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## Heliantheae of Iowa II

M. Rae Johns

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## HELIANTHEAE OF IOWA. II.

M. RAE JOHNS

The first paper on Heliantheae of Iowa<sup>1</sup> included the genera *Galinsoga*, *Eclipta*, *Actinomeris*, *Parthenium*, *Polymnia*, *Ambrosia*, *Iva*, and *Xanthium*. This list was made up of the introduced, the doubtful, and some of the obnoxious weed species of the Tribe Heliantheae. The review covered the history and the distribution of the species in the United States and in Iowa. In the descriptions of the species, emphasis was laid on the minute details of the floral structures in the effort to bring out the distinctive and possibly hitherto unnoted features that mark the species.

This plan is followed in the present paper. The genera included here are: *Heliosp*is, *Silphium*, *Rudbeckia*, *Lepachys*, and *Brauneria*. They possess the characters typical of the Tribe Heliantheae, in the involucle of leaf-like bracts, chaffy receptacle, inflorescence of radiate heads, anthers not caudate, style-arms hairy-appendaged, fruit an akene with pappus obsolete or a low crown. These features leave no doubt as to their position in the Tribe.

They are represented in lists of medicinal plants, and are among plants in cultivation. Only one (*R. hirta L.*) is regarded as an undesirable weed in some localities. All are insect-pollinated, possessing nectar glands and, often, faint but attractive odors.

The five genera are represented in Iowa by fourteen known species. Two others have been reported. All are native to the state, and are mostly coarse perennials common to the prairie, roadsides, open woods, deep woods, or moist areas. They thus range through the xerophytic and mesophytic types of habitat, and have developed definite responses in fluids, surfaces, leaf position and form.

By their conspicuous inflorescences, they contribute to the glorious pageant of the native summer flora of Iowa.

### GENUS *HELIOPSIS* Pers.

*Heliopsis* comes from the Greek *Helios*, the sun, and *opsis*, aspect, and means sun-like or resembling the sun.

<sup>1</sup> Ia. Acad. Sci. 36:147. 1929.



Plate I. *Heliopsis scabra* Dunal.

The genus is made up of seven species, six of which are found in Canada, United States and Central America, and one in Peru. The two species, *H. scabra* Dunal, and *H. helianthoides* (L.) Sweet, are widely distributed in the United States, and in Iowa.

They are somewhat coarse perennials resembling *Helianthus* L., and sold by florists under this name. They are characterized by their opposite petioled leaves coarsely serrate or toothed, and triple veined, the simple or sparingly branched stem and bright yellow heads on long slender peduncles that broaden out at the top.

Because of the perfect and fertile disk-flowers and the pistillate and fertile rays, *Heliopsis* has been associated closely with *Eclipta*, *Galinsoga*, and others,<sup>2</sup> and also with *Silphium*, *Polymnia*, and *Parthenium* which have pistillate and fertile rays but sterile disk-flowers.

#### *HELIOPSIS HELIANTHOIDES* L.

*Heliopsis helianthoides* (L.) Sweet. B. P. S. Prel.

Cat. N. Y. 28. 1888.

*Buphthalmum helianthoides* L. Sp. pl. 904. 1753.

*Heliopsis laevis* Pers. Syn. 2:473. 1807.

*Heliopsis helianthoides* Sweet, Hort. Brit. 487. 1827.

*Heliopsis helianthoides* (L.) Sweet, called Sweet Ox-eye, Smooth *Heliopsis* and False Sunflower, is a woods form. It shows adaptations to this environment in its slender smooth stem 3-15 dm. tall, dichotomously or trichotomously branched above.

The leaves are soft and thinish, smooth beneath and somewhat decurrent upon the petioles; they are coarsely toothed, truncate or narrowed at the base, and ovate-lanceolate or ovate-oblong, rather long pointed.

The floral characters which identify this species are as follows:

Head: with large rounded yellow disk becoming low-conic in age.

Involucral bracts: in 2 or 3 series, oblong-lanceolate, to oblong, the outer with acute, spreading, ciliate tips often longer than the disk, sometimes foliaceous, conspicuously linear-lined.

Disk-flowers: 3-4 mm. long, yellow, narrowed only slightly at the base, 5 spreading lobes, anthers dark, style-arms obtuse, hairy-appendaged toward the tip.

Chaff: long, linear, membranous, slightly dilated and barely jagged at the apex, partially enclosing the akene.

Ray-flowers: several, broadly linear, 2-3 cm. long, bright yellow, though paler or whitish beneath, older rays orange-yellow at base and paling toward the apex, persistent upon the akene.

<sup>2</sup> Heliantheae of Iowa Series I: *Galinsoga*, 148, *Eclipta*, 154. Ia. Acad. Sci. 36: 1929.

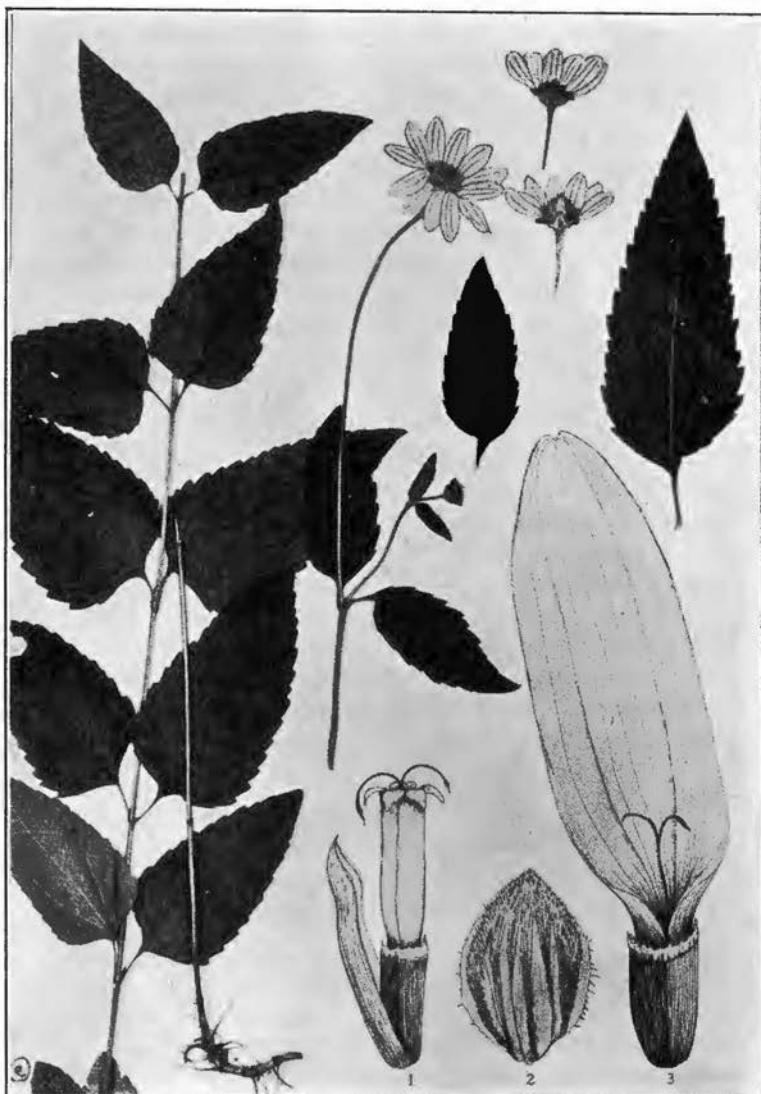


Plate II. *Heliopsis helianthoides* (L.) Sweet. Fig. 1. Disk-Flower. a. Chaff of Receptacle. Fig. 2. Involucral Bract. Fig. 3. Ray-Flower.

Akene: brown, 4-6.5 mm. long, glabrous, truncate; those of the disk-flowers 4-angled, of the rays 3-angled with outer side convex.

Pappus: none, or an obscurely 2-3 toothed crown.

Modifications in this species are to be found in size and extent of branching of the plant, the length of the peduncles, the size and greenness of the leaves. The heads often are small, the involucral bracts sometimes foliaceous, even serrate at the apex, and often longer than the disk.

The general smoothness, and softer texture of the entire plant, the more slender and wand-like stem, the larger more acuminate longer-petioled leaves, the frequently foliaceous involucre never found in the prairie form, the usually smaller heads with rays smooth and narrower, and the entirely smooth akene are the features which distinguish this species from *H. scabra* Dunal, the prairie form.

Although a mesophytic woods form, *H. helianthoides* (L.) Sweet thrives in thickets.

Its range is from Ontario, Pennsylvania, Maryland, to Florida, west to Illinois and Kentucky. In Iowa it is quite common, though locally not abundant but rather scattered in wooded areas.

Specimens were found in moist woods of the Okoboji region in Dickinson County, in the Amana woods in Iowa County, open woods at Black-Springs near Iowa City in Johnson County and in Wild-Cat Den in Muscatine County.

Herbarium specimens were from Allamakee, Clayton, Dickinson, Fayette, Iowa, Louisa, Winneshiek, and Woodbury Counties.

In the following counties it is reported as a frequent woods form: Decatur (10), Dubuque (23), Fremont (10), Harrison (31), Madison (20), Monona (31), Muscatine (2), Scott (2, 21).

#### *HELIOPSIS SCABRA* Dunal.

*Heliopsis scabra* Dunal, Mem. Mus. Paris 5:56 Pl. 4. 1819.

*Heliopsis laevis* var. *scabra* T. & G. Fl. N. Am. 2:303. 1842.

*Heliopsis scabra* Dunal is called the Rough Ox-eye in contrast with the Smooth Heliopsis of the woods.

Although Dunal<sup>3</sup> in 1819 gave to it the species status, Torrey and Gray in 1842, and Gray in 1859, and others<sup>4</sup> have cited it as a harsh form of the woods species *H. laevis* Pers., and called it *H. laevis* var. *scabra* T. & G.

<sup>3</sup> Dunal, M. F. — Memoirs of the Museum of Paris. 1819.

<sup>4</sup> Torrey, J. & Gray, A. — A Flora of North America. 1842. Gray, A. — A synoptical Flora of North America. 1859.

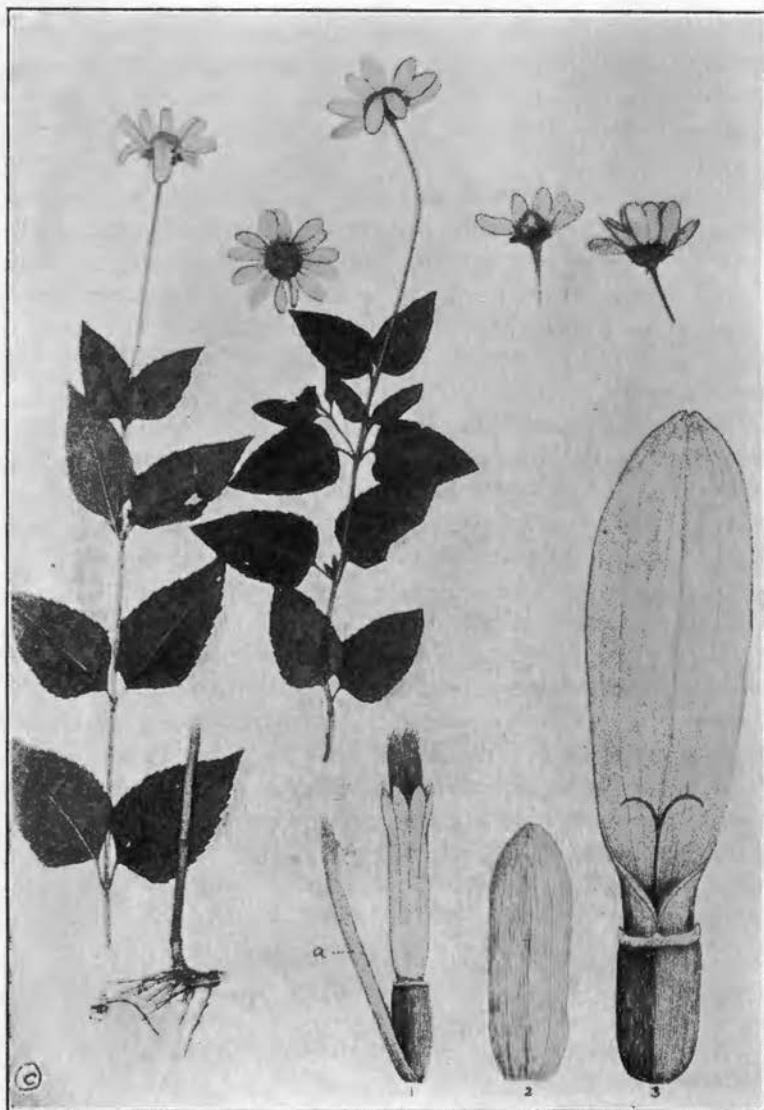


Plate III. *Heliopsis scabra* Dunal. Fig. 1. Disk-Flower. a. Chaff of Receptacle  
Fig. 2. Involucral Bract. Fig. 3. Ray-Flower.

This firm perennial grows 8-12 dm. tall, is light green or straw color and is hispidulous-scabrous above. The leaves are firm, divergent, short-petioled, deltoid to ovate or broadly lanceolate, truncate at base and short acuminate, rather sharply dentate-serrate to nearly entire, and rough-scabrous on both sides.

The showy heads are on long slender peduncles. The distinctive floral structures are as follows:

Heads: showy, receptacle conic, disk large (2-3 cm. broad) rounded to conical in age.

Involucral bracts: linear-oblong to oblong, acutish or obtuse, the outer somewhat foliar and spreading, glandular-pubescent to somewhat hoary and scariosus.

Disk-flowers: as in *H. helianthoides* (L.) Sweet, broad-tubular with 5 spreading lobes, anthers dark, and style-arms hairy toward the mucronate tip.

Chaff: as in *H. helianthoides* (L.) Sweet, membranous, some dilated and erose at summit, smooth or slightly pubescent, partly embracing the akene.

Ray-flowers: 12-17, bright yellow, broadly oblong, spreading to ascending, paler and pubescent on margins and veins beneath when young.

Akene: brown, glabrous, or pubescent on margins and at top, at least when young, truncate and 3-4 angled.

Pappus: a low lacinate crown with 1-3 short awns.

This species is readily recognized by the large yellow disk and short spreading persistent rays of the showy head, the long peduncles, and the harsh sharply divergent serrate leaves.

Many variations occur including the color and harshness of the stem, the size and roughness of the leaf-blade and the nature of the serratures. The heads vary in width and height growing more conical with age, and in the number and length of the bright rays.

The variations of this species so encroach upon *H. helianthoides* (L.) Sweet, that there is difficulty in distinguishing the two, especially when found growing in similar habitats. Three-leaved variants and fasciations are of frequent occurrence in both species.

*H. scabra* Dunal grows in dry soil, its common habitat being the dry prairies, fields and roadsides; it is common also in dry open wooded tracts, on shrubby hillsides, and on ledges; it has been found in pure sand and gravel areas (39). It comes into bloom in July and is the vanguard of the hosts of yellow flowers soon to follow on in August and September.

Its range is throughout southern Canada and the United States from New Brunswick and Saskatchewan to New York, New Jersey, west to Minnesota, Missouri, Nebraska, Arkansas and Texas.

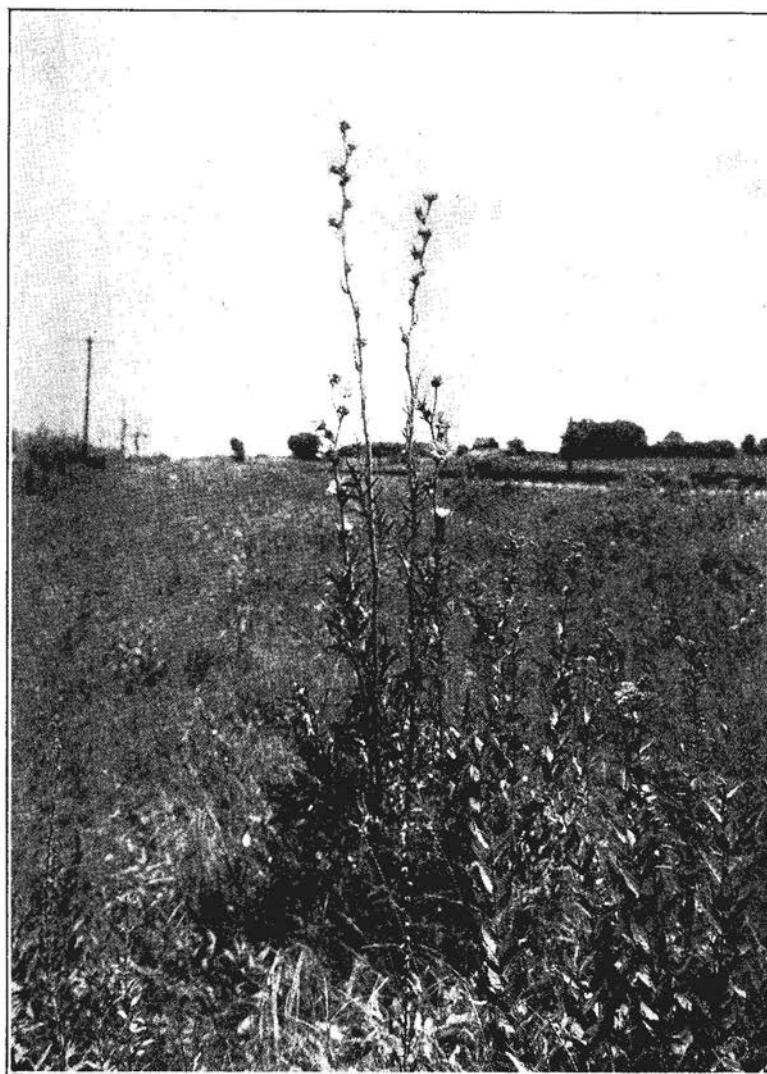


Plate IV. *Silphium laciniatum* L.

In Iowa, every roadside, prairie, and open thicket is the home of the species. It is reported from all parts of the state.

*GENUS SILPHIUM L.*

*Silphium* is a genus without a synonym. The name is derived from the Greek word Silphi, a resinous medicinal plant of Africa. It was transferred by Linnaeus to this genus of resinous plants.

It is a distinctly North American genus, no species being known in the Old World nor in South America. The twelve known species are all native to the United States. In Iowa the three species, *S. laciniatum* L., *S. integrifolium* Michx., and *S. perfoliatum* L. are known, and the two species, *S. trifoliatum* L. and *S. terebinthenaceum* Jacq. have been reported by a few authors in some of the older Iowa lists.

They are tall coarse plants with resinous juice, very striking in appearance and very unlike one another in their vegetative phases.

The characters in common are the large corymbose-panicled yellow heads, numerous pistillate and fertile rays in 2-3 rows, the disk-flowers perfect but with entire style and stigma and hence sterile, the flattish involucre, flat receptacle, the chaff deciduous with the disk-flowers, and the broad flat winged akenes.

Because of the pistillate and fertile rays, the genus *Silphium* has been associated with *Polymnia* and *Parthenium*,<sup>5</sup> and also with *Heliopsis*.

*SILPHIUM LACINIATUM L.*

*Silphium laciniatum* L. Sp. pl. 919. 1753.

*Silphium spicatum* Poir. Suppl. V. 157. 1811.

*Silphium gumniferum* Ell. Sk. II. 460. 1824.

*Silphium laciniatum* L. is known by several common names, as Compass Plant, Pilot Weed, Polar Plant, Rosin Weed, and Turpentine Weed.

This sentinel of the dry prairies comes from a thick perennial root and grows from 1-3.5 m. tall. It is simple, stout, striate-grooved, coarsely hispid with white hairs from rigid papillae, and very resinous or gumniferous above.

The leaves are mostly basal, 4-9 dm. long, simple, variously lobed, the lobes lanceolate to linear, entire or pinnatifid. The upper leaves are sessile, the clasping bases incised and hispid-ciliate with white hairs. They are disposed to direct their edges north and south and thus avoid the full force of the sun's rays.

<sup>5</sup> *Heliantheae of Iowa. I. Polymnia and Parthenium.* Ia. Acad. Sci. 36:158. 1929.

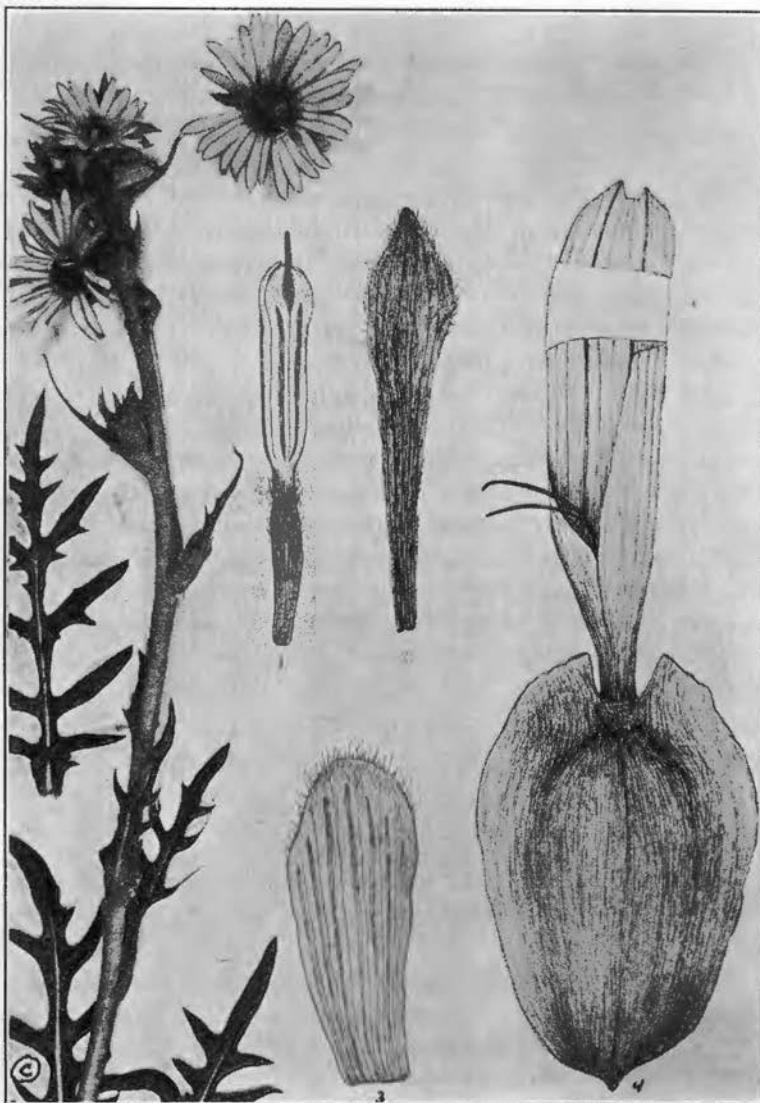


Plate V. *Silphium laciniatum* L. Fig. 1. Disk-Flower. Fig. 2. Chaff. Fig. 3. Involucral Bract. Fig. 4. Ray-Flower.

The large showy heads with disks 4 cm. in diameter, are sessile or short-peduncled, and racemose-spicate, the terminal ones flowering first.

The floral structures of the head are:

Involucral bracts: ovate-lanceolate 2.5-4 cm. long, extending into a rigid acuminate and squarrose tip, hispid with coarse white hairs.

Disk-flowers: yellow, narrowed toward the base, five spreading pubescent lobes, very deciduous.

Chaff: lanceolate, hairy at the summit, soon falling with the disk-flowers.

Ray-flowers: numerous, in 2-3 rows, light yellow, narrow, the margins long ciliate toward the base, style-arms erect.

Akene: flat, oval to sub-orbicular, about 1-3 cm. long, winged with shallow notch at the top, no awns but 2 erect points confluent with the wings.

Due to the constant xerophytic nature of its dry prairie environment, *S. laciniatum* L. is not variable to any great degree. It shows elaborate and perfected responses to extreme conditions, in the thickened perennial root, the leaves mostly basal, laciniate to cut-lobed, and with compass habit, the generally coarse-hispid surfaces, and the copious resin. It is thus able to ward off or diminish water loss due to intense heat and light and strong drying winds.

Its general distribution in the United States is from Ontario to South Dakota and Minnesota, south to Alabama, southwestward to Nebraska, Colorado and Texas.

In Iowa it is common on both the rich and sandy prairies, not in great numbers but in scattered groups of two to several plants. It comes into bloom in July lasting to September.

It was collected from prairies, hillsides, and highways in all areas visited by the writer. It is reported from all parts of the state.

*SILPHIUM INTEGRIFOLIUM* Michx.

*Silphium integrifolium* Michx. Fl. Bor. Am. 2:146. 1803.

*Silphium speciosum* Nutt. Trans. Am. Phila. Soc. N. S. II. 7:341.  
1841.

*Silphium laevigatum* Pursh. Fl. Am. Sept. II. 578. 1814.

*Silphium integrifolium* Michx., the Entire-leaved Rosin-weed is also a perennial from a thickened root. The rigid leafy stem grows 8-15 dm. tall, is 4-angled, striate-ridged, simple or corymbed and dichotomous above.

The leaves are strictly opposite, rigid, harsh, and scabrous on both sides, quite uniform in size, ovate to broadly lanceolate, acute, sessile, with sub-cordate partly clasping bases; the lower leaves often shallowly-toothed or occasionally serrate.



Plate VI. *Silphium integrifolium* Michx.

The heads are few to numerous in rather close dichotomous corymbs.

The floral structures are mostly as in *S. laciniatum* L.:

Involucral bracts: ovate-triangular, acute, somewhat squarrose, glandular-pubescent, the inner ones broader obtuse and reticulate-veined.

Disk-flowers: yellow, narrowed toward the base, the 5 lobes slightly pubescent, early deciduous.

Chaff: lanceolate, acute, pubescent at summit, as long as the disk-flowers and deciduous with them.

Ray-flowers: numerous in 2-3 rows, light yellow, 2-3 cm. long, pubescent at base on both sides and along some of the veins on the under side, style-branches straight.

Akene: flat, roundish oval, 2-toothed, broadly winged only at the top, deeply notched, pubescent.

In this species variations occur in the general roughness of the stem and leaves. In the same locality and in cultivation, stems have been found strongly scabrous, or entirely smooth and with smooth leaves.

In almost every clump may be found one or more plants of the 3-leaved form, and this, no doubt, has given the basis for the report that *S. trifoliatum* L. is found in Iowa. These plants have been regarded by the writer as variants of *S. integrifolium* Michx. since this ternate habit often occurs in all opposite-leaved species. The inflorescence in these three-leaved plants conforms to the rather close dichotomous corymbs of *S. integrifolium* Michx., and is not loosely panicled as in *S. trifoliatum* L.

*S. integrifolium* Michx. thrives on prairies of all types, coming into flower in June and July.

Its range is from Michigan and Minnesota south to western Georgia and Texas. In Iowa it is generally distributed over the state, being less abundant in the northwestern part.

Herbarium specimens were from all localities, and all lists report it as a common prairie plant.

#### *SILPHIUM PERFOLIATUM* L.

*Silphium perfoliatum* L. Sp. pl. Ed. 2:1301. 1763.

*Silphium connatum* L. Mant. 2:574. 1767.

*Silphium tetragonum* and *scabrum*. Moench. Meth. 606. 1794.

*Silphium conjunctum* Willd. Enum. 963. 1809.

*Silphium hornmanni* Schrad. Hort. Gott. 1809.

*Silphium Erythrocaulin* Bernh. and Spreng. Syst. 3:630. 1826.

*Silphium perfoliatum* L., called Indian Cup, Ragged Cup, or Cup Plant, is the annual and the mesophyte of the genus.



Plate VII. *Silphium integrifolium* Michx. Fig. 1. Disk-Flower. a. Chaff. Fig. 2. Involucral Bract. Fig. 3. Ray-Flower.

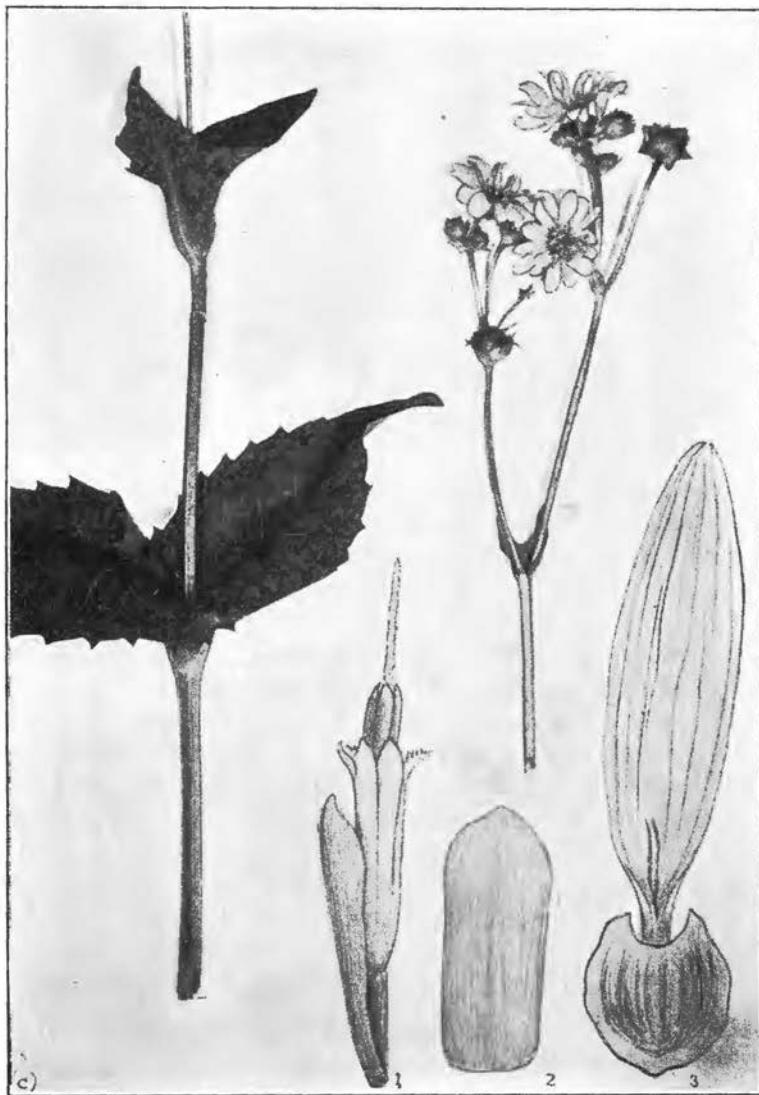


Plate VIII. *Silphium perfoliatum* L. Fig. 1. Disk-Flower and Chaff. Fig. 2. Involucral Bract. Fig. 3. Ray-Flower.

The stout, square or ternate stem grows 1-3 m. tall, branching above and leafy throughout. The leaves are rather thin, ovate, ovate-lanceolate to lanceolate, connate-foliate, the margins dentate-serrate with mucronate-tipped teeth, or the upper entire; the lower on winged or connate petioles, the upper united by broad bases.

The inflorescence of numerous showy yellow heads is trichotomous-corymbose.

The details of the floral parts are:

Involucral bracts: broad, ovate, obtuse, and squarrose, minutely hispid on margins.

Disk-flowers: yellow, gradually narrowed at the base, the 5 spreading lobes tomentose, early deciduous.

Chaff: lanceolate, acute, pubescent at summit,  $\frac{1}{2}$  as long as the disk-flowers, deceduous with disk-flowers.

Ray-flowers: numerous, light yellow, narrow, slightly pubescent on lower surface toward base, style-arms erect.

Akene: flat, obovate, winged, rounded at the summit, often 2-toothed, glabrous.

Although this species is somewhat variable, it is always easily recognized by its stout square stem and large perfoliate leaves. Ternate-leaved variants are frequent. A very large ternate-leaved plant was found by the writer at the edge of the Amana woods in Iowa County (pl. IX).

*S. perfoliatum* L. grows in low rich ground, bordering streams, in wet fields and meadows, and in mesophytic woods. It is said to be an escape from gardens. It blooms from July to September.

Its general range is from Ontario to Minnesota, Nebraska, south to Georgia and Louisiana. In Iowa it is frequent in rich soil throughout the state, growing very large and luxuriant in the lower moist places.

Herbarium specimens were from all portions of the state, and it is reported in all local, county, and state lists.

#### *SILPHIUM TEREBINTHENACEUM* Jacq.

*Silphium terebinthenaceum* Jacq. Hort. Vind. I. Pl. 43. 1770.

*Silphium pinnatifidum* Ell. Bot. S. Car. 2:462. 1824.

*Silphium terebinthenaceum pinnatifidum* A. Gray Man. 220. 1848.

*Silphium terebinthenaceum* Jacq., called Prairie Dock, is reported for Iowa.

It is a very striking species of the moist prairie. The slender scape-like and nearly leafless stem grows 1-2.5 m. tall, is ternate, and glabrous, and exudes a copious resinous juice.



Plate IX. *Silphium perfoliatum* L. A Ternate Variant

The leaves, mostly basal, are immense, 2-6 dm. long, somewhat resembling burdock but more rigid; they are cordate at the base, hispid-scabrous with short hairs from broad papillae, especially below, margins dentate with mucronate teeth, the basal leaves with very long petioles, stem-leaves few and small.

The showy heads are in loose, irregular, somewhat compound panicles.

The floral structures are very similar to those of the other species:

Involucral bracts: outer, ovate to orbicular, nearly smooth; inner bracts oval and broadly obtuse.

Disk-flowers: yellow, with 5 shallow ciliate lobes, early deciduous.

Chaff: lanceolate, striate, apex acute and ciliate, falling with the disk-flowers.

Ray-flowers: numerous, light yellow, 2-3 cm. long, sparsely ciliate on the margins and toward the base of lower side.

Akene: flat, obovate, narrowly winged, pubescent and 2-toothed at the top.

Variations occur in the height of the stem, size of the basal leaves, and number of heads in the panicle. Torrey and Gray<sup>6</sup> further describes the leaf surface: "The short hispid hairs arising from a broad papillose base in which a resinous matter is frequently deposited, and the cuticle desquamates, so the leaf appears thickly sprinkled with white scurvy dots, particularly the lower surface."

*S. terebinthenaceum* Jacq. is a moist prairie plant, although found also in open woods. It blooms from July to September.

Its general range extends from Ohio, Minnesota and Dakota southward to Georgia and Texas. In Gray's Manual 7th edition,<sup>7</sup> it is included in the area from Pennsylvania to southern Ontario, Ohio to Minnesota and southward. Although no plants were found in Iowa, specimens examined were from Illinois not far from the Mississippi River where it is a frequent to common roadside species.

It is reported by J. C. Arthur (1), H. A. Mueller (20), as not common, F. G. Fitzpatrick (10) as being reported, and W. Greene (16) as found in prairies and open woods.

#### GENUS *RUDBECKIA* L.

The Genus *Rudbeckia* was named by Linnaeus after the Swedish naturalists Claus and Olaf Rudbeck, his predecessors at the University of Upsal. He included in this genus, species now listed

<sup>6</sup> Torrey, J. & Gray, A. — A Flora of North America, 275. 1842.  
<sup>7</sup> Gray, A. — A New Manual of Botany, 7 ed. 825. 1908.

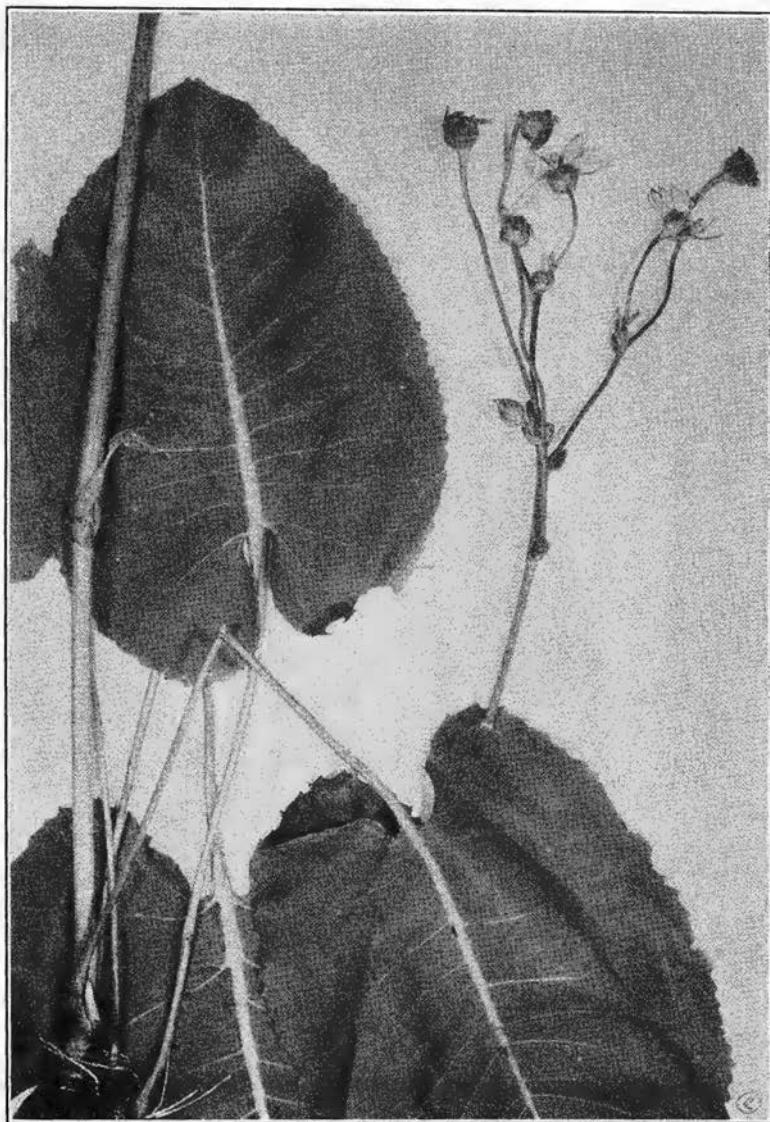


Plate X. *Silphium terebinthenaceum* Jacq.

under *Brauneria* Neck., and *Lepachys* Raf.,<sup>8</sup> and it is an interesting fact that a close study does reveal very striking similarities in the details of their floral structures.

The genus includes thirty species all native of North America, and chiefly of the United States. Nine species are recorded for the area covered by Gray's Manual, 7th edition, the four common in Iowa being *R. hirta* L., *R. subtomentosa* Pursh., *R. triloba* L., and *R. laciniata* L.

All of these Rudbeckias are listed in the ornamental and cultivated plants. "The European gardeners have shown us the decorative usefulness of the genus, and seeds are being sought through the Department of Agriculture."

They are annual, biennial, or perennial herbs having alternate entire or pinnatifid leaves, petioled, sessile, or clasping. The bracts of the hemispheric involucre are imbricated in two or three rows, spreading and rarely foliaceous. The receptacle is convex to conic with chaff short and concave, and not rigid. The disk-flowers are perfect and fertile, the stigmas having blunt pubescent tips; the rays are neutral, yellow or touched with brown, never purple, and quite persistent.

Because of these floral characters, *Rudbeckia* L. has always been closely associated with other well known genera of the Tribe as shown in the following selected list:

1753. Linn. Sp. pl. — Cl. Syngenesia, Ord. Polygamia Frustranea: *Helianthus*, *Rudbeckia*, *Coreopsis*.
1809. Willd. Enum. pl. — Cl. Syngenesia, Ord. Polygamia Frustranea: *Helianthus*, *Rudbeckia*, *Coreopsis*.
1816. Pursh. Fl. Sept. — Cl. Syngenesia, Ord. Polygamia Frustranea: *Bidens*, *Coreopsis*, *Helianthus*, *Rudbeckia*.
1824. Bigl. Fl. Bost. — Cl. Syngenesia, Ord. Polygamia Frustranea: *Helianthus*, *Actinomeris*, *Rudbeckia*, *Lepachys*, *Brauneria*, *Coreopsis*, *Bidens*.
1836. DC. Prodr. — Fam. Compositae, Tribe Senecionideae, Subtribe Heliantheae, Div. 2. Rudbeckiae: *Echinacea*, *Rudbeckia*, *Obeliscareta*.
1840. Torr. & Gray, Fl. N. Am. — Ord. Compositae, Subord. Tubuliflorae, Tribe Senecionideae, Subtribe Heliantheae, Div. 2. Euheliantheae: *Echinacea*, *Rudbeckia*, *Lepachys*, *Helianthus*, *Actinomeris*.
1867. Gray, A. Man. Bot. Ed. 5. — Tribe Senecionideae, Subtribe Heliantheae: *Eclipta*, *Heliospis*, *Echinacea*, *Rudbeckia*, *Lepachys*, *Helianthus*, *Coreopsis*, *Bidens*, *Verbesina*, *Tetragonotheca*.
1897. Engl. & Prantl, Nat. Pflanz. — Tribe Heliantheae, Subtribe Verbesiniae: *Eclipta*, *Rudbeckia*, *Helianthus*, *Actinomeris*, *Verbesina*, *Melanthera*.

<sup>8</sup> Linnaeus, C. — Species Plantarum. 906. 1753.



Plate XI. *Rudbeckia hirta* L.

*RUDBECKIA HIRTA L.*

*Rudbeckia hirta* L. Sp. pl. 907. 1753.

*Rudbeckia serotina* Nutt. Journ. Acad. Phila. 7:80. 1834.

*Rudbeckia strigosa* Nutt. Trans. Am. Phila. Soc. N. S. 7:354.  
1841.

*Rudbeckia hirta* L. is so well known and widely distributed that it is called by a variety of local or common names, as: Hairy Rudbeckia, Black-eyed Suzan, Yellow Daisy, Nigger-head, Golden Jerusalem, and Purple Coneflower.

It is a hardy annual or biennial with slender stems 1/3-1 m. tall, simple, or branched near the ground forming tufts, very rough and bristly-hairy, naked above, and bearing solitary showy heads on slender striate peduncles.

The leaves are alternate, simple and entire or sparingly serrate, strigose-pubescent, the lowest being spatulate or elliptic, narrowed into winged petioles; the upper oblong and lanceolate, sessile or with short margined petioles.

The floral parts typical of the species are:

Involute bracts: in 3 series, linear to linear-oblong 1-2 cm. long, hirsute, spreading, and reflexed.

Disk-flowers: about 6 mm. long, stout and barely narrowed at the base, densely packed on the conical disk, pink at base but purplish brown at the top, as also are the stamens and acute style-branches.

Chaff: linear, acute, about as long as the corolla, hairy at the summit.

Ray-flowers: 10-20, orange-yellow, deeper yellow toward base, notched at the tip, ciliate on the under side, spreading or somewhat recurved.

Akene: 1.5-2 mm. long, purplish or black, glabrous but with fine lines, 4-angled and truncate.

Pappus: none, or a small crown-like border.

Variations are common in the size, and the general hairiness of the plant. The heads vary both in number and in size and in the number and length of the rays.

Fasciations occur frequently, affecting both the peduncles and the inflorescence. A specimen in the herbarium of the University of Iowa has a 'fused' peduncle two inches broad, very much flattened and with the inflorescence correspondingly malformed. Others of a lesser degree were found in the field. These peculiar deformities are said to be caused by gall mites.<sup>9</sup>

*R. hirta* L. grows in open sunny places as fields, fence-rows, prairies, and in dry thickets and open woods. It frequently occurs as a weed. Its flowering season is from June to September and

<sup>9</sup> Harris, J. Arthur, New Fasciations. *Torreya* 5:157-159. 1905. Bruckman, Louisa, Fasciations in *Rudbeckia*. *Torreya* 6:194-195. 1906.

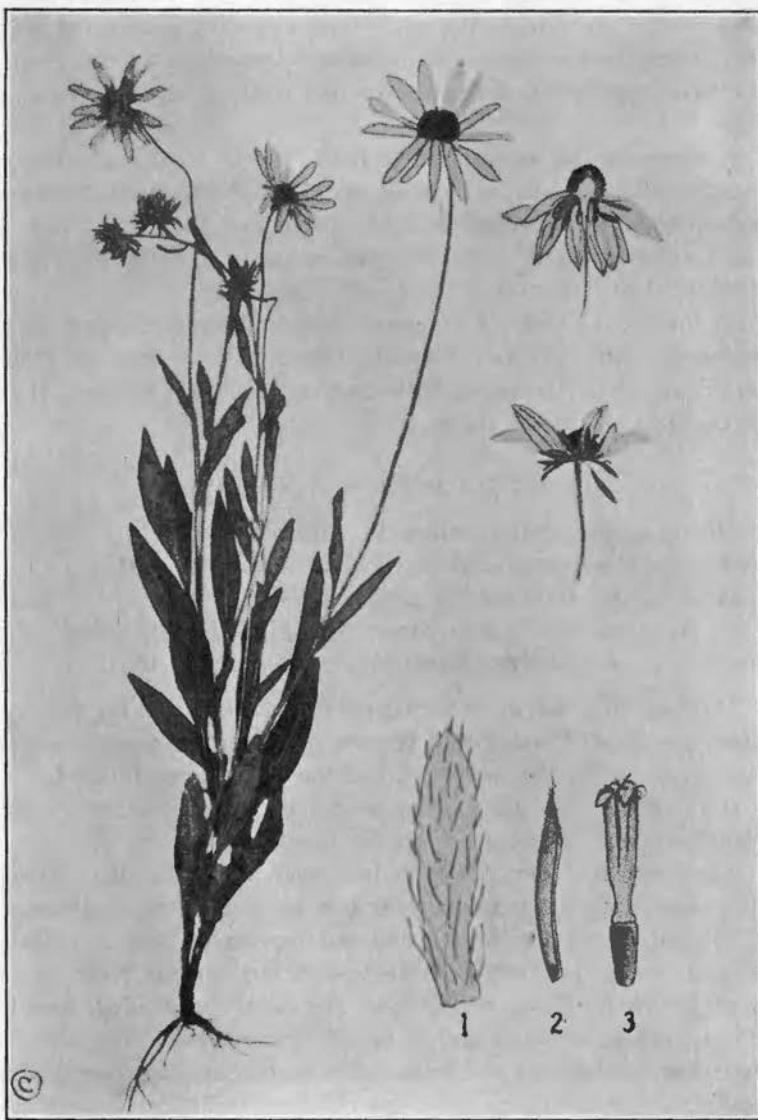


Plate XII. *Rudbeckia hirta* L. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

as in all composites, "the rays spread out first, then the disk-florets around the base of the floral-cone open and push out their yellow pollen through and over the brown tube of the anthers. Day by day, the blossoming circle creeps upward toward the top; then when the last honey-call to bee and butterfly has been given, the rays, their work done, weaken and collapse and the end has come."

A native of the western clover fields, it was accidentally introduced eastward with red clover and hay. Now it has become conspicuous and abundant in fields throughout the United States and Canada, ranging from Montana eastward to New York and southward to Arkansas, Florida and Texas.

In Iowa it is a lover of the sunny fields and prairies, fence rows, highways and thickets. Abundant material was secured from Dickinson, Scott, Johnson, Muscatine, and Louisa Counties. It is reported in all lists of the state.

*RUDBECKIA SUBTOMENTOSA* Pursh.

*Rudbeckia subtomentosa* Pursh. Fl. Am. 575. 1804.

*Rudbeckia triloba* var. *a*. Michx. Fl. N. Am. 2:144. 1803.

*Rudbeckia tomentosa* Ell. Sk. 2:453. 1824.

*Centrocarpa triloba* Don ex Sweet Brit. Fl. Gard. 61. 1826.

*Rudbeckia odorata* Nutt. Journ. Acad. Phila. 7:78. 1834.

This beautiful species of the Genus *Rudbeckia* L. has been designated the Sweet Cone-flower, because of the anise- or vanilla-like odor given off by the receptacle, and the leaves when bruised.

It resembles *R. hirta* L., but even a casual observance of the plant body and inflorescence reveals many differences.

The stem 6-15 dm. tall is rather stout and somewhat coarse, cinereous-pubescent and downy, striate, leafy and branched above.

The leaves are alternate, hispid-scabrous above, soft-tomentose beneath, veiny, 3-nerved from the base throughout the blade, nearly all petioled. Those of the stem are mostly undivided, broad-elliptic, acuminate, and rather evenly serrate; the lower are 3-parted or deeply lobed, the lateral lobes smaller and narrower. The heads may be several to numerous on short peduncles in a somewhat corymbose inflorescence.

The floral structures are:

Involucral bracts: in 3 series, linear, acute to acuminate, imbricated but later spreading or reflexed, canescent with somewhat-glandular tips.

Disk-flowers: 6 mm. long, broad-tubular as in *R. hirta* L. the 5 lobes spreading and recurved, dark purple, anise-scented, stamens and style-arms dark.



Plate XIII. *Rudbeckia subtomentosa* Pursh.



Plate XIV. *Rudbeckia subtomentosa* Pursh. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

Chaff: rounded or hood-shaped and glandular-pubescent at the summit, a narrow purple stripe near the margins, shorter than the disk-flower and akene, persistent in age.

Ray-flowers: 10-20, bright orange-yellow often darker toward the base, pubescent below, spreading and only when unusually long are they somewhat drooping.

Akene: dark brown, glabrous, angular and truncate.

Pappus: a low crown-like border.

In favorable surroundings the inflorescence becomes luxuriant, the several heads very showy with disks large, and rays long and rich orange-yellow.

The leaves show the greatest range in form. They may be entire throughout the plant, when they are broad with acute apex and base, or the lower leaves may be undivided and the upper ones 3-lobed.

*R. subtomentosa* Pursh. grows on the prairie, thriving only in the lower moist places. It also appears in the borders of open moist woods. Its flowering season is through July and August.

In North America its range is from Wisconsin and Minnesota to Louisiana and Texas. It is not common throughout Iowa, being rare in the western part and but locally common in the central and southeastern parts.

Plants were collected from Johnson, Scott, Louisa, Muscatine and Iowa Counties.

Herbarium specimens were from Madison, Appanoose, Iowa, Muscatine, Louisa, Winneshiek Counties. It is reported from the following counties: Adair (15), Calhoun (29), Emmett (25), Fayette (14), Hardin (28), Johnson (10, 41), Iowa (42), Madison (20), Muscatine (10), Decatur (10), Webster (22).

#### *RUDBECKIA TRILOBA* L.

*Rudbeckia triloba* L. Sp. pl. 907. 1753.

*Rudbeckia biennis* Chapm. ex. T. & G. Fl. N. Am. 2:309. 1840.

*Rudbeckia ruprestris* Chick. in Coult. Bot. Gaz. 6:188. 1881.

This species, known as the Thin-leaved Cone-flower is a slender and rather weak plant, .5-1 m. tall. The stem is bright green or darker with a purplish tinge. It is sparsely hispid, sulcate or striate, rarely smooth, freely branching above, and loosely panicled at the top. The soft thin leaves are rough on both sides with sparse or distant hairs; the basal leaves are long-petioled, ovate to oblong-ovate, or nearly cordate, with serrate margins, some are palmately 3-lobed or parted; the upper leaves are ovate-lanceolate,



Plate XV. *Rudbeckia triloba* L.

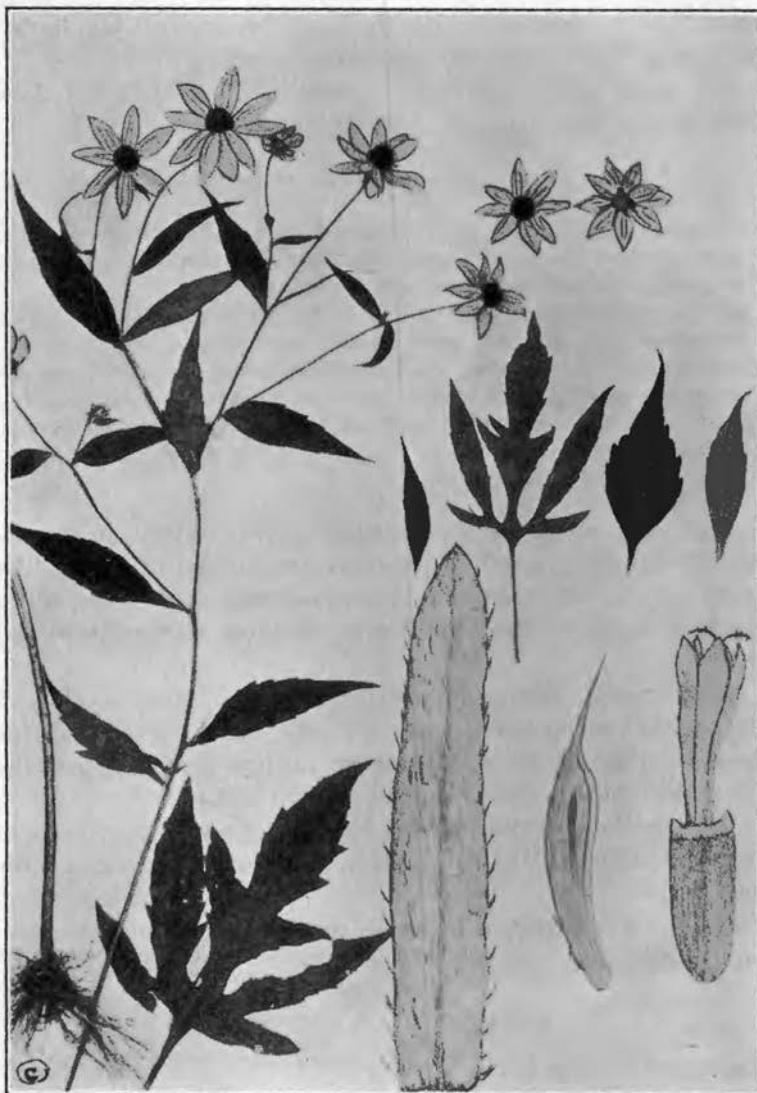


Plate XVI. *Rudbeckia triloba* L. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

acuminate, narrowed into sessile bases or short winged petioles, margins serrate or entire.

The inflorescence consists of loosely corymbed heads, several to numerous on short peduncles, the heads being small but showy, the disk globose to conic 8-15 mm. broad.

The floral parts are similar to those of *R. hirta* L. but show some interesting differences:

Involucral bracts: about 8, foliaceous, linear to lanceolate, 7-11 mm. long, hirsute, finally reflexed.

Disk-flower: about 5 mm. long (with akene), funnel-form, narrowed a little abruptly about the middle; the 5 erect lobes dark purple; stamens dark, and style-arms dark purple and with hirsute tips.

Chaff: smooth, cuspidate, about as long as the disk-flower and akene, green with purple tip, elongated purple patches near margins, persistent.

Ray-flowers: 8-12, spreading, 2-2.5 cm. long, oblong or oval, 2-notched, bright orange-yellow with brownish base, not pubescent beneath.

Akene: roughish or tuberculate, with fine lines, equally 4-angled, truncate, with a low crown or border.

Pappus: 2-4 short teeth or obsolete.

This plant varies, mainly according to environment, in the extent of branching, length of peduncles and number of heads. The heads vary in size, number of rays, and the extent of the brown patch at the base. Fasciations occur including the peduncles and heads.

*R. triloba* L. thrives in moist rich soil of open woods and thickets and along shady roadsides, and sometimes is an escape from gardens. It comes into bloom in June and brightens the woods and thickets throughout the summer and fall.

Its general distribution is from New Jersey and Pennsylvania to Michigan, Illinois, Missouri, Kansas, south to Georgia and Louisiana.

In Iowa it is a frequent or locally common woods form throughout the state.

#### *RUDBECKIA LACINIATA* L.

*Rudbeckia laciniata* L. Sp. pl. 906. 1753.

*Rudbeckia quinata* Mill. Gard. Dict. ed. 8. n.5. 1768.

*Rudbeckia laciniata* L. has been called Common Cone-flower, Laciniate Rudbeckia, Jagged-leaved Rudbeckia, Cone-disk Flower and Green-headed Cone-flower.

It is the largest of the Rudbeckias, and shows pronounced adaptations to the moist environment in which it thrives.



Plate XVII. *Rudbeckia laciniata* L. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

It grows 1-3 m. tall, is glabrous, striate, and loosely branched above.

The leaves are simple and alternate, rather thin, prominently veiny and 3-nerved from the base, minutely hairy and scabrous especially on upper surface and margins; the lower leaves are pinnately 3-7 divided, the divisions 3-lobed, the petioled long; the upper leaves are very short-petioled or nearly sessile, successively less deeply parted or lobed to merely incised, the uppermost entire.

The heads are somewhat corymbose-paniculate on the upper auxillary branches, the peduncles strigose-pubescent near the heads, the disk globose, later elongated and narrower.

The floral structures show the following distinctions:

Involucral bracts: 6-8 in a single series, loose, unequal, foliaceous, oblong to oblong-lanceolate, acute, nearly smooth or slightly pubescent at base.

Disk-flowers: greenish-yellow, tubular, narrowed below the middle, the 5 lobes erect and incurved; anthers brown, style-arms purple and with hirsute tips. In age the flowers elongate and extend considerably beyond the disk.

Chaff: cuneate-oblong, concave and keeled, much shorter than the flower, canescent at the summit, persistent.

Ray-flowers: 6-11, oblanceolate, 1-2.5 cm. long, bright yellow, glabrous below, soon drooping or reflexed.

Akene: dark brown, 3 mm. long, angled, glabrous, but with fine lines.

Pappus: none or a minute crenate crown-like border.

This extremely variable species, seemingly has innumerable leaf forms. Plants in deep moist woods have very large long-petioled leaves which are dark and very soft. The heads vary in number and in size of disk and length of rays. *R. laciniata* var. *hortensia* Bailey is the double form in cultivation called Golden Glow.

*R. laciniata* L. grows in low moist grounds, in thickets, wet meadows, and in alluvial woods. The flowering season is from July to September.

Its distribution is from Quebec, Ontario, south to New Jersey and Florida, west to Montana, Colorado, Arizona, and New Mexico.

In Iowa it is a common species found in the edges of woods, thickets, and low moist places along roadsides.

It is reported as common in all county and state lists.

#### GENUS *LEPACHYS* Raf.

*Lepachys* is derived from the Greek, meaning 'thick' and a 'scale,' and has reference to the thickened summit of the chaff.

The species of this genus originally were included under the

Genus *Rudbeckia* L. The present synonymy of the genus was, in 1897, reviewed by J. H. Barnhart<sup>10</sup> who says in part: "In his paper published in Journal de Physique, in 1819, Rafinesque erected two species of *Rudbeckia* into new genera under the names *Ratibida* and *Lepachys*. Since then, nearly all authors have considered these two species distinct from *Rudbeckia*, yet congeneric, and the resulting genus has been known as *Obiliscarea* Cass. or *Lepachys* Raf."

It is a North American genus and is represented in nearly all portions of the United States by one or both of the species, *L. pinnata* (Vent.) T. & G. and *L. columnaris* (Sims.) D. Don. Both are found in Iowa.

They are slender perennials with alternate, pinnate leaves, the stem grooved, naked above, and bearing showy heads with neutral yellow rays and purple-brown perfect and fertile disk-flowers massed upon a columnar receptacle. The details of the floral structures are much like those of *Rudbeckia*, especially the disk-flowers, the chaff and the akenes.

Its history has co-mingled with that of *Rudbeckia* and it has always been associated with *Helianthus*, *Actinomeris*, *Bidens* and others having fertile disk-flowers and neutral rays.<sup>11</sup> (See *Rudbeckia*)

*LEPACHYS PINNATA* (Vent.) T & G.

*Lepachys pinnata* (Vent.) T. & G. Fl. Am. 2:314. 1842.

*Rudbeckia pinnata* Vent. Hort. Cels. pl. 71. 1800.

*Lepachys pinnatifida* Rafin. Journ. Phys. 89:100. 1819.

*Obeliscaria pinnata* Cass. Dict. Sc. 35:373. 1825.

*Lepachys pinnata* (Vent.) T. & G., known as the Gray-headed Cone-flower, is a hardy though slender perennial. The stem grows 1-1.5 m. tall, is light or grayish green, strigose, harsh, angled, and striate or sulcate.

The leaves are alternate, somewhat harsh, pinnately 3-7 divided, the divisions acute or acuminate at each end somewhat serrate or toothed, or entire; the uppermost are undivided; the radical leaves are very long petioled, larger and much divided, or sometimes smaller and undivided.

The heads are showy, solitary or few to several, the receptacle conic to columnar, anise-scented, the disk globose and gray when young, oval to oblong and brown at maturity.

<sup>10</sup> Nomenclature Notes. Bull. Torr. Bot. Club, 24, No. 8. Aug. 29, 1897.

<sup>11</sup> Heliantheae of Iowa. I. *Actinomeris*, Ia. Acad. Sci. 36:156. 1929.



Plate XVIII. *Lepachys pinnata* (Vent.) T. & G. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

The floral parts resemble those of *Rudbeckia* L. as will be noted:

- Involucral bracts: linear-oblong, short and soon reflexed, strigose.  
Disk-flowers: 2 mm. long (with akene), broad-tubular, not narrowed toward the base, the 5 recurved lobes dark purple-brown, stamens inserted at the base of the broad tube, dark; style-arms dark.  
Chaff: hood-shaped, canescent over the rounded, thickened, and enlarged summit, 3-nerved, the broad lateral nerves or bands dark-purple, closely investing the young disk-flower while in the bud stage and giving the gray color to the disk.  
Ray-flowers: 6-9, bright yellow, 4-6 cm. long, notched at the apex, drooping.  
Akene: 2 mm. long, broad, compressed, angled, the inner margin acute or slightly wing-like when young and sometimes produced at the summit into a short tooth.  
Pappus: none or a low crown of obscure teeth.

The species is extremely variable in size, in the number of flowering branches, and especially in the leaf forms which range from the simple long-petioled leaf to the 7-9 parted leaf. In favorable situations the plants are vigorous and occupy large areas.

*L. pinnata* (Vent.) T. & G. is a typical dry area plant most common upon the prairies, roadsides, and also found in dry thickets, forest openings, and on dry ridges. The flowering season is from June to September.

Its general range is from New York to Iowa, Minnesota, Nebraska, Kansas, southward to Florida, Louisiana, and Texas. In Iowa it is one of the most common and abundant species of the dry areas.

Herbarium specimens were from all parts of Iowa, and all reports show it to be universally distributed throughout the state.

*LEPACHYS COLUMNARIS* (Sims.) T. & G.

*Lepachys columnaris* (Sims) T. & G. Fl. N. A. 2:313. 1842.

*Rudbeckia columnaris* Sims, Bot. Mag. pl. 1601. 1813.

*Ratibida columnaris* D. Don.; Sweet. Brit. Fl. Gard. 2:361. 1838.

*Lepachys columnaris* T. & G. Fl. N. A. 2:313. 1842.

*Lepachys columnaris* var. *pulcherrima* T. & G. 1. c. 1842.

*Lepachys columnaris* (Sims.) T. & G., the Prairie Cone-flower or Long-headed Cone-flower, is a hardy low perennial. The slender stem grows .5-1 m. tall. It is rough scabrose-strigose, hoary with fine appressed hairs, sulcate, often branched from the base, the long peduncles bearing solitary showy heads.

The leaves are alternate, thick and harsh, appressed-strigose;



Plate XIX. *Lepachys columnaris* (Sims) T. & G. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

5-9 parted, the segments linear and often pinnatifid and 2-3 cleft; the radical leaves often undivided, spatulate-laciniate; the uppermost leaves short-petioled or sessile, the segments with short brownish tips, entire or slightly lobed.

The heads are showy though smaller than in *L. pinnata* (Vent.) T. & G., the disk conic to columnar, about 2-5 cm. long, gray or fuscous, and with a pleasant anisate odor.

The floral structures as in *L. pinnata* (Vent.) T. & G., resemble those of *Rudbeckia* L.:

Involucral bracts: 5-8, in 2 or 3 series, awn shape, spreading, the inner series being small and obtuse resembling the chaff.

Disk-flowers: about 1 mm. long, corolla broad, not narrowed at the base, yellow-gray becoming purple-brown, the 5 lobes reflexed, stamens adnate to the base of the corolla, dark; style-arms dark.

Chaff: hood or boat-shape, nearly as long as the disk-flowers, the top wooly or villous, margins ciliate, a wide dark-purple stripe near each margin, enclosing the disk-flowers when young, deciduous with the akenes.

Ray-flowers: 5-8, light yellow, broad-oval, 2-3 cm. long, 2-notched, spreading or reflexed.

Akene: 1-2 mm. long, broad and compressed, truncate, angled, the inner angle acute and ciliate, sometimes slightly winged and terminating in a short membranous tooth, exterior margin scarcely or not at all winged except slightly at the summit.

Pappus: a mere series of these squamellate teeth.

The leaves are the most variable structures of this species; they show the greatest range from simple, lobed, or divided and from petiolate to sessile or clasping. The heads vary in height of disk, and the rays vary in size and often are darker toward the base. The entire plant varies in size and roughness.

The variety *pulcherrima* T. & G. has rays brown-red or sometimes yellow at the apex; the leaves are often bi-pinnatifid.

*L. columnaris* (Sims.) T. & G. grows on the dry plains, prairies, along roadsides, and is common on wooded bluffs. It is sometimes found with *L. pinnata*. It blossoms through May and June.

Its general distribution is from Saskatchewan to Minnesota, Colorado, Nebraska, Arizona, Tennessee, Texas and Louisiana, adventive eastward. In Iowa it occurs chiefly in the western part, but it also appears in other sections, chiefly along railroads and highways. The variety *pulcherrima* T. & G. is reported as found with the species in Johnson County (41).

Herbarium specimens were examined from the Counties of Lee, Scott, Muscatine, Henry, Hardin, Boone, Webster, Greene,

Winnebago, Dickinson, Lyon, Plymouth, Woodbury, Pottawattamie, Linn and Page.

The writer secured specimens from roadsides in Dickinson County and along a railroad in Johnson County.

It is reported from the following counties: Henry (10), Page (10), Boone (10), Webster (22), Lyon (32), Dickinson (35), Johnson (41), Scott (2), Muscatine (2).

#### *GENUS BRAUNERIA* Neck.

The Genus *Brauneria* Neck. was so named in honor of Jacob Brauner, a German botanist of the early eighteenth century.

In their early history, the known species of this genus were included under the Genus *Rudbeckia* as *R. purpurea* and *R. angustifolia*.<sup>12</sup>

In 1790, Noel Joseph de Necker removed them to a new genus, *Brauneria*. Otto Freiherr von Moench, in 1794, supplanted this name with *Echinacea* which means 'spiny,' as in the sea-urchin, in allusion to the persistent awned chaff of the dark brown disk.<sup>13</sup>

Although Gray, in his manual, 7th edition, has retained the name *Brauneria*, he, in his earlier editions, and other authorities have used the newer name *Echinacea*.<sup>14</sup>

The genus now includes five American species, four being found in the United States. In Iowa there are three known species, *B. pallida* (Nutt.) Britton, *B. angustifolia* (DC.) Heller, and *B. purpurea* (DC.) Britton.

They are coarse low perennials from black thickened rootstocks. The nearly simple stem is naked above and bears a single large head. They are readily recognized by their pale to rose-purple rays and large 'spiny' purple-brown disks. All species are characterized by the imbricate and later spreading involucral bracts, the smooth awned chaff, the perfect and fertile disk-flowers, pistillate but sterile rays, and short 4-sided akenes with a small toothed border.

Because of these floral structures, the genus has been associated with *Helianthus*, *Bidens*, *Actinomeris* and others, having perfect and fertile disk-flowers and neutral rays. (See *Rudbeckia*)

They are listed among medicinal plants under the name Black Sampson because of the black thickened rootstock.

<sup>12</sup> Linnaeus, C. — *Species Plantarum*. 1753. Aiton, Wm. — *Hortus Kewensis*. 1789.

<sup>13</sup> Necker, Noel Joseph de, — *Elem. I* 17. 1790. Moench, Otto Freiherr von, — *Meth. 591.* 1794.

<sup>14</sup> Gray, A. — *Manual of Botany*, 6 ed. — 1889. Gray, A. — *Synoptical Flora of North America*. 1884. Britton, N. L. — *Manual of Flora of Northern United States and Canada*. 1905.

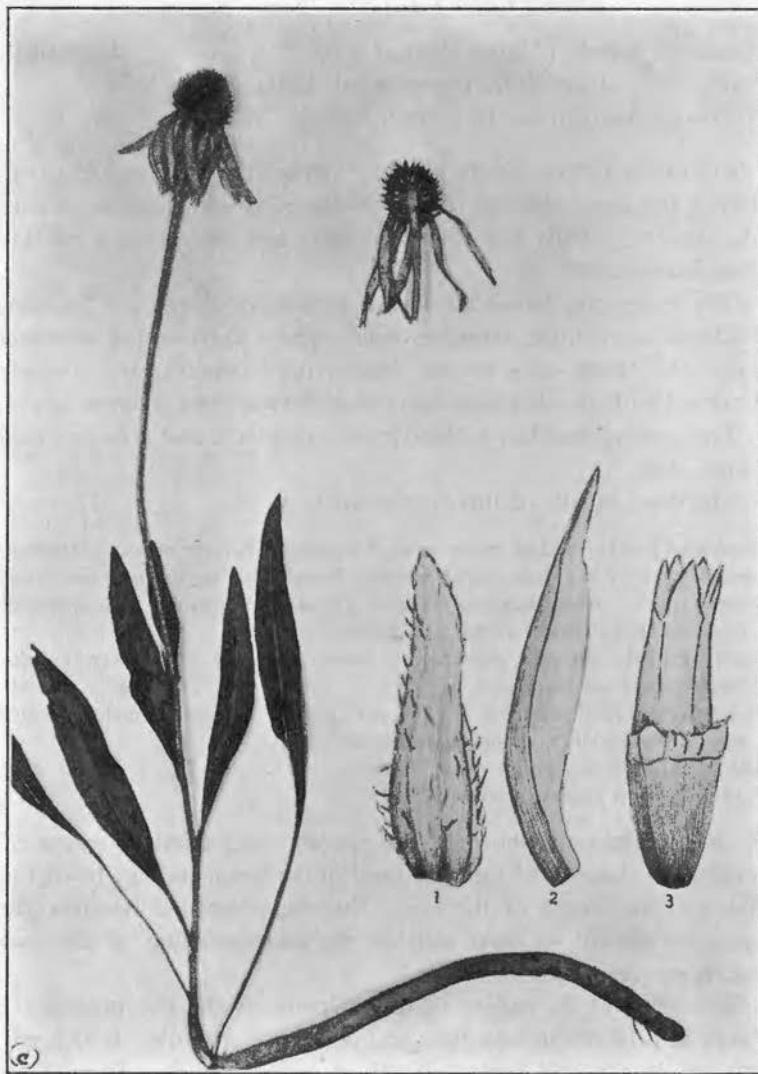


Plate XX. *Brauneria pallida* (Nutt) Britton. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

They are represented among ornamental plants by one known as the Purple Cone-Flower (*Brauneria purpurea*).

*BRAUNERIA PALLIDA* (Nutt.) Britton

*Brauneria pallida* (Nutt.) Britton Mem. Torr. Club. 5:333. 1894,  
*Rudbeckia pallida* Nutt. Journ. Acad. Phila. 7:77. 1834.  
*Echinacea angustifolia* DC. prodr. 5:554. 1836.

*Brauneria pallida* (Nutt.) Britton, called the Pale-purple Cone-flower, is a low perennial from a thickened root. The stem is simple, slender, usually less than one meter tall, and bears a solitary conspicuous head.

The leaves are lanceolate, linear to narrow-elliptic or broader, 5-20 cm. long, entire, acute, or about equally narrowed at base and apex; the lower ones narrow into slender petioles, are strongly 3-nerved with an additional nerve near the margins, strigose-hispid.

The showy head has a broad conic receptacle and a large ovoid 'spiny' disk.

The floral details of this species are:

Involucral bracts: in 3 or more series, lanceolate, sparsely ciliate, spreading. Disk-flowers: 1 cm. long (with akene), broad with no proper tube, lobes erect, dark purple, stamens inserted at base of corolla, style-branches terminating in slender hispid appendages.

Chaff: smooth, abruptly acuminate,  $\frac{1}{4}$  longer than the disk-flower, purple-tipped, enclosing the akene.

Ray-flowers: 12-15, narrow, sterile, pale purple, 2-notched, under surface with scattered hairs, drooping, rather persistent.

Akene: thick, broad wedge-shape, 4-sided.

Pappus: a short dentate crown.

Little variation is shown in this species other than the extent of roughness, the size of the plant and in the head, the height of the disk and the length of the rays. But these variable features are factors sufficient to make difficult the distinguishing of the two prairie species.

The home of *B. pallida* (Nutt.) Britton is the dry prairie. It comes into bloom in late June and lasts through July. It is a native of eastern and central North America, ranging from New York and New England to Illinois, Alabama, Tennessee west to Minnesota, Montana, Nebraska, and Texas.

In Iowa it is a common species of the prairie, rare on bluffs, and a few scattered individuals may be found in pure sand and gravel areas (39).

It is believed not to occur in the western part of the state but

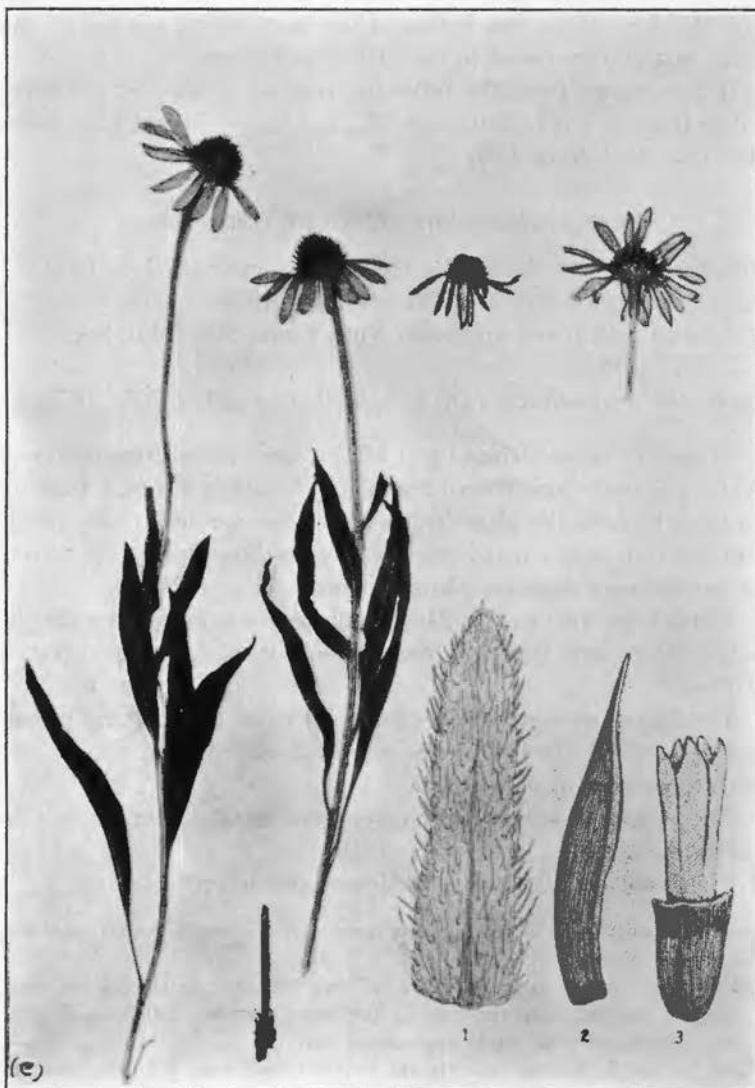


Plate XXI. *Brauneria angustifolia* (DC.) Heller Fig. 1. Involucral Bract. Fig. 2.  
Chaff of Receptacle. Fig. 3. Disk-Flower.

there is replaced by *B. angustifolia* (DC.) Heller. Herbarium specimens examined were from the counties of Emmett, Cerro Gordo, Mitchell, Wright, Dallas, Delaware, Iowa, Louisa, Muscatine and Lee. This area is that of the west central portion of the state, east and southeast to the Mississippi River.

It is reported from the following counties: Linn (45), Henry (19), Johnson (41), Muscatine (2), Louisa (2), Scott (2), Webster (22) and Iowa (40).

*BRAUNERIA ANGUSTIFOLIA* (DC.) Heller.

*Brauneria angustifolia* (DC.) Heller, Muhlenbergia 1:5. 1900.

*Echinacea angustifolia* DC. Prodr. 5:554. 1836.

*Echinacea pallida* and *sanguinea* Nutt. Trans. Am. Phil. Soc. 7:354. 1841.

*Rudbeckia angustifolia* (DC.) B. & H. Gen. Pl. 2:365. 1873.

*Brauneria angustifolia* (DC.) Heller, the Purple Cone-flower or Narrow-leaved Cone-flower resembles *B. pallida* (Nutt.) Britton. In most respects the plant bodies of the two species are so similar that the differences noted might easily be those due to the effects of environment upon the plant structures.

Plants examined were 8-24 dm. tall, rather stout, mostly simple, naked above, and generally more hirsute than *B. pallida* (Nutt.) Britton.

The leaves were narrowly elliptic 3-15 cm. long, entire, prominently 3-veined, the lower ones narrowed into slender petioles, the surface strigose-hispid.

The solitary heads in many cases were smaller than in the preceding species.

The floral details show some important differences:

Involucral bracts: in 2 series, linear-lanceolate, copiously hispid and with squarrose tips.

Disk-flowers: nearly as in *B. pallida*, 6-7 mm. long, purple, the 5 lobes erect, stamens inserted near the base of the broad corolla; anthers and style-arms dark, and with hispid appendages near the tip.

Chaff: as in *B. pallida*, smooth, the purple-tipped awn  $\frac{1}{2}$  longer than the disk-flower, which it encloses when young, persistent.

Ray-flowers: pale purple, narrow, 2-2.5 cm. long, spreading, 2-3 notched, tardily deciduous.

Akene: thick, broad wedge-shape, 4-sided.

Pappus: a crown or small toothed border.

The greater hispidity of the plant, the bracts more copiously hispid, the disks often smaller, and the rays shorter and spreading are

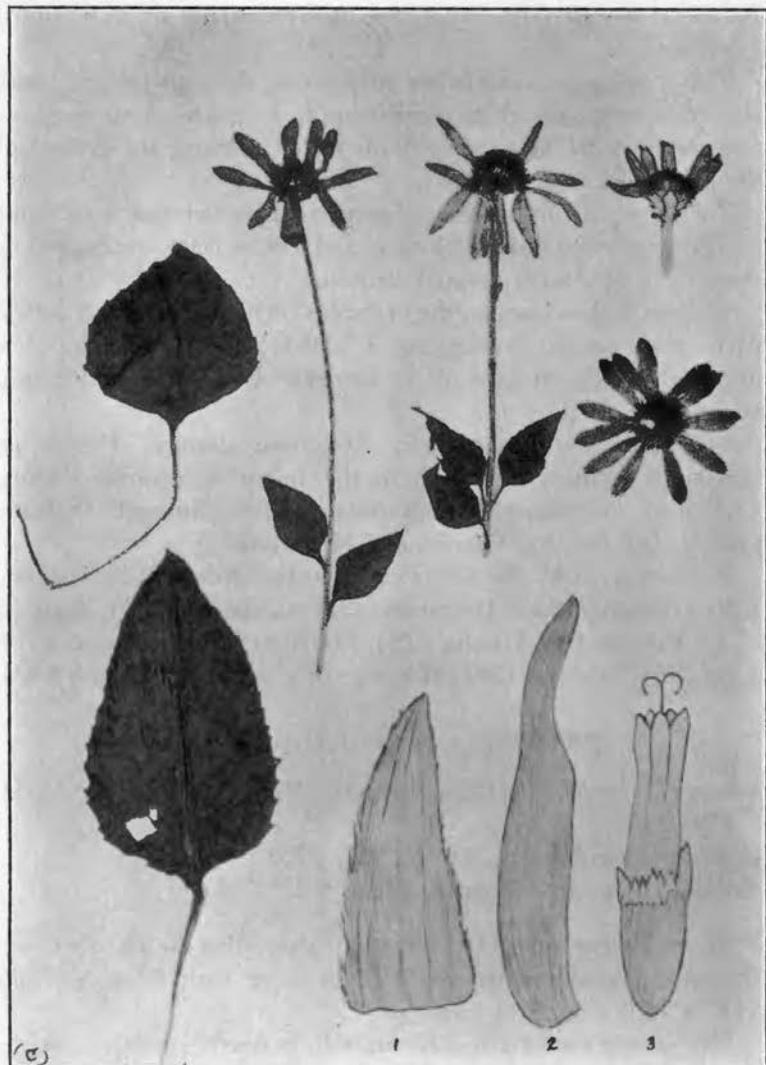


Plate XXII. *Branneria purpurea* (DC.) Britton. Fig. 1. Involucral Bract. Fig. 2. Chaff of Receptacle. Fig. 3. Disk-Flower.

the chief marks of identification in this species as compared with *B. pallida* (Nutt.) Britton.

*B. angustifolia* (DC.) Heller, is a true prairie plant. It is also found on dry barrens and slopes, growing singly or in scattered groups.

They come into bloom in late June lasting through July. Though they may seem somewhat coarse in appearance when near by, these two species with their showy heads nodding among the grasses of the prairie are very attractive.

The range of this species is from Saskatchewan south and west to Tennessee, Nebraska, Colorado, and Texas, being overlapped by the area of *B. pallida* (Nutt.) Britton.

In Iowa it flourishes on the dry areas of the western and central part, replacing and overlapping *B. pallida* (Nutt.) Britton. It is also said to exist in some of the extreme eastern and southeastern counties.

Specimens were collected in Dickinson County. Herbarium specimens examined were from the following counties: Lyon, Dickinson, Woodbury, Pottawattamie, Story, Emmett, Calhoun, Polk, Ida, Palo Alto, Carroll, and Muscatine.

It is reported by the following counties: Adair (15), Calhoun (29), Decatur (12), Dickinson (35), Dubuque (23), Emmett (25), Fayette (0), Hardin (28), Harrison (31), Johnson (41), Linn (45), Madison (20), Monona (31), Scott (2), Shelby (12).

#### *BRAUNERIA PURPURA* (DC.) Britton

*Brauneria purpurea* (DC.) Britton. Mem. Torr. Club. 5:334.  
1894.

*Rudbeckia purpurea* L. Sp. pl. 907. 1753.

*Echinacea purpurea* Moench. Meth. 591. 1794.

*Brauneria purpurea* (DC.) Britton, also called the Purple Cone-flower is probably often confused in name with *B. angustifolia* (DC.) Heller.

The simple stem from 6-12 dm. tall, is nearly smooth or sometimes scabrous-pubescent, striate, and bears a single large head.

The leaves 5-12 cm. long are ovate to lanceolate, acute or acuminate, the upper broadly ovate, cuneate to subcordate at base, prominently 5-nerved and veiny, abruptly narrowed into petioles longer than the blades, sharply serrate.

The solitary showy head has the disk high, at length becoming egg-form.



Plate XXIII. *Brauneria purpurea* (DC.) Britton

The floral structures are similar to those of the two other species:

Involucral bracts: in 3-5 series, very finely hispid, lax or squarrose.

Disk-flowers: 1 cm. long (with akene), purple, cylindric with broad base, the 5 lobes erect, stamens dark, inserted at base of the corolla, style-branches hispid near the tips.

Chaff: smooth, abruptly acuminate-awned, the awn often as long as the body, purple tipped, persistent.

Ray-flowers: 12-20, rose purple, occasionally nearly white, 2-4 cm. long, 8-9 mm. wide spreading, elongating in maturity, 2-3 notched.

Akene: 4-5 mm. long, thick and somewhat angled.

Pappus: a crown or small toothed border.

- *B. purpurea* (DC.) Britton is a woods species and shows structural adaptations to its mesophytic environment which are in contrast to the coarse hairy surfaces, and the narrow leaves of the prairie species. It has a more luxuriant appearance, smoother surfaces, broader softer leaves, and a more attractive inflorescence.

This may account for its being rare, having been transferred from its natural home in the woods to gardens. Now it is more often found in cultivation than in the wild. It blooms in July and early August.

Its distribution is from New York, Virginia, west to Ohio, Illinois, Missouri, Nebraska, and Louisiana. In Iowa it is rare in open woods and it has been reported as common on rich hillsides.

Specimens were found growing in Wild-Cat Den, Muscatine County. Others in cultivation were examined; these resembled the wild forms in every way. A specimen from the herbarium of the State University of Iowa was collected at the edge of a woods in Louisa County, August 1897. A specimen in the Ames herbarium was collected in Appanoose County, August 1896.

It is reported as infrequent from the following counties: Decatur (13), Mitchell (46), Fayette (9), Linn (45), Louisa (2), Appanoose (10, 13), and Webster (22).

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