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The Umbelliferae of Iowa

DANIEL J. CRAWFORD

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The Umbelliferae of Iowa

Daniel J. Crawford

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INTRODUCTION

This paper is the result of field and herbarium studies of Umbelliferae found in Iowa. The keys along with the generic and specific descriptions are based only on specimens which occur naturally in the state. In instances where a taxon is very rare in Iowa, specimens from other states were examined in order better to understand the variations which might exist.

This family was selected for study for two reasons. Firstly, no intensive study of the naturally occurring taxa has been carried out for the Iowan Umbelliferae. The only prior taxonomic treatment of this group was that of Murley (1946) who studied the fruits of species which occur both naturally and under cultivation in the state. Secondly, due to considerable morphological variation in vegetative features, especially the leaves, the Umbelliferae is a rather difficult group taxonomically. It is hoped that this study will result in a better understanding of the family.

Field observations and collections were made during the summer of 1965. All but seven of the thirty-one species found in Iowa were observed in their natural habitats. In addition, over two thousand specimens from the herbaria at The University of Iowa (IA), Iowa State University (ISC), University of Northern Iowa (ISTC), and the Davenport Public Museum were examined and annotated. These observations have been used (1) to describe the morphological variations which exist within each taxon, (2) to ascertain the differences among the various taxa, (3) to determine the ecological requirements of each taxon, (4) to acquire anthesis data for each species, and (5) to describe their geographical distribution within the state. These data have been compiled and summarized in the descriptions, keys, and distribution maps.

A key to the genera based substantially on floral and vegetative features, but utilizing fruit characters when necessary, has been constructed. Since most keys to members of the Umbelliferae rely almost entirely upon features of the fruits, it is often difficult or even impossible to identify members of the family when in flower. The key provided here is intended to overcome this difficulty. A key to spe-

¹ Based on a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at The University of Iowa.

cies utilizing fruit characters exclusively is also included. Additionally, when a genus is represented by more than one species, the specific key is provided immediately after the generic description.

The sequence in which the genera and species are described is that of Gleason and Cronquist (1963). When only one species of a genus occurs in the state, the generic description has been omitted. The species' names follow the eighth edition of Gray's Manual of Botany with the exception of *Heracleum lanatum* which follows Mathias and Constance (1944-45). No attempt has been made to establish synonyms. The reader is referred to Mathias and Constance for a complete list of synonymy.

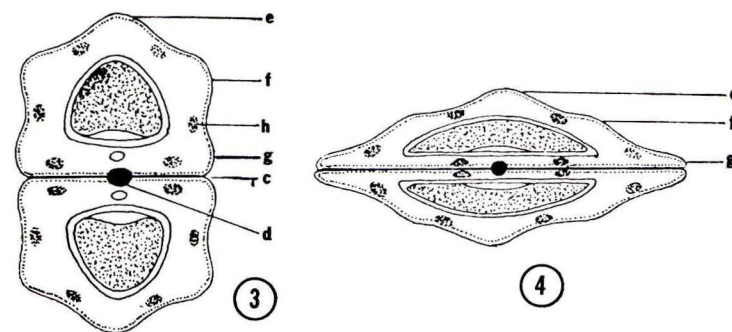
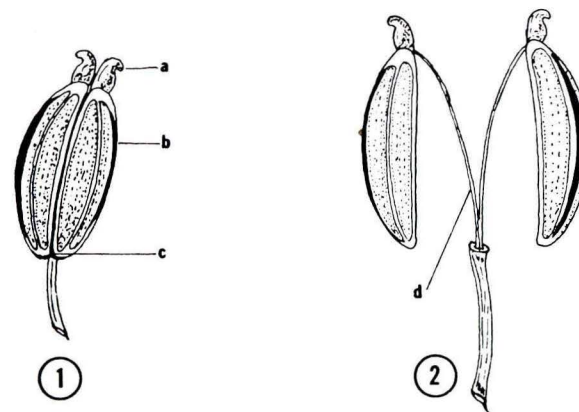
The distribution maps are based on herbarium specimens as well as the author's collections. Each dot represents a specimen which was either collected or annotated by the author. When specimens were collected from the same station, the dots were overlapped on the map. In those cases in which only the county of collection was recorded, the dot was placed in the center of the county.

The Umbelliferae in Iowa consists of thirty-one species. The salient features of the family are as follows:

The flowers are small, actinomorphic, 5-merous, and epigynous. The petals are free, inflexed at the tip, and usually yellow or white. The sepals are much reduced or often obsolete. The stamens are 5, alternate with the petals, and inserted on an epigynous disk. The single pistil invariably has 2 carpels, 2 locules, and 2 styles. The ovules are solitary in each carpel and pendulous. In most species the styles have a distinct basal swelling known as a stylopodium (Fig. 1). The fruits are schizocarps which separate into 2 distinct units (mericarps or fruitlets) at maturity (Fig. 2). The plants are all herbaceous, the stems are hollow, and the leaves are alternate and compound. The petiole bases often are dilated and sheath the stems.

The writer wishes to thank Dr. T. E. Melchert for his guidance during the course of this study. Gratitude is also expressed to the curators of the herbaria listed above for making their facilities available. Dr. V. S. Ratnakumar executed the illustrations of the fruits, and Mr. Fred Kent took the photographs. Finally, the author is indebted to Dr. J. R. Reeder, The University of Wyoming, for his help and invaluable suggestions in the preparation of the manuscript.

Laramie, Wyoming
December, 1969



Figs. 1-4. 1. Drawing of a typical Umbelliferae fruit before the mericarps have separated. a, stylopodium; b, mericarp; c, commissure. 2. Drawing of the separated mericarps of an Umbelliferae fruit. d, carpophore. 3. Drawing of cross section of a laterally flattened Umbelliferae fruit. c, commissure; d, carpophore; e, dorsal rib; f, intermediate rib; g, lateral rib; h, oil tube in interval. 4. Drawing of cross section of a dorsally flattened Umbelliferae fruit. e, dorsal rib; f, intermediate rib; g, lateral rib.

Key to Genera of Umbelliferae Based Primarily on Floral and Vegetative Features

1. Leaves simple, linear-lanceolate, leathery, parallel-veined; flowers in dense heads, these nearly globose and cymosely arranged.
 24. *Eryngium* (p. 24)
1. Leaves compound or if simple then oval to ovate; inflorescence of compound umbels.
 2. Leaflets entire.
 8. *Taenidia* (p. 15)
 2. Leaflets variously serrate, never completely entire.
 3. Leaves basal; inflorescence scapose.
 20. *Lomatium* (p. 20)
 3. Leaves cauline or basal and cauline; inflorescence terminal and axillary, not scapose.
 4. Leaves palmately compound with 3-7 leaflets or deeply palmately parted into 3-7 segments and thus appearing compound.
 5. Leaves 16-50 cm long, 18-50 cm wide, the sheaths and petioles pubescent.
 23. *Heracleum* (p. 23)
 5. Leaves 2.5-16 cm long, 2-25 cm wide, the sheaths and petioles glabrous.
 6. Fruits globose or ovoid, covered with recurved bristles (Figs. 5-8); involucre of several reduced bracts.
 1. *Sanicula* (p. 9)
 6. Fruits narrowly oblong to linear, glabrous (Fig. 10); involucre absent (rarely with 1 linear or lanceolate bract).
 3. *Cryptotaenia* (p. 12)
 4. Leaves 1-4 times pinnate, biternate or ternate-pinnate; if ternate, then with 9 or more leaflets.
 7. Bracts pinnately divided, mostly 5 cm long and 4 cm wide.
 5. *Daucus* (p. 13)
 7. Bracts, if present, entire or serrate, but never pinnately divided nor over 1 cm wide.
 8. Plants low and somewhat spreading, branching from the base; fruits narrowly oblong to linear, 5-10 mm long (Fig. 14).
 6. *Chaerophyllum* (p. 14)
 8. Plants erect, not branching from the base; fruits oval, oblong, or elliptic, 2-6 mm long.
 9. Leaflets divided into filiform segments.
 10. Fruits tuberculate, ovoid, 2 mm long (Fig. 9).
 2. *Spermolepis* (p. 11)
 10. Fruits glabrous, oblong or elliptic, 2.5-6 mm long.
 11. Fruits anise-scented when crushed, slightly flattened laterally or essentially circular in cross section (Fig. 15).
 7. *Foeniculum* (p. 14)
 11. Fruits dill-scented when crushed, strongly flattened dorsally (Fig. 28).
 18. *Anethum* (p. 21)

9. Leaflets lobed, incised or pinnatifid, never divided into filiform segments.
 12. Plants arising from taproots.
 13. Rays and pedicels bearing short pubescence.
 14. Plants 9-20 dm tall; leaf blades 25-40 cm long; leaflets often incised into ovate segments; fruits with prominent dorsal and intermediate ribs (Fig. 27).
 17. *Angelica* (p. 20)
 14. Plants 5-9 dm tall; leaf blades 3-18 cm long; leaflets pinnatifid into linear segments; fruits with dorsal and intermediate ribs obscured by the thick, corky pericarp (Fig. 32).
 21. *Polytaenia* (p. 22)
 13. Rays and pedicels glabrous.
 15. Lower leaves ternate; fruits with depressed ribs which are much wider than the intervals (Fig. 21).
 12. *Falcaria* (p. 17)
 15. Lower leaves 1-3 (4) times pinnate.
 16. Petals yellow; fruits strongly flattened dorsally, 5-7 mm long (Fig. 33).
 22. *Pastinaca* (p. 23)
 16. Petals white; fruits laterally flattened or essentially circular in cross section, 2-4 mm long.
 17. Lower leaves 2-3 (4) times pinnate; plants 0.75-3 m tall; stems often purple, especially near the base; fruits with oil tubes small and numerous around the seed (Fig. 20).
 11. *Conium* (p. 17)
 17. Lower leaves pinnate-pinnatifid; plants 4-9.5 dm tall; stems not purple spotted; fruits with oil tubes small and solitary in the intervals (Fig. 19).
 10. *Carum* (p. 16)
 12. Plants arising from fascicled fusiform, fascicled tuberous, or fibrous roots.
 18. Lower leaves once pinnate.
 19. Plants 3.7-7.5 dm tall; leaflets with coarsely serrate to incised margins; fruits 1.5-2 mm long, ribs obscure (Fig. 22).
 13. *Berula* (p. 18)
 19. Plants 5-20 dm tall; leaflets either finely serrate or sparsely serrate to nearly entire, never incised; fruits 2-7 mm long, ribs prominent.
 20. Leaflets finely and sharply serrate; plants arising from fascicled, fusiform roots; fruits orbicular, 2-3 mm long, ribs greenish yellow (Fig. 23).
 14. *Sium* (p. 18)
 20. Leaflets sparsely serrate; plants arising from fascicled, tuberous rooted, fruits narrowly oval or oblong, 3.5-7 mm long, ribs light brown (Fig. 29).
 19. *Oxypolis* (p. 21)

18. Lower leaves either 2-3 pinnate, biternate, ternate-pinnate or simple.
21. Plants arising from large, fascicled, tuberous roots or if fibrous roots, then the upper reduced leaves bear conspicuous bulblets in their axils.
15. *Cicuta* (p. 19)
21. Plants arising from fascicled, fibrous roots; bulblets never present.
22. Lateral ribs (and usually all ribs) of the fruits with broad, thin wings (Fig. 26).
16. *Thaspium* (p. 20)
22. Ribs of the fruits not winged.
23. Rays 3-6; fruits mostly linear, sometimes oblong, 13-22 mm long, hispid along the ribs (Figs. 11-12).
4. *Osmorhiza* (p. 12)
23. Rays 7-18; fruits oblong, 3-5.5 mm long, glabrous (Figs. 17-18).
- Zizia* (p. 15)

Fruit Key to Species of Umbelliferae

1. Fruit with scales, tubercles, hairs, or bristles.
2. Fruit in dense heads; covered with scales (Fig. 35).
- Eryngium yuccifolium* (p. 24)
2. Fruit with tubercles, hairs, or bristles.
3. Fruit tuberculate; 2 mm or less in length (Fig. 9).
- Spermolepis inermis* (p. 11)
3. Fruit with hairs or bristles; 2 mm or more in length.
4. Fruit 2-3 mm long, dorsally flattened; bristles white to yellow-white, not recurved (Fig. 13).
- Daucus carota* (p. 13)
4. Fruit 3.5-15 mm long, laterally flattened or essentially circular in cross section; either covered with recurved bristles or sparsely hispid with white hairs.
5. Fruit oblong or linear, 13-22 mm long; slightly hispid with white hairs.
6. Styles 0.5-1.5 mm long (Fig. 11).
- Osmorhiza claytonii* (p. 13)
6. Styles 2-3 mm long (Fig. 12).
- Osmorhiza longistylis* (p. 13)
5. Fruit globose, ovate, or suborbicular, 3.5-7 mm long; covered with recurved bristles.
7. Styles longer than bristles, conspicuous.
8. Fruit 3.5-4 mm long; bristles not bulbous at base; commissural scar linear (Fig. 6).
- Sanicula gregaria* (p. 10)
8. Fruit 5-7 mm long; bristles bulbous at base; commissural scar oval (Fig. 5).
- Sanicula marilandica* (p. 9)

7. Styles shorter than and essentially hidden by the bristles.
9. Sepals inconspicuous, shorter than the bristles (sepals can be easily distinguished from the bristles since they are not recurved at the tip); commissural scar linear (Fig. 7).
- Sanicula canadensis* (p. 10)
9. Sepals conspicuous, as long or longer than the bristles; commissural scar broadly oval (Fig. 8).
- Sanicula trifoliata* (p. 11)

1. Fruit glabrous.
10. Fruit strongly flattened dorsally.
11. More than 1 oil tube in every interval (in some species the oil tubes are indistinct and the many small tubes appear nearly continuous around the seed).
12. Pericarp thick and corky, obscuring the ribs, lateral ribs with thick, corky, rounded wings; fruit dumbbell-shaped in cross section (Fig. 32).
- Polytaenia nuttallii* (p. 22)
12. Pericarp thin, not corky, ribs not obscured, lateral ribs with thin, non-corky wings; body of fruit thicker than wings when viewed in cross section.
13. Oil tubes small, numerous, and appearing continuous around the seed (Fig. 27).
- Angelica atropurpurea* (p. 20)
13. 3 (2, 4) distinct oil tubes per interval, not appearing continuous around the seed (Fig. 30).
- Lomatium foeniculaceum* (p. 22)
11. 1 oil tube in each interval (*Lomatium orientale*, which falls under this lead, sometimes has 2 oil tubes in 1 or 2, but never all of the intervals).
14. Fruit 7-15 (mostly 10-12) mm long; oil tubes on dorsal surface visible as reddish streaks on apical half (Fig. 34).
- Heracleum lanatum* (p. 23)
14. Fruit 7 mm or less in length.
15. Fruit mostly 5-7 mm long, and neither dill-scented when crushed nor with 5 ridges on dorsal surface.
16. Stylopodium present, conspicuous, 0.5-1 mm high; 2 (4) oil tubes on the commissure (Fig. 33).
- Pastinaca sativa* (p. 23)
16. Stylopodium essentially lacking, i.e., inconspicuous, less than 0.5 mm high; 4 oil tubes on the commissure (Fig. 31).
- Lomatium orientale* (p. 22)
15. Fruit mostly 5 (rarely 7) mm or less in length and either dill-scented when crushed or with 5 ridges on dorsal surface.
17. Lateral wings strongly nerved at their inner margins, thus 5 ridges present on the dorsal surface; not dill-scented when crushed (Fig. 29).
- Oxypholis rigidior* (p. 21)
17. Lateral wings not strongly nerved at their inner margins, thus 3 ridges (ribs) present on the dorsal surface; dill-scented when crushed (Fig. 28).
- Anethum graveolens* (p. 21)

10. Fruit laterally flattened or essentially circular in cross section.
 18. All ribs usually with thin, broad wings; lateral ribs always so winged (Fig. 26).
Thaspium barbinode (p. 20)
18. Ribs without thin, broad wings.
 19. Fruit 2 mm or more in length, not appearing somewhat flaccid or crumpled at maturity.
 20. 2 or more oil tubes in each interval.
 21. Oil tubes small, numerous, indistinct, appearing continuous around the seed (Fig. 20).
Conium maculatum (p. 17)
21. Oil tubes distinct in the intervals, not appearing continuous around the seed.
 22. Fruit 2-3 mm long, orbicular to suborbicular; ribs greenish yellow, very prominent, contrasting with the brown intervals (Fig. 23).
Sium suave (p. 18)
22. Fruit 3-8 mm long, oval to oblong or linear; ribs not prominent and greenish yellow.
 23. Fruit 3-4.5 mm long; 4 oil tubes on the commissure (Fig. 16).
Taenidia integerrima (p. 15)
23. Fruit 5-8 mm long; 2 oil tubes on the commissure (Fig. 10).
Cryptotaenia canadensis (p. 12)
20. 1 oil tube in each interval.
 24. Fruit orbicular or suborbicular, 2-3 (3.5) mm long.
 25. Ribs low, light brown at maturity (Fig. 25).
Cicuta maculata (p. 19)
25. Ribs greenish yellow, very prominent (Fig. 23).
Sium suave (p. 18)
24. Fruit linear, oblong, or elliptic, 3.5-10 mm long.
 26. Ribs depressed, much wider than the intervals (Fig. 21).
Falcaria sioides (p. 17)
26. Ribs prominent or low, but not depressed, narrower than the intervals.
 27. Fruit either strongly anise or caraway-scented when crushed.
 28. Anise-scented when crushed; stylopodium 1-1.5 mm high (Fig. 15).
Foeniculum vulgare (p. 14)
28. Caraway-scented when crushed; stylopodium less than 0.5 mm high (Fig. 19).
Carum carvi (p. 16)
27. Fruit without a strong anise or caraway scent when crushed.
 29. Fruit narrowly oblong to linear, 5-10 mm long; stylopodium 0.5-1 mm high, prominent.
 30. Stylopodium 1 mm high; fruit often curved (Fig. 10).
Cryptotaenia canadensis (p. 12)

30. Stylopodium 0.5 mm high; fruit rarely curved (Fig. 14).

Chaerophyllum procumbens (p. 14)

29. Fruit oblong, 3-5 (5.5) mm long; stylopodium lacking, or if present, then less than 0.5 mm high, not prominent.

31. 3-5 (5.5) mm long; sepals not prominent, usually less than 0.25 mm long (Fig. 17).

Zizia aurea (p. 16)

31. 3-4 mm long; sepals prominent, 0.25-0.5 mm long (Fig. 18).

Zizia aptera (p. 16)

19. Fruit 1.5-2 mm long; appearing flaccid or crumpled at maturity.

32. Sepals prominent, much exceeding the depressed stylopodium (Fig. 24).

Cicuta bulbifera (p. 17)

32. Sepals lacking; stylopodium prominent, conic, not depressed (Fig. 22)

Berula pusilla (p. 18)

1. SANICULA L. Black snakeroot

Erect, glabrous, biennials or perennials, from fibrous roots; stems usually solitary below and branched above; leaf blades either palmately parted into 3-7 segments or palmately compound with 3-7 leaflets, singly or doubly serrate, often incised in the apical half; petioles of upper leaves much reduced or obsolete; inflorescence of a few terminal and axillary, compound umbels, these scattered, irregular, 1-4 rayed; involucre of several reduced, somewhat leaflike, linear or lanceolate bracts; involucl of several minute, subscarios bractlets; fruits burr-like, covered with hooked bristles, terete or subterete in cross section.

1. Styles exceeding the bristles, conspicuous.

2. Fruits 5-7 mm long; bristles bulbous at base (Fig. 5); lower leaves with 5-7 segments or leaflets, if 5 then the lateral segments deeply cleft.

1. *S. marilandica*

2. Fruits 3.5-4 mm long; bristles not bulbous at base (Fig. 6); lower leaves with 3-5 segments or leaflets, if 5, then the lateral segments never cleft.

2. *S. gregaria*

1. Styles shorter than the bristles, inconspicuous.

3. Sepals shorter than and essentially hidden by the dense bristles (Fig. 7).

3. *S. canadensis*

3. Sepals equaling or exceeding the bristles, very conspicuous and beak-like (Fig. 8).

4. *S. trifoliata*

1. *Sanicula marilandica* L.

Map 1

Perennials, (25) 50-100 cm tall; leaf blades 2.5-12 cm long, 5-22 cm

wide; blades of lowest 2-3 leaves broadly deltoid to orbicular in outline, these with 5-7 leaflets or segments, when 5 then the lateral 2 segments shallowly to deeply cleft; upper cauline blades divided into 3-6 segments; leaflets or segments mostly obovate to oblanceolate or narrowly lanceolate, 2-10.5 cm long, 0.5-6 cm wide; petioles of lowest 2-3 leaves 9-35 cm long; rays (1-)3(-4); staminate and perfect flowers in the same umbellets or umbellets occasionally composed of only staminate flowers; pedicels of staminate flowers 3-4 mm long, those of perfect flowers obsolete; sepals of staminate and perfect flowers 1.5-2 mm long; petals greenish white; bracts 3-15 mm long; fruits 3 (4) per umbellet, globose, 5-7 mm in diameter including the bristles; bristles conspicuously bulbous at the base, shorter than the styles, but exceeding the sepals; oil tubes solitary in the intervals, 2 on the commissure; commissural scar elliptical to narrowly oval.

S. marilandica grows in rich woods in the northern half of the state. It is infrequent, but may be locally abundant. Flowering occurs from June through August.

2. *Sanicula gregaria* Bickn. Map 2

Perennials, 35-85 cm tall; leaf blades 2.5-10.5 cm long, 3-18 cm wide; blades of lowest 2-3 leaves broadly ovate, deltoid, or orbicular in outline, these with 3-5 leaflets or segments, when 3, then the lateral 2 segments shallowly to deeply cleft; upper cauline blades divided into 3-5 segments; leaflets or segments mostly obovate, sometimes oblanceolate or narrowly lanceolate, 2.5-9.5 cm long, 0.5-4 cm wide; petioles of lowest 2-3 leaves 8-25 cm long; rays (1-)3; staminate and perfect flowers in the same umbellets or umbellets sometimes composed of only staminate flowers; pedicels of staminate flowers 2-2.5 mm long, those of perfect flowers 0.5-1 mm long; sepals of staminate and perfect flowers 0.5-1 mm long; petals greenish yellow; bracts 4-30 mm long; fruits 3(-4) per umbellet, globose to slightly flattened laterally, 3.5-4 mm long including the bristles; bristles shorter than the styles and exceeding the sepals, often in somewhat regular longitudinal rows; oil tubes solitary in the intervals, 2 or 3 on the commissure; commissural scar linear.

S. gregaria is found in rich woods throughout the state. It grows best and becomes most robust in low, wet woods. Flowering takes place from June through August.

3. *Sanicula canadensis* L. Map 3

Biennials, 25-75(-125) cm tall; leaf blades 2.5-13 cm long, 2-20 cm wide; blades of lowest 2-3 leaves broadly deltoid in outline, these

with 3 leaflets or segments, the lateral 2 segments usually deeply cleft; upper cauline blades divided into 3-5 segments; leaflets or segments either ovate to lanceolate or obovate to oblanceolate, 2-12 cm long, 0.5-7 cm wide; petioles of lowest 2-3 leaves 4-25 cm long; rays (1-2-)3; staminate and perfect flowers in the same umbellets; pedicels of staminate flowers 0.5-2 mm long, those of perfect flowers 0.5-1 mm long; sepals of staminate and perfect flowers 1-1.5 mm long; petals white; bracts 3-30 mm long; fruits 3(-4) per umbellet, globose, 4-6 mm in diameter including the bristles; bristles often in somewhat regular longitudinal rows, exceeding the styles and sepals; oil tubes solitary in the intervals, 2 on the commissure; commissural scar linear.

S. canadensis is found in all types of woods throughout the state. It is often the only species of *Sanicula* which is found in dry, open, upland woods. Flowering takes place from June through August.

4. *Sanicula trifoliata* Bickn. Map 4

Biennials, 25-95 cm tall; leaf blades 3-16 cm long, 4-16 cm wide; blades of lowest 2-3 leaves broadly deltoid in outline, these with 3 leaflets or segments, the lateral 2 segments shallowly to deeply cleft; upper cauline blades divided into 3 segments, the lateral 2 segments rarely cleft; leaflets or segments ovate, obovate, or lanceolate, 2-11 cm long, 0.7-7.5 cm wide; petioles of lowest 2-3 leaves 5-25 cm long; rays (1-)2-3(-4); staminate and perfect flowers in the same umbellets; pedicels of staminate flowers 3-6 mm long, those of perfect flowers obsolete; sepals of staminate flowers 1-1.5 mm long, those of perfect flowers 1.5-2.5 mm long; petals white, bracts 3-25 mm long; fruits 3 per umbellet, ovoid, 4.5-7.5 mm long including the bristles, 3-4 mm wide, each longitudinal ridge with 2 rows of bristles, these somewhat reduced in size toward the base, shorter than or about equaling the conspicuously beaked sepals, but exceeding the styles; oil tubes small and numerous; commissural scar broadly oval.

S. trifoliata is restricted to rich, moist woods in extreme eastern Iowa. Flowering takes place from June through August.

2. SPERMOLEPIS Raf.

Spermolepis inermis (Nutt.) Math. & Const. Map 5

Erect, glabrous, annuals, from slender taproots, 0.8-6 dm tall; stems solitary below, branched above; leaves ternately compound; the blades 1.5-5 cm long, 1.5-4 cm wide, ovate to oblong in outline; leaflets irregularly dissected into filiform segments, these 3-30 mm long, 0.1-1 mm wide; petioles 4-15 mm long; inflorescence of terminal and axillary, compound umbels; rays 5-10, ascending, 1-10 mm long,

the central ones of each umbel shorter than the marginal ones; pedicels 2-6, ascending, 0-6 mm long, those near the center of each umbel obsolete or nearly so; sepals obsolete; petals white; involucre wanting; involucre of several linear, ascending bractlets; fruits ovoid, 2 mm long, 1.5 mm wide, constricted at the commissure; surface dark brown to black, with white tubercles; ribs low, inconspicuous; oil tubes 1-3 per interval, 2 on the commissure; carpophore split for less than ¼ of its length.

S. inermis is known only from Muscatine and Marshall counties. It occurs on sandy, open areas. Flowering occurs in May and June.

3. CRYPTOTAENIA DC. Honewort

Cryptotaenia canadensis (L.) DC.

Map 6

Erect, glabrous, perennials, from fibrous roots, 3-10 dm (mostly 5-8) tall; stems solitary below, branched near the top; leaves ternately compound; the blades 3-15 cm long, 5-25 cm wide, ovate to deltoid in outline; leaflets lanceolate, oblong or obovate, singly and doubly serrate to incised, 3-15 cm long, 1-7.5 cm wide, the lateral 2 leaflets often deeply cleft; petioles of lowest 2 or 3 leaves 2-16 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, compound umbels; rays 3-7, ascending, 0.7-4.5 cm long, unequal; pedicels 2-10, ascending, 1-25 mm long; sepals absent; petals white; involucre wanting (rarely with 1 linear or lanceolate bract); involucre of several linear bractlets, 1-3 mm long; fruits narrowly oblong to mostly linear, 5-8 mm long, 1-2 mm wide, slightly flattened laterally; intervals dark reddish brown; ribs prominent, light brown; oil tubes 1-4 per interval, 2 on the commissure; stylopodium slender, conspicuous; carpophore split to the base.

C. canadensis is found in rich, moist, woodlands throughout the state. Flowering occurs in June and July.

4. OSMORHIZA Raf. Sweet cicely

Erect perennials, from somewhat woody, fascicled roots; stems solitary below, branching above; leaves ovate or orbicular in outline, pilose, especially along the main veins; lower leaves biternate or ternate-pinnate; upper leaves often ternately divided; ultimate leaflets ovate or lanceolate, doubly serrate to incised or lobed; petioles of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, few-rayed, compound umbels; rays ascending or spreading; pedicels ascending to spreading; sepals lacking; petals white; involucre of 1-several linear or lanceolate, reflexed bracts; involucre of sev-

eral linear or lanceolate bractlets, 3-10 mm long; fruits narrowly oblong or linear, slightly flattened laterally; ribs prominent, hispid; intervals black; oil tubes obscure; stylopodium conic.

1. Styles 1-1.5 mm long on fruit; plants not anise-scented.

1. *O. claytonii*

1. Styles 2-3 mm long on fruit; plants anise-scented.

2. *O. longistylis*

1. *Osmorhiza claytonii* (Michx.) C. B. Clarke

Map 7

3-10 dm tall; stems pilose to nearly glabrous; leaf blades 6-20 cm long, 10-32 cm wide; ultimate leaflets 1.5-10 cm long, 1.2-4 cm wide; petioles of lowest 2-3 leaves 4-20 cm long; rays 3-5, 3-7 cm long; pedicels 5-10 ((2-)3-5 fertile and fruit bearing), these 15-25 mm long; bracts 3-15 mm long; fruits 13-22 mm long, 2 mm wide, the lower ½ tapered into a slender, very hispid tail; styles persistent, 1-1.5 mm long; carpophore split about ¼ of its length.

O. claytonii is found in rich woods through the state. Flowering takes place in May and June.

2. *Osmorhiza longistylis* (Torr.) DC.

Map 8

Anise-scented, 5-8 dm tall; stems densely villous to glabrous, often villous when young and becoming more glabrous with age; leaf blades 2.5-20 cm long, 1.5-20 cm wide; ultimate leaflets 4-7.5 cm long, 2-5 cm wide; petioles of lowest 2-3 leaves 7.5-25 cm long; rays 3-5(-6), 3-6 cm long; pedicels 5-12 (3-5 fertile and fruit bearing), these 12-15 mm long; bracts 5-15 mm long, sometimes lacking; fruits 18-22 mm long; 2-3 mm wide, the lower ¼-½ tapered into a slender, very hispid tail; styles persistent, 2-3 mm long; carpophore split ¼-½ its length.

O. longistylis is found in rich woods throughout the state. Flowering takes place in May and June.

5. DAUCUS L. Carrot

Daucus carota L.

Map 9

Erect, pubescent, biennials, from taproots, 3.5-10 dm tall; stems solitary below, usually branched above; leaves pinnate-pinnatifid or bi-pinnate; the blades 7-22 cm long, 2.5-11 cm wide, oblong in outline; leaflets 1.4-4 cm long, 0.7-3 cm wide; petioles of lowest 2 or 3 leaves 4-16 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 25-50, 0.5-5.5 mm long, spreading when in flower, in fruit the marginal rays folding inward to form a compact head; pedicels spreading, 2-10 mm long; sepals lacking; petals white, the central flower of each

umbel often with purple petals; involucre of several bracts, pinnately divided into linear segments, 1-5 cm long, 1-4 cm wide; involucre of several linear (sometimes pinnately dissected), bractlets; fruits oval to oblong, 2-3 mm long, 1-1.5 mm wide (not including the bristles), strongly flattened dorsally; primary ribs low and inconspicuous; the 4 secondary ribs broadly winged with the wings segmented into bristles; oil tubes solitary in the intervals, 2 on the commissure; carpophore entire.

D. carota is a native of Eurasia and has become established as a weed of roadsides and other dry, open places throughout the state. Flowering occurs from July through September.

6. CHAEROPHYLLUM L.

Chaerophyllum procumbens (L.) Crantz Map 10

Low, spreading, annuals, from taproots, 7.5-45 cm tall; stems branched from the base, hispid at the nodes; leaves ternate-pinnate or bipinnate; the leaf blades 1-8 cm long, 0.5-6 cm wide, narrowly ovate to oblong in general outline; ultimate leaflets obovate to lanceolate, variously incised or lobed, often slightly hispid on the main veins; petioles of lowest 2 or 3 leaves 2-6 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 1-3, ascending, 1-3 cm long; pedicels (1,2)-3(-4), ascending, 0-12 mm long; sepals lacking; petals white; involucre absent; involucre of 4-5 bractlets, ovate to obovate, ciliate, connate at the base; fruits narrowly oblong to linear, 5-10 mm long, 1-2.5 mm wide, laterally flattened; ribs prominent, greenish to light brown; intervals brown to nearly black; oil tubes solitary in the intervals, 2 on the commissure; stylopodium conic; carpophore cleft, but not to the base.

C. procumbens, a native of Europe and central Asia, occurs primarily in rich, low woods in the eastern half of the state. Flowering takes place in April and May.

7. FOENICULUM Adans. Fennel

Foeniculum vulgare Mill. Map 11

Erect, glabrous, anise-scented biennials or perennials, from taproots; 7.5-21 dm tall; stems solitary below, branching above; leaves 2-3 times pinnate; blades 6-40 cm long, 3-40 cm wide, ovate to deltoid in general outline; ultimate segments filiform, 4-40 mm long, 0.5 mm wide; petioles of lowest 2 or 3 leaves 6-20 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and

axillary, regular, compound umbels; rays 15-40, spreading to ascending, 1-8 cm long; pedicels 10-25, spreading, 2-15 mm long; sepals absent; petals yellow; involucre and involucre absent; fruits oblong, 3.5-6 mm long, 1.5-2 mm wide, slightly flattened laterally or essentially circular in cross section; ribs prominent, acute; oil tubes solitary in the intervals, 2 on the commissure; stylopodium conic; carpophore split to the base.

F. vulgare is a native of the Mediterranean region which has rarely escaped from cultivation and become established in waste places in Iowa. Flowering occurs in May and June.

8. TAENIDIA Drude

Taenidia integerrima (L.) Drude Map 12

Erect, glabrous perennials, from taproots, 3.5-11 dm tall; stems solitary; leaves 2-3 times ternate (rarely 2-3 pinnate); the blades 3-13.5 cm long, 4-23 cm wide, deltoid to ovate in outline; the ultimate leaflets 10-40 mm long, 8-20 mm wide, ovate, oval or lanceolate, often deeply cleft, margins entire; petioles of lowest 2 or 3 leaves 4-20 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, compound umbels; rays 8-20, ascending, 3-8 cm long, the outer rays of each umbel longer than the inner staminate ones; pedicels ascending to spreading, the outer fertile pedicels of each umbellet 7-10 mm long, the inner staminate ones 2-5.5 mm long; sepals lacking; petals yellow; involucre and involucre absent; fruits broadly oblong to oval, 3-4.5 mm long, 2-3.5 mm wide, laterally flattened; ribs low, brown; intervals nearly black, surface often wrinkled; 3 oil tubes per interval, 4 on the commissure; stylopodium absent; carpophore split to the base.

T. integerrima is widely distributed in rich woods and on wooded limestone bluffs in Iowa. Flowering takes place in May and June.

9. ZIZIA Koch Golden alexanders

Erect, mostly glabrous perennials, from fascicled, fibrous roots; stems solitary below, branching above; petioles of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays ascending; pedicels ascending or spreading, the central one of each umbellet obsolete; sepals triangular; petals yellow; involucre of several lanceolate bractlets; fruits oblong, laterally flattened; ribs prominent, brown; 1 oil tube in each interval, 2 on the commissure; stylopodium low and inconspicuous or essentially lacking; carpophore split to the base.

1. Basal leaves ternately or biternately compound.

1. *Z. aurea*

1. Basal leaves simple.

2. *Z. aptera*

1. *Zizia aurea* (L.) Koch

Map 13

25-90 cm tall; stems pubescent at the upper nodes with short, stiff, white hairs; leaves 1-2 times ternate, if once ternate then the leaflets often ternately divided; the blades 3-15 cm long, 4-15 cm wide, ovate or orbicular in general outline; leaflets narrowly ovate or lanceolate, 2-7 cm long, 0.75-5 cm wide, sharply serrate, sometimes incised near the base; petioles of lowest 2-3 leaves 3-20 cm long; rays 10-16, 1-4.6 cm long; pedicels 0-4 mm long; involucre wanting or of 1-several lanceolate bracts; bractlets 1-3 mm long; fruits 3-5.5 mm long, 2-3 mm wide; intervals nearly black.

Z. aurea is abundant in woodlands and open areas throughout the state. Flowering occurs in May and June.

2. *Zizia aptera* (Gray) Fern.

Map 14

20-70 cm tall; leaf blades 2-13 cm long, 2-9 cm wide; lower leaves simple (rarely ternately divided), oval or ovate in outline, crenate or dentate, cordate; upper cauline blades ternately divided; petioles of lowest 2-3 leaves 4-22 cm long; rays 7-18, 1.8-3.5 cm long; pedicels 0-5 mm long; involucre absent; bractlets 1-2 mm long; fruits 3-4 mm long, 2-2.5 mm wide; intervals glossy, dark reddish brown.

Z. aptera is infrequently found on prairies of the northern half of the state. Flowering occurs in May and June.

10. CARUM L. Caraway

Carum carvi L.

Map 15

Erect, glabrous, biennials, from stout taproots, 4-9.5 dm tall; leaves once pinnate; the blades 2-20 cm long, 1.5-6 cm wide, oblong in general outline; leaflets pinnately dissected; petioles of lowest 2 or 3 leaves 6-15 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, compound umbels; rays 7-16, ascending to spreading, 1-4 cm long, unequal; pedicels ascending to slightly spreading, 4-10 mm long, unequal; sepals minute, triangular; petals white; involucre of 1-several linear bracts (sometimes lacking); involucre usually lacking (rarely of 1-several linear bractlets); fruits oblong to narrowly oval, 3-4 mm long, 1.5-2 mm wide, laterally flattened; ribs prominent, lighter than the reddish brown intervals; oil tubes solitary in the intervals, 2 on the commissure; stylopodium short, conic; carpophore split to the base.

C. carvi is a native of Eurasia which has infrequently escaped from cultivation and has become established in open waste places in the state. Flowering occurs from June through August.

11. CONIUM L. Poison hemlock

Conium maculatum L.

Map 16

Erect, stout, glabrous, biennials, from stout taproots, 0.75-3 m tall; stems often with purple spots; leaves 2-3 (4) times pinnate; the blades 3-25 cm long, 2-25 cm wide, ovate in outline; ultimate segments lanceolate to linear, pinnatifid; petioles of lowest 2 or 3 leaves 5-15 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 5-15, spreading to ascending, 1-5 cm long; pedicels spreading, 3-7 mm long; sepals absent; petals white; involucre of several lanceolate bracts, 3-6 mm long; involucre of several ovate to lanceolate bractlets, 1-5 mm long, slightly connate at base; fruits broadly oval to suborbicular, 2-3.5 mm long, 1.5-3 mm wide, laterally flattened; ribs prominent, lighter than the intervals; oil tubes small and numerous; stylopodium short, conic; carpophore split to the base, or nearly so.

C. maculatum is a native of Eurasia which has become established as a weed in waste places throughout Iowa. Flowering takes place from June through September.

12. FALCARIA Host. Sickleweed

Falcaria soides (Wibel) Asch.

Map 17

Erect, glabrous, biennials or perennials, from long, stout taproots, 3-9 dm tall; stems branched from near the base; the lower leaves ternate with the leaflets pinnately or ternately divided, the upper mostly once ternate; the blades 1.5-30 cm long, 1.5-15 cm wide, ovate to oblong in general outline; ultimate segments linear, sharply serrate and with calloused margins; petioles of lowest 2 or 3 leaves 2-25 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 8-20, spreading, 1-4 cm long; pedicels spreading, 5-10 mm long; sepals triangular, 0.5 mm long; petals white; involucre and involucre of several linear, entire bracts or bractlets; fruits narrowly oblong to linear, 3.5-5 mm long, 1-1.5 mm wide, laterally flattened; ribs depressed, greenish, much wider than the dark reddish brown intervals; oil tubes solitary in the intervals, 2 on the commissure; stylopodium low, conic; carpophore cleft to the base.

F. soides is a native of Eurasia which has rarely escaped from cul-

tivation and has become established in waste places in the state. Flowering occurs from July through September.

13. BERULA Hoffm.

Berula pusilla (Nutt.) Fern. Map 18
Erect, weak, glabrous, aquatic perennials, from fibrous roots, 35-75 cm tall; stems solitary below, branched at the top; leaves once pinnate; the blades 2-12 cm long, 1-6 cm wide, narrowly ovate to oblong in general outline; leaflets variable, those of lower leaves mostly ovate to oblong, those of upper leaves often linear, margins coarsely serrate to incised; petioles of lowest 2 or 3 leaves 3-10 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 5-15, spreading, 0.5-2 cm long; pedicels spreading, 2-6 mm long; sepals lacking; petals white; involucre of several foliaceous lanceolate to linear bracts, 3-15 mm long; involucre of several lanceolate or linear bractlets, 1-5 mm long; fruits ovate to orbicular, 1.5-2 mm long, 1-2 mm wide, laterally flattened, appearing somewhat flaccid or crumpled; the ribs somewhat obscured by the thick, corky pericarp; oil tubes numerous; stylopodium, low, conic.

B. pusilla is rare in Iowa, occurring only in the extreme northwestern part of the state. It is, however, abundant on Silver Lake Fen in Dickinson county. Flowering takes place from July through September.

14. SIUM L. Water-parsnip

Sium suave Walt. Map 19
Erect, glabrous, stout, perennials, from fascicled, fusiform roots, 5-20 dm tall; stems solitary below, branched above; leaves once pinnate; the blades 3.5-26 cm long, 7-15 cm wide, ovate in general outline; leaflets 5-13, 2-8 cm long, 0.3-3 cm wide, lanceolate, sharply serrate; petioles of lowest 2 or 3 leaves 6-25 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 9-20, spreading, 10-30 mm long; pedicels spreading, 3-5.5 mm long; sepals lacking; petals white; involucre of several lanceolate to linear bracts, 3-15 mm long; involucre of several linear to lanceolate bractlets, 1-3 mm long; fruits orbicular to suborbicular, 2-3 mm long, 2-2.5 mm wide; ribs prominent, greenish yellow; intervals dark brown; oil tubes 1-3 in each interval, 2-6 on the commissure; stylopodium low, broad, conic; carpophore adnate along entire length.

S. suave is found in marshy areas throughout the state, but it is much more common in northwestern Iowa. Flowering takes place from July through September.

15. CICUTA L. Water-hemlock

Erect, glabrous, perennials; stems solitary below, branching above; lower leaves 2-3 times pinnate; petioles of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; pedicels spreading; sepals triangular, 0.5 mm long; petals white; involucre of several linear or lanceolate bractlets; fruits laterally flattened; oil tubes solitary in the intervals, 2 on the commissure; stylopodium low, obscure; sepals prominent.

1. Bulblets in axils of upper leaves; plants from fibrous roots.

1. *C. bulbifera*

1. Bulblets not present in axils of upper leaves; plants from large, fascicled, tuberous roots.

2. *C. maculata*

1. *Cicuta bulbifera* L. Map 20

From fibrous, somewhat fleshy roots, 6-10.5 dm tall; leaf blades 3-18 cm long, 2-12 cm wide, ovate or oblong in general outline; upper cauline blades mostly ternately divided, bearing bulblets in their axils; ultimate segments linear or lanceolate, 1-10 cm long, 2-15 mm wide, sparsely serrate or dentate; petioles of lowest 2-3 leaves 5-18 cm long; rays 5-12, spreading, 1-3 cm long; pedicels 1-5 mm long; involucre of 1-several lanceolate or linear bracts (rarely absent); fruits orbicular, 1.5-2 mm long, 1.5-2 mm wide, appearing somewhat flaccid or crumpled; ribs low and broad, somewhat obscure.

C. bulbifera is found on fens, bogs, and marshes in the northern half of the state. Flowering occurs from June through September.

2. *Cicuta maculata* L. Map 21

Stout, from large, fascicled, tuberous roots, 0.75-3 m tall; leaf blades 3-35 cm long, 3-25 cm wide, ovate in general outline; the upper cauline blades once ternate; ultimate leaflets lanceolate, 2.5-10 cm long, 0.5-2 cm wide, sharply serrate, sometimes incised near the base; petioles of lowest 2-3 leaves 3-45 cm long; rays 10-25, slightly spreading, 1.5-6 cm long; pedicels 4-10 mm long; involucre absent; fruits broadly oval or orbicular, 2-3 mm long, 2-3 mm wide; intervals black; ribs low, rounded, pale brown; carpophore split to the base.

C. maculata is found in low, wet, open areas throughout the state. Flowering occurs from June through August.

16. THASPIUM Nutt. Meadow-parsnip

Thaspium barbinode (Michx.) Nutt.

Map 22

Erect, mostly glabrous, perennials, from fascicled, fibrous roots, 40-85 cm tall; stems solitary below, branching above, stiff white hairs present on upper nodes; leaf blades 2-18 cm long, 5-30 cm wide, ovate to deltoid in general outline; lower leaves twice ternate or ternate-pinnate; upper cauline leaves mostly ternately divided; the ultimate segments obovate, oval to linear, coarsely serrate, incised in the apical half; petioles of lowest 2 or 3 leaves 4-20 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 8-20, spreading to ascending, 8-25 mm long; pedicels spreading, 2-3 mm long; sepals obovate, 0.5 mm long; petals yellow to pale yellow; involucre wanting; involucel of several linear bractlets, 1-4 mm long; fruits oblong, 5-6 mm long, 3-4 mm wide, slightly flattened laterally, light brown; lateral ribs always winged, the dorsal and intermediate ribs usually winged; oil tubes solitary in the intervals, 2 on the commissure; stylopodium absent; carpophore wanting.

T. barbinode is found in woodlands and open places throughout the state. Flowering occurs in June.

17. ANGELICA L. Angelica

Angelica atropurpurea L.

Map 23

Erect, tall, stout, essentially glabrous, perennials, from large tap-roots; 9-20 dm tall; stems often purple; leaves pinnate; the blades 25-40 cm long, 20-30 cm wide, ovate to broadly oval or suborbicular in general outline, blades of upper cauline leaves often reduced to sheaths; leaflets narrowly ovate to ovate-lanceolate, 4-13 cm long, 2-8 cm wide, doubly serrate to variously incised, giving the blade a very irregular appearance; petioles of lowest 2 or 3 leaves 10-25 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 25-45, spreading, 3-8 cm long, shortly pubescent; pedicels spreading, 4-12 mm long, shortly pubescent; sepals wanting; petals white or greenish white; involucre lacking; involucel of several linear bractlets, 2-6 mm long; fruits oblong, 6-9 mm long, 3-5 mm wide, strongly flattened dorsally; dorsal and intermediate ribs prominent, lateral ribs broadly winged; oil tubes small, numerous around the seed; stylopodium low, conic; carpophore split to the base.

A. atropurpurea is infrequent in the state. It is found along stream banks and in other wet open areas or wet woods. Flowering occurs from June through August.

18. ANETHUM L. Dill

Anethum graveolens L.

Map 24

Erect, glabrous, strongly-scented, annuals, from fusiform roots, 5-10 dm tall; stems solitary below, branched above; leaves once pinnate; the blades 2-15 cm long, 3-12 cm wide, ovate or oblong in general outline; leaflets pinnatifid into filiform segments; petioles of lowest 2 or 3 leaves 3-6 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 20-40, spreading, 3-11 cm long; pedicels spreading, 6-12 mm long; sepals obsolete; petals yellow; bracts and bractlets absent; fruits oblong to elliptic, 2.5-5 mm long, 1-3 mm wide, strongly flattened dorsally, dark brown to black except for the light brown wings on the lateral ribs; dorsal and intermediate ribs prominent; oil tubes solitary in the intervals, 2-4 on the commissure; carpophore cleft to the base.

A. graveolens is a native of southern Europe which has escaped from cultivation. It is rarely found as a volunteer near gardens and in waste places. Flowering occurs in July and August.

19. OXYPOLIS Raf. Hog-fennel

Oxyopolis rigidior (L.) Raf.

Map 25

Erect, glabrous, slender, perennials, from fascicled, tuberous roots, 6-13 dm tall; stems solitary or sometimes branched above; leaves once pinnate; the blades 11-35 cm long, 16-32 cm wide, ovate to deltoid in general outlines; leaflets 5-13, lanceolate or linear, sparsely dentate, 3.5-17 cm long, 3.5-35 mm wide; petioles of lowest 2 or 3 leaves 5-11 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 14-30, spreading, 3.5-10 cm long; pedicels spreading, 3.5-12 mm long; sepals triangular, 0.5 mm long; petals white; involucre of several linear bracts, 1-2 cm long, or wanting; involucel of several linear bractlets 2-5 mm long or sometimes wanting; fruits strongly flattened dorsally, narrowly oval to oblong, 3.5-7 mm long, 1.5-2.5 mm wide, light brown except for the reddish brown intervals; dorsal and intermediate ribs prominent; the lateral ribs broadly winged, these wings strongly nerved at their inner margins, giving the appearance of 5 ribs on the dorsal surface; oil tubes solitary in the intervals, 2-6 on the commissure; stylopodium conic; carpophore split to the base.

O. rigidior occurs on mesic or wet prairies and open marshy areas in the eastern half of the state. Flowering takes place from June through September.

20. LOMATIUM Raf.

Erect perennials, from stout, deep, taproots; stems solitary; leaves basal; petiole bases much dilated; inflorescence of scapose, terminal, regular, compound umbels; sepals wanting; involucre lacking; fruits strongly flattened dorsally; dorsal and intermediate ribs low; lateral ribs with broad, thin wings; stylopodium low and obscure or lacking; carpophore split to the base.

1. Petals yellow; fruits with 1 oil tube in each interval (sometimes 2 in 1 or 2 intervals of a mericarp).

1. *L. foeniculaceum*

1. Petals white; fruits with 3 oil tubes in each interval.

2. *L. orientale*

1. *Lomatium foeniculaceum* (Nutt.) Coult. & Rose Map 26

Glabrous or pubescent, 12-35 cm tall; leaves 3 times pinnate; the blades 7.5-12 cm long, 5-9 cm wide, ovate in general outline, villous; the ultimate segments linear, 2-4 mm long, 0.5-1 mm wide; petioles 2-8 cm long; rays 8-18, ascending to slightly spreading, 1-6 cm long, pubescent; pedicels spreading, 3-10 mm long; petals yellow; involucre of several ovate or lanceolate bractlets, 2-6 mm long, connate below; fruits broadly oval or suborbicular, 6-8 mm long, 5-7 mm wide; the ribs and wings light brown, intervals reddish brown; oil tubes 3 in each interval, 4 on the commissure.

L. foeniculaceum is found only on west-facing loess prairie bluffs in extreme western Iowa. Flowering takes place in April.

2. *Lomatium orientale* Coult. & Rose Map 27

Pubescent, 7-40 cm tall; leaves 2-3 times pinnate; the blades 4-9 cm long, 3-7 cm wide, narrowly ovate or oblong in general outline; the ultimate segments linear, 1-12 mm long, 0.5-2 mm wide; petioles 3-11 cm long; rays 10-15, ascending to spreading, 0.5-3.5 cm long, sparsely to densely villous; pedicels ascending to spreading, 0-7 mm long, glabrous or scabrous; petals white; involucre of several linear or lanceolate bractlets, 2-3 mm long, distinct to the base; fruits narrowly oval or ovate, 5-7 mm long, 3-5 mm wide; ribs and wings lighter than the intervals; 1 oil tube in each interval (rarely 2 in 1 or 2 of the intervals of a mericarp), 4 on the commissure.

L. orientale is a prairie species which is found only in extreme western Iowa. Flowering takes place in April.

21. POLYTAENIA DC.

Polytaenia nuttallii DC. Map 28

Erect, stout, sparsely pubescent, perennials, from thick taproots, 5-9

dm tall; stems solitary below, branching above; leaf blades 3-18 cm long, 3-15 cm wide, ovate to oblong in general outline; lower leaves pinnate-pinnatifid or bipinnate, upper cauline leaves mostly ternately divided; leaflets ovate to oblong, sparsely serrate to incised or lobed; petioles of lowest 2 or 3 leaves 6-16 cm long; those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 10-15, ascending to spreading, 2-3 cm long, shortly pubescent; pedicels ascending to spreading, 3-5 mm long, shortly pubescent; sepals triangular, 0.5 mm long; petals yellow; involucre lacking; involucre of 1-several linear, scarious bractlets; fruits strongly flattened dorsally, oval to obovate or suborbicular, 6-9 mm long, 4-6 mm wide; dorsal and intermediate ribs obscured by the thick, corky pericarp, lateral ribs with thick, corky wings; oil tubes obscure; stylopodium absent; carpophore split to the base.

P. nuttallii is infrequently found on the prairies of Iowa. Flowering occurs in May and June.

22. PASTINACA L. Parsnip

Pastinaca sativa L.

Map 29

Erect, glabrous, stout, biennials, from taproots, 25-90 cm tall; stems solitary below, branching above; leaves once pinnate; the blades 10-20 cm long, 6-18 cm wide, oblong in outline; leaflets 1.5-9 cm long, 0.4-6 cm wide, oblong to ovate, coarsely serrate to incised or lobed; petioles of lowest 2 or 3 leaves 4-15 cm long, those of upper leaves much reduced or obsolete; inflorescence of terminal and axillary, regular, compound umbels; rays 5-25, ascending to slightly spreading, 1-8 cm long; pedicels ascending to spreading, 2-11 mm long; sepals lacking; petals yellow; bracts and bractlets absent; fruits strongly flattened dorsally, oval to obovate or suborbicular, 5-7 mm long, 4.5-6 mm wide; dorsal and intermediate ribs prominent, the lateral ribs broadly winged; oil tubes solitary in the intervals, 2-4 on the commissure; stylopodium conic; carpophore split to the base.

P. sativa is a native of Eurasia which has escaped from cultivation and has become established as a roadside weed throughout Iowa. Flowering occurs from May through October.

23. HERACLEUM L. Cow-parisnip

Heracleum lanatum Michx.

Map 30

Erect, stout, pubescent perennials, from fascicled, tuberous roots, 1-3 m tall; leaves ternate; the blades 1.6-5 dm long, 1.8-5 dm wide; leaflets coarsely serrate to variously lobed or incised, the lateral leaf-

lets often narrower than the middle leaflet; petioles 4-60 cm long, the bases much dilated; inflorescence of terminal and axillary, regular, compound umbels; rays 18-35, ascending, 5-13.5 cm long; pedicels ascending to spreading, 4-20 mm long; sepals lacking; petals white; involucre of 5-10 lanceolate, deciduous bracts, 5-20 mm long; involucre of lanceolate to linear bractlets, 3-15 mm long; fruits strongly flattened dorsally, obovate, 7-15 mm long, 4-10 mm wide, light brown to nearly yellow at maturity; lateral ribs broadly winged; oil tubes solitary in the intervals (visible as red to brown streaks on apical half of fruit), 2-4 on the commissure; stylopodium conspicuous, conic; carpophore split to the base.

H. lanatum is found in rich, moist woods throughout Iowa. Flowering takes place in June and July.

24. ERYNGIUM L. Eryngo

Eryngium yuccifolium Michx.

Map 31

Erect, stout, glabrous, perennials, from fascicled, somewhat woody roots, 4.8-11 dm tall; stems solitary below, branching above; leaves simple, linear-lanceolate, parallel-veined, sessile, coriaceous, spinulose on margins; flowers in dense heads, these terminal and axillary, cymosely arranged, ovoid to globose, 0.5-2.5 cm long, 0.5-2.5 cm wide; pedicels obsolete; sepals ovate, 0.5 mm long; petals white; involucre of 6-10 linear-lanceolate bracts, 0.5-2 cm long, entire or sparsely spinulose; involucre of several ovate to ovate-lanceolate bractlets; fruits oblong, covered with scales, 4-8 mm long, 2-3 mm wide; ribs absent; usually 5 oil tubes per fruit; commissural scar linear, 2-forked at apex; stylopodium lacking.

E. yuccifolium is found on mesic to wet-mesic prairies and prairie remnants throughout Iowa. Flowering takes place in July and August.

Excluded Taxa

1. *Angelica venenosa* (Greenway) Fern.

Murley (1946) reported this species as occurring naturally in the state. This report was based on the following herbarium specimens: Winneshiek Co.: 9 June 1896, *Herbert Goddard s.n.* (ISC). Winneshiek Co.: 9 June 1896, *Herbert Goddard s.n.* (IA). Winneshiek Co.: 20 June 1895, *T. J. Fitzpatrick s.n.* (IA).

In 1960 T. G. Hartley annotated both the Fitzpatrick and Goddard collections in The University of Iowa Herbarium as *Angelica atropurpurea* L., a species which definitely occurs in Iowa.

The two species are distinguished by the following characteristics:

A. atropurpurea: Inflorescence shortly pubescent to scabrous; leaflets 4-13 cm long, 2-8 cm wide; ovaries glabrous to scaberulous.

A. venenosa: Inflorescence tomentose; leaflets 2.5-4 cm long, 1-3 cm wide; ovaries densely tomentose.

The specimens are in poor condition and only part of a plant is present on each sheet. The Fitzpatrick specimen and the Goddard specimen in The University of Iowa Herbarium consist of the inflorescences with buds, flowers, and immature fruits. The rays and pedicels of these plants are shortly and sparsely pubescent. The ovaries are scaberulous or glabrous. The Goddard specimen in the Iowa State University Herbarium consists of several leaflets and the inflorescence with immature fruits. The leaflets are 8-10 cm long. The rays and pedicels are shortly and sparsely pubescent. The ovaries are glabrous or scaberulous.

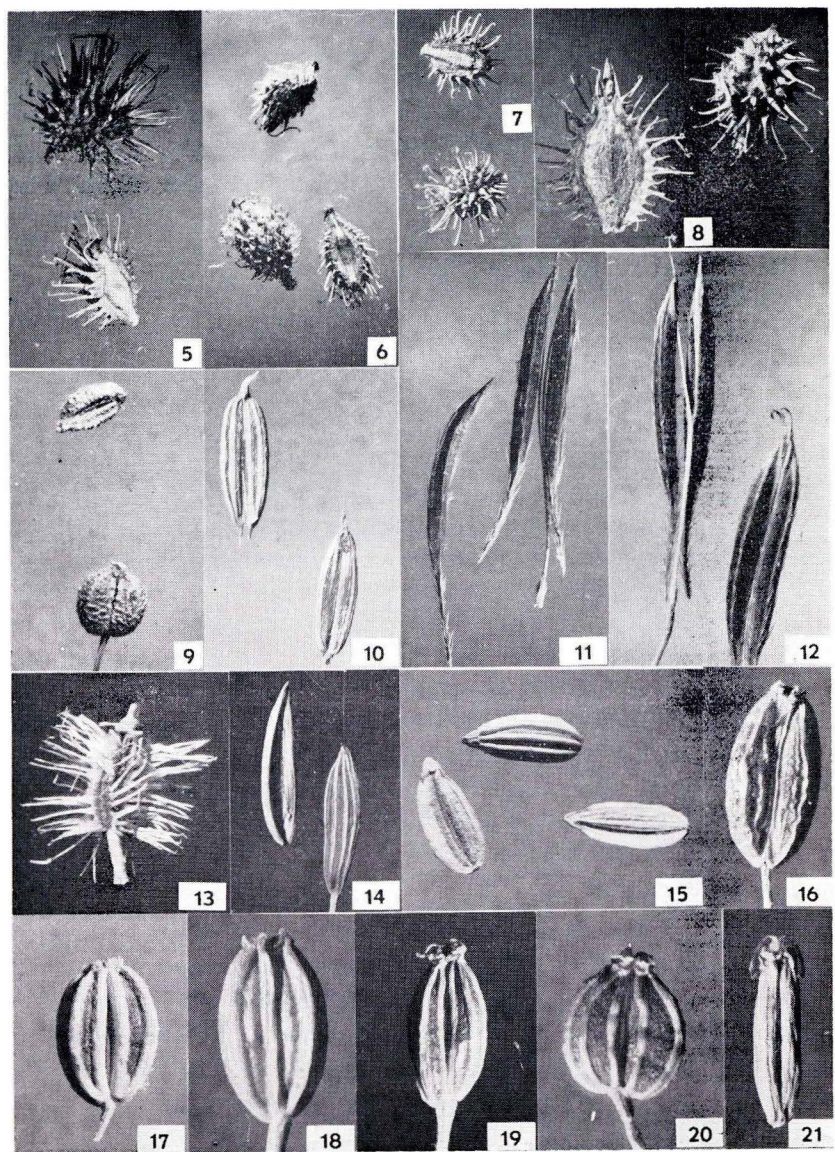
After careful study and consideration of the above features, all 3 specimens were annotated as *A. atropurpurea*. To my knowledge *A. venenosa* does not occur in Iowa.

2. *Torilis japonica* (Houtt.) DC.

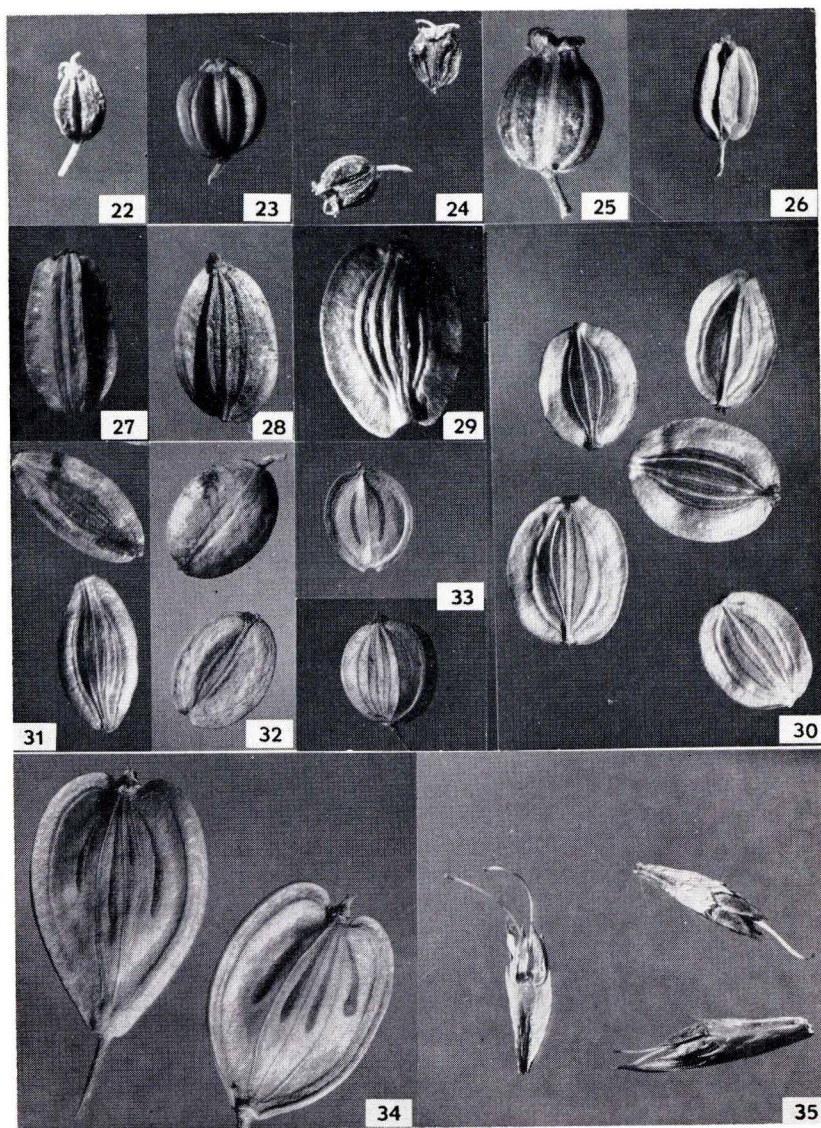
Murley (1946) reported this species as occurring in the state. This report is apparently based on the following specimen: Hardin Co.: Between Hubbard and Eldora, 30 May 1929, *L. H. Pammell s.n.* (ISC). The specimen consists of a fragment of a leaf. Positive identification is impossible; however, it does not appear to be *T. japonica*. Murley did not annotate the specimen.

3. *Osmorhiza longistylis* var. *villicaulis* Fern.

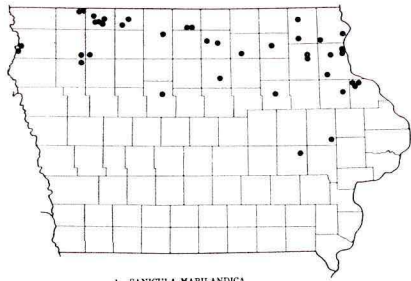
This variety is recognized by Mathias and Constance (1944-45) on the basis of densely villous stems and petioles. I am of the opinion that this characteristic is not worthy of varietal recognition. Many plants which are intermediate between the glabrous and villous condition have been found. Furthermore, given individuals often become more glabrous as they mature.



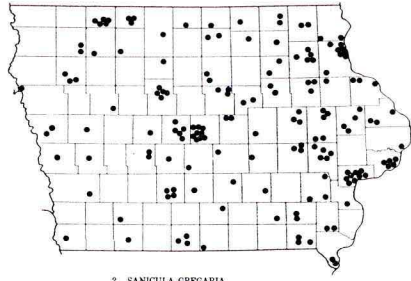
Figs. 5-21. 5. Fruits of *Sanicula marilandica*. Note the conspicuous styles which exceed the bristles, the bulbous-based bristles, and the narrowly oval commissural scar (x ca. 3). 6. Fruits of *Sanicula gregaria*. The styles are much longer than the bristles. Also, the bristles are not bulbous-based and the commissural scar is linear (x ca. 3.5). 7. Fruits of *Sanicula canadensis*. Note the linear commissural scar (x ca. 2.5). 8. Fruits of *Sanicula trifoliata*. Note the beaked sepals which equal or exceed the bristles. The commissural scar is broadly oval (x ca. 4). 9. Fruits of *Spermolepis inermis*. Note the tubercles (x ca. 5). 10. Fruits of *Cryptotaenia canadensis* (x ca. 3). 11. Fruits of *Osmorhiza claytonii* (x ca. 3). 12. Fruits of *Osmorhiza longistylis* (x ca. 2.5). 13. Fruit of *Daucus carota*. Note the long white spines which result from segmentation of the broad wings of the secondary ribs (x ca. 7). 14. Fruits of *Chaerophyllum procumbens*. Note the light, broad wings and the low stylopodia (x ca. 3). 15. Fruits of *Foeniculum vulgare*. Note the prominent dorsal and intermediate ribs, and the high, conspicuous stylopodia (x ca. 3). 16. Fruit of *Taenidia integerrima*. Note the wrinkled pericarp and the absence of stylopodia (x ca. 5.5). 17. Fruit of *Zizia aurea*. Note the prominent ribs and the dark intervals (x ca. 4.5). 18. Fruit of *Zizia aptera*. Note the prominent ribs and conspicuous sepals (x ca. 6). 19. Fruit of *Carum carvi*. Note the shiny intervals, prominent ribs, and low stylopodia (x ca. 6). 20. Fruit of *Conium maculatum*. Note the prominent, light ribs, the dark intervals, and the mature, separating mericarps (x ca. 6). 21. Fruit of *Falcaria sioides*. Note the broad, depressed ribs, and the linear shape of the fruit (x ca. 5.5).



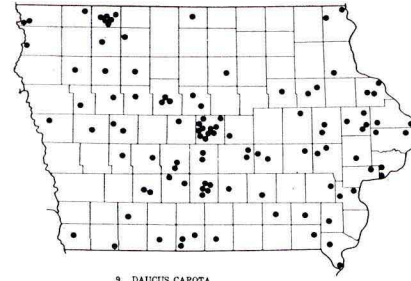
Figs. 22-35. 22. Fruit of *Berula pusilla*. Note the prominent stylopodia, the persistent styles, and the absence of sepals (x ca. 5). 23. Fruit of *Sium suave*. Note the very prominent, light ribs which contrast with the dark intervals (x ca. 5). 24. Fruits of *Cicuta bulbifera*. Note the prominent sepals and styles, and the absence of stylopodia (x ca. 5). 25. Fruit of *Cicuta maculata*. Note the prominent sepals and the wide, dark intervals which contrast with the low, light ribs (x ca. 7). 26. Fruit of *Thaspium barbinode*. All the ribs have broad, thin wings (x ca. 2.5). 27. Fruit of *Angelica atropurpurea*. Note the conspicuous dorsal and intermediate ribs, and the wings on the lateral ribs (x ca. 3). 28. Fruit of *Anethum graveolens*. Note the prominent dorsal and intermediate ribs, and the winged lateral ribs (x ca. 5). 29. Fruit of *Oxypolis rigidior*. Note that the wings on the lateral ribs are strongly nerved at their inner margins, and along with the dorsal and intermediate ribs give the appearance of 5 ridges on the dorsal surface (x ca. 5). 30. Fruits of *Lomatium foeniculaceum*. Note the 3 oil tubes in each interval and the 4 oil tubes on the commissure. Also note the broadly winged lateral ribs (x ca. 3). 31. Fruits of *Lomatium orientale*. Note the solitary oil tubes in each interval and the winged lateral ribs (x ca. 3.5). 32. Fruits of *Polytaenia nuttallii*. Note the thick pericarp which obscures the ribs (x ca. 2.5). 33. Fruits of *Pastinaca sativa*. Note the very low dorsal and intermediate ribs, and the solitary oil tubes in each interval. Note also the 2 oil tubes on the commissure and the broad wings on the lateral ribs (x ca. 2.5). 34. Fruits of *Heracleum lanatum*. Note the low dorsal and intermediate ribs and the solitary oil tubes in each interval. The broad wings on the lateral ribs and the stylopodia are also conspicuous (x ca. 3). 35. Fruits of *Eryngium yuccifolium*. Note the scales on the fruit bodies and the persistent styles (x ca. 3).



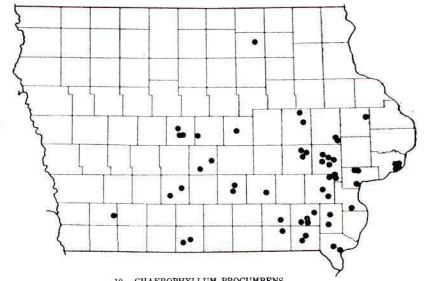
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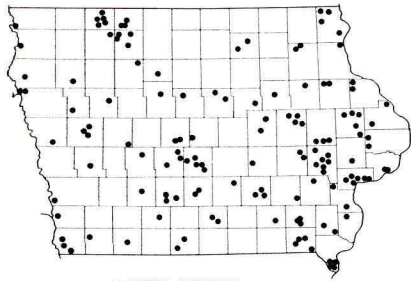
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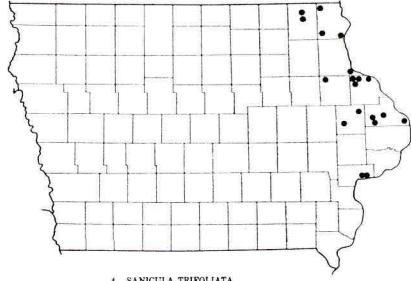
9. *DAUCUS CAROTA*



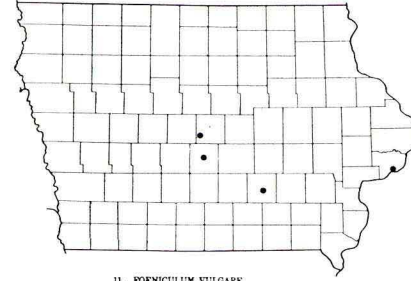
10. *CHAEROPHYLLUM PROCUMBENS*



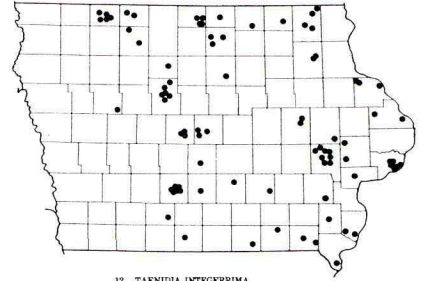
3. *SANICULA CANADENSIS*



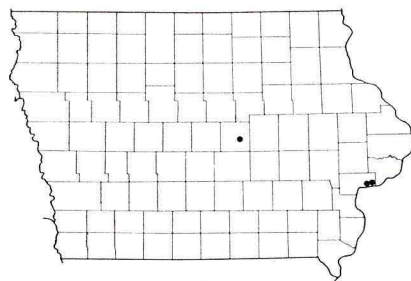
4. *SANICULA TRIPOLIATA*



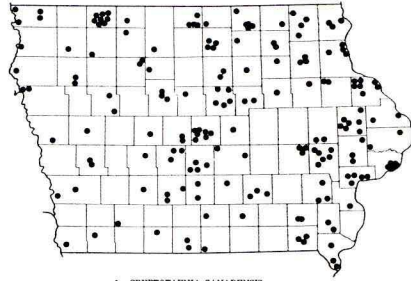
11. *FOENICULUM VULGARE*



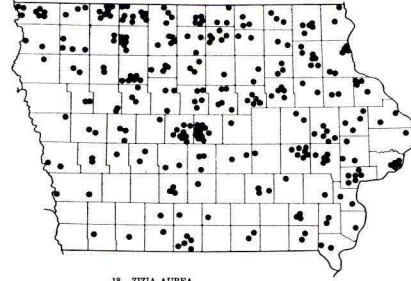
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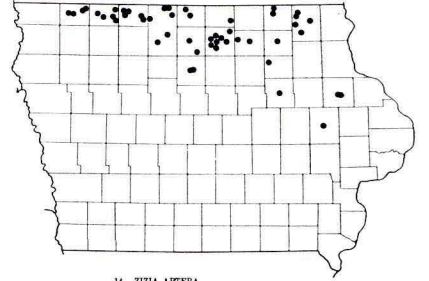
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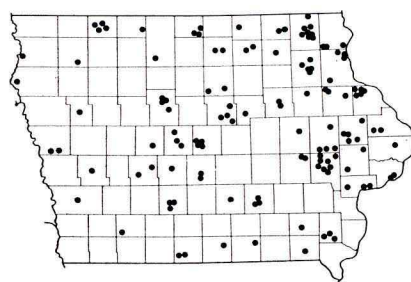
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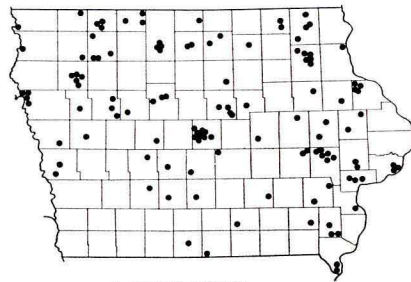
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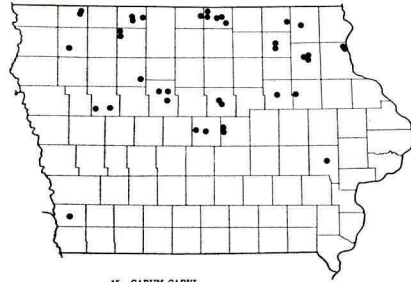
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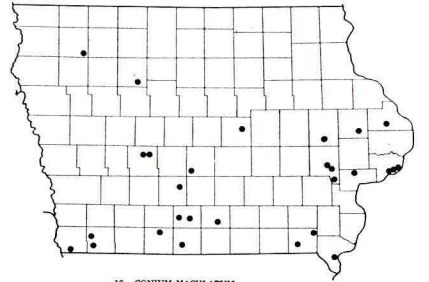
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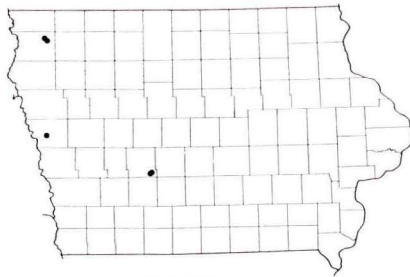
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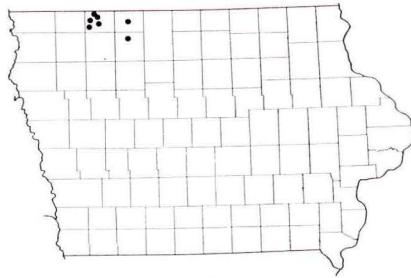
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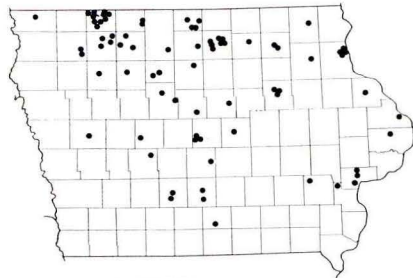
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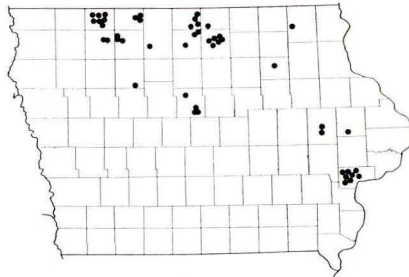
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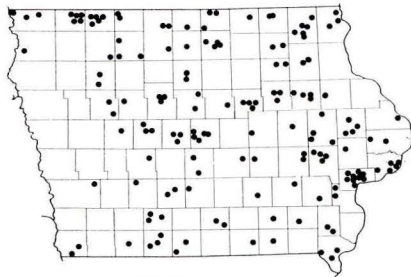
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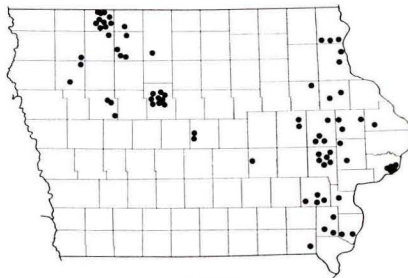
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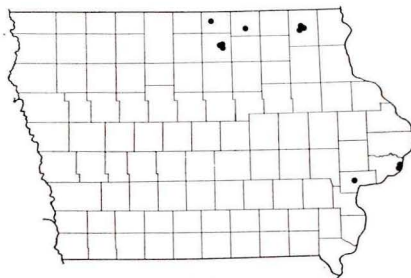
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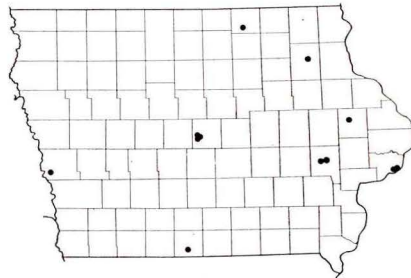
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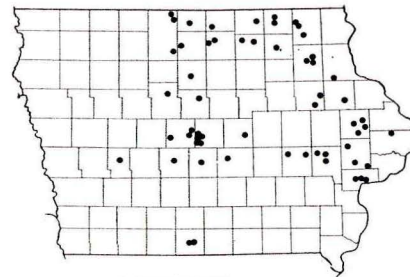
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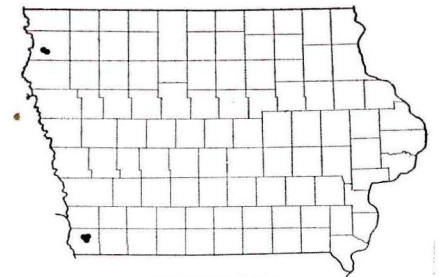
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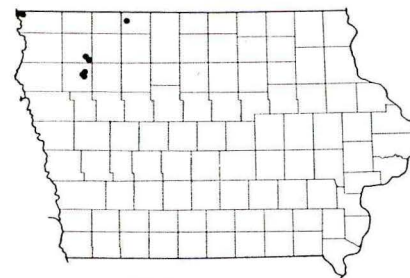
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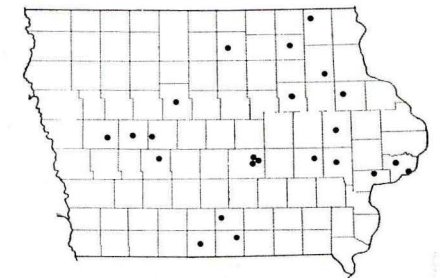
25. OXYPOLIS RIGIDIOR



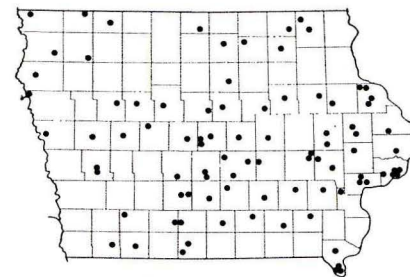
26. LOMATIUM FOENICULACRUM



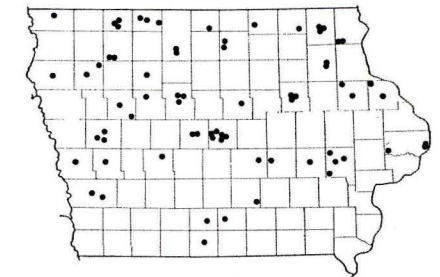
27. LOMATIUM ORIENTALE



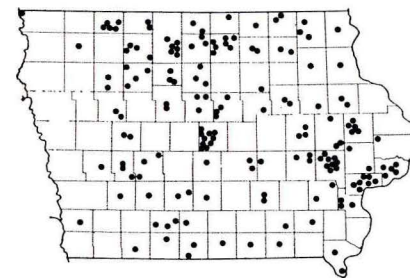
28. POLYTAENIA NUTTALLII



29. PASTINACA SATIVA



30. HERACLEUM LANATUM



31. ERYNGIUM YUCCIFOLIUM

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