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A PRELIMINARY LIST OF PLANTS OF THE SAND MOUNDS OF MUSCATINE AND LOUISA COUNTIES, IOWA

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This paper deals with the flora of a dune area in Muscatine and Louisa counties in Iowa known locally as the Sand Mound, the only region of its kind nearer than the sand hills of Nebraska to the west and the dunes of Lake Michigan to the east. Shimek [2] in 1893 listed the plants of the Iowa Sand Lands including the Sand Mound, but no one has actually determined the flora of the large dune. It is the purpose of this paper to learn as far as possible what plants grow on the mound including its margins.

THE SAND MOUND

The Sand Mound is located ten miles south of the city of Muscatine on the west side of the Mississippi river. It rises thirty or forty feet in height above the surrounding river flood plain. It comprises approximately fifteen hundred acres, a little over half being in Muscatine County and the rest in Louisa. It is roughly horseshoe-shaped. The south prong of the shoe ends in the Mississippi river while the north prong is bordered by a marsh which circles the mound a mile and a half westward and is continuous southward to McKee Lake.

In regard to the geologic origin of the Sand Mound, J. A. Udden in the "Geology of Muscatine County" says, "On the south half of sections 33 and 34 there is a remnant of a terrace known as the Sand Mound, rising from thirty to forty feet above the level of the island. It consists of rather fine white sand with very few pebbles. Some of the surface material on the island may have been derived from this terrace. . . ." Profesor F. M. Witter, in his "History of Muscatine County," writes: "The Sand Mound, the northern part of which is in the southeastern corner of the county, is no doubt a part of the debris of the sandstones crushed by the glaciers, washed away by the river, or both. . . ." No mat-

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2 Shimek, Bohumil, "The Sand Flora of Iowa" Bulletins from the Laboratories of Natural History, Vol. VII.

ter what the origin of this mound of sand in this river bottom the fact remains that the area exists and is subject to wind action today.

In general, the direction of the "blows," which are on the east portion of the mound, is from northwest to southeast. Some blows are twenty or thirty feet deep and some as long as an eighth mile or more. Where the sand is advancing on the remnant forest, entire trees of an estimated forty-foot height are buried to their top branches. Others have varying portions of their trunks yet exposed.

Between the more or less permanent west side and the moving area is a strip of land one-half to one-and-one-fourth miles wide used for watermelons, cantaloupes, and sweet potatoes.

SOME OF THE SHOWY PLANTS AND THE TIME THEY BLOSSOM ON THE MOUND

Although the authors began watching the dune area March 30, the first plant found was on April 19 at the foot of East Hill along the marsh, *Cardamine pennsylvanica.* The first real dune plant came about the same time, brought perhaps by our first warm week in an abnormally cold spring. This plant was *Draba caroliniana* and was followed by bluets, (*Houstonia patens*). In a week a showy yellow succulent plant *Corydalis crystallina* came and stayed a month or more. May and June were the months of rapid plant growth. The east slope was dominated by columbine, (*Aquilegia canadensis*). The sandy prairie violet, (*Viola pedatifida*) grows in the open to the edge of the moving sand.

After the early spring flowers there was a definite trend in the flower color toward yellow (orange) and blue. Following the deep orange-yellow of *Lithospermum augustifolium* and the creamy ivory *Baptisia bracteata* came the blue of *Linaria canadensis.* The latter dominated for two weeks or more every part of the sand mound except the open blow.

Astragalus distortus was found on what we thought to be virgin sod in the middle of the mound. Later a few plants were found in virgin sod along an east side gully. This is rare in Muscatine county. A second rare plant in Iowa was found at the foot of the Sand Mound at the east end of the footpath across the marsh. This was mousetail, *Myosurus minimus.*

There followed in rapid succession *Penstemon pallidus, Delphinium Penardi, Amorpha canescens, Achillea Millifolium, Specularia perfoliata, Erigeron canadensis, Helianthus petiolaris,* and

then the showy lavender-colored *Pentstemon grandiflorus*. Along with these were of course many others but these were most prevalent among the herbaceous plants.

Trees and shrubs are present along the east side of the area and occasionally on the west slope. There are some newly-planted Scotch pine, *Pinus sylvestris*, in the blows, intended to bind the sand. *Rhus canadensis* var. *trilobata* is thick in patches throughout the area, particularly along fence rows. Red cedar, *Juniperus virginiana*, Scotch pine, *Pinus sylvestris*, and white pine, *Pinus Strobus*, make up the various surrounding homestead groves. The east side woods is dominated by soft maple, *Acer saccharinum*, Kentucky coffee bean, *Gymnocladus dioica*, and honey locust, *Gleditsia triacanthos*, while the shrubs beneath are principally prickly ash, *Zanthoxylum americanum*, hop tree, *Ptelea trifoliata*, bladdernut, *Staphylea trifolia* and buttonbush, *Cephalanthus occidentalis*.

Fig. 1. *Opuntia Rafinesquii*

Fig. 2. Trees are buried beneath shifting sands. *Spartina cynosuroides* on the banks on each side of the blow above are being gradually undermined by wind action. In the foreground is *Lespedeza capitata*.

Fig. 3. Looking north from a high point south of McKee Lake. The arrow in the background indicates a car.

Fig. 4. *Aquilegia canadensis* covers the east slope of the Sand Mound.

The sequence of families and genera follows that of Gray's Manual, ed. 7, as does the nomenclature. The plants marked with an asterisk were not included in Prof. Shimek's list.

DIVISION I. PTERIDOPHYTA

Equisetaceae
*Equisetum arvense L.
*Equisetum hyemale L. var. robustum (A. Br.) A. A. Eaton

DIVISION II. SPERMATOPHYTA

Class I MONOCOTYLEDONEAE

Typhaceae
**Typha latifolia* L.
Hydrocharitaceae
**Elodea canadensis* Michx.
Gramineae
Andropogon furcatus Muhl.
Andropogon scoparius Michx.
Sorghastrum nutans (L.) Nash.
Digitaria sanguinalis (L.) Scop.
Paspalum ciliatifolium Michx.
**Panicum lanuginosum* Ell.
**Panicum praecoccum* Hitch. & Chase
Panicum Scribnerianum Nash.
Panicum virgatum L.
**Setaria glauca* (L.) Beauv.
Setaria viridis (L.) Beauv.
Cenchrus tribuloides Walt.
Stipa spartea Trin.
**Aristida* sp.
**Alopecurus carolinianus* Walt.
Sporobolus cryptandrus (Torr.) Gray
Sporobolus neglectus Nash.
Agrostis alba L.
Sphenopholis obtusata (Michx.) Scribn.
Koeleria cristata (L.) Pers.
**Spartina cynosuroides* (L.) Roth.
Bouteloua curtipendula (Michx.) Torr.
Bouteloua hirsuta Lag.
Triplasis purpurea (Walt.) Chapm.
Eragrostis pectinacea (Michx.) Steud.
Poa compressa L.
Poa pratensis L.
Festuca octoflora Walt.
**Lolium multiflorum* Lam.
Agropyron Smithii Rydb.
Hordeum jubatum L.

Fig. 5. *Penstemon grandiflorus.*

Fig. 6. *Panicum virgatum*

Hordeum nodosum L.
Elymus canadensis L.
Cyperaceae
Cyperus filiculmis Vahl.
Cyperus Schweinitzii Torr.
**Scirpus pedicellatus* Fernald
Carex cephalophora Muhl.
Carex festucacea Schkuhr.
Carex pennsylvanica Lam.
Araceae
Acorus Calamus L.
Commelinaceae
Tradescantia reflexa Raf.
Commelina virginica L.
Juncaceae
Juncus tenuis Willd.
Liliaceae
**Smilax herbacea* L.
**Allium canadense* L.
**Smilacina stellata* (L.) Desf.
Amaryllidaceae
**Hypoxis hirsuta* (L.) Coville
Iridaceae
**Iris versicolor* L.
Sisyrinchium campestre Bicknell

Class II DICOTYLEDONEAE

Salicaceae
Salix humilis Marsh.
Salix longifolia Muhl.
Betulaceae
* *Betula lutea* Michx.
Urticaceae
**Cannabis sativa* L.
**Celtis occidentalis* L.
Santalaceae
Comandra umbellata (L.) Nutt.
Polygonaceae
**Fagopyrum esculentum* Moench.
Rumex Acetocella L.
Rumex crispus L.
**Rumex altissimus* Wood.
Polygonum Convolvulus L.
**Polygonum pennsylvanicum* L.
Polygonum ramosissimum Michx.
**Polygonum sagittatum* L.
Polygonum tenue Michx.
Chenopodiaceae
Cycloloma atriplicifolium (Spreng.) Coult.
Chenopodium album L.
Chenopodium Botrys L.
Chenopodium leptophyllum Nutt.
Salsola Kali var. *tenuifolia* G. F. W. Mey.
Amaranthaceae
**Amaranthus retroflexus* L.
Froelichia floridana (Nutt.) Moq.
Phytolaccaceae
**Phytolacca decandra* L.
Nyctaginaceae
Oxybaphus nyctagineus (Michx.) Sweet.
Aizoaceae
Mollugo verticellata L.
Caryophyllaceae
**Arenaria lateriflora* L.
* *Cerastium nutans* Raf.
Cerastium viscosum L.
**Cerastium vulgatum* var. *hisutum* Fries.
Silene antirrhina L.
Silene stellata (L.) Ait. f.
Ranunculaceae
Caltha palustris L.
**Ranunculus abortivus* L.
Ranunculus fascicularis Muhl.
**Myosurus minimus L.*
**Thalictrum dioicum* L.
Anemone canadensis L.
Anemone caroliniana Walt.
Anemone cylindrica Gray.
Clematis Pitcheri T. & G.
**Aquilegia canadensis* L.
Delphinium Penardi Huth.
Menispermaceae
**Menispermum canadense* L.
Fumariaceae
**Corydalis aurea* Willd.
**Corydalis crystallina* Engelm.
Cruciferae
Draba caroliniana Walt.
Lepidium apetalum Willd.
**Lepidium virginicum* L.
**Capsella bursa-pastoris* (L.) Medic.

Fig. 7. The trees in the background border the Mississippi river.

Fig. 8. *Cenchrus tribuloides* grows everywhere on the Sand Mound but particularly on the sides of "fresh blows."

Sisymbrium canescens var. *brachycarpon* (Richards) Wats.
**Dentaria laciniata* Muhl.
**Cardamine bulbosa* (Schreb.) BSP
**Cardamine pennsylvanica* Muhl.
**Arabis hirsuta* (L.) Scop.
**Arabis dentata* T. & G.
Capparidaceae
Polanisia graveolens Raf.
**Polanisia trachysperma* T. & G.
Saxifragaceae
Heuchera hispida Pursh.
Ribes gracile Michx.
Rosaceae
Spiraea salicifolia L.
Fragaria virginiana Duchesne.
Potentilla arguta Pursh.
Potentilla monspeliensis L.
Rubus sp.
Rosa humilis Marsh.
Rosa pratincola Greene.
Prunus americana Marsh.
**Prunus virginiana* L.
Leguminosae
**Gymnocladus dioica* (L.) Koch
Cassia chamaecrista L.
**Cassia Medsgeri* Shafer.
Baptisia bracteata (Muhl.) Ell.
Crotalaria sagittalis L.
**Trifolium repens* L.
Trifolium stoloniferum Muhl.
Melilotus alba Desr.
**Melilotus officinalis* (L.) Lam.
Amorpha canescens Pursh.
Amorpha fruticosa L.
Petalostemum candidum Michx.
Petalostemum purpureum (Vent.) Rydb.
Tephrosia virginiana (L.) Pers.
Astragalus distortus T. & G.
**Astragalus canadensis* L.
Desmodium canadense (L.) DC
Desmodium illinoense Gray
Lespedeza capitata Michx.
Strophostyles helvola (L.) Britton.
**Robinia Pseudo-Acacia* L.
Strophostyles pauciflora (Benth.) Wats.
Linaceae
Linum sulcatum Riddel.
Oxalidaceae
**Oxalis corniculata* L.
Oxalis stricta L.
Oxalis violacea L.
Geraniaceae
Geranium carolinianum L.
Zygophyllaceae
Tribulus terrestris L.
Rutaceae
Zanthoxylum americanum Mill.
Ptelea trifoliata L.
Polygalaceae
Polygala incarnata L.
Polygala sanguinea L.
**Polygala Senega* L.
Polygala verticillata L.
Euphorbiaceae
Croton capitatus Michx.
**Croton glandulosus* var. *septentrionalis* (Muell.) Arg.
Euphorbia corollata L.
**Euphorbia dentata* Michx.
Euphorbia maculata L.
Euphorbia polygonifolia L.
Anacardiaceae
Rhus canadensis var. *trilobata* (Nutt.) Gray.
Rhus glabra L.
Rhus Toxicodendron L.
Celastraceae
**Evonymus atropurpureus* Jacq.
Staphyleaceae
**Staphylea trifolia* L.
Aceraceae
**Acer Negundo* (Moench) Koehne.
**Acer saccharinum* L.
Balsaminaceae
Impatiens biflora Walt.
Rhamnaceae
Ceanothus americanus L.
Vitaceae
**Psedera quinquefolia* (L.) Greene.
Vitis vulpina L.
Tiliaceae
Tilia americana L.
Malvaceae
Callirhoe triangulata (Leavenw.) Gray.

Fig. 9. *Physostegia virginiana.*

Fig. 10. *Spartina cynosuroides* found in blows on top of the Sand Mound in Muscatine County, Iowa.

**Abutilon Theophrasti* Medic.
**Malva rotundifolia* L.
**Hibiscus militaris* Cav.
Hypericaceae
Hypericum cistifolium Lam.
Cistaceae
Helianthemum canadense (L.?) Michx.
Helianthemum majus BSP.
Lechea stricta Leggett.
Lechea tenuifolia Michx.
Violaceae
Viola fimbriatula Sm.
Viola pedata L.
**Viola pedatifida* G. Don.
**Viola palmata* L.
**Viola sagittata* Ait.
**Viola sororia* Willd.
Cactaceae
Opuntia Rafinesquii Engelm.
Onagraceae
Oenothera biennis L.
Oenothera muricata L.
Oenothera rhombipetala Nutt.
Umbelliferae
Eryngium yuccifolium Michx.
**Chaerophyllum procumbens* (L.) Crantz.
Cornaceae
**Cornus asperifolia* Michx.
**Cornus stolonifera* Michx.
Primulaceae
Androsace occidentalis Pursh.
**Steironema ciliatum* (L.) Raf.
Oleaceae
**Fraxinus americana* L.
Apocynaceae
Apocynum cannabinum L.
Asclepiadaceae
**Asclepias amplexicaulis* Sm.
Asclepias syriaca L.
Asclepias tuberosa L.
Asclepias verticillata L.
Acerates viridiflora Ell.
Convolvulaceae
Convolvulus sepium L.
Cuscuta arvensis Beyrich.
Polemoniaceae
**Phlox maculata* L.
Phlox pilosa L.
Hydrophyllaceae
Ellisia Nyctelea L.
Boraginaceae
Lithospermum augustifolium Michx.
Lithospermum canescens Lehm.
Lithospermum Gmelini Hitchc.
Onosmodium occidentale Mackenzie.
**Myosotis virginica* (L.) BSP.
Verbenaceae
Verbena augustifolia Michx.
Verbena bracteosa Michx.
Verbena hastata L.
Verbena stricta Vent.
**Lippia lanceolata* Michx.
Labiatae
Teucrium canadense L.
Stachys palustris L.
**Monarda fistulosa* L.
Monarda mollis L.
Monarda punctata L.
Hedeoma hispida Pursh.
Pycnanthemum flexuosum (Walt.) BSP.
**Nepeta cataria* L.
**Physostegia virginiana* Benth.
**Leonurus Cardiaca* L.
Solanaceae
**Solanum nigrum* L.
Physalis pruinosa L.
Physalis pubescens L.
**Physalis virginiana* Mill.
**Datura Stramonium* L.
Scrophulariaeceae
Verbascum Blattaria L.
Verbascum Thapsus L.
Scrophularia leporella Bicknell.
**Scrophularia lanceolata* Pursh.
Pentstemon gracilis Nutt.
Pentstemon grandiflorus Nutt.
Linaria canadensis (L.) Dumont.
Synthyris Bullii Heller.
**Veronica peregrina* L.
**Veronica Tournefortii* C. C. Gmel.
**Chelone* sp.
Bignoniaceae
Catalpa speciosa Warder.
Acanthaceae

Ruellia caroliniensis (Walt.) Steud.
Gnaphalium polycephalum Michx.
Plantaginaceae
Plantago aristata Michx.
**Plantago Purshii* R. & S.
Plantago Rugelii Dcne.
**Plantago virginica* L.
Rubiaceae
**Houstonia patens* Ell.
**Galium aparine* L.
**Cephalanthus occidentalis* L.
Caprifoliaceae
**Sambucus canadensis* L.
Curcurbitaceae
**Sicyos angulatus* L.
Campanulaceae
**Campanula americana* L.
Specularia perfoliata A. DC.
Lobeliaceae
Lobelia inflata L.
Lobelia spicata Lam.
Compositae
**Vernonia altissima* Nutt.
Kuhnia eupatorioides L.
Liatris cylindracea Michx.
Liatris pycnostachya Michx.
Liatris scariosa Willd.
Solidago graminifolia Salisb.
Solidago missouriensis Nutt.
Solidago nemoralis Ait.
Solidago rigida L.
Solidago serotina Ait.
Solidago speciosa var. *angustata* T. & G.
Aster linariifolius L.
Aster multiflorus Ait.
Aster novae-angliae L.
Aster oblongifolius var. *rigidulus* Gray.
Aster ptarmicoides T. & G.
Aster sericeus Vent.
Erigeron canadensis L.
Erigeron divaricatus Michx.
Erigeron ramosus BSP.
Erigeron philadelphicus L.
Antennaria plantaginifolia Richards.
Antennaria neglecta Greene.
Antennaria neodioica Greene.
Silphium integrifolium Michx.
Silphium laciniatum L.
Ambrosia artemisiifolia L.
Ambrosia psilostachya DC.
Xanthium commune Britton.
Rudbeckia hirta L.
Rudbeckia subtomentosa Pursh.
Brauneria pallida Britton.
Brauneria angustifolia (DC.) Heller.
Lepachys pinnata T. & G.
**Helianthus petiolaris* Nutt.
Helianthus scaberrimus Ell.
Helianthus occidentalis Riddell.
Helianthus grosseserratus Martens.
Coreopsis palmata Nutt.
**Helenium autumnale* L.
Dyssodia papposa Hitchc.
Achillea Millefolium L.
Artemisia caudata Michx.
Artemisia dracunculoides Pursh.
Artemisia ludoviciana Nutt.
Cacalia tuberosa Nutt.
Senecio Balsamitae var. *pauperculus* (Michx.) Fernald
Senecio plattensis Nutt.
Cirsium altissimum Spreng.
Cirsium Hillii Fernald.
Krigia amplexicaulis Nutt.
Taraxacum officinale Weber.
Lactuca canadensis L.
Lactuca ludoviciana Riddell.
Lactuca scariola L.

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