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The Family Boraginaceae in Iowa—A Preliminary Report

CHARLES L. GILLY AND EVELYN K. O'BRIAN

Except for the annotated list published by Cratty in "The Iowa Flora" (1933), there has been no publication dealing with the entire family Boraginaceae in Iowa. On the basis of only the Iowa State College herbarium, Cratty listed thirteen species of the family known to occur in the state; three of these were indicated as introductions from Europe or Asia. Prior to the appearance of Cratty's list, certain species of the family had been included in local and county lists,^{1/} and in Cratty's paper on the immigrant flora of Iowa (1929), while Conard and Clarke (1929) had discussed the differentiation of *Lithospermum canescense* and *L. gmelini* (the *L. croceum* of the present paper). Four species, not listed by Cratty (1933), had been reported for the state prior to the publication of "The Iowa Flora;" these are: (a) *Hackelia americana* (A. Gray) Fern., reported by Arthur (1878) as *Echinosperrum deflexum* and by Somes (1913) as *Lappula deflexa* var. *americana*; (b) *Lithospermum arvense* L., reported by Arthur (1884), Halstead (1888), Barnes, Reppert and Miller (1901), Greene (1907), and more recently by Goodman (1940) and Augustine (1941); (c) *Lithospermum officinale* L., reported by Fink (1897); and (d) *Symphytum officinale* L., reported by Diehl (1916) and Hagge (1929). Cratty (1934), in a second paper on the immigrant flora of Iowa, added *Borago officinalis* L. to the state list. Six other species have been reported for Iowa, but we have been unable to find specimens of them; they are placed, therefore, in the list of Excluded Species on page 147 of the present paper.

The eighteen species included here are arranged in alphabetical order, and pertinent synonymy is given for each. The known distribution of each species in Iowa is indicated, by counties, on the maps in Figures 1-12.^{2/} The limits of distribution beyond the boun-

^{1/} In addition to those cited elsewhere in this paper, the following county floras and lists contain data on the distribution of the Boraginaceae in Iowa: Adair Co. (Gow 1901), Allamakee, Clayton and Winneshiek Cos. (Tolstead 1938), Calhoun Co. (Rigg 1896), Clay and Palo Alto Cos. (Hayden 1943), Dickinson Co. (Shimek 1915), Emmet Co. (Cratty 1904), Henry Co. (Lindly 1928), Henry, Jefferson and Van Burens Cos. (Gilly and McDonald 1949), Linn Co. (Bowne 1946), Lyon Co. (Shimek 1900), Monona Co. (Boot 1915), Story Co. (Pammel 1899; Lindly 1912), and Winneshiek Co. (Shimek 1906).

^{2/} In examining these distribution maps, the reader should remember that "comparatively little botanical work has been done in the south-central and southwestern portions of our state. Therefore, the maps for many Iowa species merely show where a particular species has been collected rather than where it actually grows" (Gilly 1946). Published reports for additional counties, when we have not seen confirmatory specimens, are listed as *unconfirmed reports* under individual species.

daries of Iowa, together with a brief statement with regard to habitat, are given for each species. Eight species, indicated in the Annotated List of Species by means of asterisks, have been introduced into Iowa (as weeds or as escapes from cultivation) from other continents or from the western part of the United States.

A descriptive key is provided for use in the identification of specimens of this family. With the exception of assigning individual specimens of *Lithospermum canescens* or *L. croceum* to the proper place, little difficulty should be encountered in the use of this key. It should be noted here that early-season material, wherein the nature of the fruit is not readily determinable, should not prove troublesome in this key which is based primarily upon characters of the flowers. Inasmuch as the key contains many details of the flowers, leaves and fruits, descriptions of the genera and species are not included in this paper. If needed, such descriptions may be found in any of the standard manuals or floras, such as those of Britton (1901), Britton and Brown (1913), Robinson and Fernald (1908) and Rydberg (1932). Synoptical or semi-synoptical keys are also available in manuals by Deam (1940), Jones (1945) and Steyermark (1940), and in papers by Johnston (1923, 1924) and Krusche (1944).

Inasmuch as 784 specimens of Boraginaceae from Iowa were examined in the preparation of this paper, citation of all specimens examined has seemed inadvisable because of space requirements. Specimens, therefore, have been cited for only seven species, which are represented by only one or a few specimens in the collections which we have examined. The herbarium in which each of these specimens may be found is indicated, in the citation, by parenthetical letters as follows: (G) Grinnell College, Grinnell; (ISC) Iowa State College, Ames; (IW) Iowa Wesleyan College, Mt. Pleasant; (P) Parsons College, Fairfield; (SUI) State University of Iowa, Iowa City. We wish to express our thanks to the persons in charge of these herbaria for permission to study the specimens.

DESCRIPTIVE KEY TO THE SPECIES OF BORAGINACEAE IN IOWA

- A1. Flowers regular, the five lobes of the corolla equal in size and shape
 - B1. Throat of the corolla with scale-like appendages opposite the lobes
 - C1. Anthers not more than 3 mm. long, included within the corolla or barely protruding, not appressed around the style
 - D1. Corolla lobes about equalling or longer than the tube of the corolla; nutlets with prickles on surface or margins
 - E1. Flowers 2-3 mm. broad; nutlets erect, with prickles only on the back or margins, higher than broad, rounded or pointed at apices

- F1. Nutlets basally attached by broad oblique scar; pedicels of fruit-clusters recurved or deflexed; leaves oblong, lanceolate or ovate, 1.5 cm. or more in width; usually some flowers without bracts at base of pedicels; corolla white or whitish
- F2. Nutlets attached by entire margin, the attachment scar long and linear; pedicels of fruit-clusters erect or merely spreading; leaves linear to linear-oblong, less than 7 cm. wide; all flowers bracteate; corolla blue or bluish.
- G1. leaves lanceolate to elliptical; fruit-clusters pyramidal
.....4. *Hackelia americana*
- G2. Leaves ovate to broadly elliptical; fruit-clusters globose
.....5. *Hackelia virginiana*
- H1. Marginal prickles of nutlets in two rows, scarcely if at all united together; outer surface (back) of each nutlet also prickly; leaves usually more than 4 mm. wide.....6. *Lappula echinata*
- H2. Marginal prickles of nutlets in one row, usually confluent at base to form a marginal rim; outer surface (back) of each nutlet minutely warty but not covered with prickles; leaves usually less than 4mm. wide.....
7. *Lappula redowskii* var. *occidentalis*
- E2. Flowers 6-8 mm. broad; corolla reddish-purple or rarely white; nutlets divergent, completely covered with prickles on surface, broader than high with flattened depressed top; leaves lanceolate to elliptical, 10-30 cm. long, the lower long-petioled, the upper sessile
.....2. *Cynoglossum officinale*
- D2. Corolla lobes much shorter than the tube of the corolla; nutlets smooth, wrinkled or pitted, but not prickly
- I1. Flowers pale yellowish or purplish, 1-2 cm. long, the margins of the lobes entire; leaves lanceolate to ovate, 6 cm. long or longer, with prominent lateral veins; surface of nutlets slightly wrinkled, the attachment scar as broad as the nutlet, concave, its margin irregularly toothed.....18. *Symphytum officinale*

12. Flowers bright yellow, 2-3 cm. long, the margin of the lobes erose to lacinate;^{3/} outer surface of the nutlets smooth, the inner surface minutely pitted, the attachment scar smaller than the diameter of nutlet, flat-surfaced and entire-margined.....11. *Lithospermum incisum*
- C2. Anthers 5-8 mm. long, protruding for the full length from the blue corolla and appressed into a cone around the style; nutlets without prickles, the surface vertically ridged, the attachment scar as broad as base of nutlet, concave, smooth margined; leaves ovate to oblong, 5-12 cm. long, the lower petioled1. *Borago officinalis*
- B2. Throat of the corolla without scale-like appendages, sometimes with fleshy folds or crests at base of lobes; nutlets with smooth or wrinkled surface, without prickles
- J1. Flowers yellow or white, various in shape and size
- K1. Calyx lobes essentially equal in length, the calyx not oblique
- L1. Lobes of the corolla more or less spreading, obtuse or rounded at apices; nutlets with prominent keel-like ridge in center of inner face
- M1. Corolla 4-10 mm. long, funnel-shaped or narrow and bud-like, white, greenish-white or pale yellow
- N1. Calyx shorter than the corolla
- O1. Leaves lanceolate to elliptical, 6-20 mm. wide, with prominent lateral veins, acute or acuminate at apices; flowers funnel-shaped, opening at anthesis; surface of nutlets smooth13. *Lithospermum officinale*
- O2. Leaves narrowly linear, 2-5 mm. wide, only the midrib prominent, acute at apices; the flowers bud-like, unopening; nutlets minutely pitted on inner surface.....cleistogamous 11. *Lithospermum incisum*
- N2. Calyx as long or longer than corolla
- P1. Leaves obscurely veined only the midrib prominent, 3-6 mm. wide, linear to linear-oblong, acute or

^{3/} This applies to the early spring flowers of this species. The flowers which appear later in the season are pale yellow, with corollas 1 cm. or less in length, and without the scale-like appendages in the throat; these later flowers are cleistogamous (i. e., bud-like and non-opening).

- obtuse; corolla not crested in throat; nutlets with warty surface.....8. *Lithospermum arvense*
- P2. Leaves with prominent lateral veins, 1-5 cm. wide, ovate, acuminate; corolla crested in throat; nutlets with smooth surface or rarely minutely pitted.....
.....12. *Lithospermum latifolium*
- M2. Corolla 12-18 mm. long, salverform, the lobes spreading and the corolla-face thus appearing flat, bright yellow or orange-yellow; leaves obscurely veined, only the midrib prominent; surface of nutlets smooth
- Q1. Leaves mostly elliptical or oblong, softly and densely pubescent with delicate hairs which obscure one-fourth to one-third of the leaf surface; calyx lobes, in fruiting specimens, 4-7 mm. long; nutlets 2-3 mm. long.....
.....9. *Lithospermum canescens*
- Q2. Leaves lanceolate, rough with sparse stiff hairs which obscure about one-tenth of the leaf surface; calyx lobes, in fruiting specimens, 8-15 mm. long; nutlets 3-4 mm. long.....
.....10. *Lithospermum croceum*
- L2. Lobes of the corolla erect, not spreading, acute at apices; corolla 1-2 cm. long, the tube whitish and the lobes greenish-margined; leaves elliptical to ovate, prominently nerved; pubescence varying from soft and appressed to stiff and spreading; nutlets smooth-surfaced, without keel-like ridge on inner face.....
.....17. *Onosmodium molle* var. *occidentale*
- K2. Calyx lobes unequal in size, the calyx thus appearing oblique; corolla crested in throat, 3-5 mm. long, the lobes spreading, the whitish flowers thus appearing flat-faced; leaves linear to oblong or spatulate, 1-2.5 cm. long; nutlets smooth surfaced, about 1.5 mm. long.....16. *Myosotis verna*
- J2. Flowers blue or purplish (rarely pink or white); corolla 1.5-3 cm. long, tubular or funnel-shaped; nutlets wrinkled on surface
- R1. Leaves ovate-lanceolate, acute to acuminate at apices, sparsely and minutely pubescent; corolla conspicuously 5-lobed and crested in the throat.....
.....14. *Mertensia paniculata*

- R2. Leaves oblong to ovate, obtuse at apices, glabrous; corolla lobes scarcely evident, the uncrested and flaring corolla thus appearing almost entire-margined.....15. *Mertensia virginica*
- A2. Flowers irregular, blue to purplish, the five corolla lobes unequal in size and shape, neither scales nor crests in the throat; leaves narrowly lanceolate to linear-oblong, 2-6 cm. long; nutlets 8-10 mm. long, with irregular pattern of prominent ridges on surface.....3. *Echium vulgare*

ANNOTATED LIST OF IOWA SPECIES

*1. BORAGO OFFICINALIS L. Sp. Pl. 137. 1753.

Borage—annual, 3-8 dm. high—waste places, railroad ballast and old gardens—native of Mediterranean Europe, widespread in central Europe as a cultivated plant and as an escape; naturalized or occurring as a waif in scattered localities in North America from Nova Scotia to Michigan and North Dakota, southward to Virginia, Illinois and Iowa, also in British Columbia, Oregon, Mexico and Central America—Iowa distribution: Fig. 1.

SPECIMENS EXAMINED: Benton Co., Blairstown, *Pammel*, Sept. 29, 1929, (ISC); Jackson Co., Bellevue, *Zeutner*, Sept. 3, 1944, (ISC).

NOTE: both of these specimens are labeled as escapes from cultivation.

*2. CYNOGLOSSUM OFFICINALE L. Sp. Pl. 134. 1753.

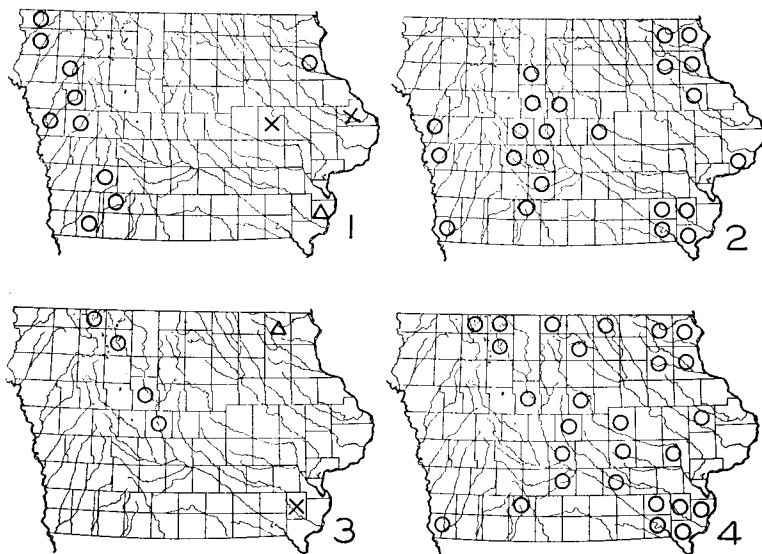
Houndstongue; common houndstongue—biennial, 5-8 dm. high—waste places and pastures, usually in moderately dry soil—native and widespread in Eurasia; naturalized in North America from Quebec to Manitoba and Oregon, southward to North Carolina, Alabama, Arkansas and New Mexico—Iowa distribution: Fig. 2.

UNCONFIRMED REPORTS: Des Moines Co. (Fitzpatrick and Fitzpatrick 1898; *Pammel* 1913; *Pammel* and *King* 1926); Johnson Co. (Somes 1913; *Pammel* 1913; *Pammel* and *King* 1926); Mahaska Co. (Augustine 1941) Muscatine Co. (Barnes, Reppert and Miller 1901; *Pammel* 1913; *Pammel* and *King* 1926). Also indicated on a distribution map by *Pammel* (1913) and *Pammel* and *King* (1926) for the following additional counties: Adair, Benton, Black Hawk, Bremer, Buchanan, Butler, Cass, Cedar, Cerro Gordo, Chickasaw, Clinton, Dubuque, Floyd, Grundy, Hancock, Hardin, Howard, Iowa, Jackson, Jasper, Jones, Kossuth, Linn, Louisa, Polk, Poweshiek, Story, Tama, Warren and Winnebago.

*3. ECHIUM VULGARE L. Sp. Pl. 139. 1753.

Blueweed; viper's bugloss—biennial, 3-7 dm. high—cultivated fields, roadsides and waste places—native of central and Mediterranean Europe, northern Africa and Asia Minor; naturalized in North America from Nova Scotia and New Brunswick to Ontario, Minnesota and Nebraska, southward to Georgia, Louisiana, Texas and New Mexico—Iowa distribution: Fig. 1.

UNCONFIRMED REPORT: Lee Co. (*Fults* 1934).



FIGURES 1-4. Known Distribution of Iowa Boraginaceae. Fig. 1—*Borago officinalis* L. (X); *Echium vulgare* L. (O); *Lithospermum arvense* L. (Δ). Fig. 2—*Cynoglossum officinale* L. Fig. 3—*Hackelia americana* (A. Gray) Fern. (O); *Lithospermum officinale* L. (X); *Mertensia paniculata* (Ait.) G. Don (Δ). Fig. 4—*Hackelia virginiana* (L.) I. M. Johnston.

4. *HACKELIA AMERICANA* (A. Gray) Fern. *Rhodora* 40:341. 1938.

Echinosperrum deflexum of authors; not of (Wahl.) Lehm. 1818.

Hackelia deflexa of Am. authors; not of (Wahl.) Opiz, 1839.

Echinosperrum deflexum var. *americanum* A. Gray, Proc. Am. Acad. 17:224. 1882.

Lappula deflexa of authors; not of (Wahl.) Greene, 1891.

Hackelia deflexa var. *americana* (A. Gray) Fern. & I. M. Johnston, *Rhodora* 26:124. 1924.

Nodding stickseed—biennial, 3-10 dm. high—thickets, woodland clearings and margins—Manitoba to British Columbia, southward to Iowa, Nebraska and Idaho—Iowa distribution: Fig. 3.

SPECIMENS EXAMINED: Boone Co., Ledges Park, *Pammel, Buchanan and King 3921*, July 25, 1903 (ISC), Frazer, *ISC Botanical Seminar 53*, Sept. 11, 1911, (ISC); Dickinson Co., Spirit Lake, *Shimek*, Aug. 1, 1896 (SUI), West Okoboji Lake, *McDonald 3607*, June 26, 1938 (P); Palo Alto Co., Lost Island Lake, *Hayden 9005*, July 27, 1936 (ISC); Webster Co., without exact locality, *Oleson*, 1903 (ISC).

NOTE: the differentiation between this species and *Hackelia deflexa* (Wahl.) Opiz of Eurasia has been discussed by Fernald (1924, 1938).

5. *HACKELIA VIRGINIANA* (L.) I. M. Johnston, Contr. Gray Herb. 48:45. 1923.

Myosotis virginiana L. Sp. Pl. 131. 1753.

Echinosperrum virginicum Lehm. Asperif. 1:117. 1818.

Cynoglossum morisoni A. DC. Prodr. 10:155. 1846.

Lappula virginiana (L.) Greene, Pittonia 2:182. 1891.

Beggar's lice; sticktight—biennial or perennial, 3-9 dm. high—thickets, open woodlands and roadsides—Maine to Quebec, Minnesota and South Dakota, southward to Georgia, Louisiana and Kansas—Iowa distribution: Fig. 4.

UNCONFIRMED REPORTS: Black Hawk Co. (Burk 1932); Boone Co. (Diehl 1916); Decatur Co. (Fitzpatrick and Fitzpatrick 1899); Dubuque Co. (Pammel 1924); Linn Co. (Lazell 1927); Lyon Co. (Boot 1918); Madison Co. (Mueller 1904); Muscatine Co. (Barnes, Reppert and Miller 1901); Page Co. (Fitzpatrick and Fitzpatrick 1899); Scott Co. (Nagel and Haupt 1876; Barnes, Reppert and Miller 1901); Woodbury Co. (Pammel 1896). NOTE: the Boone Co. report (Diehl 1916) may be based on a misidentification of a specimen of *H. americana*.

- *6. *LAPPULA ECHINATA* Gilib. Fl. Lith. 1:25. 1781.

Myosotis lappula L. Sp. Pl. 131. 1753.

Echinosperrum lappula (L.) Lehm. Asperif. 1:121. 1818.

Lappula lappula (L.) Karst. Deutsch. Fl. 979. *tautonym*. 1880-83.

Stickseed—annual, 2-6 dm. high—waste places, cultivated fields and roadsides—native and widespread in Eurasia; naturalized in North America from Nova Scotia to Ontario, Alberta and British Columbia, southward to New Jersey, Indiana, Missouri, Texas and California—Iowa distribution: Fig. 5.

UNCONFIRMED REPORTS: Floyd Co. (Bessey 1871); Hardin Co. (Peck 1920); Mitchell Co. (Tuttle 1920); Poweshiek Co. (Bessey 1871); Scott Co. (Nagel and Haupt 1876; Barnes, Reppert and Miller 1901; Pammel 1913; Pammel and King 1926); Wapello Co. (Fitzpatrick and Fitzpatrick 1898). Also indicated on a distribution map by Pammel (1913) and Pammel and King (1926) for the following additional counties: Allamakee, Boone, Bremer, Clinton, Delaware, Dubuque, Jackson, Pocahontas and Union.

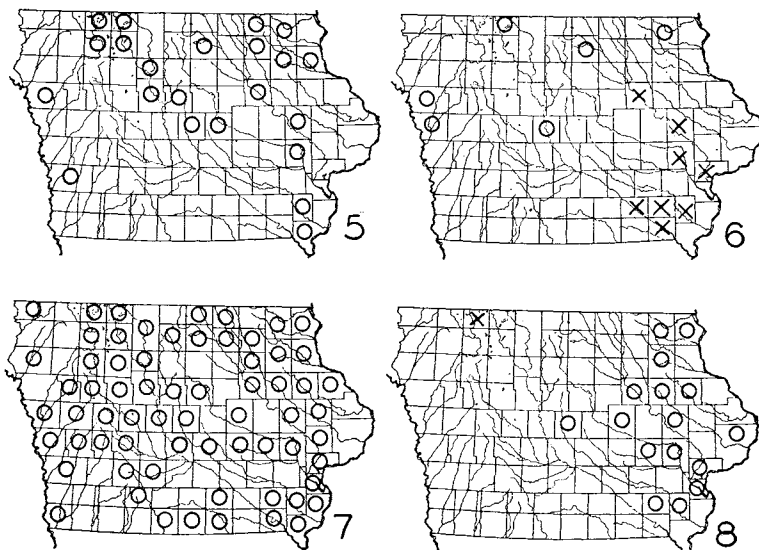
- *7. *LAPPULA REDOWSKII* (Hornem.) Greene, var. OCCIDENTALIS (S. Wats.) Rydb. Contr. U. S. Nat. Herb. 3:170. 1895.

Echinosperrum redowskii var. *occidentale* S. Wats. Bot. King. Exped. 246. 1871.

Lappula texana of Iowa authors; not of (Scheele) Britt. 1894.

Lappula occidentalis (S. Wats.) Greene, Pittonia 4:97. 1899.

Beggar's ticks; stickseed—annual, 2-6 dm. high—sandy and dry soils of the plains, also in waste places and ballast areas—Manitoba to Saskatchewan, southward to Oklahoma and New Mexico; also introduced eastward to Maine, Massachusetts, Michigan, Wisconsin, Minnesota, Iowa and Missouri—Iowa distribution: Fig. 6.



FIGURES 5-8. Known Distribution of Iowa Boraginaceae. Fig. 5—*Lappula echinata* Gilib. Fig. 6—*Lappula redowskii* var. *occidentalis* (S. Wats.) Rydb. (O); *Myosotis verna* Nutt. (X). Fig. 7—*Lithospermum canescens* (Michx.) Lehm. Fig. 8—*Lithospermum croceum* Fern. (O); *Symphytum officinale* L. (X).

SPECIMENS EXAMINED: Boone Co., Boone, *Carver*, without date (ISC); Cerro Gordo Co., Mason City, *Shimek*, July 30, 1922 (SUI); Emmet Co., Estherville, *Wolden*, June 29, 1922 (ISC); Monona Co., north of Turin, *Weber 683*, May 28, 1938 (ISC); Lewis and Clarke State Park, *Hayden 7302*, May 31, 1941 (ISC); Winneshiek Co., without locality, *Goddard*, June 14, 1895 (ISC), Decorah, *Holway*, July 1, 1882 (ISC); Woodbury Co., Sioux City, *Hitchcock*, without date (SUI). UNCONFIRMED REPORTS: Dickinson Co. (*Shimek 1917*); Johnson Co. (*Shimek 1896*; *Somes 1913*; *Shimek 1917*); Lyon Co. (*Boot 1918*).

*8. LITHOSPERMUM ARVENSE L. Sp. Pl. 132. 1753.

Corn gromwell—annual, 2-7 dm. high—waste places, dry fields and ballast areas—native of southern Europe, northern Africa and western Asia; locally naturalized or occurring as a waif in North America from Maine to Quebec, Minnesota and Montana, southward to Florida, Louisiana and Kansas, also in British Columbia, California and Utah—Iowa distribution: Fig. 1.

SPECIMEN EXAMINED: Des Moines Co., along Mississippi River, *Goodman 2986*, May 22, 1937 (ISC). UNCONFIRMED REPORTS: Lee Co. (*Arthur 1884*); Mahaska Co. (*Augustine 1941*); Muscatine Co. (*Barnes, Reppert and Miller 1901*); also reported, without exact locality, by *Halstead (1888)* and *Green (1907)*.

9. LITHOSPERMUM CANESCENS (Michx.) Lehm. Asperif. 2:305. 1818.

Batschia canescens Michx. Fl. Bor.-Am. 1:130. 1805.

Puccoon; orange puccoon—perennial, 2-5 dm. high—plains, prairies and moist to dry pastures and waysides—Pennsylvania to Ontario, Manitoba, and Saskatchewan, southward to Alabama, Texas and Colorado—Iowa distribution: Fig. 7.

UNCONFIRMED REPORTS: Mahaska Co. (Augustine 1941); Osceola Co. (Fitzpatrick 1905); Page Co. (Fitzpatrick and Fitzpatrick 1898); Scott Co. (Fitzpatrick 1898; Barnes, Reppert and Miller 1901); Woodbury Co. (Pammel 1896). NOTE: a few specimens were found to be intermediate in type of pubescence between this species and the next. These are from the following counties: Jefferson, Muscatine, Plymouth and Story; the Jefferson Co. specimen was reported by Gilly and McDonald (1938) as *L. canescens*.

10. LITHOSPERMUM CROCEUM Fern. Rhodora 37:329. 1935.

Lithospermum hirtum of authors; not of Lehm. 1818.

Lithospermum carolinense of authors; not of (Walt.) MacM. 1892.

Lithospermum gmelini of authors; not of (Michx.) Hitchc. 1894.

Orange puccoon; hairy puccoon—perennial, 3-6 dm. high—dry plains, prairies, sandy areas and open woodlands—western New York to Manitoba and Montana, southward to Indiana, Iowa, Missouri and Kansas—Iowa distribution: Fig. 8.

UNCONFIRMED REPORTS: Emmet Co. (Wolden 1933); Lyon Co. (Shimek 1900; Boot 1918); Madison Co. (Mueller 1904); Mahaska Co. (Augustine 1941); Scott Co. (Nagel and Haupt 1876; Barnes, Reppert and Miller 1901). NOTE: Fernald (1935) has recently shown that this species is distinct from *L. carolinense* (Walt.) MacM. [incl. *L. gmelini* (Michx.) Hitchc. and *L. hirtum* Lehm.] of the eastern and southern coastal plains and adjacent areas. It is of some interest to discover, as we have done (Gilly and O'Brian 1949, in press), that both sets of differential characters which separate these two species are to be found in Iowa specimens of *L. canescens*.

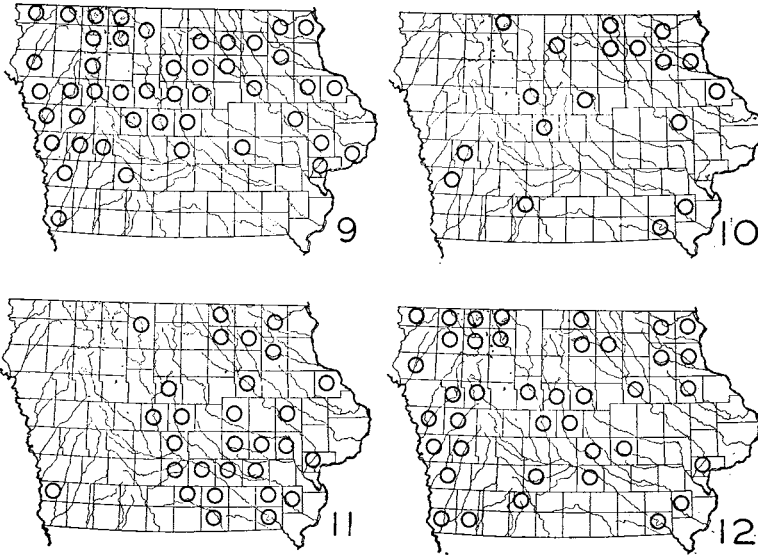
11. LITHOSPERMUM INCISM Lehm. Asperif. 1:303. 1818.

Lithospermum angustifolium Michx. Fl. Bor.-Am. 1:130, 1803; not of Forssk. 1775.

Lithospermum linearifolium Goldie, Edinb. Philos. Jour 6:322. 1822.

Lithospermum longiflorum (Nutt.) Spreng. Syst. 1:544. 1825; not of Salisb. 1796.

Yellow puccoon; narrow-leaved puccoon—perennial, 1-6 dm. high; two types of flowers (see footnote 3)—dry prairies and roadsides—Ontario to Wisconsin, Manitoba and British Columbia, southward to Indiana, Missouri, Texas, Arizona and northern Mexico—Iowa distribution: Fig. 9.



FIGURES 9-12. Known Distribution of Iowa Boraginaceae. Fig. 9—*Lithospermum incisum* Lehm. Fig. 10—*Lithospermum latifolium* Michx. Fig. 11—*Mertensia virginica* (L.) Pers. ex Link. Fig. 12—*Onosmodium molle* var. *occidentale* (Mackenz.) I. M. Johnston.

UNCONFIRMED REPORTS: Des Moines Co. (Bessey 1871); Johnson Co. (Somes 1913); Louisa Co. (Brown and Brown 1940); Mitchell Co. (Tuttle 1920). NOTE: Rickett (1934) has determined the correct name for this species.

12. LITHOSPERMUM LATIFOLIUM Michx. Fl. Bor.-Am. 1:131. 1803.

American Gromwell—perennial, 6-9 dm. high—dry prairies, thickets and open woodlands—western New York to Ontario, Wisconsin and southern Minnesota, southward to Tennessee, Missouri and Kansas—Iowa distribution: Fig. 10.

UNCONFIRMED REPORTS: Johnson Co. (Somes 1913); Lyon Co. (Boot 1918); Story Co. (Bessey 1871; Hitchcock 1891).

*13. LITHOSPERMUM OFFICINALE L. Sp. Pl. 132. 1743.

Gromwell—perennial, 6-12 dm. high—waste places, ballast and roadsides—native from central Europe through the Caucasus to Persia and north-central Asia; naturalized or occurring locally as a waif in North America from Quebec to Minnesota, southward to New Jersey, Indiana, Iowa and Kansas—Iowa distribution: Fig. 3.

SPECIMEN EXAMINED: Henry Co., Mt. Pleasant, *Henderson and Schmeiser*, May 1924 (IW). UNCONFIRMED REPORT: Fayette Co. (Fink 1897).

14. *MERTENSIA PANICULATA* (Ait.) G. Don, Gen. Syst. 4:318. 1838.

Pulmonaria paniculata Ait. Hort. Kew 1:181. 1789.

Tall lungwort; tall mertensia—perennial, 3-10 dm. high—low, moist to wet woodland, shaded stream banks and wooded swamps—Quebec to northern Ontario, Manitoba, Mackenzie District, Yukon and Alaska, southward to Michigan, Wisconsin, northern Iowa, Minnesota, Alberta, Idaho and Washington—Iowa distribution: Fig. 3.

SPECIMENS EXAMINED: Winneshiek Co., without exact locality, Goddard, June 21, 1896 (SUI) and June 16, 1899 (ISC), Decorah *Holway*, May 29, 1881 (ISC), June 10, 1882 (ISC) and June 13, 1887 (ISC, SUI).

15. *MERTENSIA VIRGINICA* (L.) Pers. ex Link, Handb. 1:580. 1829.

Pulmonaria virginica L. Sp. Pl. 135. 1753.

Bluebells; Virginia cowslip; lungwort; mertensia—perennial, 2-6 dm. high—moist woodlands and thickets and along shaded streams—New York to Ontario and Minnesota, southward to New Jersey, Virginia, Alabama, Missouri and eastern Kansas—Iowa distribution: Fig. 11.

UNCONFIRMED REPORTS: Clayton Co. (Hagge 1929); Des Moines Co. (Bessey 1871; Fitzpatrick and Fitzpatrick 1898); Hardin Co. (Peck 1905); Lee Co. (Fults 1934); Madison Co. (Mueller 1904); Page Co. (Fitzpatrick and Fitzpatrick 1898); Scott Co. (Nagel and Haupt 1876; Fitzpatrick 1898; Barnes, Reppert and Miller 1901). NOTE: the authorship for the name of this species has been listed in several manuals as "(L.) DC. Prodr. 10:88. 1846" but Williams (1937) has shown that this is incorrect.

16. *MYOSOTIS VERNA* Nutt. Gen. 2: addenda. 1818.

Myosotis virginica of authors; probably not of (L.) B.S.P. 1888.

Scorpion-grass; wild forget-me-not—annual, 0.5-4 dm. high—dry grassy areas and woodland clearings, occasionally in cultivated fields—Maine to Ontario and Minnesota, southward to northern Florida, Tennessee, Missouri, Oklahoma and Texas, also from Idaho to southern British Columbia and southward to Wyoming and California; also reported in southern South America—Iowa distribution: Fig. 6.

UNCONFIRMED REPORTS: Benton Co. (Arthur 1878; Lee Co. Fults 1934); Louisa Co. (Brown and Brown 1940); Mahaska Co. (Augustine 1941). NOTE: Fernald (1941) recently has discussed the status of the name *Myosotis virginica*; he concludes that it represents some species other than this one, with which the name frequently has been associated.

17. *ONOSMODIUM MOLLE* Michx., var. *OCCIDENTALE* (Mac-kenz.) I. M. Johnston, Contrib. Gray Herb. 70:18. 1924.

Onosmodium molle of Iowa authors; not of Michx. 1803.

Onosmodium carolinianum of authors; not of (Lam.) A. DC. 1846.

Onosmodium carolinianum var. *molle* A. Gray, Syn. Fl. 2:205. 1878, as to plants described.

Onosmodium occidentale Mackenz. Bull. Torr. Club 32:502. 1905.

Onosmodium occidentale var. *sylvestre* Mackenz. l. c. 504.

Onosmodium hispidissimum of Iowa authors; probably not of Mackenz. 1905.

False gromwell—perennial, 4-12 dm. high—prairies, plains, pastures and old fields—Wisconsin to Manitoba and Alberta, southward to Illinois, Missouri, Kansas, Texas and New Mexico—Iowa distribution: Fig. 12.

UNCONFIRMED REPORTS: Adams Co. (Fitzpatrick and Fitzpatrick 1899); Johnson Co. (Fitzpatrick and Fitzpatrick 1898; Somes 1913); Linn Co. (Lazell 1927); Louisa Co. (Brown and Brown 1940); Montgomery Co. (Fitzpatrick and Fitzpatrick 1899); Scott Co. (Nagel and Haupt 1876; Barnes, Reppert and Miller 1901); Woodbury Co. (Pammel 1896). NOTE: a few specimens from eastern and southeastern Iowa have the dense, harsh, spreading pubescence characteristic of *O. hispidissimum*, but the nutlets are not constricted and flanged at the base as in that species. Apparently these specimens are referable to the so-called variety *sylvestre*, which seems to be nothing more than a series of hybrids between the various phases of *O. molle* and *O. hispidissimum*. We can find however, no clear distinction between these specimens and the more typical phase of the variety *occidentale*, since some of the specimens which we have examined are intermediate in certain characteristics.

*18. SYMPHYTUM OFFICINALE L. Sp. Pl. 136, 1753.

Comfrey—perennial, 6-9 dm. high—waste places and roadsides—native of central Europe, Asia Minor and western Siberia; naturalized or occasionally occurring locally as a waif in North America from Newfoundland to New Brunswick, Minnesota and Montana, southward to Virginia, Tennessee, Iowa and Colorado—Iowa distribution: Fig. 8.

SPECIMEN EXAMINED: Dickinson Co., roadside near Templar Park, Sargent, July 28, 1928 (G.). UNCONFIRMED REPORT: Boone Co. (Diehl 1916); northeastern Iowa, without exact locality (Hagge 1929).

EXCLUDED SPECIES

The following species have been reported from Iowa but we have been unable to find specimens to confirm the reports; some of them, almost certainly, are based upon misidentifications.

Amsinckia spectabilis F. & M.—reported from Webster Co. (Oleson and Somes 1907).

Cynoglossum boreale Fern.—reported from Boone Co. (Diehl 1906) and Clayton Co. (Hagge 1929).

Cynoglossum virginianum L.—reported from Mitchell Co. (Tuttle 1920) and indicated on a distribution map by Pammel (1913) and Pammel and King (1926) for the following additional counties: Allamakee, Boone, Buchanan, Clayton, Clinton, Delaware, Dickinson, Dubuque, Emmet, Greene, Hardin, Johnson, Linn, Marshall, Muscatine, Polk, Story and Winneshiek.

Myosotis micrantha Pall.—reported from Black Hawk Co. (Burk 1932); perhaps based on a misidentification of a specimen of *M. verna* Nutt.

Myosotis scorpioides L.—reported, as an escape from cultivation, in northeastern Iowa, without exact locality (Hagge 1929).

Onosmodium hispidissimum Mackenz.—reported from Black Hawk Co. (Burk 1932) and Mitchell Co. (Tuttle 1920); these reports are almost certainly based on misidentifications of specimens of *O. molle* var. *occidentale* (Mackenz.) I. M. Johnston.

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