays 1 or 2 inches long: fruit sessile on a dilated receptacle, hirsute, cuneate-obovate, 3 lines long; lateral wings broader than dorsal and intermediates. (Fig. 19).—*Sphænosciadium capitellatum* Gray, Proc. Am. Acad. vi. 536.

Along stream banks in the Sierra Nevada of California, Nevada, and S. E. Oregon. California (*Lemmon*), St. Jacinto Mts. (*Parish* 986), Yosemite (*C. S. Sargent*), Ebbett's Pass (*Brewer*), Upper Carson Valley (*Hooker & Gray*), Butte county (*Mrs. Bidwell*), Donner Pass (*Torrey*), Donner Lake (*Sonne* 122), Nevada county (*Jones* 2582), Plumas county (*Mrs. Austin*, *Mrs. Ames*, *Cleveland*); Nevada, near Carson City (*Dr. Anderson*); E. Oregon (*Henderson*), Eagle Mts. (*Cusick* 1392).

2. **S. Kingii** Watson, King's Rep. v. 126. Smooth (except the slightly pubescent inflorescence), 1 to 2 feet high: lower leaves bipinnate, the upper nearly simply pinnate, with dilated petioles; leaflets ovate or linear-lanceolate, 1 to 3 inches long, coarsely and unequally serrate; umbel 5 to 10-rayed, with no involucels; pedicels 2 to 3 lines long: fruit broadly ovate, hispid, 2 to 3 lines long; lateral wings broader than the narrow dorsal and intermediate ones.

An aquatic, first collected in the mountains of N. Nevada, 6,000 feet altitude (*Watson* 456); since collected in S. Utah or N. Arizona (*Palmer* 183); California, Saw Mill Canon, Monitor Range, 9,000 feet altitude (*Phillips & Sargent*, in 1878); Washington Territory, Mt. Adams (*Henderson*, in 1883).

The species simulates *Angelica Breweri* in general appearance.

3. **S. Pacificum** Watson, Proc. Am. Acad. xi. 140. Leaves ternate then pinnate; the ovate acutish segments an inch long, laciniately toothed and lobed: umbel (on stout peduncle) about 15-rayed, with a conspicuous involucre of 2 or 3 lobed and toothed leaflets an inch long and equalling the rays, and involucels of several narrowly linear entire or 3-toothed bractlets equalling the flowers; pedicels 2 to 4 lines long: fruit oblong, smooth, 3 or 4 lines long, 1½ lines broad, with rather narrow thin wings: rarely an additional small oil-tube in a lateral interval.

The only reported station is Saucelito Hills, near San Francisco, California (*Kellogg & Harford*).

4. **S. Dawsoni** C. & R. Bot. Gazette, xiii. 144. A foot or so high, glabrous: leaves ternate then pinnate, the small ($\frac{1}{4}$ to $\frac{1}{2}$ inch long) ovate acute segments laciniately toothed to entire: umbel with involuclers of linear-oblong scarious bractlets longer than the pedicels and abruptly ending in a long attenuation; pedicels 1 to 2 lines long: fruit oblong, smooth, about 2 lines long, with prominent wings, the lateral ones but little broader; rarely an additional small oil-tube in a lateral interval: seed hardly at all dorsally sulcate. (Fig. 20.)

Pelly River, at Pelly Banks, Yukon, lat. 61°, August 11, 1887 (*Dawson* 23).

This interesting species is quite distinct from all other species of *Selinum* in its leaf and involucler characters, as well as in the prominent thin wings of the fruit.

5. **S. Grayi** C. & R. Bot. Gazette, xiii. 144. Stout, sometimes very much so, 1 or 2 feet high, glabrous except the more or less scabrous inflorescence, leaf-margins and veinlets (beneath): leaves once or twice pinnate, with much dilated petioles; leaflets oblong to ovate, about an inch long, acute, toothed (sometimes laciniately toothed or lobed): umbel with involuclers of conspicuous lanceolate-ovate long-acuminate bractlets; rays 1 to 2 inches long; pedicels 1 to 2 lines long: fruit oblong, smooth, 2 to $2\frac{1}{2}$ lines long, with prominent thin wings; the laterals decidedly broadest: seed-face dorsally sulcate. (Fig. 21.)—*Archangelica Gmelini* of Fl. Colorado and Coulter's Rocky Mt. Manual.

High mountains of Colorado (*Parry* 154, *Vasey* in 1868, *Canby* in 1871, *Coulter*, *Wolf & Rothrock* in 1873, *Letterman* in 1884, *Trelease* in 1886, etc.)

This plant has always been distributed as *Archangelica Gmelini*, having been wrongly referred to that species. So far as we have seen, most of the *Archangelica Gmelini* reported from Colorado is this species. Its general habit resembles that of an *Angelica* somewhat, but its fruit characters are very different and are entirely those of *Selinum*.

6. **S. Benthami** Watson, Bibl. Index Polypet. 432. Glabrous throughout: leaves ternate then pinnate, the oblong to linear-oblong acute segments $\frac{1}{2}$ to $\frac{3}{4}$ inch long, laciniately toothed or lobed to entire: umbels on stout peduncles, 10 to 15-rayed, with an involucre of a few linear setaceous bracts, and involuclers of several

elongated linear entire bractlets equalling the flowers or longer; rays about one inch long; pedicels 2 to 3 lines long; fruit ovate, 2 lines long, often with a single prominent calyx-tooth; oil-tubes (in immature fruit) obscure; seed apparently not dorsally sulcate. — *Conioselinum Fischeri* of authors, in part.

Alaska (early explorers, *Rothrock*); Unalaska and Shumagis (*Harrington* in 1871-72); Behring Islands (*Stejneger* in 1882); Queen Charlotte's Islands, B. C., July 15, 1878 (*Dawson*); also "Arctic shores and mountain slopes, wet borders of streams, Mitchell Creek, foot-hills of the Rocky Mts.," July 11, 1883 (*Dawson*); said to have been collected in Labrador by *Morrison* (*Maccom's catalogue*).

7. **S. Hookeri** Watson in herb. Stout, 2 to 3 feet high, glabrous except the somewhat puberulent inflorescence; leaves large, with much dilated petioles, bipinnatifid, the narrowly ovate to linear-oblong acute segments an inch or less long, laciniately toothed or lobed to entire; umbel 10 to 25-rayed, with involucre of few deciduous linear-setaceous bracts, and involucels of narrowly linear more or less elongated bractlets; rays about an inch long; pedicels 2 to 3 lines long; fruit oblong, glabrous, 2 to 2½ lines long, with prominent but scarcely winged dorsal and intermediate ribs, and rather broadly winged thickish lateral ribs; no strengthening cells; seed but slightly dorsally sulcate. (Fig. 22.) — *Conioselinum Fischeri* of authors, in part.

Alaska (*Kellogg* in 1867); Puget Sound (*Buckley*); Ocean Bluffs, Long Beach, Ilwaco, Washington Territory, July and August, 1885 and 1886 (*Henderson* 2160); Oregon (P. V. LeRoy's distribution* as *Conioselinum Fischeri*).

Probably this is the form commonly distributed as *Conioselinum Fischeri*. It bears a striking resemblance to *C. Canadense*.

9. **CONIOSELINUM** Fisch. in Hoffm. Umbel. 185.—Tall glabrous perennial, with pinnately decomposed leaves, few-leaved involucre or none, involucels of elongated linear-setaceous bractlets, and white flowers.

The foreign species of *Conioselinum* have been merged with *Ligusticum* and our own species put into *Selinum* by Bentham & Hooker. Their decision in reference to our species was based upon immature fruit, while study of a quantity of fine fruiting material has led us to restore it to generic rank.⁵ It differs so decidedly from our definition of *Ligusticum* that it is only necessary to call attention to the characters which separate it from

⁵ Botanical Gazette, xii, 11

Selinum, with which genus it is very closely allied. The chief differences are the more decidedly dorsally flattened fruit, less prominent (not winged) dorsal and intermediate ribs, laterals broadly winged, and thick conical stylopodium, numerous small oil tubes, and concave seed-face of *Contiose-linum*. Our species is related to *Selinum* through *S. Hookeri*, which it very closely resembles.

1. **C. Canadense** Torr. & Gray, Fl. i. 619. One to five feet high, glabrous except the somewhat puberulent inflorescence: leaves often very large, with inflated petioles, 2 to 3-pinnate (or the primary divisions apparently ternate in the larger leaves), the ovate acute segments an inch or more long, laciniately lobed: umbel 10 to 20-rayed; rays about an inch long; pedicels 3 to 4 lines long; fruit 2 to 2½ lines long. (Fig. 23.)—*Selinum Canadense* Michx. Fl. i. 165.

Swamps and cold cliffs, from the mouth of the St. Lawrence (*Michaux*) to Vermont and Minnesota, and extending southward into Illinois, Indiana, and Missouri; also along the highest mountains as far south as North Carolina. Fl. August to October. The stations reported from the United States are as follows: Vermont (*Tully*, *Pringle*), Massachusetts (*Oukes*), New York (*Kneiskern*, *Hoystradt*, *Dudley*), Pennsylvania (*Porter*), North Carolina (*Gray & Carey*), Indiana (*Rose*), Illinois (*Vasey*), Missouri (*Tracy*, *Broadhead*), Iowa (*Arthur*), Minnesota (*Garrison*), Wisconsin (*Lapham*), and Michigan (*Wheeler & Smith*); also in the mountains of Colorado, where it is confused with *Ligusticum scopulorum*. *Apium bipinnatum* Walter has also been very doubtfully referred to this species, but Walter's plant is altogether uncertain, and his locality is a presumptive evidence against such reference.

10. **TIEDEMANNIA** DC. Mem. Umbel 51.—Smooth erect swamp herbs, with fascicled tubers, leaves simply pinnate or ternate or reduced to petioles, involucre of few bracts or none, involuclcs of numerous small bractlets or none, and white flowers.—Incl. *Archemora* DC.

Bentham & Hooker have included both *Tiedemannia* and *Archemora* under *Peucedanum*. Their habit and habitat are totally different from our species of *Peucedanum*, which are low dry ground western forms, with much dissected leaves, and roots never fasciculate-tuberous. The fruit characters are no less distinguishable, that of *Tiedemannia* being less flattened than in *Peucedanum*, with a thick conical stylopodium, and always appearing to have 5 filiform dorsal ribs (owing to the prominent inner marginal nerves of the lateral wings). In *Peucedanum* when the lateral wings are nerved it is always on the commissural side as in *Leptotania*. These characters, which serve so well to separate *Tiedemannia*

and *Archemora* from *Peucedanum*, also serve to merge these two genera into one well-defined genus.⁶

1. **T. teretifolia** DC. l.c. Stem 2 to 6 feet high, fistulous; leaves reduced to cylindrical hollow pointed petioles (jointed by transverse partitions); umbel 6 to 12-rayed, with involucre and involucels of few or many subulate bracts: rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels 2 to 3 lines long: fruit somewhat obovate, 2 to $2\frac{1}{2}$ lines long: oil-tubes large, filling the intervals, 2 to 4 on the commissural side. (Fig. 24.)—*Peucedanum teretifolium* Benth. & Hook.

Ponds and swamps, from Delaware (*Canby, Commons*) to Florida, and westward to Louisiana. Fl. August and September.

2. **T. ternata** C. & R. Bot. Gazette, xii. 74. Stem slender, 2 to 3 feet high: leaves few, with very long petioles, ternately divided into more or less elongated linear or filiform segments, or sometimes reduced to a flat-tipped petiole: umbel 6 to 9-rayed, with involucre of few small bracts, and involucels of several setaceous bractlets; rays 1 to $1\frac{1}{2}$ inches long: pedicels 3 to 5 lines long: fruit ovate to obovate, 2 lines long: oil-tubes smaller, 4 on the commissural side. (Fig. 25.)—*Archemora ternata* Nutt., *Neurophyllum longifolium* Torr. & Gray.

Pine barren swamps, North Carolina to Florida. Fl. November.

3. **T. rigida** C. & R. l.c. Stem 2 to 5 feet high: leaves pinnate, 3 to 9-foliolate; leaflets from ovate or lanceolate-oblong to linear-lanceolate, entire or remotely toothed: umbel 15 to 25-rayed, with involucre of few small bracts, and involucels of several setaceous bractlets; rays $1\frac{1}{2}$ to 4 inches long; pedicels 3 to 9 lines long: fruit oblong, $2\frac{1}{2}$ to $3\frac{1}{2}$ lines long: oil-tubes 4 to 6 on the commissural side. (Fig. 26.)—*Archemora rigida* DC.

Swamps, New York to Minnesota, and south to the Gulf.

Very variable in foliage and size of fruit, so much so that DeCandolle made four species of it. An extreme form is

Var. **ambigua**, with elongated linear entire leaves, fewer rays, and fruit but 2 lines long.—*Archemora rigida*, var. *ambigua* Torr. & Gray.

Apparently more restricted than the type. New Jersey (*Gray, Canby, Martindale*), South Carolina (*Ravenel*), Tennessee (*Guttinger*).

A good deal of material labeled as this variety really belongs to the

⁶ Botanical Gazette, xii. 73.

type. Intermediate forms are numerous, as for instance certain Delaware forms, sent by Mr. Canby, with leaves of the type (the narrow forms) and the small fruit of the variety.

4. **T. Fendleri**. Stem slender, simple, 1 to 2 feet high, from a large fascicle of tubers (an inch long): leaves pinnate, 5 to 9-foliolate; leaflets ovate or oblong (or lanceolate in upper leaves), obtuse, 1 to 2 inches long, incisely serrate: umbel unequally 5 to 12-rayed, with neither involucre nor involucels; rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels 2 to 3 lines long: fruit ovate, scarcely 2 lines long, with rather more prominent dorsal and intermediate ribs, and narrower lateral wings, than in the other species: oil-tubes 2 to 4 on the commissural side. (Fig. 27.)—*Archemora Fendleri* Gray, Pl. Fendl. 56.

Subalpine swamps and stream banks, Colorado (*Hall & Harbour* 220, *Parry* 155, *Vasey* 228, *Canby*, *Brundee*, *Coulter*, *Jones* 380, *French*, *Trelease*, etc.) and New Mexico (*Fendler* 272). Fl. July.

11. **HERACLEUM** Linn. Gen. n. 345.—Tall stout perennials, with large ternately compound leaves, deciduous involucre, involucels of numerous bractlets, large many-rayed umbel of white flowers, and obcordate petals (the outer ones often dilated and 2-cleft).

The genus is very closely allied to *Pastinaca*, differing chiefly in the remarkable petals and thick conical stylopodium.

1. **H. lanatum** Michx. Fl. i. 166. Very stout, 4 to 8 feet high, pubescent or woolly above: petioles much dilated; leaflets petiolulate, round-cordate, 4 to 10 inches broad, irregularly cut-toothed: rays 2 to 6 inches long: fruit 4 to 6 lines long, somewhat pubescent. (Fig. 28.)

Wet ground, throughout Canada and as far south as North Carolina and Kentucky, extending westward to New Mexico and the Pacific coast. Fl. June.

The var. *vestitum* Torr & Gray, Fl. i. 632, is untenable. If it deserved varietal rank it would have to be made the type, as it was the woolly form that was described by Michaux as *H. lanatum*.

H. SPONDYLIIUM L. has been found on ballast near N. Y. City by Mr. Addison Brown.

12. **PASTINACA** Linn. Gen. n. 362.—Tall stout biennial, with pinnately compound leaves, mostly no involucre, and yellow flowers.

Bentham & Hooker include *Pastinaca* under *Peucedanum* although the fruit characters are quite distinct and almost identical with those of *Heracleum*. In comparison with *Peucedanum*, the fruit of *Pastinaca* is much more dorsally flattened, the lateral wings are nerved towards the outer margin, and a remarkable layer of strengthening cells invests the seed-cavity (instead of occurring in small isolated groups beneath each rib); all of which characters it shares with *Heracleum*. The length of the oil-tubes, a character sometimes used, is quite variable, in *Pastinaca* being sometimes as long as the fruit and sometimes shorter.

P. SATIVA L., the common parsnip, is introduced almost everywhere. The leaflets are ovate to oblong, and cut-toothed. (Fig. 29.) Fl. July to September.

13. **POLYTENIA** DC. Mem. Umbel. 53. —Perennial mostly glabrous herbs, with twice pinnate leaves, no involucre, involuclcs of narrow bractlets, and bright yellow flowers.

1. **P. Nuttallii** DC. l.c. Two to three feet high, mostly glabrous except the pubescent pedicels and involuclcs: leaf-segments cuneate and incised; upper leaves opposite and 3-cleft: umbel 6 to 12-rayed; rays about an inch long; pedicels 1 or 2 lines long: fruit 3 to 5 lines long. (Fig. 30.)

Bartens, Wisconsin (*Lopham*), S. Michigan (*Wright, Gray*), and Indiana (*Clapp*), to Kentucky (*Short*), Tennessee (*Gattigcr*), N. Alabama (*Buckley*), and Louisiana, westward to the Rocky Mountains.

14. **COLOPTERA**.—Dwarf sandy ground plants, with small leaves (lobed, simply pinnate, or bipinnate), no involucre, involuclcs of foliaceous more or less united bractlets, and mostly yellow flowers.

The whole habit of this genus is very peculiar. The thick corky lateral wings of the fruit are those of *Leptotania*, while the frequent winging of dorsal and intermediate ribs approaches *Cyanopterus*. It seems therefore somewhat to combine the characters of these two genera in its fruit, while in habit it more nearly approaches some species of *Cyanopterus*. Such combination of characters is to be found in no genus, and therefore we propose a new genus to contain the three following species:

1. **C. Newberryi**. Acaulescent, 2 to 6 inches high: leaves ovate to oblong in outline, 1 to 2 inches long, shorter than the petioles, pinnately 3 to 5-foliolate or simply lobed; terminal leaflet 3-lobed, the lower mostly 2-lobed, all the lobes sparingly incised: umbel unequally 4 to 10-rayed, with conspicuous involuclcs of very

unequal oblong foliaceous bractlets: fruit sessile or nearly so, 3 lines long, with very thick lateral wings and filiform dorsal and intermediate ribs: oil-tubes very small, 4 to 8 in the intervals, 8 to 10 on the commissural side: seed-face somewhat concave. (Fig. 31.)—*Peucedanum Newberryi* Watson, Am. Naturalist, vii. 301. *Ferula Newberryi* Watson, Proc. Am. Acad. xi. 145.

S. Utah (Parry), N. Arizona, and New Mexico. Fl. April.

2. **C. Jonesii.** Closely resembling the preceding in habit and foliage: involucels of short equal ovate bractlets more or less united into a cup: fruit with corky and undulate dorsal and intermediate wings (usually a dorsal wing on one carpel and two intermediate wings on the other). (Fig. 32.)

Milford, Utah, June 18, 1880, at 5,000 feet altitude (Jones 1792). Distributed as *Leptotenia* (*Peucedanum*) *Newberryi*.

The dorsal and intermediate fruit wings of this species are very peculiar, but it simulates *C. Newberryi* so completely in other regards that there can be no question of relationship.

3. **C. Parryi.** Resembling the two other species in habit: leaves small, ovate in outline, bipinnate, with very small oblong segments: involucels of more or less united bractlets: fruit with wings as in the last, but the dorsal and intermediates much more prominent, giving the fruit a *Cymopterus*-like appearance: oil-tubes very small, 5 to 8 in the intervals, 10 to 14 on the commissural side. (Fig. 33.)

Little Sandy, N. W. Wyoming (Parry in 1873), collected in Capt. Jones' Wyoming expedition.

This species resembles *Cymopterus Fendleri* somewhat, but the character of its wings and its habit place it with the two species above. It is the species of *Coloptera* which looks most towards *Cymopterus*; while the same may be said of *C. Newberryi* in relation to *Leptotenia*. *C. Jonesii* occupies a strictly intermediate position between the other two species.

15. LEPTOTENIA Nutt. Torr. & Gray, Fl. i. 629. Tall and stout (except in the anomalous *L. anomala*) glabrous nearly acaulescent perennials, with thick often very large fusiform roots, usually large (except in *L. anomala*) pinnately decomposed leaves, involucre of few bracts or none, involucels of numerous small bractlets, and yellow or purple flowers.

This genus was referred to *Ferula* by Gray, Proc. Am. Acad. vii. 348, but kept distinct by Bentham & Hooker, Gen. Plant. i. 922. *Ferula*, *Peucedanum*, *Pastinaca*, *Tiedemannia*, *Archemora*, *Polytania*, and *Lepto-*

tania form quite a confusing group in which to draw consistent generic lines, and as a consequence have been variously treated. In our restoration of *Leptotania* it is only necessary to point out the characters which separate it from *Ferula*, to which it has been referred, and from *Peucedanum* and *Polytania*, with which it is most likely to be confounded by American students. *Ferula* has mostly a membranous-winged fruit, no ridge on the commissural face, and a very prominent disk, all of which characters, as well as its general habit, are strikingly contradicted by *Leptotania*. The thick corky wings of this latter genus and their connection with the thin-walled pericarp (still more striking in cross-section) serve to separate it well from any allied genus except *Coloptera*. *Peucedanum* also differs in its membranous lateral wings, which are strongly nerved on the ventral face at the inner margin, in the absence of a longitudinal ridge on the commissural face, and in the often solitary oil-tubes. In the case of those species of *Peucedanum* which have more than one oil-duct in the intervals, the decidedly membranous wings are in sharp contrast with those of *Leptotania*, and simply indicate species of *Peucedanum* looking towards *Ferula*. In fact, we have failed to discover any good reason why *Ferula* should not be incorporated with *Peucedanum*. In *Polytania* the corky lateral wings are found, but the same corky thickening is continued over the whole back of the carpel, through which small oil-tubes are scattered, in addition to the almost continuous row about the seed-cavity.

* *Oil-tubes obsolete or very obscure* (but often scattered vesicles simulating oil-tubes).

1. **L. dissecta** Nutt. Torr. & Gray, Fl. i. 630. One to three feet high, leafy at base: leaves broad, a foot or so long, ternate and thrice pinnate; segments ovate or oblong, $\frac{1}{2}$ to 1 inch long, pinnatifidly laciniate-lobed and toothed, puberulent on the veins (beneath) and margins: umbel 8 to 20-rayed, with an involucre of few linear bracts, and involucels of several linear bractlets; rays 2 to 5 inches long: flowers yellow or purplish: fruit sessile (but sterile flowers pedicelled) or nearly so, 5 to 9 lines long, about 3 lines broad: strengthening cells in the distinct filiform dorsal and intermediate ribs, as well as in the laterals: seed-face plane. (Fig. 34.)—*Ferula dissecta* Gray, Proc. Am. Acad. vii. 348. *F. dissoluta* Watson, Bot. Calif. i. 271.

From S. California to British Columbia (*Mucoun*). Fl. April to July.

2. **L. multifida** Nutt. l.c. Like the preceding, but with more finely divided leaves, umbels mostly without involucre, pedicels of the fruit 3 to 12 lines long, fruit 4 to 6 lines long, no strengthening cells in the almost obsolete dorsal and intermediate

ribs, and seed-face concave (the carpel section being crescentic). (Fig. 35.)—*Ferula multifida* Gray, Proc. Am. Acad. vii. 348.

From S. California to British Columbia (*Macoun, Dawson*), eastward to Utah, Wyoming (*Forwood*), Idaho and W. Montana. Fl. May and June.

* * *Fruit with oil-tubes and pedicels (4 to 12 lines long).*

3. **L. Eatoni.** Like the last, but with less dissected leaves, few-rayed umbels, pedicels of fruit 4 to 6 lines long, fruit 8 or 9 lines long, 4 or 5 lines broad, flatter and thinner than in any other species, oil-tubes 4 to 6 in the intervals, 4 on the commissural side, a prominent corky nerve on the commissural face of the lateral wing near the inner margin, and seed-face plane. (Fig. 36.)

Utah (*D. C. Eaton* 147, in 1869). Fl. June.

This species was collected and distributed as *L. multifida*, but the decidedly different fruit characters seem to justify its separation.

4. **L. Watsoni.** Foot high or less, rather stout, somewhat branching: leaves few and small, at or near the base, ternate-pinnately decomposed, the ultimate segments very small, ovate and cuspidate: umbel with 5 to 10 variously elongated divaricate rays, no involucre, and involucels of few setaceous bractlets; rays 2 to 4 inches long; fruiting pedicels (2 to 8 or 10 in number) about half inch long and divaricate: fruit (immature) 6 lines long: oil-tubes 3 in the intervals: seed-face concave.

Collected in Canby's N. Transcontinental Survey, in the Wenatchie region, Washington Territory, altitude 4,000 feet, July, 1883 (*Brandegee* 801, *Tweedy* 848).

5. **L. purpurea.** About a foot high: leaves completely glabrous, very much dissected, the ultimate segments linear or filiform: umbel 8 to 20-rayed, with no involucre, and involucels of several linear acuminate bractlets; rays 3 or 4 inches long; flowers purple: fruit 9 to 12 lines long, as long as the pedicels, 5 to 6 lines broad, with a much more prominent corky margin and commissural ridge than in any other species: oil-tubes prominent, 3 in the intervals of the distinct dorsal and intermediate ribs, 4 on the commissural side. (Fig. 37.)—*Ferula purpurea* Watson, Proc. Am. Acad. xxi. 453.

On rocky hillsides near the Columbia River in Oregon and Washington Territory.

6. **L. Californica** Nutt. Torr. & Gray, Fl. i. 630. About 2 feet high, with 1 or 2 stem leaves: leaves ternate and pinnate or twice ternate; leaflets cuneate-obovate, 1 to 2 inches long, usually 3-lobed, coarsely toothed above: umbel 15 to 20-rayed, with involucre of 1 or 2 narrow bracts or none, and no involucels; rays 2 to 4 inches long; pedicels 2 to 4 lines long: fruit 5 to 7 lines long, 3 to 4 lines broad, with a thinner margin than in any other species; dorsal and intermediate ribs indistinct: oil-tubes 3 or 4 in the intervals, 6 on the commissural side. (Fig. 38.)--*Ferula Californica* Gray, Proc. Am. Acad. vii. 348.

From Kern county, California (*Parish* 1941), through the state to Oregon (*Howell, Henderson*). Fl. May.

7. **L. anomala**. Acaulescent, glabrous, with slender scape (6 to 12 inches high) bearing an unequally 3 to 6-rayed umbel: leaves slender petioled, pinnate with few distant very narrowly linear divisions: umbel with no involucre, and involucels of prominent scarious-margined veiny bractlets more or less united; rays 1 to 3 inches long; pedicels hardly a line long: fruit small, oblong, in nearly sessile clusters of 2 to 8, 4 lines long, about 2 lines broad, the lateral ribs considerably thicker than the body, the dorsal and intermediates very slender filiform to obsolete, occasionally with minute calyx-teeth: oil-tubes none: the commissural ridge small or almost wanting. (Fig. 39.)

Carbondale, California, May, 1886 (*M. K. Curran*).

This curious species is really anomalous, combining in a certain way the characters of several genera. Its fruit characters are prominently those of *Leptoternia*, its whole general habit approaches certain species of *Peucedanum*, and its occasional calyx-teeth look towards *Polytania*.

16. PEUCEDANUM Linn. Gen. n. 339. Short caulescent or acaulescent dry ground perennials, with fusiform or tuberous roots, ternate or pinnate to dissected leaves, no involucre, involucels mostly present, and yellow (sometimes white) flowers.

Our largest and by far the most difficult genus, with ill-defined boundaries in some directions. Our North American species, all western, form a group different in some respects from foreign representatives of the genus, but not distinct enough to justify separation, without a critical study of the immense display of foreign forms.

Artificial Key to Species.

I. *Plants with globose tubers.** *Flowers yellow: oil-tubes solitary.*

Fruit puberulent.....	<i>Cous</i> , 6
Fruit glabrous.	
Involucels wanting	<i>ambiguum</i> , 7
Involucels conspicuous.....	<i>circumdatum</i> , 8

* * *Flowers white.*

Oil-tubes numerous.

Fruit rough-puberulent....	<i>Watsoni</i> , 3
Fruit glabrous.....	<i>farinosum</i> , 5

Oil-tubes solitary.

Fruit wings as broad as body or broader.....	<i>eurycarpum</i> , 12
Fruit wings half as broad as body....	<i>Canbyi</i> , 2
Fruit wings narrower, thickish and involute.....	<i>Hendersoni</i> , 1
Root moniliform.....	<i>Geyeri</i> , 4

II. *Plants without globose tubers.** *Flowers purplish*.....*Austinii*, 25* * *Flowers white.*

Oil-tubes numerous.

Fruit tomentose.....	<i>tomentosum</i> , 14
Fruit with abundant close pubescence, and prominent dorsal ribs.....	<i>Mohavense</i> , 15
Fruit sparsely pubescent, and with rather obscure dorsal ribs.....	<i>Nevadense</i> , 16
Fruit glabrous.	
Plant glabrous.....	<i>Cusickii</i> , 32
Plant closely pubescent.....	<i>Parishii</i> , 31

Oil-tubes solitary.

Fruit pubescent.....	<i>dasy carpum</i> , 13
Fruit glabrous.	

Fruit large (5 to 12 lines long): pubescent plants.

Fruit wings as broad as body or broader.....	<i>eurycarpum</i> , 12
Fruit wings narrow.....	<i>macrocarpum</i> , 11

Fruit small (2 to 5 lines long).

Fruit round: plant pubescent.....	<i>nudicaule</i> , 17
Fruit oblong: plant glabrous.....	<i>Cusickii</i> , 32

Oil-tubes obsolete.....*bicolor*, 30* * * *Flowers yellow.*Oil-tubes obsolete.....*bicolor*, 30

Oil-tubes solitary.

- Fruit wings narrow (less than half as broad as body).
 Plant puberulent: leaflets linear, elongated (2 to 4 inches).....*triternatum*, 34
 Plant glabrous: leaflets linear, short (3 to 9 lines).....*lavigatum*, 35
 Plant glabrous: leaflets thickish, lanceolate to ovate....*leiocarpum*, 37
- Fruit-wings from half to as broad as body.
 Fruit small (2 to 4 lines): involuclcs much dilated.....*utriculatum*, 28
 Fruit larger (4 to 8 lines): involuclcs linear-subulate*Grayi*, 10
 Fruit very large (9 to 14 lines).....*Suksdorfii*, 40
- Fruit-wings much broader than body.
 Leaves ternate, with linear or narrow leaflets.....*simplex*, 33
 Leaves with broad laciniately-toothed leaflets.
 Leaflets broadly cordate, somewhat lobed*Euryptera*, 41
 Leaflets ovate, obtuse, with divaricate cuspidate teeth.....*parvifolium*, 43
 Leaves pinnately decomound.
 Plant glabrous.....*Martindalei*, 26
 Plant pubescent.....*Vaseyi*, 27
- Oil-tubes numerous.
 Fruit emarginate, with wings broader than body.....*Howellii*, 42
 Fruit-wings half as broad as body.
 Plant villous to sparsely tomentose.
 Fruit pubescent.....*villosum*, 20
 Fruit glabrous....*forniculaceum*, 9
 Plant glabrous.
 Involuclcs conspicuous.....*carnifolium*, 29
 Involuclcs of few setaceous bractlets.
 Leaves ternate: pedicels a line long.....*Brandegei*, 39
 Leaves pinnate: pedicels 3 or 4 lines long.....*Hullii*, 24
- Fruit-wings less than half as broad as body.
 Plant puberulent or pubescent.
 Fruit glabrous.....*microcarpum*, 23
 Fruit puberulent.
 Petioles dilated with conspicuous white scarious margins.....*Sandbergii*, 22
 Petioles not scarious-margined.
 Plant 6 to 8 inches high: fruit $3\frac{1}{2}$ to $4\frac{1}{2}$ lines long....*Purryi*, 18
 High alpine, 1 to 2 inches high: fruit 2 lines long.....*Oregonum*, 19
- Plant glabrous.
 Leaflets elongated-linear.....*Kingii*, 36
 Leaflets ovate to orbicular.....*Nuttallii*, 38
 Leaves pinnately decomound, with small segments...*Donnellii*, 21

Systematic Synopsis.

§ 1. Mostly low, from globose tubers (single or moniliform); leaves small, more or less dissected, with short segments (unless in *P. ambiguum*): fruit-wings narrow (not more than half as broad as body): oil-tubes mostly solitary in the intervals or with accessory ones in some species.

* *Always acaulescent and mostly glabrous: flowers white.*

1. **P. Hendersoni** C. & R. Bot. Gazette, xiii. 210. From a shallow constricted tuber 6 to 12 lines in diameter; leaves ternate then bipinnate, ultimate segments short and obtuse: umbel equally 2 to 5-rayed, with involucl of linear acuminate scarious bractlets; rays about half inch long; pedicels $1\frac{1}{2}$ to 2 lines long: fruit ovate, glabrous, $2\frac{1}{2}$ lines long, 2 lines broad, with thickish narrow wings (not half as broad as body) more or less involute, filiform or nearly obsolete dorsal and intermediate ribs, and a rather prominent ridge on the commissural face: oil-tubes solitary in the intervals, 2 on the commissural side: seed-face plane. (Fig. 40.)

On high hill-tops, Oregon, John Day Valley, May, 1882 (*Howell* B in part), and Lost Valley, June, 1882 (*Howell* 410).

Dedicated to L. F. Henderson, one of our best Oregon collectors. The fruit of this species, in its thickish involute wings and rather prominent commissural ridge, very nearly approaches that of *Orogenia fusiformis* Watson.

2. **P. Canbyi** C. & R. Bot. Gazette, xiii. 78. Three to eight inches high, with a short underground stem from a thick more or less elongated rootstock which ends in a globose tuber 6 to 12 lines in diameter: leaves ternate-pinnatifid or bipinnate, ultimate segments small, with 3 to 5 linear-oblong lobes: umbel equally 5 to 10-rayed, with involucl of narrowly linear scarious-margined bractlets; rays 1 to 2 inches long; pedicels 4 to 6 lines long: fruit ovate-oblong, glabrous, 4 lines long, $2\frac{1}{2}$ lines broad, with wings about half as broad as body, and filiform dorsal and intermediate ribs: oil-tubes solitary in the intervals (lateral intervals often with 1 or 2 accessory but shorter ones), 2 or 4 on the commissural side.

High ridges, E. Oregon (*Howell*, April, 1880, and May, 1882, no. 67; *Cusick* 1010, in 1882 and 1884) and Washington Territory, Klickitat county (*Howell*), and Spokane River.

This species has been referred to *P. Nevadaense*, but always with a doubt. In *Howell's* distribution it is labeled *P. dasycarpum*. It has been collected too often in its early condition, before either fruit or leaves had matured, and in this state has been very puzzling. Mature fruit of *Cusick's*

collecting, in Canby's herbarium, has enabled us to characterize it as quite a distinct species. This is "Chucklusa" of the Spokane Indians, next to Camass their most valuable food plant.

3. **P. Watsoni** C. & R. Bot. Gazette, xiii. 209. Two or three inches high, glabrous or puberulent, with a short subterranean stem from a deep-seated globose or oblong tuber (with clusters of rootlets over its surface) with or without a thick elongated root below: leaves bipinnate, the ultimate segments short and linear-oblong: umbel unequally 1 to 5-rayed, with involuclers of more or less united often toothed bractlets; rays from almost wanting to an inch long: fruit sessile or nearly so, ovate, rough-puberulent, 3 lines long, $1\frac{1}{2}$ lines broad, with very narrow wings, and filiform or almost obsolete dorsal and intermediate ribs: oil-tubes (sometimes wanting) very obscure, 3 to 6 in the intervals, 1 in each rib, and 6 on the commissural side: seed-face plane. (Fig. 41.)

High hills and mountains of Washington Territory, Cincoe Mts. (Howell, in 1881), Klickitat county (Howell, 411, 412, 413), Cascade Mts. (Brandegge, in 1882, no. 320 of Canby's N. Transcontinental survey), near Columbus (Saksdorf); Oregon, near the Dalles (Howell C. in 1882), and Alkali (Howell 830, in 1882). Fl. May and June.

This species is readily recognized by its 1 to 3 clusters of sessile ovate puberulent fruits, and Erigenia-like flowers.

4. **P. Geyeri** Watson, Proc. Am. Acad. xiv. 293. Root moniliform, with 2 or 3 small rounded tubers: leaves ternate-quinate; leaflets linear, 4 to 9 lines long; umbel small, unequally rayed, with involuclers of several linear acuminate bractlets: mature fruit unknown.

Collected by Geyer (458); also on the Clear Water, Idaho (Rev. Mr. Spalding); and probably near Fort Colville, Washington Territory (Lyall, in 1861).

A good deal of *P. farinosum* has been distributed as *P. Geyeri*.

5. **P. farinosum** Geyer, Hook. Lond. Journ. Bot. vi. 235. Dwarf, from a deep-seated solitary rounded tuber with frequent clusters of fine rootlets over its surface: leaves 2 to 3-ternate, with segments more or less lobed, ultimate divisions all linear: umbel 1 to 8-rayed, with involuclers of few small linear bractlets; rays 1 to 2 inches long: fruit almost sessile, oblong-elliptical, glabrous, 3 to 4 lines long, 2 lines broad, with wings half as broad as body: oil-

tubes small, 2 to 4 in the intervals, 4 to 6 on the commissural side: seed-face plane. (Fig. 42.)

From N. California to Washington Territory and Idaho. Fl. March and April.

This species is very much confused in collections, for in the absence of good fruit it is hard to separate *P. Geyeri* and *P. farinosum* from *Orogenia*. All are low spring-bloomers, mostly from deep-seated round tubers, white flowers, and a general *Erigenia*-like appearance. Collectors should not attempt to distinguish them without mature fruit or their distributions will lead to great confusion. This is "Tuhua" of the Spokane Indians.

* * *Caulescent or acaulescent: flowers yellow: oil-tubes solitary.*

6. **P. Cous** Watson, Proc. Am. Acad. xxi. 453. Acaulescent, glabrous or slightly puberulent, with roughish scapes 2 to 6 inches high, from a nearly globose tuber (6 to 12 lines in diameter): leaves pinnate; leaflets 3 to 7-parted or cleft or even entire; ultimate segments linear-oblong: umbels unequally 3 to 10-rayed, with involucels of short oblong-ovate scariously margined bractlets; rays from nearly wanting to 2 inches long; pedicels short: fruit oblong, more or less puberulent, $2\frac{1}{2}$ to 4 lines long, $1\frac{1}{2}$ to 2 lines broad, with wings about half as broad as body, and prominent dorsal and intermediate ribs: oil-tubes large, filling the intervals, 4 to 6 on the commissural side: seed-face with central longitudinal ridge. (Fig. 43.)

Stony hillsides, E. Oregon, John Day's Valley, May 26, 1880 (*Howell* 270), and Antelope, in 1885 (*Howell* 418). *Cusick* 358, referred by Watson to *P. Cous*, is *P. circumdatum*.

This species is called "Cous" by the Indians, and the starchy tubers are used by them for food.

7. **P. ambiguum** Nutt. Torr. & Gray, Fl. i. 626. Glabrous, from low acaulescent to a foot high and caulescent, with tuberous usually moniliform roots: petioles much dilated at base; leaves 1 to 2-pinnate, with more or less elongated linear leaflets, the upper often more dissected: umbel unequally 8 to 18-rayed, with mostly no involucels; rays 1 to $3\frac{1}{2}$ inches long; pedicels 2 to 3 lines long: fruit narrowly oblong, glabrous, 3 to 4 lines long, a line broad, very narrowly winged: oil-tubes 2 (broad and thin) on the commissural side. (Fig. 44.)

From Oregon (*Cusick* 1099, *Henderson* 55), Washington Territory (*Suks-*

dorf 319), Idaho (*Wilcox*), Yellowstone Falls (*Parry* 119), and Montana (*Watson*, *Canby* 151), northward into British Columbia. Fl. May to July.

This species is extremely variable in foliage, and hence hard to define clearly in this regard. Collectors seem to have confused it with *P. triternatum*, but its tuberous roots and glabrous character, as well as its much narrower fruit-wings, should serve as distinguishing characters. *P. laevigatum* has also been mistaken for *P. ambiguum*, but its broader fruit-wings and much reduced leaflets should easily separate them.

Var. leptocarpum. Fruit sessile or nearly so, making a close somewhat divaricate cluster: rays few and very unequal.—*P. triternatum*, var. *leptocarpum* Torr. & Gray, Fl. i. 626.

Oregon (*Nuttall*, *Geyer* 557, *Howell* 417, *Cusick* 359).

8. ***P. circumdatum*** Watson, Proc. Am. Acad. xxii. 474. Stems solitary from a deep-seated constricted tuber, glabrous or puberulent, foot or less high: leaves ternate-quinately, the segments once or twice pinnatisect, lobes linear, 1 to 3 or 4 lines long: umbel unequally 6 to 12-rayed, with involucels of conspicuous broadly oblanceolate (often united) bractlets, becoming scarious; rays $\frac{1}{2}$ to $3\frac{1}{2}$ inches long; pedicels very short: fruit oblong-elliptical, glabrous, 3 or 4 lines long, $1\frac{1}{2}$ lines broad, with narrow wings, and very prominent dorsal and intermediate ribs: oil-tubes 4 on the commissural side: seed-face concave, with a prominent central ridge. (Fig. 45.)

Abundant on hillsides in Oregon, the Dalles (*Nevius*), John Day Valley (*Howell*), Wallowa region (*Cusick*), Blue Mountains (*Henderson*); Montana, near Bozeman (*Scribner* 66a), Little Belt Mts. (*Scribner* 66), Belt River Canon (*Williams* 149), Bozeman Pass and Little Blackfoot River (*Canby* 152); Yellowstone Park (*Tweedy* 854); N. W. Wyoming (*Parry* 120); Dakota (*Miss Eloise Butler*), Little Missouri (*Canby* 152a). Fl. May to August.

§ 2. Stout, glabrous only in *P. Grayi*, from large roots (in *P. macrocarpum* and *P. eurycarpum* ending in an oblong sometimes large tuber): leaves mostly large and very finely dissected, the ultimate segments filiform or narrowly linear: fruit wings broader (from half as broad as body to somewhat broader than body): oil-tubes 1 to 3 in the intervals (solitary in two species).

* *Flowers yellow: fruit glabrous: acaulescent plants.*

9. ***P. fœniculaceum*** Nutt. Torr. & Gray, Fl. i. 627. Tomentose or glabrous, with peduncles 8 to 12 inches long: leaves finely dissected, ternate-pinnate, with short filiform segments: umbel rather equally 3 to 12-rayed, with gamophyllous involucels, 5 to 7-cleft and with conspicuously hairy margins; rays 1 to $2\frac{1}{2}$ inches

long; pedicels 3 to 5 lines long; fruit broadly oblong, $2\frac{1}{2}$ to 3 lines long, 2 lines broad, with wings half as broad as body, and prominent dorsal and intermediate ribs: oil-tubes 1 to 3 in the intervals, 2 to 4 on the commissural side.

From the Saskatchewan to Nebraska, Missouri (*Tracy*), Kansas (*Oyster*), Indian Territory and Texas (*Reverchon*). Fl. March and April.

The forms distributed under this name from New Mexico and Arizona are mostly *P. villosum*.

10. **P. Grayi** C. & R. Bot. Gazette. xiii. 209. Glabrous, with peduncles 12 to 18 inches long; leaves ternate-pinnately decomposed, the ultimate segments linear, elongated or short, cuspidate, very numerous: umbel rather equally 6 to 16-rayed, with involucels of distinct linear-subulate bractlets; rays 1 to 3 inches long; pedicels 5 to 8 lines long; fruit oblong, 4 to 8 lines long, $2\frac{1}{2}$ to $4\frac{1}{2}$ lines broad, with wings usually more than half as broad as body, and filiform dorsal and intermediate ribs: oil-tubes usually solitary in the intervals (sometimes 2 in the lateral intervals), 2 or 4 on the commissural side. (Fig. 46).—*P. millefolium* Watson, King's Rep. v. 129, a name which must give way to the older *P. millefolium* of Sonder from S. Africa.

Common on dry rocks, from N. Utah to Washington Territory. Fl. March to May.

It has been questioned whether certain forms with short leaf-segments are not entitled to rank at least as varieties, but we find the short and elongated leaf-segments often upon the same plant. When the segments become very much elongated and crowded the leaves strikingly resemble those of *Leptotania purpurea*.

* * *Flowers white.*

11. **P. macrocarpum** Nutt. Torr. & Gray, Fl. i. 627. Somewhat caulescent or nearly acaulescent, foot or less high, more or less pubescent, from a long caudex terminating below in a fusiform tuber: leaves bipinnate, segments pinnately incised, ultimate divisions ovate or shortly linear: umbel somewhat equally 6 to 8-rayed, with involucels of conspicuous somewhat foliaceous lanceolate or linear bractlets, often united and unilateral; rays 1 to 3 inches long; pedicels 2 to 5 lines long; flowers mostly white (rarely yellow): calyx-teeth evident: fruit narrowly oblong, glabrous, 4 to 12 lines long, 2 to 3 lines broad, with wings about half as wide as body, and filiform dorsal and intermediate ribs: oil-tubes solitary in the intervals (often obscure, rarely 2 or 3), 2 or 4 on the commissural

side: seed-face with a slight central longitudinal ridge. (Fig. 17.)

N. California and N. Nevada to N. W. Territory (*Mucoun*) and Saskatchewan. Fl. May and June.

We find that a good deal of this species has been distributed in herbaria as *P. bicolor*.

12. *P. eurycarpum*. Caulescent, branching, a foot or two high, more or less pubescent, frequently from a much enlarged tuberous root: leaves ternate-pinnately decomposed, with small linear cuspidate segments: umbel 3 to 12-rayed, with involuclers of lanceolate acuminate often united bractlets; rays $\frac{1}{2}$ to 4 inches long; pedicels 1 to 5 lines long: fruit broadly elliptical, glabrous, 5 to 9 lines long, 3 to 4 lines broad, with wings as broad as body or broader, and filiform dorsal and intermediate ribs: oil-tubes large, solitary in the intervals, 2 on the commissural side. (Fig. 48.)—*P. nudicaule*, var. (?) *ellipticum* Torr. & Gray, Pacif. R. Rep. ii. 121. *P. macrocarpum*, var. (?) *eurycarpum* Gray, Proc. Am. Acad. viii. 385.

From the Sacramento in California to Oregon (*Hall* 210) and British Columbia (*Mecoun*).

The coarser foliage, shorter and broad-winged fruit, and less conspicuous involuclers, are the more prominent characters which seem to entitle this form to rank as a species, rather than a variety of *P. macrocarpum*. "Skelaps" of the Spokane Indians, its very large starchy roots forming a valuable food.

13. *P. dasycarpum* Torr. & Gray, Fl. i. 628. Very short caulescent or acaulescent, with several stout peduncles 6 to 12 inches high from a common root, tomentose-pubescent: leaves rather small, pinnately decomposed, with numerous short linear segments: umbel somewhat equally 6 to 12-rayed, with involuclers of linear-lanceolate more or less tomentose bractlets; rays 1 to 3 inches long; pedicels 3 to 5 lines long: fruit nearly orbicular, coarsely pubescent (sometimes becoming almost glabrous), 4 to 7 lines long, $3\frac{1}{2}$ to 6 lines broad, with thin membranous wings broader than the body, and filiform dorsal and intermediate ribs: oil-tubes large and solitary in the intervals (an occasional secondary one in the lateral intervals), 4 on the commissural side: seed deeply sulcate beneath the oil-tubes, with plane face. (Fig. 49.)—*P. Pringlei* C. & R. Bot. Gazette, xiii. 209.

California, San Diego county (*Pringle, Paery, Vasey*). Lake and Eldorado counties (*M. K. Curran*); New Mexico, Upper Gila (*Greene*). Fl. April and May.

Distributed frequently as *P. curvifolium* and *P. feniculaceum*. This species had become so confused with *P. tomentosum* that in our first study, *P. tomentosum* Benth. being accepted as a synonym of *P. dasycarpum*, it was taken as the type of *P. dasycarpum*. This leaving the true *P. dasycarpum* without a name we described it as *P. Pringlei*. We have discovered since that the true *P. tomentosum* is abundantly distinct from the much more abundant *P. dasycarpum*, and hence *P. Pringlei* becomes a synonym under the latter.

The Asiatic *P. dasycarpum* Regel & Schmalh. was not published until 1871.

14. **P. tomentosum** Benth. Pl. Hartw. 312. More or less densely villous-tomentose, somewhat caulescent or scarcely so, a foot or so high: leaves finely dissected into narrow or filiform segments: umbel with 4 to 8 equal rays, with involucels of linear to lanceolate or ovate acuminate bractlets; rays (fertile) 1 to 3 inches long; pedicels 3 to 6 lines long; calyx-teeth evident: fruit ovate to orbicular, densely tomentose, 5 to 9 lines long, 3 to 5 lines broad, with thickish wings from not quite as broad as body to broader, and prominent dorsal and intermediate ribs (concealed by the tomentum): oil-tubes mostly 3 in the intervals, 4 on the commissural side: seed-face somewhat concave. (Fig. 50.)

On dry hillsides, Central California. Sometimes distributed as *P. villosum* Nutt., but more usually as *P. dasycarpum* Torr. & Gray. This species is by no means as abundantly collected as *P. dasycarpum*. Fine fruiting specimens collected at Elmira, California, by *M. K. Curran*, first called our attention to the fact that this is the original *P. tomentosum* Benth. and distinct from *P. dasycarpum* Torr. & Gray.

15. **P. Mohavense**. Having the habit of the preceding species, but with much more strigose pubescent leaves, which are dissected into very small much crowded linear-oblong or obovate obtuse segments: umbel somewhat unequally 6 to 10-rayed, with involucels of linear to lanceolate acuminate bractlets; fertile rays 1 or 2 inches long; pedicels 2 to 4 lines long; calyx-teeth obsolete: fruit broadly elliptical to almost orbicular, with close fine pubescence, 4 to 5 lines long, 3 to 4 lines broad, with wings not as broad as body, and prominent and approximate dorsal and intermediate ribs: oil-tubes 3 or 4 in the intervals, 8 to 10 on the commissural side.

Yucca, Mojave Desert, California, June, 1884 (*M. K. Curran*).

The fruit of this species is quite different from that of *P. tomentosum*, to which species it is most closely allied. It is only about half as large,

rounder, with a fine but abundant pubescence, prominent dorsal ribs, and the numerous oil-tubes superficially distinct. In *P. tomentosum* not only the oil-tubes but the dorsal ribs are completely hidden by the tomentum.

§ 3. Low and rather slender, from elongated comparatively slender roots: leaves rather small, more or less pinnately compound (the first division sometimes ternate), with short segments: fruit-wings narrow (never broader than body): oil-tubes 3 to 6 in the intervals (mostly solitary in *P. nudicaule*).

* *Flowers white: fruit-wings more than half as wide as body.*

16. ***P. Nevadense*** Watson, Proc. Am. Acad. xi. 143. Glaucous, puberulent, shortly caulescent, peduncles 3 to 15 inches high: leaves pinnately decomposed, with small segments: umbel unequally 5 to 10-rayed, with involuclcs of scarious-margined linear-lanceolate bractlets; rays often 1 to 2 inches long; pedicels 2 to 5 lines long: fruit rounded to ovate, somewhat pubescent (rarely glabrous), 3 to 5 lines long, 2 to 4 lines broad, with wings almost as broad as body, and evident dorsal and intermediate ribs: oil-tubes 3 or 4 in the intervals, 4 to 6 on the commissural side.—*P. nudicaule* of Watson, King's Rep. v. 130, and others, not Nutt.

East of the Sierra Nevada, from N. California and S. E. Oregon (*Howell*) to Nevada and Utah. Fl. April to June.

17. ***P. nudicaule*** Nutt. Torr. & Gray, Fl. i. 627. Acaulescent or shortly caulescent, with peduncles 3 to 8 inches high, pubescent, from a thick elongated root (often swollen in places): leaves bipinnate, the small oblong segments entire or toothed: umbel unequally 5 to 8-rayed, with involuclcs of scarious-margined (often purplish) lanceolate bractlets; rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels $2\frac{1}{2}$ to $3\frac{1}{2}$ lines long; flowers white or pinkish: fruit almost round, emarginate at base, glabrous, $2\frac{1}{2}$ lines long, 2 lines broad, with wings not as broad as body, and indistinct or obsolete dorsal and intermediate ribs: oil-tubes solitary in the intervals (rarely 2 in the lateral intervals), 4 on the commissural side: seed-face plane. (Fig. 51.)

Arizona (*Palmer* 158 of 1876, 181 of 1877) and New Mexico northward to the boundary, and extending eastward to Minnesota, Iowa and Kansas, Fl. March to May.

This is one of our earliest bloomers and in this regard, in its own range, it represents the more eastern *Erigenia*. This is the *Cymopterus montanus* Porter & Coulter's Flora Colorado, from plains near Denver.

* * *Flowers yellow: fruit-wings narrower.*

18. **P. Parryi** Watson, Proc. Am. Acad. xi. 143. Strictly acaulescent, somewhat glaucous, with rather stout peduncles 6 to 8 inches high from a stout multicapital caudex clothed with old leaf-sheaths, puberulent or glabrous: leaves pinnate; leaflets short, pinnatifid below to entire above; ultimate segments very small, ovate and cuspidate: umbel 5 to 10-rayed, with involuclcs of a few linear-acuminate bractlets; rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels 2 to 4 lines long: calyx-teeth evident: fruit oblong, puberulent or glabrous, $3\frac{1}{2}$ to $4\frac{1}{2}$ lines long, 2 to 3 lines broad, with wings not half as broad as body, and filiform dorsal and intermediate ribs: oil-tubes 3 to 5 in the intervals, 4 to 10 on the commissural side. (Fig. 52.)—*P. macrocarpum* of Parry, Am. Naturalist ix. 271.

Mountains of Southern Utah (*Parry* 75 and 85, *Pulmer* 178, *Jones* 1864.)

19. **P. Oreganum**. Similar to the preceding species, but a very much reduced caespitose form, not glabrous, with very slender peduncles but 1 to 2 inches high, bearing a very small simple umbel, or sometimes two nearly sessile umbellets, and one to few matured puberulent fruits about 2 lines long; ultimate leaf-segments very small, linear-oblong, not cuspidate. (Fig. 53.)

Alpine rocks. Blue and Eagle Creek Mts., Oregon (*Cusick* 1390, Aug. 1886-88.)

20. **P. villosum** Nutt. Watson, King's Rep. v. 131. Acaulescent, more or less densely pubescent, 3 to 8 inches high: leaves finely dissected, with very numerous narrow crowded segments: umbel somewhat equally 4 to 5-rayed, with involuclcs of ovate to linear usually very tomentose bractlets; rays about an inch long; pedicels 1 to 3 lines long: fruit oval, somewhat pubescent, $3\frac{1}{2}$ lines long, $2\frac{1}{2}$ lines broad, with wings half as broad as body, and prominent dorsal and intermediate ribs: oil-tubes 3 or 4 in the intervals, 4 on the commissural side: seed-face plane. (Fig. 54.)

From N. California (*M. K. Curran*), W. Nevada, N. Arizona, and New Mexico, to Nebraska, Dakota, and N. W. Territory (*Macoun*, *Dawson*).

Specimens collected by Canby (no. 150) in "Bad Lands," Little Missouri, Dakota, June 30, 1883, and by Dawson (no. 2184) along Pelly River, N. W. T., June 28, 1883, for the first time bring the mature fruit to our knowledge, from which we have drawn the above characters. The fruit becomes smoother with age and may become but sparsely pubescent, in which condition it has been mistaken for *P. frniculaceum*.

21. **P. Donnellii** C. & R. Bot. Gazette, xiii, 143. Shortly caulescent or acaulescent, 6 to 12 inches high, glabrous, from a fusiform root: leaves ternate then pinnately decompose, with segments pinnately cleft into short oblong or linear lobes: umbel somewhat unequally 6 to 12-rayed, with involucrels of linear acuminate bractlets; rays 1 to 4 inches long; pedicels 2 to 8 lines long: fruit ovate to broadly oblong, glabrous, $3\frac{1}{2}$ to 4 lines long, 2 to 3 lines broad, with wings less than half as broad as body, and prominent dorsal and intermediate ribs: oil-tubes small, 4 to 6 in the intervals, 4 to 6 on the commissural side. (Fig. 55.)

Oregon, Union county (*Cusick* 36, in 1883), John Day Valley (*Howell* 420 and 829, in 1885). Fl. April.

Most nearly resembling *P. Nevadaense*. Dedicated to John Donnell Smith, in whose herbarium the species was first detected.

22. **P. Sandbergii** C. & R. Bot. Gazette, xiii, 79. Caulescent, branching at base, an inch or two to a foot high, from an elongated comparatively slender root, rough puberulent: petioles wholly inflated, with a very conspicuous white scarious margin; leaves ternately or pinnately dissected, the ultimate segments very short linear: umbel very unequally 6 to 15-rayed, with involucrels of distinct linear-lanceolate bractlets; rays 1 to 4 inches long; pedicels a line or two long; flowers bright yellow: fruit ovate, puberulent, 2 to $2\frac{1}{2}$ lines long, $1\frac{1}{2}$ lines broad, with very narrow wings, and filiform dorsal and intermediate ribs: oil-tubes 4 or 5 in the intervals, 6 on the commissural side: seed-face plane. (Fig. 56.)

Bare mountain tops, 5,000 feet altitude, along snow drifts, Kootenai county, N. Idaho (*J. H. Sandberg* 47); Upper Marias Pass, 7,300 feet altitude, N. Montana (*Caubg* 150); North and South Kootenai Pass (*Dawson* 876) and top of Crow's Nest Pass (*Dawson* 92), B. C.

This very distinct alpine species is remarkable for its inflated petioles, with very broad glistening scarious margins, which form the most conspicuous feature of the plant. The peduncles are short when the plant first blooms, rising but a few inches above the ground, but they rapidly elongate, becoming as much as a foot high. The fertile rays also are often very much elongated, becoming many times longer than the sterile rays.

23. **P. microcarpum** Howell in herb. Closely resembling the preceding species, but differing in its stouter habit, petioles without conspicuous margins, somewhat equally-rayed umbels, deeper yellow flowers, glabrous fruit which is oblong and 3 lines long, and much earlier blooming.

On cliffs, Roseburg, Umpqua Valley, Oregon, April 20, 1887 (*Howell* 709).

§ 4. Shortly caulescent, slender, from elongated comparatively slender roots, glabrous (except *P. Vaseyi*): leaves small, lanceolate or oblong in outline, pinnate or bipinnate, with ovate toothed segments: fruit-wings half as broad as body or much broader: oil-tubes solitary in the intervals (except *P. Hallii*).

* *Fruit-wings half as broad as body.*

24. **P. Hallii** Watson, Proc. Am. Acad. xi. 141. The elongated peduncles 6 to 15 inches high: leaves pinnate, oblong in outline, the ovate segments half inch long, deeply toothed or pinnatifid: umbel equally 3 to 6-rayed, with small involucels; rays about an inch long; pedicels 3 or 4 lines long; flowers yellow: fruit broadly elliptical, glabrous, 3 lines long, 2 lines broad, with filiform dorsal and intermediate ribs: oil-tubes 3 in the intervals, 4 to 6 on the commissural side. (Fig. 57.)—*P. nudicaule* Gray, Proc. Am. Acad. viii. 385.

Oregon, "northern part" (*Hall* 211), above snow line on Mt. Hood (*Mrs. P. G. Barrett*, in 1882); Washington Territory, Mt. St. Helens (*Mrs. Briggs*, in 1885).

25. **P. Austinæ** C. & R. Bot. Gazette, xiii. 208. Resembling the preceding species, but with leaf-segments larger and pinnate with narrow often toothed divisions, flowers purplish, fruit $3\frac{1}{2}$ lines long, $1\frac{1}{2}$ lines broad, with oil-tubes solitary in the dorsal intervals, mostly 2 in the lateral, 4 on the commissural side, and an additional one in each group of strengthening cells; seed-face concave, with central longitudinal ridge. (Fig. 58.)

California, Plumas county (*Mrs. R. M. Austin*, in 1880), Humboldt county (*Greene* 732). Distributed as *P. Hallii*.

* * *Fruit-wings much broader than body.*

26. **P. Martindalei** C. & R. Bot. Gazette, xiii. 142. Resembling *P. Hallii* in habit and foliage, but differing in leaves sometimes bipinnate, with toothed or pinnatifid segments, fruit 4 to 7 lines long, $3\frac{1}{2}$ lines broad, with wings much broader than body (which is but a line), and prominent dorsal and intermediate ribs; oil-tubes solitary in the intervals, 2 on the commissural side; seed-face somewhat concave, with central longitudinal ridge. (Fig. 59.)

Rocky places, Oregon, Cascade Mts. and Waldo (*Howell*, in 1880), Fl. May.

Distributed as *P. Hallii* Watson. Dedicated to Mr. I. C. Martindale, to whose collection of *Umbelliferae* we are much indebted.

Var. **angustatum** C. & R. l. c. 143. Usually more caulescent and sometimes taller, with more dissected leaves, and wings of fruit but half a line wide, making a fruit 2 lines wide.

Mountain peaks, California, Yosemite (*Curran*), Mendocino county (*Kellogg*); Oregon, Cascade Mts. (*Howell*); Washington Territory (*Brundee* 323, *Tweedy* 28), Mt. Adams (*Suksdorf* 383), and other mountain peaks; Vancouver Island, Mt. Arrowsmith, 5,500 feet altitude (*Macona* 19). Distributed as *P. Hallii*.

27. **P. Vaseyi** C. & R. Bot. Gazette, xiii. 144. Shortly caulescent, 6 to 8 inches high, pubescent: petioles wholly inflated; leaves small (1 to 2 inches long), bipinnate, with the small ovate segments irregularly 3 to 5-lobed: umbel equally 2 to 5-rayed, with involuclcs of obovate petiolulate toothed bractlets; rays an inch long; pedicels a line or two long; flowers yellow (?): fruit broadly oblong, emarginate, glabrous, 6 to 7 lines long, 4 lines broad, with wings twice as broad as body, and mostly prominent dorsal and intermediate ribs: oil-tubes solitary in the intervals, 4 on the commissural side.

California, San Bernardino Mts., May, 1880 (*G. R. Vasey* 231), Mesas near San Bernardino, April, 1881 (*S. B. & W. F. Parish* 286, in part), Folsom, May, 1883 (*M. K. Curran*)

Distributed by Vasey as *P. macrocarpum* Nutt., var., and by Parish as *Cymopterus terebinthinus* Torr. & Gray.

§ 5. Caulescent, puberulent or pubescent (occasionally glabrous), from elongated comparatively slender roots: leaves decompose, with narrowly linear more or less elongated segments (excepting *P. Parishii*) and usually wholly dilated petioles; bractlets of the involucl scarios-marginated, more or less conspicuous.

* *Fruit-wings nearly as broad as body, thin: oil-tubes large and solitary in the intervals: dorsal and intermediate ribs prominent.*

28. **P. utriculatum** Nutt. Torr. & Gray, Fl. i. 628. Caulescent or sometimes nearly acaulescent, from cespitose to a foot or more high, from a more or less tuberous root, puberulent or glabrous: petioles very broadly dilated; leaves ternately or pinnately decompose, with ultimate segments narrowly linear, 6 lines or less long: umbel unequally 5 to 20-rayed, with involuclcs of much dilated mostly obovate often toothed petiolulate bractlets; rays 2 inches or less long; pedicels 2 to 5 lines long;

flowers yellow: fruit broadly elliptical, glabrous, 2 to 5 lines long, 1 to $3\frac{1}{2}$ lines broad: oil-tubes 4 to 6 on the commissural side, sometimes 2 or 3 very short accessory ones in the dorsal intervals: seed-face somewhat concave. (Fig. 60.)

From S. California to British Columbia, and extending eastward to Idaho. Fl. April to July.

* * *Fruit-wings narrow and thickish: oil-tubes obsolete or very indistinct and numerous in the intervals: dorsal and intermediate ribs obsolete or nearly so.*

29. **P. caruifolium** Torr. & Gray, Fl. i. 628. Like the preceding species, but often more caulescent, the elongated peduncles $\frac{1}{2}$ to $1\frac{1}{2}$ feet high, leaf-segments $\frac{1}{2}$ to 2 inches long, dilated bractlets not only obovate but often lanceolate, fruit 3 or 4 lines long, with wings half as broad as body and obsolete dorsal and intermediate ribs, oil-tubes indistinct, 2 or 3 in the intervals, none on the commissural side. (Fig. 61.)—*P. marginatum* Benth. Pl. Hartw. 312.

Central California, from San Luis Obispo county (*Jones* 3600), through the central counties by numerous collectors, to Butte county (*Mrs. R. M. Austin*).

30. **P. bicolor** Watson, King's Rep. v. 129. Caulescent or scarcely so, 4 to 18 inches high, glabrous or slightly puberulent: petioles wholly dilated; leaves ternate-pinnately decomposed, the ultimate segments very numerous and linear: umbel very unequally 2 to 10-rayed, with involuclers of 1 to 8 linear-subulate bractlets; rays 1 to 5 inches long; pedicels short; flowers yellow or white: calyx-teeth obsolete: fruit oblong, glabrous, 5 to 6 lines long, 1 to $2\frac{1}{2}$ lines broad, with nearly obsolete dorsal and intermediate ribs: dorsal oil-tubes obsolete, 2 on the commissural side.

Utah, Wahsatch Mts. (*Watson, Parry* 21), City Creek Canon (*Jones* 1713, in 1880); Nevada, Empire City (*Jones*, in 1882); Oregon, Hood River (*Henderson*).

This species resembles *Leptotenia* in the thickness of its wings.

31. **P. Parishii** C. & R. Bot. Gazette, xiii. 209. Caulescent, from a few inches to a foot high, glaucous, closely pubescent, from a thick elongated root: leaves pinnate, with pinnatifid or entire leaflets, the ultimate oblong-linear or linear segments cuspidate, somewhat toothed or entire; root-leaves sometimes nearly entire or few-cleft: umbel unequally 4 to 12-rayed, with involuclers of small linear-lanceolate acuminate bractlets; rays 1 to 5 inches

long; pedicels 2 to 4 lines long; flowers white; fruit somewhat obovate, glabrous, $3\frac{1}{2}$ to 6 lines long, 2 to 4 lines broad, the usually narrow wings in robust specimens sometimes becoming almost as broad as body, filiform or obsolete dorsal and intermediate ribs: oil-tubes exceedingly small, often obscure, 6 to 8 in the intervals, 8 to 10 on the commissural side: seed-face concave. (Fig. 62.)

California, San Bernardino county, high ridges north side of Old Baldy Mt. (*Parish* 1942, in June 1887), Bear Valley, 6,500 feet altitude (*Parish* 1828, in June 1886), Colusa county, Bear Valley (*M. K. Curran*, in May 1884).

§ 6. Mostly tall and often stout, from long fleshy roots: leaves not so much divided, with usually broad or elongated segments: bractlets of the involucrel small or none: flowers mostly yellow: fruit glabrous, narrowly winged (except in 3 species): oil-tubes mostly large and solitary in the intervals (3 to 5 in a few species).

* *Leaves with narrowly linear more or less elongated leaflets.*

† *Low: flowers white.*

32. **P. Cusickii** Watson, Proc. Am. Acad. xxi. 453. Dwarf, caulescent, glabrous, from a thick elongated root: stems 2 to 5 inches high, bearing a single leaf: leaves 1 to 2-ternate, the segments with 3 to 5 linear acute lobes from 3 lines to an inch or more long: umbel with 1 to 3 short fertile rays, and involucrels of narrow acuminate bractlets, which are distinct or more or less united; pedicels very short: fruit oblong-elliptical, 4 to 5 lines long, the thin wings as broad as the body or narrower: oil-tubes 1 to 3 in the intervals, 4 or 6 on the commissural side: seed-face concave. (Fig. 63.)

Oregon, on the highest summits of Eagle Creek Mts., Union county (*Cusick*, in 1885), subalpine ridges of Blue and Powder River Mts. (*Cusick* 1280, in 1886). Fl. July and August.

Resembles small forms of *P. simplex*.

† † *Taller: flowers yellow.*

33. **P. simplex** Nutt., Watson, King's Rep. v. 129. Caulescent or acaulescent, puberulent, often tall and stout: leaves ternate or biternate; leaflets from very narrowly linear (almost filiform) to linear-lanceolate, 2 to 4 inches long: umbel unequally 3 to 15-rayed, with involucrels of lanceolate or setaceous bractlets; rays $\frac{1}{2}$ to 3 inches long; pedicels 1 to 3 lines long: fruit broadly

oblong to nearly orbicular, sometimes emarginate at each end, 3 to 6 lines long, 2 to 5 lines broad, with wings broader than body (also extending below body), and prominent dorsal and intermediate ribs: oil-tubes large and solitary in the intervals, 2 on the commissural side: seed-face slightly concave. (Fig. 64.)—*P. triternatum*, var. *platycarpum* Torr, Stansb. Rep. 389.

From Arizona and California (*M. K. Curran*) to Washington Territory, Idaho, and Montana.

In determining this species it is important to remember that wings develop late, and hence very mature fruit must be obtained to show wings of full width.

34. *P. triternatum* Nutt. Torr. & Gray, Fl. i. 626. Cau-lescent or acaulescent, puberulent, 1 to 2½ feet high: leaves biternate to triternate; leaflets from narrowly linear to linear-lanceolate, 2 to 4 inches long: umbel unequally 5 to 18-rayed, with involu-els of lanceolate or setaceous bractlets; rays ½ to 2½ inches long; pedicels a line or more long: fruit narrowly oblong, glabrous (rarely pubescent), 3 to 6 lines long, 1½ to 2 lines broad, with narrow wings, and somewhat prominent dorsal and intermediate ribs: oil-tubes very large and broad, solitary in the intervals, 2 on the commissural side: seed-face very slightly concave. (Fig. 65.)—Incl. *P. triternatum*, var. *leptocarpum* Nutt.

From California to Washington Territory, Idaho, and British Columbia (*Macoun*). Fl. April to June.

One of the most abundant and variable of our species. It shades off towards *P. simplex* sometimes in a most perplexing way. The following are extreme forms:

Var. **macrocarpum**. A more robust form, with broader leaflets, longer rays, and larger fruit (6 to 8 lines long).

Oregon (*Suksdorf* 502), Dalles (*Kellogg*, in 1869), Hood River (*Hender-son* 390).

Var. **brevifolium**. Stout and more rough puberulent, with more compact leaves, having stout inflated petioles, and shorter and broader often toothed leaflets.

Oregon, Klickitat county (*Howell* 379, in 1881), and rocky hillsides near the Dalles (*Suksdorf*).

Var. **alatum**. Leaves with very narrowly linear and elongated segments; fruit 5 to 6 lines long, with broader wings (some-times as broad as body or even broader), but the elongated form is that of *P. triternatum* and not *P. simplex*.

California, Folsom (*M. K. Curran*), Modoc county (*Mrs. R. M. Austin*); Oregon (*Cusick* 1098).

This form most evidently intergrades between *P. triternatum* and *P. simplex*, having the fruit outline of the former and the broad wings of the latter. As it merges into true *P. triternatum*, however, by insensible gradations, and is quite distinct in fruit outline from *P. simplex*, we include it as a variety of the former.

35. **P. lævigatum** Nutt. Torr. & Gray, Fl. i. 627. Closely resembling the preceding species, but completely glabrous, a foot or so high, with triternate leaves and much reduced leaflets or segments, the latter but 3 to 9 lines long, and half a line wide; pedicels 4 to 5 lines long; fruit 4 to 5 lines long, $1\frac{1}{2}$ to 2 lines broad, with wings as broad as body. (Fig. 66.)

Along bluffs of the Columbia River in Oregon (*Henderson*) and Washington Territory (*Howell, Suksdorf*).

36. **P. Kingii** Watson, Proc. Am. Acad. xxii. 474. Acaulescent, glabrous: scape 6 to 18 inches high, a little exceeding the leaves: leaves pinnate or bipinnate; leaflets linear, elongated, cuspidate, sometimes 2 inches long: umbel somewhat equally 4 to 20-rayed, with involucl of linear-lanceolate bractlets; rays $1\frac{1}{2}$ inches long; pedicels 1 to 3 lines long: calyx-teeth evident: fruit oblong, 4 to 5 lines long, 2 lines broad, narrowly winged, the dorsal and intermediate ribs also sometimes irregularly winged: oil-tubes 3 to 5 in the intervals, 6 to 10 on the commissural side: seed somewhat sulcate on the back, with slightly concave face. (Fig. 67.) —*Seseli Nuttallii* Gray, Proc. Am. Acad. viii. 287, in part. —*Musenium tenuifolium* Hook., not Nutt. *P. graveolens* Watson, King's Rep. v. 128.

Mountains of Utah and Colorado. Fl July and August.

Var. **alpina**. Dwarf, with stems 4 to 6 inches high, leaves 3 inches long, mostly simply pinnate, with 3 to 5 pairs of leaflets: umbel 3 to 6-rayed: fruit linear-oblong, 2 to 3 lines long: oil-tubes very obscure, 1 or 2 in the intervals, 4 to 6 on the commissural side.—*P. graveolens*, var. *alpinum* Watson, King's Rep. v. 129.

East Humboldt Mountains, Nevada, 9,000 feet altitude (*Watson* 464).

* * *Leaves with lanceolate to orbicular segments.*

37. **P. leiocarpum** Nutt. Torr. & Gray, Fl. i. 626. Acaulescent, glabrous, 1 to 2 feet high, from a very long fleshy root:

leaves biternate or ternate-quinately or sometimes simply ternate; leaflets thickish, from ovate to narrowly lanceolate, 1 to 2 inches long, petiolulate, entire or toothed at apex: umbel very unequally 6 to 15-rayed, with neither involucre nor involucels; peduncles and rays dilated at summit; rays 1 to 8 inches long; pedicels variable, 1 to 9 lines long; flowers yellow: fruit narrowly oblong, 5 to 7 lines long, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines broad, narrowly winged: oil-tubes large and solitary in the intervals, 4 on the commissural side: seed-face somewhat concave. (Fig. 68.)

From California to British Columbia, and eastward to Idaho. Fl. May to July.

38. **P. Nuttallii** Watson, King's Rep. v. 128. Like the preceding, but smaller, leaves once or twice ternate, with ovate to orbicular leaflets having cuneate to cordate base; fruit ovate to oblong, 4 lines long, 3 lines broad, and very narrowly winged; oil-tubes small, 3 in the intervals, 4 to 6 on the commissural side; seed-face almost plane. (Fig. 69.)—*P. latifolium* Nutt. Torr. & Gray, Fl. i. 625, not DC.

N. Nevada, Oregon, and Idaho (*Wilcox*).

39. **P. Brandegei** C. & R. Bot. Gazette, xiii. 210. Short caulescent, glabrous, 6 inches to a foot high, from a thick elongated root: leaves ternately decomposed, the ultimate segments lanceolate (6 to 12 lines long, $1\frac{1}{2}$ to 3 lines wide), cuspidate pointed: umbel 6 to 12-rayed, with involucels of few linear or setaceous bractlets; rays 3 to 6 lines long, pedicels not more than a line, both reflexed at maturity; flowers yellow: calyx-teeth evident: fruit (immature) oblong, about 4 lines long and 2 lines broad (undoubtedly becoming larger), with wings about half as broad as body, and prominent or even slightly winged dorsal and intermediate ribs: oil-tubes 2 to 4 in the intervals, 4 to 6 on the commissural side.

Collected in Canby's N. Transcontinental Survey, in the Walla Walla region, Washington Territory, May, 1883 (*Brandegee* 799, *Tweedley* 856).

* * * *Very stout and tall, with large decomposed leaves and linear-oblong segments: fruit the largest in the genus.*

40. **P. Suksdorfii** Watson, Proc. Am. Acad. xx. 369. Glabrous, 2 to 3 feet high or more: leaf-segments 1 or 2 inches long, entire or 2 to 3-cleft towards the top: umbel somewhat equally 6

to 12-rayed, with involuclcs of linear acuminate bractlets; rays 1 to 5 inches long; pedicels 3 to 9 lines long; flowers yellow: fruit narrowly oblong, 9 to 14 lines long, 3 to 6 lines broad, with wings narrower than body, and very prominent dorsal and intermediate ribs: oil-tubes solitary, very large (filling the intervals), 2 on the commissural side: seed-face somewhat concave. (Fig. 70.)

Dry rocky mountain sides, Klickitat county, Oregon (*Saksdorf*).

§ 7. Low, shortly caulescent or acaulescent, from a thick elongate root, glabrous: leaves ternate or pinnate, with broad oblong or round coarsely cuspidate-toothed leaflets: flowers yellow: fruit wings very broad, often several times broader than body: oil-tubes solitary in the intervals (except in *P. Howellii*).

41. **P. Euryptera** Gray, Proc. Am. Acad. vii. 348. Shortly caulescent, rather stout, 6 to 12 inches high: leaves ternate; leaflets broadly cordate, somewhat lobed, coarsely mucronate-toothed, $\frac{1}{2}$ to 1 inch long: umbel equally 8 to 15-rayed, with involuclcs of lanceolate bractlets; rays $\frac{1}{2}$ to 2 inches long; pedicels 6 lines long: fruit nearly orbicular, emarginate at each end, glabrous, 5 to 7 lines in diameter, with wings more than twice as broad as body, and prominent obtuse dorsal and intermediate ribs: oil-tubes 2 to 4 on the commissural side. (Fig. 71.)—*Euryptera lucida* Nutt. Torr. & Gray, Fl. i. 629.

Gravelly hills, S. California, and Tucson, Arizona (*Lemmon* 62).

42. **P. Howellii** Watson, Proc. Am. Acad. xx. 369. Acaulescent, with peduncle 12 to 18 inches high: leaves biternate to biquinate; leaflets cuneate-orbicular to round-cordate, acutely dentate, often 3-lobed, 6 to 12 lines long: umbel with few elongated and divaricate fertile rays, with involuclcs of acuminate lanceolate bractlets; pedicels 4 lines long: fruit glabrous, broadly elliptical or nearly orbicular, emarginate, with wings broader than body, 4 lines long: oil-tubes 3 or 4 in the intervals, 4 to 10 on the commissural side. (Fig. 72.)

Near Waldo, Josephine county, Oregon (*Howell*).

43. **P. parvifolium** Torr. & Gray, Fl. i. 628. Short caulescent, slender, with a solitary peduncle 4 to 12 inches high: leaves clustered near the base, usually large (4 to 6 inches long), bipinnate (but the upper leaflets confluent); leaflets broad, obtuse (usually ending truncately or emarginately between two divaricate teeth), irregularly incised and with broad strongly cuspidate teeth:

umbel 8 to 10-rayed, with involucels of linear or lanceolate acuminate bractlets; rays $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; pedicels 3 to 4 lines long; fruit broadly elliptical to orbicular, 3 to $3\frac{1}{2}$ lines long, scarcely emarginate, with wings broader than body, and rather prominent dorsal and intermediate ribs; oil-tubes 2 to 4 on the commissural side. — *P. Californicum* C. & R. Bot. Gazette, xiii. 143.

California (*Thos. Coulter, Brandegee*), pine woods near Monterey (*Douglas*), San Luis Obispo (*Jones*).

This species has been so frequently mistaken in collections that we were misled until the type had been examined.

17. PSEUDOCYMOPTERUS.—Mostly low (often caespitose) glabrous perennials from a thick elongated root, with bipinnate leaves (shorter than the peduncles), no involucre, and involucels of narrow bractlets mostly longer than the white or yellow flowers.

This genus is constructed to contain a species that has been referred doubtfully to *Thaspium* and *Ligusticum*, and two others that have been referred to *Cymopterus*. That *P. montanus* should be referred to *Thaspium* is no longer held. It seems generically distinct from *Ligusticum* on account of its broad lateral fruit-wings and irregular dorsal and intermediate ribs, dorsal flattening of the fruit, depressed stylopodium, often solitary oil-tubes, and yellow flowers. *P. bipinnatus* and *P. anisatus* are distinct from *Cymopterus* on account of their smaller fruit, which does not have broad dorsal and intermediate wings, is dorsally flattened, and contains prominent strengthening cells. The three species form a well-defined genus.

1. **P. montanus.** Stem erect, slender, 1 to 2 feet high; leaves mostly with broad outline; leaflets cut into 3 or 5 oblong or lanceolate segments, the upper often entire: umbel 6 to 12-rayed, with involucels of linear or setaceous bractlets longer than the yellow flowers; rays 6 to 9 lines long; pedicels about a line long; fruit broadly oblong, about 2 lines long, with lateral wings (not cohering) almost as broad as body, the dorsal and intermediates very variable (either ribbed or narrowly winged): oil-tubes 1 to 4 in the intervals, 4 to 6 on the commissural side: seed-face plane. (Fig. 73.)—*Thaspium* (?) *montanum* Gray, Pl. Fendl. 57. *Ligusticum montanum* Benth. & Hook. Gen. Plant. i. 912 and 914.

Colorado, New Mexico, and Arizona.

Widely variable, especially in its foliage. The following are the extreme forms:

Var. **tenuifolius**. Often larger and more branching, with narrowly linear leaflets $\frac{1}{2}$ to $1\frac{1}{2}$ inches long. *Thaspium* (?) *montanum*, var. (?) *tenuifolium* Gray, Pl. Wright, ii, 65. *Ligusticum montanum*, var. *tenuifolium* Watson, Bibl. Index Polypet. 426.

= Same range as the species.

Var. **purpureus**. Shortly caulescent, with rather weak ascending peduncles (3 to 6 inches long), and purple flowers.

Sandy soil, Arizona. Mt. Humphreys, July, 1883 (*Rusby* 632), and Flagstaff (*Rusby* 631, August, 1883; *Jones*, August, 1884; *Lemmon*, September, 1884; *Tracy* 235, June 24, 1887).

2. **P. bipinnatus**. Cespitose, the short branches of the rootstock covered with the crowded remains of dead leaves, glaucous, puberulent or glabrous: leaves pinnate with few pairs of short segments, which are pinnately divided into short linear lobes: scapes 4 to 8 inches high, much exceeding the leaves; rays 1 to 4 lines long; involucels of few linear-lanceolate bractlets; flowers white: fruit nearly sessile, ovoid, $1\frac{1}{2}$ to 3 lines long, moderately flattened dorsally, the 5 thickish carpel wings equal and narrow (often being but very prominent acute ribs), with obscure strengthening cells: oil-tubes 3 or 4 in the intervals, 6 to 8 on the commissural side: seed-face concave. (Fig. 74).—*Cymopterus bipinnatus* Watson, Proc. Am. Acad. xx, 368.

Montana, in the mountains south of Virginia City (*Hayden*, in 1871, under *Cymopterus faniculaceus*), near Bannock City (*Watson*, in 1880), Mt. Helena (*Canby*, in 1883), Shields River (*Scribner* 66 c, in 1883), along N. P. R. R. (*Tweed* 291, in 1882); Dakota, Black Hills (*Rusby*, in 1887).

3. **P. anisatus**. Acaulescent, cespitosè from a much branched caudex which is more or less covered with the remains of old leaves: leaves on long petioles, narrow, somewhat rigid, pinnate and the leaflets pinnately-parted into linear (sometimes linear-oblong) pungently acute segments: peduncles 6 to 12 inches high, exceeding the leaves; umbel unequally 5 to 12-rayed, with involucels of linear-subulate (sometimes lobed) bractlets exceeding the white or yellow flowers; rays $\frac{1}{2}$ to 3 inches long; pedicels 1 to 3 lines long: fruit about 2 lines long, the carpel irregularly 2 to 5-winged, with prominent group of strengthening cells in each one: oil-tubes 1 to 3 in the intervals, 2 to 4 on the commissural side: seed-face plane. (Figs. 75, 76).—*Cymopterus terebin-*

thinus, var. *fœniculaceus* Gray, Am. Jour. Sci. 2. xxxiii. 408.
C. anisatus Gray, Proc. Acad. Philad. 1863, 63.

Mountains, from Colorado and Utah to N. W. Wyoming and Oregon.
 Fl. June to August This is *Hall & Harbour* 22.

18. CYMPTERUS Raf. Journ. Phys. 1819, 100.—Mostly low and glabrous perennials (often cespitose) from a thick elongated root, with more or less pinnately compound leaves, mostly no involucre and prominent involucels, and white, purple, or yellow flowers.

This genus has heretofore seemed polymorphous and perplexing on account of having been made to contain species which held no relation to it. As restricted here, it is quite definite and distinct, being easily recognized by the broad thin wings of the fruit, which is not at all dorsally flattened, the concave seed-face (often enclosing a central cavity), and the entire absence of strengthening cells. At the same time, the fruit characters are so diverse as to make the species easy of distinction. The genus is confined to Western North America, and especially the Great Basin,

* *Seed-face slightly concave.*

† *Flowers white.*

‡ *Involucre none.*

Oil-tubes numerous.

1. **C. glomeratus** Raf. l. c. Low (3 to 8 inches), with a short caudex bearing leaves and peduncles, glabrous: leaves pinnate to bipinnate; ultimate segments linear-oblong, entire or toothed: rays and pedicels very short, making a rather compact cluster; involucel of a single palmately 5 to 7-parted bractlet: fruit globose, 3 to 4 lines in diameter, with 3 to 5 broad thin wings on each carpel: oil-tubes small, 4 or 5 in the intervals (or double the number where a rib has been suppressed), 8 on the commissural side: seed-face almost plane. (Fig. 77.)

From Colorado to British Columbia, east to Saskatchewan, Wisconsin (*Lapham*), Iowa (*Bessey*), and Arkansas (*Nuttall*).

2. **C. campestris** Torr. & Gray, Fl. i. 624. Low (2 to 3 inches high), with short caudex from a tuberous root: leaves bipinnate, with oblong segments: peduncle scarcely as long as leaves; umbels 3 to 4-rayed, with involucels of minute bractlets: fruit with somewhat thickened wings, the dorsal or both intermediate ones

obsolete on each carpel: oil-tubes 6 on the commissural side: carpophore free.

"Plains of the Platte, near the Rocky Mountains" (*Nuttall*).

In the type specimens of this uncertain species the fruit, upon which its specific rank chiefly depends, has disappeared. It closely resembles low forms of *C. glomeratus*, but differs from that species in its free persistent carpophore, small involucrel bractlets, and few rays, besides the remarkable fruit characters described by Nuttall. Specimens collected by E. L. Greene, in 1870, on the plains near Denver, Colorado, and by Prof. T. C. Porter, in 1871, near Cheyenne, Wyoming Territory, all in flower, have been referred to this species, correctly so, it may be. However, they are somewhat larger, the bractlets are larger, though much smaller than in *C. glomeratus*, and there is an elongated subterranean caudex from a deep-seated fusiform root. Mature fruit alone can certainly determine the relationship.

Oil-tubes solitary in the intervals (not known in *C. nivalis*).

3. *C. globosus* Watson, Proc. Am. Acad. xi. 141. With a very short stem bearing a few leaves and peduncles (2 to 4 inches high), glabrous: leaves glaucous, pinnate or bipinnate with broadly oblong pinnatifid segments; ultimate divisions oblong, entire or toothed, often cuspidate: rays and pedicels obsolete, the flowers and fruit being in dense globose heads, and the involucrel-bractlets very much reduced or wanting: fruit 3 to 4 lines long, the 5 thickish carpel wings approximately equal, becoming narrower towards the base of the fruit: oil-tubes 2 on the commissural side, and a small one in each wing. (Fig. 78.)—*C. montanus* Torr. & Gray, Pac. R. Rep. ii. 120; Watson, King's Rep. v. 123, in part. *C. montanus*, var. *globosus* Watson, l. c. 124, excl. fruit.

Northern Nevada, near Carson City (*Stretch, Watson*), in the Goshoot mountains (*Beckwith*), near Empire City (*Jones*), near Pyramid Lake (*Leuemon*). Fl. May and June.

4. *C. corrugatus* Jones, Am. Nat. 1883, 973. Like the preceding species, but leaves simpler, with broader more obtusely-toothed segments: rays 1 to 6 lines long; involucrels very variable, of large or small oblong or lanceolate bractlets more or less united: fruit (immature) apparently identical in section, the young wings very much wrinkled.

Nevada, in the region of Humboldt Lake, June, 1882 (*Jones* 3886). *Jones* 1691, from Juab and Sioux Bridge, Utah, distributed as *C. Fendleri*,

we have also referred to this species, though there are some slight differences.

The wrinkled fruit-wings are very striking in the immature stage that has been collected, but many fruit-wings show the same sort of wrinkling while immature and become plane enough when fully developed. The characters of leaves and inflorescence, however, serve well to distinguish this species from *C. globosus*.

5. **C. nivalis** Watson, King's Rep. v. 123. With long and branching caudex, glaucous, minutely scabrous-puberulent to glabrous: leaves simply pinnate, with leaflets 3 to 5-lobed or pinnately dissected, the segments oblong-lanceolate: peduncle 2 to 4 inches high, exceeding the leaves, bearing a small nearly capitate umbel; involuclcs of broad obtuse membranous bractlets united at base and nearly equalling the white or pinkish flowers: fruit-wings equal, thin: section unknown.

East Humboldt Mountains, Nevada, 9000 to 10000 feet altitude, July and August (Watson).

+ + *Involucre and involuclcs both conspicuous.*

6. **C. montanus** Torr. & Gray, Fl. i. 624. Leaves clustered at the summit of the very short stem, glaucous and glabrous (rarely slightly puberulent): leaves pinnate or bipinnate; pinnae oblong, pinnatifid with oblong obtuse entire or toothed lobes: peduncles 1 to 6 inches high: rays 3 to 9 lines long; pedicels very short; involucre and involuclcs of mostly broad membranaceous usually green-veined bracts, more or less united: fruit oblong in outline, 3 to 6 lines long, the 3 to 5 carpel wings broad and thin (thick at base): oil-tubes 1 to 3 in the intervals, 4 to 8 on the commissural side. (Fig. 79.)

From New Mexico to Colorado, Utah, and Yellowstone Park (Tweed), east to Texas, Kansas (L. Watson), and Nebraska (Hayden). Fl. March and April.

This is *Fendler* 275 and *Hall & Harbour* 211. The species is quite variable in its involucre and involuclcs. While in some specimens they are quite conspicuous and almost cup-like, in others they are narrow and nearly distinct.

Var. **purpurascens** Gray, Ives Colorado Rep. 15. With very broad and conspicuous involuclcs nearly enclosing the flowers, obtuse and tinged or veined with purple and green: fruit large and very broadly winged.—*C. montanus* var. *globosus* Watson, King's Rep. v. 124, as to fruit.

From New Mexico to S. California (Parish) and Nevada.

† † *Flowers yellow; oil-tubes numerous.*

7. **C. terebinthinus** Torr. & Gray, Fl. i. 624. Shortly caulescent, glabrous, 6 to 18 inches high, leafy at base: leaves rather rigid, thrice pinnate (sometimes ternate at first); leaflets a line long or less, linear or linear-oblong, entire or toothed, mucronate: umbels with 4 to 15 fertile rays, mostly no involucre, and involucl of short linear or lanceolate bractlets; rays $\frac{1}{2}$ to 2 inches long; pedicels 1 to 5 lines long; fruit 3 to 4 lines long, the (mostly) δ carpel wings broad and thin (sometimes wrinkled), with a rather indistinct group of strengthening cells in the base of each: oil-tubes 2 to 5 in the intervals, 5 to 10 on the commissural side. (Fig. 80.)—Incl. *C. faniculacens*, *C. albiflorus*, and *C. thapsoides* of Nuttall in Torr. & Gray, Fl. i. 624.

From the mountains of S. California to British Columbia, and extending eastward through Nevada and Utah to Colorado and S. W. Wyoming. Fl. April to June.

This is *Braudleyae* 800 and *Tweedye* 819 of Canby's N. Transcontinental Survey, distributed as *C. ? anisatus*.

8. **C. Fendleri** Gray, Pl. Fendl. 56. Low, subcaulescent: leaves oblong or ovate-lanceolate in outline, exceeding the peduncles, 2 to 3-pinnate, pinnae and segments 5 or 7, oblong and incised: umbels few-rayed, with no involucre, and involucl of oblong or lanceolate bractlets united at base and exceeding the flowers: fruit about 3 lines long, each carpel with 3 or 4 thin wings: oil-tubes several in the intervals, 4 on the commissural side.

Gravelly hills, Arizona (*Rushby*), and New Mexico (*Fendler* 274, *Newberry*, *Thurber*), to W. Texas and Mexico (*Bigelow*, *Wright*, in Mex. Bound. Surv.); also Fort Lyon, on the Arkansas (*Palmer*).

* * *Seed-face very deeply concave.*

† *Flowers yellow.*

9. **C. longipes** Watson, King's Rep. v. 124. Shortly caulescent, glabrous: leaves pinnate to bipinnate, the ultimate segments oval and mucronulate: fruiting peduncles longer than the leaves, 4 to 10 inches long: umbels 5 to 10-rayed, with mostly no involucre, and involucl of subulate acuminate bractlets; rays 6 to 15 lines long; pedicels 2 lines long: fruit 3 to 4 lines long, the δ carpel wings broad and thin, rather unequal: oil-tubes 3 in the intervals, 6 on the commissural side: seed-face strongly involute, nearly enclosing a central cavity. (Fig. 81.)

Utah, Wahsatch Mts., near Salt Lake City, and on Antelope Island, 5000 feet altitude (*Watson*, in 1869), near Ogden (*Coulter*, in 1872), S Utah (*Capt. F.M. Bishop*, in 1873), Utah Valley (*Jones* 1680, in 1880). Fl. May and June.

† † *Flowers purple.*

10. **C. purpureus** *Watson*, *Am. Nat.* vii. 300. Whole plant purplish, nearly acaulescent, glabrous; leaves broadly triangular in outline, 2 to $\frac{3}{2}$ -pinnate, the broad segments coarsely mucronate-dentate; peduncles stout, exceeding the leaves; umbel unequally 8 to 12-rayed, with mostly no involucre, and involucels of lanceolate bractlets united near the base and nearly equalling the yellowish-purple flowers; fruit 4 lines long, each carpel with 3 to 5 broad membranous wings; oil-tubes 4 or 5 in the intervals, 8 on the commissural side; seed-face deeply sulcate.

New Mexico (*Palmer*) and N. Arizona (*Mrs. E. P. Thompson, Palmer* 177, in 1877). *Palmer* 177 may be from S. Utah.

11. **C. Jonesii**. Nearly acaulescent, glaucous and glabrous; leaves ternate then pinnate to bipinnate, with ultimate segments rather broad and mucronate-toothed; peduncles stout and longer than the leaves, 2 to 5 inches high; umbels 5 to 12-rayed, with no involucre and involucels of small lanceolate bractlets somewhat united at base; rays about an inch long; pedicels 2 to 3 lines long; fruit globose, 4 lines in diameter, the 5 carpel wings broad and thin (very thick at base); oil-tubes solitary in the very narrow intervals, 2 on the commissural side; seed-face deeply sulcate. (Fig. 82.)

Frisco, Utah, altitude 8000 feet, June 22, 1880 (*Jones* 1808).

Distributed as *C. purpureus*, but differing decidedly in its fruit, which has wings very thick at base, very narrow intervals in which are solitary oil-tubes, and but 2 oil-tubes on the commissural side.

12. **C. cinerarius** *Gray*, *Proc. Am. Acad.* vi. 535. Acaulescent, with subterranean creeping rootstock; peduncles (2 or 3 inches high) and petioles glabrous; leaves somewhat cordate in outline, bipinnate with toothed segments, glaucous-cinereous with a fine rough pubescence; rays few, short or almost none; involucels of numerous united somewhat membranous long-acuminate segments; fruit 3 lines long, with rather narrow undulate wings; oil-tubes 3 in the intervals, several on the commissural side; seed narrow, strongly curved, with a deep central channel.

California, at Sonora Pass and above Mono Lake in the Sierra Nevada, at 9000 to 10,000 feet altitude (*Brewer*).

† † † *Flowers white.*

13. *C. glaucus* Nutt. in Jour. Philad. Acad. vii. 28. Leaves and peduncles clustered at the summit of a short (sometimes elongated) caudex, more or less scabrous-puberulent: leaves tripinnate, the ultimate divisions crowded, linear-oblong, with revolute margins: peduncles at first short, elongating in fruit and exceeding the leaves: umbels 5 to 15-rayed, with an involucre of setaceous bracts or none, and involucels of linear acute bractlets; rays 4 to 12 lines long; pedicels 2 to 3 lines long: fruit 2 to 3½ lines long, the 2 to 5 carpel wings rather narrow: oil-tubes 3 to 5 in the broad intervals, 6 to 8 on the commissural side: seed-face deeply sulcate or involute. (Fig. 83.)

Nevada (*Watson, Vasey*), Utah (*Jones* 1688), Idaho (*Nuttall*), and Montana, headwaters of Jocko River (*Canby* 147). Fl. April.

19. PHELLOPTERUS Benth. Gen. Plant. i. 905.—Low tomentose-villous herbs on the sands of the sea-shore, with once or twice ternate or ternate-pinnate coriaceous leaves, ovate to roundish more or less confluent leaflets densely white tomentose beneath, involucre and involucels of subulate bracts, and glomerate whitish flowers.

The fruit of this genus differs in no respect from that of *Cymopterus*, and we retain it only on account of its very peculiar habit and habitat. It is one of the Japanese and Corean forms which have reached our western coast.

1. *P. littoralis* Schmidt, Fl. Sachel. in Mem. Acad. Petrop. 7. 12. 138. Subcaulescent: petioles elongated; leaflets callous-seriate to dentate, with impressed veinlets above, 1 to 2 inches long: umbels shorter than the leaves, 10 to 12-rayed; rays 6 to 12 lines long; umbellets capitate: fruit 4 to 5 lines in diameter, the wings 1½ lines broad. (Fig. 84.)—*Cymopterus* (?) *littoralis* Gray, Pac. R. Rep. xii. 62.

Sandy sea-shores, Oregon (*Howell, Henderson*); Washington Territory (*Cooper*), Puget Sound (*Wilkes' Expedition*); Vancouver Island (*Macoun*, in 1887). Fl. June.

The plant is said to scarcely rise above the surface of the shifting sands, the leaves lying prostrate.

20. THASPIUM Nutt. *Genera*, i. 196.—Perennials (2 to 5 feet high), with ternately divided leaves and broad serrate or toothed leaflets (or lower leaves simple), mostly no involucre, involuclcs of small bractlets, mostly yellow flowers, and all the fruits pedicelled.

The species of *Thaspium* are in great confusion. In Gray's *Manual* *T. aureum* Nutt. and *T. trifoliatum* Gray each have an apterous variety. These apterous forms were taken from Koch's genus *Zizia* and placed under the *Thaspium* species apparently from the close resemblance of the foliage. The fruit characters, however, are abundantly distinct, for the *Zizia* forms have simply ribbed fruit flattened laterally, the central fruit of the umbellets sessile, and flower in early spring; while *T. aureum* and *T. trifoliatum* of the *Manual* have winged fruit flattened dorsally, central fruit pedicelled, and flower late in summer, maturing fruit in the fall. Bentham & Hooker have transferred these apterous *Zizia* forms to a section *Zizia* under *Carum*, from which genus they differ in the absence of stylopodia, central sessile fruit, more prominent ribs, and *Thaspium*-like foliage. The same authors seem to have made no disposition of *T. aureum* of the *Manual*, unless it went with the apterous variety, while the group of forms under *T. trifoliatum* Gray, of the *Manual*, has been taken to represent *T. cordatum* Torr. & Gray. For this latter species Bentham & Hooker seem to have had in mind only Gray's apterous variety, and so referred it to *Carum* § *Zizia* as one of the two species. In Watson's *Bibliographical Index* the synonym *Carum cordatum* Benth. & Hook, under *T. trifoliatum*, is correctly quoted so far as literature is concerned, but apparently should be transferred to *T. trifoliatum*, var. *apterum* Gray, to express the real form Bentham & Hooker had in mind. This leaves the *Manual* forms *T. aureum* and *T. trifoliatum* with its var. *atropurpureum* unprovided for by these authors, the two apterous varieties only having been used to form the section *Zizia* under *Carum*. An explanation of this may be found in the fact that most of the herbarium specimens labeled *Thaspium aureum* are really the so-called apterous varieties. The true *Thaspium* forms, with winged fruit, are quite uncommon in herbaria, while the apterous forms are very abundant.

1. **T. aureum** Nutt. l.c. Glabrous: radical leaves mostly cordate, serrate: stem leaves simply ternate (rarely biternate); leaflets ovate to lanceolate, rounded or tapering at base, serrate: umbels 8 to 12-rayed; rays $\frac{1}{2}$ to 1 inch long; pedicels about a line long; flowers deep yellow: fruit globose-ovoid, about 2 lines long, all the ribs equally winged. (Fig. 85.)

Thickets and woodlands, throughout the Atlantic States and westward into the Mississippi Valley. Apparently not in Canada, all the specimens so labelled from there being *Zizia aurea*. Fl. in summer and maturing fruit in late summer or autumn.

This species has a wide range of variation in the division and tothing of its leaves, but the variations are so inconstant that it seems impossible to found specific distinctions upon them. In characterizing *T. aureum*, Nuttall has laid some stress upon "lateral divisions of the upper leaves sessile," a character which means nothing, as these divisions may be sessile, subsessile, or petioled upon the same plant, either in *T. aureum* or the *T. trifoliatum* of Gray. So far as foliage characters are concerned, serrate leaflets point to Nuttall's form, while crenately-toothed leaflets stand for Gray's *T. trifoliatum*, exclusive of his vars. *apterum* and *atropurpureum*. Further confusion in leaf characters has arisen by including the so-called apterous varieties, which we have restored to *Zizia*. An extreme variation in leaf characters, but merging completely into the type through intermediate forms, is

Var. **trifoliatum** C. & R. Bot. Gazette, xii. 136, in which the leaves or leaflets are crenate or crenately-toothed.—*T. trifoliatum* Gray, Manual, in part.

Ohio to Illinois, westward to Oregon and British Columbia (*Macoun*).

This seems to be the common western form of the species, as our Pacific coast specimens are all distinctly this variety. From Ohio to Illinois there is an interminable intermingling of species and variety, while in Pennsylvania the specific form is distinctly represented.

Var. **involutratum**. Radical leaves twice to thrice ternate; leaflets as in the species: umbel with conspicuous involucre of serrate bracts, and involucels of numerous toothed bractlets often as long as the pedicels, which are 2 to 3 lines long.

Mountain meadows, Kootenai county, Idaho, July, 1887 (*J. B. Leiberger*).

Var. **atropurpureum** C. & R. Bot. Gazette, xii. 136. Petals dark-purple.—*T. atropurpureum* Nutt. *T. trifoliatum*, var. *atropurpureum* Gray, Manual.

Same range as the species.

This variety has the leaf characters of the species, and if var. *trifoliatum* had been retained as a species, var. *atropurpureum* would have been transferred to *T. aureum*.

In giving the range of the above group of forms it has been impossible to use published ranges, owing to the great confusion as to what forms were intended. Discarding the apterous varieties, the true Thasplums of this group are but scantily represented in our herbaria, far more so, probably, than their occurrence would justify. The early spring and summer flowers and fruits of the apterous forms have probably too often satisfied collectors that they had already secured good material of forms which only appeared in collecting condition in late summer and autumn. Therefore we can only cite such range as our material indicates, confident

at the same time that it cannot represent the whole range. For example, the species doubtless occurs in Canada, though we have seen no specimens.

2. **T. barbinode** Nutt. l. c. Loosely branched, pubescent on the joints, sometimes puberulent in the umbels: leaves 1 to 3-ternate; leaflets ovate to lanceolate, acute, with cuneate base, coarsely cut-serrate, often ternately cleft or parted; flowers light yellow: fruit broadly oblong, about 3 lines long and 2 lines broad, with mostly 7 ribs prominently winged, the other 3 not at all winged or but slightly so. (Fig. 86.)

Banks of streams, Canada and New York to Minnesota and southward. Fl. May and June.

Var. **angustifolium** C. & R. Bot. Gazette, xii. 137, has smaller and narrower more sharply cut leaflets, and fruit more or less puberulent.

Pennsylvania (W. W. Bailey), Ohio (Sullivan), Indiana (Rose), and Illinois (Bebb).

Var. **pinnatifidum**. Divisions of the 1 to 3-ternate leaves inclined to be pinnate; leaflets small, more or less lacinate-toothed with blunt teeth: fruit puberulent.—*T. pinnatifidum* of Chapman's Manual.

Reported only from Florida (*Chapman, Curtiss*).

3. **T. Walteri** Shuttlew. Resembling the last, but puberulent on branchlets, umbels, and fruit, with fewer leaves: leaves 1 to 3-ternate; leaflets 1 to 2-pinnatifid, lobes linear or oblong; one or two leaves near the base often very large and long petioled (petioles sometimes a foot long); flowers light yellow: fruit oblong, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines long, and 1 to $1\frac{1}{2}$ lines broad, all the ribs winged, generally 3 of them narrowly so. (Fig. 87.)—*Zizia pinnatifida* Buckley. *T. pinnatifidum* of Gray's Manual, ed. 4. 155.

Barrens and mountains, North Carolina (*Rugel, Buckley*), Tennessee (*Buckley*), and Kentucky (*Short*, in herb. *Durand*).

21. **LIGUSTICUM** Linn. Gen. n. 346.—Smooth perennials from large aromatic roots, with large ternately or ternate-pinnately compound leaves, mostly no involucre, involucels of narrow bractlets (mostly wanting in *L. Porteri*), and white flowers in large many-rayed umbels.

* *Leaves ternately decomposed, with broad leaflets simply toothed or serrate: seed-face plane: eastern species (or high northern).*

1. *L. actæifolium* Michx. Fl. i. 166. Stem stout, branched above, 2 to 6 feet high, leafy, with glabrous inflorescence: leaves large, 3 to 4-ternate; leaflets broadly oblong, 2 to 5 inches long, coarsely serrate: umbel 10 to 20-rayed, with involuclers of few short bractlets; rays (fruiting) 1 to 2 inches long; pedicels 1 to 2 lines long: fruit ovate, 2 to 3 lines long, with prominent somewhat winged ribs: oil-tubes 3 to 4 in the intervals, 6 on the commissural side: seed slightly flattened dorsally, with angled back. (Fig. 88.)

Rich ground, S. Pennsylvania to Kentucky, and southward to the Gulf. Fl. July and August.

2. *L. Scoticum* L. Spec. 250. Stem simple, 1 to 2 feet high, somewhat leafy, with glabrous inflorescence: leaves biternate; leaflets ovate, 1 to 2 inches long, coarsely toothed: umbel 8 to 15-rayed, with involuclers of several linear bractlets; rays (fruiting) 1 to 3 inches long: fruit narrowly oblong, 4 to 5 lines long, with prominent somewhat winged ribs: oil-tubes small, 2 or 3 in the intervals, 6 on the commissural side: seed flattened dorsally, with with round back. (Fig. 89.)

Salt marshes, along the east and west coasts of British America, and extending into New England as far south as Cohasset, Mass. (*Walter Deane*); also in Alaska.

* * *Leaves ternate-pinnately compound, with leaflets laciniately toothed or pinnatifid.*

† *Rocky Mountain species.*

3. *L. scopulorum* Gray, Proc. Am. Acad. vii. 347. Stout, 2 to 3 feet high, more or less leafy, with puberulent inflorescence: lower leaves often very large, twice or thrice ternate, then once or twice pinnate; segments (often small) ovate, laciniately pinnatifid; upper leaves often ternate-pinnate or simply pinnately compound: umbel of numerous rays, with involuclers of several narrowly linear elongated bractlets; rays (fruiting) 2 to 3 inches long; pedicels 6 lines long: fruit oblong, about 3 lines long, with somewhat prominent conical stylopodium, and prominent somewhat winged ribs: oil-tubes 3 to 5 in the intervals, 6 to 8 on the commissural side: seed somewhat dorsally flattened, with angled

or sulcate back, and face with a broad shallow concavity and central longitudinal ridge. (Fig. 90.)

Common in the mountains of Colorado, and extending into Utah (Ward), N. Arizona (Palmer 176, Lemmon 393, Rusby 630), and New Mexico (Bigelow, Walcott, Rusby). Fl. June to August. This is Hall & Harbour 218.

So far as we can discover, this species does not occur outside of the Rocky Mountains, and chiefly in Colorado, even the range widely separating it from *L. apiifolium*, with which it has often been confused. Certain Colorado forms, commonly referred to this species, are *Conioselinum Canadense*. In some cases the fruit is necessary to distinguish these species. Collectors should carefully note whether any so-called specimens of *L. scopulorum* develop fruit with lateral wings.

4. **L. Porteri.** Rather stout, 2 to 3 feet high, more leafy, with glabrous or puberulent inflorescence: leaves large, biternate then bipinnate; the numerous rather crowded segments lanceolate to lanceolate-ovate, laciniately pinnatifid, toothed or entire: umbel of numerous rays, mostly with neither involucre nor involucels; rays (fruiting) 1 to 2 inches long; pedicels 3 to 4 lines long; flowers white or pinkish: fruit (immature) oblong-ovate, 2 lines long, with more prominent winged ribs than in other species: oil-tubes 4 to 6 in the intervals, 8 to 10 on the commissural side: seed somewhat dorsally flattened, with very sharply angled back, and face with a broad shallow concavity and central longitudinal ridge.

In the mountains and foothills of Colorado, Bear Creek (Vasey 223, in 1868), headwaters of Platte River (Coulter, in 1873, distributed as *L. apiifolium*, and described as such in Fl. Colorado); Arizona (Palmer 176, in 1877), Huachuca Mts. (Pringle, in 1884, distributed as *L. flicinum*); New Mexico, mountains near Las Vegas (G. R. Vasey, in 1881, distributed as *L. apiifolium*), near top of mesa, Raton (Tracy 52, in 1887). Fl. June and July.

This is also the Colorado form referred doubtfully to *L. apiifolium* by Brewer & Watson in Bot. Calif. i. 264. It is a curious fact that this species has always been referred to *L. apiifolium* or *L. flicinum*, two species with which it cannot be confounded, and has never been referred to *L. scopulorum*, to which it is most nearly allied. It differs from that species chiefly in its more leafy habit, more numerous crowded smaller and narrower leaf-segments, naked often glabrous umbels, more ovate fruit, which is more prominently winged than in any other species, more numerous oil-tubes, and seed with a very sharply angled back.

5. **L. Canbyi.** Stem about 2 feet high, leafy at base, with a small cauline leaf or two, and glabrous inflorescence: leaves large, biternate; leaflets lanceolate, 3 to 4 inches long, pinnately

parted below, then confluent, finally toothed above, the larger segments more or less laciniately toothed: umbel of numerous rays, with involuclers of elongated (half inch long) linear bractlets; rays 2 inches long; pedicels 5 or 6 lines long; fruit (immature) with long slender conical stylopodia as long as the styles, and prominent winged ribs: oil-tubes 5 or 6 in the intervals, 6 to 8 on the commissural side: seed strongly flattened dorsally.

Low grounds, near headwaters of Joeko River, Montana, July 16, 1883 (*Canby* 155, distributed as *L. scopulorum*, var. ? with the herbarium note, "perhaps a sp. nov.")

The foliage of this species is very different from that of any other *Ligusticum*, but the mature fruit is needed to complete the description.

6. *L. filicinum* Watson, Proc. Am. Acad. xi. 140. Stem $1\frac{1}{2}$ to 3 feet high, more or less leafy, with glabrous inflorescence: lower leaves often very large, once or twice ternate, then bipinnate; the narrow segments deeply pinnatifid to entire: umbel of numerous rays, with involuclers of one or few small linear bractlets; rays (fruiting) 1 to 2 inches long; pedicels 3 to 5 lines long; fruit narrowly oblong, 3 to $3\frac{1}{2}$ lines long, with somewhat prominent conical stylopodia, and prominent somewhat winged ribs: oil-tubes 3 to 5 in the intervals, 6 to 8 on the commissural side: seed strongly flattened dorsally, with angled back, and face slightly concave, with no central ridge.

S. Utah, in the Wahsatch and Uintah Mts. (*Watson* 454, *Parry* 82, *Jones* 1170, *Tracy* 686, *Hooker & Gray*), northward to Wyoming (*Parry* 121), and Yellowstone Park (*Tweedy* 5). Fl. July.

In Watson's Report on King's Exped. this was referred to *L. apiifolium*; and in Am. Nat. ix. 291, it was referred by Parry to *L. scopulorum*. It differs from both of these species chiefly in its more dissected foliage, larger more oblong fruit, more dorsally flattened carpels, and the absence of any central ridge upon the seed-face.

7. *L. tenuifolium* Watson, Proc. Am. Acad. xiv. 293. Stem slender, 1 to 2 feet high, naked above the base or with a single leaf, bearing 1 to 3 glabrous umbels: leaves small, ternate then pinnately decomposed, finely dissected with laciniately divided leaflets, the ultimate segments linear and short: umbel few-rayed (6 to 12), with involuclers of 1 or 2 narrowly linear bractlets; rays about an inch long; pedicels 2 to 3 lines long: fruit oblong, $1\frac{1}{2}$ to 2 lines long, with narrow ribs: oil-tubes 3 to 5 in the intervals, 6 to 8 on the commissural side.

Mountains of Colorado (*Hull & Harbour* 216, in part, *Parry, Wolf & Rothrock* 721); Oregon, Eagle Creek Mts. (*Cusick* 1057). Fl. August.

The *Hull & Harbour* plant was distributed as *Conioselinum Fischeri*.

† † *Pacific species.*

8. *L. apiifolium* Benth. & Hook. Gen. Pl. i. 912. Stems 2 to 4 feet high, few-leaved or almost naked, puberulent in the inflorescence: leaves mostly radical, ternate or biternate, then once or twice pinnate; the segments ovate, laciniately pinnatifid ($\frac{3}{4}$ to $1\frac{1}{2}$ inches long): umbel of numerous rays, with involuclers of several narrowly linear elongated bractlets; rays (fruiting) about 2 inches long; pedicels 2 to 4 lines long; fruit oval, $1\frac{1}{2}$ to 2 lines long, with short conical stylopodia, and narrow acute ribs: oil-tubes 3 to 5 in the intervals, 4 to 8 on the commissural side: seed with round back and more or less deeply concave face, and a prominent central longitudinal ridge. (Fig. 91.)—*Cynapium apiifolium* Nutt. Torr. & Gray, Fl. i. 641.

Chiefly in the mountains of Oregon (represented in older collections by *Hull* 207, and recently by *Howell* 6, *Henderson* 1589, *Cusick* 1058 and 1391, *Kellogg & Harford* 314); and extending southward into California, Yosemite Valley (*Bolander*), Big Tree Road and Ebbett's Pass (*Brewer*), Donner Lake (*Torrey*), Tamal Pass (*Bigelow*), Siskiyou county (*Pringle*, in 1882), etc.; also probably in British Columbia (*Macoun*). Fl. June.

It is very evident, from a study of herbarium specimens, that this species has been much misunderstood; for while we discover any number of sheets labelled *L. apiifolium*, very few of them prove to be that species. The small oval fruits, smaller than in any other species, with their narrow ribs and reniform seed-section, easily separate it from other species. Its range, apparently limited to the mountains of Oregon and N. California, serves well to separate it from the Colorado *L. scopulorum*, with which it has been confounded. A form apparently near *L. apiifolium* was collected by *Henderson* (no. 1588) at Oswego, Oregon, May, 1887, and by *Howell* (no. 121) near Waldo, Oregon. The leaves are almost entirely wanting, but the fruit is somewhat larger, the seed-face more deeply sulcate, and and its central ridge wanting or nearly so.

9. *L. Grayi*. Stems 1 to 2 feet high, with leaves all nearly radical, and glabrous inflorescence: leaves ternate then pinnate; the segments ovate, laciniately pinnatifid: umbel of numerous rays, with involuclers of several narrowly linear elongated bractlets; rays 1 to 2 inches long; pedicels 2 to 4 lines long; fruit narrowly oblong, 2 to $2\frac{1}{2}$ lines long, with short conical stylopodia, and narrow prominent almost winged ribs: oil-tubes 3 to 5 in the

intervals, 8 on the commissural side: seed strongly flattened dorsally, with angled back, and face but slightly concave, with no central ridge. (Fig. 92.)—*L. apifolium* var. (?) *minus* Gray; Brewer & Watson, Bot. Calif. i. 264 and ii. 451.

California, Ostrander's Meadows (*Bolander*), Ebbett's Pass (*Brewer*), Mts. Shasta and Stanford (*Hooker & Gray*), Donner Lake (*Sonne*), Sierra county (*Lemmon*), Plumas county (*Mrs. Austin*); Oregon, Portland (*Henderson*), Willamette Slough (*Howell*); Washington Territory, Mt. Adams (*Henderson 378, Suksdorf*). Fl. June.

The specific name *minus* is preoccupied by *Ligusticum minus* Lam.

22. OREONIS Raf., Seringe, Bull. Bot. Soc. Genev. 1830, 214.—An alpine caespitose glabrous perennial, with pinnate leaves mostly shorter than the peduncles, no involucre, and involucels of narrow bractlets equalling the yellow flowers.

The corky-ribbed rather than thin winged fruit, as well as the well-developed strengthening cells, are characters which do not belong to *Cymopterus*, the genus to which this form has been referred. The fruit bears a closer resemblance to that of *Apium* or *Ceroplasteum*.

1. *O. humilis* Raf. l. c. Caespitose, from a somewhat slender elongated root: leaves pinnate, the leaflets cut into 3 to 7 linear-lanceolate mucronate segments: peduncles 1 to 5 inches high: umbels few-rayed, with involucels of linear or lanceolate bractlets: fruit globose, 2 lines long, with 5 very thick and prominent (but not winged) carpel ribs: oil-tubes solitary in the very narrow intervals, 2 on the commissural side, and a small one in each dorsal rib: seed sulcate beneath the oil-tubes, with face somewhat concave. (Fig. 93.)—*Cymopterus alpinus* Gray, Am. Jour. Sci. 2. xxxiii. 408.

High mountains of Colorado, at 11,000 feet altitude and upwards. Fl. July and August.

23. ÆTHUSA Linn. Gen. n. 355. Poisonous annuals, with 2 to 3-ternate then pinnate leaves having small and many-cleft segments, no involucre, involucels of long narrow bractlets, and white flowers.

Æ. CYNAPIUM L. is a fetid poisonous European herb, in cultivated grounds, from New England and Pennsylvania to Minnesota. (Fig. 94.) Fl. June to August.

24. *CÆLOPLEURUM* Ledeb. Fl. Ross. ii. 361.—Stout glabrous sea-coast perennials (somewhat puberulent in the inflorescence), with 2 to 3-ternate leaves on very large inflated petioles, few-leaved deciduous involucre, involucels of numerous small linear-lanceolate bractlets (sometimes conspicuous or even like the leaves), and greenish-white flowers in many-rayed umbels.

This genus is referred to *Archangelica* by Bentham & Hooker, which genus we have included under *Angelica*⁶, and in the same connection restored *Cælopleurum*⁷ to generic rank. It differs from *Angelica* in the fact that all the ribs are very prominently thick and corky, and that the laterals are not winged, although in *C. maritimum* they are broader than the dorsals. The fruit is not at all dorsally flattened, the flattening being lateral, if any, as in *Ligusticum*. The seed is soon loose in the pericarp, the oil-tubes adhering to it. This fact, taken in connection with the very characteristic ribs, serves to distinguish this genus from any *Angelica*, to which genus it is nearly allied though *Cælopleurum maritimum* and *Angelica pinnata*.

1. *C. Gmelini* Ledeb. l. c. Stem 1 to 3 feet high: leaflets ovate (with acute or obtuse base), acute, irregularly cut-serrate, 2 to 2½ inches long, 1 to 1½ inches broad: rays 1 to 1½ inches long; pedicels 3 to 4 lines long: fruit globose to oblong, 2 to 3½ lines long, with ribs all nearly equal, and seed-face plane. (Fig. 95.)—*Archangelica Gmelini* DC.

Rocky coasts, Massachusetts Bay (*Murong*), Isles of Shoals (*Cunby*), Shore of St. Lawrence (*Pringle*), coast of Gaspe (*Macoun*), Labrador (*Allen*, *Munn*), to Greenland; also Vancouver Island (*Macoun*), Queen Charlotte Islands (*Dawson*), to Alaska (*Rothrock*, *Harrington & White*); besides reported stations of the earlier collectors.

This species very likely occurs on the coast of Washington Territory and Oregon, but we have as yet seen no specimens. So far as known it is not found in the interior, the so-called *Archangelica Gmelini* of the Rocky Mountains (so far as seen) being *Selinum Grayi*. The plant from "Alpine region of White Mts. (*Oakes*)," in the Gray and Torrey herbaria, is probably something else, but the specimens are much too young to determine. *Hall & Harbour* 219 from the Colorado mountains, and *Watson* 459 from the Uintas are the same, and have been doubtfully referred to this species, but in the absence of fruit it is impossible to determine the relationship, and the range is presumptive evidence against this reference. They may as well be some *Angelica*. *Archangelica peregrina* Nutt., quoted by Torrey & Gray as a synonym of *Archangelica Gmelini* DC., is *Angelica genuflexa* Nutt. In *Pringle's* distribution from Temiscouata, Canada (rocky shore of the St. Lawrence), the sheet in *J. Donnell Smith's* herbarium contains de-

⁶ Botanical Gazette, xii. 60. ⁷ L. c. p. 62.

tached fruits which (if they belong to this species) are longer than any known, being 5 lines long. Certain Alaskan forms referred to this species show a remarkable development of involucels, the bractlets being ovate, very long acuminate, and several times longer than the head. There has been considerable mixing of this species with *Ligusticum Scoticum* in herbaria.

2. **C. maritimum** C. & R. Bot. Gazette, xiii, 145. Stems 2 to 3 feet high: leaflets broad, often round, usually with cordate base, very obtuse, dentate or crenate-dentate, $2\frac{1}{2}$ to 3 inches long, $2\frac{1}{2}$ inches broad: rays 2 to 3 inches long; pedicels 6 to 7 lines long: fruit oblong, 3 to $3\frac{1}{2}$ lines long, with lateral ribs broader than the others, and seed-face concave. (Fig. 96.)

Washington Territory, wet ocean bluffs. Long Beach, Ilwaco, July 24, 1886 (*L. F. Henderson* 384), Astoria (*Cooper*).

25. **OROGENIA** Watson, King's Rep. v. 120, t. 15.— Dwarf, glabrous, nearly acaulescent plants, from tuberous or fusiform roots (underground part of the stem sheathed with large scarious bracts), with ternate leaves and linear segments, no involucre, involucels of few linear bractlets, and white flowers in subcompound umbels with very unequal rays.

This very peculiar and distinct genus is like *Erigenia* in habit and time of blooming, as is said in the original description, but it is far removed from it in fruit structure.

1. **O. linearifolia** Watson, l. c. Stem (or scape) slender, rising 1 to 2 inches above ground from a deep-seated round tuber: leaves 2 or 3, once or twice ternate, upon slender petioles; leaflets entire, 1 to 2 inches long, 1 to 3 lines wide, obtuse: umbels 2 to 4-rayed, with nearly sessile flowers: fruit $1\frac{1}{2}$ to 2 lines long, lateral ribs and commissural projection much more strongly developed than in the next. (Fig. 97.)

Utah, in the Wahsatch (*Watson, Jones*); Idaho (*Wilcox*); Oregon (*Cusick*); and Washington Territory (*Suksdorf*). Fl. in early spring.

2. **O. fusiformis** Watson, Proc. Am. Acad. xxii, 474. Stout, 3 to 6 inches above ground, from a long fusiform root: leaves more compounded, 2 or 3-ternate, with terminal leaflets often 3-parted; leaflets an inch or less long: umbels 6 to 10-rayed; rays longer: fruit about 3 lines long, $1\frac{1}{2}$ lines broad, lateral ribs and commissural projection smaller. (Fig. 98.)

California, Plumas county (*Mrs. R. M. Austin*), Nevada county (*C. F. Sonne*). Fl. in early spring.

Var. **Leibergi**. A taller, more slender form, a foot or more high, with petioles correspondingly elongated.

Sandhills in the Bitterroot Mountains, Idaho, June, 1887 (*J. B. Leiberg*).

This is not only a much taller plant than the species, but it blooms considerably later, and mature fruit may reveal specific characters.

26. **CRANTZIA** Nutt. *Genera*, i, 178.—Small glabrous perennials, creeping and rooting in the mud, with leaves reduced to hollow cylindrical or awl-shaped petioles (jointed by transverse partitions), minute involucrel bracts, and simple few-flowered umbels of white flowers.

1. **C. lineata** Nutt. l. c. Leaves very obtuse, 1 to 3 inches long (sometimes nearly a foot), 1 to 2 lines broad: fruit a line long, the thick lateral wings forming a corky margin. (Fig. 99).

In brackish marshes along the Atlantic coast from Massachusetts to Mississippi; on the Pacific coast, Oregon (*Hull* 205, *Meehan*), Washington Territory (*Henderson* 403), Puget Sound (*Wilkes' Exped.*), Vancouver Island (*Macoun*); also from Santa Cruz Valley, Arizona (*Pringle, Lemmon*).

The Arizona specimens are somewhat peculiar, Pringle's having unusually elongated filiform leaves, and Lemmon's having leaves of ordinary width, but in some cases 9 inches to a foot long.

27. **GENANTHE** Linn. *Gen.* ii, 352.—Mostly aquatic glabrous herbs, with succulent stems, pinnate or decomposed leaves, and usually involucre umbels of white flowers.

1. **Æ. sarmentosa** Presl. DC. *Prodr.* iv, 138. Succulent stems 2 to 5 feet high: leaves ternate and bipinnate; leaflets ovate, acuminate, toothed, often lobed at base, 6 to 12 lines long; umbels many-rayed, with involucre of a few linear bracts or none, and involucrel of similar more numerous bractlets; rays an inch long or less; pedicels numerous, short: fruit about 2 lines long, with commissural face (as well as ribs) very corky. (Fig. 100.)

California (*Lemmon*), through Oregon and Washington Territory, to British Columbia (*Meehan, Macoun*). Fl. June to August.

Var. **Californica**. With usually larger more approximate acute or acutish leaflets.—*Æ. Californica* Watson, *Proc. Am. Acad.* xi, 139.

With the last in the southern part of its range, but extending southward in California to San Diego county.

We can discover no good specific characters in *Æ. Californica* Watson.

Its range overlaps with that of *C. sarmentosa*, while the leaf characters depended upon to distinguish it are not constant, but show every gradation to the leaf characters of that species.

28. **CYNOSCIADIUM** DC. Mem. Umbel. 44. Glabrous annuals, with pinnately divided cauline leaves (leaflets linear), mostly undivided lower and radical leaves, involucre and involucels of linear bracts, and white flowers.

1. **C. digitatum** DC. l. c. Slender, 1 to 2 feet high: radical leaves linear-lanceolate, entire; cauline leaves palmately 3 to 5-parted: umbels irregular, mostly 3 to 8-rayed; rays about an inch long; pedicels very unequal, 3 to 10 lines long; fruit a line long, contracted into a neck at summit, with very prominent ribs and minute calyx-teeth. (Fig. 101.)

Wet ground, Arkansas, Alabama, Louisiana, and Texas. Fl. May and June.

2. **C. pinnatum** DC. l. c. Smaller: cauline leaves pinnately divided into few distant segments, terminal one much the largest; radical leaves similar or often entire: umbels 5 to 10-rayed; rays $\frac{1}{2}$ to 1 inch long; pedicels 1 to 4 lines long; fruit $1\frac{1}{2}$ lines long, not beaked at summit, with less prominent ribs and very prominent calyx-teeth. (Fig. 102.)

Wet ground, Arkansas, Indian Territory, and Texas. Fl. April.

Quite variable in size, often becoming very low and passing into

Var. **pumilum** Engelm. & Gray, Pl. Lindh. 10, which is a caespitose form.

Texas.

29. **ERYNGIUM** Linn. Gen. n. 324.—Glabrous perennials, with leaves mostly rigid, coriaceous, spinosely toothed or divided, and white or blue flowers sessile in dense bracteate heads.

The outer *bracts* form the involucre, the inner ones, *bractlets*, intermixed with the flowers, represent the involucels. (Fig. 103.)

* *Stout, with parallel-veined elongated linear coriaceous leaves, which are mostly entire or with margin sparingly bristly: extending northward.*

1. **E. yuccæfolium** Michx. Fl. i. 164. From 1 to 6 feet high, branching above: leaves broadly linear (from 2 lines to over an inch wide), tapering to a point, with remotely bristly margins,

the lower ones sometimes becoming 2 or 3 feet long: heads pedunculate, ovate-globose (9 lines long), with ovate-lanceolate mostly entire cuspidate-tipped bracts shorter than the head, and similar bractlets: fruit scaly, about a line long, with short ovate calyxlobes, and long rigid styles.—*E. aquaticum* Linn., in part.

Dry or damp soil, from New Jersey to Florida, and westward to Minnesota, Missouri, and Texas. Fl. July to September.

Exceedingly variable in height and size of leaves.

Var. **synchætum** Gray in herb. Smaller, with leaves more bristly margined, and bristles in clusters of 2 to 4.

Florida (*Chapman, Curtiss, Palmer*). Louisiana, near New Orleans (*Dr. Ingalls*, in 1835).

2. **E. longifolium** Cav. Ann. ii, 133. Stem dichotomously branching: radical leaves (sometimes 3 or 4 feet long) parallel-veined, linear, tapering to a point, entire or rarely with 1 or 2 bristle-teeth; stem leaves similar but shorter: heads oval, with much shorter linear-lanceolate bracts and similar bractlets.

A Mexican species, collected in this country only by *Wright*, in 1851, at "Las Playas Springs, near the Sierra de los Animas," New Mexico, October.

The original description calls for reflexed bracts, but *Wright's* specimens show no such character.

* * *Tall and often stout: leaves thick, linear to oblong, on long fistulous petioles, entire or somewhat toothed (not spiny): chiefly southern.*

3. **E. Virginianum** Lam. Dict. iv. 759. Slender, 1 to 3 feet high, branching above: radical and lower cauline leaves linear to oblong-lanceolate (petioles sometimes a foot long), entire or with remote small hooked teeth; upper cauline leaves sessile, spiny-toothed or lacinate: heads ovate-oblong (6 lines long), with lanceolate spiny-toothed or entire reflexed bracts mostly as long as the head, and bractlets with 3 spiny cusps, the middle one largest: fruit scaly, with prominent lanceolate acuminate-cuspidate calyxlobes equally or exceeding the bractlets.

Wet places, margins of ponds and streams, New Jersey to Florida and Texas. Fl. August and September in the north, June and July in the south.

Mr. Canby sends specimens from Delaware with bracts longer than the heads, but in every other respect they conform to the species.

4. **E. Mettaueri** Wood, Cl.-Book, 379. Stem erect, simple, 4 to 6 feet high, branching at top: stem leaves linear to linear-lanceolate, entire or sparingly spinose toothed at base, the lower linear (sometimes 1 to 2 feet long), on very long jointed petioles: heads ovate-oblong (6 lines long), with numerous reflexed linear-lanceolate spinose-tipped and toothed bracts (whitish within and greenish without) larger than the heads, and bractlets lanceolate, with 3 strong and equal spiny cusps (as in *E. Ravenellii*): fruit about a line long, with ovate acute calyx-teeth, and long stout rigid styles.

In marshes and wet places, Florida, Newport (*Mettauer*). Fl. August and September.

Most of the herbarium material labeled *E. Mettaueri* is *E. Floridanum*. This species is intermediate between *E. Virginianum* and *E. Ravenellii*, but stouter than either, having the bractlets of the latter and leaves of intermediate character.

5. **E. Ravenelli** Gray, Pl. Lindh. 209. Slender, from 1½ to 3 feet high, branching above: leaves linear, elongated, nearly terete (conduplicate), obscurely denticulate, the lower ones from 12 to 18 inches long: heads as in the former species, with lanceolate spiny-toothed or entire reflexed bracts as long as the head, and bractlets with 3 strong and equal spiny cusps: fruit with short mucronulate calyx-lobes, and long rigid styles.

Wet pine barrens, South Carolina, St. John's Parish (*Ravenel*); Florida, Apalachicola (*Chapman*), St. Marks' (*Rugel*), Tampa Bay (*Leavenworth*). Fl. September and October.

Chapman's Florida specimens are those from which he described the *E. Virginianum* of his Manual, of course more or less modified by published descriptions. The narrow conduplicate nearly entire leaves, the bractlets with 3 strong and equal spiny cusps, and the short-mucronate calyx-lobes, should serve well to distinguish this species from *E. Virginianum*.

6. **E. præaltum** Gray, Pl. Lindh. 210. Stout, 4 to 6 feet high, branching above: radical leaves narrowly oblong (not unlike those of a *Rumex*), with strong midrib, often 2 feet or more long including the long petioles, entire or repand; stem-leaves lanceolate, veiny, serrate, tapering at both ends; floral leaves similar to the bracts, which are linear-lanceolate, spinulose-dentate or incised, 2 or 3 times longer than the ovate oblong head (6 lines long); bractlets with 3 spiny cusps, the middle one somewhat the largest:

fruit with lanceolate acuminate-cuspidate calyx-lobes shorter than the bractlets.—*E. Virginianum* Torr. & Gray, Fl. i. 605, in part.
In tide swamps, N. Carolina to Georgia. Fl. August.

7. **E. Floridanum** C. & R. Bot. Gazette, xiii. 140. Erect, 2 to 3 feet high: lower leaves narrowly oblong (1 to 4 inches long), mostly entire, on long jointed petioles (sometimes a foot long); upper ones becoming sessile, elongated-linear, usually remotely serrulate: bracts linear-lanceolate, rigid, sharp-pointed, entire or spiny-toothed, reflexed, longer than the subglobose heads; bractlets linear, rigid, entire, tapering to a pungent tip, much longer than the flowers: fruit with short ovate acute calyx-lobes and very long rigid styles.

Brackish marshes, Florida (*Curtiss*). Distributed as *E. præaltum* and *E. Mettaueri*.

This is the only species of the group that has entire bractlets. Most of the herbarium specimens labelled *E. Mettaueri* are this species, which can be easily separated from the former by its entire bractlets.

* * * *Weaker: leaves thin, toothed to laciniate (sometimes spinosely tipped): western species (except E. virgatum.)*

8. **E. virgatum** Lam. Dict. iv. 757. Erect, 1 to 3 feet high, branching above: leaves oblong or oblong-ovate, often subcordate, on short petioles; lower one entire or crenately toothed; upper ones becoming sharply serrate or even laciniately toothed: bracts linear and entire or with a few bristly teeth, longer than the subglobose heads; bractlets equally 3-cuspidate, little longer than the flowers: fruit with lanceolate acuminate calyx-lobes and long rigid styles.

Damp pine barrens, from N. Carolina to Florida, and westward to Louisiana and Texas.

Certain Louisiana specimens become narrower-leaved than the type, and merge gradually into the extreme form,

Var. **Ludovicianum** Morong in litt., which has linear-lanceolate or even linear leaves.—*E. Ludovicianum* Morong, Bull. Torr. Bot. Club, xiv. 51.

Barrens of Louisiana (*Langlois, etc*) and Texas (*Wright, Neally*).

9. **E. armatum** C. & R. Bot. Gazette, xiii. 141. Diffuse, branching throughout, a foot or so high (sometimes quite tall): radical leaves oblanceolate (sometime broadly so), from serrate to spinose-dentate or incised, attenuate into a short more or less mar-

gined petiole; stem-leaves narrower and sessile: heads peduncled, globose (about 6 lines in diameter), with involucre of triangular-lanceolate (broader at base) entire rigid thick-margined bracts (sometimes an inch long) much longer than the head; bractlets the same and fully as prominent: fruit with lanceolate acuminate calyx-lobes longer than the short styles.—*E. petiolatum* var. *armatum* Watson, Bot. Calif. i. 255.

California, from San Diego (*Orcutt*), San Luis Obispo (*Palmer* 155, in part), through the central part of the state (numerous collectors) to Humboldt (*Ke'logg & Harford* 1142) and Butte counties (*Mrs. R. M. Austin*).

Distributed by *Orcutt*, *Pringle*, and *Mrs. Austin* as *E. petiolatum* Hook., from which it differs in its diffuse branching habit, short petioled radical leaves, broad entire rigid bracts and bractlets, all similar and conspicuously longer than the head, and short styles.

10. **E. Vaseyi** C. & R. Bot. Gazette, xiii. 142. Stems a foot or less high (sometimes reduced to 2 or 3 inches), several from a common root and branching above: leaves oblanceolate, unequally spinulose-serrate, attenuate below: involucre of narrow thick and rigid spinose and spiny-toothed bracts (sometimes an inch long) much longer than the head; bractlets the same: fruit with lanceolate acuminate-cuspidate calyx-lobes longer than the short styles.

In wet ground. California, San Antonio River, July, 1880 (*G. R. Vasey* 222, distributed as *E. petiolatum*), near Chico, Butte county (*Mrs. R. M. Austin*), near Merced, Merced county (*Redfield* 2477), near Mt. Shasta (*F. H. Miller*, in 1886); S. W. Oregon, near Medford (*Howell*, a much reduced form), also by the Wilkes' Expedition.

This species is remarkable for its narrow very spiny bracts and bractlets (often blue), much more rigid than in *E. acutatum*, and spiny toothed. The calyx-lobes also have stronger cuspidate tips than in that species.

11. **E. petiolatum** Hook. Fl. Bor.-Am. i. 259. Erect, 1 to 5 feet high, branching above (or from the base in low forms): radical leaves oblanceolate, spinosely and unequally serrate, attenuate in an elongated fistulous petiole (submerged leaves only of the terete jointed petiole); stem leaves mostly sessile: heads peduncled, globose (6 lines in diameter), with involucre of linear-lanceolate spinosely-tipped and toothed bracts (sometimes an inch long) longer than the head: bractlets lanceolate, cuspidate-tipped, but little longer than the flowers, scarious-winged below: fruit with calyx-lobes

resembling the bractlets but smaller, much shorter than the long styles.

Mostly in marshes; throughout California (*Greene, Lemmon 108, G. R. Vasey 223* and distributed as var. *armatum*. *Cleveland, etc.*)

The species varies greatly in size, and in drier places it passes into the dwarfed

Var. **minimum**, which is but 1 to 3 inches high, with all parts correspondingly reduced, and bracts about as long as the heads.

Donner Lake (*C. F. Sonne*).

12. **E. discolor** Watson, Proc. Am. Acad. xviii. 193. Stem erect, slender, 1 to 2 feet high, bearing a single head (rarely more): radical leaves on very long petioles, oblong to narrowly oblanceolate, thin, slightly crenate; stem leaves few, sessile, linear-lanceolate, acutely or spinosely-toothed: head ovate-oblong (about 6 lines long), with involucre of numerous linear-lanceolate spinose-tipped bracts (white within and green without) longer than the heads and entire or sparingly spinose-toothed; bractlets narrow, with a long spinose acumination: fruit with ovate abruptly cuspidate-tipped calyx-lobes and long slender styles.

Growing in water, at Cienega, Huachuca Mts., S. Arizona (*Lemmon, in 1882*); also in S. W. Chihuahua, Mexico (*Palmer 397*). Fl. August to November.

* * * * *Simple to diffuse: leaves coriaceous, lobed or parted, spinosely tipped: southern (except the first two species).*

13. **E. articulatum** Hook. Lond. Journ. Bot. vi. 232. Erect, a foot or so high (rarely prostrate), more or less branching throughout: radical and lower stem leaves reduced to very long (sometimes a foot long) jointed petioles with or without a small lanceolate blade (from entire to laciniately toothed); upper stem leaves sessile: involucre of linear cuspidate-tipped and spiny-toothed bracts (about 6 lines long) much longer than the heads; bractlets tricuspidate, the middle one much the largest, scarcely longer than the flowers: fruit with lanceolate cuspidate-acuminate calyx-lobes hardly longer than the styles.—*E. petiolatum* var. *juucifolium* Gray, Proc. Am. Acad. viii. 385.

Swamps and wet meadows, California, San Simeon (*M. K. Curran*), Plumas county (*Mrs. R. M. Austin*); Oregon (*Nuttall, Hall 200, Howell*,

Henderson); Washington Territory, Falcon Valley (*Suksdorf*), Spokane River (*Geyer* 583, in part); Idaho, Coeur d'Alene (*Geyer* 583, in part).

Numerous very immature specimens of this species are found in herbaria, in which the bracts seem very prominent, but it is simply owing to the immaturity of the heads.

Var. **microcephalum**. A small slender form, with short ovate acuminate bracts (with somewhat spinulose margins) but little longer than the very small heads (2 or 3 lines in diameter), and calyx-lobes short-mucronate.

Plumas county, California, 1878 (*Mrs. R. M. Austin*).

The bracts have a bluish tint.

14. **E. Harknessii** Curran, Bull. Calif. Acad. iii. 153. Like the preceding, but much simpler and taller, about 2 feet high; with much larger ovate-oblong heads (half inch or more long) exceeding the bracts; the prominent bractlets blue.

California, Suisan Marsh, August (*Bolander*, in 1864, *Harkness*, in 1883), shores of Goose Lake, September, 1884 (in herb. Martindale, labeled *E. petiolatum*); also probably, Washington Territory, Spokane River (*Cooper*); also collected by *Nerberry* in Survey of California and Oregon, with neither station nor date.

15. **E. aromaticum** Baldwin; Elliott, i. 344. Stems decumbent or erect, several from one root, simple to near the summit, very leafy, 1 to 2 feet high: leaves pinnately parted, with entire segments and cartilaginous margins; the 3 upper segments remote and broader, cuspidate; the lower ones scattered and setaceous: heads globose (about 5 lines long), with involucre of 3-cleft bracts longer than the head, and 3-toothed bractlets: fruit tuberculate, half a line long, with setaceous calyx-teeth a line long, and long styles: oil-tubes large, 3 dorsal and 2 commissural: seed flattened dorsally, with plane face. (Fig. 103.)

Dry pine barrens, Florida; also near Ft. King, Alabama (*L. Alden*, in 1833). Fl. August and September.

16. **E. fœtidum** L. Spec. 232, in part. A foot or more high (said to be heavy-scented), branching above: radical leaves oblong, spinulose-serrate; upper leaves sessile, palmately cleft with segments more or less cuspidate-toothed: heads oblong (about 3 or 4 lines long), sessile, with involucre of large leaf-like bracts many times longer than the head, deeply palmately parted into lanceolate more or less spinosely-toothed segments; bractlets

small, entire, ovate, cuspidate-tipped: fruit with small ovate calyx-lobes.

A West Indian species, found in dry fields in Florida by Michaux, and not collected since. Said by Pursh to occur in Georgia and Florida.

17. **E. Hookeri** Walp. Rep. ii. 389. Stem erect, branching above, a foot or two high: radical leaves petioled, somewhat dentate; lower stem leaves almost sessile, lanceolate, laciniately-toothed and spinulose, with a pair of small lacinate segments at base; upper leaves palmately 5 to 7-parted, with narrow pinnatifid-lacinate spinose-tipped segments: heads ovate-oblong (4 to 6 lines long), with involucre of numerous narrowly lanceolate spiny-toothed bracts longer than the head: bractlets lanceolate, entire, spiny at tip, the terminal ones leafy and crowning the head: fruit scaly, half a line long, with ovate spiny-tipped calyx-lobes, and short styles.—*E. coronatum* Torr. & Gray, Fl. i. 604.

Low grounds, Texas, on the Brazos (*Drummond, Lindheimer, Wright*). Matagorda county (*R. G. Bechdolt*), near Houston (*Joor*), and near Dallas (*Reverchon*).

18. **E. Leavenworthii** Torr. & Gray, Fl. i. 604. Stout, 1 to 3 feet high, branching above: lowest stem leaves broadly oblanceolate, spinosely-toothed, gradually becoming more or less palmately parted above to the ordinary stem-leaves, which are sessile and deeply palmately-parted into narrow incisely-pinnatifid spreading pungent segments: heads pedunculate, ovate-oblong (1 to 1½ inches long), with involucre of incisely-pinnatifid spinose bracts about as long as the head; bractlets narrow, 3 to 7-cuspidate, the terminal ones very prominent, resembling the bracts, and crowning the head: fruit a line long, with oblong pinnatifid 3 to 5-cuspidate calyx-lobes, more than twice as long as the fruit, and short rigid styles: oil-tubes large, 3 dorsal and 2 commissural: seed flattened laterally.

Dry soil, Kansas (*Hull*), Arkansas (*Nuttall, Leavenworth*), and Texas (*Drummond, Lindheimer, Wright, Thurber, Reverchon*).

Nuttall's plant, from "Plains of the Red River," and described as *E. heterophyllum*, is this species.

19. **E. Wrightii** Gray, Pl. Wright. i. 78. Glaucons: stem erect, branching, 1 or 2 feet high: leaves rigid; radical oblanceolate, pectinate-dentate or pinnatifid with triangular teeth tipped

with long bristles; stem leaves sessile, from laciniately-toothed to pinnately cut into linear-lanceolate cuspidate divisions; heads ovate to oblong (about 6 lines long), with involucre of numerous linear-lanceolate entire to remotely toothed spiny-tipped bracts (whitish within, green without) twice as long as the head; bractlets subulate, rigid, spiny-tipped, longer than the flowers, the terminal ones very prominent and crowning the head: fruit half a line long, with short ovate mucronate calyx-lobes, and short styles.

Hills and plains, E. Texas (*Hall*). New Mexico (*Wright*), and Arizona (*Lemmon*): extending also into Mexico. Fl. August.

20. **E. diffusum** Torr. Ann. Lyc. N. Y. ii. 207. Stem about a span high, diffusely branching from the base, with thick rigid branches: leaves sessile, palmately parted, coriaceous, midrib very prominent beneath and margins cartilaginous; segments oblong, incisely serrate and spinose: heads subglobose, about 6 lines long, on very short peduncles in the forks of the stem, with involucre of leaf-like bracts longer than the head, and bractlets lanceolate, entire, spinosely-tipped: fruit clothed with imbricated pointed scales, less than a line long, with ovate long-pointed calyx-lobes twice as long as the fruit, and long styles: oil-tubes very large, 3 dorsal and 2 commissural, more or less sunken in the somewhat dorsally flattened seed: seed-face plane.

Sandy plains, Arkansas, on the Canadian River (*James*), Wichita Mts. (*Thurber*, in *Marey's Exped.*); Texas (*Reverchon 356*), and extending into Mexico.

An excellent figure of this rare plant is to be found in *Marey's Report*, t. 6.

* * * * * *Low, slender, mostly prostrate: leaves small, thin and unarmed: heads very small: southern.*

21. **E. Baldwinii** Spreng. Syst. i. 870. Prostrate, often rooting at the joints, diffusely branched: lower leaves oblong, usually long-petioled, from entire to laciniately toothed; upper leaves much smaller, 3-parted, the divisions from lanceolate to filiform, toothed or entire: heads usually narrowly oblong at maturity (about 3 lines long), with involucre of subulate bracts, and similar bractlets: fruit half a line long, with very prominent tubercles, ovate calyx-lobes shorter than the fruit, and styles a line long; oil-tubes medium-sized, 3 dorsal and 2 commissural, with

plane face. (Fig. 103a)—Incl. *E. Cervantesii* of Chapman's Manual.

Sandy soil, from Georgia and Florida to Louisiana and Missouri (*Tracy*). Apparently flowering from March through the season.

This species is very variable in foliage, the extreme forms with filiform leaf-segments being the *E. Cervantesii* of Chapman's Manual, but no line of separation can be drawn to distinguish even a variety.

22. *E. prostratum* Nutt. DC. Prodr. iv. 92. Prostrate, rooting at the joints, diffusely branched: lower leaves long-petioled, oblong, entire, few-toothed, or lobed at base; upper leaves smaller, clustered at the rooting joints, ovate, few-toothed or entire, with some additional trifid ones: heads narrowly oblong (about 3 lines long), with involucre of reflexed lanceolate bracts longer than the heads, and very small bractlets: fruit tuberculate, half a line long.—*E. Baldwinii* var. *B.* Torr. & Gray, Fl. i. 605.

Wet places, Kentucky (*Short*), West Tennessee (*Guttinger*), S. E. Missouri (*Engelmann*), Arkansas (*Nuttall*, *Harvey*, *Hasse*), Texas (*Hall*), Louisiana (*Drummond*, *Joor*, *Langlois*), Georgia (*Boykin*), and Florida (*Croom*, *Rugel*).

In Pl. Wright, i. 78, Dr. Gray speaks of this species as probably distinct and the *E. Americanum* of Walter. In his Bibl. Index Mr. Watson also refers Walter's *E. Americanum* doubtfully to *E. prostratum*. The fact is, there is no *E. Americanum* Walter. That name was first used by Sprengel in Bœm. & Schult. Syst. and referred by him to Walter, but he copied the description of Walter's *E. integrifolium*. Therefore all the *E. Americanum* Walter of our literature is *E. integrifolium* Walter, and what that is seems impossible to determine. As Walter describes a prostrate form with upper leaves trifid, he may have been referring to some form of *E. Baldwinii*, which seems to conform better to his description than *E. prostratum*. But Walter's description is so meager, and the two species in question so variable, that there seems to be no way of positively determining which one of them is *E. integrifolium* Walter.

30. SANICULA Linn. Gen. n. 326.—Smooth perennials, with almost naked or few-leaved stems, mostly palmate (pinnate in two species) leaves with more or less pinnatifid or incised lobes, involucre and involucels present, and greenish-yellow or purple flowers in irregularly compound few-rayed umbels.

* *Atlantic species: oil-tubes always 5 (3 dorsal and 2 commissural): leaves palmately divided.*

1. *S. Marylandica* L. Spec. 235. Mostly simple, 1 to 3

feet high: root-leaves long-petioled, palmately 3 to 7-parted, the divisions mostly sharply cut and serrate, the teeth more or less mucronate-tipped; cauline leaves similar, short-petioled or sessile: umbels irregular, one to few-rayed, with involucre of few leaf-like or small bracts, and involucels of few small bractlets: flowers greenish-yellow, sterile ones numerous and long-pedicelled: fruit sessile, prickly all over, $\frac{1}{2}$ to 2 lines long; the styles longer than the prickles: seed-face plane or slightly convex. (Fig. 104.)

Throughout the eastern United States and Canada, and westward to the Rocky Mountains, Fl. May to August.

Var. **Canadensis** Torr. Fl. U. S. 302. Differs only in its comparatively few short-pedicelled sterile flowers, and styles shorter than the prickles.—*S. Canadensis* L.

With the last, but extending westward only as far as Minnesota and Missouri.

In studying all our species of *Sanicula* it becomes apparent that the characters which have been used to separate *S. Marylandica* from *S. Canadensis* are not specific. They can always be separated, but the distinctions are only varietal. This species is very closely allied to *S. Europæa* L., and forms from the mountains of Georgia, considered by Dr. Chapman as representing a new species, can scarcely be separated from it. If our species is to be kept separate from the European one, the differences are simply continental, such as slight differences in habit and fruit structure.

* * *Pacific species: oil-tubes irregular in number and distribution.*

† *Mature fruit pedicelled: leaves palmately divided.*

2. **S. arctopoides** Hook. & Arn. Bot. Beechy, 141 and 347. Stems very short, from thickened rootstocks, bearing a tuft of leaves and several (often much longer) divergent scape-like branches 2 to 8 inches long, each bearing an umbel of 1 to 3 elongated rays: leaves deeply palmately 3-lobed, the cuneate divisions once or twice laciniately cleft, dissected with lanceolate acute spreading segments: involucre of 1 or 2 similar leaf-like bracts: umbellets large, 3 to 6 lines in diameter, with conspicuous involucels of 8 to 12 narrowly oblanceolate mostly entire bractlets: flowers yellow: fruit short pedicellate, $1\frac{1}{2}$ lines long, naked at base, with strong prickles above: seed-face almost plane. (Fig. 105).

On the plains and dry hillsides in California, about San Francisco and

eastward into the Sacramento Valley; also Vancouver and Queen Charlotte Islands (*Macoun, Dawson*), and the northwest coast (*Menzies*). Fl. March to May.

3. **S. Howellii** C. & R. Bot. Gazette, xiii. 81. Stems coarse, a foot or less high, more or less buried in the sand, often bearing tufts of stout elongated peduncles and leaves: leaves broad and palmately 3 to 5-lobed (often much modified by burial in the sand), the upper inclined to be pinnately lobed, the divisions rather sharply cut and toothed, the teeth mucronate-tipped: umbels unequally few-rayed, with involucre of few leaf-like bracts, and involucels of very prominent bractlets, sometimes much exceeding the large globose head of fruit; flowers yellow: fruit short pedicellate, prickly all over, $1\frac{1}{2}$ to 2 lines long: seed-face concave. (Fig. 106.)

Sandy shores, Tilamook Bay and Ocean Beach, Oregon, July 15, 1882 (*Howell 16, Henderson 1584*); Oreas Island, in 1858 (*Lyall*, on Oregon Boundary Commission); Puget Sound (*Wilkes' Exped. 71*, distributed as *S. Menziesii*); Salinas Valley (*J. C. Nevin*, in 1882); on Beacon Hill, Victoria, Vancouver Island, May 5, 1887 (*Macoun 5*); also probably near San Francisco, California (*Kellogg & Harford 299*, in 1868-9).

Exceedingly variable in its leaves and the length of its bractlets. This sea-coast species is most nearly allied to *S. arctopoides* H. & A., but the habitat of that species, its almost stemless habit, its leaves so laciniately dissected as to appear fringed, its fruit naked at base, and its nearly plane seed-face, are the more marked characters which separate it from *S. Howellii*.

4. **S. Menziesii** Hook. & Arn. Bot. Beechey, 142 and 347. Stem solitary, erect, 1 to $3\frac{1}{2}$ feet high, branching: leaves roundcordate, 2 to 4 inches broad, very deeply 3 to 5-lobed, the broad segments sharply toothed or somewhat cleft, the teeth bristle-tipped; upper leaves more narrowly lobed and laciniately toothed: umbel with 3 to 4 slender rays, involucre of 2 or 3 small leaf-like bracts, and involucels of 6 to 8 small entire bractlets; flowers yellow, the sterile ones nearly sessile: fruit becoming distinctly pedicellate and divergent, obovate, 1 to 2 lines long, covered with with strong pickles: seed-face sulcate. (Fig. 107).

Woods and meadows, S. California (*Parish, Orcutt*) to Vancouver Island (*Macoun*), British Columbia (*Fletcher*), and the northwest coast (*Menzies*). Fl. April and May.

† † *Mature fruit sessile.*

‡ *Leaves palmately divided* (undivided in *S. maritima*).

5. **S. laciniata** Hook. & Arn. Bot. Beechey, 347. Stems more or less branching, 6 to 18 inches high, from a thickened rootstock: leaves mostly palmately 3 to 5-parted, the divisions 1 to 2-pinnatifid, segments laciniately toothed, the teeth spinosely pointed: umbel 3 to 5-rayed, with involucre of leaf-like bracts, and involucels of lanceolate spinosely pointed bractlets; flowers yellow, the sterile ones on long pedicels: fruit somewhat naked below, more prickly above, $1\frac{1}{2}$ lines long: seed-face deeply sulcate, somewhat involute. (Fig. 108.)—*S. nudicaulis* Hook. & Arn. l. c.

Hills and woods, California, from San Diego to Humboldt county; also in N. Oregon (*Mrs. R. W. Summers*). Fl. April and May.

We find in herbaria considerable confusion between this species and *S. bipinnatifida*, a good deal of *S. laciniata* having been distributed as *S. bipinnatifida*, as, for instance, *Pringle* of 1882, and *Jones* 3149. The palmately parted leaves, spinosely pointed teeth and bractlets, yellow flowers, less prickly fruit, and involute sulcate seed-face of *S. laciniata*, are well set off against the pinnately-parted leaves, merely acute or but slightly pointed teeth and bractlets, purple flowers, densely prickly fruit, and broadly concave centrally ridged seed-face of *S. bipinnatifida*. *Nevin & Lyon*, in their exploration of San Clemente Island (off S. California), collected this species with pedicelled fruit. The same form was also collected on Catalina Island by *Baker and Dall* of the U. S. Coast Survey, and on Guadalupe Island by *Palmer*. In every other respect these plants are identical with *S. laciniata*.

6. **S. Nevadensis** Watson, Proc. Am. Acad. xi. 139. Stem slender, sometimes very short, simple or branching near the base, a foot or less high: leaves ternate, the divisions oblong-ovate, 3 to 5-lobed; the segments lobed or toothed: umbel with about 5 rays, which are sometimes branched and become $\frac{1}{2}$ to $1\frac{1}{2}$ inches long in fruit, involucre of pinnatifid leaf-like bracts, and involucels of small oblong acute bractlets: flowers yellow, the sterile ones pedicelled: fruit prickly all over, $1\frac{1}{2}$ lines long: seed-face plane. (Fig. 109.)

In dry sandy soil or damp places, California (*Fremont's Exped.*), Sonoma county (*Congdon*), Placer county (*C. F. Saane*), Plumas county (*Mrs. Ames, Mrs. Austin, Lemman*), Siskiyou county (*Green* 741); Oregon, Siskiyou Mts. (*Henderson*), near Hood River and the Dalles (*Howell*),

Union county (*Cusick* 960); Washington Territory (*Wilkes' Exped.*), Klickitat county (*Susksdorf* 276); Montana, upper waters of Jocko and Flathead rivers (*Canby* 142); Vancouver Island (*Macoun*), British Columbia (*Fletcher*). Fl. April to June.

The original description was drawn from Californian (Plumas Co.) specimens, in which the stems are very short and peduncles mostly from the base; while the northern forms, from Oregon northward, are slender-stemmed, taller, and usually more simple.

7. **S. maritima** Kellogg, Watson in Bot. Calif. ii. 451. Foot or more high, from a thickened rootstock: radical leaves long petioled, somewhat cordate, very obtuse, entire or sparingly denticulate or crenulate, 2 to 4 inches long, 1½ to 3 inches broad; cauline leaves one or few, smaller and more or less lobed or parted: umbel with about 3 elongated rays (often with bracts near the middle), involucre of large leaf-like lobed or parted bracts, and involucels of numerous small lanceolate bractlets: flowers yellow, the sterile ones short-pedicelled: fruit somewhat naked below, prickly above, 2 lines long: seed-face concave, with a very prominent central longitudinal ridge. (Fig. 110.)

Near the coast about San Francisco, California (*Kellogg, G. R. Vasey*).

† † *Leaves more or less pinnately divided.*

8. **S. bipinnatifida** Dougl. in Hook. Fl. Bor.-Am. i. 258. Stems a foot or more high, from a thickened rootstock, with usually a pair of opposite leaves at base, and 1 to 3 leaves above: leaves pinnately 3 to 7-parted, the divisions incisely toothed or lobed, decurrent on the toothed rhachis, teeth acute or slightly pointed: umbel with 3 or 4 elongated rays, involucre of leaf-like bracts, and involucels of small narrow merely acute bractlets: flowers purple (rarely yellow), in dense heads, the sterile ones on long pedicels: fruit prickly all over, 1½ lines long: seed-face broadly concave, with a prominent central longitudinal ridge. (Fig. 111.)

Hills, woods, and dry plains, from S. California (*Bigelow, Newberry, Vasey, Parish, Parry, Lemmon, Cleveland, etc.*), to N. Oregon (*Nuttall*), Puget Sound (*Wilkes' Exped.*), and Vancouver Island (*Macoun*). Fl. May and June.

9. **S. bipinnata** Hook. & Arn. Bot. Beechey, 347. A foot or more high, from a slender fusiform root: leaves twice or thrice pinnate, with divisions not at all decurrent, cuneate-oblong to ovate, incisely and mucronately toothed: umbel 3 to 4-rayed, with involucre of leaf-like bracts, and involucels of a few small bractlets

more or less united; flowers yellow: fruit tuberculate at base, prickly above, $1\frac{1}{2}$ lines long: seed-face deeply sulcate, more or less involute (sometimes enclosing a central cavity), with a central longitudinal ridge. (Fig. 112.)

California, from Kern county (*Parish* 1947), to the Upper Sacramento Valley. Fl. February and March.

This species is said to have a very offensive odor. It seems to be rare in herbaria, and sometimes strangely confused with *S. bipinnatifida*.

10. **S. tuberosa** Torrey, *Pacif. R. Rep.* iv. 91. Stem 3 inches to 2 feet high, from a small globose tuber: leaves twice or thrice pinnate, usually very finely divided, ultimate segments very small: umbel 1 to 4-rayed, with involucre of leaf-like bracts, and involuclers of small unequally united bractlets: flowers yellow, the sterile ones on long pedicels: fruit broader than long, more flattened laterally than in any other species, a line long, strongly tuberculate: seed somewhat laterally flattened, with plane face. (Fig. 113.)

Dry hills and woods, California, from San Diego county (*Cleveland* 421) and San Bernardino county (*Parish* 982, *Vasey*), to Mendocino and Plumas counties. Fl. February to May.

This species is also said to have a very offensive odor.

31. **AMMOSELINUM** Torr. & Gray, *Pacific. Rep.* ii. 165. —Low diffuse annuals, with ternately divided leaves, the small ultimate segments linear to spatulate, involucre and involuclers of entire or dissected bracts, and white flowers in small sessile or short-pedunculate unequal umbels.

A very distinct genus, and one of doubtful affinity, but holding no relation whatever to *Cherophyllum*, as was surmised in the original description and followed by Bentham & Hooker.

1. **A. Popei** Torr. & Gray, l. c. About a span (sometimes a foot) high, with stem-angles, rays, pedicels, and ribs of fruit rough scabrous: leaf-segments narrowly linear: fruit ovate-oblong, 2 to $2\frac{1}{2}$ lines long, with thick corky commissure.—*Apium Popei* Gray, *Proc. Am. Acad.* vii. 343.

In sandy soil, W. Kansas (*E. N. Plank*), Texas (*Wright, Parry, Reeverchon, Miss Croft*). New Mexico (*Wright*), Arizona (*Pringle*, in 1882, very large forms), and extending into Mexico. Fl. April and May.

2. **A. Butleri** C. & R. *Bot. Gazette*, vii. 294. Smaller, nearly glabrous: leaf-segments narrowly oblong or spatulate: fruit

ovate, about a line long, with ribs smooth or minutely scabrous, and corky commissure much less prominent. (Fig. 114.)—*Apium Butleri*, Watson in Proc. Am. Acad. xxi. 453.

In wet grounds, Indian Territory, south of the Arkansas (*Butler*, in 1876); and Texas, near Houston (*Hall* 244. in 1872), near Dallas (*Reverchon*, in 1874). Fl. March and April.

32. FENICULUM Adans. Fam. Pl. ii. 101.—Stout glabrous aromatic herb, with leaves dissected into numerous filiform segments, no involucre nor involucels, and large umbels of yellow flowers.

F. VULGARE Gært., the cultivated fennel, from Europe, seems to have become naturalized in some places, as shores of Maryland and Virginia (*Canby*), roadsides, Pointe-a-la-Hache Louisiana (*Langlois*); also on ballast sand near Philadelphia (*Parker, Martindale*), and commonly escaped from gardens.

The fruit of this species (Fig. 115) is described under *Cicuta bulbifera* in Bot. Gazette, xii. 263, and figured in the accompanying plate. The mistake arose from the fact that a fruiting head of *Feniculum* was pasted upon the herbarium sheet with specimens of *Cicuta bulbifera*, the mature fruit of which species remains unknown.

33. PODISTERA Watson, Proc. Am. Acad. xxii. 475.—A dwarf cespitose acaulescent perennial, with pinnately parted leaves, no involucre, involucels of foliaceous 3 to 5-cleft bractlets (by the reduction of the rays often forming a false involucre), and white or pinkish flowers.

1. **P. Nevadensis** Watson, l. c. Obscurely puberulent: caudex with numerous very short crowded branches bearing tufts of leaves: leaves small, 3 or 4 lines long, rather thick, the 3 to 7 lanceolate segments acute and entire: peduncles very short; umbels of 3 to 5 umbellets which are either sessile or with very short rays; involucels as long as umbellets: fruit little more than a line long, nearly sessile. (Fig. 116.)—*Cymopterus* (?) *Nevadensis* Gray, Proc. Am. Acad. vi. 536.

Near the top of Mt. Dana, California, at 13,000 feet altitude, forming large convex dense mats among the rocks (*Brewer*, in 1863, *Lemmon*, in 1875). Fl. June and July.

34. **PIMPINELLA** Linn. Gen. n. 366.—Glabrous perennials, with ternately or pinnately compound leaves, involucre and involuclcs scanty or none, and white or yellow flowers.

1. **P. integerrima** Benth. & Hook. Gen. Pl. i. 894. Glaucous, 1 to 3 feet high, branching: leaves 2 to 3-ternately compound; leaflets lanceolate to ovate, entire: umbels 10 to 20-rayed; rays 2 to 3 inches long; pedicels 4 to 6 lines long: flowers yellow: fruit broadly oblong, 2 lines long: stylopodium small or wanting: oil-tubes mostly 3 in the intervals, 4 on the commissural side: seed-face almost plane. (Fig. 117.)—*Zizia integerrima* DC.

Rocky hillsides throughout Canada and the Atlantic States, as far west as Minnesota, Missouri, and Arkansas. Fl. May.

2. **P. apiodora** Gray, Proc. Am. Acad. vii. 345. Smooth, rather stout, 2 to 3 feet high: leaves mostly radical, 2 to 3-ternate, the cuneate-ovate leaflets laciniately pinnatifid and toothed, an inch long: umbels long peduncled, 6 to 15-rayed; rays 1 to 2 inches long, hispidly puberulent: flowers white or pinkish: fruit (immature) broadly ovate, $1\frac{1}{2}$ lines long: oil-tubes numerous in the intervals (4 or 5 in the dorsal, 6 in the laterals), 8 or more on the commissural side.

From San Francisco, California, to E. Nevada (*Watson*).

The plant is said to have a strong odor of celery. Mature fruit has not yet been collected.

Var. **nudicaulis** Gray, l. c. viii. 385. Small, stem scapiform, almost leafless, scarcely a foot high.

A high mountain form, Oregon (*Hall* 206).

P. SAXIFRAGA L. var. **MAJOR** Koch, a European species, has been collected since 1877 by Prof. T. C. Porter and others along rocky shores of the Delaware River, from Delaware Water Gap (*Poggenburg*) to Easton, Penn., and along road-sides near the latter place; also at Sycamore, Ohio, in 1878 (*H. H. Rusby*). It has simply pinnate leaves with sharply-toothed leaflets, oblong fruit a-line long, with ribs sometimes almost obsolete, convex seed-face, a cushion-like stylopodium, and white flowers. (Fig. 118.)

35. **APIASTRUM** Nutt. in Torr. & Gray, Fl. i. 643.—Very slender smooth branching (somewhat dichotomously) annuals, with finely dissected leaves having filiform or linear (some-

times a little broader) segments, and small white flowers in naked unequally few-rayed umbels.

1. **A. angustifolium** Nutt. l. c. 644. A span or two high: leaves 1 or 2 inches long, biternately or triternately divided, with linear or nearly filiform segments (rarely linear-oblong): umbels sessile; rays from an inch long to wanting; pedicels half inch long to wanting: fruit with narrow commissure, cordate in outline, $\frac{1}{2}$ line long. (Fig. 119.)—Incl. *A. latifolium* Nutt. l. c., which is the coarser-leaved form. *Helosciadium leptophyllum*, var. (?) *latifolium* Hook. & Arn. Bot. Beechey, 347.

Hillsides, California, from San Bernardino to Mendocino county; also in Lower California (*Miss F. E. Fish, Orcutt*). Fl. April and May.

2. **A. patens**. One to two feet high, branching above: leaves (1 or 2 inches long) ternately or biternately divided, with long filiform segments: umbels long-peduncled; rays and pedicels as in the last: fruit with broader commissure, ovate, slightly larger. (Fig. 120.)—*Leptocaulis patens* Nutt. in DC. Prodr. iv. 107. ?*L. inermis* Nutt. in DC. Mem. Umbel. 39. *Apium patens* Watson, Bibl. Index. Polypet. 413

From Missouri to Louisiana, Texas, and New Mexico (*Wright 1106*). Fl. June.

In Bot. Gazette, xii. 293, we referred this species provisionally to *Leptocaulis*. From that genus it differs, as was pointed out, in its thinner pericarp, absence of strengthening cells, frequent increase in the number of oil-tubes, and sulcate seed-face, all of which important characters associate it with *Apiastrum*.

36. **MUSENIUM** Nutt. in Torr. & Gray, Fl. i. 642.—Glabrous or scabrous dwarf resiniferous dry ground perennials, from thick elongated roots, acaulescent or dichotomously branching at base, with pinnately decompound leaves, no involucre, involuclers of a few narrow bractlets, and yellow or white flowers.

This genus seems to be British American, extending into the United States along the Rocky Mountains. Few specimens have been collected in the United States, and hence herbarium material is very scanty. Prof. Macoun has discovered the first two species abundantly represented on the great plains of N. W. Terr., but *M. tenuifolium* remains very poorly known, mature fruit of it not yet having been collected.

1. **M. divaricatum** Nutt. l. c. Decumbent, glabrous: stem short, dichotomously branching from base: leaves bipinnatifid,

with winged rhachis; segments 3 to 5-toothed: peduncles 2 to 5 inches long: umbel 10 to 25-rayed; rays 3 to 9 lines long; pedicels short: fruit smooth or nearly so, about two lines long: oil-tubes 3 in the intervals, with accessory ones beneath the ribs, 4 on the commissural side: seed terete, with rather deeply concave face. (Fig. 121.)—*Seseli divaricatum* Pursh, 732; DC. Prodr. iv. 146.

From the plains of the Upper Missouri to Oregon, and extending into N. W. British America. Fl. May and June.

2. **M. trachyspermum** Nutt. l. c. Like the last, but more or less scabrous throughout: fruit scabrous, smaller, 1 to $1\frac{1}{2}$ lines long, with more prominent ribs: oil-tubes mostly solitary in the intervals, often with smaller accessory ones in the intervals or beneath the ribs, 2 on the commissural side: seed sulcate beneath the oil-tubes, with more shallow concavity. (Fig. 122.)—*M. divaricatum* Nutt. var. *Hookeri* Torr. & Gray, l. c. *M. angustifolium* Nutt. l. c.

Colorado (Hall & Harbour 214) to Montana (Watson, Canby) and plains of British America. Fl. May and June.

3. **M. (?) tenuifolium** Nutt. l. c. Acaulescent, somewhat cespitose, glaucous: leaves tripinnatifid with narrowly linear segments: flowers said to be white: peduncles much longer than the leaves; umbel 12 to 20-rayed: fruit nearly glabrous, with ribs nearly obsolete: oil-tubes large, 2 or 3 in the intervals.

"Rocky Mountains" (Nuttall).

The type specimens of this very uncertain species have been examined at Cambridge, Philadelphia, and New York, but the fruit is so very immature that the relationship cannot be determined. Very likely it is not a *Musenium* at all. In general appearance it resembles *Harbouria* more than anything else.

37. **EULOPHUS** Nutt. in DC. Prodr. iv. 248.—Glabrous perennials from deep-seated fascicled tubers, 1 to 5 feet high, with pinnately or ternately compound leaves, narrowly linear to oblong-linear mostly entire leaflets (or segments), the terminal one elongated, involucre (rarely wanting) and involucels of several lanceolate acuminate usually subscarious bracts, and long-peduncled umbels of white or pinkish flowers.—Incl. *Podosciadium* Gray, Proc. Am. Acad. vii. 345.

This genus is remarkably well defined, being readily recognized by

such external characters as its elongated linear entire leaflets, fasciated tubers, conspicuous involuclcs, prominent calyx-teeth, conical stylopodium, and long recurved styles. Its nearest alliance is to *Pimpinella*, from which it differs, not only in most of the characters just noted, but also in the concavity of the seed-face. The broad concavity of the seed-face, as well as its comparative shallowness, is one of the marked characters of this genus, and separates it not only from certain allied genera, but also from some species which have been confused with it. This cannot include the Mexican forms referred to it.

1. **E. Americanus** Nutt. in DC. Mem. Umbel. 69, t. 2. Three to five feet high: radical and lower cauline leaves large, 1 to 2-pinnately compound, with leaflets cut into short narrow segments; upper cauline leaves ternate, with narrowly linear elongated leaflets (1 to 2 inches long, a line wide): umbel 10 to 12-rayed, with involucre scanty or none, and involuclcs of numerous very narrowly lanceolate bractlets (tapering from the bottom) but a line long: fruit ovate or oblong, 2 to 3 lines long, $1\frac{1}{2}$ to 2 lines broad, with ribs almost obsolete: oil-tubes mostly 3 in the intervals, 4 on the commissural side. (Fig. 123.)

Ohio (*Sullivant*), to Illinois (*Vasey, Bebb*), Missouri (*H. E. Husse*), Arkansas, and Tennessee (*Guttinger*). Fl. July.

2. **E. Parishii**. One to two feet high: leaves ternate, on petioles 2 to 4 inches long, with linear-lanceolate leaflets 1 to 3 inches long, 2 to 5 lines wide, terminal leaflet more or less distant; uppermost leaves simple: umbel 8 to 10-rayed, with scanty involucre or none, and involuclcs of 2 to 6 narrowly lanceolate bractlets 2 lines long; rays $\frac{1}{2}$ to 1 inch long; pedicels 2 to 4 lines long: fruit ovate or oblong, $1\frac{1}{2}$ to 2 lines long, half to a line broad: oil-tubes 2 to 4 in the intervals, 6 on the commissural side. (Fig. 124.)—*Pimpinella Parishii* C. & R. Bot. Gazette, xii. 157.

Damp meadows, San Bernardino, and San Jacinto Mts., California (*S. B. & W. F. Parish* 987, in part); also "Rattlesnake Bar," Calif. (*M. K. Curran*). Fl. July and August.

This species has found its way into herbaria under the name of *Curum Gairdneri*, but chiefly as *Podosciadium Californicum*.

3. **E. Bolanderi**. Two feet high: leaf divisions more or less pinnately compound; ultimate segments narrowly linear, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long (terminal one sometimes 3 inches), $\frac{1}{4}$ to 1 line wide (lateral leaflets sometimes much reduced and toothed); uppermost leaves simple: umbel 10 to 25-rayed, with prominent involucre,

and involucls of scarious ovate-lanceolate abruptly long-acuminate bractlets longer than the pedicels; rays 5 to 10 lines long; pedicels $1\frac{1}{2}$ to 2 lines long; fruit oblong, $1\frac{1}{2}$ lines long, $\frac{1}{2}$ line broad; oil-tubes small, 2 to 5 in the intervals, 6 on the commissural side; seed more dorsally flattened than in any other species. (Fig. 125).—*Podocladium Bolanderi* Gray, Proc. Am. Acad. vii. 346; Brewer & Watson, Bot. Calif. i. 263.

California, among rocks on Mariposa Trail, Yosemite (*Bolander* 1898, in 1866 and 1873), Big Meadows, Plumas county (*Mrs. R. M. Austin*, in 1880). Emigrant Gap (*Jones* 3603, in 1882); Nevada, western part of state (*Stretch*). E. Humboldt Mts. (*Watson* 112, named *Curum Gairdneri* in Bot. King's Exped.), "Geiger Grade" (*M. K. Curran*, in 1884); Oregon, Union county (*Cusick* 1097, in 1883). Stein's Mt. (*Hocell*, in 1885). Fl. May to July.

This species has been much confused with *Curum Gairdneri* and *C. Oregonum* by collectors, and under these names it is found in herbaria. A glance at the conspicuous scarious-bracted involucls, broadly concave seed-face, and numerous oil-tubes, should at once distinguish it from any *Curum*. It is an interesting fact that a species thought to be so local is now found to be somewhat widely distributed through contiguous parts of California, Nevada, and Oregon, having heretofore concealed its identity under a general similarity of habit to *Curum*.

4. **E. Pringlei.** One to two feet high; leaves pinnately compound, with broad inflated midrib and distinct divisions, which are cut into a few narrowly linear almost filiform segments; umbel 3 to 8-rayed, with scanty involucre, and involucls of numerous sub-scarious lanceolate bractlets about a third as long as the pedicels (sometimes nearly as long); rays about 2 inches long; pedicels 3 to 6 lines long; fruit oblong, 2 to $2\frac{1}{2}$ lines long, about half a line broad; oil-tubes 3 to 5 in the intervals, 8 on the commissural side.

California (*Pringle* 40, in 1882), San Luis Obispo and Emigrant Gap (*Jones*, in 1882), Ft. Tejon (*Parish* 1945, in 1887), probably Tehachapi (*M. K. Curran*); also collected by Fremont in 1848, and referred to *Curum Kelloggii*.

This very distinct species has also been collected as a *Curum*. Its leaf characters are so marked that it should be readily recognized.

Var. **simplex** is a form with 3 to 5 linear-lanceolate entire leaflets, and smaller involucls.

Sierra county, California (*Lemmon*, in 1874.)

The fruit is immature, but the oil-tubes are 2 or 3 in the intervals, and 4 on the commissural side. Mature fruit may show specific distinctions. Distributed as *Curum Gairdneri*.

5. **E. Californicus.** Three or four feet high; leaf-divisions pinnately compound; segments linear, half to an inch long, 1 to $1\frac{1}{2}$ lines broad, terminal one elongated (2 to 5 inches long); uppermost leaves simple: umbel 9 to 12-rayed, with prominent involucre, and involucels of numerous scarious lanceolate long-acuminate bractlets 3 lines long; rays 2 inches long; pedicels 8 to 10 lines long: fruit linear-oblong, 4 lines long, $1\frac{1}{2}$ lines broad: oil-tubes large, solitary in the intervals, 4 on the commissural side: sulcus of seed-face deeper than in other species, and with more prominent central ridge. (Fig. 126.)—*Cherophyllum* (?) *Californicum* Torr. Pacif. R. Rep. iv. 93. *Podosciadium Californicum* Gray, Proc. Am. Acad. vii. 346.

California, Knight's Ferry, Stanislaus county (*Bigelow*, in 1853), Santa Lucia Mts. (*G. R. Vasey* 227, in 1880, distributed as *Cicum Kelloggii*). Fl. May.

Until Vasey's collection in 1880, this species was known only from the single collection of *Bigelow*, in 1853. In the character of single oil-tubes in the intervals it differs from the other species, but so closely resembles them in every other detail that it cannot well be separated from them.

38. **ANTHRISCUS** Hoffm. Umb. i. 38.—Resembling *Cherophyllum* in vegetative characters.

A. CEREFOLIUM Hoffm. l. c. 41. Mature fruit smooth and shining. (Fig. 127.)—*Cherophyllum sativum* L.

Naturalized in E. Pennsylvania (*Thos. C. Porter*).

A. SYLVESTRIS Hoffm., from Europe, has been collected on ballast ground by *I. C. Martindale* near Philadelphia, and by *Addison Brown* near N. Y. City.

A. VULGARIS Pres., from Europe, is said by *Prof. Macoun* to be introduced at Bedford, N. S.

39. **BUPLEURUM** Linn. Gen. n. 328.—Annuals or perennials, with simple entire clasping or perfoliate stem-leaves, with or without an involucre, involucels of 5 or more ovate bractlets, and yellow flowers.

The genus *Bupleurum* contains about 90 described species, which *Bentham & Hooker* think should be reduced to about 60. Although it is called by these authors "*genus naturalissimum*," it contains the most diverse characters, especially in fruit structure, characters which are usually considered generic. Our generic description applies to the only two species found in our flora, one introduced, and the other indigenous,

but they are so widely different that they seem to deserve generic separation. As this can be determined, however, only after a detailed study of the numerous foreign species, we prefer to leave them as they are for the present.

* *Perennial, from a branching caudex: involucre of 3 to 5 unequal bracts; involuclers of 5 to 8 rather small ovate bractlets: carpel with prominent ribs, oil-tubes continuous about the seed-cavity and one in each rib: seed-face plane.*

1. **B. Americanum.** Radical leaves linear-lanceolate; cauline ones very variable, oblong to linear, more or less clasping; rays unequal $\frac{1}{2}$ to 2 inches long; pedicels short. (Fig. 128.) — *B. ranunculoides* of American authors, not L.

Alaska (*Lay & Collie, Rothrock, Schwatka, Muir, etc.*); mountains of N. W. Territory (*Hooker, Dawson*); mountains of Montana and Yellowstone Park (*Coulter, Canby, Scribner, Tweedy, Parry, etc.*) Fl. July and August.

This species is so variable in foliage that varieties would seem admissible. Resemblance to the European *B. ranunculoides* is well shown by low forms with rather small oblong thin leaves and quite prominent bractlets; while more abundant in collections are the larger forms with elongated linear-lanceolate rather rigid stem-leaves and smaller bractlets. In the European species referred to, and to which our species has been heretofore referred, the oil-tubes are large and solitary, while in our species they are so numerous (about 25) as to be continuous about the seed-cavity. In habit there is a close resemblance to the European species.

* * *Annual: involucre none, involuclers of 5 very conspicuous ovate mucronate bractlets: carpels with very slender ribs, and no oil-tubes: seed-face somewhat concave.*

B. ROTUNDFOLIUM L., with ovate perfoliate leaves, is introduced from Europe, and is very common in fields and cultivated ground, from New York to N. Carolina, and westward to Arkansas and Missouri. (Fig. 129.)

B. PROTRACTUM Link, which differs from the last chiefly in its tuberculate fruit, has been collected on ballast ground near Philadelphia by Mr. Martindale.

40. **CHLEROPHYLLUM** Linn. Gen. n. 358. Annuals, in moist ground, with ternately decomposed leaves, pinnatifid leaflets with oblong obtuse lobes, usually no involucre, involuclers of many bractlets, and white flowers.

1. **C. procumbens** Crantz, Umbel. 77. More or less hairy: stems slender, spreading, 6 to 18 inches high: umbel sessile or peduncled, few-rayed; rays 1 to 2 inches long; pedicels from 4 lines long to almost wanting: fruit (in the type) narrowly oblong, $2\frac{1}{2}$ to $3\frac{1}{2}$ lines long, glabrous, contracted but not tapering at summit, intervals broader than the ribs: seed-face deeply sulcate. (Fig. 130.)

New York to New Jersey and N. Carolina, and westward to Michigan, Iowa, Arkansas, and Mississippi.

We consider this polymorphous species to include all our forms of *Charophyllum*. The only characters that can be used to separate them specifically must be drawn from the beaking of the fruit, the size of the ribs, and the depth of the sulcus of the seed-face. Isolated specimens can be selected which seem distinct enough in these particulars, but a study of a great number of specimens from all regions shows an inextricable running together, and it seems impossible to draw specific lines. Characters that have been used to define species are found displayed on the same plant. Owing to intergrading forms even varieties cannot in all cases be distinctly set apart, but the following extreme forms may, in some cases, be distinguished from the specific type by means of mature fruit.

Var. **Shortii** Torr. & Gray, Fl. i. 637, has more broadly oblong to ovate (often somewhat pubescent) fruit, not at all contracted at summit.

Kentucky to Arkansas and Louisiana.

Var. **Tainturieri** C. & R. Bot. Gazette, xii. 160, has fruit tapering at summit or beaked, ribs very prominent and much broader than the intervals, and seed-face with a shallower sulcus. (Fig. 131.)—*C. Tainturieri* Hook.

From Florida to Texas.

Var. **dasycarpum** C. & R. l. c., differs from the preceding variety in having pubescent fruit, with ribs prominent but narrower than the intervals. (Fig. 132.)—*C. Tainturieri*, var. *dasycarpum* Hook.

Texas (Hull 260, "pubescent form," and Lindheimer 616) and Louisiana, near New Orleans (Drummond 136).

41. OSMORHIZA Raf. in DC. Prod. iv. 232.—Glabrous to hirsute perennials, from thick aromatic roots, 1 to 3 feet high, with ternately decomposed leaves, ovate variously toothed leaflets, involucre and involucels few-leaved or wanting, and white flowers in few-rayed and few-fruited umbels.—Incl. *Glycos-*

ma Nutt., Torr. & Gray, Fl. i. 639; referred to *Myrrhis* by Benth. & Hook. Gen. Plant. i. 897. *Myrrhis* § *Glycosma* Gray, Proc. Am. Acad. vii. 346.

This genus is well circumscribed, not only by its fruit structure, but also by its general habit. In the original description of *Glycosma* Nutt. the authors note its close relationship to *Osmorhiza*, pointing out that it differs "in its glabrous fruit, depressed stylopodium, and the absence of involucls." The discovery of species since then has broken down these characters completely; for *G. ambigua* has fruit sometimes bristly, *G. occidentalis* often has a conical stylopodium, *O. brachypoda* a somewhat depressed one, *O. nuda* rarely has involucls, and in *G. occidentalis* they are sometimes found. In the description of *O. nuda* Torr. Pacif. R. Rep. iv. 95, the author remarks that "this species is intermediate between *Osmorhiza* and *Glycosma*. The two genera should perhaps be united." This was said in view of the combination in the new species of the bristly fruit of the former with the stylopodium and absence of involuere of the latter. Bentham & Hooker, in *Genera Plantarum*, refer the *Glycosma* species to *Myrrhis* Scop., but fail to modify their description so as to include them. The wing-like ribs, prominent involucls, numerous and much cut leaves of *Myrrhis* do not apply to *Glycosma*; a difference which is still further emphasized by the internal structure of the fruit. Dr. Gray, to reconcile this discrepancy, in Proc. Am. Acad. vii. 349, proposed a § *Glycosma* under *Myrrhis*, characterized so as to include our *Glycosma* species; but in Proc. Am. Acad. viii. 386, he withdrew *Glycosma* from *Myrrhis*, and affirmed a much closer alliance for it to *Osmorhiza* (also, see Watson, Bot. Calif. i. 263), although still retaining it as an independent genus. This view was obtained from the study of the new *Glycosma ambiguum*. That *Glycosma* is distinct from *Myrrhis* is abundantly evident for the reasons given above, strengthened as they are by the fact that the prominent groups of strengthening cells are not found in the pericarp of *Myrrhis* as in *Osmorhiza* and *Glycosma*, but almost in the tips of the wing-like ribs. In reference to the distinction between *Glycosma* and *Osmorhiza*, Dr. Gray (l. c.) says "the cardinal characteristic of *Osmorhiza* is the caudate attenuation of the base of the carpels. *Glycosma* has none of this, but the base is abrupt and obtuse." While this distinction is apparent between such extreme species as *O. hirsutylis* and *G. occidentalis*, the "caudate attenuation" of *Osmorhiza* becomes a very short stout base in *O. brachypoda*, while the "abrupt and obtuse base" of *Glycosma* becomes acute in *G. ambiguum*. A generic line drawn between *O. brachypoda* and *G. ambiguum* would be extremely arbitrary.

* Fruit with prominent caudate attenuation (2 to 4 lines long) at base, very bristly.

1. **O. nuda** Torr. Pacif. R. Rep. iv. 93. Rather slender, somewhat pubescent or glabrous; leaves twice ternate; leaflets $\frac{1}{2}$

to 2 inches long, acute or obtuse, toothed and cleft; umbel long-peduncled, 3 to 6-rayed, mostly naked; rays slender, spreading, 2 to 4 inches long; pedicels 2 to 12 lines long; fruit (not including the attenuate base) 5 to 6 lines long, about a line wide, with not very prominent ribs, and small groups of strengthening cells; stylopodium and style but a quarter line long, the former short conical; seed-face concave. (Fig. 133.) — *O. brevistylis* Torr. & Gray, Fl. i. 638, in part.

In the mountains, from S. California to Alaska, and eastward to Utah, Colorado, Montana, and Lake Winnipeg (*Macoun*). Fl. May and June.

2. *O. brevistylis* DC. Prodr. iv. 232. Rather stout, villos-pubescent; leaves 2 to 3-ternate; leaflets 2 to 3 inches long, acuminate, much cleft and toothed; umbel 4 to 6-rayed, with involucre and involucrels of few bracts; rays stout, somewhat spreading, 1 to 2 inches long; pedicels 3 to 5 lines long; fruit (not including the attenuation) 6 lines long, a line or more wide, with more prominent ribs, and large groups of strengthening cells; stylopodium and style half line long, the former slender conical; seed-face more deeply concave. (Fig. 134.)

Throughout the northern states and Canada, extending southward along the mountains to N. Carolina. Fl. May and June.

3. *O. longistylis* DC. Prodr. iv. 232. Stout, from sweet aromatic roots, glabrous or slightly pubescent; leaves, umbels, and fruit as in the preceding; stylopodium slender conical, half line long, with style a line or more long; seed-face more deeply and broadly concave. (Fig. 135.)

Throughout the northeastern states and Canada, extending southward to Virginia and Tennessee, and westward to Dakota and N. W. Territory (*Macoun*).

* * *Fruit without caudate attenuation at base.*

4. *O. brachypoda* Torr. in Durand, Pl. Pratt. 89. Stout, from sweet aromatic roots, pubescent or sometimes glabrous; leaves ternately compound (often appearing pinnate after the first division); leaflets an inch or so long, acute, laciniately lobed or toothed; umbel 1 to 4-rayed, with involucre and involucrels of linear bracts, the latter equalling or exceeding the flowers; rays $1\frac{1}{2}$ to 4 inches long; pedicels about a line long; fruit 6 to 8 lines long, 2 lines wide, short attenuate at base, rough-bristly on the very prominent ribs; groups of strengthening cells large; stylopo-

dium and style half line long, the former somewhat depressed: seed-face very deeply concave, nearly enclosing a central cavity. (Fig. 136.)

California, Nevada Co. (*Bigelow, Pratten*), Santa Clara Valley (*Goodale*), Monterey (*Parry, Lemmon*), Santa Barbara Co. (*Ford*), and Kern Co. (*Parish* 1985 and 1945). Fl. May.

5. **O. ambigua.** Glabrous, or hairy near the nodes: leaves 2 to 3-ternate; leaflets 1 to 2 inches long, acute, shortly toothed or cleft: umbel 4 to 8-rayed, naked; rays about 2 inches or more long, somewhat spreading; pedicels 1 to 3 lines long: fruit 6 to 7 lines long, $1\frac{1}{2}$ lines wide, acutish at base, sometimes bristly, with ribs and groups of strengthening cells prominent: style half line long; seed-face concave.—*Glycosma ambiguum* Gray, Proc. Am. Acad. vii, 386.

California (*Kellogg & Harvard*), Oregon (*Hall* 217, *Howell, Henderson*), and Washington Territory, Falcon Valley (*Suksdorf, Henderson*). Fl. April to June.

6. **O. occidentalis** Torr. Mex. Bound. 71. Rather stout, puberulent or pubescent: leaves 2 or 3-ternate; leaflets $1\frac{1}{2}$ to 4 inches long, acute, coarsely serrate, rarely incised: umbel 5 to 12-rayed, naked or with 1 or 2 involucreal bracts; rays 1 to 5 inches long, mostly erect; pedicels 1 to 3 lines long: fruit 7 to 12 lines long, $1\frac{1}{2}$ lines wide, obtuse at base, glabrous, with prominent acute ribs, and smaller groups of strengthening cells: stylopodium and style $\frac{1}{2}$ to 1 line long, the former mostly conical: seed-face more concave. (Fig. 137.)—*Glycosma occidentale* Nutt. in Torr. & Gray, Fl. i. 639. *Myrrhis occidentalis* Benth. & Hook. Gen. Pl. i. 897.

California, Oregon (*Spalding*), and Washington Territory (*Howell, Bradegee*), eastward to Nevada (*Watson*), S. Utah (*Parry*), Wahsatch Mts. (*Hooker & Gray*), and Montana (*Cronq. Watson*). Fl. June to August.

Very variable in pubescence, size of leaflets, and length of pedicels. An extreme but not distinct form is

Var. **Bolanderi**, with widely spreading rays, short pedicels, and more obtuse ribs.—*Myrrhis Bolanderi* Gray, Proc. Am. Acad. vii, 346. *Glycosma Bolanderi* Gray, l. c. viii, 386.

Mendocino county, California (*Bolander*).

42. VELÆA DC. Prodr. iv. 230.—Glabrous or pubescent perennials, from thick elongated roots, with mostly radical pinnate or ternate leaves, involucre present or wanting, conspicuous involucels, and yellow flowers.—*Dereya* Torr. and Gray, Fl. i. 641. *Arracacia* Benth. & Hook. Gen. Plant. i. 884, in part.

There is no doubt that our species that have been described under *Dereya* are the same generically as the Mexican *Velæa*, and as such must bear the older name. Bentham & Hooker have referred the group to *Arracacia*, from which it seems to us sufficiently distinct to be retained as an independent genus. Watson (Proc. Am. Acad. xxii. 415) unwillingly came to the same conclusion and transferred the more recent species of *Dereya* to *Arracacia*. A study of the internal fruit-structures emphasizes a distinction which seemed to be too slight upon external characters. The genus, although somewhat polymorphous in habit, is consistent enough even in that regard, with its thick elongated roots, mostly radical pinnate or ternate leaves, and yellow flowers. The contrasting characters with *Arracacia* are as follows: *Arracacia* has a somewhat beaked fruit, with broad corky equally distant ribs (giving a pentagonal carpel section), a prominent well defined group of strengthening cells beneath each rib, single large oil-tubes in the intervals, and a conical stylopodium. *Velæa* has beakless fruit, with filiform unequally placed ribs (the dorsal being approximate), very small ill-defined groups of strengthening cells, numerous oil-tubes (in some cases almost continuous), and a depressed stylopodium. The character of dorsally sulcate or terete seeds has been used, but adds nothing, as any large solitary oil-tube may have a sulcus developed beneath it. Numerous intervallate oil-tubes never are accompanied by a dorsally sulcate seed. The result is that *Arracacia* may or may not have dorsally sulcate seeds, while *Velæa* never has; but this is only another way of saying that the former has large solitary oil-tubes in the intervals, and the latter numerous oil-tubes.

1. *V. arguta*. One to 2 feet high, glabrous, mostly with a few cauline leaves: leaves simply pinnate; leaflets 5 to 7, ovate, 1 to 1½ inches long, the lowest petiolulate and often subcordate, finely and sharply mucronate-serrate, the terminal often 3-lobed: umbel 12 to 16-rayed, mostly with no involucre, and involucels of few linear acuminate bractlets; rays 2 to 3 inches long; pedicels short; calyx-teeth prominent: fruit oblong, smooth, 2½ to 3½ lines long, acutely ribbed: oil-tubes 3 to 5 in the intervals, 4 to 6 on the commissural side.—*Dereya arguta* Torr. & Gray, Fl. i. 641. *Arracacia arguta* Benth. & Hook. Gen. Plant. i. 885.

Mountains of S. California (Parry & Lemmon 148), Bigelow, Palmer 110a, Parish 979; "N. Calif." (Nuttall); also in Lower California (Orcutt 907).

2. **V. Hartwegi.** Mostly acaulescent, 1 to 2 feet high, minutely scabrous throughout: leaves biternate and quinate (ultimate segments more or less confluent); leaflets ovate, 1 to 2 inches long, acute at base, more coarsely and deeply mucronate-serrate and lobed; umbel 16 to 20-rayed, mostly with no involucre, and involucels of prominent foliaceous linear-oblong reflexed bractlets on one side of the umbellets; rays $2\frac{1}{2}$ to 4 inches long; pedicels short; fruit nearly orbicular, smooth, 3 or 4 lines long, $2\frac{1}{2}$ to 3 lines broad, sharply ribbed; oil-tubes 3 in the dorsal intervals, 5 to 6 in the laterals, 8 to 10 on the commissural side. (Fig. 138.)—*Deweya Hartwegi* Gray, Proc. Am. Acad. vii. 342. *Arracacia Hartwegi* Watson, Proc. Am. Acad. xxii. 415.

California, Lower Sacramento (*Hartweg*), near San Francisco (*Kellogg*), on Whipple Exped. (*Bigelow*), Butte and Placer counties (*Mrs. R. M. Austin*), Mariposa Co. (*J. W. Congdon*), Kern Co. (*Parish* 1939, distributed as *Deweya arguta*), San Felipe (*Mrs. A. E. Brush*). Fl. April to June.

3. **V. Kelloggii.** Acaulescent or nearly so, mostly puberulent, more slender: leaves triternate; leaflets ovate, half to less than an inch long, mostly 3-lobed; umbel 8 to 16-rayed, mostly with no involucre, and involucels of small linear bractlets; rays 1 to 3 inches long; fruit 1 or 2 lines long, almost as broad, somewhat notched at base, with filiform ribs; otherwise like the last. (Fig. 139.)—*Deweya Kelloggii* Gray, Proc. Am. Acad. vii. 343. *Arracacia Kelloggii* Watson, Proc. Am. Acad. xxii. 415.

California, about San Francisco and Bolinas Bay (*Kellogg & Bolander*), Petaluma (*J. W. Congdon*), San Luis Obispo (*Jones*); Oregon, Waldo and Grave Creek Hills (*Howell*), Glendale (*Howell & Anderson*).

Some of the Oregon forms are glabrous.

4. **V. Parishii.** Glabrous throughout, nearly acaulescent, about a foot high; leaves thickish, ternate-pinnatifid, the segments ovate, irregularly cuspidate-toothed and lobed, with revolute margins; umbel about 20-rayed, with no involucre and involucels of few setaceous bractlets; rays 2 inches or more long; pedicels about 4 lines long; calyx-teeth prominent; fruit (immature) oblong, glabrous, about 3 lines long, with prominent ribs; oil-tubes 3 or 4 in the intervals, 4 or 5 on the commissural side.

Southern California (*Parry & Lemmon*, in 1876), San Bernardino Mts. (*S. B. & W. F. Parish* 978 and 1827, in June 1881 and 1886, distributed as *Cymopterus terebinthinus*), Long Meadow, Tulare county, 8-9000 feet alt. (*Dr. E. Palmer*, July, 1888).

This species has the most strongly laterally flattened carpels in the genus.

5. **V. Howellii.** Glabrous throughout, short caulescent, 2 or 3 inches high: leaves 1 or 2, thickish, about $1\frac{1}{2}$ inches long, with ovate outline, pinnatifid, the oblong segments irregularly cuspidate-toothed and lobed, with revolute margins: umbel 3 to 6-rayed (sometimes with 1 or 2 sessile umbellets), with no involucre, and involucels exceedingly prominent, being exactly like the leaves and forming the principal part of the foliage of the plant; rays 6 to 8 lines long; pedicels about a line long; calyx-teeth prominent: fruit (immature) oblong, glabrous, a line long: oil-tubes several in the intervals.

Alpine, top of Siskiyou mountains, Oregon, July 20, 1887 (*Howell* 711).

This interesting alpine *Yelua* closely resembles *V. Parishii* C. & R. in foliage. Its dwarf habit and remarkable involucels well characterize it.

6. **V. vestita.** Acaulescent, 2 to 4 inches high, densely clothed throughout with white soft spreading hairs: leaves pinnately compound, with numerous crowded confluent oblong segments: umbel 10 to 15-rayed, with no involucre, and involucels of numerous lanceolate bractlets; rays 4 to 8 lines long; fruit sessile or nearly so, the sterile pedicels 6 to 9 lines long; fruit ovate-oblong, pubescent, 2 to $2\frac{1}{2}$ lines long, $1\frac{1}{2}$ lines broad, with inconspicuous ribs: oil-tubes 3 to 4 in the intervals, 3 on the commissural side. (Fig. 140.)—*Deweya vestita* Watson, Proc. Am. Acad. xvii. 373. *Arracacia vestita* Watson, l. c. xxii. 415.

California, San Bernardino mountains (*S. B. & W. F. Parish*), Long Meadow, Tulare county, 8-9000 feet alt. (*Dr. E. Palmer*, July, 1888).

43. MUSENIOPSIS.—Glabrous perennials, from thick elongated roots, with radical pinnate leaves, no involucre, involucels of few small bractlets, and yellow flowers.—Based upon *Tauschia* (*Museniopsis*) *Texana* Gray, Pl. Lindh. ii. 211.

The fact that this can be made an outlying member of several genera and a satisfactory member of none suggests the propriety of isolating it and thus making more consistent generic groupings. It brings trouble into every genus under which it can be placed, and thus seems to prove its right to generic independence. First placed under *Tauschia* by Gray, it differs from that genus chiefly in its numerous small oil-tubes, instead of solitary large ones, and in not having an involute seed-face. Referred to *Eulophus* by Bentham & Hooker, its deeply and narrowly sulcate seed-face at once contradicts the broad and shallow sulcus of that genus, to say

nothing of its laterally flattened carpels, yellow flowers, and general habit. It seems to coincide in characters most with *Velva*, but is at variance in the most important character in that genus, viz: a strongly involute seed, enclosing a central cavity. Almost identical in habit with *Muscium*, its carpels are flattened laterally instead of dorsally, the seed-face is not so broadly but more deeply concave, the intermediate ribs (like *Velva*) are much nearer the dorsal than the laterals, instead of being equidistant, its oil-tubes are more uniform in size, and its calyx-teeth are obsolete. It also simulates *Altes acutis* in general appearance, but differs radically in fruit structure. Such a combination of resemblances and differences can best be expressed by an independent genus, and hence we use Gray's section name under *Tauschia* and raise it to generic rank.

1. **M. Texana.** Acaulescent: scape 2 to 8 inches high, longer than the leaves, somewhat scabrous at base of umbels: leaves 5 to 7-pinnate; lower pinnae petiolulate, pinnately parted; segments cuneiform, 3 to 5-cleft: umbel 5 to 8-rayed: fruit $1\frac{1}{2}$ lines long. (Fig. 141).—*Tauschia Texana* Gray, Pl. Lindh. ii. 211. *Eulophus Texanus* Benth. & Hook. Gen. Plant. i. 885.

Western Texas, and extending into Mexico. Fl. July.

44. **CONIUM** Linn. Gen. n. 336.—Poisonous biennials, with spotted stems, large decomposed leaves with lanceolate pinnatifid leaflets, involucre and involucels of narrow bracts, and white flowers.

C. MACULATUM L. A large branching European herb, in waste places throughout the northeastern states and Canada; also found in California. Fl. July. (Fig. 142.)

45. **SIUM** Linn. Gen. n. 348.—Smooth perennials growing in water or wet places, with pinnate leaves and serrate or pinnatifid leaflets, involucre and involucels of numerous narrow bracts, and white flowers.

Bentham & Hooker refer our two species of *Sium* to *Apium*; but they seem abundantly distinct, as indicated by Watson, Bot. Calif. i. 261. The oil-tubes are never solitary in all the intervals, and the prominent group of strengthening cells in the outer edge of each rib, as well as the broad intervals, still further emphasizes the distinction. There is no better defined generic group than that formed by our two species of *Sium*, being so nearly identical in fruit and so easily separated from all other genera.

1. **S. cicutæfolium** Gmelin. Syst. ii. 482. Stout, 2 to 6 feet high; leaflets 3 to 8 pairs, linear to lanceolate, sharply serrate

and mosly acuminate, 2 to 5 inches long (lower leaves sometimes submersed and finely dissected, as in the next): umbel many-rayed; rays 1 to 1½ inches long; pedicels 1 to 3 lines long: fruit 1½ lines long, with prominent ribs: oil-tubes 2 to 6 on the commissural side. (Fig. 143.)—*S. lineare* Michx. Fl. i. 167. *Apium lineare* Benth. & Hook. Gen. Plant. i, 888 and 893.

Apparently throughout North America.

The forms with submersed dissected leaves are from S. Illinois (*Schneck*), Wisconsin (*Lapham*), and Turtle Lake, Mt. Desert (*Redfield*).

2. **S. Carsonii** Durand, Gray's Manual, 196. Weak, 1 to 2 feet high: leaflets 1 to 3 pairs, linear, sharply serrate, 1 to 2 inches long; when submersed or floating, very thin, ovate to oblong, usually lacinate-toothed or dissected, the leaf sometimes reduced to the terminal leaflet: umbel fewer (10 to 15)-rayed; rays about an inch long; pedicels 1 to 3 lines long: fruit smaller, about a line long, with less prominent ribs: oil-tubes 2 to 4 on the commissural side. (Fig. 144.)—*Apium Carsonii* Benth. & Hook. l. c.

Pennsylvania, Connecticut, Rhode Island, and Massachusetts.

46. APIUM Linn. Gen. n. 367.—Erect or prostrate glabrous herbs, with pinnately or ternately divided leaves, and umbels of white flowers opposite the leaves.

1. **A. leptophyllum** F. Muel., Benth. Fl. Austral. iii. 372. A few inches to two feet high: leaves ternately divided into filiform segments: umbels sessile or short-pedunculate: fruit a line long. (Fig. 145.)—*Helosciadium leptophyllum* DC.

Florida to Texas, extending north to "St. Louis" (*Nuttall*), and southward into Mexico. A very much reduced form (2 to 3 inches high) was collected by Martindale near Long Branch, N. J., August, 1864.

A. NODIFLORUM Benth. & Hook., an introduced species from Europe, was reported first by Walter as very abundant around Charleston, S. C., but was not afterwards found until recently collected by Dr. J. H. Mellichamp. It has also been found on ballast near Philadelphia by Martindale. It grows in wet places, and has simply pinnate leaves, the leaflets being oblong and serrate.

A. GRAVEOLENS L., the common garden celery, is a native of the coasts of Europe, but has become widely naturalized, being reported from California, in salt marshes from Santa Barbara to San Diego, also from San Bernardino (*Parish*) and Ft. Tejon;

also collected on ballast near Philadelphia (*Martindale*). It may be recognized by its branching and rather leafy habit, pinnate leaves of 1 or 2 pairs of broadly cuneate-obovate or rhomboidal lobed and toothed leaflets. It is much changed by cultivation.

A. PETROSELINUM L., the cultivated parsley, a native of the Mediterranean region, is reported by J. Donnell Smith from Anne Arundel county, Maryland, May 29, 1878; and by Professor Macoun, as having become spontaneous in Canada.

A. REPENS Reich., a European species, has been found on ballast near Philadelphia (*Martindale*).

47. **HARBOURIA**.—Glabrous perennials, with 1 to 3 leaves which are ternately decomposed and with narrowly linear or filiform segments, involucre and involucels of few subulate bracts, and long-peduncled umbels (mostly in pairs) of yellow flowers.

First collected by *Hall & Harbour*, to the latter of whom it is dedicated, as the name *Hallia* is preoccupied.

1. **H. trachypleura**. A foot or more high: leaf-segments mucronulate: umbels (mostly 2 long-peduncled ones) 15 to 25-rayed; rays an inch long; pedicels 2 to 3 lines long: fruit 2 lines long. (Fig. 146.)—*Thaspium trachypleurum* Gray, Proc. Acad. Philad. 1863, 63. *Cicuta* (?) *trachypleura* Watson, Bibl. Index. Polypet. 417.

In the foot-hills of the mountains of Central Colorado (*Hall & Harbour* 215, *Parry* 159, etc., etc.) to New Mexico (*Fendler* 277). Fl. May to July.

This plant, as the synonymy shows, has been referred doubtfully to both *Thaspium* and *Cicuta*. Its position in *Thaspium* must have been among the so-called "apterous" forms, which we have referred to *Zizia*, from which genus it is plainly separated by its much more prominent corky ribs, narrow and prominently corky-thickened commissural face, and whole general habit. It is distinct from *Cicuta* not only in these same characters, but also in its more laterally flattened fruit, equal ribs, yellow flowers, and habitat.

48. **ALETES**.—An acaulescent glabrous perennial, with pinnate leaves, broad sharply toothed or cut rather distant leaflets, mostly no involucre, and involucels of lanceolate bractlets about equalling the yellow flowers.

1. *A. acaulis*. Cespitose, with peduncles 4 to 10 inches high, often much longer than the leaves: leaflets ovate, irregularly toothed and cut, sometimes almost pinnatifid: umbel 8 to 15-rayed; rays 5 to 10 lines long: fruit almost sessile, $1\frac{1}{2}$ lines long. (Fig. 147.)—*Deweya* (?) *acaulis* Torrey, Pacif. R. Rep. iv. 94. *Oreosciadium acaule* Gray, Proc. Am. Acad. vii. 343. *Seseli Hallii* Gray, l. c. viii. 288. *Musenium Greenei* Gray, l. c. 387. *Carum* (?) *Hallii* Watson, Bibl. Index. Polypet. 416. *Zizia Hallii* C. & R. Bot. Gazette, xii. 137, foot-note.

In the foot-hills of Colorado and New Mexico. Fl. May.

The history of this species has been somewhat remarkable. Not only has it been referred to six genera, but it has stood under three of them at the same time. Referred first doubtfully to *Deweya* by Torrey in 1856, it was transferred by Gray to *Oreosciadium* in 1868. It then turned up in the Hall & Harbour collection and was described as *Seseli Hallii* Gray in 1870. A year or two later it was sent to Dr. Gray by E. L. Greene, and appeared in 1872 as a new species of *Musenium*, *M. Greenei* Gray. At this time the same plant was appearing in our publications under three names, *Oreosciadium acaule*, *Seseli Hallii*, and *Musenium Greenei*, all of Gray. In his Bibliographical Index, Watson referred it doubtfully to *Carum*, as *C.* (?) *Hallii*, at the same time recognizing the identity of *Seseli Hallii* and *Musenium Greenei*, and quoting them as synonyms. In 1887, however, in Proc. Am. Acad. xxii. 475, Watson records the identity of *Oreosciadium acaule* with his *Carum* (?) *Hallii*, and so the names were at last reduced to one. The fruit characters are those of *Zizia*, and if they are to dominate over every other consideration this plant must be a *Zizia*, as we suggested in Bot. Gazette, xii. 137. But no character should be used too arbitrarily, and the complete dissimilarity of habit between the recognized species of *Zizia* and this species seems something that cannot be neglected. If such a thing is to be neglected in this case, consistency would demand a consolidation of genera such as we are not at present disposed to accept. If this plant, then, is not a *Zizia*, nor any of the numerous genera proposed for it, a genus must be made for it, for surely, if a plant does not satisfy any genus, it must be *sui generis*. That it does not satisfy the demands of any recognized genus is to be inferred from its strange history; but it may be proper to point out a few of the reasons why it cannot belong to any of the genera heretofore proposed for it. It is hardly necessary to show why it cannot be a *Velva* (*Deweya*). From *Oreosciadium* it differs in its prominent calyx-teeth, pinnate leaves, and yellow flowers; from *Seseli* in its laterally flattened fruit, yellow flowers, and whole habit; from *Musenium* in its much more prominent ribs, strengthening cells, solitary oil-tubes, almost plane seed-face, and simpler leaves; from *Carum* in its depressed stylopodium, yellow flowers, and its general habit. Taking its habit and fruit both into consideration it is more nearly related to *Musenium* than any other genus. For the reasons given,

we propose for it a new genus, the name of which indicates its changing history.

49. *ZIZIA* Koch, Umbel. 129.—Smooth perennials (1 to 3 feet high), with mostly *Thaspium*-like leaves, no involucre, involucels of small bractlets, yellow flowers, and central fruit of each umbellet sessile.—Flowers in early spring, in open prairies and upland meadows.

In separating the species of *Zizia* from the *Thaspium aureum* group we are indebted to Mr. M. S. Bebb for his field notes. His observations concerning their decided differences in habitat and time of blooming very strongly confirm the differences discovered in fruit structure.

1. *Z. aurea* Koch, l. c. Radical leaves very long-petioled, all but the uppermost leaves 2 to 3-ternate; leaflets ovate to lanceolate, sharply serrate: rays 15 to 25, stout, 1 to 2 inches long: fruit oblong, about 2 lines long. (Fig. 148.)—*Thaspium aurcum*, var. *apterum* Gray, Manual, 195. *Carum aurcum* Benth. & Hook. Gen. Plant. i. 891.

Throughout Canada and the Atlantic States, extending westward as far as Saskatchewan and Texas.

Although *Thaspium aureum* var. *apterum* is the real synonym of the species, botanists will find in their herbaria many specimens of *Zizia aurea* labeled *Thaspium aurcum* and *T. trifoliatum*.

Var. *Bebbii* C. & R. Bot. Gazette, xii. 138. A more slender mountain form, with leaflets more coarsely serrate or even toothed, the radical leaves smaller and more simple; rays 2 to 8, slender, 2 to 3 inches long: fruit mostly smaller, oval, 1 to 1½ lines long.

West Virginia (*Cuoby*), Virginia, N. Carolina (*Buckley, Curtiss, Cuoby, Meehan, Porter*), and Georgia (*Vasey*).

2. *Z. cordata* Koch, l. c. Radical leaves mostly long-petioled, cordate or even rounder, crenately toothed, very rarely lobed or divided; stem-leaves simply ternate or quinate, the leaflets ovate to lanceolate, serrate, incised, or even parted: fruit ovate, 1½ lines long: seed-section larger than the preceding. (Fig. 149.)—*Thaspium trifoliatum*, var. *apterum* Gray, Manual, 195. *Carum cordatum* Benth. & Hook. Gen. Plant. i. 891.

Same range as last and extending to Oregon.

As in the last species, herbarium specimens of *Zizia cordata* will be found labeled almost anything under the *Thaspium aureum* section.

50. **CARUM** Linn. Gen. n. 365.—Smooth erect slender herbs, with tuberous or fusiform fascicled roots, pinnate leaves with few linear leaflets, involucre and involucels of few to many bracts, and white flowers.

Our American species form the section *Edosmia* Benth. & Hook. (excepting *C. Howellii*). The roots are used as an article of food among the Indians.

1. **C. Gairdneri** Benth. & Hook. Gen. Plant. i. 891. Stem 1 to 4 feet high, from fascicled tuberous or fusiform roots: leaves few, usually simply pinnate, with 3 to 7 linear (sometimes almost filiform) leaflets 2 to 6 inches long (the lower rarely pinnate); upper leaves usually simple: umbels 6 to 15-rayed, with involucre of several bracts or none, and involucels of linear acuminate bractlets; rays about $1\frac{1}{2}$ inches long: fruit ovate, small, $\frac{1}{2}$ to 1 line long, with long styles: seed terete. (Fig. 150.)—*Edosmia Gairdneri* Torr. & Gray, Fl. i. 612.

From S. California to British Columbia, and eastward to Utah, Wyoming and Montana. Very common on Vancouver Island (*Macoun*). Fl. June and July.

Var. **latifolium** Gray, Proc. Am. Acad. vii. 344. Leaflets broader, linear-lanceolate, about $\frac{1}{2}$ inch broad.

California, Ebbett's Pass (*Brewer*), Yosemite (*Bolander*); Nevada, near Carson City (*C. L. Anderson*).

2. **C. Oregonum** Watson, Proc. Am. Acad. xx. 368. Closely resembling the preceding, but with lower leaves more divided, with shorter linear lobes: fruit oblong, larger, $1\frac{1}{2}$ to 2 lines long, with long styles: seed flattened dorsally, sulcate beneath the oil-tubes, and slightly concave on the face, with central longitudinal ridge. (Fig. 151.)—*Edosmia Oregonum* Nutt. in herb.

California, Siskiyou Co. (*Greene*); Nevada, East Humboldt Mts. (*Watson* 442, in part); Oregon (*Hull* 203), "Wappatoo Island" (*Nuttall*), Union Co. (*Cusick*); Vancouver Island and N. W. Territory (*Macoun*, in 1887).

This has been much confused by collectors with specimens of *Eulophus* (*Podosciadium*), especially *E. Bolanderi*; hence this species is very scarce in herbaria.

3. **C. Kelloggii** Gray, Proc. Am. Acad. vii. 344. Resembling *C. Gairdneri*, but somewhat stout, from a fascicle of thickened fibers, with lower leaves ternate or biternate with pinnate divisions and linear segments: involucre and involucels more prominent and rather scarious: fruit larger, oblong, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines

long, with very prominent stylopodium, and styles about the same length: seed sulcate beneath the large oil-tubes.

Central California, near the coast (*Brewer, Bolander, Kellogg, Palmer* 156 and distributed as *C. Guirducci*, etc.)

The Fremont specimen referred to by Dr. Gray in the original description of this species is *Eulophus Pringlei*, and this specimen somewhat affects the whole description. This species is very scarce in herbaria.

4. **C. Howellii.** Stem 3 to 3½ feet high, from a fascicle of thickened fibres: leaves few, ternate, then once or twice pinnate; leaflets lanceolate to ovate, strongly toothed or lobed: umbels many-rayed (about 25), with involucre of long narrowly oblanceolate bracts (becoming reflexed), and involucels of prominent lanceolate scarious-margined bractlets; rays about 1½ inches long; pedicels 3 lines long: fruit (immature) with very prominent stylopodium longer than the styles: oil-tubes very large.

Grant's Pass, Oregon, July 13, 1887 (*Howell* 710, distributed as *C. Kelloggii*?).

C. CARUI L., the common garden caraway from Europe, has become naturalized in many places, especially in the north and northwest. It may be recognized by its pinnately compound leaves with fliform divisions.

51. **CICUTA** Linn. Gen. n. 354.—Smooth poisonous marsh perennials, with pinnately compound leaves and serrate leaflets, involucre of few bracts or none, involucels of several slender bractlets, and white flowers.

1. **C. virosa** L. Spec. 255. Stout, 2 to 6 feet high: leaves twice or thrice pinnate, the lower on long petioles; leaflets narrowly lanceolate, 1 to 2 inches long, acuminate, coarsely serrate, with the veinlets commonly running to the sinuses: umbel many-rayed, with involucre mostly wanting, and involucels of few narrow lanceolate bractlets; rays 1 to 3 inches long; pedicels 2 to 4 lines long: fruit broadly ovate to oval, 1 to 1½ lines long, with lateral ribs much larger than the others: oil-tubes broad and conspicuous, the commissural pair contiguous: seed nearly terete. (Fig. 152.)

Quite common in marshes from the Saskatchewan region and Hudson Bay (*Burke*), to the western coast, and northward (*Ljall, Bourgeau, Macoun*). Fl. summer.

Var. **maculata**. Leaflets broader, from lanceolate to oblong-lanceolate, 1 to 5 inches long.—*C. maculata* L.

Throughout the United States.

We can discover no other difference between *C. maculata* L. and *C. villosa* L. than the one in the leaves noted above.

Var. **Californica**. Upper leaves simply pinnate: fruit with the more prominent dorsal and intermediate ribs nearly equalling the laterals, and oil-tubes narrower.—*C. Californica* Gray, Proc. Am. Acad. vii. 344.

From California, San Francisco and northward to Oregon (*Howell*), Washington Territory (*Suksdorf, Henderson*), and Vancouver Island (*Macoun*).

This variety seems to be confined to the western coast region, and is commonly distributed as *C. maculata*. The fruit differences between this variety and the species depend only upon the development of the dorsal and intermediate ribs, and are closely connected by intermediate forms. The venation character, while tolerably constant in the species, cannot be used to separate this variety from it, although in some specimens the veinlets pass to the teeth instead of the sinuses with considerable regularity.

2. **C. bulbifera** L. Spec. 255. Rather slender, 1 to 3 feet high: leaves twice or thrice pinnate (sometimes appearing ternate); leaflets linear, sparsely toothed, 1 or 2 inches long: upper axils bearing clustered bulblets: mature fruit not seen, nor to be found in herbaria.

Common in swamps, from Lower Canada and the Saskatchewan region, to Indiana, Pennsylvania, and Delaware. Fl. July to September.

Immature fruit, clearly showing *Cicuta* characters, were found in herb. Walter Deane, collected by L. H. Bailey near Lansing, Michigan. Packets of fruit reputed to be of this species had better be suspected unless seen on the plant. The fruit described and figured in Bot. Gazette, xii. 263, under this name, is that of *Ferniculum vulgare*, put by mistake on the same sheet.

3. **C. Bolanderi** Watson, Proc. Am. Acad. vi. 139. Leaves bipinnate; leaflets narrowly lanceolate, narrowly and sharply acuminate, 2 inches long, very acutely serrate; lower leaflets petiolulate, often deeply lobed: involucre of several linear bracts: fruit nearly orbicular, 2 lines long, strongly ribbed, and with broad oil-tubes which are sunk in the channelled seed.

In salt marshes, at Suisun. California (*Bolander*).

52. **CRYPTOTOLENIA** DC. Mem. Umbel. 42.—Glabrous perennials, with thin 3-foliolate leaves, no involucre, involucels of minute bractlets or none, and white flowers.

Bentham & Hooker consider this genus to be too near *Pimpinella*, but the fruit characters are very different. In *Cryptotolenia* the carpellary wall is composed of two distinct layers, the outer being almost made up of the very broad bundles of strengthening cells, the inner composed of a single layer of large parenchyma cells in which the oil-tubes always occur. In *Pimpinella* the bundles of strengthening cells are very small and widely separated, and there is no such inner layer.

1. **C. Canadensis** DC. l. c. One to three feet high; leaflets large, ovate, 2 to 4 inches long, pointed, doubly serrate, often lobed; umbels irregular and unequally few-rayed; pedicels very unequal, from a line or two to an inch long; fruit 2 to 3 lines long, often becoming curved. (Fig. 153.)

Canada to Minnesota, and south to N. Carolina. Georgia, Mississippi, and Texas. Fl. June to September.

53. **LEPTOCAULIS** Nutt. in DC. Prodr. iv. 107.—Very slender smooth branching annuals, with finely dissected leaves having filiform or linear segments, and small white flowers in involucellate very unequally few-rayed pedunculate umbels.

This genus is referred to *Apium* by Bentham & Hooker, but the differences in its fruit structure are so great that only similarity in habit could have suggested such an association.

1. **L. echinatus** Nutt. l. c. A span to a foot high; fruit with rather narrow commissure, echinate with spreading hooked bristles, about $\frac{1}{2}$ line long; ribs obsolete. (Fig. 154.)—*Apium echinatum* Benth. & Hook. Gen. Plant. i. 888.

Alabama to Arkansas, westward to Texas (*Hall, Reverchon, Miss Croft*), New Mexico (*Wright, Greene*), Arizona (*Pringle, Parish*), and S. California (*W. F. Parish*). Fl. April and May.

2. **L. divaricatus** DC. Mem. Umbel. 39. t. 10. One to two feet high, with spreading branches; umbels more diffuse than in the last and usually with fewer rays; fruit with broader commissure, tuberculate, $\frac{1}{2}$ line long; ribs somewhat prominent. (Fig. 155.)—*Apium divaricatum* Benth. & Hook. l. c.

North Carolina to Florida, and westward to Kansas (*Oyster*), Arkansas (*Nuttall*), Indian Territory (*Palmer*), and Texas; also rare on ballast near Philadelphia (*Parker*). Fl. April.

54. DISCOUPLEURA DC. Mem. Umbel. 38.—Smooth branching annuals, with finely dissected leaves (filiform or lanceolate divisions), involucre of foliaceous bracts, involucels of prominent or minute bractlets, and white flowers.

1. *D. capillacea* DC. l. c. A foot or two high, or even reaching 5 or 6 feet: leaves finely dissected into filiform divisions: umbel 5 to 20-rayed, with involucre of filiform bracts usually cleft or parted, and involucels more or less prominent; rays $\frac{1}{4}$ to 1 inch long; pedicels $1\frac{1}{2}$ to 3 lines long: fruit $\frac{1}{2}$ to 1 line long, with filiform or thick dorsal and intermediate ribs, the laterals forming a broad flat band about the fruit: seed-face convex. (Fig. 156.)

Wet ground. Massachusetts to Florida, and westward to the plains. Fl. June to October.

This species is an exceedingly variable one, so much so that while certain extreme forms have been considered as distinct varieties and even species, they are so completely connected by intermediate forms that no distinct separation can be made. For instance, the number of rays is very inconstant, the involucral bracts are frequently cleft and entire in different umbels upon the same plant, the involucels may or may not be prominent in any form, and the dorsal and intermediate ribs may be filiform or prominent with any other combination of characters. The prominent ribs furnish the chief character of DeCandolle's var. *costata*, but ribs just as prominent occur in all other forms, and DeCandolle himself (Prodr. iv. 107) says he is not able to separate many specimens of var. *costata* from the species. An extreme form, completely connected with the species by intermediate forms, is

Var. *Nuttallii* C. & R. Bot Gazette, xii. 292, which is usually stouter, with more numerous rays, entire involucral bracts, and minute involucels.—*D. Nuttallii* DC.

In the Mississippi Valley, from S. Illinois (*Vasey*) to Louisiana and Texas.

2. *D. laciniata* Benth. & Hook. Gen. Plant. i. 907. Two or three feet high: leaves dissected into lanceolate divisions, or the uppermost linear-setaceous: umbel nearly equally many-rayed, with involucre and involucels of numerous 3 to 5-parted setaceous bracts; rays $\frac{1}{2}$ to $1\frac{1}{4}$ inches long; pedicels 2 to 3 lines long: fruit about 2 lines long, with broad and flattish dorsal and intermediate ribs, the laterals forming a prominent acute ridge about the fruit: seed-face plane. (Fig. 157.)—*Daucus laciniatus* Eng. & Gray, Pl. Lindh. 210.

Moist prairie land and along margins of thickets, Western Texas (*Lindheimer, Wright, Thurber, Bigelow, Palmer*). Fl. July to September.

The whole plant is said to exhale a strong odor of carrot.

55. **BERULA** Koch, *Deutsch. Fl.* ii. 455.—Smooth aquatic perennial, with simply pinnate leaves and variously cut leaflets, usually conspicuous involucre and involucels of narrow bracts, and white flowers.

Bentham & Hooker refer this genus to *Sium*, but it is very properly restored in *Bot. Calif.* i. 260.

1. **B. angustifolia** Koch, l. c. Erect, $\frac{1}{2}$ to 3 feet high or even smaller: leaflets 5 to 9 pairs, linear to oblong or ovate, serrate to cut-toothed, often laciniately lobed, sometimes crenate, $\frac{1}{2}$ to 3 inches long: umbel many-rayed; rays 2 inches long or less; pedicels 2 to 3 lines long: fruit scarcely a line long. (Fig. 158).—*Sium angustifolium* L.

Throughout the United States and Mexico, but not abundant; common in Europe. Fl. July and August.

The size and foliage of this species are excessively variable.

56. **LEGOPODIUM** Linn. *Gen. n.* 368.—A coarse glabrous perennial, with creeping rootstock, biternate leaves, sharply toothed ovate leaflets, and rather large naked umbels of white flowers.

Æ. PODAGRARIA L., a common and troublesome weed in Europe and Russian Asia, is sparingly introduced into this country, having been reported by Darlington in his *Flora Cestrice*; by Addison Brown (August, 1877) and others as occurring along roadsides at Woodside, Long Island; by A. Commons from Newark, Delaware; by W. W. Bailey, near Providence, R. I.; and by several collectors in the vicinity of N. Y. City. (Fig. 159.)

57. **BOWLESIA** Ruiz & Pav. *Prod. Fl. Peruv.* 44. t. 34.—Slender branching annuals, with stellate pubescence, opposite simple (lobed) leaves, scarious lacerate stipules, and simple few-flowered umbels of white flowers on axillary peduncles.

Our generic characters are drawn chiefly from our own species, and do not entirely apply to all the South American forms.

1. **B. lobata** Ruiz & Pavon, *Fl. Peruv.* iii. 28. Weak, 2 inches to a foot or two long, dichotomously branching; leaves

thin cordate to reniform, half to over an inch broad, 3 to 5-lobed (lobes entire or toothed), on long slender petioles: umbels 1 to 4-flowered, on short peduncles: fruit about a line long, sessile or nearly so. (Fig. 160.)—*B. tenera* Spreng. *B. geraniifolia* Cham. & Schlecht. *B. nodiflora* Presl.

Damp shady places, from the Sacramento Valley, California, and southward, extending into Arizona (*Pringle*) and Texas (*Hall, Wright, Miss Croft*). Fl. April and May.

58. HYDROCOTYLE Linn. Gen. n. 325.—Low herbaceous perennials, growing in or near water, with slender creeping stems, orbicular-peltate or reniform leaves, and small white flowers in simple or proliferous umbels.

The strong lateral flattening of the carpels and the prominent hypodermal oil-bearing layer of this genus are strikingly different from those of any other of our genera. In the European *H. vulgaris* the oil-bearing layer breaks through the epidermis in places, covering the fruit with oil-vesicles.

* *Fruit with pericarp thin except at the broad thick corky dorsal and lateral ribs: involucre of short ovate bracts: leaves orbicular-peltate, crenate: peduncles as long as petioles, both from slender creeping rootstocks.*

† *Fruit notched⁷ at base and apex: intermediate ribs corky.*

1. *H. umbellata* L. Spec. 234. Descending branches of the rootstock with round tubers: umbels many-flowered, simple (sometimes proliferous); pedicels 2 to 6 lines long: fruit strongly notched, 1 line long, about 1½ lines broad, with dorsal ribs prominent but obtuse. (Fig. 161.)

From Massachusetts to Florida, westward to Minnesota and Texas, and extending into Mexico.

Forms collected on ballast near Philadelphia (*Martindale*), Port Eads, Louisiana (*Lauglois*), and Vancouver Island (*Macoun*), are unusually proliferous, sometimes so much so as to give the impression of compound umbels.

2. *H. prolifera* Kellogg, Proc. Calif. Acad. i. 15. Tuberosus as in the last: umbels mostly proliferous, with 5 to 20-flowered whorls; pedicels 1 to 3 lines long: fruit but slightly notched, a line long or slightly broader, with dorsal ribs prominent and more

⁷ This notching may not be apparent except in fully matured fruit.

obtuse than in the last. (Fig. 162.)—*H. interrupta* Torr. & Gray, Fl. i. 599, in part.

Texas to Arizona and California, extending also into Mexico.

A species very closely related to the last.

3. **H. Canbyi** C. & R. Bot. Gazette, xii. 103. Umbels 3 to 9-flowered, generally proliferous; pedicels very short, but distinct: fruit slightly notched, a line long, and about two lines broad, much more flattened than in the preceding forms, dorsal and lateral ribs much more prominent, the former acutish, (Fig. 163.) *H. umbellata*, var ? *ambigua* Gray, Manual, 190.

New Jersey to Maryland.

Distributed in the older collections as a probable form of *H. vulgaris* L.

The three foregoing species, with *H. vulgaris* of Europe, form a very natural group, closely resembling each other in the anatomical details of the fruit. *H. vulgaris* is most nearly related in external appearance to *H. Canbyi*, but differs in its smaller fruit more or less dotted with oil vesicles, its less flattened carpels, and less prominent dorsal and lateral ribs, thus intermediating between *H. Canbyi* and the first two species. There can be no doubt but that our three species are the North American representatives of *H. vulgaris*.

† † *Fruit not notched; intermediate ribs not corky (filiform).*

4. **H. verticillata** Thunberg, Diss. II. 415. t. 3. Umbels few-flowered, proliferous, forming an interrupted spike; pedicels very short or none: fruit a line long, $1\frac{1}{2}$ to 2 lines broad, with dorsal and lateral ribs very prominent, the former acute. (Fig. 164.)—*H. interrupta* Muhl. Cat. 10.

Massachusetts to Florida and Texas; extending into Arizona (*Leaven*), Utah (*Palmer*), and near San Diego, California (*Orcutt*); also in Mexico.

* * *Fruit with pericarp uniformly corky thickened and ribs all filiform; leaves not peltate; peduncles much shorter than petioles.*

† *Fruit small ($\frac{1}{2}$ to $1\frac{1}{2}$ lines broad), without secondary ribs or reticulations; involucre bracts small or wanting.*

5. **H. Americana** L. Spec. 234. Stems filiform, branching and creeping, often bearing small fusiform tubers: leaves thin, round-reniform, crenate-lobed and lobes crenate, shining: few-flowered umbels axillary and almost sessile: fruit $\frac{1}{2}$ to $\frac{3}{4}$ line

broad, with evident ribs, and no oil-bearing layer: seed-section broadly oval. (Fig. 165.)

From Canada to Minnesota, and southward to the mountains of N. Carolina.

6. **H. ranunculoides** L. f. Suppl. 177. Usually floating: leaves thicker, round reniform, 3 to 7-cleft, with crenate lobes: peduncles 1 to 3 inches long, reflexed in fruit: capitate umbel 5 to 10-flowered: fruit 1 to $1\frac{1}{2}$ lines broad, with rather obscure ribs, and no layer of strengthening cells about the seed cavity: seed-section oblong. (Fig. 166.)—*H. natans* Torr. & Gray, Fl. i. 599.

E. Pennsylvania to Florida. thence westward to Texas and California, and up the coast to Oregon (*Howell, Henderson*).

† † *Fruit larger* (2 to $2\frac{1}{2}$ lines broad), with prominent secondary ribs and reticulations: the 2 to 4-flowered umbel subtended by an involucre of two conspicuous bracts.

7. **H. Asiatica** L. Spec. 234. Smooth or somewhat pubescent: petioles (3 to 4 inches or even a foot long) and peduncles (2 inches or less long) clustered on creeping stems or runners: leaves ovate-cordate, repand-toothed, thickish: seed-section narrowly oblong. (Fig. 167.)—*H. repanda* Pers.

Maryland to Florida, and west to Texas.

The petioles are very variable in length, an extreme form being

Var. **Floridana**, in which the petioles are an inch or less long, making the leaves appear in rather close clusters along the rootstock, and the petioles and somewhat larger fruit are more or less pubescent.

Florida (*A. H. Curtiss*), Polk county (*J. Donnell Smith*); and found also in the West Indies and Guatemala (*Turckheim*).

59. ERIGENIA Nutt. Genera, i. 187.—Low glabrous nearly acaulescent plant, from a deep-seated tuber, with ternately decomposed leaves and oblong segments, no involucre (unless a reduced leaf), involucels of leafy linear or spatulate bractlets, and white flowers in small compact umbels.

1. **E. bulbosa** Nutt. l. c. 188. Span or so high: leaves radical except those subtending the imperfect umbels: pedicels very short: fruit 1 line long $1\frac{1}{2}$ lines broad. (Fig. 168.)

W. Canada to Maryland, and westward into the Mississippi Valley,

extending southward into Tennessee (*Gatlinger*), Alabama, near Huntsville (*Wells*, in 1840), and Missouri.

AMMI MAJUS L., as a North American plant, rests solely upon the authority of DeCandolle, who reports it (*Prodr.* iv. 112) among the collections of Pylaie from Newfoundland. Martindale and Parker have also collected in ballast near Philadelphia. It has fusiform roots, pinnately divided leaves with linear or lanceolate serrate segments, compound many-rayed umbels of white flowers, and small oblong fruit with filiform and solitary oil-tubes. (Fig. 169.)

A. VISNAGA L., from the Mediterranean region, has been collected by Martindale on ballast near Philadelphia (1879), and also by Henderson on ballast near Portland, Oregon (1887). The numerous rigid rays from an enlarged receptacle becoming turned inwards after anthesis, in the manner of *Daucus*, make it easily recognized.

LIST OF FIGURES (PLATES I-IX).

Figure 1.	<i>Daucus pusillus</i>	Figure 41.	<i>Peucedanum ambiguum</i>
2.	<i>Caucalis microcarpa</i>	45.	<i>circumdatum</i>
3.	<i>nodosa</i>	46.	Grayi
4.	<i>Tropocarpus Æthusa</i>	47.	<i>macrocarpum</i>
5.	<i>Bifora Americana</i>	48.	<i>eurycarpum</i>
6.	<i>Eurytenia Texana</i>	49.	<i>dasy carpum</i>
7.	<i>Angelica pinnata</i>	50.	<i>tomentosum</i>
8.	<i>genullexa</i>	51.	<i>nudicaule</i>
9.	<i>Lyallii</i>	52.	Parryi
10.	<i>arguta</i>	53.	<i>Oreganum</i>
11.	<i>Breweri</i>	54.	<i>villosum</i>
12.	<i>lepotina</i>	55.	<i>Donnellii</i>
13.	<i>Wheeleri</i>	56.	<i>Sandbergi</i>
14.	<i>Canbyi</i>	57.	<i>Hallii</i>
15.	<i>Curtissii</i>	58.	<i>Austinea</i>
16.	<i>hirsuta</i>	59.	<i>Martindalei</i>
17.	<i>dentata</i>	60.	<i>utriculatum</i>
18.	<i>atropurpurea</i>	61.	<i>caruifolium</i>
19.	<i>Selinum capitellatum</i>	62.	<i>Parishii</i>
20.	<i>Dawsoni</i>	63.	<i>Cusickii</i>
21.	<i>Grayi</i>	64.	<i>simplex</i>
22.	<i>Hookeri</i>	65.	<i>triternatum</i>
23.	<i>Conioselinum Canadense</i>	66.	<i>levigatum</i>
24.	<i>Tiedemannia teretifolia</i>	67.	<i>Kingii</i>
25.	<i>ternata</i>	68.	<i>leiocarpum</i>
26.	<i>rigida</i>	69.	<i>Nuttallii</i>
27.	<i>Fendleri</i>	70.	<i>Suksdorffi</i>
28.	<i>Heracleum lanatum</i>	71.	<i>Euryptera</i>
29.	<i>Pastinaca sativa</i>	72.	<i>Howellii</i>
30.	<i>Polytenia Nuttallii</i>	73.	<i>Pseudocymopterus mon-</i>
31.	<i>Coloptera Newberryi</i>		<i>tanus</i>
32.	<i>Jonesii</i>	74.	<i>bipinnatus</i>
33.	<i>Parryi</i>	75.	<i>anisatus</i>
34.	<i>Leptotenia dissecta</i>	76.	<i>anisatus</i>
35.	<i>multifida</i>	77.	<i>Cymopterus glomeratus</i>
36.	<i>Eatoni</i>	78.	<i>globosus</i>
37.	<i>purpurea</i>	79.	<i>montanus</i>
38.	<i>Californica</i>	80.	<i>terebinthicus</i>
39.	<i>anomala</i>	81.	<i>longipes</i>
40.	<i>Peucedanum Hendersonii</i>	82.	<i>Jonesii</i>
41.	<i>Watsoni</i>	83.	<i>glaucus</i>
42.	<i>farinosum</i>	84.	<i>Phellopterus littoralis</i>
43.	<i>Cous</i>	85.	<i>Thaspium aureum</i>

Figure 86.	<i>Thaspium barbinode</i>	Figure 129.	<i>Bupleurum rotundifolium</i> .
87.	Walteri	130.	<i>Cherophyllum procumbens</i>
88.	<i>Ligusticum actaeifolium</i>	131.	var. <i>Tainturieri</i>
89.	Scoticum	132.	var. <i>dasyca-pua</i>
90.	scopulorum	133.	<i>Osmorhiza nuda</i>
91.	apilfolium	134.	<i>brevistylis</i>
92.	Grayi	135.	<i>longistylis</i>
93.	<i>Oreoxis humilis</i>	136.	<i>brachypoda</i>
94.	<i>Ethusa Cynapium</i>	137.	<i>occidentalis</i>
95.	<i>Celopleurum Gmelini</i>	138.	<i>Velea Hartwegi</i>
96.	maritimum	139.	<i>Kelloggii</i>
97.	<i>Orogenia linearifolia</i>	140.	<i>vestita</i>
98.	fusiformis	141.	<i>Musenopsis Texana</i>
99.	<i>Crantzia lineata</i>	142.	<i>Conium maculatum</i>
100.	<i>Onanthe saumentosa</i>	143.	<i>Sium cicutifolium</i>
101.	<i>Cynosiadium digilatatum</i>	144.	<i>Carsonii</i>
102.	pinnatum	145.	<i>Apium leptophyllum</i>
103.	<i>Eryngium aromaticum</i>	146.	<i>Harbouria trachypleura</i>
103a.	Baldwinii	147.	<i>Aletes acaulis</i>
104.	<i>Sanicula Marylandica</i>	148.	<i>Zizia aurea</i>
105.	aretopoides	149.	<i>cordata</i>
106.	Howellii	150.	<i>Carum Gairdneri</i>
107.	Menziesii	151.	<i>Oreganum</i>
108.	laciniata	152.	<i>Cicuta virosa</i>
109.	Nevadensis	153.	<i>Cryptotaenia Canadensis</i>
110.	maritima	154.	<i>Leptocaulis echinatus</i>
111.	bipinnatifida	155.	<i>divaricatus</i>
112.	bipinnata	156.	<i>Discopleura capillacem</i>
113.	tuberosa	157.	<i>laciniata</i>
114.	<i>Anmoselinum Butleri</i>	158.	<i>Berula angustifolia</i>
115.	<i>Foeniculum vulgare</i>	159.	<i>Egopodium Podagraria</i>
116.	<i>Podistera Nevadensis</i>	160.	<i>Bowlesia lobata</i>
117.	<i>Pimpinella integerrima</i>	161.	<i>Hydrocotyle umbellata</i>
118.	<i>Saxifraga</i> , var.	162.	<i>prolifera</i>
119.	<i>Apiastrum angustifolium</i>	163.	<i>Canbyi</i>
120.	patens	164.	<i>verticillata</i>
121.	<i>Musenium divaricatum</i>	165.	<i>Americana</i>
122.	<i>trachyspermum</i>	166.	<i>ranunculoides</i>
123.	<i>Eulophus Americanus</i>	167.	<i>Asiatica</i>
124.	Parishii	168.	<i>Erigenia bulbosa</i>
125.	Bolanderi	169.	<i>Anni maius</i>
126.	Californicus		
127.	<i>Anthriscus Cerefolium</i>		
128.	<i>Bupleurum Americanum</i>		

GENERAL INDEX.

Synonyms are printed in italics. The numbers in parenthesis refer to the figures.

- Egopodium* L., 28, 133.
Podagraria L. (150), 133.
Ethusa L., 22, 89.
Cynapium L. (94), 89.
Aletes C. & R., 27, 125.
acaulis C. & R. (147), 126.
Anmi L., 137.
majus L. (169), 137.
Visnaga L., 137.
Ammoselinum T. & G., 23, 107.
Butleri C. & R. (114), 107.
Popei T. & G., 107.
Angelica L., 18, 35.
arguta Nutt. (10), 37.
atropurpurea L. (18), 41.
Breweri Gray (11), 39.
Canbyi C. & R. (14), 40.
Curtisii Bueckl. (15), 40.
Dawsoni Wats., 38.
dentata C. & R. (17), 41.
genulifera Nutt. (8), 36.
Hendersoni C. & R., 38.
hirsuta Muhl. (16), 41.
leporina Wats. (12), 39.
lineariloba Gray, 39.
lucida L., 42.
Lyallii Wats. (9), 36.
pinnata Wats. (7), 36.
tomentosa Wats., 37.
Wheeleri Wats. (13), 40.
verticillata Hook., 42.
Anthriscus Hoffm., 25, 114.
Cerefolium Hoffm. (127), 114.
sylvestris Hoffm., 114.
vulgaris Pres., 114.
Apiastrum Nutt., 24, 109.
angustifolium Nutt. (119), 110.
latifolium Nutt., 110.
patens C. & R., 110.
Apium L., 26, 124.
Butleri Wats., 108.
Carsoni B. & H., 124.
divaricatum B. & H., 131.
echinatum B. & H., 131.
graveolens L., 124.
leptophyllum F. Muel. (145), 124.
lineare B. & H., 124.
nodiflorum B. & H., 124.
patens Wats., 110.
petroselinum L., 125.
Popei Gray, 107.
repens Reich., 125.
Archangelica,
atropurpurea Hoffm., 42.
dentata Chapm., 41.
Gmelini DC., 44, 90.
hirsuta T. & G., 41.
peregrina Nutt., 36.
Archemora,
Fendleri Gray, 48.
rigida DC., 47.
ternata Nutt., 47.
Arcecaria,
arguta B. & H., 120.
Hartwegii Wats., 121.
Kelloggii Wats., 121.
vestita Wats., 122.
Arcana,
Americana DC., 24.
Berula Koch, 28, 133.
angustifolia Koch (158), 133.
Bifora Hoffm., 17, 34.
Americana B. & H. (5), 34.
radians Bieb., 34.
Bowlesia Ruiz & Pav. (28), 133.
geraniifolia C. & S., 134.
lobata R. & P. (160), 133.
nodiflora Presl., 134.
tenera Spreng., 134.
Bupleurum L., 25, 114.
Americum C. & R. (128), 115.
protractum Link, 115.
ramunculoides, 115.
rotundifolium L. (129), 115.
Carum L., 27, 128.
aureum B. & H., 127.
Carui L., 129.
cordatum B. & H., 127.
Gairdneri B. & H. (150), 128.
Hallii Wats., 126.
Howellii C. & R., 129.
Kelloggii Gray, 128.
Oreganum Wats. (151), 128.
Caucalis L., 17, 33.
Anthriscus Huds., 33.
latifolia L., 34.
microcarpa H. & A. (2), 33.
nodosa Huds. (3), 33.
Cherophyllum L., 25, 115.
Californicum Torr., 114.
procumbens, Crantz (130), 116.
Tainturieri Hook., 116.

- Cicuta* L., 27, 129.
Bolanderi Wats., 130.
bulbifera L., 130.
Californica Gray, 130.
maculata L., 130.
trachypleura Wats., 125.
virosa L. (152), 129.
- Colopleurum* Ledeb., 22, 90.
Gmelini Ledeb. (95), 90.
maritimum C. & R. (96), 91.
- Coloptera* C. & R., 20, 49.
Jonesii C. & R. (32), 50.
Newberryi C. & R. (31), 49.
Parryi C. & R. (33), 50.
- Conioselinum* Fisch., 18, 45.
Canadense T. & G. (23), 46.
Fischeri, 45.
- Conium* L., 26, 123.
maculatum L. (142), 123.
- Coriandrum* L., 17, 34.
sativum L., 35.
- Crantzia* Nutt., 22, 92.
lineata Nutt. (99), 92.
- Cryptotaenia* DC., 27, 131.
Canadensis DC. (153), 131.
- Cymopterus* Raf., 21, 70.
albiflorus Nutt., 79.
alpinus Gray, 89.
anisatus Gray, 76.
hipinnatus Wats., 75.
campestris T. & G., 76.
eincerarius Gray, 80.
corrugatus Jones, 77.
Fendleri Gray, 79.
fauciculaceus Nutt., 79.
glaucus Nutt. (83), 81.
globosus Wats. (78), 77.
glomeratus Raf. (77), 76.
Jonesii C. & R. (82), 80.
littoralis Gray, 81.
longipes Wats. (81), 79.
montanus T. & G. (79), 78.
montanus, 77, 78.
Nevadensis Gray, 108.
nivalis Wats., 78.
purpureus Wats., 80.
terebinthinus T. & G. (80), 79.
thapsoides Nutt., 79.
- Cynaphum*.
apifolium Nutt. 88.
- Cynosciaidium* DC., 23, 83.
digitatum DC. (101), 93.
pinnatum DC. (102), 93.
- Daucus* L., 17, 32.
Cirola L., 33.
laciniatus Eng. & Gr., 132.
pusillus Michx. (1), 32.
- Deurypa*.
acaulis Torr., 126.
arguta T. & G., 129.
Harbregii Gray, 121.
Kelloggii Gray, 121.
vestita Wats., 122.
- Discopleura* DC., 28, 132.
capillacea DC. (156), 132.
laciniata B. & H. (157), 132.
Nuttallii DC., 132.
- Edosmia*.
Gairdneri T. & G. 128.
Oregonum Nutt., 128.
- Erigenia* Nutt., 29, 136.
bulbosa Nutt. (168), 136.
- Eryngium* L., 23, 93.
aquaticum L., 94.
armatum C. & R., 96.
aromaticum Baldw. (103), 99.
articulatum Hook., 98.
Baldwinii Spreng. (103a), 102.
Baldwinii, 102.
Cerrantesii Chapm., 102.
coronatum T. & G., 100.
diffusum Torr., 101.
discolor Wats., 98.
Floridanum C. & R., 96.
foetidum L., 99.
Harknessii Curran, 99.
Hookeri Walp., 100.
Leavenworthii T. & G., 100.
longifolium Cav., 94.
Ludovicianum Morong, 96.
Mottaneri Wood, 95.
petiolatum Hook., 97.
petiolatum, 97, 98.
praetium Gray, 95.
prostratum Nutt., 102.
Ravenellii Gray, 95.
Vaseyi C. & R., 97.
virgatum Lam., 96.
Virginianum Lam., 94.
Virginianum T. & G., 96.
Wrightii Gray, 100.
yuccifolium Michx., 93.
- Eulophus* Nutt., 24, 111.
Americanus Nutt. (123), 112.
Bolanderi C. & R. (125), 112.
Californicus C. & R. (126), 114.
Parishii C. & R. (124), 112.
Pringlei C. & R., 113.
Texanus B. & H., 123.
- Eurypptera*.
lucida Nutt., 73.
- Eurytemia* T. & G., 18, 35.
macrophylla Buckl., 35.
Texana T. & G. (6), 35.

Ferula

- Californica* Gray, 53.
dissecta Gray, 51.
dissoluta Wats., 51.
multifida Gray, 51.
Newberryi Wats., 50.
purpurea Wats., 52.

Foeniculum Adans., 24, 108.
vulgare Gaertn. (115), 108.

Glycyrrhiza

- ambigua* Gray, 119.
Bolanderi Gray, 119.
occidentale Nutt., 119.

Harbouria C. & R., 26, 125.

- trachyleura* C. & R. (146), 125.

Helosciadium

- leptophyllum*, 110.

Heracleum L., 19, 48.

- lanatum* Mx. (28), 48.
Spondylium L., 48.

Hydrocotyle L., 28, 134.

- Americana* L. (165), 135.
Asiatica L. (167), 136.
Canbyi C. & R. (163), 135.
interrupta, 135.
natans T. & G., 136.
prolifera Kellogg (162), 134.
ranunculoides L. f. (166), 136.
repanda Presl., 136.
umbellata L. (161), 134.
umbellata, 135.
verticillata Thunb. (164), 135.

Leptoëmilis Nutt., 27, 131.

- divaricatum* DC. (155), 131.
echinatus Nutt. (154), 131.
inermis Nutt., 110.
patens Nutt., 110.

Leptotania Nutt., 20, 50.

- anomala* C. & R. (39), 53.
Californica Nutt. (38), 53.
dissecta Nutt. (34), 51.
Eatonii C. & R. (36), 52.
multifida Nutt. (35), 51.
purpurea C. & R. (37), 52.
Watsonii C. & R., 52.

Ligusticum L., 21, 84.

- actaeifolium* Michx. (88), 85.
apiifolium B. & H. (91), 88.
apiifolium, 89.
Canbyi C. & R., 86.
illicinum Wats., 87.
Grayi C. & R., 88.
montanum B. & H., 74.
Porteri C. & R., 86.

Ligusticum L.

- scopulorum* Gray (90), 85.
Scoticum L. (89), 85.
tennifolium Wats., 87.

Musciniopsis C. & R., 26, 122.

- Texana* C. & R. (141), 143.

Musenium Nutt., 24, 110.

- angustifolium* Nutt., 111.
divaricatum Nutt. (121), 110.
divaricatum, 111.
Greenii Gray, 126.
tennifolium Nutt., 111.
tennifolium Hook., 71.
trachyspermum Nutt. (122), 111.

Myrrhis

- Bolanderi* Gray, 119.
occidentalis B. & H., 119.

Neurophyllum

- longifolium* T. & G., 47.

Oenanthe L., 23, 92.

- Californica* Wats., 92.
sarmentosa Presl. (100), 92.

Oreosciadium

- acule* Gray, 126.

Oreoxis Raf., 22, 89.

- humilis* Raf. (93), 89.

Orogenia Wats., 22, 91.

- fusiformis* Wats. (98), 91.
linearifolia Wats. (97), 91.

Osmorhiza Raf., 25, 116.

- ambigua* C. & R., 119.
brachypoda Torr. (136), 118.
brevistylis DC. (134), 118.
brevistylis, 118.
longistylis DC. (135), 118.
nuda Torr. (133), 117.
occidentalis Torr. (137), 119.

Pastinaca L., 19, 48.

- sativa* L. (29), 49.

Peucedanum L., 20, 53.

- ambiguum* Nutt. (44), 58.
Anstinae C. & R. (58), 66.
bicolor Wats., 68.
Brandegei C. & R., 72.
Californicum C. & R., 74.
Canbyi C. & R., 56.
carneifolium T. & G. (61), 68.
circumdatum Wats. (45), 59.
Cous Wats. (43), 58.
Cusickii Wats. (63), 69.
dasycarpum T. & G. (49), 61.
Donnellii C. & R. (55), 65.
eurycarpum C. & R. (48), 61.
Euryptera Gray (71), 73.

Peuceclanum L.

- farinosum* Geyer (42), 57.
feniculaceum Nutt., 59.
Geyeri Wats., 57.
graveolens Wats., 71.
Grayi C. & R. (46), 60.
Hallii Wats. (57), 66.
Hendersoni C. & R. (40), 56.
Howellii Wats. (72), 73.
Kingii Wats., 71.
laevigatum Nutt. (66), 71.
latifolium Nutt., 72.
lelocarpum Nutt. (68), 71.
macrocarpum Nutt. (47), 60.
macrocarpum, 61, 64.
Martindalei C. & R. (59), 66.
marginatum Benth., 68.
microcarpum Howell, 65.
millefolium Wats., 60.
Mohavense C. & R., 62.
Nevadense Wats., 63.
Newberryi Wats., 50.
nudicaule Nutt. (51), 63.
udicaule, 61, 63, 66.
Nuttallii Wats. (69), 72.
Oreganum C. & R. (53), 64.
Parishii C. & R. (62), 68.
Parryi Wats. (52), 64.
parvifolium T. & G., 73.
Pringlei C. & R., 61.
Sandbergi C. & R. (56), 65.
simplex Nutt. (64), 69.
Suksdorfii Wats. (70), 72.
teretifolium B. & H., 47.
tomentosum Benth. (50), 62.
tritermatum Nutt. (65), 70.
tritermatum, 70.
utriculatum Nutt. (60), 67.
Vaseyi C. & R., 67.
villosum Nutt. (54), 64.
Watsoni C. & R. (41), 57.
- Phellopterus Benth.**, 21, 81.
littoralis Schmidt (84), 81.
- Pimpinella L.**, 24, 109.
apiodora Gray, 109.
integerrima B. & H. (117), 109.
Parishii C. & R., 112.
Saxifraga L. (118), 109.
- Podistera Wats.**, 24, 108.
Nevadensis Wats., (116), 108.
- Podoscadiium.**
Bolanderi Gray, 133.
Californicum Gray, 114.
- Polytenia DC.**, 19, 49.
Nuttallii DC. (30), 49.

- Pseudo-cymopterus C. & R.**, 20, 74.
anisatus C. & R. (75, 76), 75.
bipinnatus C. & R. (74), 75.
montanus C. & R. (73), 74.

Samolus L., 23, 102.

- aretopoides* H. & A. (105), 103.
bipinnata H. & A. (112), 106.
bipinnatifida Dougl. (111), 106.
Canadensis L., 103.
Howellii C. & R. (106), 104.
laciniata H. & A. (108), 105.
maritima Kellogg (110), 106.
Marylandica L. (104), 102.
Menziesii H. & A. (107), 104.
Nevadensis Wats. (109), 105.
udicaulis H. & A., 105.
tuberosa Torr. (113), 107.
- Selinum L.**, 18, 42.
Benthami Wats., 45.
Canadensis Michx., 46.
capitellatum B. & H. (19), 43.
Dawsoni C. & R. (20), 44.
Grayi C. & R. (21), 44.
Hookeri Wats., (22), 45.
Kingii Wats., 43.
Pacificum Wats., 43.
- Seseli.**
divaricatum Pursh, 111.
Hallii Gray, 126.
Nuttallii Gray, 71.
- Sium L.**, 26, 123.
angustifolium L., 133.
Carsonii Durand (144), 124.
ciutaefolium Gamelin (143), 123.
lineare Michx., 124.
- Sphacnoscadium.**
capitellatum Gray, 43.
- Tauschia.**
Texana Gray, 123.
- Thaspium Nutt.**, 21, 82.
atropurpureum Nutt., 83.
aureum Nutt. (85), 82.
atrum, 127.
barbinode Nutt. (86), 84.
montanum Gray, 74, 75.
pinnatifidum, 84.
trachypleurum Gray, 125.
trifoliatum Gray, 83, 127.
Walteri Shuttlew. (87), 84.
- Tiedemannia DC.**, 19, 46.
Fendleri C. & R. (27), 48.
rigida C. & R. (26), 47.
teretifolia DC. (24), 47.
ternata C. & R., (25), 47.
- Tropocarpus Nutt.**, 17, 34.
Ethuse Nutt. (4), 34.

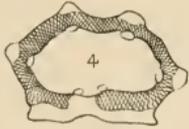
- Velea* DC., 25, 120.
 arguta C. & R., 120.
 Hartwegi C. & R. (138), 121.
 Howellii C. & R., 122.
 Kelloggii C. & R. (139), 121.
 Parishii C. & R., 121.
 vestita C. & R. (140), 122.
- Zizia* Koch., 27, 127.
 aurea Koch. (148), 127.
 cordata Koch. (149), 127.
 Hallii C. & R., 126.
 integerrima DC., 109.
 pinnatifida Buckl., 84.



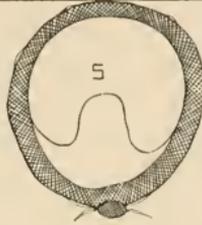
Daucus



Caulis



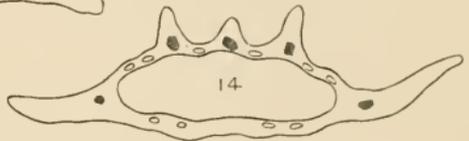
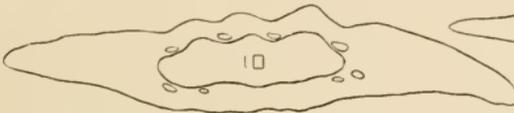
Trepocarpus



Bifora



Eurytaenia



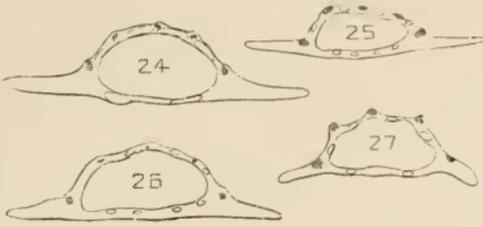
Angelica



Selinum



Conioselinum



Tiedemannia



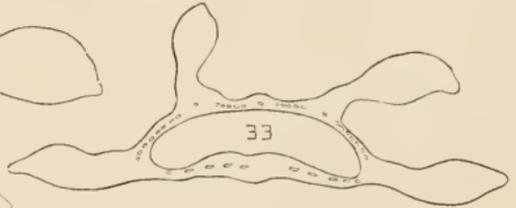
Heracleum



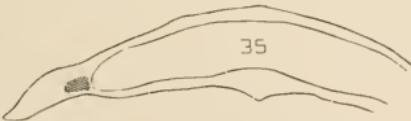
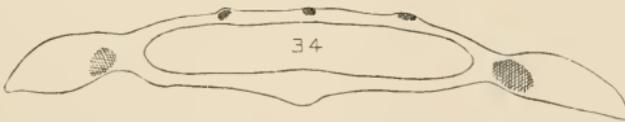
Pastinaca



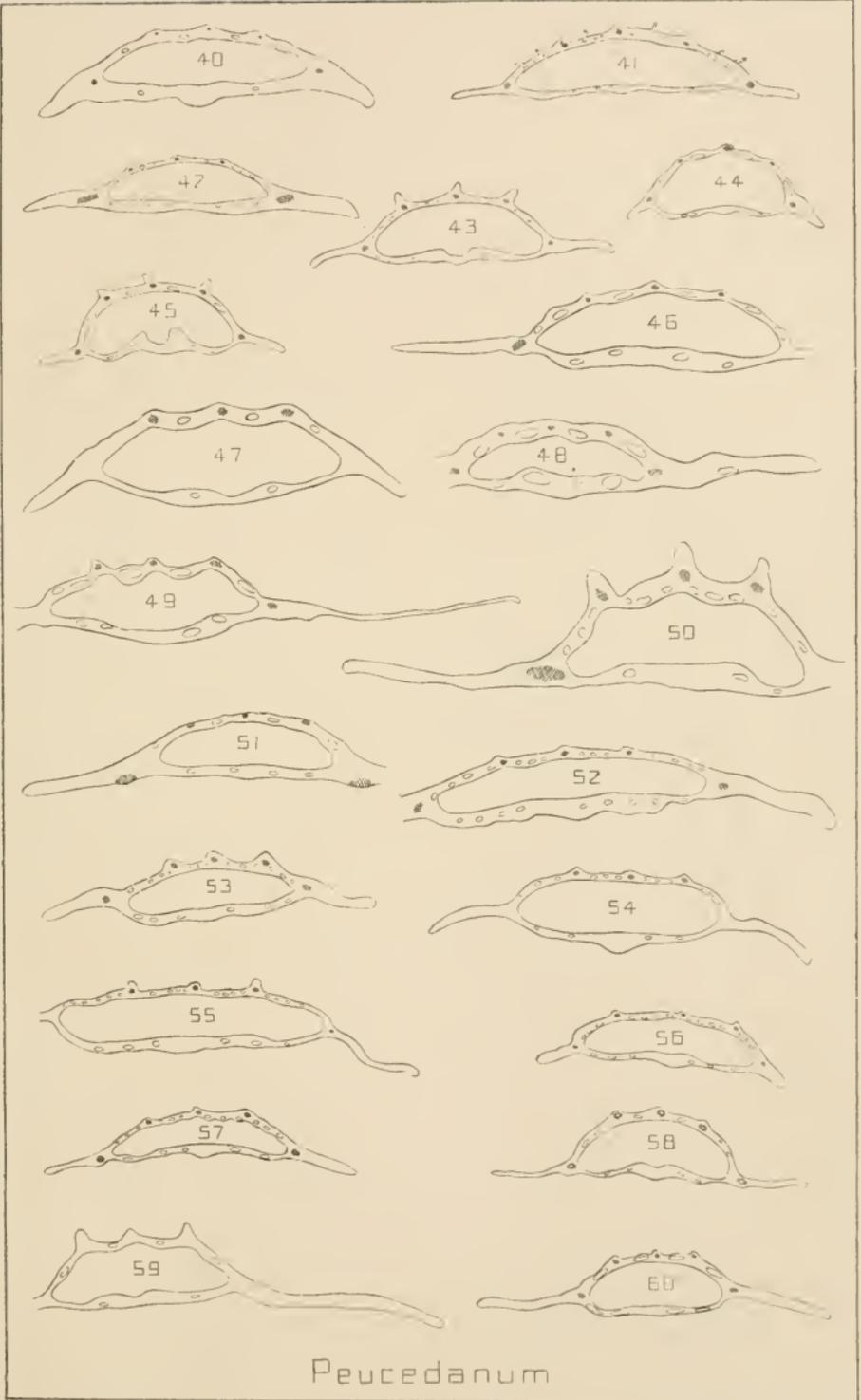
Polytaenia



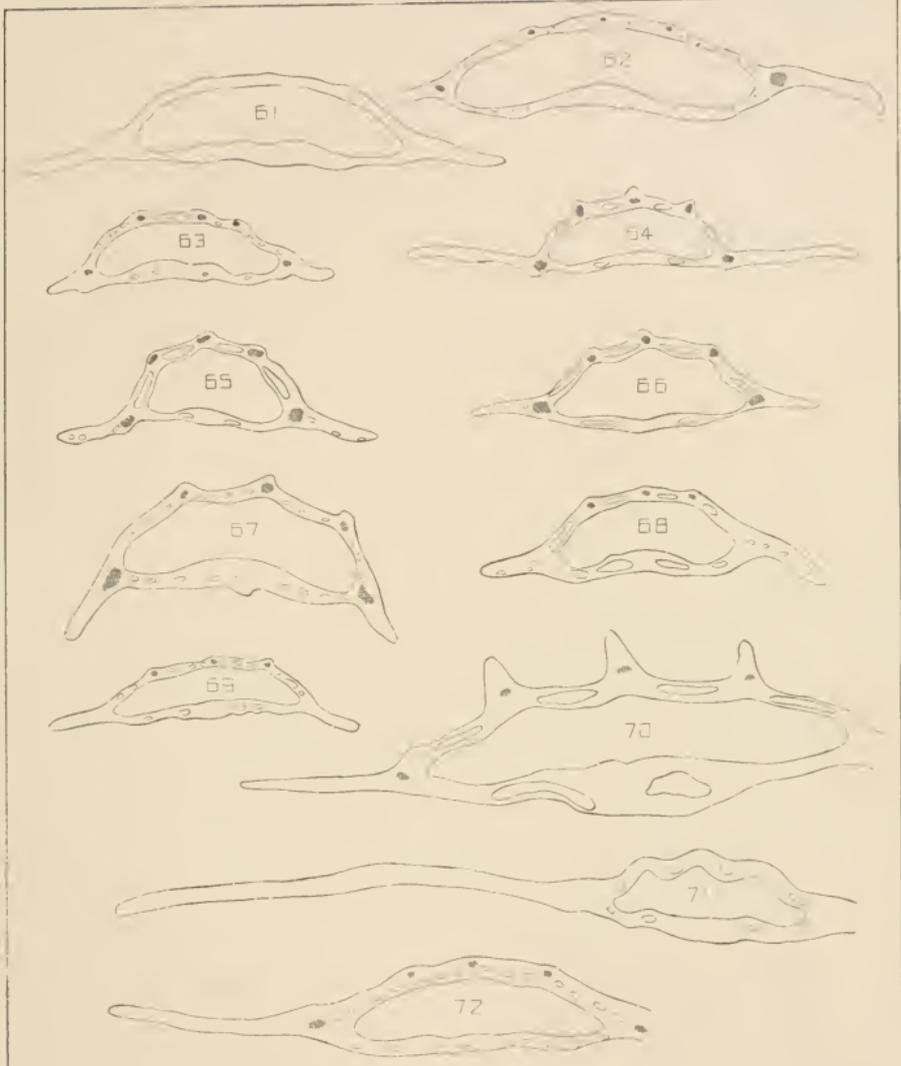
Coloptera



Leptotaenia



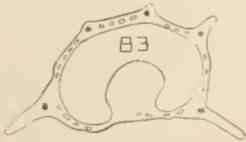
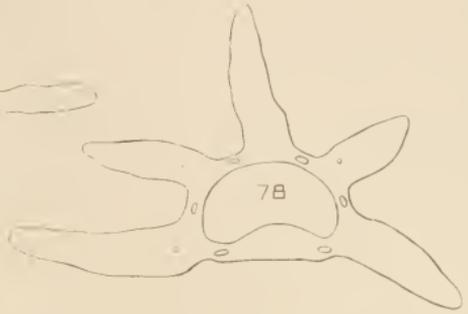
Peucedanum



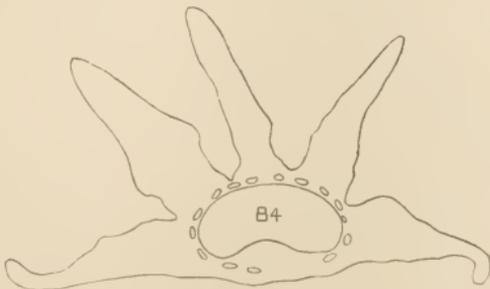
Peucedanum



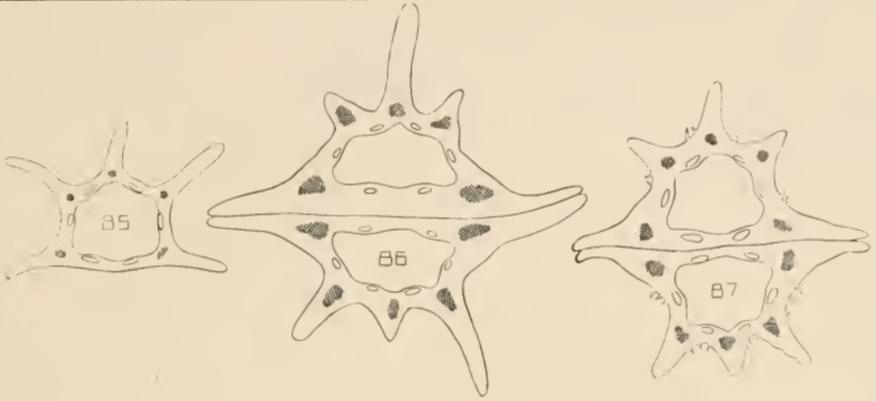
Pseudocymopterus



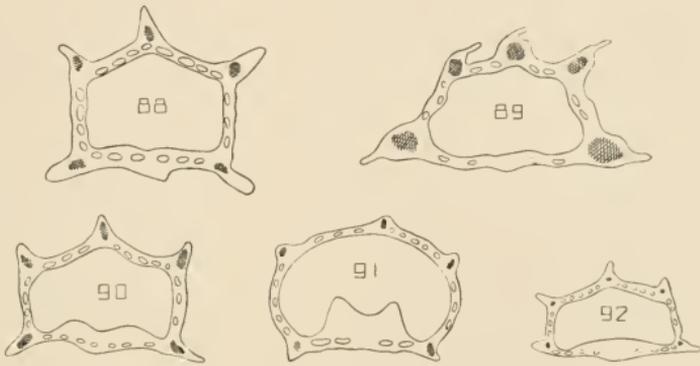
Cymopterus



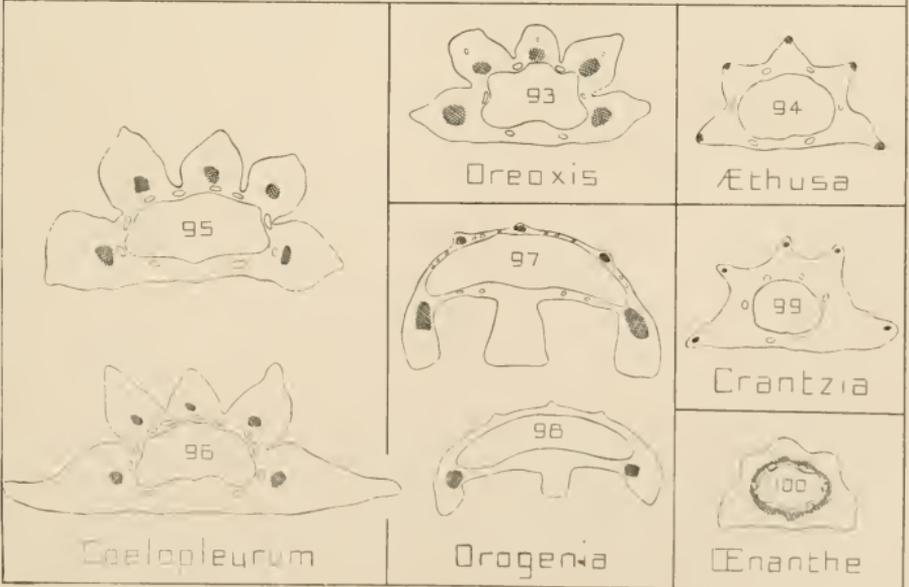
Phellopterus



Thaspium



Ligusticum

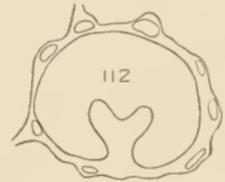
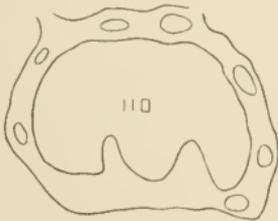
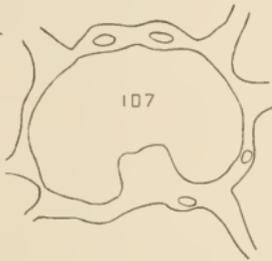




Cynosciadium



Eryngium



Sanicula



Ammoselinum



Pimpinella



Apiastrum



Musenium

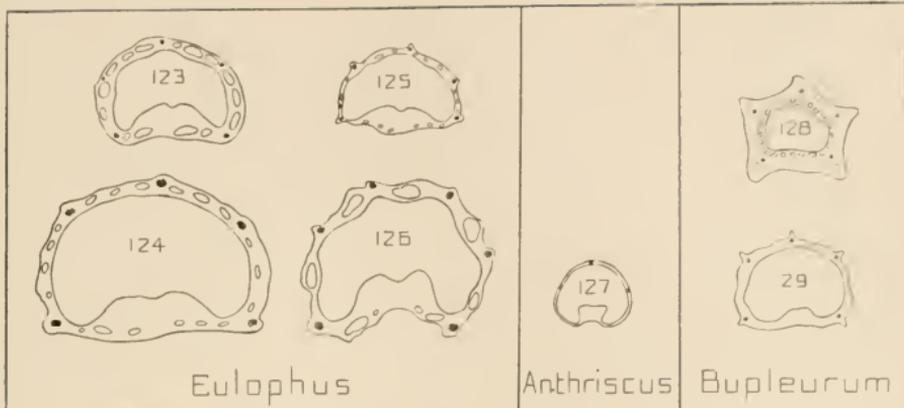


Foeniculum



Podistera

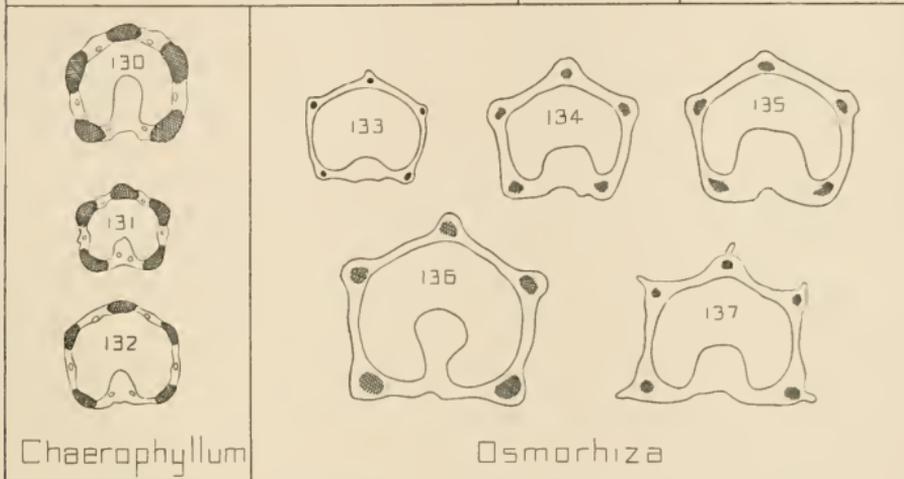




Eulophus

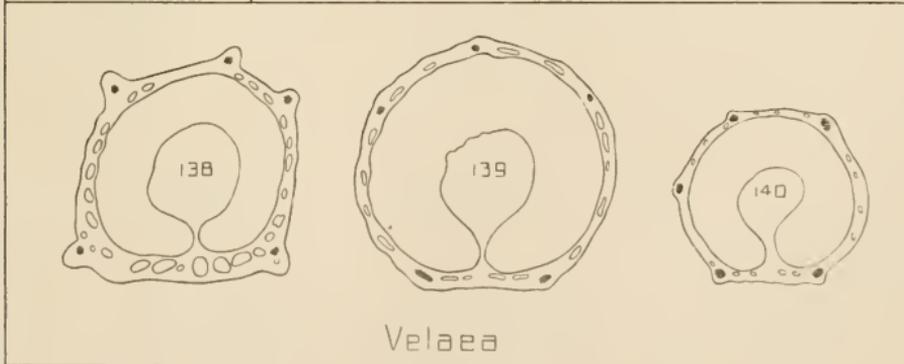
Anthriscus

Bupleurum

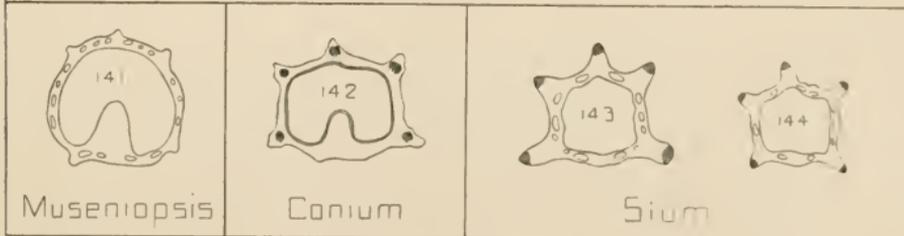


Chaerophyllum

Osmorhiza



Valaea



Musenlopsis

Conium

Sium

 <p>145</p> <p>Apium</p>	 <p>146</p> <p>Harbouria</p>	 <p>147</p> <p>Aletes</p>	 <p>148</p>  <p>149</p> <p>Zizia</p>
 <p>150</p>  <p>151</p> <p>Carum</p>	 <p>152</p> <p>Cicuta</p>	 <p>153</p> <p>Cryptotaenia</p>	 <p>154</p>  <p>155</p> <p>Leptocaulis</p>
 <p>156</p>  <p>157</p> <p>Discopleura</p>			 <p>160</p> <p>Bowlesia</p>
 <p>158</p> <p>Berula</p>	 <p>159</p> <p>Ægopodium</p>	 <p>168</p> <p>Erigenia</p>	
 <p>161</p>  <p>162</p>  <p>163</p>  <p>164</p>  <p>165</p>  <p>167</p> <p>Hydrocotyle</p>			 <p>169</p> <p>Ammi</p>

[From the BOTANICAL GAZETTE, April, 1886.]

Revision of North American Hypericaceæ.—I.

JOHN M. COULTER.

Having studied the North American species of Hypericaceæ with all the material to be had at Cambridge, it seems to be proper, before putting the results into a more permanent shape, to present them to botanists for their criticism, that they may test them in the herbarium and field, and that the limitations of certain species may be better defined. It is with the earnest request

that botanists will thoroughly examine this work during the coming season that this paper is presented, and any specimens which will correct either the characters or ranges given will be received as a great favor. Of course work done at the Harvard Herbarium is of itself an acknowledgment of the great courtesy that prevails there, and the patient criticism given to these pages by Dr. Gray has given to them probably their greatest value.

Our three genera may be grouped and characterized as follows:

* *Hypogynous glands none.*

1. **Ascyrum.** Sepals 4, very unequal, decussate; the two outer very broad and flat; the inner much smaller. Petals 4, oblique, convolute in æstivation, deciduous. Stamens numerous, distinct. Ovary one-celled, with 2 to 4 parietal placentæ: styles 2 to 4, distinct or united below: stigmas not capitate. Capsule ovoid.

2. **Hypericum.** Sepals 5 (rarely 4), similar. Petals 5 (rarely 4), oblique, convolute in æstivation, deciduous or marcescent. Stamens numerous (sometimes few), in 3 or 5 clusters: filaments distinct or united at the very base into phalanges. Ovary one-celled with parietal placentæ, or 3 to 5-celled with placentæ in the axis: styles 3 to 5, distinct or united even to the apex: stigmas often capitate. Capsule conical to globose.

** *Hypogynous glands three.*

3. **Elodea.** Sepals 5, equal. Petals 5, equal-sided, imbricate in æstivation, deciduous. Stamens 9 (rarely more), strongly triadelphous; the large orange-colored glands alternating with the phalanges. Ovary 3-celled: styles 3, distinct: stigmas not capitate. Capsule elongated-oblong.

1. ASCYRUM L. ST. PETER'S-WORT.

Low suffruticose leafy plants; with small black-dotted leaves and nearly solitary light yellow flowers; pedicels bibracteolate.—Gen. 903; Torr. & Gray, Fl. i. 156 & 671; Gray, Gen. Ill. i. 211, t. 91; Benth. & Hook. Gen. Plant. i. 164, excl. syn. *Isophyllum*.—A genus of 5 species, peculiar to Eastern North America and the West Indies.

* Diffuse: branches somewhat two-edged and winged above: leaves narrowed at the base, not clasping: inner sepals very small (about half line long) or obsolete, petaloid: petals about as long as the outer sepals: styles two, distinct or united.

† Pedicels long ($\frac{1}{4}$ to $\frac{1}{2}$ inch), bibracteolate near the base: inner sepals obsolete or nearly so: styles as long as the ovary.

1. **A. pumilum** MICHX. Low (3 to 9 inches), with spreading branches: leaves linear-oblong to oval, sometimes spatulate or narrowly obovate, 2 to 4 lines long, about a line wide: pedicels becoming more or less reflexed: petals obovate, little longer than

the ovate, acute or obtuse outer sepals.—Fl. ii. 77; Torr. & Gray, Fl. i. 156.

A. pauciflorum Nutt. Gen. ii. 15; Choix. in DC. Prodr. i. 555.

Pine barrens of Georgia and Florida.

The specimens examined were all from Florida, collected by Canby, Chapman, Curtiss, and J. D. Smith. The original station given by Michaux is in Georgia, in which he is confirmed by Elliott and Nuttall, as well as by subsequent collections.

†† Pedicels shorter (a line or two), bibracteolate close to the flower: inner sepals evident: styles short.

2. **A. Crux-Andreae** L. Low (half to a foot or less), much branched at base, generally decumbent: leaves narrowly obovate-oblong, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, 3 to 4 lines wide, more or less plainly biglandular at base: pedicels about a line long: outer sepals ovate or cordate-ovate, mostly obtuse: petals linear-oblong to narrowly obovate.—Spec. ed. 2, 1107, excl. Pluk. syn. (which is *Hypericum mutilum*), not ed. 1, 787, *vide* Torr. & Gray, Fl. i. 671; Choix. in DC. Prodr. i. 155; Torr. & Gray, Fl. i. 156, in part.

A. multicaule Michx. Fl. ii. 77.

From Nantucket, Mass., through the pine-barrens of New Jersey to Virginia, E. Texas, and S. Illinois.

The narrow-leaved forms south of this range should be referred to the following species, with which *A. Crux-Andreae* has unfortunately been confounded. The western forms all seem to be taller and more robust than those of the Atlantic States. In reference to the confusion of the synonymy of *A. Crux-Andreae* and *A. hypericoides* consult Torr. & Gray, Fl. i. 671, where the best course for settling the difficulty is suggested. The specimens examined were from Nantucket (*Mrs. Owen*), New Jersey (*Gray, Parker*), Pennsylvania (*Porter*), Virginia (*Curtiss, Dana*), S. Illinois (*Vasey*), W. Tennessee (*Fendler*), E. Arkansas (*Hurvey*, 52), E. Texas (*Hall*, 36 in part).

3. **A. hypericoides** L. Taller (1 to 2 feet), more erect, branched above: leaves linear to linear-oblong, 3 to 10 lines long, a line or two wide, conspicuously biglandular at base: pedicels longer: outer sepals usually narrower, often acute.—Spec. ed. 1, 788, as to Plum. syn., ed. 2, 1108, excl. Pluk. syn.; Choix. in DC. Prodr. i. 555, in part; Griseb. Fl. Brit. W. Ind. 112.

A. Crux-Andreae Torr. & Gray, Fl. i. 156, in part; Griseb. Plant. Cub. 40 Chapm. Fl. 38; indeed of all southern authors.

A. Crux-Andreae var. *angustifolium* Nutt. Gen. ii. 16; Torr. & Gray, Fl. i. 156.

A. Plumieri Bertol. Bot. Misc. xiii. 19, t. 3, f. 3.

South Carolina to Florida, Louisiana and Texas. Also in the Bermudas, W. Indies, and Mexico.

Much uncertainty has arisen from attempting to reduce *A. hypericoides* to a form of *A. Crux-Andree*, but the larger more branching habit, narrower leaves with conspicuous basal glands, as well as a decidedly more southern range, serve to distinguish it. The Bermuda and Jamaica plants are typical forms of the species, and can by no means be taken for forms of *A. Crux-Andree*, but those of the continent are more apt to be perplexing. The specimens examined were from S. Carolina (*Ravenel*), Florida (*Curtiss*, 243), Louisiana (*Drummond*, 90 and 92), Texas (*Hall*, 36 in part, *Lindheimer*), Mexico (*Berlandier*, 989, 2419, *Botteri*, 373), Cuba (*Wright*, 2129), Jamaica (*Alexander*, *Grisebach*, 1497. 811), Bermuda (*Lane*, 331 in part).

** Erect, stouter, a foot or two high: stems simple or branched above, conspicuously two-edged, even winged: leaves broader and thicker, more or less clasping: pedicels 2 to 6 lines long: inner sepals 3 to 6 lines long, sometimes as long as the outer, seldom petaloid: petals mostly much longer than the outer sepals: styles 3 (rarely 4), generally distinct.

4. *A. stans* MICHX. Leaves oblong to oval, closely sessile and somewhat clasping, an inch or two long and 5 or 6 lines wide: pedicels bibracteolate near the middle: outer sepals ovate to orbicular-cordate; inner ones lanceolate: styles short.—Fl. ii. 77; Choix. in DC. Prodr. i. 555 (but not “2-styled”); Torr. & Gray, Fl. i. 157; Gray, Gen. III. i. 212, t. 91.

A. hypericoides L. Spec. 788, as to Pluk. syn.; Pursh, 373.

Barrens of New Jersey and E. Pennsylvania to Florida, Louisiana, and W. Texas.

In a southern form (var. *obovatum* Chapm.) the lower leaves taper to the base and become almost obovate. The specimens examined were from New Jersey (many collectors), E. Pennsylvania (*Porter*), Florida (*Curtiss*, 244), Louisiana (*Drummond*, 91, also *Hale*, a very large specimen), W. Texas (*Young*).

5. *A. amplexicaule* MICHX. Leaves ovate-cordate, often broadly so, clasping, half an inch or more long and nearly as wide: pedicels with very small bractlets near the base or none: outer sepals broadly ovate-cordate, resembling the leaves; inner ones linear-lanceolate: styles about as long as the ovary.—Fl. ii. 77; Torr. & Gray, Fl. i. 157.

A. stans Willd. Spec. iii. 1473.

A. stans var. β Choix. Prodr. Hyper. 61.

A. Cubense Griseb. Plant. Cub. 40 (*Wright*, 2128).

Hypericum tetrapetalum Lam. Dict. iv. 153.

Georgia and Florida. Also in Cuba.

The specimens examined were from Florida (*Buckley*, *Palmer*, *Curtiss*, *Garber*), Georgia, and Cuba (*Wright*, 2128).

2. HYPERICUM Tourn., L. ST. JOHN'S-WORT.
Herbs or shrubs; with cymose yellow flowers; the sessile leaves

more or less pellucid-punctate and black-dotted: very variable in size of leaves, sepals, and flowers.—Gen. 902; Torr. & Gray, Fl. i. 157; Gray, Gen. III. i. 213, t. 92, 93; Benth. & Hook. Gen. Plant. i. 165, excl. *Flodea*. *Sarothra* L. Gen. 383. *Brathys*, *Brathydium*, *Myriandra*, *Roseyna*, and *Isophyllum* of Spach, Ann. Sci. Nat. 2. v. 367.—A genus of about 160 species, widely distributed, but chiefly of northern temperate regions; all but three of the 29 North American species restricted to the Atlantic U. S.

H. setosum L. Spec. 787, with the character only "floribus digynis, foliis linearibus," represents no plant known to Linnæus, but is a complex wholly founded on a phrase of Gronov. Fl. Virg., which belongs to *H. pilosum* Walt., and to one of Pluk. Alm., which is *H. nudicaule* Walt., whence the "digynis" and the suggestion of the specific name.

H. elatum Ait. Hort. Kew. iii. 104, proves to be *H. hircinum* L., or some nearly related Old World species.

H. triplinerve Vent. Hort. Cels. t. 58, must also be an Old World species, related to *H. hyssopifolium* L.

‡1. Sepals and petals 4, or occasionally 5; stamens numerous, distinct styles 3, at first united into a long sharp beak, becoming distinct: capsule 1-celled, the placenta projecting: branching shrubs.—*Isophyllum* Spach.

1. *H. microsepalum* GRAY. Decumbent or erect, half to a foot high or more: leaves very small, oblong-linear, 3 or 4 lines long, hardly a line wide, obtuse: flowers showy, about an inch in diameter, clustered at the summit of the branches: sepals slightly unequal, linear to oblong, mostly obtuse, much shorter than the somewhat unequal petals: capsule oblong-ovate, 2 to 3 lines long; seeds oblong, minutely striate and fitted.—Watson, Bibl. Index, Polypet. 456.

Isophyllum Drummondii Spach, Ann. Sci. Nat. 2. v. 367.

Ascyrum microsepalum Torr. & Gray, Fl. i. 157; Gray, Gen. III. i. 212; Chapm. Fl. 39.

Georgia and Florida.

This species is intermediate between *Ascyrum* and *Hypericum*, and Spach separated it from both by founding the genus *Isophyllum*. The habit, small and nearly equal sepals, and long beak-like styles, all belong to *Hypericum*, while the 4-merous flower associates it with *Ascyrum*. As the flowers are also sometimes 5-merous it seems most proper to consider it an outlying species of *Hypericum*.

‡2. Stamens very numerous, distinct, or more or less united into sets.

* Styles 5, united below, distinct above; stigmas capitate: capsule 5-celled, the placenta turned far back from the axis: tall perennial herbs with large leaves and flowers.

2. **H. Aseyron** L. Usually branching above, 2 to 5 feet high: leaves ovate-lanceolate, clasping, mostly acute, 2 to 5 inches long, about an inch wide, pellucid-punctate with elongated dots: flowers an inch or two in diameter, solitary at the ends of branches and in terminal cymes: sepals lanceolate to ovate, acute, 4 to 6 lines long: capsule ovoid-conical, 9 lines long; seeds terete, with slightly winged rhapshe.—Spec. 2 ed. 1102; Maxim. Pl. Nov. Asiat. iv. 162.

H. pyramidatum Ait. Hort. Kew. iii. 103; Torr. & Gray, Fl. i. 158; Gray, Manual, 84.

H. aseyyroides Willd. Spec. iii. 1443; Choix. in DC. Prodr. i. 545, Hook. Fl. Bor.-Am. i. 109.

H. macrocarpum Michx. Fl. ii. 82.

From Canada to Vermont, Massachusetts, Connecticut, and E. Pennsylvania, westward to N. Illinois, Iowa, Michigan, Minnesota, the Winnipeg valley, and probably farther northwest. Also throughout northeastern Asia, and in Europe.

Our plant can not be distinguished in any way from the Asiatic, and was included with it in the original Linnaean description (“*Habitat in Sibiria, Canada, Pyrenæis.*”) Maximowicz (l. c.) has called attention to the identity of the North American and Asiatic forms, and a careful comparison of specimens has fully confirmed his opinion.

** Styles united into a long, sharp beak, becoming distinct; stigmas minute, not capitate: more or less shrubby plants.

† Styles 5: capsule 5-celled: bushy shrubs with crowded leaves.

3. **H. Kalmianum** L. A foot or two high: leaves linear to oblanceolate, tapering at base, one or two inches long, 2 to 4 lines wide, pellucid-punctate with round dots, glaucous beneath: cymes few-flowered: sepals lanceolate to oval, half as long as the petals: capsule ovate, about 3 lines long; seeds abruptly and minutely pointed.—Spec. 783; Torr. Fl. N. Y. i. 86, t. 13; Torr. & Gray, Fl. i. 158.

Rocky shores, Canada, Niagara Falls, and about the Great Lakes.

†† Styles 3: capsule completely 3-celled: branching shrubs.

4. **H. Buckleyi** M. A. CURTISS. Low (half to a foot), widely branching from the base: leaves oblong, obtuse, narrowed at base, half to an inch long, 2 to 4 lines wide, paler beneath and more or less black dotted: flowers solitary and terminal, on long peduncles, sometimes in threes, about an inch in diameter: sepals obovate, not half as long as the petals: capsule conical, 4 to 5

lines long: seeds striate, with prominent raphé.—Am. Jour. Sci. 1. xlv. 80; Chapm. Fl. 39.

Cliffs, mountains of North Carolina and Georgia.

5. *H. prolificum* L. Leaves linear-lanceolate to narrowly oblong, narrowed at base, mostly obtuse and mucronulate, 1 to 3 inches long, 3 to 9 lines wide, with smaller ones in axillary fascicles: flowers numerous, half to an inch in diameter: sepals unequal, foliaceous, lanceolate to ovate, mucronate, much shorter than the petals: capsule lanceolate to ovate, 4 to 6 lines long; seeds striate.—Mant. 106; Chois. in DC. Prodr. i. 547; Torr. & Gray, Fl. i. 159, excl. var. γ .

H. rosmarinifolium Lam. Dict. iv. 159; Torr. & Gray, l. c.

Myriandra ledifolia Spach, Ann. Sci. Nat. 2. v. 365.

From New Jersey and District of Columbia, to Alabama, Arkansas, Missouri, Kentucky, Illinois, and Minnesota.

This species varies greatly in size, and in width of leaves, the southern forms often approaching the next species in appearance, but readily distinguished by the much larger and fewer capsules and flowers.

6. *H. densiflorum* PURSH. More shrubby and taller, sometimes 5 or 6 feet high, much more branching: leaves more crowded, narrower and shorter: flowers much more numerous and smaller: sepals smaller, not foliaceous: capsule 2 to 3 lines long.—Fl. 376; Chois. l. c.

H. galioides Pursh, 376, not Lam.

H. prolificum var. (?) γ Torr. & Gray, l. c.

H. prolificum var. *densiflorum* Gray, Manual, 84.

Myriandra spathulata Spach, l. c.

Pine barrens of New Jersey, to Florida, Tennessee, Arkansas, and Texas.

Large leaved forms from New Jersey (*Canby*) seem to intergrade with the last species, but the characters of capsules and flowers plainly indicate *H. densiflorum*. Between closely related species it is to be expected that intermediate forms will occur.

††† Styles 3: capsule 1-celled, or almost 3-celled by the projecting placenta: shrubby at least at base.

‡ Placenta projecting nearly to the center of the ovary.

= Sepals broad, ovate, foliaceous: flowers large and showy, solitary or in leafy cymes: leaves rather broad and somewhat coriaceous: shrubby.

7. *H. aureum* BARTRAM. Widely branched above, 2 to 4 feet high: leaves oblong, more or less attenuate at base, obtuse or acute, 1 to 3 inches long, 3 to 9 lines wide: flowers often solitary,

1 or 2 inches in diameter, very showy: sepals very unequal, often enclosing the capsule: petals orange-yellow, firm, reflexed: stamens excessively numerous: capsule ovate-conical, not lobed, 3 to 5 lines long.—Travels, 383; Torr. & Gray, Fl. i. 161.

H. frondosum Michx. Fl. ii. 81; Chois. in DC. Prodr. i. 544.

H. ascyroides var. β Poir. Suppl. iii. 694.

H. amernum Pursh, 375; Nutt. Gen. ii. 10; Chois. l. c.

South Carolina and Georgia, to Tennessee, Alabama, and Texas.

Varies much in the size of its leaves and sepals, the mountain forms usually having smaller leaves.

8. *H. myrtifolium* LAM. More or less branching: leaves cordate-oblong, clasping, obtuse, half to an inch long, 3 to 6 lines wide, those of the cyme much smaller: flowers not an inch in diameter, in compound cymes: sepals resembling the leaves, larger than the floral bracts, often reflexed: capsule as in the last, but coriaceous and 3 or 4-lobed or angled.—Diet. iv. 180; Chois. l. c. 547; Torr. & Gray, l. c. 162.

H. glaucum Michx. Fl. ii. 78; Chois. l. c.

H. rosmarinifolium Chois. l. c., not Lam.

H. sessiliflorum Willd. Spreng. Syst. iii. 346; Torr. & Gray, l. c. 166.

From South Carolina to Florida and Alabama.

= = Sepals small, very narrow: flowers small, axillary and terminal: leaves narrow and much fasciated in the axils: shrubby and branching.

9. *H. fasciculatum* LAM. One to three feet high: leaves very narrowly linear and revolute, coriaceous, crowded, closely sessile, not tapering at base, usually with a line of large pellucid glands upon each revolute edge, 2 to 8 lines long: sepals resembling the leaves, shorter than the petals: capsule 3-lobed, oblong-ovate-conical, few-seeded, a line or two long.—Diet. iv. 160; Chois. in DC. Prodr. i. 554; Torr. & Gray, Fl. 160.

H. nitidum Lam. l. c.

H. aspalathoides Willd. Spec. iii. 1451; Pursh, 376.

H. fasciculatum var. *aspalathoides* Torr. & Gray, l. c. 672.

Myriandra nitida, *brachyphylla*, and *galioides* of Spach.

Wet pine barrens, from North Carolina to Florida, Louisiana, and E. Texas.

Very variable in length and fasciculation of leaves. Lamarck's original specimen is our short-leaved form (var. *aspalathoides*), while his *H. nitidum* is a loose, long-leaved form, approaching some forms of the next species.

10. *H. galioides* LAM. Like the last, but leaves longer and broader, linear-lanceolate to oblanceolate, generally mucronate,

always tapering and subpetiolate at base, not so revolute, half to three inches long, as many lines wide: sepals linear-lanceolate, acute, tapering at base, shorter or longer than the petals.—Dict. iv. 161; Chois. l. c. 550; Torr. & Gray, Fl. i. 159.

H. axillare Lam. l. c. 160, not Michx.

H. fasciculatum Michx. Willd. Spec. iii. 1452, not Lam.

? *H. ambiguum* Elliott, ii. 30; Torr. & Gray, l. c. 162 and 673.

H. galioides var. *ambiguum* Chapm. Fl. 40.

Myriandra Michauxii Spach.

Wet ground, from Delaware to Georgia, E. Tennessee, and Louisiana.

These two species are inextricably connected by intermediate forms, and it is a question whether *H. galioides* should be considered more than a variety of *H. fasciculatum*. But the extreme forms are so remarkably different in appearance that for the present, at least, they are kept separate.

=== Sepals small: flowers small, in naked cymes: leaves rather broad, thin and veiny: somewhat shrubby at base, a foot or two high, simple or branching.

11. *H. adpressum* BARTON. Leaves linear-lanceolate to narrowly oblong, mostly acute, ascending, about two inches long, 3 to 4 lines wide, revolute, pellucid-punctate without black dots, translucently veiny: cymes leafy only at base, dichotomal flowers very short pedicelled: sepals linear to lanceolate, acute, half to two-thirds as long as the petals, often reflexed: capsule ovate to oblong, about 2 lines long; seeds oblong.—Fl. Philad. ii. 15; Torr. & Gray, Fl. i. 159.

H. Bonaparteae Barton, Fl. N. Am. iii. 95, t. 106.

H. fastigiatum Elliott, ii. 31; Torr. & Gray, l. c. 166.

H. adpressum var. *fastigiatum*, Torr. & Gray, l. c. 673.

Moist ground, Nantucket to Rhode Island, New Jersey, Pennsylvania, and Georgia.

12. *H. cistifolium* LAM. Leaves ovate-lanceolate or oblong, obtuse, 2 or 3 inches long, half an inch wide, pellucid-punctate with very small crowded dots: cymes pedunculate, loosely-flowered, dichotomal flowers pedicelled: sepals variable, linear to oblong, about half as long as the petals: capsule ovate-conical, about 3 lines long; seeds cylindrical, with prominent raphae.—Dict. iv. 158, not of Torr. & Gray, Fl. i. 674, Chapm. Fl. 41, etc.

H. nudiflorum Michx. Willd. Spec. iii. 1456; Torr. & Gray, l. c. 162; Chapm. l. c.; Gray, Manual, 84.

From North Carolina through Georgia and Alabama to Texas.

As our *H. nudiflorum* has proved to be Lamarck's *H. cistifolium*, the latter name as applied in Watson's Bibliographical Index, p. 125, must disappear.

This leaves, as the oldest unoccupied name, *H. opacum* of Torrey & Gray, which accordingly reappears as a specific name.

‡‡ Placentæ projecting a little, or not at all: sepals unequal.

= Leaves mostly linear, with rather large and scattered pellucid dots: flowers in somewhat leafy-bracted cymes: capsule conical or globose; seeds large, oval, strongly rugose transversely.

13. *H. sphaerocarpum* MICHX. Simple or branched, 1 to 3 feet high: leaves linear to narrowly oblong, mostly obtuse, 2 to 3 inches long, 3 to 6 lines wide: cyme loosely-flowered, dichotomal flower mostly sessile: sepals varying from small and linear to ovate and as long as the petals: capsule from depressed globose to ovoid, about 2 lines long; rhaps almost winged.—Fl. ii. 78; Torr. & Gray, Fl. i. 163.

Rocky banks of the Ohio and its tributaries, southward to Arkansas.

This stands as a very good species, easily distinguished from any likely to be confounded with it, by its strictly one-celled capsule and large very rough seeds. In fact, the seeds are the most characteristic ones of the genus. By some mistake the specific name has been often written *H. sphaerocarpon*, while the original name is as above.

14. *H. dolabriforme* VENT. Low, straggling, 6 to 18 inches high: leaves linear to linear-lanceolate, widely spreading, about an inch long, a line or two wide, mostly acute: cyme few-flowered, dichotomal flower pedicelled: sepals large and foliaceous, lanceolate to ovate, acute or acuminate, as long as the petals: capsule ovate-conical, almost triquetrous, about 3 lines long, coriaceous.—Hort. Cels. t 45; Pursh, 378; Chois. in DC. Prodr. i. 547; Torr. & Gray, Fl. i. 162.

H. procumbens Desf. Willd. Spec. iii. 1450; Michx. Fl. ii. 81; Pursh, 379; Chois. l. c.

Dry hills, Kentucky and Tennessee.

= = Leaves oblong, obtuse: flowers in nearly naked cymes: capsule ovate; seeds oblong, minutely striate and pitted.

15. *H. opacum* TORR. & GRAY. One to four feet high: leaves linear oblong, about an inch long, 2 to 4 lines wide, closely sessile, pellucid-punctate with minute crowded dots: flowers 3 to 5 lines in diameter, in divaricate cymes, the dichotomal flowers mostly sessile: sepals oblong to obovate, about half as long as the bright yellow petals: capsule 2 to 3 lines long.—Fl. i. 163.

H. punctulosum Bertol. Bot. Misc. xiii. 18, t. 3, f. 2.

H. cistifolium Watson, Bibl. Index, Polypet. 125, not Lam.

South Carolina to Georgia, Florida, and Mississippi.

16. *H. ellipticum* HOOK. Mostly herbaceous, 10 to 20 inches high: leaves elliptical-oblong, sessile or tapering at base, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, 3 to 5 lines wide, pellucid-punctate with large scattered dots, translucently veiny: flowers 4 to 6 lines in diameter, in few-flowered cymes, the dichotomal flowers pedicelled: sepals mostly foliaceous and spreading, oblanceolate to narrowly obovate, usually shorter than the pale yellow petals: capsule as in the last.—Fl. Bor.-Am. i. 110; Torr. & Gray, Fl. i. 164.

H. sphaerocarpum Barton, Fl. Philad. ii. 14, not Michx.

In moist ground, from Canada to Pennsylvania, westward to the Winnipeg valley.

[FROM THE BOTANICAL GAZETTE, MAY, 1886.]

Revision of North American Hypericaceæ.—II.

JOHN M. COULTER.

*** Styles 3 or 4, very long, distinct and spreading, stigmas capitate; capsule ovate, strictly one-celled, a line or two long; seeds minutely striate and pitted: simple or branching herbs, 1 to 3 feet high, with small distant ascending sessile or clasping leaves, and the uppermost branches of the cyme bearing alternate distant flowers.

17. *H. virgatum* LAM. Leaves ovate or oblong-lanceolate, acute, half to an inch long, 2 to 4 lines wide: flowers bright yellow, 4 to 8 lines in diameter, in nearly naked cymes: sepals lanceolate to ovate, acute or acuminate, keeled below, more or less foliaceous and enclosing the small capsule.—Dict. iv. 158; Chois. in DC. Prodr. i. 547; Torr. & Gray, Fl. i. 166.

H. angulosum Michx. Willd. Spec. iii. 1453; Chois. l. c. 546; Torr. & Gray, l. c. 164 and 673; Gray, Manual, 85.

H. hedyotifolium Poir. Suppl. vii. 700.

Wet pine barrens of New Jersey, to Florida and Kentucky.

This species is exceedingly variable in the size of its leaves, but this is a characteristic of the whole genus, and has led to much confusion in attempting to construct species upon leaf characters. The broader-leaved, more northern forms are to be referred to the species, while associated with it at the south is

Var. *acutifolium*. Usually taller and more branching: leaves linear-lanceolate, tapering to a very acute apex, an inch or more long, a line or two wide.

H. acutifolium Ell. ii. 26; Torr. & Gray, Fl. i. 167.

18. *H. pilosum* WALTER. Scabrous tomentose, mostly simple: leaves ovate-lanceolate, usually appressed, 4 to 6 lines long, about a line or two wide, sometimes much reduced: flowers 3 to 5 lines in diameter, in few-flowered cymes: sepals ovate-lanceolate, acute: petals more than twice as long, involute when old.—Fl. Car. 190; Chois. l. c. 549; Torr. & Gray, Fl. i. 163.

H. setosum L. as to Clayton's plant in Gronov. Virg. 88.

H. simplex Michx. Fl. ii. 80; Chois. l. c.

Aseyrum villosum L. Spec. 788.

Wet pine barrens, South Carolina, to Florida and Louisiana.

*** Styles 3, long, distinct and usually spreading; stigmas capitate; capsule ovate, 3-celled, more or less glandular and exhaling a heavy odor when crushed; seeds as in the last: whole plant (including petals and anthers) more or less black dotted; herbs, with rather large leaves and flowers, the petals much longer than the sepals.

† Eastern species: plants 1 to 4 feet high: capsules mostly not lobed.

19. *H. perforatum* L. Much branched: leaves linear to oblong, obtuse, mostly tapering at base, half to an inch long, 1 to 5 lines wide: flowers numerous in loose cymes, about an inch in diameter: sepals linear-lanceolate, very acute or acuminate: petals bright yellow, black dotted along the margin: capsule conical-ovate, 2 or 3 lines long.

Common everywhere in old fields as a weed difficult to extirpate. (Nat. from Europe.)

20. *H. maculatum* WALTER. Simple below, more or less branched above, conspicuously dotted all over: leaves oblong to lance-ovate, obtuse or acute, more or less clasping, sometimes tapering at base, 1 to 3 inches long, 4 to 9 lines wide: flowers smaller, 3 to 6 lines in diameter, crowded: sepals lanceolate to ovate, acute: petals pale yellow, with black lines as well as dots: capsule conical-ovate, 2 or 3 lines long.—Fl. Car. 189; Michx. Fl. ii. 80; Torr. & Gray, Fl. i. 161 and 673.

H. Virginicum Walter, 189.

H. punctatum Lam. Dict. iv. 164; Chois. in DC. Prodr. i. 547; Reich. Hort. Bot. i. 61, t. 88.

H. corymbosum Muhl. Willd. Spec. iii. 1457; Torr. & Gray, l. c. 160; Gray, Manual, 85.

H. micranthum Chois. Prodr. Hyper. 44, t. 5; Hook. Fl. Bor.-Am. i. 109.

From Canada and Minnesota to Florida and Texas.

This species is quite variable in the length of its styles, and upon the characters of short and long styles *H. corymbosum* and *H. maculatum* were formerly separated. This distinction, however, does not hold, as although the northern forms are mostly shorter styled the same forms are also found at the south associated with the longer styled forms. Besides it is only in extreme cases that the styles are very different in length, and there is every gradation between. The long styled forms of the south represent this species as formerly defined, which must now be made to include also *H. corymbosum*. The southern plants also usually have more glandular capsules.

21. *H. graveolens* BUCKLEY. Simple, or somewhat branched above: leaves large, elliptical-oblong, obtuse, closely sessile or clasping, 2 or 3 inches long, about an inch wide: flowers an inch or more in diameter, in few-flowered cymes: sepals lanceolate,

very acute: petals very scantily black dotted, if at all: capsule somewhat lobed, ovate, 3 to 5 lines long.—Am. Jour. Sci. I. xlv. 174; Gray, Genera III. i. 214, t. 92, Manual, 85; Chapm. Fl. 41.

Mountains of North Carolina.

†† Western species: plants 3 inches to 2 feet high: capsules 3-lobed, 3 or 4 lines long: petals bright yellow, often tinged with purple, with a few black dots along the margin.

22. *H. formosum* HBK. var. *Scouleri*. From running root-stocks, simple or somewhat branching, often with numerous small branchlets, a half to two feet high: leaves ovate-oblong, obtuse, more or less clasping, about an inch long, half inch or more wide (those of the branchlets much smaller and often tapering at base), usually black dotted along the margin of the under surface, veiny: flowers half to an inch in diameter, in loose corymbs: sepals lanceolate to ovate, obtuse or acute: styles mostly erect.

H. Scouleri Hook. Fl. Bor.-Am. i. 111; Torr. & Gray, Fl. i. 160; and of all authors.

Throughout all our western mountain systems, and extending into British Columbia.

Exceedingly variable. The species is Mexican, and differs from our variety only in its narrower and acuminate sepals. It is really questionable whether our forms deserve to rank even as a variety, as there are found among them sepals which are almost indistinguishable from those of *H. formosum*.

23. *H. concinnum* BENTH. Somewhat shrubby and branching at base, 3 to 18 inches high: leaves linear to oblong, not clasping, usually folded, half to over an inch long, 1 to 4 lines wide, acute: flowers over an inch in diameter, few, in rather close clusters at the summit of the stem, with black lines as well as dots: sepals ovate, mucronate-acute, or very acuminate, longer than the capsule.—Pl. Hartw. 300; Brewer & Watson, Bot. Calif. i. 81.

H. bracteatum Kellogg, Proc. Calif. Acad. i. 65.

California. First collected by *Hartweg*, in the "Sacramento Valley."

‡3. Stamens 5 to 20, mostly in 3 clusters: styles 3 (sometimes 2), short, distinct; stigmas capitate: capsules ovate to conical, one-celled; seeds yellow, more or less striate and pitted: small and slender annuals, with very small flowers, and petals shorter than the sepals.

* Procumbent or ascending, or forming dense mats, diffusely branching: leaves rather broad, obtuse, clasping: capsule a line or two long.

24. *H. anagalloides* CHAM. & SCHLECHT. Often forming dense mats: stems an inch to a foot long: leaves oblong to broadly ovate, very obtuse, 5 to 7-nerved at base, 2 to 6 lines long, almost as broad: flowers 3 or 4 lines in diameter, in few-flowered naked or leafy cymes: sepals foliaceous, unequal, lanceolate to broadly ovate, longer than the ovate capsules: stamens 15 to 20.—*Linnæa*, iii. 127; Torr. & Gray, Fl. i. 167 and 674.

? *H. mutilum* Watson, King's Report, v. 46.

In wet ground from Southern California to Washington Territory, Montana (*Watson*), and British Columbia. Also in adjacent Mexico.

Possibly this is but a form of *H. Japonicum* Thunb.

25. *H. mutilum* L. Like the last, but more erect and diffusely branching, a half to a foot (or even two feet) high: leaves narrowly oblong to somewhat ovate, half to an inch long, 2 to 4 lines wide, 5-nerved at base: flowers in very loose leafy cymes: sepals linear to lanceolate, usually shorter than the ovate capsule: stamens 6 to 12.—*Spec.* 787; Torr. & Gray, Fl. i. 164.

H. quinquenerivium Walter, Fl. Car. 190; Chois. in DC. Prodr. i. 550; Hook. Fl. Bor.-Am. i. 110.

H. parviflorum Willd. *Spec.* iii. 1456; Pursh. 377.

H. stellarioides HBK. *Nov. Gen.* v. 196.

Low grounds, from Canada to Florida and Texas. Also in adjacent Mexico.

Quite variable in size, and in some forms closely resembling the last species.

** Almost simple, with strict stems and branches: flowers in naked cymes: sepals linear to linear-lanceolate, acuminate.

26. *H. gymnanthum* ENGELM. & GRAY. A foot to three feet high: leaves cordate-ovate, clasping, often quite distant, half inch or more long, 5 to 7-nerved and 3 to 5 lines wide at base, tapering to an acute or obtuse apex: flowers in strict mostly few-flowered elongated cymes: sepals a line or two long, about as long as the ovate-conic capsule: stamens 10 to 12.—Pl. Lindh. 4; Walp. Ann. ii. 188.

H. mutilum var. *gymnanthum* Gray, *Manual*, 86.

Delaware, Pennsylvania and Illinois, to Louisiana and Texas.

The strict habit and naked cymes resemble the following species. In the *Berichte der Deutschen Botanischen Gesellschaft* for Feb. 1885, R. v. Uechtritz and P. Ascherson refer this species to *H. Japonicum* Thunb. They well establish it as a species distinct from *H. mutilum*, but an examination of many specimens of *H. Japonicum* shows it to be very distinct from that species also. If *H.*

Japonicum is represented in our flora at all, it is our western *H. anagalloides*. This last named species approaches very nearly our eastern *H. mutilum*, to which species *H. gymnanthum* has been referred. This is the closest relationship we can trace between *H. Japonicum* and *H. gymnanthum*. If these two are one, then must *H. mutilum* and *H. anagalloides* follow, and with such a limitation our species of *Hypericum* could be reduced to very few.

27. *H. Canadense* L. A half to a foot or more high: leaves linear to linear lanceolate, glandular dotted beneath, mostly tapering to the sessile 3-nerved base, half to an inch or more long, a line or two wide: flowers in loose cymes: stamens 5 to 10: capsule very acutely conical, 2 or 3 lines long, longer or shorter than the sepals.—Spec. 785; Torr. Fl. N. Y. 1. 89; Torr. & Gray, Fl. i. 165.

H. thesiifolium, *pauciflorum* and *Moranense* HBK. Nov. Gen. & Spec. v. 192 and 193.

Wet sandy soil, from Canada to Georgia, Illinois, Wisconsin, and the Winnipeg valley.

Exceedingly variable in size. The extreme forms may be grouped under the following varieties:

Var. major Gray. Stems much stouter and taller: leaves larger, an inch or two long, 4 to 6 lines wide, lanceolate, more or less clasping, often very acute: flowers in larger more crowded cymes: sepals long pointed: capsules larger.—Manual, 86.

From Canada to Pennsylvania, Illinois, and about the Great Lakes.

Var. minimum Choisy. Dwarf, 1 to 3 inches high, simple, few-flowered: leaves oblong, obtuse, 4 to 5 lines long, a line or two wide, smaller and more crowded below.—DC. Prodr. i. 550; Hook. Fl. Bor.-Am. i. 110.

On wet rocks, Canada, to Wisconsin (*Lapham*), and "Cypress Hills," N. W. T. (*Macoun*).

* * * Bushy branching, with rigid erect black-dotted stems and branches: leaves very slender and rigid or minute, erect or appressed: flowers scattered along the upper part of leafy branches.

28. *H. Drummondii* Torr & Gray. Stem and alternate branches rather stout, 10 to 30 inches high: leaves linear-subulate, erect, a fourth to an inch long, one-nerved: flowers pedicellate: stamens 10 to 20: capsule ovate, about 2 lines long, not longer than the sepals; seeds large, oval, strongly ribbed and transversely lacunose, brownish yellow.—Fl. i. 165.

Sarothra Drummondii Grev. & Hook. Bot. Misc. iii. 236, t. 107.

In dry soil, Georgia and Florida, to Illinois and Texas.

29. **H. nudicaule** WALTER. Stem and opposite branches foliform, wiry, appearing naked from the very minute awl-shaped appressed leaves, 4 to 20 inches high: flowers very small, mostly sessile: stamens 5 to 10; capsule very acutely conical, 1 to 3 lines long, much longer than the sepals; seeds very much smaller, oblong, minutely striate and pitted, light yellow.—Fl. Car. 190.

H. setosum L. Spec. 787, as to Pluck. syn.

H. Sarothra Michx. Fl. ii. 79; Torr. & Gray, Fl. i. 165; Gray, Gen. III. i. 214, t. 93, f. 1-7, Manual, 86.

Sarothra gentianoides L. Spec. 272; Lam. III. t. 215, f. 1.

S. hypericoides Nutt. Gen. i. 204; Barton, Fl. N. Am. iii. 59, t. 92, f. 1.

Dry sandy soil, Canada to Florida, and the Mississippi valley.

3. ELODEA JUSS., PURSH.

Perennial herbs, in marshes or shallow water; with small close clusters of flesh-colored flowers in the axils of the leaves and at the summit of the stem; sepals much shorter than the acute capsules.—Juss. Gen. 255, partly; Pursh. Fl. 360; Torr. & Gray, Fl. i. 167; Gray, Gen. III. i. 216, t. 94. Not *Elodes* Adans., Spach, nor *Elodea* Michx. *Triadenum* Raf.—A genus of two species, peculiar to Eastern North America.

1. **E. campanulata** PURSH. A foot or two high, mostly simple: leaves oblong to ovate, very obtuse or emarginate, clasping by a broad base, about an inch and a half long, half inch wide, glaucous beneath and black dotted: axillary flower clusters at the ends of elongated branches: sepals lanceolate to ovate: filaments united below the middle: capsule 4 or 5 lines long.—Fl. 379.

E. Virginia Nutt. Gen. ii. 17; Torr. & Gray, Fl. i. 167; Gray, Gen. III. i. 216, t. 94; Manual, 86.

Hypericum Virginicum L. Spec. 2 ed. 1104; Choix. in DC. Prodr. i. 546.

H. campanulatum Walter, Fl. Car. 191.

H. emarginatum Lam. Diet. iv. 154.

From Hudson's Bay to New Jersey and North Carolina, westward to Minnesota and the Winnipeg valley. Also in adjacent Asia and Japan.

2. **E. petiolata** PURSH. Resembling the last, but usually taller and more branching: leaves longer (2 to 5 inches), half to an inch wide, tapering to a sessile base or petioled, not so glaucous or black dotted beneath: axillary flower clusters almost

sessile: filaments united about to the middle.—Fl. 379; Torr. & Gray, Fl. i. 168.

E. tubulosa Pursh (*Hypericum tubulosum* Walter) has not been identified, but is probably this species, from which it differs only in its "tubular corolla," concerning which there must have been some mistake; see Torr. & Gray, Fl. i. 168.

Hypericum petiolatum Walter, Fl. Car. 191.

H. axillare Michx. Fl. ii. 81.

H. paludosum Choix. in DC. Prodr. i. 546.

From Virginia to Florida, Louisiana, and Arkansas.

North Carolina State University Libraries

QK495 .U48 C69

REVISION OF NORTH AMERICAN UMBELLIFERAE



S02777576 Q