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Notes on the Flora of Western Iowa

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therefore, in this instance, change the commonly received name. Instead of *Cornuvia circumscissa* (Wallr.) R., we shall say *Ophiotheca chrysosperma* Currey, unless we can show that Wallroth actually described the same thing, when, of course, we should write *Ophiotheca circumscissa* (Wallr.), followed by the name of the author who first established the combination, in this case, Masee.

NOTES ON THE FLORA OF WESTERN IOWA.

BY L. H. PAMMEL.

The flora of the loess in western Iowa is unique, in many respects. While it may be said that many parts of the state have a typical prairie flora, certain species being common from Texas to British America, east to Wisconsin, Illinois and Indiana, only occasionally do we find plants of the great plains in our own state. Western species are somewhat unequally distributed in our state; they occupy a larger area in north-western Iowa than in southern and western. In northern Iowa a few prominent types appear, as in Emmet county. Of these I may mention *Bouteloua oligostachya*, *Agropyrum caninum*, *A. caesium*, *Grindelia squarrosa*, *Helianthus Maximiliani*. The latter is not, however, a typical western plant, though introduced in central Iowa. It crosses our western border on the loess and extends south to Texas.

The loess of western Iowa is peculiar so far as the flora is concerned, nothing like it in Iowa. A number of American writers have written upon the peculiarities of its plant life. B. F. Bush¹ has given us a complete catalogue of the flora of northwestern Missouri.

A. S. Hitchcock² has reported a few of the plants occurring near Sioux City, and in general touches on the flora of western Iowa.

J. W. McGee considers the loess flora of northeastern Iowa. The two regions are however not similar from a botanical standpoint. It may be well to speak of the formation in this

¹Notes on the mound flora of Atchison county, Missouri. Reprint, Sixth Ann. Rep. Missouri Botanical Garden, 1895, pp. 121-134.

²Notes on the flora of Iowa, Bot. Gazette Vol. XIV, p. 127

connection. McGee³ says: "The macroscopic characters of the deposit are moderately constant:

"(1) It is commonly fine, homogeneous, free from pebbles or other adventitious matter, and either massive or so obscurely stratified that the bedding planes are inconspicuous; (2) it commonly contains unoxidized carbonate of lime in such quantity as to effervesce freely under acids; (3) it frequently contains nodules and minute ramifying tubules of carbonate of lime; (4) in many regions it contains abundant shells of land and fresh water mollusca; (5) is commonly so friable that it may be removed with a spade or impressed with the fingers, yet it resists weathering and erosion in a remarkable manner, standing for years in vertical faces and developing steeper erosion slopes than any other formation except the more obdurate clastic or crystalline rocks." McGee also states that it is a fallacy to regard the loess as identical in composition or that it is identical in genesis or even in age. As to its origin, Chamberlin and Salisbury find that in western Wisconsin and contiguous parts of Illinois and Iowa its composition varies in different localities with that of the associated drift and that both composition and distribution point to glacial silt as the parent formation of the loess in the upper Mississippi valley. Prof. McGee in speaking of the plants of the loess in northeastern Iowa lays stress on the prevalence of hard wood forests in the area. That the timber belt is confined to this area. The chief trees of this region from my observations are, oaks a half dozen species (*Quercus macrocarpa*, *Q. coccinea*, *Q. tinctoria*, *Q. rubra*, *Q. alba*, *Q. Muhlenbergii*, *Q. bicolor*). The *Q. bicolor* is however, a swamp species. The latter and *Q. Muhlenbergii* are southern species that have extended northward along the Mississippi. The butternut (*Juglans cinerea*) of the uplands and walnut (*Juglans nigra*) of the bottoms, the former is northern and the latter southern. The genus *Prunus* is represented by three species (*Prunus Americana*, *P. serotina*, and *P. Virginiana*). The crab-apple (*Pyrus coronaria*) is found everywhere in thickets. The white birch (*Betula papyracea*) is a rare tree, the river birch (*Betula nigra*) is abundant along the streams; other trees along streams are honey locust (*Gleditschia triacanthos*); sycamore (*Platanus occidentalis*) Kentucky coffee tree (*Gymnocladus Canadensis*), all southern representatives. The elms are represented

³The Pleistocene history of northeastern Iowa, Eleventh Ann. Rep. U. S. Geological Survey, p. 291.

by three species (*Ulmus Americana*, *U. racemosa* and *U. fulva*). Only one, the slippery elm, is abundant on the loess formation, though *Ulmus Americana* is less restricted to low bottoms than *U. racemosa*. Of the maples the sugar maple (*Acer saccharinum*) is common on the loess, while the soft maple (*Acer dasycarpum*) is exclusively a lowland species, so is box elder (*Negundo-aceroides*). The mountain maple (*Acer spicatum*) occurs on the loess. *Tilia Americana* is common on the loess formation. Three cone bearing trees occur in northeastern Iowa (*Abies balsamea*, *Pinus Strobus* and *Juniperus Virginiana*), but they occur on other than loess soil. Of the ashes there are several species the *Fraxinus viridis* delights in low bottoms. The *F. Americana* occurs on higher soil.

I cannot, in this connection, enumerate the shrubs that occur, but they are numerous and may occur in thickets in both loess and bottoms. Comparing the plants found in northeastern Iowa with those about La Crosse, Wis., where my early botanical work was done, I may say that most of the species occur and that the woody plants are more numerous. Some of the southern species, however, fail to appear, but in places northern forms occur. The density of the timber increases from the Mississippi east. In the drainage basin of the Kickapoo Valley the finest timber in western Wisconsin occurs. Nowhere have I seen such beautiful specimens of *Acer saccharinum*, *Tilia Americana* and *Quercus macrocarpa*. This, too, is outside of the loess region. In southwestern Minnesota, the statement of McGee that there is a significant relation between the loess sheeting and forest covering is very apparent.

The most significant fact appearing to one who has made a study of the loess flora of western Iowa is the absence of trees, except an occasional cottonwood, on the peculiar mounds that occur in parallel ridges along the Missouri river. These peculiar hills rise abruptly from the rich, fertile Missouri bottom and somewhat resemble the low foot hills of the Rocky mountains. They are from 100 to 200 feet high. From a distance they look bare, but a day spent in this region will show that the hills are full of botanical interest. I have made four botanical trips at different times along the Missouri. On the whole there is very little variation in the flora of Iowa. If we leave out of consideration a number of most interesting plants found in Winneshiek county by Mr. Holway and a few peculiar southern plants found by Mr. Ferd Reppert, near the city of

Muscatine, the only radical difference shown in our flora is that occurring along the Missouri. About twenty-five western and northwestern species occur and, according to the list of Mr. Bush, nearly the same species occur from Sioux City, Iowa, to St. Joseph, Mo. The region is not entirely devoid of trees, in its northern portion, between the steep mounds a variety of bur oak (*Quercus macrocarpa* var. *olivaeformis*), Slippery elm (*Ulmus fulva*), Cottonwood (*Populus monilifera*), Plum (*Prunus Americana*), Basswood (*Tilia Americana*), box elder (*Negundo aceroides*), occur. Several shrubs also occur; Grape (*Vitis riparia*), climbing bittersweet (*Celastrus scandens*), wahoo (*Euonymus atropurpureus*). South, the timber area is more extensive, as at Council Bluffs and Missouri Valley. At Glenwood and Logan there are fine specimens of *Quercus rubra*, *Tilia Americana* and *Ulmus fulva*. They are abundant from one-half to two miles from the hills. The trees on the loess about Turin and Sioux City are broad and spreading.

Of the peculiar herbaceous plants, I shall content myself by giving a list. The beautiful Spanish bayonet (*Yucca angustifolia*) so abundant everywhere in the west. The *Aplopappus spinulosus* forms dense mats on the tops of the mounds. *Grindelia squarrosa*, now naturalized in other parts of Iowa. *Liatris punctata*, *Euphorbia marginata*, *E. heterophylla*, a beautiful blue-flowered lettuce (*Lactuca pulchella*), *Gaura coccinea*, so abundant everywhere in Nebraska and in the Rocky mountain region. *Oxybaphus angustifolia*, *Helianthus Maximiliani*, *Lygodesmia juncea*, an abundant plant of the plains now exerting itself with great force in the cornfields of northwestern Iowa. The beautiful *Mentzelia ornata* is confined to Cedar Bluffs along the Big Sioux a few miles north of Sioux City. *Cleome integrifolia*, the celebrated Rocky Mountain bee plant. Two species of *Dalea* (*D. alopecuroides* and *D. laxiflora*) the Loco weed (*Oxytropis Lamberti*) and *Astragalus lotiflorus*, var. *brachypus*. Professor Hitchcock records *Stipa comata*, which belongs chiefly to the Rocky Mountain region and rarely found in eastern Nebraska. *Shepherdia argentea* occurs along the Missouri near Sioux City undoubtedly a waif from the northwest.

I may also add a gamma grass peculiar to the west, most common species of Nebraska (*Bouteloua oligostachya*) Buffalo grass (*Buchloe dactyloides*) from Lyon county. The most abundant grasses on the hills are *Andropogon scoparius*, *Bouteloua racemosa*, quite common in many parts of Iowa. *Muhlenbergia*

soboliferia, *Ammophila longifolia* and *Sporobolus Hookeri*, *S. brevifolius* and an unnamed western species which has heretofore been referred to *S. cuspidatus*. I may also remark that a peculiar thistle occurs, the *Cnicus altissimus*, var. *fililpendulus*.

Why is it that these peculiar hills, not more than a few hundred feet wide, should have such a local western flora? The soil is retentive of moisture, it dries out quickly and the roots easily penetrate the soil to draw on the contained moisture below. This certainly cannot be the reason, since the loess extends along the river courses in the interior. Some of these plants, since the cultivation of the soil, have shown some tendency to spread, as in *Euphorbia marginata*, *Lygodesmia juncea*, *Grindelia squarrosa*, which are tramping eastward to menace the farmer.

Were the seeds of some of these plants brought to Iowa with the buffalo, as has been suggested for buffalo grass? Some of the plants are disseminated by the wind, and in others the water can by a purely mechanical means bring them to the base of the mound. With the more woody country of southeastern Iowa there seems to have been but little chance for these plants to spread beyond the bluffs. In northwestern Iowa some of these plants, like *Helianthus Maximiliani*, are not uncommon, which shows that the woody area of southwestern Iowa is in part a barrier against a further eastern extension. But why did the plants not extend beyond the very narrow limits, as the forest area does not encroach directly on the loess mounds? I am at a loss to explain this most peculiar distribution.

In the list appended I enumerate the most striking plants. The writer is under obligations to Mrs. Rose Schuster Taylor and Miss Bandusia Wakefield, of Sioux City, for favors rendered; also Mr. E. D. Ball, of Little Rock; Mr. W. Newell and J. Jensen, of Hull, and E. G. Preston, of Battle Creek, for specimens, to Dr. Millspaugh for naming the Euphorbias.

My own collections were made at various times near Sioux City, Hawarden, Onawa, Turin, Missouri Valley, Council Bluffs and Logan. The list could have been extended and localities added, but college material is not readily accessible at this time of the year. Miss Wakefield's list is based on colored sketches in her possession. I have abbreviated all specimens credited to her as (B. W.), and those collected by myself as (L. H. P.). I have followed Gray's Manual in arrangement of

orders, genera and species. It will not be necessary to comment on the value of this, since it is the standard work in the schools and colleges of Iowa.

RANUNCULACEÆ.

Clematis Virginiana L.

Sioux City, in woody ravines (B. W.).

Anemone patens L. var. *Nuttalliana* Gray.

Sioux City, prairies, abundant (B. W.).

Anemone cylindrica A. Gray.

Hull (W. Newell); Little Rock, dry grounds (Herb. C.R. Ball).

A. Virginiana L.

Sioux City (B. W.).

A. Canadensis L.

Sioux City, low grounds, bottoms (B. W.); Little Rock (Herb. C. R. Ball).

Thalictrum purpurascens L.

Sioux City, low grounds and prairies (B. W.); Hull (W. Newell); Little Rock (C. R. Ball).

Ranunculus Cymbalaria Pursh.

Hull (W. Newell); Little Rock (Herb. C. R. Ball).

R. multifidus Pursh.

Little Rock, in water (Herb. C. R. Ball).

R. abortivus L.

Sioux City (B. W.).

R. septentrionalis Poir.

Cherokee (B. W.).

Caltha palustris L.

Sioux City, not common, low marshes (B. W.).

Aquilegia Canadensis L.

Sioux City, abundant in wooded ravines (B. W.).

Delphinium azureum Michx.

Sioux City prairies (B. W.); Little Rock (C. R. Ball); flowers of Iowa specimens are greenish white.

Actaea spicata L. var. *rubra*, Ait.

Sioux City woods, frequent (B. W.).

MENISPERMACEÆ.

Menispermum Canadense L.

Sioux City, common, in wooded ravines (B. W. L. H. P.).

BERBERIDACEÆ.

Caulophyllum thalictroides, Michx.

Sioux City woods, frequent (B. W.).

NYMPHAEACEÆ.

Nelumbo lutea Pers.

Onawa (B. W.).

Nymphaea reniformis D. C.

Lyon Co. (B. W.).

Nuphar advena Ait.

Sioux township Lyon Co , northwest corner of state (B. W.).

PAPAVERACEÆ.

Sanguinaria Canadensis L.

Sioux City. Wooded ravines (B. W.).

FUMARIACEÆ.

Dicentra cucullaria D. C.

Sioux City, abundant in wooded ravines in vegetable mould.

Corydalis aurea Willd.

Sioux City, borders of woods, common (B. W.).

CRUCIFERÆ

Lepidium Virginicum L.

Sioux City, waste places abundant (B. W.)

L. apetalum Willd.Not represented by specimens though abundant on mounds,
fields and pastures in western Iowa (L. H. P.).*Capsella Bursa-pastoris* Medic.

Sioux City (B. W.).

Brassica nigra Koch.

Sioux City (B. W.).

B. Sinapistrum Boiss.

Sioux City (B. W.).

Sisymbrium officinale Scop.Sioux City (B. W.); Battle Creek (E. G. Preston); Little
Rock (C. R. Ball); roadside weed.*S. canescens*, Nutt.

Sioux City (B. W.).

Erysimum cheiranthoides L.

Sioux City, rich soil, river bottoms (B. W.).

Nasturtium terrestre R. Br.Sioux City (B. W.) low grounds; borders of ponds and
streams.*Cardamine hirsuta* L.

Little Rock (C. R. Ball).

Arabis, hirsuta Scop.

Sioux City (B. W.).

CAPPARIDACEÆ.

Polanisia graveolens, Raf.

Sioux City (B. W.).

Cleome integrifolia Torr. & Gray.

Onawa, Missouri Valley streets and loess mounds (L. H. P.) common (B. W.); common in the city (L. H. Pam-mel); from observation.

VIOLACEÆ.

Viola pedatifida Don.

Sioux City, prairies frequent (B. W.).

A. palmata L. var. *cucullata* Gray.

Sioux City, common in woods (B. W.).

Viola Canadensis L.

Sioux City, wooded ravines between loess mounds east of Sioux City (B. W.). Apparently out of its range.

CARYOPHYLLACEÆ.

Saponaria officinalis L.

Sioux City, escaped from cultivation (B. W.).

Silene stellata Ait.

Sioux City, woods common (B. W.); Hawarden, Council Bluffs, common borders of woods (L. H. P.).

Lychnis Githago Lam.

Sioux City, an introduced weed (B. W.); Rock Valley (Jensen & Newell); Little Rock (Herb. C. R. Ball).

Stellaria longifolia Muhl.

Sioux City (B. W.); Little Rock (C. R. Ball).

PORTULACACEÆ.

Portulaca oleracea L.

Sioux City (B. W.); an abundant weed everywhere in western Iowa.

Talinum teretifolium Pursh.

Sioux City (B. W.).

Claytonia Virginica L.

Smithland, in woods (B. W.).

MALVACEÆ.

Malva rotundifolia L.

Turin, Onawa, weed in streets and along roadsides (L. H. P.); Sioux City (B. W.); Little Rock (C. R. Ball).

Abutilon Avicennæ Gaertn.

Onawa, streets and waste places, abundant (L. H. P.); Sioux City (B. W.).

TILIACEÆ.

Tilia Americana L.

Sioux City, Turin, Missouri Valley, Council Bluffs, ravines
between loess mounds (L. H. P.); back of mounds an
abundant tree.

LINACEÆ.

Linum sulcatum Riddell.

Sioux City, top and sides of loess mounds, prairies (L. H.
P.), (B. W.); Little Rock (C. R. Ball).

L. rigidum Pursh.

Sioux City, loess mounds, capsules and old stems only
found by myself (L. H. P.); Hamburg (Hitchcock, Bot.
Gazette, XIV, 128).

GERANIACEÆ.

Oxalis violaceæ L.

Sioux City, in woods frequent (B. W.); Little Rock (Herb.
C. R. Ball).

O. corniculata L. var. *stricta* Sav.

Turin, Onawa, in woods and fields abundant (L. H. P.);
Sioux City (B. W.).

Impatiens pallida Nutt.

Sioux City, in woods along streams (B. W.).

I. Fulva Nutt.

Sioux City, in woods along streams (B. W.).

RUTACEÆ.

Xanthoxylum Americanum Nutt.

Sioux City, common in woods (B. W.); South Dakota, oppo-
site Hawarden, in valleys between hills (L. H. P.).

CELASTRACEÆ.

Celastrus scandens L.

Sioux City, common in woods between loess mounds (B. W.
and L. H. P.).

Euonymus atropurpureus Jacq.

Sioux City, in woods between loess mounds (B. W., L. H. P.);
South Dakota, opposite Hawarden (L. H. P.).

RHAMNACEÆ.

Rhamnus lanceolata Pursh.

Logan, low hills in woods (L. H. P.), Sioux City, level
woodland near the Big Sioux river (B. W.).

Ceanothus Americanus L.

Turin, Missouri Valley, loess hills in open, grassy places
(L. H. P.); Sioux City (B. W.).

C. ovatus Desf.

Council Bluffs, sides and tops of loess mounds (L. H. P.).

VITACEÆ.

Vitis riparia Michx.

Sioux City, valleys between loess mounds in woods (L. H. P.);
South Dakota, opposite Hawarden (L. H. P.).

Ampelopsis quinquefolia Michx.

Sioux City, in woods; common (B. W.).

SAPINDACEÆ.

Acer dasycarpum Ehrh.

Sioux City, Hawarden; abundant in alluvial bottoms, along
Big Sioux and Missouri rivers (L. H. P.).

Negundo aceroides Moench.

Sioux City, frequent along streams (B. W.).

Staphylea trifolia L.

Sioux City, in valleys between loess hills (B. W.).

ANACARDIACEÆ.

Rhus glabra L.

Sioux City, common border of loess mounds (B. W.) South
Dakota, opposite Hawarden (L. H. P.).

R. Toxicodendron L.

Sioux City, common in valleys between loess mounds
(B. W.).

POLYGALACEÆ.

Polygala verticillata L.

Sioux City, loess mounds (L. H. P. and B. W.).

LEGUMINOSÆ.

Baptisia leucantha Torr. and Gray.

Battle Creek, low places, prairie (E. G. Preston), Cherokee
(B. W.).

Crotalaria sagittalis L.

Sioux City, bank of Big Sioux river, Cedar Bluffs (B. W.).

Trifolium pratense L.

Sioux City (B. W.).

T. stoloniferum Muhl.

Sioux City (B. W.).

T. repens L.

Sioux City (B. W.).

Melilotus officinalis Willd.

Sioux City (B. W.), Council Bluffs (L. H. P.).

M. alba Lam.

Sioux City, along railroads, in streets, fields and roadsides, abundant (L. H. P. and B. W.), Onawa, Turin (L. H. P.).

Medicago sativa L.

Sioux City, in streets; not common, Council Bluffs (L. H. P.).

Hosackia Purshiana Benth.

Sioux City, loess mounds (B. W.).

Psoralea argophylla Pursh.

Sioux City, abundant on loess mounds (B. W.), high prairies and low, rich soil; Little Rock (Herb. C. R. Ball), Hull (W. Newell). A typical prairie plant, common throughout Iowa on dry hills.

Amorpha canescens L.

Sioux City, bottoms (B. W.), Missouri Valley (L. H. P.).

Dalea alopecuroides Nutt.

Near Lake Okoboji (B. W.), Missouri Valley, Sioux City, loess mounds; abundant; Hawarden, in open grounds (L. H. P.), Hamburg (Hitchcock Bot. Gazette, XIV, 128).

D. laxiflora Pursh.

Sioux City (B. W.). The species is abundant on the loess mounds about Sioux City, Missouri Valley and Turin, producing a long and thick root. Hamburg (Hitchcock, Bot. Gazette, XIV, 128).

Petalostemon violaceus Michx.

Sioux City abundant on loess hills (B. W., L. H. P.); Hull (W. Newell); South Dakota opposite Hawarden dry hills (L. H. P.); Logan (L. H. P.); Battle Creek (E. G. Preston); Little Rock (C. R. Ball); Council Bluffs dry hills (L. H. P.); Missouri Valley, Turin, loess hills (L. H. P.). On loess mounds, usually with shorter heads than commonly found on prairies.

P. candidus Michx.

Sioux City, hills loess abundant; L. H. P. South Dakota opposite Hawarden (L. H. P.); Hull (W. Newell); Battle Creek (E. G. Preston); Little Rock (Herb. C. R. Ball); Council Bluffs, Turin, Missouri Valley, on loess mounds, shorter heads and smaller plants than commonly found on prairies.

Robinia Pseudacacia L.

Sioux City, an escape from cultivation (B. W.).

Astragalus caryocarpus Ker.

Sioux City (B. W.).

A. Canadensis L.

Sioux City (B. W.).

A. lotifloris Hook var. *brachypus* Gray.

Hamburg, Hitchcock, Bot. Gazette XIV, 128.

Oxytropis Lamberti Pursh.

Sioux City (B. W.). Specimens in fruit were found near Turin and Missouri Valley on loess mounds (L. H. P.). Produces a perennial root several feet in length, frequently exposed where soil has washed away. Miss Wakefield finds the form with violet colored flowers more common than the white. Hamburg (Hitchcock, Bot. Gazette, XIV, 128).

Glycyrrhiza lepidota Nutt.

Sioux City (B. W.); Turin, Missouri Valley, along railroads, and border of hills common, Logan, Council Bluffs (L. H. P.). Hull (W. Newell); Little Rock (C. R. Ball).

Desmodium Canadense D. C.

Hull (W. Newell).

D. canescens D. C.

Sioux City, bottom (L. H. P.).

Apios tuberosa Moench.

Smithland, low grounds (B. W.).

Strophostyles angulosa Ell.

South Dakota, opposite Hawarden, flood plain of Big Sioux river (L. H. P.); Sioux City (B. W.).

Amphicarpaea monoica Nutt.

Sioux City (B. W.).

Cassia Chamæcrista L.

Missouri Valley, loess hills abundant (L. H. P.); Sioux City (B. W. and L. H. P.); South Dakota, opposite Hawarden (L. H. P.); Battle Creek (E. G. Preston).

Gymnocladus Canadensis Lam.

Sioux City (B. W.), abundant at the mouth of the Big Sioux river, in alluvial soil, base of hills (L. H. P.).

Gleditschia triacanthos L.

Sioux City, abundant along the river (B. W.).

Desmanthus brachylobus Benth.

Spirit Lake (B. W.).

ROSACEÆ.

Prunus Americana Marshall.

Council Bluffs, loess in valleys between mounds. South Dakota, opposite Hawarden forming thickets at the base of hills (L. H. P.), Sioux City (B. W.) the species forms dense thickets in western Iowa, fruit small.

P. Virginiana L.

Logan, in valleys between hills. Sioux City (B. W.); the species occurs in thickets mostly small shrubs.

Rubus strigosus Michx.

Sioux City, rare (B. W.).

R. occidentalis L.

Sioux City, not common (B. W.).

Geum album Gmelin.

Logan, in woods (L. H. P.); Sioux City (B. W.).

Fragaria Virginiana Mill. var. *Illinoensis* Gray.

Sioux City (B. W.).

Potentilla arguta Pursh.

Hull (W. Newell); Battle Creek, (E. G. Preston); Little Rock, (Herb. C. R. Ball); Sioux City (B. W.). The species is frequent in dry places in western Iowa, loess mounds.

P. Norvegica L.

Hull (W. Newell); Little Rock (C. R. Ball); Rock Valley, (J. F. Jensen and W. Newell); Sioux City (B. W.).

Var. *millegrana* Watson.

Sioux City (B. W.).

Rosa Arkansana Porter.

Hull (M. Newell).

SAXIFRAGACEÆ.

Heuchera hispida Pursh.

Sioux City (B. W.).

Ribes gracile Michx.

Sioux City, in woods (B. W.) Council Bluffs, loess in woods (L. H. P.).

R. floridum L'Her.

Sioux City, in woods (L. H. P.); South Dakota, opposite Hawarden in woods, valleys and between hills.

CRASSULACEÆ.

Penthorum sedoides L.

Hull (W. Newell); Sioux City (B. W.).

ONAGRACEÆ.

Oenothera biennis L.

Hull (W. Newell); Battle Creek (E. G. Preston); Little Rock (C. R. Ball); Council Bluffs (L. H. P.). A weed in streets and waste places, and fields abundant throughout western Iowa.

O. serrulata Nutt.

Sioux City (B. W.); Battle Creek (E. G. Preston); Little Rock (C. R. Ball); Hull (W. Newell). Praries and loess mounds abundant.

Gaura parviflora Dougl.

Sioux City, base of mounds (B. W.); Missouri Valley (L. H. P.). It is spreading eastward, occurring in meadows and fields.

G. coccinea Nutt.

Sioux City (B. W.) Missouri Valley, Turin top of loess mounds, common (L. H. P.); Hamburg (Hitchcock, Bot. Gazette XIV, 128).

LOASACEÆ.

Mentzelia ornata Torr. & Gray.

Sioux City on sandy and rocky bluffs along the Big Sioux river, Cedar Bluffs, abundant in that locality (B. W.).

CUCURBITACEÆ.

Echinocystis lobata Torr & Gray.

Turin, low ground along streams (L. H. P.).

CATACEÆ.

Opuntia Rafinesquii Englem.

Lyon county (B. W.).

UMBELLIFERÆ.

Heracleum lanatum Michx.

Sioux City (B. W.).

Pastinaca sativa L.

A roadside weed. Council Bluffs, Sioux City (L. H. P.).

Cryptotœnia Canadensis D. C.

Sioux City (B. W.).

Zizia aurea Koch.

Sioux City (B. W.).

Cicuta maculata L.

South Dakota opposite Hawarden (L. H. P.); Sioux City (B. W.)

Osmorrhiza brevistylis D. C.

Sioux City (B. W.).

Eryngium yuccaefolium Michx.

Cherokee (B. W.).

CAPRIFOLIACEÆ.

Triosteum perfoliatum L.

Cherokee Co., Sioux City (B. W.)

Sambucus Canadensis L.

Sioux City (B. W.).

Symphoricarpos occidentalis Hook.

Sioux City, base of mounds; abundant (L. H. P. and B. W.); South Dakota, opposite Hawarden (L. H. P.); Battle Creek (E. G. Preston); Rock Valley (W. Newell and J. F. Jensen); Little Rock (C. R. Ball); Council Bluffs, Missouri Valley, Turin, base of loess mounds; abundant (L. H. P.).

RUBIACEÆ.

Houstonia angustifolia Michx.

Logan, hills; Council Bluffs, Missouri Valley, loess mounds (L. H. P.); Smithland (B. W.), common everywhere on the hills.

Galium Aparine L.

Sioux City (B. W.).

COMPOSITÆ.

Vernonia fasciculata Michx.

Hawarden, Missouri Valley, Turin, low grounds (L. H. P.); Sioux City (B. W.).

V. noveboracensis Willd.

Missouri Valley, Council Bluffs, loess mounds near base (L. H. P.).

Eupatorium purpureum L.

Sioux City (B. W.).

E. serotinum Michx.

Sioux City, Big Sioux bottom; not common (L. H. P.).

E. perfoliatum L.

Missouri Valley, low grounds (L. H. P.), Sioux City (B. W.).

E. ageratoides L.

Sioux City (B. W.); Onawa, in woods and low grounds (L. H. P.).

Kuhnia eupatorioides L.

Missouri Valley, Turin, loess mounds; Sioux City, loess mounds (B. W. and L. H. P.); Alton, prairies; South Dakota, opposite Hawarden (L. H. P.).

Liatris punctata Hook.

Missouri Valley, loess mounds (L. H. P.); Sioux City (B. W., L. H. P.); Hitchcock, South Dakota, opposite Hawarden, hills (L. H. P.).

L. scariosa Willd.

- Alton, prairies, South Dakota, opposite Hawarden (L. H. P.).

Grindelia squarrosa Dunal.

Smithland (J. M. Wrapp), Sioux City, Hawarden, alluvial plain, Big Sioux river, abundant (L. H. P.); Battle Creek (E. G. Preston); Little Rock (Herb. C. R. Ball).
Sioux City (Hitchcock, Bot. Gazette, XIV, 128).

Aplopappus spinulosus D. C.

Missouri Valley, Turin, Sioux City, tops of loess mounds, found in dense patches (L. H. P., B. W., Hitchcock, Bot. Gazette, XIV, 128).

Solidago speciosa Nutt.

Turin low grounds, border of woods (L. H. P.); Sioux City, base of hills (B. W.).

S. Missouriensis Nutt.

Turin, Missouri Valley, loess mounds common (L. H. P.).

S. serotina Ait.

Sioux City (B. W.).

S. rupestris Raf.

Sioux City, loess mounds (L. H. P.).

S. Canadensis L.

Sioux City, border of woods, thickets, roadsides, fences, pastures, abundant (L. H. P. B. W.); Onawa, Turin (L. H. P.).

S. rigida L.

Turin, loess hills (L. H. P.); Sioux City (B. W.).

Boltonia asteroides L'Her.

Missouri Valley, Turin, low bottoms, common (L. H. P.);
Sioux City (B. W.).

Aster oblongifolius Nutt.

Turin, very abundant over loess mounds; South Dakota, opposite Hawarden, abundant all over low hills (L. H. P.); Sioux City, low mounds, common (B. W., L. H. P.).

A. Novae-Angliae L.

Turin, borders of woods, common; South Dakota, opposite Hawarden, few specimens near spring (L. H. P.); Sioux City (B. W.).

A. sericeus Vent.

Sioux Rapids, prairies, Turin, Missouri Valley, abundant over loess mounds (L. H. P.); Sioux City (B. W.).

A. sagittifolius Willd.

Turin, low grounds (L. H. P.).

A. ericoides L.

Turin, low grounds (L. H. P.).

A. multiflorus Ait.

Missouri Valley, open places, woods (L. H. P.); Sioux City (B. W.).

A. paniculatus Lam.

Sioux City, bottoms (L. H. P.); *A. ptarmicoides*, Torr. & Gray. Little Rock, prairies (Herb. C. R. Ball).

Erigeron Canadensis L.

Sioux City (B. W.); a weed in fields and pastures throughout western Iowa (L. H. P. observations).

E. strigosus Muhl.

Rock Valley (W. Newell, J. F. Jensen); Little Rock, prairies (Herb. C. R. Ball).

E. Philadelphicus L.

Hull (W. Newell); Sioux City (B. W.).

Antennaria plantaginifolia Hook.

Sioux City (B. W.).

Silphium laciniatum L.

Council Bluffs, common around loess mounds (L. H. P.); Sioux City (B. W.).

S. perfoliatum L.

Sioux City (B. W.).

Iva xanthiifolia Nutt.

Sioux City (B. W., L. H. P.); Onawa L. H. P.); Smithland (J. M. Wrapp). An extremely abundant weed everywhere in western Iowa, growing luxuriantly ten to twelve feet high in streets, vacant lots, dooryards, and around neglected buildings, etc.

Ambrosia trifida L.

Smithland (J. M. Wrapp); Sioux City (B. W.). A common weed along creeks and river courses in western Iowa (L. H. P.).

A. artemisiaefolia L.

Alton, Turin (L. H. P.); Sioux City (B. W.). A common weed in cultivated fields, pastures, meadows, along roadsides, vacant lots, and railroads.

A. psilostachya DC.

Council Bluffs, common weed along creeks and river courses in western Iowa (L. H. P.).

Xanthium Canadense Mill.

Sioux City, Turin (L. H. P.). In alluvial soil very abundant and weedy. South Dakota, opposite Hawarden, bottoms of Big Sioux river (L. H. P.).

Heliopsis scabra Dunal.

Sioux City (B. W.); Hull (W. Newell); Battle Creek, in woods (E. G. Preston); Little Rock (Herb. C. R. Ball).

Echinacea angustifolia DC.

Sioux City (B. W.); Hull (W. Newell); Battle Creek, abundant prairies (E. G. Preston); Council Bluffs, Logan (L. H. P.); Little Rock (Herb., C. R. Ball).

Rudbeckia laciniata L.

South Dakota, opposite Hawarden in woods abundant (L. H. P.); Sioux City (B. W.).

R. triloba L.

Onawa, low grounds, common (L. H. P.)

R. hirta L.

Sioux City (B. W.) Little Rock (Herb. C. R. Ball.).

Lepachys pinnata Torr. & Gray.

Sioux City (B. W.) Council Bluffs (L. H. P.).

Helianthus annuus L.

Sioux City (B. W.); Hawarden (L. H. P.); Onawa, Missouri Valley, (L. H. P.). A common weed everywhere in western Iowa, flood plains, Missouri and Big Sioux rivers, streets and dooryards. (L. H. P.).

H. rigidus Desf.

Hawarden (L. H. P.); Sioux City (B. W.).

H. grosse-serratus Martens.

Sioux City, abundant in alluvial bottoms of Missouri river, and along river courses, creeks (L. H. P., B. W.); Onawa, Turin. One of the most conspicuous plants in September.

H. Maximiliani Schrad.

Sioux City, Loess hills along the Missouri and Big Sioux rivers. Alton, Sioux Rapids, Hawarden, occasionally in alluvial bottoms at Whiting; also observed near Bradgate further east (L. H. P.).

H. tuberosus L.

Sioux City, between loess mounds, common, Hawarden,
Big Sioux bottom, common (L. H. P.).

Coreopsis palmata Nutt.

Sioux City (B. W.); Hull (W. Newell); Battle Creek (E. G.
Preston); Little Rock (Herb. C. R. Ball).

Bidens frondosa L.

Sioux City (B. W.).

B. chrysanthemoides Michx.

Sioux City (B. W.).

Helenium autumnale L.

Missouri Valley, low grounds, common (L. H. P.) Sioux
City (B. W.).

Dysodia chrysanthemoides Lag.

Sioux City, hills, waste places, streets, along roadsides
abundant (L. H. P., B. W.); Turin (L. H. P.).

Anthemis Cotula D. C.

Sioux City (B. W.); Little Rock (C. R. Ball).

Achillea millefolium L.

Sioux City (B. W.); Battle Creek, pastures (E. G. Preston);
Little Rock (C. R. Ball.).

Crysanthemum Leucanthemum L.

Sioux City; escaped from cultivation (B. W.).

Artemisia Canadensis Michx.

Sioux City (B. W., L. H. P.); South Dakota, opposite Har-
warden (L. H. P.).

A. Ludoviciana Nutt.

Sioux City (L. H. P.).

A. biennis Willd.

Sioux City (B. W.).

Senecio aureus L.

Sioux City (B. W.)

Cuculia tuberosa Nutt.

Council Bluffs (L. H. P.); Smithland (B. W.).

Arctium Lappa L.

Sioux City (B. W.).

Cnicus undulatus Gray.

Sioux City, lower parts of loess mounds; abundant in places
(L. H. P.).

C. altissimus Willd. var. *flipendulus* Gray.

Has been sent to me from western Iowa—Rathven (D. Cha-
pin); Sioux City (L. H. P.; Hitchcock Bot. Gazette, XIV,

129). This approaches *C. undulatus*, Miss Wakefield's *C. undulatus*, from Sioux City, is referable to this variety.

Var. *discolor* Gray.

Sioux City (B. W.).

C. arvensis Hoffm.

Maple River Junction (Bernholtz).

Krigia Dandelion Nutt.

Sioux City (B. W.).

Lygodesmia juncea Don.

Sioux City, loess mounds very abundant (L. H. P.); Logan, Missouri Valley, Turin (L. H. P.); Hull, weedy (James C. Watson); Little Rock, weedy (C. R. Ball); Battle Creek, roadsides, weedy (E. G. Preston). Very abundant tops and sides of mounds. In August and September most of the plants are affected with galls.

Taraxacum officinale Weber.

Sioux City (B. W.).

Lactuca Scariola L.

Missouri Valley (L. H. P.). Common in streets of Council Bluffs, Onawa, Turin (L. H. P. observations).

L. Canadensis L.

Sioux City (B. W.).

L. integrifolia Bigel.

Lake Okoboji (B. W.).

L. pulchella Bigel.

Sioux City, base of loess mounds and in streets (B. W., L. H. P.).

LOBELIACEÆ.

Lobelia syphilitica L.

Sioux City (B. W.).

L. spicata Lam.

Rock Valley (C. R. Ball), Sioux City (B. W.).

CAMPANULACEÆ.

Campanula Americana L.

Sioux City (B. W.), Hull (W. Newell).

ERICACEÆ.

Monotropa uniflora L.

Smithland, in rich woods (B. W.).

PRIMULACEÆ.

Steironema ciliatum Raf.

Rock Valley (J. Jensen and W. Newell), Sioux City (B. W.).

S. lanceolatum Gray.

Little Rock (C. R. Ball).

APOCYNACEÆ.

Apocynum cannabinum L.

Little Rock (C. R. Ball), Sioux City (B. W.).

ASCLEPIADACEÆ.

Asclepias tuberosa L.

Hull (W. Newell), Sioux City (B. W.).

A. incarnata L.

Hull (W. Newell), Sioux City (B. W.).

A. Cornuti Decaisne.

Sioux City (B. W.), Little Rock (C. R. Ball).

A. ovalifolia Decaisne.

Sioux City (B. W.).

A. verticillata L.

Sioux City, loess mounds, common in open places (B. W., L. H. P.); South Dakota, opposite Hawarden, hills; Turin, Missouri Valley (L. H. P.); Rock Valley (J. F. Jensen and W. Newell).

Acerates viridiflora Ell.

Little Rock (C. R. Ball).

GENTIANACEÆ.

Gentiana puberula Michx.

Sioux City, grassy low lands and hills; not common (B. W.).

G. Andrewsii Griseb.

Sioux City, meadows of Missouri river bottom (B. W.).

POLEMONIACEÆ.

Phlox pilosa L.

Sioux City (B. W.); Little Rock (C. R. Ball).

P. divaricata L.

Sioux City, in rich woods (B. W.).

Polemonium reptans L.

Cherokee, in rich woods (B. W.).

BORRAGINACEÆ.

Echinosperrnum Virginicum Lehm.

Sioux City, woods, along streets and roadsides (B. W.).

Lithospermum canescens Lehm.

Sioux City, prairies, and loess mounds (B. W.)

L. angustifolium Michx.

Sioux City, prairie and loess mounds (B. W.).

Onosmodium Carolinianum D. C. var. *molle*, Gray.

Sioux City, prairies and common on loess mounds (B. W.);
Little Rock (C. R. Ball); Council Bluffs, loess woods,
South Dakota opposite Hawarden, border of woods,
hills (L. H. P.).

CONVOLVULACEÆ.

Convolvulus sepium L.

Sioux City (B. B.); a common weed in fields, and pastures,
gardens and meadows (L. H. P. observations).

Cuscuta glomerata Choisy.

Sioux City on *Heilanthus*, *Solidago*, common (B. W.).

SOLANACEÆ.

Solanum nigrum L.

Sioux City (B. W.).

S. Carolinense L.

Introduced; Mapleton (Abjah Lamb); Logan, along road-
sides, Council Bluffs in streets (L. H. P.).

S. rostratum Dunal.

Woodbine; South Dakota, opposite Hawarden (L. H. P.).

Physalis pubescens L.

Sioux City (B. W.); A very common weed in neglected yards
Missouri Valley, Council Bluffs, Onawa (L. H. P. observations).

SCROPHULARIACEÆ.

Scrophularia nodosa L. var. *Marilandica* Gray.

Sioux City (B. W.); Little Rock (C. R. Ball).

Pentstemon grandiflorus Nutt.

Sioux City, common on the sides of the loess mounds (L.
H. P., B. W.).

Mimulus ringens L.

Sioux City in low grounds (B. W.).

Ilysanthes riparia Raf.

Sioux City, low grounds and muddy places (B. W.);
Hawarden (L. H. P.); Hull (W. Newell).

Veronica Virginica L.

Sioux City (B. W.); Hull (W. Newell); Little Rock (C. R.
Ball).

Gerardia aspera Dougl.

Sioux City, common on sides and tops of loess mounds (L.
H. P.).

G. tenuifolia Vahl.

Missouri Valley, loess mounds (L. H. P.).

Castilleia sessiliflora Pursh.

Sioux City, abundant on loess mounds (B. W.).

LENTIBULARIACEÆ.

Utricularia vulgaris L.

Hull (W. Newell).

PEDALIACEÆ.

Martynia proboscidea Glox.

Missouri Valley, in fields, base of hills (L. H. P.).

VERBENACEÆ.

Verbena urticæfolia L.

Sioux City (B. W.); Hull (W. Newell); Turin, Missouri Valley, low grounds (L. H. P.).

V. hastata L.

Sioux City, fields and low ground (B. W.); Hull (W. Newell).

V. stricta Vent.

Sioux City, base of loess mounds, prairies and fields, abundant (B. W.); Battle Creek (E. G. Preston); Little Rock (C. R. Ball); Turin, Missouri Valley (L. H. P.).

Phryma leptostachya L.

Sioux City (B. W.).

LABIATÆ.

Teucrium Canadense L.

Sioux City, low grounds, abundant (B. W.); Council Bluffs, abundant (L. H. P.).

Mentha Canadensis L.

Sioux City (B. W.); Hull (W. Newell); Little Rock, low grounds (C. R. Ball).

Lycopus sinutus Ell.

Sioux City (B. W.); Hull, low grounds (W. Newell).

L. Virginicus L.

Sioux City (B. W.).

Hedeoma hispida, Pursh.

Sioux City (B. W.).

Pycnanthemum lanceolatum Pursh.

Spirit Lake (B. W.).

Salvia lanceolata Willd.

Council Bluffs (L. H. P. observations).

Monarda fistulosa L.

Logan, prairies and borders of woods (L. H. P.).

Lophanthus scrophulariæfolius Benth.

Sioux City (B. W.).

Nepeta Cataria L.

Sioux City (B. W.). A common weed in western Iowa
(L. H. P.).

Scutellaria lateriflora L.

Turin, rich, low woods near stream (L. H. P.); Sioux City
(B. W.).

S. parvula Michx.

Little Rock (C. R. Ball); Sioux City (B. W.).

Physostegia Virginiana Benth.

Sioux City, low grounds (B. W.).

Stachys palustris L.

Sioux City, low grounds (B. W.); Rock Valley (J. Jensen,
W. Newell).

PLANTAGINACEÆ.

Plantago major L.

Sioux City (B. W.).

P. Patagonica Jacq., var. *gnaphalioides* Gray.

Rock Valley (J. Jensen, W. Newell).

NYCTAGINACEÆ.

Oxybaphus hirsutus Sweet.

Hull (W. Newell); Sioux City, common along roadsides and
fields (B. W.); Little Rock (C. R. Ball).

O. angustifolius Sweet.

Sioux City, loess hills near top (L. H. P.).

AMARANTACEÆ.

A. retroflexus L.

A common weed everywhere in western Iowa (L. H. P.);
Sioux City (B. W.).

A. albus L.

Sioux City (B. W.); Onawa, Turin, a common weed (L. H. P.).

A. blitoides Watson.

Sioux City, loess mounds in open places (L. H. P.).

Acnida tuberculata Moq.

Onawa, common weed in cultivated ground (L. H. P.).

CHENOPODIACEÆ.

Onawa, Turin, Des Moines (L. H. P.); Smithland (J. M.
Wrapp); Sioux City (B. W.).

C. urbicum L.

Onawa, Missouri Valley, Turin near stables and houses
(L. H. P.).

C. hybridum L.

Missouri Valley, Turin, Onawa (L. H. P.); Sioux City (B. W.), a common weed in waste places.

Salsola Kali L., var. *tragus* Moq.

Onawa, Sioux City, Missouri Valley, Hawarden, Council Bluffs (L. H. P.), spreading rapidly.

POLYGONACEAE.

Rumex verticillatus L.

Missouri Valley, in swamps, common (L. H. P.).

R. crispus L.

Council Bluffs, weed in streets (L. H. P. observations).

R. maritimum L.

Sioux City (B. W.); Little Rock (C. R. Ball), in low grounds.

R. Acetosella L.

Missouri Valley, Turin, weedy in yards and fields (L. H. P.).

Polygonum aviculare L.

Sioux City (B. W.); Hawarden, weed in yards (L. H. P.); Missouri Valley.

P. erectum L.

Missouri Valley, common weed in streets (L. H. P.).

P. ramosissimum Michx.

Missouri Valley, Sioux City, L. H. P., B. W.) Hawarden (L. H. P.).

P. lapathifolium L., var. *incarnatum* Watson.

Sioux City, (B. W.); Turin, low grounds (L. H. P.).

P. Pennsylvanicum L.

Logan, Turin, Onawa, Missouri Valley, low grounds, (L. H. P.); Hull (N. Newell).

P. Muhlenbergii Watson.

Sioux City (B. W.), common along the Missouri river (L. H. P.).

P. Persicaria L.

Hull (W. Newell); Sioux City (B. W.).

P. orientale L.

Missouri Valley, an escape from cultivation (L. H. P.).

P. acre HBK.

Hull (W. Newell).

P. Virginianum L.

Sioux City (B. W.).

P. Convolvulus L.

Sioux City (B. W.), Hull (W. Newell).

P. dumetorum L., var. *scandens* Gray.

Sioux City (B. W.).

ARISTOLOCHIACEÆ.

Asarum Canadense L.

Cherokee (B. W.).

ELÆAGNACEÆ.

Shepherdia argentea Nutt.

Sioux City, sandy banks of Missouri river (B. W., L. H. P., Hitchcock, Bot. Gazette, XIV, 128).

EUPHORBIACEÆ.

Euphorbia maculata L.

Missouri Valley, Des Moines, Turin and Onawa; waste places and along railroad (L. H. P.).

E. hypericifolia.

Onawa (L. H. P.), Sioux City (B. W.).

E. marginata Pursh.

South Dakota, opposite Hawarden, hills, Missouri Valley, Turin and in waste places (L. H. P.), Hull (W. Newell), Council Bluffs (L. H. P.), Sioux City (B. W., L. H. P.).

E. corollata L.

Missouri Valley (L. H. P.), Sioux City (B. W.).

E. serpens H. B. K.

Missouri Valley, low grounds (L. H. P.).

E. serpyllifolia Pers.

Turin (L. H. P.), Sioux City (B. W.).

Var. *consanguinea*.

Onawa, Turin (L. H. P.).

E. glyptosperma Engelm.

Missouri Valley (L. H. P.).

Var. *pubescens*.

Turin (L. H. P.).

E. hexagona Nutt.

Missouri Valley (L. H. P.), Sioux City (B. W.).

E. Geyeri Engelm.

Missouri Valley (L. H. P.)

E. heterophylla L.

Sioux City, in woods, Council Bluffs (L. H. P.); Sioux City (B. W.).

E. obtusata Push.

Sioux City (B. W.).

Acalypha Virginica L.

Sioux City (B. W.)

URTICACEÆ.

Ulmus fulva Michx.

Sioux City, in valleys between loess mounds (B. W., L. H. P.); South Dakota opposite Hawarden.

U. Americana L.

Sioux City, along the Big Sioux river and Missouri river (B. W., L. H. P.).

Celtis occidentalis L.

Sioux City, along Missouri and Big Sioux rivers (L. H. P.).

Cannabis sativa L.

Missouri Valley (L. H. P. observations); Sioux City (B. W.).

Humulus Lupulus L.

Sioux City (B. W.).

Urtica gracilis Ait.

Sioux City (B. W.); Little Rock (Herb. C. R. Ball.).

~~Laportea~~ *Canadensis* Gaudichaud.

Sioux City (B. W.).

Pilea pumila Gray.

Logan (L. H. P.)

Parietaria Pennsylvanica Muhl.

Turin (L. H. P.).

JUGLANDACEÆ.

Juglans nigra L.

Sioux City (B. W.).

Carya olivæformis Nutt.

Sioux City (Hitchcock); this is further north than it occurs elsewhere in this state.

C. amara Nutt.

Smithland (B. W.).

CUPULIFERÆ.

Corylus Americana Walt.

Sioux City (B. W.).

Ostrya Virginica Willd.

Council Bluffs, in woods, back of steep mounds (L. H. P.); Logan (L. H. P.); Sioux City (B. W.).

Quercus macrocarpa Michx.

Council Bluffs (L. H. P.).

Var. *olivæformis* Gray.

Sioux City, sides of bluffs (L. H. P., B. W.)

Q. rubra L.

Sioux City (B. W.).

SALICACEÆ.

Salix humilis Marsh.

Sioux City, common on prairies and at base of loess mounds (L. H. P.).

S. longifolia Muhl.

Sioux City (B. W.).

Populus monilifera Ait.

Missouri Valley, in bottoms near streams, in swales between loess mounds; occasionally near top of mound. Common (L. H. P.), South Dakota, opposite Hawarden (L. H. P.); Sioux City (B. W.).

CERATOPHYLLACEÆ.

Ceratophyllum demersum L.

Sioux City (B. W.).

CONIFERÆ.

Juniperus Virginiana L.

Sioux City (B. W.).

ORCHIDACEÆ.

Orchis spectabilis L.

Sioux City (B. W.).

Habenaria leucophœa Gray.

Cherokee (B. W.).

Spiranthes cernua Richard.

Smithland (B. W.).

Cypripedium pubescens Willd.

Cherokee, Smithland (B. W.).

IRIDIACEÆ.

Iris versicolor L.

Sioux City (B. W.).

LILIACEÆ.

Smilax herbacea D.

Sioux City (B. W.).

Allium stellatum Fras.

Alton, common on prairies (L. H. P.).

A. Canadense Kalm.

Sioux City (B. W.).

Yucca angustifolia Pursh.

Council Bluffs, Missouri Valley, Sioux City, Turin (L. H. P.); near top of loess, mounds common. South, north and west sides. Many seeds produced. Not all the plants which flower produce seeds—many empty stalks were found. It is a significant fact that this species does

not occur on the east slopes of the mounds, perhaps because they are more or less wooded about Council Bluffs and Missouri Valley. Sioux City (B. W.), Hitchcock Bot. Gazette, XIV, p. 128.

Polygonatum giganteum Dietr.

Sioux City (B. W., L. H. P. observations). Deep rich woods.

Smilacina stellata Desf.

Sioux City (B. W.).

Uvularia grandiflora Smith.

Sioux City (B. W.).

Erythronium albidum Nutt.

Sioux City (B. W.).

Lilium Philadelphicum L.

Little Rock (Herb., C. R. Ball).

L. Canadense L.

Sioux City (B. W.).

Trillium nivale Riddell.

Cherokee (B. W.).

Zygadenus elegans Pursh.

Little Rock (Herb., C. R. Ball).

COMMELINACEÆ.

Tradescantia Virginica L.

Sioux City (B. W.).

JUNCEACEÆ.

Juncus tenuis Willd.

Sioux City (B. W., L. H. P. observations).

J. nodosus.

Sioux City (B. W.).

TYPHACEÆ.

Typha latifolia L.

Sioux City (B. W.).

Sparganium eurycarpum Engelm.

ARACEÆ.

Dickinson Co. (Hitchcock); Hull (W. Newell).

Arisaema triphyllum Torr.

Sioux City (B. W.).

ALISMACEÆ.

Alisma plantago L.

Sioux City (B. W.).

Echinodorus rostratus Nutt.

Sioux City, Big Sioux river (L. H. P.).

NAIADACEÆ.

Potamogeton natans L.

Lake Okoboji (Hitchcock).

P. lonchites Tuck.

Spirit Lake (Hitchcock).

P. praelongus Wulf.

Clear Lake (Hitchcock).

P. perfoliatus L. var. *Richardsonii*, Bennett.

Lake Okoboji and Spirit Lake (Hitchcock).

P. zosterifolius Schum.

Lake Okoboji (Hitchcock).

P. mucronatus Schrad.

Spirit Lake (Hitchcock).

P. pectinatus L.

Woodbine (Burgess); Lake Okoboji (Hitchcock)

CYPERACEÆ.

Cyperus diandrus Torr.

Near Lake Okoboji (B. W.).

C. Schweinitzii Torr.

Lake Okoboji (B. W.).

Eleocharis acicularis R. Br.

Sioux City (B. W.; L. H. P.).

Scirpus lacustris L.

Council Bluffs (L. H. P. observations); Sioux City (B. W.).

S. atrovirens Muhl.

Sioux City (B. W.).

Species of *Carex* numerous, but omitted because they have not been studied critically. There are also a large number of grasses, localities and species will appear in another connection.

SOME NOTES ON CHROMOGENIC BACTERIA.

L. H. PAMMEL AND ROBERT COMBS.

Quite a large list of chromogenic bacteria are known to bacteriologists. Many of these are familiar objects in bacteriological laboratories. Of the early works describing these in this country we may mention Sternberg and Trelease. For later works on North American chromogenic bacteria we must refer to Sternberg, Jordan and the numerous text books dealing with pathogenic species.