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The Flora of the Ledges Region of Boone County, Iowa

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THE FLORA OF THE LEDGES REGION OF BOONE COUNTY, IOWA.

WILLIAM W. DIEHL.

INTRODUCTION.

In the south-central part of Boone county is an area that possesses characteristic plants as well as peculiar geological and topographic features. This is located four miles directly south of Boone and extends for about two miles south toward and along the Des Moines river. Its name "The Ledges" is appropriate because of striking sandstone cliffs from ten to over forty feet in height, extending beyond the perpendicular in some cases as much as twelve feet. This ledge rock here comprises an island of younger massive sandstone surrounded unconformably by somewhat older Carboniferous layers, which are of different structure.¹ The conditions peculiar to this restricted locality give the flora a distinctive character.

The region has been of special interest at various times to students of plant life. Plants from "The Ledges" have been collected and studied chiefly by students from Ames. Thus the herbarium of the Department of Botany of Iowa State College possesses much material from that source. Hitchcock probably made use of some material from "The Ledges" in his *Anthophyta and Pteridophyta of Ames, Iowa*. L. H. Pammel in "The Character and Distribution of Forest Trees and Shrubs of Boone County, Iowa"² gives a list which was based largely upon collections and observations made at "The Ledges." Bruce Fink collected lichens at The Ledges in 1903³. Collections preserved in the herbarium of the Department of Botany have been made at various times by L. H. Pammel, R. E. Buchanan, C. M. King, Robert Combs, C. R. Ball, J. P. Anderson, J. V. Ellis, and others.

THE SCOPE OF THE WORK.

The scope of this paper is to list the Pteridophytes and Spermatophytes of "The Ledges" with an account of the plant characters of the region as revealed by a detailed study of a strip across a characteristic location.

The area from which this collection was taken includes practically all that region, originally part of the forest belt adjacent to the Des Moines river, which is drained by the ravines that converge among the ledge outcrops. The more restricted area, represented on the map (fig. 1) by the shaded part, is

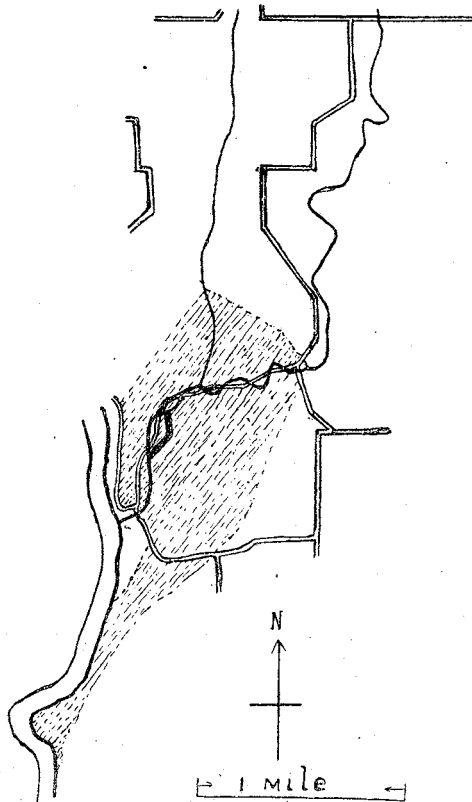


FIG. 1.—Map of the "Ledges" region. The shaded part indicates the area characterized by the sandstone outcrops.

characterized by outcropping native sandstone rock. All of the plants listed as collected by the writer were obtained within this area at various times from September, 1914, until June, 1915. Those specimens which are listed as collections by others may have been obtained within the boundaries of the unshaded part of the map. All the plants in the catalogue are represented by specimens in the herbarium of the Department of Botany of the Iowa State College at Ames. The arrangement followed is that of Engler and Prantl as used in Gray's Manual,

seventh edition,⁷ and the nomenclature of this manual has been used throughout. This list is incomplete in some respects, due to the limitations of the season when this study was undertaken.

THE CHARACTER OF THE FLORA.

It is evident from the appended catalogue that this area possesses a flora typical of a forested region or of a region until recently covered with woodland. Originally all or nearly all of this area was wooded. It would seem that the northern limit of the unshaded part of the map represents approximately the northern extension of the former encroaching forest belt. Along the roadside just north of this line are some remnants of such prairie grasses as *Spartina Michauxii* Hitch, which have not been found within the area in question. That the forest once extended to this line is shown by the presence of tree stumps over much of the area. The stump of a bur oak growing near a clump in this vicinity showed sixty-one annual rings. Residents of the district also attest that practically all this land was once wooded. Of course the wooded area is now confined to the rough land near the river and along the steep slopes of the ravines adjacent.

The catalogue indicates the somewhat anomalous character of the vegetation of the region. For instance, *Morus rubra* L. and *Viburnum Lentago* L., which are plentiful just outside the tract to the westward, have not yet been found within "The Ledges." *Aesculus glabra* var. *arguta* (Buckley) Robinson, while plentiful at Frazer near Boone, and along Honey creek about three miles to the northwest where conditions are somewhat similar, has not been found at "The Ledges." *Anemonella thalictroides* L. is abundant on the bluffs along the Skunk river in Story county, but it has not been collected at "The Ledges." *Caltha palustris* L. covers the marshy southern bank of the Des Moines river to the west of "The Ledges," but the writer has been unable to find it within the area in question.

"The Ledges" may be said to be characterized by the presence of *Cladonia sylvatica*, *Polytrichum commune*, *Camptosorus rhizophyllus*, *Polypodium vulgare*, *Woodsia obtusa*, *Trillium nivale*, *Mitella diphylla*, *Juniperus virginiana*, *Dirca palustris*, *Lathyrus ochroleucus*, *Physocarpus opulifolius*, *Prunus pennsylvanica*, and *Rhamnus lanceolata*.

THE BELT TRANSECT.

An idea of the character of the region is best indicated perhaps by a detailed study of a belt transect or strip across some part of the area representative of the diverse conditions which give "The Ledges" their peculiarity. The belt chosen extends toward the southeast from the bank of Pease creek, up the north-facing hillside, over the ridge or hogback and down the south-facing slope to Pease creek. The belt is represented on the map (fig. 1) as a black block.

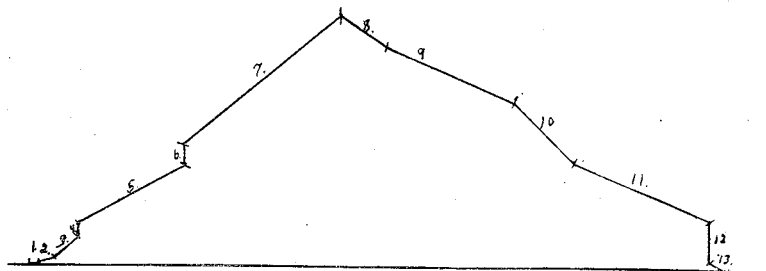


FIG. 2.—Diagram showing the relative location of the various plots in the strip survey.

The strip is six feet in width. The north and south slopes are designated "A" and "B" respectively. Each has been subdivided into separate plats because of their somewhat individual characters.

PART A.

Plat 1 is two yards long. It is the area directly along the stream bank, and is made up of plants growing a part of the time partly submerged.

Plat 2, three yards in length, extends from the edge of plat 1 to the base of the hill; it has many characters in common with 1.

Plat 3 extends up the talus slope for six yards to the first vertical cliff or rock exposure. Here, as on much of the hillside above, the extreme mesophytic conditions are reflected in the type of plants found.

Plat 4 is the part of the belt which extends up the cliff at this point. In one respect this location is not typical of the ledges in that here is found the Moosewood, *Dirca palustris*, which is nowhere else in this region.

Plat 5 extends for twenty-three yards up the slope to the base of the next cliff, and goes up most of the way in a rock-strewn ravine.

Plat 6 is the twelve foot cliff, which is bare of any vascular plants.

Plat 7 lies from the top of the cliff to the watershed of the hogback, a distance of thirty-eight yards.

At this point, where the sun's rays strike the hilltop, the vegetation is immediately of a different character, even approaching a prairie type. But the woody plants are becoming established in places, giving shade sufficient to protect those plants more commonly found on the north slope.

PART B.

Plat 8 extends ten yards down the hillside. The plat is covered chiefly by *Antennaria plantaginifolia* (L.) Richards.

Plat 9 is a tract twenty-six yards long, covered by a shrubby growth.

Plat 10, sixteen yards long, is rather open clay and dry exposed rock, with scant plant-cover.

Plat 11 is a twenty-eight yard strip covered with a fairly dense growth of shrubs and young trees.

From this point there is a sheer drop of twenty-four feet down a bare sandstone cliff, plat 12, to plat 13, which is a talus and alluvial bank nine feet across, reaching to the edge of the stream.

The appended tables give the data upon a comparative percentage basis with the number of plants in the average square yard, rated at 100 per cent.

THE PERCENTAGE DISTRIBUTION OF PLANTS ON THE NORTH SLOPE (A).

Species	Percentage to Each Plat						
	1	2	3	4	5	6	7
<i>Adiantum pedatum</i>	---	---	---	2.6	9.2	---	---
* <i>Camptosorus rhizophyllus</i>	---	---	---	---	---	---	---
<i>Cystopteris fragilis</i>	---	---	172.8	---	---	---	---
<i>Woodsia obtusa</i>	---	---	---	.4	0.9	---	---
<i>Equisetum arvense</i>	---	+	---	---	---	---	---
<i>Equisetum hyemale</i> var. <i>robustum</i>	---	+	---	---	---	---	---
<i>Muhlenbergia</i> Sp.....	---	+	---	---	---	---	---
<i>Cinna arundinacea</i>	---	+	---	---	---	---	---
<i>Poa pratensis</i>	---	---	---	---	---	---	---
<i>Glyceria aquatica</i>	+	+	---	---	---	---	---
<i>Eleocharis palustris</i>	+	---	---	---	---	---	---

*NOTE—For such plants not easily counted the relative abundance is indicated by + or —; these are not taken into consideration otherwise.

PERCENTAGE DISTRIBUTION, NORTH SLOPE (A)—Continued

Species	Percentage to Each Plat						
	1	2	3	4	5	6	7
Carex pennsylvanica.....	—	—	—	—	—	—	—
Carex sp.....	—	—	—	—	—	—	—
Carex sp.....	—	—	—	—	—	—	—
Arisaema triphyllum.....	—	—	8.7	2.2	—	—	—
Polygonatum commutatum.....	—	—	0.8	—	—	—	—
Salix longifolia.....	19.4	3.5	—	2.2	—	—	—
Populus grandidentata.....	—	—	—	—	—	—	0.1
Corylus americana.....	—	—	—	—	—	—	0.5
Ostrya virginiana.....	—	—	—	0.4	1.8	—	3.4
Carpinus caroliniana.....	—	—	9.6	0.8	1.8	—	—
Quercus alba.....	—	—	—	—	—	—	0.2
Quercus rubra.....	—	—	—	—	—	—	1.1
Ulmus fulva.....	—	—	0.8	—	0.2	—	—
Asarum canadense.....	—	—	2.6	—	0.9	—	—
Thalictrum dioicum.....	—	—	15.7	6.6	9.2	—	8.7
Hepatica acutiloba.....	—	—	4.3	3.5	10.6	—	12.9
Anemone virginiana.....	—	—	1.7	—	—	—	—
Anemone quinquefolia.....	—	—	7.8	—	0.2	—	0.6
Isopyrum biternatum.....	—	—	—	1.7	—	—	0.6
Aquilegia canadensis.....	—	—	9.6	—	—	—	0.1
Sanguinaria canadensis.....	—	—	—	1.7	—	—	—
Draba caroliniana.....	—	—	—	—	0.2	—	—
Mitella diphylla.....	—	—	13.2	6.4	1.8	—	—
Ribes cynosbati.....	—	—	0.8	—	0.4	—	0.2
Amelanchier canadensis.....	—	—	—	—	—	—	1.6
Rubus occidentalis.....	—	—	0.8	0.4	0.2	—	—
Rosa pratincola.....	—	—	—	—	—	—	0.2
Prunus virginiana.....	—	—	—	—	—	—	1.7
Astragalus canadensis.....	—	—	—	0.4	—	—	—
Desmodium grandiflorum.....	—	—	8.7	—	—	—	1.1
Rhus Toxicodendron.....	—	—	—	1.7	0.9	—	0.2
Evonymus atropurpureus.....	—	—	2.6	—	—	—	—
Celastris scandens.....	—	—	0.8	—	—	—	1.7
Acer saccharum.....	—	—	0.8	—	—	—	0.2
Impatiens pallida.....	—	—	1.7	—	—	—	—
Psedera quinquefolia.....	—	—	—	0.4	—	—	0.6
Vitis vulpina.....	—	—	1.7	—	—	—	0.6
Tilia americana.....	—	—	0.8	—	—	—	0.1
Dirca palustris.....	—	—	—	0.8	—	—	—
Aralia racemosa.....	—	—	0.8	0.8	0.4	—	—
Aralia nudicaulis.....	—	—	—	—	—	—	2.0
Osmorhiza Claytoni.....	—	—	1.7	0.4	—	—	—
Cornus circinata.....	—	—	—	—	—	—	0.2
Cornus asperifolia.....	—	—	—	—	—	—	2.5
Cornus alternifolia.....	—	—	—	—	0.4	—	—
Fraxinus americana.....	—	—	—	—	—	—	0.4
Fraxinus nigra.....	—	—	—	—	0.2	—	—
Hydrophyllum appendiculatum.....	—	—	—	—	1.3	—	—
Teucrium canadense.....	—	—	0.8	—	—	—	—
Prunella vulgaris.....	—	5.9	—	—	—	—	—
Monarda fistulosa.....	—	10.6	13.0	2.6	—	—	—
Pedicularis canadensis.....	—	10.6	13.0	2.6	—	—	—
Galium aparine.....	—	—	—	—	+	—	+

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PERCENTAGE DISTRIBUTION, NORTH SLOPE (A)—Continued

Species	Percentage to Each Plat						
	1	2	3	4	5	6	7
<i>Galium circaezans</i>	---	---	---	---	---	---	+
<i>Galium boreale</i>	---	---	---	---	+	---	+
<i>Galium trifidum</i>	---	---	---	---	+	---	+
<i>Lonicera dioica</i>	---	---	0.8	1.3	0.2	---	0.8
<i>Viburnum pubescens</i>	---	---	---	---	---	---	2.2
<i>Vernonia altissima</i>	---	---	0.8	2.2	0.9	---	---
<i>Solidago latifolia</i>	---	---	17.5	---	33.4	---	3.6
<i>Solidago canadense</i>	---	122.6	31.4	---	---	---	---
<i>Aster sagittifolius</i>	---	---	0.8	---	108.1	---	20.3
<i>Erigeron philadelphicus</i> ..	---	---	1.7	---	---	---	10.7
<i>Ambrosia trifida</i>	---	---	---	0.4	---	---	---
<i>Heliopsis scabra</i>	---	7.0	---	---	---	---	1.9
<i>Rudbeckia laciniata</i>	---	17.6	14.8	1.3	---	---	0.1
<i>Prenanthes alba</i>	---	---	---	1.3	---	---	---

THE PERCENTAGE DISTRIBUTION OF PLANTS ON THE SOUTH SLOPE (B).

Species	Percentage of Plants to Each Plat					
	8	9	10	11	12	13
<i>Adiantum pedatum</i>	---	---	---	0.1	---	---
<i>Equisetum arvense</i>	---	---	---	---	---	+
<i>Equisetum hyemale</i> var. <i>robusta</i>	---	---	---	---	---	+
<i>Panicum lanuginosum</i>	---	---	---	---	---	---
<i>Muhlenbergia tenuiflora</i>	---	---	---	---	---	+
<i>Elymus robustus</i>	---	---	---	+	---	---
<i>Carex</i> sp.....	+	---	---	---	---	---
<i>Hypoxis hirsuta</i>	0.3	3.6	---	---	---	---
<i>Populus grandidentata</i>	---	---	---	0.1	---	---
<i>Corylus americana</i>	---	---	---	2.3	---	---
<i>Ostrya virginiana</i>	---	2.3	2.9	1.2	---	---
<i>Carpinus caroliniana</i>	---	---	---	0.9	---	---
<i>Quercus alba</i>	---	0.1	---	---	---	---
<i>Quercus rubra</i>	0.9	0.7	---	0.2	---	---
<i>Ulmus fulva</i>	---	---	0.3	1.1	---	1.0
<i>Ulmus racemosa</i>	---	---	3.5	---	---	---
<i>Thalictrum dioicum</i>	31.5	3.5	---	0.2	---	---
<i>Hepatica acutiloba</i>	---	---	1.1	6.2	---	---
<i>Anemone virginiana</i>	---	0.4	---	0.3	---	---
<i>Anemone quinquefolia</i>	---	---	1.9	---	---	---
<i>Menispermum canadense</i>	---	---	---	---	---	8.4
<i>Amelanchier canadensis</i>	---	1.3	---	0.1	---	---
<i>Fragaria virginiana</i> var. <i>illinoisensis</i>	---	---	1.3	2.0	---	---
<i>Potentilla argentea</i>	---	0.1	---	---	---	---
<i>Rubus occidentalis</i>	---	---	0.5	0.4	---	---
<i>Rosa pratincola</i>	---	---	---	0.6	---	---
<i>Prunus virginiana</i>	---	---	---	1.0	---	---
<i>Melilotus alba</i>	---	---	---	---	---	5.5
<i>Amorpha canescens</i>	1.4	3.9	---	---	---	---
<i>Astragalus canadensis</i>	1.2	---	---	1.0	---	---

THE PERCENTAGE DISTRIBUTION OF PLANTS ON THE SOUTH SLOPE (B).

Species	Percentage of Plants to Each Plat					
	8	9	10	11	12	13
<i>Lespedeza capitata</i>	---	---	---	1.3	---	---
<i>Vicia americana</i>	---	---	---	0.4	---	---
<i>Lathyrus ochroleucus</i>	---	0.6	---	0.5	---	---
<i>Zanthoxylum americanum</i>	---	---	---	0.2	---	---
<i>Oxalis corniculata</i>	---	---	---	0.5	---	4.2
<i>Polygala Senega</i>	---	---	---	1.3	---	---
<i>Rhus glabra</i>	---	---	3.5	---	---	---
<i>Rhus Toxicodendron</i>	---	0.1	---	0.7	---	---
<i>Vitis vulpina</i>	---	---	---	0.3	---	---
<i>Tilia americana</i>	---	---	---	0.1	---	---
<i>Aralia nudicaulis</i>	0.9	0.4	0.1	0.9	---	---
<i>Zizia aurea</i>	---	0.4	---	0.7	---	---
<i>Cornus asperifolia</i>	---	3.4	1.3	6.9	---	---
<i>Fraxinus americana</i>	---	---	---	---	---	1.0
<i>Apocynum androsaemifolium</i>	---	0.1	---	0.1	---	---
<i>Phlox pilosa</i>	---	3.0	---	0.5	---	---
<i>Phlox divaricata</i>	---	---	0.1	0.1	---	---
<i>Teucrium canadense</i>	---	---	---	---	---	3.1
<i>Monarda fistulosa</i>	---	---	2.5	0.1	---	15.8
<i>Pedicularis canadensis</i>	---	.03	---	---	---	---
<i>Galium circaezans</i>	---	---	+	+	---	---
<i>Galium boreale</i>	---	---	---	+	---	---
<i>Galium sp.</i>	---	---	---	+	---	---
<i>Lonicera dioica</i>	0.6	0.4	---	---	---	---
<i>Viburnum pubescens</i>	---	5.2	---	1.2	---	---
<i>Solidago latifolia</i> (?).....	---	0.3	---	7.6	---	---
<i>Solidago ulmifolia</i> (?).....	---	---	---	2.9	---	---
<i>Solidago canadensis</i> (?).....	0.3	0.6	---	---	---	---
<i>Aster sagittifolia</i>	---	---	0.9	6.1	---	---
<i>Aster sp.</i>	4.3	2.0	---	3.9	---	---
<i>Erigeron philadelphicus</i>	---	---	40.5	7.3	---	---
<i>Heliopsis scabra</i>	13.0	---	0.7	6.3	---	---
<i>Prenanthes alba</i>	0.3	0.3	---	---	---	---

CATALOGUE OF THE PLANTS OF "THE LEDGES."

PTERIDOPHYTA.

FILICALES.

Polypodiaceæ.

- Polypodium vulgare* L. L. H. P., 96; 296, L. H. P., R. E. B., C. M. K., 03; 1, W. W. D., 14. Common on sandstone exposures.
- Adiantum pedatum* L. R. E. B., 02; 3938, L. H. P., R. E. B., C. M. K., 03; 2, W. W. D. Common in rich woods.
- Asplenium Filix-femina* (L.) Bernh. 3926, L. H. P., R. E. B., C. M. K., 03. (No collection of this plant has since been made.)
- Camptosorus rhizophyllus* (L.) Link. 3974, L. H. P., R. E. B., C. M. K., 03; 3, W. W. D. On damp sandstone exposures.
- Cystopteris fragilis* (L.) Bernh. L. H. P., 98; 3892, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 3, J. V. Ellis, 14; 4, W. W. D. Common on woody slopes.
- Woodsia obtusa* (Spreng.) Torr. L. H. P., 96; L. H. P. & R. C., 97; 3903, L. H. P., R. E. B., C. M. K., 03; 5, W. W. D., 15. On shaded, rocky banks.

Ophioglossaceæ.

- Botrychium virginianum* (L.) Sw. L. H. P. & R. C., 97; R. E. B., 02; 32, J. V. E., 14; 6, W. W. D., 15. Common in rich woods.

EQUISETALES.

Equisetaceæ.

- Equisetum arvense* L. E. Bissell, L. H. P., 10; 36, V. E. 14; 7, W. W. D., 15. Common in sandy alluvium.
- Equisetum hyemale* L. var. *robustum* (A. Br.) A. A. Eaton. R. E. B., 02; 3979, L. H. P., R. E. B., C. M. K., 03; 33, J. V. E., 14; 8, W. W. D., 14.

SPERMATOPHYTA.

GYMNOSPERMÆ.

CONIFERALES.

Pinaceæ.

- Juniperus virginiana* L. L. H. P., 98, 99, 13; 3935, C. M. K., 03; 9, W. W. D., 14. On exposed hillsides, rare.

ANGIOSPERMÆ.

MONOCOTYLEDONÆ.

PANDANALES.

Typhaceæ.

Typha latifolia L. 62, J. V. E.; 10, W. W. D., 15. In artificial swamp on upland.

NAJADALES.

Alismaceæ.

Sagittaria latifolia Willd. 11, W. W. D., 15. On flood plain of the Des Moines river.

Alisma Plantago-aquatica L. L. H. P., 14.

GRAMINALES.

Gramineæ.

Andropogon furcatus Muhl. R. E. B., 02; 12, W. W. D., 15. Roadsides.

Sorghastrum nutans (L.) Nash. R. E. B., 02.

Digitaria humifusa Pers. L. H. P., 91.

Digitaria sanguinalis (L.) Scop. L. H. P., 91; 13, W. W. D., 15. Upland fields.

Panicum capillare L. L. H. P., 96; R. E. B., 02; 14, W. W. D., 14. Common in fields.

Panicum virgatum L. 287, W. W. D., 15.

Panicum lanuginosum Ell. 15, W. W. D., 15. Dry exposed hillside.

Panicum latifolium L. L. H. P., R. E. B., C. M. K., 03; W. W. D., 14. Upland woods.

Panicum villosissimum Nash. 3879, L. H. P., R. E. B., C. M. K., 03.

Echinochloa crusgalli (L.) Beauv. 17, W. W. D., 14. Upland fields.

Setaria glauca (L.) Beauv. 18, W. W. D., 14. Upland fields.

Setaria viridis (L.) Beauv. 65, J. V. E., 14; 19, W. W. D., 14. Upland fields.

Cenchrus carolinianus Walt. 20, W. W. D., 15. Sandy alluvium.

Leersia virginica Michx. L. H. P., 96.

Leersia oryzoides (L.) Sw. L. H. P., 15.

Muhlenbergia tenuiflora (Willd.) B. S. P., 21, W. W. D., 15. Exposed, rocky hillsides.

- Muhlenbergia racemosa* (Michx.) B. S. P., L. H. P., 96; 22, W. W. D., 15. Moist banks of Pease creek.
- Muhlenbergia Mexicana* (L.) Trin. L. H. P., 15.
- Phleum pratense* L. 28, J. V. E., 14.
- Agrostis alba* L. 3940, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 68, J. V. E., 14.
- Agrostis hyemalis* (Walt.) B. S. P. 3942, L. H. P., R. E. B., C. M. K., 03.
- Agrostis perennans* (Walt.) Tuckerm. 3688, L. H. P., R. E. B., C. M. K., 03.
- Cinna arundinacea* L. 3930, L. H. P., R. E. B., C. M. K., 03; 23, W. W. D., 15. Moist shaded banks of Pease creek.
- Sphenopholis obtusata* (Michx.) Scribn. L. H. P., 15. Hill-sides.
- Danthonia spicata* (L.) Beauv. 3951, R. E. B., L. H. P., C. M. K., 03; 24, W. W. D., 15. Exposed hillsides.
- Eragrostis hypnoides* (Lam.) B. S. P. 108, L. H. P., C. R. B., 96.
- Eragrostis capillaris* (L.) Nees. L. H. P., 96; C. R. B., L. H. P., 96.
- Eragrostis Frankii* (Fisch. May. & Lall.) Steud. C. R. B., L. H. P., 96.
- Eragrostis pilosa* (L.) Beauv. L. H. P., 15.
- Eragrostis Megastachya* (Koeler.) Link. 183, W. W. D.
- Poa pratensis* L. 109, W. W. D., 15. Woods and pastures, common.
- Glyceria nervata* (Willd.) Trin. L. H. P., 96; 110, W. W. D., 15. Banks of Pease creek and of Des Moines river.
- Bromus purgans* L. 3908, L. H. P., R. E. B., C. M. K., 03.
- Elymus virginicus* L. 3924, L. H. P., R. E. B., C. M. K., 03.
- E. robustus* Scribn. & J. G. Sm. 3925, L. H. P., R. E. B., C. M. K., 02; 111, W. W. D., 14.
- Hystrix patula* Moench. L. H. P., 91; 3902, L. H. P., R. E. B., C. M. K., 03; L. H. P., J. V. E., 13.

Cyperaceæ.

- Cyperus esculentus* L. 291, W. W. D., 15. Roadside.
- Eleocharis palustris* (L.) R. & S. 112, W. W. D., 15. Partly submerged, along Pease creek.
- Scirpus validus* Vahl. 67, J. V. E., 14.
- Carex rosea* Schkuhr. ? 197, W. W. D., 15. Rich shaded hillside.

- Carex gravida* Bailey. 462, L. H. P., R. H. C., 97; L. H. P., 98.
Carex pennsylvanica Lam. 113, W. W. D., 15. Common on hillsides.
Carex panicea L. var. *Meadii* (Dewey) Bailey. 193, W. W. D.
Carex eburnea Boot.? 305, W. W. D., 15.
Carex laxiflora Lam. L. H. P., R. H. C., 97.
Carex laxiflora Lam. var. *latifolia* Boot. 114, W. W. D., 15.
 Rich wooded hillsides, frequent.
Carex oligocarpa Schkuhr. L. H. P., C. R. B., 97; L. H. P., 13.
Carex grisea Wahlenb.? Too young. 194, W. W. D., 15.
Carex Crawei Dewey.? Too young. 195, W. W. D., 15.
Carex Assiniboensis W. Boot.? 196, W. W. D., 15.

ARALEES.

Araceæ

- Arisaema triphyllum* (L.) Schott. L. H. P., R. H. C., 97; L. H. P., 14; 115, W. W. D. Woods, common.
Arisaema Dracontium (L.) Schott. L. H. P., 97, 13; L. H. P., R. H. C., 97; L. H. P., C. R. B., 98.

XYRIDALES.

Commelinaceæ

- Tradescantia reflexa* Raf. 315, W. W. D., 15.

LILIALES.

Liliaceæ

- Uvularia grandiflora* Sm. 116, W. W. D., 15. Woods, common.
Erythronium albidum Nutt. 117, W. W. D., 15. Woods, not uncommon.
Allium canadense L. L. H. P., R. H. C., 97.
Lilium philadelphicum L. L. H. P., 15.
Smilacina racemosa (L.) Desf. R. E. B., 02.
Polygonatum commutatum (R. & S.) Dietr. 118, W. W. D., 15.
 Woods, common.
Trillium nivale Riddell. E. Bissell, L. H. P., 10; 119, W. W. D., 15. Common.
Smilax herbacea L. 120, W. W. D., 15. Edge of upland wood.
Smilax ecirrhata (Engelm.) Wats. 121, W. W. D., 15.
Smilax hispida Muhl. L. H. P., 98; 45, J. V. E., 14; 122, W. W. D., 15.

FLORA OF THE LEDGES

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Amaryllidaceæ

Hypoxis hirsuta (L.) Coville. 123, W. W. D., 15. With moss on hilltop.

ORCHIDALES.

Orchidaceæ

Cypripedium candidum Muhl. Edith Cairns, 97.

Cypripedium hirsutum Mill. Edith Cairns, 03.

Orchis spectabilis L. L. H. P., 15.

Habenaria bracteata (Willd.) R. Br.

DICOTYLEDONÆ.

Archiclamydeæ.

SALICALES.

Salicaceæ

Salix nigra Marsh. L. H. P., 13; 124, W. W. D., 15. Along Pease creek and Des Moines river.

Salix amygdaloides Anders. 3473, W. D. Fitzgerald, R. F. M., 01; 3876, L. H. P., R. E. B., C. M. K., 03; 125, W. W. D., 15. Along Pease creek and in wet places on upland.

Salix longifolia Muhl. 3870, L. H. P., R. E. B., C. M. K., 03; H. S. Kellogg, 06; 125, W. W. D., 15. Valley of Pease creek and Des Moines river, abundant.

Salix discolor Muhl. L. H. P., 98.

Salix humilis Marsh. 3873, L. H. P., R. E. B., C. M. K., 03.

Populus tremuloides Michx. 126, W. W. D., 15. Exposed hill-tops and level upland.

Populus grandidentata Michx. L. H. P., 02; 3898, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 127, W. W. D. Dry slopes.

Populus deltoides Marsh. L. H. P., A. F. M., 12; 128, W. W. D. Valley of Pease creek and of Des Moines river.

JUGLANDALES.

Juglandaceæ

Juglans cinerea L. 129, W. W. D., 14. Wooded slopes, common.

Juglans nigra L. 130, W. W. D., 14. Common.

Carya ovata (Mill.) K. Koch. 131, W. W. D., 15. Frequent.

Carya cordiformis (Wang.) K. Koch. 132, W. W. D., 14. Hill-sides.

FAGALAS.

Betulaceæ.

Corylus americana Walt. 133, W. W. D., 14. Dry hillsides, abundant.

Ostrya virginiana (Mill.) K. Koch. R. E. B., 02; L. H. P., 13; J. P. A., L. H. P., 13; 134, W. W. D., 15. Hillside, abundant.

Carpinus caroliniana Walt. L. H. P., 98; R. E. B., 02; 135, W. W. D., 14. Shaded hillsides, common.

Fagaceæ.

Quercus alba L. 3897, L. H. P., R. E. B., C. M. K., 03; 136, W. W. D., 15. Hillside and upland, common.

Quercus macrocarpa Michx. R. E. B., 02; 154, J. V. E., 98; 137, W. W. D., 14. Common.

Quercus Muhlenbergii Engelm. L. H. P., C. R. B., 98; 3906, L. H. P., R. E. B., C. M. K., 03; 138, W. W. D., 15. Upland and dry hillsides, not uncommon.

Quercus rubra L. 139, W. W. D., 15. Common.

URTICALES.

Urticaceæ.

Ulmus fulva Michx. L. H. P., C. R. B., 98; L. H. P., 98; 3943, L. H. P., R. E. B., C. M. K., 03; 18, J. V. E., 14; 140, W. W. D., 15. Common.

Ulmus americana L. 141, W. W. D., 15. Ravines and valleys.

Ulmus racemosa Thomas. 142, W. W. D., 15. Dry, rocky hillsides, and along Pease creek, rare.

Celtis occidentalis L. 143, W. W. D., 15. Valley of Des Moines river.

Cannabis sativa L. 144, W. W. D., 15. Pasture, east end of "Ledges".

Humulus lupulus L. 145, W. W. D., 15. Valley of Pease creek.

Morus rubra L. L. H. P., 98. (Probably just outside the mapped area.)

Laportea canadensis (L.) Gaud. 3927, L. H. P., R. E. B., C. M. K., 03; 42, J. V. E., 14; 146, W. W. D., 15. Woods, common.

Pilea pumila (L.) Gray. 147, W. W. D., 15. Low woods, common.

SANTALALES.

Santalaceæ.

Comandra umbellata (L.) Nutt. L. H. P., 92, 02, 12, 13; 3897, L. H. P., R. E. B., C. M. K., 03; 148, W. W. D. Dry exposed south slope.

ARISTOLOCHIALES.

Aristolochiaceæ.

Asarum canadense L. 3936, L. H. P., R. E. B., C. M. K., 03;
L. H. P., 10; 149, W. W. D., 15. Damp shaded locations,
common.

POLYGONALES.

Polygonaceæ.

Rumex crispus L. 150, W. W. D., 15. Fields.

Rumex altissimus Wood. 151, W. W. D., 15. Fields in valley
of Des Moines river.

Rumex acetosella L. L. H. P., 15.

Polygonum aviculare L. 152, W. W. D., 15. Common weed.

Polygonum convolvulus L. 300, W. W. D., 15. Field, common.

Polygonum virginianum L. L. H. P., R. F. M., 12.

Fagopyrum esculentum Moench. L. H. P., 02.

CHENOPODIALES.

Chenopodiaceæ.

Chenopodium album L. 153, W. W. D., 15. Common weed.

Salsola Kali L. var. *tenuifolia* G. F. W. Mey. 154, W. W. D.,
15. Weed, rare.

Amaranthaceæ.

Amaranthus retroflexus L. 155, W. W. D., 15. Common weed.

Amaranthus graecizans L. 156, W. W. D., 15.

CARYOPHYLLALES.

Caryophyllaceæ.

Silene stellata (L.) Ait. 3863, L. H. P., R. E. B., C. M. K., 03;
51, J. V. E., 14; 158, W. W. D., 15.

Silene nivea (Nutt.) Otth. 3954, L. H. P., R. E. B., C. M.
K., 03.

Saponaria officinalis L. 159, W. W. D., 15. Roadside.

Claytonia virginica L. 160, W. W. D., 15. Common in woods.

RANUNCULALES.

Portulacaceæ.

Ranunculus aquatilis L. var. *capillaceus* DC. L. H. P., 9.

Ranunculus rhomboides Goldie. L. H. P., 98.

Ranunculus abortivus L. 161, W. W. D., 15. Damp hillsides,
common.

- Ranunculus septentrionalis* Poir. 162, W. W. D., 15. Wooded hillsides, common.
- Thalictrum dioicum* L. L. H. P., 98, 13; R. E. B., 03; 163, W. W. D., 15. Hillsides, common.
- Hepatica acutiloba* DC. 164, W. W. D., 15. Shaded hillside, common.
- Anemone virginiana* L. R. E. B., 02; 3884, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 165, W. W. D., 15. Hillsides, frequent.
- Anemone quinquefolia* L. 294, W. W. D., 15. Woods, common.
- Clematis virginiana* L. 30, J. V. E., 14.
- Isopyrum biternatum* (Raf.) L. & G. 166, W. W. D., 15. Hillsides, common.
- Aquilegia canadensis* L. L. H. P., 98; 167, W. W. D., 15. Hillsides, common.
- Actaea rubra* (Ait.) Willd. 3917, L. H. P., R. E. B., C. M. K., 03; 168, W. W. D., 14. Shaded hillsides.

Menispermaceæ.

- Menispermum canadense* L. 6, J. V. E., 14; 169, W. W. D., 14. Common.

Berberidaceæ.

- Podophyllum peltatum* L. 170, W. W. D., 15. Common in woods.

PAPAVERALES.

Papaveraceæ.

- Sanguinaria canadensis* L. 171, W. W. D., 15. Open woods, frequent.

Fumariaceæ.

- Dicentra cucullaria* (L.) Bernh. 172, W. W. D., 15.

Cruciferaæ.

- Draba verna* L. 173, W. W. D., 15. Roadsides, fields.
- Draba caroliniana* Walt. 174, W. W. D., 15. Woods and fields.
- Lepidium virginicum* L. 175, W. W. D., 15. Fields and roadsides, common.
- Lepidium apetalum* Willd. L. H. P., 15.
- Capsella bursa-pastoris* (L.) Medic. 176, W. W. D., 15. Fields and roadsides, common.
- Brassica nigra* (L.) Koch. R. E. B., 02.
- Sisymbrium canescens* Nutt. L. H. P., 98; L. H. P., C. R. B., 98.

- Sisymbrium officinale* (L.) Scop. 301, W. W. D., 15. Fields.
Erysimum cheiranthoides L. 3869, L. H. P., R. E. B., C. M. K., 03.
Radicula palustris (L.) Moench. 3954, L. H. P., R. E. B., C. M. K., 03.
Dentaria laciniata Muhl. 177, W. W. D., 15. Hillside, common.
Cardamine bulbosa (Schreb.) B. S. P. L. H. P., C. J. Griffiths, R. H. C., 97; 157, W. W. D., 15. Roadside ditch.
Cardamine hirsuta L. 3928, 3975, L. H. P., R. E. B., C. M. K., 03.
Arabis laevigata (Muhl) Poir. 3870, L. H. P., R. E. B., C. M. K., 03.
Arabis canadensis L. R. E. B., 03.

ROSALES.

Saxifragaceæ.

- Heuchera villosa* Michx. L. H. P., 02.
Mitella diphylla L. L. H. P., C. R. B., 98; 162, L. H. P., R. E. B., C. M. K., 03; 180, W. W. D., 15. Damp shaded hillsides.
Ribes cynosbati L. L. H. P., 96, 02, 13; 8, J. V. E., 14; 181, W. W. D., 15. Common.
Ribes floridum L'Her. L. H. P., 15.
Ribes gracile Michx. 182, W. W. D., 15. Common.

Rosaceæ.

- Physocarpus opulifolius* (L.) Maxim. L. H. P., 13; 184, W. W. D., 15. Wooded slopes.
Pyrus ioensis (Wood.) Bailey. L. H. P., R. H. C., 97; L. H. P., 06; 185, W. W. D., 15. Frequent.
Amelanchier canadensis (L.) Medic. L. H. P., 02, 13; 186, W. W. D., 15.
Crataegus punctata Jacq. L. H. P., 98; 3427, L. H. P., R. E. B., C. M. K., 03; 187, W. W. D., 15. Frequent.
Crataegus tomentosa L. R. E. B., 02.
Crataegus mollis (T. & G.) Scheele. L. H. P., 98; 188, W. W. D., 15. Common.
Fragaria virginiana Duchesne var. *illinoisensis* (Prince) Gray. 189, W. W. D., 15. Common.
Fragaria vesca L. var. *americana* Porter. L. H. P., 98; 3964, L. H. P., R. E. B., C. M. K., 03; 190, W. W. D., 15. On rocky hillside.
Potentilla arguta Pursh. R. E. B., 02.

- Potentilla monspeliensis* L. 292, W. W. D., 15. Fields.
Potentilla canadensis L. L. H. P., 02.
Rubus idaeus var. *aculeatissimus* (C. A. Mey.) Regel & Tiling.
 L. H. P., 98.
Rubus occidentalis L. 191, W. W. D., 15. Frequent.
Rubus villosus Ait. 192, W. W. D., 15. Frequent.
Agrimonia striata Michx. 3956, L. H. P., R. E. B., C. M. K., 03.
Rosa pratincola Greene. L. H. P., 98; 193, W. W. D., 15. Frequent.
Rosa blanda Ait. L. H. P., 98.
Prunus serotina Ehrh. L. H. P., C. R. B., 98; 194, W. W. D., 15. Not uncommon.
Prunus virginiana L. 3923, L. H. P., R. E. B., C. M. K., 03; 195, W. W. D., 15. Common.
Prunus pennsylvanica L. L. H. P., 14. Rare.
Prunus americana Marsh. L. H. P., 97; 3881, L. H. P., R. E. B., C. M. K., 03; 196, W. W. D., 15. Common.

Leguminosæ.

- Gymnocladus dioica* (L.) Koch. 197, W. W. D., 15. Rare.
Gleditsia triacanthos L. L. H. P., 00; 197, W. W. D., 15. Frequent.
Baptisia bracteata (Muhl.) Ell. 135, J. V. E., 14.
Trifolium pratense L. 198, W. W. D., 14. Escaped to fence rows.
Melilotus officinalis (L.) Lam. 199, W. W. D., 14. Roadsides.
Melilotus alba Desr. 200, W. W. D., 15. Roadsides and old fields.
Medicago sativa L. 201, W. W. D., 15. Old field.
Amorpha canescens Pursh. 3991, L. H. P., R. E. B., C. M. K., 03; 202, W. W. D., 15.
Petalostemum purpureum (Vent.) Rydb. R. E. B., 02.
Petalostemum candidum Michx. 3865, L. H. P., R. E. B., C. M. K., 03.
Robinia pseudo-acacia L. 3901, L. H. P., R. E. B., C. M. K., 03.
Astragalus caryocarpus Ker. L. H. P., 00.
Astragalus canadensis L. R. E. B., 02; 3918, L. H. P., R. E. B., C. M. K., 03; 203, W. W. D., 15. Exposed hillside.
Desmodium grandiflorum (Michx.) DC. R. E. B., 02; 204, W. W. D., 15. Rich woods.
Desmodium Dillenii Darl. R. E. B., 02.

- Desmodium canadense* (L.) DC. 52, J. V. E., 14.
Lespedeza capitata Michx. R. E. B., 02; 205, W. W. D., 15.
 Dry exposed slopes.
Vicia caroliniana Walt. L. H. P., R. H. C., 97.
Vicia americana Muhl. L. H. P., 13; 206, W. W. D., 15. In
 woods, common.
Lathyrus ochroleucus Hook. L. H. P., C. R. B., 98; L. H. P., 99;
 L. H. P., R. F. M., 12; 207, W. W. D., 15. Dry slopes.
Strophostyles helvola (L.) Britton. L. H. P., 15.
Amphicarpa monoica (L.) Ell. 56, J. V. E., 14.

GERANIALES.

Oxalidaceæ.

- Oxalis corniculata* L. R. E. B., 02; 3871, L. H. P., R. E. B., C.
 M. K., 03. Common.
Oxalis violacea L. L. H. P., 15.

Geraniaceæ.

- Geranium maculatum* L. 208, W. W. D., 15. Common.

Rutaceæ.

- Zanthoxylum americanum* Mill. 209, W. W. D., 15. Frequent.

Polygalaceæ.

- Polygala senega* L. L. H. P., C. R. B., 98; L. H. P., 02; 210,
 W. W. D., 15. Dry slopes.
Polygala sanguinea L. R. E. B., 02; 3957, L. H. P., R. E. B.,
 C. M. K., 03.
Polygala verticillata L. 3855, L. H. P., R. E. B., C. M. K., 03.

Euphorbiaceæ.

- Acalypha virginica* L. 211, W. W. D., 15. Fields, common.
Euphorbia Preslii Guss. R. E. B., 02; 212, W. W. D., 15. Fields.
Euphorbia corollata L. 3668, L. H. P., R. E. B., C. M. K., 03.

SAPINDALES.

Anacardiaceæ.

- Rhus glabra* L. R. E. B., 02; 213, W. W. D., 15. Common on
 dry slopes.
Rhus toxicodendron L. 22, J. V. E., 14; 214, W. W. D., 14.
 Frequent.

Celastraceæ.

- Evonymus atropurpureus* Jacq. R. E. B., 02; 215, W. W. D.,
 14. Common.

Celastrus scandens L. R. E. B., 02; J. P. A., 13; 216, W. W. D., 14. On wooded slopes.

Staphylaceæ.

Staphylea trifolia L. 2900, L. H. P., R. E. B., C. M. K., 03; 217, W. W. D., 15. On damp shaded slopes.

Aceraceæ.

Acer saccharum Marsh. var. *nigrum* (Michx. f.) Britton. L. H. P., 98; R. E. B., 02; 218, W. W. D., 14. Common on slopes and in upland woods.

Acer saccharinum L. 9, J. V. E., 14; 219, W. W. D., 15. Valley of Des Moines river.

Acer negundo L. 3885, R. E. B., 02; 220, W. W. D., 15. Along Pease creek and Des Moines river.

Balsaminaceæ.

Impatiens pallida Nutt. 3939, L. H. P., R. E. B., C. M. K., 03; 221, W. W. D., 15. In damp shaded locations.

Impatiens biflora Walt. 61, J. V. E., 14.

RHAMNALES.

Rhamnaceæ.

Rhamnus lanceolata Pursh. L. H. P., C. R. B., 98.

Ceanothus americanus L. R. E. B., 02; 35, J. V. E., 14; 222, W. W. D., 15.

Vitaceæ.

Pseodera quinquefolia L. 223, W. W. D., 15. Common.

Vitis vulpina L. L. H. P., 98; R. E. B., 02; 26, J. V. E., 14; 224, W. W. D., 15.

MALVALES.

Tiliaceæ.

Tilia americana L. 225, W. W. D., 15. Frequent in fields.

Abutilon Theophrasti Medic. 226, W. W. D., 15. Fields.

VIOLALES.

Cistaceæ.

Lechea villosa Ell. 3952, L. H. P., R. E. B., C. M. K., 03.

Violaceæ.

Viola cucullata Ait. 3946, L. H. P., R. E. B., C. M. K., 03; 308, W. W. D., 15. Common.

Viola pubescens Ait. L. H. P., R. H. C., 97; 309, W. W. D., 15. Common.

FLORA OF THE LEDGES

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MYRTALES.

Thymelaeaceæ.

Dirca palustris L. 4020, R. E. B., 02; 310, W. W. D., 15. On damp shaded ledge; one station only.

Onagraceæ.

Oenothera biennis L. 3868, L. H. P., R. E. B., C. M. K., 03; 311, W. W. D., 15. Fields.

UMBELLALES.

Araliaceæ.

Aralia racemosa L. R. E. B., 02; 2976, 2933, L. H. P., R. E. B., C. M. K., 03; 312, W. W. D., 15. Damp woods.

Aralia nudicaulis L. L. H. P., 13; 313, W. W. D., 15. Woods, common.

Panax quinquefolium L. 314, W. W. D., 15. Very rare.

Umbelliferae.

Sanicula marilandica L. L. H. P., C. R. B., 98; L. H. P., 13.

Chaerophyllum procumbens (L.) Crantz. L. H. P., 98, 00.

Osmorhiza Claytoni (Michx.) Clarke. L. H. P., R. E. B., C. M. K., 03; 227, W. W. D., 15. In woods, frequent.

Osmorhiza longistylis (Torr.) DC. 228, W. W. D., 15. In damp woods, infrequent.

Cicuta maculata L. 3944, L. H. P., R. E. B., C. M. K., 03; 229, W. W. D., 14. Valley of Des Moines river.

Cryptotaenia canadensis (L.) DC. L. H. P., 98; 3932, L. H. P., R. E. B., C. M. K., 03.

Zizia aurea (L.) Koch. L. H. P., 98; 23, J. V. E., 14; 230, W. W. D., 15.

Zizia cordata (Walt.) DC. R. E. B., 02.

Taenidia integerrima (L.) Drude. L. H. P., R. H. C., 97; L. H. P., 98; 3898, L. H. P., R. E. B., C. M. K., 03.

Pastinaca sativa L. 231, W. W. D., 15. Roadside.

Heracleum lanatum Michx. L. H. P., 13; 70, J. V. E., 14; 316, W. W. D., 15.

Cornaceæ.

Cornus circinata L'Her. 3968, L. H. P., R. E. B., C. M. K., 03; 232, W. W. D., 15. Rocky hillsides, infrequent.

Cornus asperifolia Michx. 3886, L. H. P., R. E. B., C. M. K., 03; 233, W. W. D., 15. Hillsides.

Cornus amomum Mill. R. E. B., 02; 3932, L. H. P., R. E. B.,
C. M. K., 03; 234, W. W. D., 15.

Cornus alternifolia L. f. 3961, L. H. P., R. E. B., C. M. K., 03; L.
H. P., J. P. A., 13; 235, W. W. D., 15. Frequent.

ERICALES.

Ericaceæ.

Monotropa uniflora L. L. H. P., 15.

PRIMULALES.

Primulaceæ.

Steironema ciliatum (L.) Raf. 3907, L. H. P., R. E. B., C. M.
K., 03.

GENTIANALES.

Oleaceæ.

Fraxinus americana L. 236, W. W. D., 15. Uplands and wooded
hillsides, common.

Fraxinus pennsylvanica Marsh. 37, J. V. E., 15; 237, W. W. D.,
15. Infrequent.

Fraxinus pennsylvanica Marsh. var. *lanceolata* (Borkh.) Sarg.
L. H. P., 15.

Fraxinus nigra Marsh. L. H. P., 98; 3895, L. H. P., R. E. B.,
C. M. K., 03; L. H. P., 13; 238, W. W. D., 15. Frequent in
ravines and in valley of Pease creek.

Apocynaceæ.

Apocynum androsaemifolium L. 239, W. W. D., 15. On dry
wooded hillsides.

Apocynum cannabinum L. L. H. P., 14.

Asclepiadaceæ.

Asclepias incarnata L. 69, J. V. E., 14.

Asclepias syriaca L. 240, W. W. D., 15.

Asclepias verticillata L. L. H. P., 15.

POLEMONIALES.

Convolvulaceæ.

Convolvulus sepium L. 241, W. W. D., 15. In fields along Des
Moines river.

Ipomoea hederacea Jacq. L. H. P., 15.

Polemoniaceæ.

Phlox divaricata L. J. V. E., 14; 242, W. W. D., 15. Common in woods.

Phlox pilosa L. L. H. P., 00; 243, W. W. D., 15. On dry slopes, frequent.

Hydrophyllaceæ.

Hydrophyllum appendiculatum Michx. 3885, L. H. P., R. E. B., C. M. K., 03.

Hydrophyllum virginianum L. 244, W. W. D., 15. Common in woods.

Ellisia nyctelea L. 245, W. W. D., 15. Damp woods, common.

Boraginaceæ.

Cynoglossum officinale L. L. H. P., 15.

Cynoglossum boreale Fernald. L. H. P., 15.

Lupula virginiana (L.) Greene. 3921, L. H. P., R. E. B., C. M. K., 03; 246, W. W. D., 15. Woods, common.

Symphytum officinale L. L. H. P., 15. Near mouth of Pease creek.

Mertensia virginica (L.) Link. L. H. P., E. Bissel; 247, W. W. D., 15. Valley of Pease creek.

Lithospermum latifolium Michx. 3859, L. H. P., R. E. B., C. M. K., 03.

Lithospermum canescens (Michx.) Lehm. 19, J. V. E., 14.

Onosmodium occidentale Mackenzie. 299, W. W. D., 15. Exposed hillsides.

Verbenaceæ.

Verbena urticaefolia L. 3920, L. H. P., R. E. B., C. M. K., 03.

Verbena hastata L. 3872, L. H. P., R. E. B., C. M. K., 03; 155, J. V. E., 14.

Verbena stricta Vent. 290, W. W. D., 15. Pastures.

Verbena bracteosa Michx. 3882, L. H. P., R. E. B., C. M. K., 03; 317, W. W. D., 15.

Lippia lanceolata Michx. L. H. P., 13.

Labiataæ.

Teucrium canadense L. 3971, L. H. P., R. E. B., C. M. K., 03; L. H. P., J. P. A.; 39, J. V. E., 14; 248, W. W. D., 15. Shaded hillsides.

Agastache nepetoides (L.) Ktze. 249, W. W. D., 15. Common in valley of Pease creek.

- Nepeta cataria* L. 3893, L. H. P., R. E. B., C. M. K., 03; 250, W. W. D., 15. About abandoned dwellings.
Nepeta hederacea (L.) Trevisan. L. H. P., 13; 288, W. W. D., 15. In pastured ravine.
Prunella vulgaris L. 3862, L. H. P., R. E. B., C. M. K., 03; 251 W. W. D., 15.
Stachys palustris L. L. H. P., 98; 3931, L. H. P., R. E. B., C. M. K., 03.
Monarda fistulosa L. R. E. B., 02; 252, W. W. D., 14. Common along Pease creek.
Hedeoma hispida Pursh. L. H. P., 99, 00.
Pycnanthemum virginianum (L.) Durand & Jackson. L. H. P., 15.
Mentha spicata L. 253, W. W. D., 15.

Solanaceæ.

- Solanum carolinense* L. L. H. P., C. R. B., 97.
Solanum nigrum L. L. H. P., C. R. B., 97; 270, W. W. D., 14.
Physalis subglabrata (L.) Mackenzie & Bush. R. E. B., 97.
Physalis pruinosa L. 306, W. W. D., 15. Des Moines river valley.
Lycium halimifolium Mill. 254, W. W. D., 15. Escaped from door-yard.
Datura stramonium L. R. E. B., 02; 271, W. W. D., 14.

Scrophulariaceæ.

- Verbascum thapsus* L. L. H. P., 02; 13, J. V. E., 14.
Scrophularia leporella Bicknell. 296, W. W. D., 14. Woods, frequent.
Chelone glabra L. L. H. P., 15.
Mimulus ringens L. 3875, L. H. P., R. E. B., C. M. K., 03.
Veronica peregrina L. 295, W. W. D., 15.
Pedicularis canadensis L. L. H. P., 95; J. V. E., 14; 293, W. W. D., 15. Rocky hillsides, etc.

Phrymaceæ.

- Phryma leptostachya* L. L. H. P., R. E. B., C. M. K., 03.

Plantaginaceæ.

- Plantago major* L. J. V. E., 14; 255, W. W. D., 15.

Rubiaceæ.

- Galium aparine* L. 3947, L. H. P., R. E. B., C. M. K., 03; 272, W. W. D., 15.

- Galium circaezans* Michx. 24, J. V. E., 14; 273, W. W. D., 15.
Galium boreale L. 3969, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 274, W. W. D., 15.
Galium boreale L. 3969, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13; 275, W. W. D., 15.
Galium trifidum L. 3916, L. H. P., R. E. B., C. M. K., 03; 276, W. W. D., 15.

Caprifoliaceæ.

- Lonicera dioica* L. L. H. P., R. H. C., 97; 277, W. W. D., 15.
Viburnum pubescens (Ait.) Pursh. L. H. P., 98; 3965, R. E. B., 02; 25, J. V. E., 14; 278, W. W. D., 14.
Sambucus canadensis L. J. P. A., L. H. P., 13; 279, W. W. D., 15.

CAMPANULALES.

Cucurbitaceæ.

- Sicyos angulatus* L. 26, L. H. P., C. R. B., 96; 256, W. W. D., 15. Des Moines valley, common.
Campanula americana L. 3950, L. H. P., R. E. B., C. M. K., 03.

Lobeliaceæ.

- Lobelia spicata* Lam. 3880, L. H. P., R. E. B., C. M. K., 03; 21, J. V. E., 14.
Lobelia siphilitica L. R. E. B., 02.

Compositæ.

- Vernonia fasciculata* Michx. 257, W. W. D., 15. In open upland woods.
Eupatorium urticaefolium Reichard. L. H. P., 15. In woods, common.
Eupatorium perfoliatum L. L. H. P., 15. Along Pease creek.
Eupatorium purpureum L. var. *maculatum* (L.) Darl. L. H. P., 15. In damp woods.
Kuhnia eupatoroides L. 258, W. W. D., 14. Dry, exposed hillsides.
Liatris pycnostachya Michx. L. H. P., 15. Dry hillside.
Solidago latifolia L. 28, 29, J. V. E., 14; 259, W. W. D., 14.
Solidago ulmifolia Muhl. R. E. B., 02; 3894, L. H. P., R. E. B., C. M. K., 03; 260, W. W. D., 14. Dry slopes.
Solidago radula Nutt. R. E. B., 02.
Solidago canadensis L. 261, W. W. D., 15. Wooded hillsides.
Solidago altissima L. 262, W. W. D., 15. Wooded slopes.
Solidago rigida L. R. E. B., 02.

- Boltonia asteroides* (L.) L'Her. L. H. P., 15.
- Aster cordifolius* L. 48, L. H. P., C. R. B., 96; 263, W. W. D., 14. Wooded slopes.
- Aster sagittifolius* Wedemeyer. R. E. B., 02; 3967, L. H. P., R. E. B., C. M. K., 03; 264, W. W. D., 15.
- Erigeron philadelphicus* L. L. H. P., 02; 12, J. V. E., 14; 265, W. W. D., 15. Common.
- Erigeron annuus* (L.) Pers. L. H. P., R. H. C., 97; 3864, L. H. P., R. E. B., C. M. K., 03; 307, W. W. D., 15. Fields and exposed slopes.
- Erigeron canadensis* L. L. H. P., 02; 12, J. V. E., 14.
- Antennaria plantaginifolia* (L.) Richards. 266, W. W. D., 15. Common on hillsides.
- Silphium perfoliatum* L. 3910, L. H. P., R. E. B., C. M. K., 03.
- Silphium laciniatum* L. 298, W. W. D. Dry exposed hillsides. Infrequent.
- Ambrosia trifida* L. 267, W. W. D., 14. River valley, etc., common.
- Ambrosia artemisiifolia* L. 267, W. W. D., 14. Upland fields, common.
- Ambrosia psilostachya* DC. L. H. P., 15.
- Xanthium canadense* Mill. R. E. B., 02; 268, W. W. D., 15. Fields, common.
- Heliopsis scabra* Dunal. 3913, L. H. P., R. E. B., C. M. K., 03; 268, W. W. D., 15. Frequent.
- Rudbeckia hirta* L. 3948, L. H. P., R. E. B., C. M. K., 03; 269, W. W. D., 15.
- Helianthus grosseserratus* Martens. L. H. P., 15.
- Helianthus strumosus* L. L. H. P., 15.
- Helianthus tuberosus* L. L. H. P., C. R. B., 96; R. E. B., 02; 49, J. V. E., 14; 270, W. W. D., 15.
- Coreopsis palmata* Nutt. 3866, L. H. P., R. E. B., C. M. K., 03; L. H. P., 13.
- Bidens discoidea* (T. & G.) Britton. L. H. P., 15.
- Bidens frondosa* L. L. H. P., 15.
- Bidens cernuum* L. L. H. P., C. R. B., 98; 280, W. W. D., 15. Valley of Pease creek.
- Helenium autumnale* L. L. H. P., 15.
- Dyssodia papposa* (Vent.) Hitchc. L. H. P., 15.
- Achillea Millefolium* L. L. H. P., 13; 281, W. W. D., 15. Valley of Pease creek.

- Matricaria suaveolens* (Pursh.) Buchenau. L. H. P., 15. About dwelling at head of Pease creek.
- Tanacetum vulgare* L. L. H. P., J. P. A., 13.
- Cacalia tuberosa* Nutt. L. H. P., 15. Fields and open spaces.
- Senecio balsamifera* Muhl. L. H. P., 15. Hillsides and open spaces.
- Arctium minor* Bernh. 63, J. V. E., 14; 282, W. W. D., 15. Roadsides.
- Cirsium discolor* (Muhl.) Spreng. R. E. B., 02.
- Cirsium lanceolatum* (L.) Hill. L. H. P., 15. Along Pease creek.
- Cirsium ioense* (Pammel) Fernald. L. H. P., 15. In open places.
- Taraxacum officinale* Weber. 283, W. W. D., 15. Pastures and roadsides, common.
- Sonchus oleraceus* L. 284, W. W. D., 15. Roadsides and pastures.
- Lactuca canadensis* L. 43, J. V. E., 14.
- Lactuca scariola* L. L. H. P., 15. Along Pease creek.
- Lactuca floridana* (Lam.) Hitch. 297, W. W. D., 15. Woods, frequent.
- Prenanthes alba* L. R. E. B., 02; 47, J. V. E., 14; 285, W. W. D., 14. Common on wooded hillsides.

Key to initials used in the Catalogue:

J. P. A.	J. P. Anderson
C. R. B.	C. R. Ball
R. E. B.	R. E. Buchanan
R. H. C.	R. H. Combs
W. W. D.	W. W. Diehl
J. V. E.	J. V. Ellis
C. M. K.	Miss C. M. King
R. F. M.	R. F. Miller
L. H. P.	L. H. Pammel

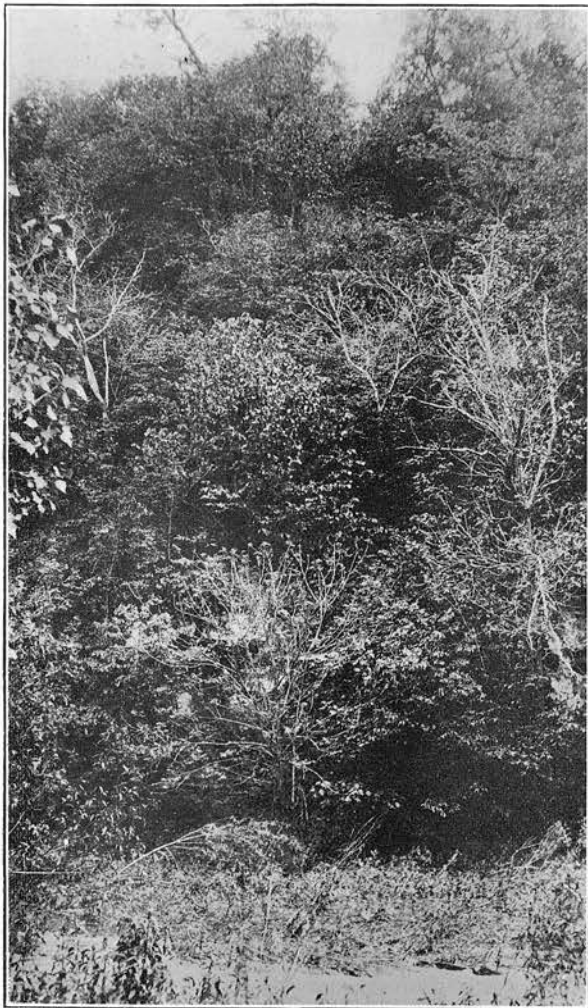
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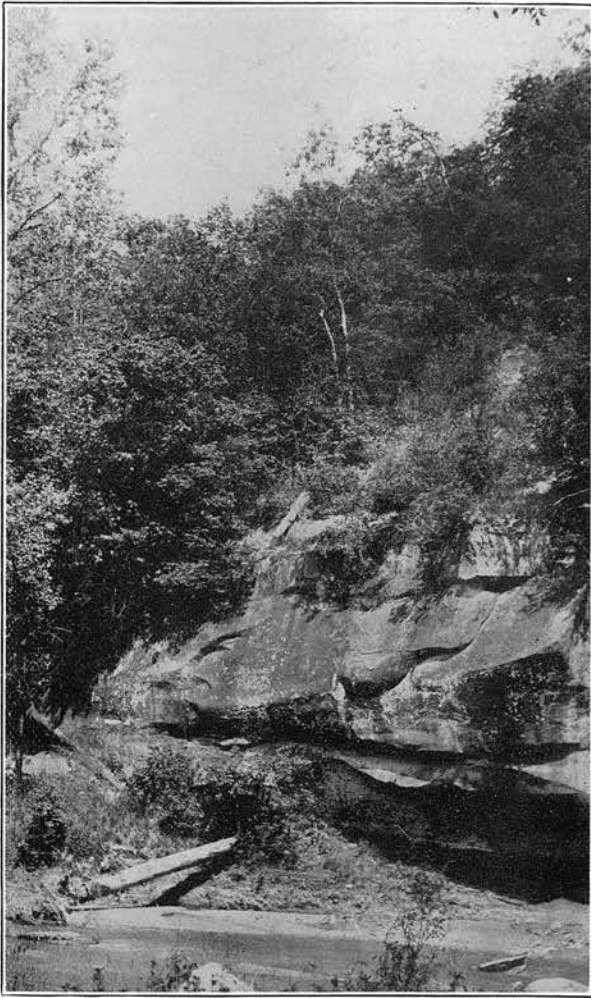
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PLATE XVIII.



North slope of the strip survey.

PLATE XIX.



South slope of the strip survey.