Hunt Institute for Botanical Documentation
5th Floor, Hunt Library
Carnegie Mellon University
4909 Frew Street
Pittsburgh, PA 15213-3890
Telephone: 412-268-2434
Email: huntinst@andrew.cmu.edu
Web site: www.huntbotanical.org

The Hunt Institute is committed to making its collections accessible for research. We are pleased to offer this digitized item.

Usage guidelines
We have provided this low-resolution, digitized version for research purposes. To inquire about publishing any images from this item, please contact the Institute.

About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

(7) Bot. Club of AAAS

which shall lead to a pronunciation in conformity with what is now regarded as the best usage.

3. The question of the publication of botanical papers (and from those of systematic interest) may well demand attention. We have several journals devoted to botany alone, and several others maintaining botanical departments. Now, might it not be well to provide for a "division of labor" in these, so that each journal might develop its particular branch or department. Moreover, might not the club arrange for a more general distribution of botanical papers (articles), by a general system of exchange?

4. The relations of the botanists of the country to the National Herbarium might be made the subject of discussion and action, with good results profit, we apprehend, to the botanists and also to the National Herbarium.

Charles E Bessey.

(6)

Work for the Botanical Club of the A.A.A.S.

This organization with its large yearly attendance may well undertake some work which has been long neglected in this country. We do not forget that the principal object of its founders was to bring the botanists together for social purposes, and are rejoiced to know that in this respect it has accomplished much. Many of the lonely botanists living in remote parts of the country have been gladdened and encouraged by meeting their fellows, and consulting upon means and methods. This result is in itself a justification of the existence of the Club.

But this should not be all. At every annual meeting some progress should be made in the effort to bring about concerted action among the botanists of the country in with regard to many matters. We will venture to suggest here some things which might well occupy a part of the time of the Club.

1. In view of the rapid increase in what may be termed popular Cryptogamic botany, it is desirable that there should be uniformity in the use of common English names of the species and groups. For example, to what group shall we apply the name of the Mildews? or the Blights?

2. Can not the botanists do something to bring about greater uniformity in the pronunciation of botanical names and terms? That this is needed, requires no further demonstration than that afforded by a single session of the Club. We believe that the time is not far distant when botanists must listen to our Latin scholars, and take steps

Iowa Agricultural College
1870-1884

The University of Nebraska
1884-1909

The Botanical Seminar

of

The University of Nebraska

invites you to attend a banquet in honor of

Charles Edwin Bessey

commemorating the

Fortieth Anniversary of his Professorship

of Botany

The Lincoln Hotel, Lincoln, Nebraska
Saturday, June 5, 1909
Eight o'clock p. m.

United States

Department of Agriculture,

Washington, D. C., June 25 - - , 1901.

Mr. Charles E. Bessey - - - - - - - - - - - - -, of the State of Nebraska -, is hereby appointed

a Collaborator

In the Bureau of Forestry,

in the **United States Department of Agriculture,** at a salary of Three Hundred (300) - Dollars per annum, **on the statutory roll appropriated for salaries in the Bureau of Forestry,** by transfer from Collaborator in the Division of Forestry at a salary of $300 per annum.

He is hereby required to take the Oath of Office immediately and file the same, together with a statement of legal and city residence and personal record, with the Appointment Clerk in the Department of Agriculture, and report for duty in writing, to the **Chief of the Bureau of Forestry,**

- -

and be subject to the rules and orders of the Secretary of Agriculture. This appointment to take effect on July 1, 1901.

James Wilson
Secretary of Agriculture.

List of Flowers

analyzed by

Chas. H. Besse,

Agt. Ped.

1867.

No.	Page	Order	Genus	Species	Common Name	Where gathered	Date	
1	396		Ulmus	Americana	White Elm	River. C.F.	Apr 17	I
2	84		Acer	Dasycarpum	Silver Maple	" "	" "	I
3	272		Trientalis	Americana	Star flower	Isabella. Co.	" 20	I
4	6	Ranunculaceae	Hepatica	Triloba	Three-lobed Hepatica	C.F.	" 22	I
5	65		Claytonia	Virginica	Spring beauty	"	" 23	I
[illegible]	380		Dirca	palustris	Moose wood	C.F.	" "	C.H.
7	26		Sanguinaria	Canadensis	Blood root	near C.F.	" "	I
[illegible]	428		Symplocarpus	foetidus	Skunk Cabbage	" C.F.	" 24	C
[illegible]	85		Acer	rubrum	Red Maple	C.F.	" "	I
10	31	Cruciferae	Cardamine	rhomboidea [Pennsylvanica?]	Spring Cress	C.F.	" "	Rost
11	11		Isopyrum	biternatum		C.F.	" 25	C.H.
12	471		Erythronium	Americanum	Yellow Adder Tongue	near C.F.	" "	I
13	159		Erigenia	bulbosa	Harbinger of Spring	C.F.	" "	I
14	395		Ulmus	fulva	Red Elm	C.G.	" "	I
15	11		Caltha	palustris	Marsh Marigold	C.F.	" "	I
16	356	Ericaceae	Kalmia	glauca	Pale Laurel	Isabella Co.	" "	Prof.
17	27		Dicentra	Cucullaria	Dutchman's breeches	near C.F.	" 26	I
18	6	Ranunculaceae	Thalictrum	anemonoides	Rue anemone	C.F.	" "	I
19	lxxix. 423		Larix	Europaea	European Larch	C.G.	" "	C.H.
20	43	Violaceae	Viola	rostrata	Long Spurred Violet	C.F.	" "	I+

No	Page	Order	Genus	Species	Common Name	Where found	Date	Where and
21	44	Violaceae	Viola	pubescens	Downy yellow violet.	College Farm.	Apr 26	I
22	43	"	Viola	cucullata	Common blue violet	" "	" "	I
23	239		Taraxacum	Dens-leonis	Common Dandelion	" "	" "	I
24	331		Phlox	divaricata	Wild Sweet William	" "	" 27	I+
25	44	Violaceae	Viola	Canadensis	Canada Violet	" "	" "	I+
26	379		Benzoin	odoriferum	Spice bush.	" "	" "	I
27	464	Smilaceae	Trillium	Grandiflorum	Birthroot	" "	" "	I
28	32		Dentaria	laciniata	Pepper-root	" "	" "	I
29	20		Caulophyllum	thalictroides	Blue Cohosh	" "	" "	I
30	10	Ranunculaceae	Ranunculus	repens	Creeping Crowfoot	" "	" "	I
31	423		Larix	Americana	Tamarack	near C. F.	" "	I
32	59		Stellaria	Media	Common Chickweed	Coll. Gard.	" "	I
33	6	Ranunculaceae	Anemone	nemorosa	Wood anemone	Coll. Farm	" "	I
34	39		Capsella	Bursa-pastoris	Shepherd's purse	Garden	" 29	I
35	9	Ranunculaceae	Ranunculus	abortivus	Small flowered Crowfoot	River bank down Stream	" 29	I
36	228		Gnaphalium	uliginosum	Low cudweed	" " "	" 30	I
37	126-7	Rosaceae	Amelanchier	Canadensis V. oblongifolia	Juneberry	River bank up Strea		I
38	418	Salicaceae	Populus	tremuloides	American Aspen	Plank Road near C. F.	" "	C&I
39		"	Populus	monilifera	Cottonwood	" " " "	" "	C&I
40	187	Grossulaceae	Ribes	rubrum	Red currant	Coll. Gar.	" "	I

No	Page	Order	Genus	Species	Common name	Where found	Date	Who anal.	
41	147		Hamelis	Virginica	Witch Hazel.	River bluff. down	May 1	I	
42	42	Violaceae	Viola	blanda	Sweet White Violet	Brook E. C. F.	" "	I+	
43	120	Rosaceae	Fragaria	vesca	Wild Strawberry	C F No. 9	" "	I	
44	lxxxv		Petilium	imperiale	Crown Imperial	C. G	" 2	I	
45	lxxxvi		Hyacinthus	orientalis	Hyacinth	" "	" "	Mart I	
46	lxxiv	–	Forsythia	viridissima		" "	" "	Mart. I	
47	480		Luzula	campestris	Wood rush	Ravine Coll Farm	" "	Class	
48	lxxiii		Vinca	minor	Common Periwinkle	C. G	" "	I	
49	145		Mitella	diphylla	Mitrewort	N.W. C.F. Ravine	" "	I	
50.	160		Aralia	trifolia	Ground nut		3	I	
51	84		Acer	saccharinum	Sugar Maple	Bluff. C.G	" "	I	
52	251	Ericaceae	Epigaea	repens	Trailing arbutus	Eastern Penn.	" "	Class	
53	414	Salicaceae	Salix	discolor	Glaucous Willow	N.W. Coll. Farm	" "	I	Swamp N. of Harrison's orchard.
54	249		Vaccinium	Canadense	Canada blueberry	Ravine Coll Farm	" 4	I	Harrison's orchard
55	409		Carpinus	Americana	Blue beech	" " "	" 8	I	
56	425	Coniferae	Juniperus	Virginiana	Red Cedar	River C.F. down.	" "	I	
57	xlvi	Rosaceae	Prunus	Cerasus	Garden Cherry	Coll Garden	May 4	I	
58	414	Salicaceae	Salix	humilis	Low bush Willow	Coll Farm	" "	I	S.W. of apple orchard.
59	27		Dicentra	Canadensis	Squirrel Corn	" "	" "	I	
60	44	Violaceae	Viola	Muhlenbergii	American Dog violet.	Ravine Coll Farm	" "	I	Damp shady woods.

No	Page	Order	Genus	Species	Common name	Locality	Date	When anal.	
61	117		Waldsteinia	fragarioides	Barren Strawberry	Harrison Farm	May 4	I	
62	165		Lonicera	ciliata	Fly Honeysuckle	Vicin Coll Farm	" "	I	
63	13	Ranunculaceae	Zanthorhiza	apiifolia	Shrub Yellowroot	Coll Gar	May 6	Class	
64	7	"	Thalictrum	dioicum	Early Meadow Rue	Riverbank	" "	I	
65	285		Collinsia	verna	Collinsia	Vicin Coll Farm	" "	Friday St & I	Riverbank
66	60		Cerastium	viscosum	Large Mouse-ear Chickweed	" "	" "	I	
67	137	Grossulaceae	Ribes	Grossularia	Garden Gooseberry	Coll Gar	" 9	I	
68	250	Ericaceae	Cassandra	calyculata	Leather Leaf	Vicin Coll Farm	" 6	Class	Swamp … in a swamp
69	112	Rosaceae	Prunus	Pennsylvanica	Wild Red Cherry	Vicin Coll Farm	" 7	I	
70	137	Grossulaceae	Ribes	Cynosbati	Wild Gooseberry	" "	" "	I	
71	424	Coniferae	Thuja	occidentalis	Arbor vitae	Coll Garden	" "	I	
72	295		Pedicularis	Canadensis	Common Lousewort	Coll Farm	" 8	I	
73	296	Salicaceae	Salix	petiolaris	Petioled Willow	Vicin Coll Farm	" "	I	Harrison's Orchard
74	396		Ulmus	racemosa	Corky Elm	Coll Garden	" "	I	
75	xlvi	Rosaceae	Amygdalus	Persica	Peach	Vicin Coll Farm	" "	I	
76	472		Uvularia	grandiflora	Large Bellwort	" "	" "	II	Sandy soil, riverbank
77	417	Salicaceae	Salix	lucida	Shining Willow	" "	" "	II	Overflowing river banks
78	xlix	Rosaceae	Cydonia	Japonica	Japan Quince	Coll Gar	" 9	I	
79	249	Ericaceae	Vaccinium	vacillans	Low Blueberry	" "	" "	II	
80	36		Sinapis	arvensis	Field Mustard	" Garden	" 11	I	

No	Page	Order	Genus	Species	Common name	Locality	Date	When anal.	
81			Vicia	Cracca	Vetch	Coll Farm	May 11	11	I
82	lii	Grossulaceae	Ribes	aureum	Missouri Currant	Coll Garden	" "	I	I
83	31		Dentaria	diphylla	Pepperroot	Vicin Coll Farm	" "	I	I
84	125	Rosaceae	Amelanchier	V. Bt. Bastygapium Canadensis	June Berry	" " "	" "	I	I
85	471		Erythronium	albidum	White D. T. Violet	" " "	" 13	13	I
86	lxv		Calceolaria	Var. Erecta Superba		Green House	" "	Class	
87	75		Xanthoxylum	Americanum	Prickly Ash	" " "	"	12	
88	137	Grossulaceae	Ribes	rotundifolium	Wild Gooseberry	" " "	" "	I	
89	lii	"	Ribes	nigrum	Black Currant	Coll Garden	" "	I	
90	48	Violaceae	Viola	striata	Pale Violet	Vicin. Coll. Farm	" "	I	
91	358		Fraxinus	Sambucifolia	Black Ash	Coll Farm	" 14	I	
92	249	Ericaceae	Vaccinium	Pennsylvanicum	Dwarf Blueberry	Vicin. Coll Farm	" 15	I	
93	294		Castilleia	coccinea	Scarlet painted Cup	" "	" "	I	
94	14	Ranunculaceae	Hydrastis	Canadensis	Yellow Puccoon	" " "	" "	I	
95	xxxiii		Brassica	V Turnip campestris	Com. Turnip	Coll Farm	" 16	I	
96	137	Grossulaceae	Ribes	floridum	Wild black Currant	Vicin. Coll. Farm	" 17	I	
97	xl	Tropaeolaceae	Tropaeolum	majus	Common Nasturtium	Coll. Gar.	" 18	Mil.	
98	xlix	Rosaceae	Pyrus	communis	Pear	" "	" "	I	
99	xlix	"	Pyrus	Malus	Apple	" "	" "	I	
100	xlvi	"	Amygdalus	nana	Flowering Almond	" "	" "	I	

No	Page	Order	Genus	Species	Common name	Locality	Date	No. anal.	
101	XXXII	Fumitory	Dicentra	spectabilis	...	Coll Garden	May 18	I	
102	167		Sambucus	pubens	Redberried Elder	Vicin Coll. Farm	" "	I	
103	466	Liliaceae	Polygonatum	biflorum	Sm. Solomons Seal	" "	" "	I	
104	7		Ranunculus	Purshii	Yellow Water Crowfoot	" " "	" "	I	
105	120	Rosaceae	Rubus	triflorus	Dwarf Raspberry	" "	" "	I	
106	426		Arisaema	triphyllum	Indian Turnip	" " "	" "	I	
107	454		Cypripedium	pubescens	Large Yel. Lady's Slipper	" " "		I	
108	464		Trillium	cernuum	Wake Robin	" " "	" "	I	
109	44	Violaceae	Viola	V. eriocarpa. pubescens		" " "	" "	I	
110	XXXV	"	Viola	tricolor	Pansy	Coll. Gar.	" "	I	
111	443		Orchis	spectabilis	Showy Orchis	Vicin Coll. Farm	" "	I	
112			Geum	rivale	Water Avens	" " "	" 20	I	
113	32		Cardamine	rhomboidea	Spring Cress	" " "	" 31	I	
114	112		Prunus	spinosa	Black thorn	Coll Garden	" 21	I	
115	113		"	virginiana	Choke Cherry	" "	" "	I	
116	lxxxv		Tulipa	Gesneriana	Common Tulip	" "	" "	I	
117	548		Oryzopsis	asperifolia	Mountain Rice		" 22	I	
118	12	Ranunculaceae	Aquilegia	Canadensis	Wild Columbine		" 23	I	
119	72		Geranium	maculatum	Wild Cranesbill	Vicin Coll Farm	" "	I	In swamp.
120	21		Podophyllum	peltatum	Mandrake	" " "	" "	I	

121	548		Coptis	trifolia	Goldthread		May 23	Class	
122	9	Ranunculaceae	Ranunculus	recurvatus	Hooked Crowfoot		" 24	I	
123	408		Fagus	ferruginea	Beech	Vicin Coll Farm	" "	Class	
124	169		Galium	Aparine	Goose Grass	Vicin Coll Farm	" "	I	
125	113	Rosaceae	Prunus	serotina	Wild blk Cherry	C. Gar	" 25	I	
126	231	Compositae	Senecio	aureus V obovatus.	Golden Ragwort.	" "	" "	I	
127	14	Ranunculaceae	Actea	spicata v. alba	Bane berry Cohosh	Coll Farm	" "	I	Damp ground
128	268		Plantago	cordata	Water Plantain	" "	" "	Mid I	Damp ground along brook
129	379		Sassafras	Afficionale	Sassafras	Vicin Coll Farm	" "	I	
130	2[illegible]		[illegible]	serpyllifolia	Ants Betony		" "	I	
131	143		Saxifraga	Pennsylvanica	Swamp Saxifrage		" 27	Ea I	
132	248 50	Ericaceae	Vaccinium	corymbosum	Common Swamp Blueberry	" "	" 28	I	Swamp
133	103		Lathyrus	ochroleucus	Everlasting Pea	Coll Garden	" "	I	
134	229	Compositae	Antennaria	plantaginifolia	Plantain-leaved Everlasting	" "	" "	Class	
135	112	Rosaceae	Prunus	Americana	Wild Plum	Vicin Coll Farm	" "	I	Leaves not convolute
136	467	Liliaceae	Smilacina	Stellata	False Solomon Seal	Vicin Coll Farm	" 29	Class	
137	367		Fraxinus	Americana	White Ash	" " "	" "	Class	
138	91		Lupinus	perennis	Wild Lupine	" " "	" 31	I	
139	822		Lithospermum	longiflorum	Puccoon		" "	I	
1	83		Staphylea	trifolia	American Bladdernut	vicin Coll F	June 1	I	

141	125		Pyrus	coronaria	Amer. Crab Apple	Coll Garden	June 1	I	
142	xlix		"	aucuparia	Euro. Mountain Ash	" "	" "	I	
143	291		Veronica	peregrina	Purslane Speedwell	" "	" "	I	
144	291		"	arvensis	Corn Speedwell	" "	" "	I	
145	59		Stellaria	crassifolia	Chickweed	" "	" "	Wil'H	
146	Lxxv		Rheum	Rhaponticum	Garden Rhubarb	" "	" 3	I	
147	382		Comandra	umbellata	Bastard Toad Flax	Vicin Coll. Gar.	" "	Class	
148	125	Rosaceae	Pyrus	arbutifolia	Choke Berry	" Farm	" 1	I	
149	112	"	Prunus	Chicasa	Chickasaw Plum	" "	" 4	I	Redbridge S side river up
150	378		Rumex	acetosella	Field Sorrel	Coll Gar	" 4	I	
151	92		Trifolium	repens	White Clover	" "	" "	I	
152	258		Ledum	latifolium	Labrador Tea	Vicin Coll Farm	" 3	I	Swamp north.
153	Lxxxiii		Iris	Germanica	Flower de luce	Coll Gar	" 6	Fert I	
154	160		Aralia	nudicaulis	Wild Sarsaparilla	Vicin Coll Farm	" "	Class	
155									

1868

1	586	Equisetaceae	Equisetum	arvense		V.C.T.	May 6		
2	479	Juncaceae	Luzula	pilosa	Wood rush	C.T.	" 9		
3	587	Equisetaceae	Equisetum	hyemale	Scouring Rush	"	" 9		
4	467	Liliaceae	Smilacina	bifolia	T—	Swamp border	" 23		
5	422	Borraginaceae	Lithospermum	canescens	Hoary puccoon or Alkanet	Near Bath	" 25		Brightly – Davis
6	43	Violaceae	Viola	pedata	Bird foot violet	" "	" "		" "
7	348	Gentianaceae	Menyanthes	trifoliata	Buckbean	Northeast C T	" 30		In swamps.
8		Rosaceae	Potentilla	Canadensis	Cinquefoil	N.E.C.T.	" "		
9		Iridaceae	Sisyrinchium	Bermudiana	Blue eyed Grass	Up River on flats	" "		Oak Openings
10	79	Rhamnaceae	Rhamnus	alnifolius	Buckthorn	N.E.C.T.	" "		Sweet smell bark
11	324	Borraginaceae	Cynoglossum	officinale	Houndstongue	Near Lansing	June 4		Bad weed.
12	326	Hydrophyllaceae	Hydrophyllum	appendiculatum	Hairy Waterleaf	No 7	" 8		Pretty little plant.
13	236	Compositae	Cynthia	Virginica	Cynthia	All around	" "		
14	272	Primulaceae	Dodecatheon	Meadia	American Cowslip	Illinois	" "	† Garfield	By kindness of Norton
15	247	Ericaceae	Gaylussacia	resinosa	Common Huckleberry	No 12, Edge Swamp	" 9	† "	
16	121	Rosaceae	Rubus	strigosus	Red Raspberry	" 12	" 9		
17	428	Araceae	Calla	palustris	Water Arum Calla	" " Swamp	" "		
18	290	Scrophulariaceae	Veronica	scutellata	Marsh Speedwell	" " "	" "		Instead of 1-2 racemes it has on one specimen 5 racemes, another 3.
19	272	Primulaceae	Naumburgia	thyrsiflora	Tufted Loosestrife	" " "	" "		
20	464	Smilaceae	Medeola	virginica	Ind. Cucumber Root	No. 12, Ridges	" "		

21	168	Caprifoliaceae	Viburnum	pubescens	Downy Arrow-wood	No 12 Dygr.	May 9		
22	467	Liliaceae	Smilacina	bifolia	————	" "	" 10		
23	541	Gramineae	Alopecurus	aristulatus	Water Foxtail	" " Swamp	" "		
24	151	Umbelliferae	Sanicula	Marilandica	Black Snakeroot	" "	" "	+ 49 Keyholds	3
25	375	Polygonaceae	Rumex	crispus	Yellow Dock	Coll buildgs	" 11	+ Gar.	
26	324	Borraginaceae	Echinospermum	Lappula	Beggarstick	Lansing	" 13		
27	166	Caprifoliaceae	Triosteum	perfoliatum	Horse Gentian	Road to Lansing	" 15	—	
28	170	Rubiaceae	Galium	trifidum	Bedstraw	Bluff. C.G.	" 15	+ Gar.	Dont apply will Fd. many flowers. lobes of corolla in fours.
29	121	Rosaceae	Rubus	Canadensis	Low Blackberry	" " "	" "		
30	4	Ranunculaceae	Pulsatilla	Nuttalliana	Pasque Flower	Montcalm Co	" "	[illegible]	[illegible]
31	286	Scrophulariaceae	Pentstemon	pubescens	Beard tongue	Bluff C.G.	June 16	—	
32	225	Compositae	Achillea	Millefolium	Yarrow or Milfoil	" "	" 16		
33	156	Umbelliferae	Zizia	integerrima	Golden Alexanders	" "	" "	+ Gar	
34	151	Umbelliferae	Sanicula	Canadensis	Black Snakeroot	" "	" "	+ Gar	
35	1 iv	Saxifragaceae	Philadelphus	coronarius	Mock orange or Syringa	C.G.	" 20		Near fount
36	1 x ii	Ericaceae	Rhododendron	arboreum	Rhododendron	" "	" "		N. C. H.
37	1 x i x v	Liliaceae	Hemerocallis	fulva	Yellow Day Lily	C.G.	" "		
38	350	Apocynaceae	Apocynum	androsaemifolium	Spreading Dogbane	N.C.T.	July 6		
39	56	Caryophyllaceae	Silene	noctiflora	Night flowering Catchfly	N.E.C.T.	" "		Closely resemble Cockle
40	283	Scrophulariaceae	Verbascum	Blattaria	Moth Mullein	N.E.C.T.	" "		

1878

Synopsis of Lectures to
Freshmen Class
in Botany.

I.
Leaves. = Green expansions, of some part of the surface of ordinary plants.
Attached to stems.
Grow with stems, from buds.
Note the different forms of leaves
~~Almond~~ Younger Apple leaf (Am. nanus) and Twigs
Lilac " (S. vulgaris)

II.
Elm
Soft Maple "
~~Apple~~ "
Oak "
Hard Maple "

III.
Clover "
Box Elder "
Ash "
Honey Locust " some good
III Indian Corn
Timothy Grass
Pine
Spruce

IV.
Two palmately compound
(1) once "
(2) twice "
Two pinnately "
(1) once "
(2) twice "

Tell abt branching of leaves. Palmately Pinnately.

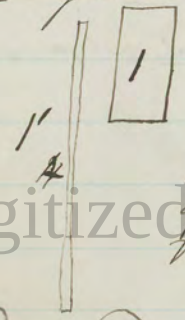
V Venation.

Netted veined
Pinnate
Palmate

Parallel veined
from end to end
from midrib to margin.

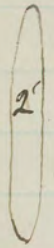
V[a]

Leaves may be described by the use of a few geometrical forms.



1 The Oblong form as in fig 1.

1' When this is greatly elongated and narrowed it becomes the Linear (as 1')



2 The Elliptical form (Ellipsis) (as 2)

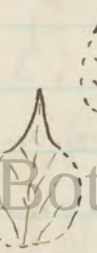
When this is narrowed and elongated it becomes the very common form known as narrowly elliptical (2')

3 The Ovate (fig 3) when narrowed (fig 3') becomes the Lanceolate which is very common

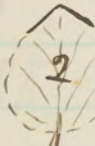
4 The Orbicular (fig 4) is not so common as the preceding, and of course is incapable of modification.

V[b].

Leaves are modified as to their apices, and these modifications may be reduced to a few typical forms.



1 The apex may be an acute angle (fig 1) and when this is attenuated so that the marginal lines are concave it gives rise to the Acuminate (fig 1')

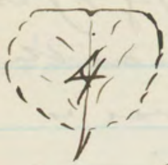


2 The apex may be an obtuse angle (fig 2) and this is subject to greater or less modifications (2' and 2'')

2'

2''

3 The apex may be truncate (fig 3)

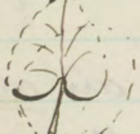


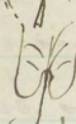
4 The Apex may be indented (retuse) (fig 4) and this may be modified as in 4' (notched or Emarginate)

4' and

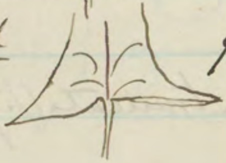
4'' 4''(Obcordate).

VI The bases of leaves are modified as are their apices. No 4 is considerably more modified however as

4a  Cordate = 4a

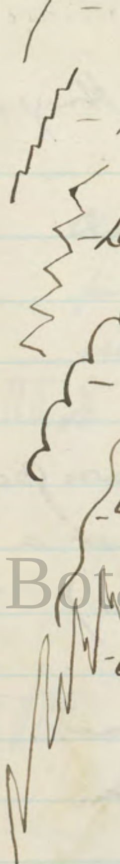
4b  Auriculate = 4b

4c  Sagittate or Arrowshaped = 4c

4d  Hastate or Halberd Shaped – 4d

VIa

Leaf margins are



– Entire

– Serrate or saw-toothed (singly and doubly).

– Dentate or toothed

– Crenate or scalloped

– Undulate (Repand)

– Incised { Lobed. Cleft. Parted. Divided.

VII Give now the parts of leaves

Blade.

Petiole

Stipules.

With their modifications as follows

In the Grass Leaf. (Explain)

The Equitant leaf of Iris.

The scale-like leaves of Arbor Vitæ.
Perfoliate leaves
Connate perfoliate leaves of Honeysuckle
Phyllodia
Stipules of Clover
" " Guaranteed &c &c

VIII. The Flower.
Send class to the flower garden to find, draw and dissect a flower of Bouncing Bet (Silene)

IX. Class to dissect and draw flower of Garden Petunia.

X. Class to do do
Portulaca Morning glory

XII. ~~To Explain to class the~~
Give the names of the parts of the flower and explain somewhat as to the plan.
1. Calyx - of sepals
2. Corolla of petals
3. The Stamens
Each stamen is composed of —
(a) Filament -
(b) anther -
4 The Pistil.
Every pistil has
(a) Ovary.
(b) style
(c) stigma.

Class to examine Phlox Drummondi for next lesson, and to draw and name all the parts.

XII. To Examine the cult Verbena, next ~~lesson~~ and note flower clusters
Give class here a start in the subject of inflorescence.

XIII. To Examine ~~Verbena~~ Verbain or Wild Verbena next lesson.
Wild Lobelia
The class to apply everything learned so far, and to describe the plant in full.

Have ~~require~~ metric rules (for measurement) and Analysis blanks.
Explain the following terms
Life (Annual - Biennial - Perennial

Habit (Herb – Shrub – Tree)
~~Root~~ (Fibrous).

XIV. The class to examine and analyze Buckwheat.

XV. The class to examine and analyze (1) Cult. Verbena and
(2) " Petunia,

XVI. do. do. Garden Balsam,

XVII. " " Bouncing Bet and Portulaca

XVIII. do do Blue Lobelia (L. syphilitica)

XIX. do. do. Red Clover,

XX. do do Wild Sunflower

XXI. Draw all the parts of Wild Sunflower.

XXII. Examine & analyze and draw large Aster (A. patens).

XXIII Fruits & Seeds 6 kinds
Fr – No of cavities.
No of seeds in ea. cavity.
Note dehiscence –.

Seeds. Outline sketches. with point of attachment shown

XXIV do. do. six more – ea –

XXV " " " " – ea.

XXVI Roots of different Kinds.
1. Tap roots
2. Clustered roots.
(a) fibrous. (b) conical. (c) turnip shaped
(d) spindle shaped.
I. Annual. II. Biennial. III Perennial.

XXVII. Get some more roots (six) and treat as before

XXVIII. Get six different kinds of buds.
(1) Make vertical section. and draw.
(2). Make cross section. and draw.
(3). Make note as to positions of the buds on the stem.

- Lilac
- Soft Maple.
- Hickory
- Oak
- Basswood (Lynn or Linn)
- Hazel.

XXIX. Stems.

Duration 1. Annual 2. Perennial.

Structure 1. Herbaceous. 2. Woody

(a) Bark.
(b) Wood.
(c) Pith.

1 Annual rings of wood.
2 Cellular tissue or pith.
3 Medullary rays.

Get 6 stems which differ from each other as much as possible
Make cross sections. and draw carefully.

Review topics

1. Define a leaf.
2. Name the parts of the leaf.
3. How do leaves originate.
4. How are leaves attached.
5. Describe and draw Almond leaf.
6. " " and draw Lilac leaf
7. " " " " Apple "
8. " " " " Soft Maple "
9. " " " " Hard " "
10. " " " " Oak "
11. " " " " Clover "
12. " " " " Ash "
13. " " " " Honey Locust "
14. What is a compound leaf
15. How many and what are the kinds of Cpd. lvs.
16. Classify lvs. as to their venation
17. Define accurately, pinnate, palmate, netted, parallel as used—
18. Give in diagram the principal geometrical forms used in describing leaf forms.
19. Describe Oblong form
20. " linear "
21. " ovate "

21½ " elliptical "
22. Describe lanceolate form
23. " orbicular "
23½ Give in diagram the typical forms of the apex of the leaf.
24. Describe the acute form
25 " acuminate "
26 " obtuse "
27 " truncate "
28 " indented "
29 " notched "
30 " obcordate "
31 " The cordate base
32 " auriculate "
33 " sagittate "
34 " hastate "
35 " & draw entire margin
36 " " serrate "
37 " " dentate "
38 " " crenate "
39 " " undulate "
40 " " incised "
41 Describe the parts of a grass leaf
42 What is a perfoliate leaf
43. Describe flower of Bouncing Bet

44 Describe flower of Petunia
45 11 " " " Portulaca
46 Name all the parts of the flower.
47 Describe fully the calyx
48 " " " Corolla
49 12 " " " Stamens
50 " " " pistil.
51 Describe flower of Phlox Drummondi
52 " " " Cult Verbena
53 " " " Wild Verbena
54 What is an annual plant
55 13 " " a biennial "
56 " " " perennial "
57 Define an herb.
58 14 " a shrub.
59 " tree
60. Describe the Buckwheat plant as a whole
61. 15 " " Cult Verbena "
62. " " " Petunia " "
63. " " Garden Balsam " "
64 " " Bouncing Bet " "
65 " " Wild Lobelia " "
66 16 " " Red Clover " "
67 " " Wild Sunflower " "
68 " " Wild Aster " "
69 " " Portulaca " "
70. What is a fruit.
71. Describe a common form of fruit.
72. What so-called fruits are not fruits. & why
73. Describe an Apple. (as to fruit)
74. Describe 3 fruits.

75. Describe 3 seeds.
76 " modes of attachment of some seeds
77 Make drawings several fruits.
78 Classify roots.
79 Describe the tap root.
80 " Clustered roots.
81 21 " fibrous "
82 " conical "
83 " turnip shaped "
84 " spindle shaped "
85 What can you say as to duration of roots.
86 Describe the roots of 3 kinds of plants
87 " " " " 3 more plants.
88 Make drgs of Lilac bud in cross & long. section.
89. do do hickory.
90. What is a bud?
91. Where do buds occur.
92. How do buds grow.
93. What do buds contain.
94. What is an annual stem
95 " " a perennial stem
96 " " an herbaceous "

97. What 25 a woody stem.

98. What 26 the parts of an ordinary stem.

99. What is bark

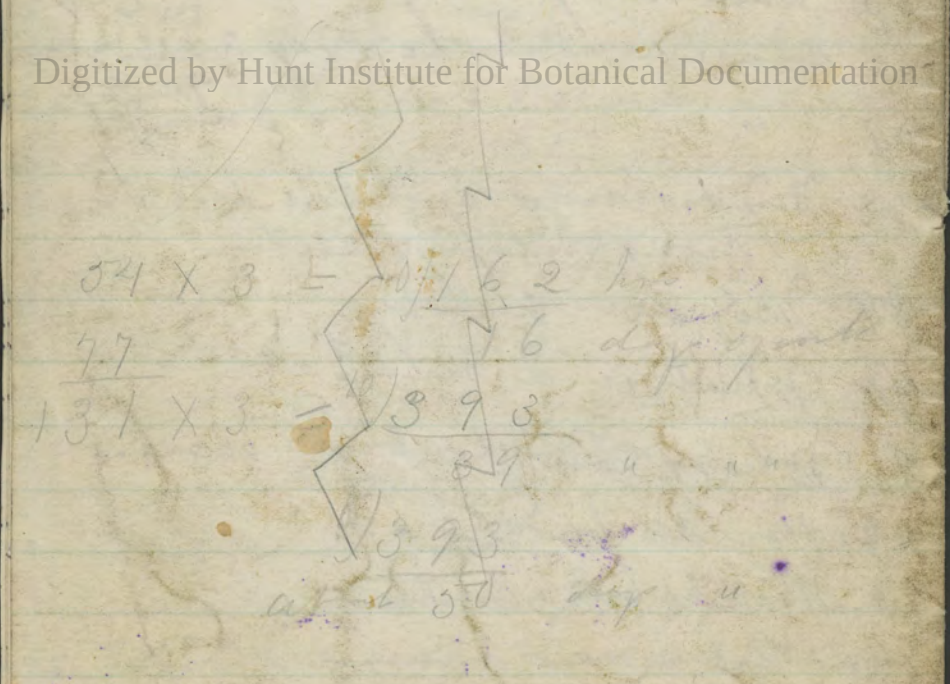
100. " " wood

101 26 " pith

102 " " the annual rings

103 " " " medullary rays

104 Describe 26 three stems.



Correspondence began in 1870. I was 25.

1 My first meeting 1872

I found a sprightly little man full of enthusiasm

At Dubuque, Iowa.

21st Meeting A.A.A.S.

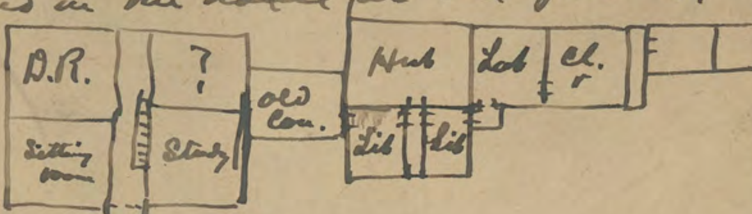
August . . .

1872
1845
27
Then 62
I was 27
38 yrs ago

A friendship that lasted for 16 yrs.

In November I reported to him for work. My first trip east. (Ocean)

He lived in the house at the Garden.



Frank.

very kindly.

Sat. everything closed (As Boston took the Agassiz Museum.)
The day of the old horse cars to Boston.
and no transfers!
Usually took an hour to go & come

Found a room near

Worked early and late.

I felt the need of Syst. Bot.

So he gave me a few fresh things from the greenhouse.

My notes.

And then dried things & in families.

Lippincott's Wonder Series

THE PLANT WORLD

By

G. F. Scott Elliot

③

In the meetings of A.A.A.S.
Simple in speech.
Contrast with young men.
Reception for him.
The excursion to Atlantic City
& Little Egg Harbor.
He tramped the pine barrens
although 74!
As young as the youngest.

Letters and post cards.
His illegible writing
~~Humility of his letters.~~

Honors bestowed upon him
Degrees the last year.
The End.

He lies in Mt Auburn —

Letters.
Chirography

~~Degrees~~

75th ~~Annivers~~

LIPPINCOTT'S WONDER SERIES COMPRISES THE FOLLOWING TITLES. Bound in Decorated Cloth at

75c each

Animal Ingenuity

By H. COUPIN and J. LEA

Mechanical Ingenuity

By ARCHIBALD WILLIAMS

Asiatic Exploration

By ARCHIBALD WILLIAMS

Plant World

By G. F. SCOTT ELLIOT

These volumes present in a charming and interesting manner the marvels in the worlds of science, natural history, and exploration. Each volume contains eight illustrations.

Composites.

Order Asterales. Flowers actinomorphic or zygomorphic, collected into involucrate heads; calyx small, and often forming a "pappus"; stamens 5, epipetalous, mostly with their anthers connate; carpels 2, united, inferior, with one style which is 2-branched above; ovule one erect, anatropous.

(commonly regarded as a family)

all 3 orders are here

An immense family of more than 14,000 species, which are usually distributed among fourteen tribes, some of which should probably be raised to families. In the following arrangement the Helianthaceae are regarded as the lowest, from which the two principal phyletic lines have arisen, culminating on the one hand in the Eupatorieae, and on the other in the Lactuceae.

ac ac (Pf IV. 5. 87)

Family 287. Helianthaceae. Sunflowers. Herbs. Calyx not capillary; receptacle chaffy; usually with ray flowers; mostly large and coarse plants. Helianthus, Zinnia, Rudbeckia, Silphium. (Pf. IV. 5. 210.)

Family 288. Ambrosiaceae. Ragweeds. Herbs. Calyx not capillary; receptacle chaffy; without ray flowers; mostly large and coarse plants, which are dicliness. Ambrosia, Xanthium, (Pf. IV. 5. 220)

Family 289. Heleniaceae. False Sunflowers. Herbs. Calyx not capillary; receptacle usually naked; with or without rays: anthers tailless; medium sized plants. Helenium, Gallardia, (Pf. IV. 5. 251.)

Family 290. Arctotideae. Gazanias. Herbs. Calyx not capillary; receptacle naked: anthers tailless, South African plants. Gazania, Arctotis, (Pf. IV. 5. 307)

Family 291. Calendulaceae (Herbs) // Marigolds. Calyx none or capillary: receptacle naked; anthers tailed. Old world plants, mostly tropical. Calendula. (Pf. IV. 5. 303)

Family 292. Inulaceae (Herbs (sh or tr)) // Everlastings. Calyx from bracteose to capillary; receptacle usually naked: anthers tailed: usually rayless; anthers tailed. Mostly low plants. Inula, Antennaria, Gnaphalium, Helichrysum. (Pf. IV, 5, 172)

Family 293. Asteraceae (Herbs or undershrubs) // Asters. Calyx from bracteose to capillary: receptacle naked: usually with rays. Medium sized plants. Aster, Solidago, Erigeron, Bellis. (Pf. IV. 5. 142.)

Family 294. Vernoniaceae (Herbs) // Ironweeds. Calyx from bracteose to capillary: receptacle naked: without rays: style branches hispidulous. Medium sized plants. Vernonia. (Pf. IV. 5. 120.)

Family 295 Eupatoriaceae (Herbs) // Blazing Stars. Calyx from bracteose to capillary: receptacle naked, without rays: style branches papillose. Medium sized plants. Liatris. Eupatorium. (Pf. IV. 5. 131)

Family 296. Anthemidaceae (Herbs, sh or subtrs) // Camomiles. Calyx a short crown or wanting; receptacle chaffy or naked; usually with white ray flowers. Medium sized plants. Anthemis. Chrysanthemum, Artemisia. (Pf. IV. 5. 267.)

Family 297. Senecionidaceae. Herbs, shrubs or trees. Groundsels. Calyx capillary; receptacle naked; with or without rays. Medium sized to large plants. Senecio, Arnica. (Pf. IV. 5. 283)

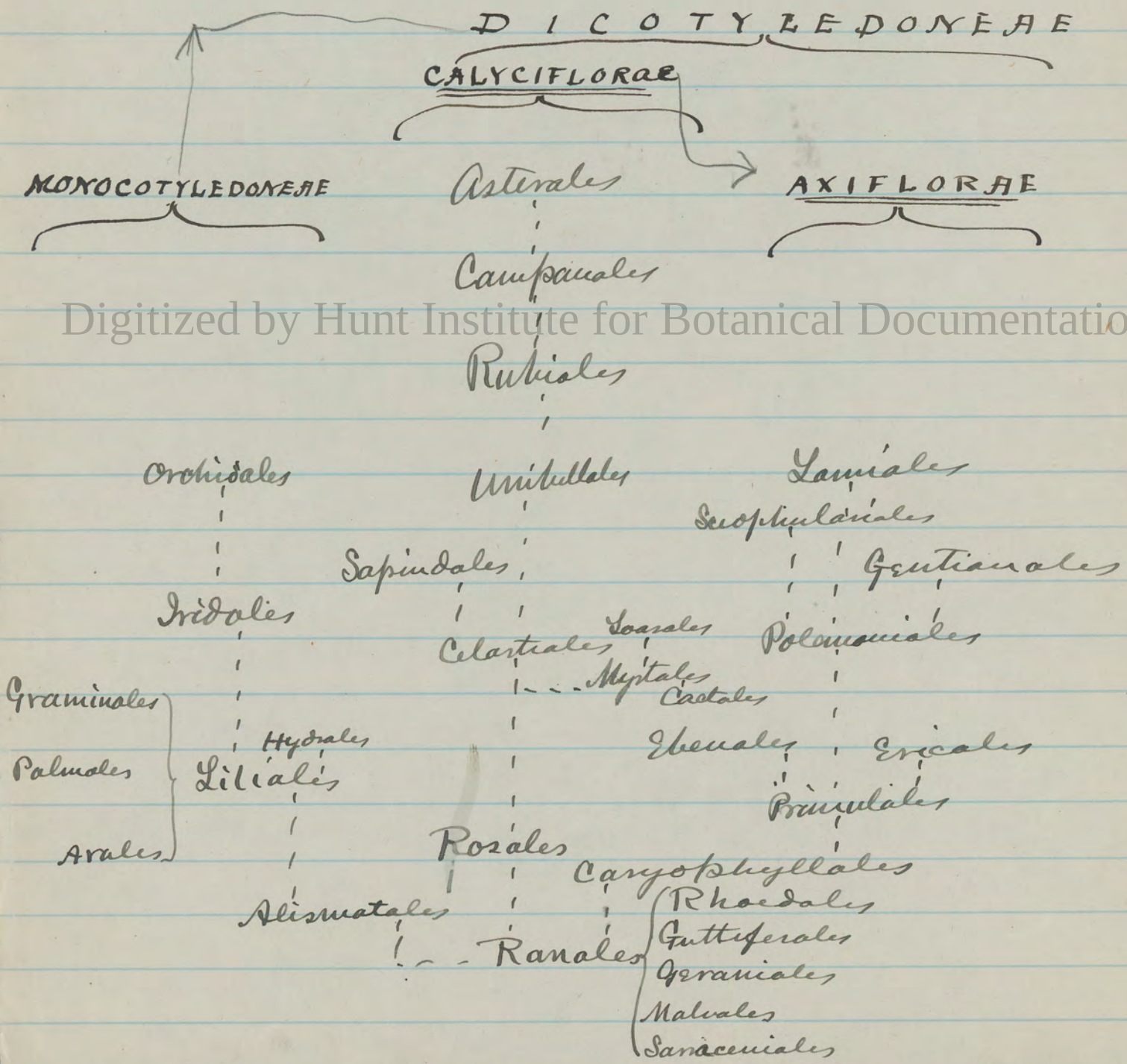
Family 298. Cardueaceae. Herbs. Thistles. Calyx mostly capillary; receptacle usually bristly (not chaffy); without rays. Mostly stout plants. Carduus, Arctium, Cnicus. (Pf. IV. 5. 312)

Family 299 Mutisiaceae. Herbs or shrubs or small trees. Mutisias. Calyx mostly capillary: receptacle usually naked; flowers all two lipped. Medium to large (even woody) plants of tropical or warm regions. Mutisia, Chaptalia. (Pf. IV. 5. 333)

Family 300. Lactucaceae. Herbs. Lettuces. Calyx mostly capillary: receptacle usually naked; flowers all strap-shaped. Small to medium sized plants, mostly with a milky juice. Lactuca, Hieracium, Cichorium, Taraxacum. (Pf. IV. 5. 350)

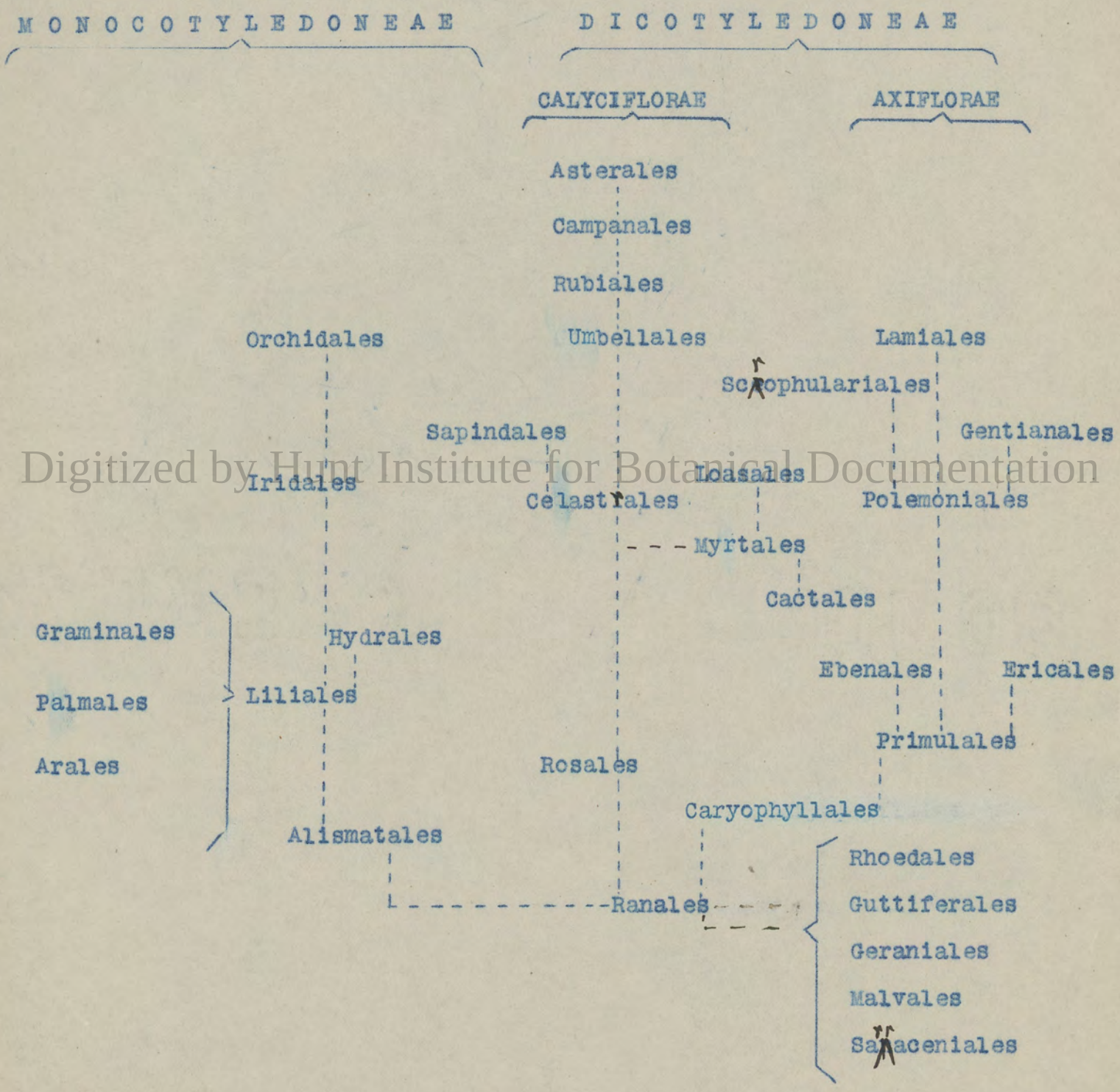
Phylogenetic Chart.

Showing the sequence and general relationship of the orders of Anthophyta. as given on the preceding pages.



PHYLOGENETIC CHART

Showing the sequence and general relationship of the orders of Anthophyta, as given on the preceding pages.



Class Musci

The Mosses.

Small plants, frequently of great beauty, numbering 1000 or more species, and most abundant in temperate climates.

Their tissues are ~~cellular~~ parenchymatous throughout, or are composed of but slightly modified parenchyma.

~~Their leaves are~~ usually thin and composed of but one layer of cells, excepting of course the midrib which is usually present and composed of several layers of cells.

Economically they are of but little value.

The Sphagnums are used for packing plants, on account of their holding a great deal of moisture in their tissues.

7 Sphagnum

Many species die down and produce peat which is valuable.

The Spore bearing plant.

~~The fruiting~~

The leafy stem

" stipe or seta.

" Capsule. Theca or Sporogonium

Calyptra

Operculum (cap)

Peristome.

Columella

Spores.

The Growth of the Spores.

Protonema.

Leafy buds.

Leafy stem ∠ Gemmae

"Flower"

Antheridia.

Antherozoids.

Archegonia.

Class Hepaticeae.

The Liverworts.

Small plants. frequently flat and thalloid: sometimes leafy and moss like.

They number 700 or more species, and are found in ~~at~~ temperate and warm regions of the world.

They possess no economical properties.

In their general growth and development they are much like mosses.

We can notice the development of but one group the Marchantiae

The Thallus
" Gemmae
- Antheridia
" Archegonia
on Receptacle.
Elaters.

Class Characeae.

Sometimes classed, and probably more correctly with the Algae.

A few species of water plants, with whorled leaves.

Of very simple struct-ure.

Male organs = Globules below the whorl. contain filaments which move in the Antheroz-oids.

Female organs = Nucules

On Thallophyta

A difficult group to limit: in ~~the~~ way and we cannot do so now with Endlicher's Characters (AHP 1836.)

"Opposition of Root and Stem" does hold in a modified way for most. but clearly it does not for all.

Agardh in 1821 divides Thallophytes into Algae, Fungi & Lichenes.

"Berkeley & Lindley were compelled to adopt physiological characters" (Algae in Ency Britt)

"Algae were defined to be generally aquatic in their mode of life. Fungi and Lichenes, on the other hand were aerial. — but the former drew their nutriment from the substratum

while the latter obtained it from the air." [Ibid.]

But let us look at Algæ and Fungi

Lab the former contain Chlorophyll while the latter do not.

This is a matter of Morphological importance. but it is associated with the habit of Fungi. they being in all cases either parasites or saprophytes.

Now we know that in the higher orders of plants many cases occur of parasitic members of groups which otherwise contain chloro-

-phyll Thallophyta

Class Protophyta

The Thallophyta

Class. Protophyta

Many of the organisms are regarded by Haeckel as belonging to neither the Animal Kingdom nor the Vegetable Kingdom.

Unquestionably they are not to be distinguished in many cases from animals by any character or any set of characters. It may be considered as little else than a matter of mere convenience, as to whether we do or do not separate them from Animals. In the latter event Haeckel's Kingdom Protista is convenient.

For the present purpose we will treat these organisms as Plants, reserving until a future

time the discussion as to their relationship to plants on the one hand and to animals on the other.

Many of these forms are interesting because they are some of the organisms which are supposed by some to spontaneously appear in sealed flasks.

We may notice only a few of the many forms

Of the chlorophyll plants the order

Chroococcaceæ includes probably the lowest.

The plants of this order are unicellular, and they multiply by simple cell division In many cases the cells surround

themselves with a gelatinous sheath.

In Nostocaceæ the cells upon multiplying adhere in threads, but each cell is probably to be regarded as an individual plant. The threads are surrounded by a layer of jelly, as in the previous case.

They occur on damp ground and in water, sometimes in such numbers as to produce masses an inch or more in diameter.

At a certain stage of their growth portions of the threads become motile.

In Oscillatoriæ the union of the cells is much greater. The plants are endowed with a very remarkable motile

power. and in the water they appear to continually wave from side to side, and seem to move from place to place. often climbing up the side of the glass dish in which they may happen to be placed. They occur abundantly in ponds and streams, and are readily detected by their deep green or blue-green color.

Genus Oscillatoria.

Other plants of this group which contain Chlorophyll, we can not now take up.

A glance at the charts will show what they are like.

[See Rivularia. Scytonema and Palmella.]

The Chlorophyll-less plants of the Class include with others the forms which have been called Bacteria.

They are "of spherical, oblong, or cylindrical form, sometimes twisted or bent," and they "multiply themselves exclusively by transverse division".

They occur either as single cells, or these cells may be gathered into cell-families.

Many species give rise to the fermentations or putrefactions which is so well known in the experiments made in connection with the problem of Spontaneous generation. Almost any putrid fluid will soon swarm with these

little organisms.

In size they are among the most minute of all living things.

Cohn states that "their diameter is not more than 1/20000 of an inch, and their length varies from twice to 100 times as much.

Saccharomyces includes the Yeast Plant, which may be said to be a unicellular plant which lives at the expense of the starchy substance in which it grows. Probably by its withdrawing certain compounds or constituents what we know as fermentation takes place.

See Thorne p 277.

Zygospores

Essential nature of a

Zygospore.

Volvox.

General description of.

IV

Tell about one of my teachers. —

"Dave" Smith -

A fellow pupil - older.

- big -

- awkward -

a coarse, primitive,

giant

But he loved the woods -

- the trees

- the bushes

- the flowers.

- the animals -

Of him I learned more ~~that~~

I know of them.

It was his single-minded

enthusiasm for these things.

II You must relate them to one another.

Here is the basis of the demand for Biology – and General Science courses

Yet I would not fear these studies. I would relate them.

Why do we have teachers?
The book is dry and dead.

The teacher is alive.

The teacher represents the life of the subject.

The teacher should vitalize the study.

It is enthusiasm that he represents.

He must have enthusiasm or he might as well not exist.

I

6/16/14

The Most Important Thing in the Teaching of Botany.

Why are there teachers?
So many good books;
why not merely read them?

—"—

There must be some good reason for having teachers.
—for the "personal touch".

—"—

Let us consider: —

Of course — you must know something about Plants

— and you should know about some other things.

— related things.

(as birds, insects, the ground, the air, the weather)

These and the plants are in the same world. and must not be isolated.

III

"The Most Imp. Thing in the Teaching of Botany" 1914

Tell the story of Capt Rouse and his pupil (Pool)

R. knew some Botany

— he was full of enthusiasm

— he led his pupil.

— he filled him with his contagious enthusiasm.

P. is now one of the rising botanists of America.

Tell about Miss Field.

Knew only the outline.

but interested and enthusiastic.

She interested her pupils as no one had before.

Cryptogams.

The Term a misnomer.

They are not now Crypto-
-gams.

Sometimes called Acotyledons.
Rays Negative characters not
scientific.

Jussieu (1789)

De Candolle's Classification. (1819)
(Thomé)

Endlicher's Classification (1836-44)
(Thomé)

Lindley's. " (1845)
(Lindley Veg. King)

Bentham & Hooker's "
(L & H Gen.)

German "
Sachs.
Which last we follow for
Cryptogams.

German (Sachsian) System

Group I. Thallophyta.

Class 1. Protophyta.

" 2. Zygosporeæ.

" 3. Oosporeæ.

" 4. Carposporeæ.

Group II. Characeæ.

" 5. Characeæ.

Group III. Muscineæ.

" 6. Hepaticæ.

" 7. Musci.

Group IV. Cryptogamica Vasculares.

" 8. Filices.

" 9. Equisetaceæ.

" 10. Ophioglossaceæ.

" 11. Rhizocarpeæ.

" 12. Lycopodiaceæ.

Group V. Phanerogamia.

" 13. Gymnospermia

" 14. Monocotyledones.

" 15. Dicotyledones.

The Germination of the Spore. and Development of the Sexual Organs

The Spore.

Prothallium.

Antheridia

Archegonia

Antherozoids

Illustrations

Authors figures ([illegible])

Sachs. of Germ. Spore – Fig 269

" Prothallium " 270

Hofmeister " ~~Arch~~ Anther & Antheroid Pl 36. 23-24 28-29

" — Arch. Pl 36– 35

" 37– 1–2–3 6-7–8

Class. Filices.

The Ferns

Of these graceful members of the Vegetable Kingdom there are no less than 2000 species, distributed through 70 or more genera, and forming probably half a dozen not well settled orders.

They are widely spread throughout the globe. "Ferns found in greater or less numbers in all climates between the most northern and southern limits of vegetation, and at elevations ranging from the sea level to 14,000 to 15,000 feet, within the tropics." [Sm. Hom. Bot.]. They are more abundant in damp climates than in dry ones; and in wooded countries than in

and large air cavities, each bundle zone having an air cavity in its interior.

In some species the stems secrete a large amount of silica, which gives to them such a roughness that they have been used for scouring cutlery.

Their general structure

Rootstock

Stem

Strobile

Sporangia.

Spores.

Illustrations. Gray Man. Pl 20.

those which are distinctly of trees.

In size they vary from small herbs from an inch or so in height to great trees fifty feet or more high.

Economically they are comparatively of but little account. From through the thick stems or root-stocks of a few species some barbarous nations have been obtained some inferior food.

One or two inferior textiles have been obtained also. From the Azores a soft silky material consisting of the hairs of a certain fern has been imported for stuffing cushions &c

Pulu is a similar product of a Sandwich Island species. Bokara Wool is [?] probably derived from one or more trees in Asia.

The Germination of the Spore and Development of the Sexual Organs.

The Spore.

Its Germination.

The Prothallus

with

Archegonia [pl = -ia]

Antheridium. [pl = -ia]

containing

Antherozoids.

Illustrations. from

Hofmeister. Pl. 24. 1. figs.

Sachs Fig. 205.

Henslow Fig 441. I. & Fig 442.

Class Equisetaceæ

The Equisetums.

A small group of anomalous plants, not numbering more than a dozen or fifteen species, all members of the single genus Equisetum.

They are widely distributed throughout the globe, and are usually to be found in damp localities.

In size they range from a few inches, up to weak stems twenty five feet in length, but never attaining more than one inch in diameter.

Their stems are herbaceous, usually furrowed, and are hollow and jointed. About each joint is a whorl of small leaves, whose united bases form a sheath. They are traversed by vascular bundles

Class Lycopodiaceæ.

The Club Mosses.

A group of plants numbering about 300 species. They are widely distributed, occurring in tropical as well as temperate climates. They appear to be wanting in the Prairie regions.

Many are of great beauty, and hence they are in great request for ornamenting rooms upon festive occasions.

The Spores of Lycopodium clavatum are highly inflammable, and have been used to produce artificial lightening-flashes in theaters. "[Sm. Dom. Bot.]

Selaginella serpens of Jamaica changes its color from green to white in darkness, regaining its green color again upon the return of light. [Smith's Dom. Bot. p. 114.]

The modern genera include small plants. The principal ones are Lycopodium, Selaginella and Isöetes. The ancient genus Lepidodendron included species attaining "a height of 30 and a diameter of one meter" [Thomé]

Production of Spores.

In Selaginella.

Microspores and Macrospores.

Illustrations. Sachs figs 307. 309, 310

Germination of Spores, and Fertilization.

Illustrations. Sachs. fig. 303.

Hofmeister Pl. 5⅞. figs 21, 23

" " 58 " 1, -2-3-4,

Iowa

IV

Charles E. Bessey

Catalogue of Rude Plants

of

Nicollet's Expedition

as probably were

found within the present limits

of

Iowa.

Being Appendix B.
of Senate Doc. No 237
of 26th Cong. 2d Session -

(Report intended to illustrate the
Map of the Hydrographical Basin of
the Upper Mississippi River - Made
by I N Nicollet. while employed
under the Bureau of Topographical Engi-
neers.

A list of such plants as may belong to Iowa Flora. Found in Nicollet's Catalogue.

Coll. by Chas Geyer. legit Iowa. 1841.

Note Council Bluffs of Nicollet was above the present town of that name, and on the Nebraska side.

"

Anemone Canadensis. C. Bluffs.

" Pennsylvanica. Alluvial prairies of Missouri.

Isopyrum biternatum. Rocky woods. banks of Missouri.

Aquilegia Canadensis. Fertile woods. C. Bluffs.

Delphinium azureum. Dry hills. Upper Missouri

Uvaria trilobata. Mouth of Platte river.

Leontice thalictroides. Woods near C. Bluffs.

Nasturtium sinuatum. Sand bars in Mo. river.

Arabis Canadensis. Shady woods. Upper Mo.

" dentata Shady ravine near C. Bluffs.

Hesperis laciniata. Rocky banks of the Missouri

Draba Caroliniana. C. Bluffs.

Capsella Bursa-pastoris. Upper Mo.

Cleome integrifolia. Naked banks of rivers. Up. Mo.

Polanisia graveolens. Gravelly hills & sandy banks of Up. Mo.

Polygala Senega. Borders of ponds. Up. Mo.

Viola delphinifolia. Prairies near C. Bluffs.

Note. V. Canadensis. Prairie grows from near the mouth of Vermillion river, Upper Mo. North to Devils Lake.

Viola cucullata. Prairies near C. Bluffs.
" pubescens. var scabriuscula. Woods near C. Bluffs.
Claytonia virginica. Woods. Up. Mo.
Linum rigidum. Missouri hills & alluvions.
Geranium carolinianum. Dry prairies. Up. Mo.
" maculatum. Fertile woods. C. Bluffs.
Oxalis violacea. Moist prairies C. Bluffs.
" stricta. Dry banks Up. Mo.
Vitis riparia. Throughout the prairie region between the Missouri & Mississippi rivers.
Acer dasycarpum. Up. Mo.
Negundo aceroides " "
Celastrus scandens. Ravines near C. Bluffs.
Staphylea trifolia Woods. Up. Mo.
Evonymus atropurpurea Woods. Spirit Lake.
Rhamnus lanceolatus. Ravines near C. Bluffs.
Ceanothus ovalis. C. Bluffs.
Lathyrus platustris. Buffalo prairie near C. Bluffs.
" ornatus. Grassy banks of Up. Mo. - rare -
" linearis. Prairie near C. Bluffs.
Phaseolus Diospermus. Torr & Gr. Common on the rivers and banks of lakes ~~of the~~ through the prairie region between the Mississippi & Missouri - rivers.
Psoralea esculenta. Prairies from C. Bluffs. North.
" argophylla. High prairies in the whole region between the Mo & Miss. rivers
" lanceolata. Sand bars of Up. Mo.

Amorpha fruticosa. Sand bars of Up. Mo.
" canescens. Prairie region between the Mo. & Miss. rivers.
Petalostemum candidum. High prairies of the Mo. & Miss – abundant.
Dalea alopecuroides. Banks of Spirit Lake.
Hosackia Purshiana. Naked hills of Up. Mo.
Astragalus Hypoglottis. High prairies and river alluvions of Up. Mo.
" Caryocarpus. – high prairies between the Mo & Miss.
" racemosus. Dry argillacous hills of Up. Mo.
" spicatus. Naked hills of Up. Mo. & the adjoining prairies.
Oxytropis Lamberti. Hills near C. Bluffs.
Homalobus multiflorus. Naked hills of Missouri & Sheyenne Rivers.

Schrankia uncinata. Hills on the Mo.
Darlingtonia brachyloba var. glandulosa } Gravelly banks of Spirit Lake
Cercis Canadensis. Wooded Missouri. common.
Cassia Virginiana. Banks of the Mo.
" pumila. arid hills of the upper Mo.
Fragaria virginiana. Hills of the Up. Mo.
Rosa lucida Banks of the Up. Mo.
Crataegus coccinea. " " " " " "
Amelanchier Canadensis var oblongifolia } Banks of the Up. Mo. & its tributaries.
Gaura coccinea. C. Bluffs. & high prairies between Mo & Miss rivers.
Oenothera serrulata. with the preceding.
" caespitosa. Slate hills. Up. Mo.
" biennis. Upper Mo. & Up. Missr.

Menzelia ornata. Argillaceous hills. Up. Mo. with Yucca angustifolia and Stanleya.

Ribes Missouriense. Rocky woods &c on the Mo. & Miss. rivers

" lacustre, with the preceding

" floridum Woods. Miss. & Mo.

Note Ribes aureum. Banks and ravines near Niobarara river.

Zizia aurea. Prairies. C. Bluffs

Thaspium barbinode. Fertile woods. Up. Mo.

Peucedanum fornicolatum. Fertile elevated prairies. C. Bluffs.

Polytaenia Nuttallii. Dry argillaceous hills Up. Mo.

Osmorrhiza longistylis. Woods. C. Bluffs.

" brevistylis. with preceding

Cornus stolonifera. Low woods and islands. Up. Mo. abundant.

Note Cornus Florida. Mo. bluffs as high as the Kansas river.

Galium aparine. Low woods of the Mo.

Liatris punctata vars β & γ. Dry prairies on the dividing ridges between Miss. & Mo. waters

Eupatorium purpuratum. Sioux country.

" agnatoides. Borders of swamps Up. Mo.

Aster Novae Angliae " " " " " & tributaries.

" Novae Belgii Borders of Spirit Lake.

Aster laevis. Up. Mo.

" oblongifolius. High prairies & limestone hills. Up. Mo.

" ptarmicoides. Hills &c between Miss. & Mo rivers

Erigeron Philadelphicum. Mo. alluvion.

" divaricatum. Up. Mo. Around about the habitations of the prairie marmot.

Solidago erecta. var Stricta. Prairie region between the Mo. & Miss.

" incana. [same locality] growing in tufts

Gutierrizia Euthamiae. Arid soil. Up. Mo.

Aplopappus spinulosus. High prairies Up. Mo. to Up. St Peters.

Chrysopappus villosa. Sandy arid soil. Up. Mo.

Silphium laciniatum. Wet prairies. lower St Peters river. Up. Des Moines

Iva axillaris. Arid hills. Up. Mo.

Xanthium echinatum. Banks of Spirit Lake & headwaters of Little Sioux river

Echinacea angustifolia. Dry gravelly ridges of Up. Mo.

Helianthus petiolaris. Argillaceous hills Up. Mo.

" luticularis. [with the last]

Leptodia chrysanthemoides. Marmot habitations about St Pierre. ran on Up. Mo.

Achillea millefolium ~~& occidentalis~~ Grassy ravines of the Missouri hills.

Antennaria plantaginea. Dry hills. Up. Mo.

" dioica. with the preceding.

Senecio balsamitae. Dry hills near C. Bluffs

" aureus. Prairies. C. Bluffs. abundant.

" integerrimus. Grassy ravines. Up. Mo.

Artemisia dracunculoides. ([redacted]) Pursh Sandy prairies, lakes and river banks. between Mo & Miss rivers-

" cana - Arid hills of the Mo. & Shayen oju rivers.

A — biennis. Arid banks of Spirit lake &c

A —— dracunculoides, var? canescens. Sandy banks & prairies of Jacques river -

Sonchus pulchellus. (Pursh) Banks of lakes & rivers. Up. Mo.

Nabalus Illinoensis. D.C. Coteau des Prairies. Upper Sioux river.

Lygodesmia juncea. Up. Mo. near Ft Pierre &c

Troximon glaucum. Grassy damp ravines Coteau des Prairies

" marginatum. Fertile hills & valleys Up. Mo.

Fraxinus acuminata (Lam?) & F. Americana. Upper Mo.

Note.

Forestiera acuminata. Banks of Kahokia opposite St Louis.

Acerates viridiflora. Hills of the Mo.

Gentiana pubercula. Northern part of the elevated grassy plain between Miss & Mo. rivers.

Gentiana quinqueflora. Northern part of the prairie regions.

Phlox divaricata. Banks of the Mo. to the Platte.

Collomia linearis. Up. Mo.

Lithospermum incisum. High prairies near C. Bluffs.

" Mandanense. Hook. Up. Mo.

Hydrophyllum virginicum. Fertile woods near. C. Bluffs.

Ellisia nyctaginea. About marmots habitations ?? Up. Mo.

Hedeoma hirta [same locality]

Solanum nigrum. Banks of Spirit Lake.

" triflorum. A weed about marmot holes. Up. Mo.

Physalis viscosa. L. Banks Spirit Lake

Penstemon grandiflorum. Banks of Up. Mo.

Castilleia sessiliflora. Prairies about C. Blfs.

Orobanche fasciculata. Arid hills of the Mo. near great bend.

Verbena Stricta. Banks of lakes & rivers: prairies of Missouri.

Verbena bracteosa. Prairies of Up. Mo: a weed in the Marmots habitations

Lysimachia thyrsiflora. Swamps about C. Blfs.

Plantago Caroliniana. β? Pusilla (Torr) Up. Mo.

Oxybaphus nyctagineа. Buffalo prairie. Up. Mo.

Amaranthus albus. Sandy shore of Up. Mo.

" near polygonoides (Willd). with preceding.

Obione canescens. Sterile sandy soil in valley of the Missouri.

Obione argentea. with preceding. probably in saline situations. as the Specs. have a salt taste.

Rumex persicarioides. Sandy banks of the Mo.

" Britannicus. Wet meadows. valley of the Mo.

~~Runneg~~

Polygonum articulatum. Sandy plains. Up. Mo.
" aviculare. Borders of ponds and lakes in prairies.
" amphibium. var stigosum (Torr.) Sand bars of the Mo. near C.B.
Laurus Benzoin. Low woods. banks of Mo.
Shepherdia argentea. Up. Mo. & Up. St Peters.
Comandra umbellata. Dry prairies near C.B.
Euphorbia corollacoides. Hills of Up. Mo.
" Marginata. Valley of Up. Mo. & Up St Peters
" Cyathophora. Sandy shore of Spirit Lake.
" Missulata sandy situations. Valley of Mo.
" polygonifolia with preceding.
Urtica gracilis. Banks of Spirit Lake
Parietaria Pennsylvanica. Prairies. Up. Mo.
Morus rubra. Woods of the Mo. near C.B.
Ulmus Americana Woods of the Mo. near Platte Riv.
Ostrya Virginica. with preceding.
Salix longifolia. The commonest sandbar willow of Up. Mo.
" —(undetermined) - two abundant in same locality
" —(") with preceding (not abundant)
Quercus tinctoria. Prairies near C.B.
" rubra. Islands. Up. Mo.
" macrocarpa. Prairies " " " The principal oak of the prairie region.
Juniperus Virginiana. Dry hills & ravines. Big Bend of the Mo.
Sisyrinchium anceps. Moist prairies Up. Mo.
Peristylus bracteatus. Prairie groves near C.B.
~~Spiranthes cernua.~~
Cypripedium pubescens. Prairies. Up. Mo.
" candidum Prairie copses " "
Convallaria stellata. Woody ravines. Up. Mo.

Uvularia grandiflora. Fertile woods. banks of Mo.
Allium angulosum. Hills. Up. Mo.
Erythronium albidum. Rocky woods. Up. Mo.
Trillium sessile. " " " "
Smilax herbacea. Low fertile woods. C.B.
Smilax rotundifolia? On the Mo. common.
Potamogeton natans. Ponds (note) Up. Mo.
Arum triphyllum. Fertile woods Up. Mo.
Tradescantia virginica. Sandy fertile places in valley of the Mo.
Sisyrinchium spathaceum. Swamps in the Sioux country.
Scirpus atrovirens. with preceding.
" lacustris. Swamps & ponds in prairies. Comm.
Carex straminea. Swamps. C.B.
" arida. Shady fertile woods. Up. Mo.
" Sartwellii. Swamps in prairies. C.B.
" cæspitosa with preceding.
" lanuginosa. Sandy banks of the Mo.
var Minor. with preceding.
" Pennsylvanica. Prairies. C.B.
" longirostris. Shady woods. Up. Mo.
" lacustris. Prairies. C.B.
" Houghtonii with preceding.
Alopecurus geniculatus. var aristulatus. Borders of swamps in prairies.
Panicum virgatum. Abundant on all the high prairies, but nowhere so luxuriant as near the Up. Des Moines river & Spirit Lake.
Stipa juncea. High & dry prairies between Miss & Mo.
Hrachne pauciflora (Agrostis miliacea (Linn?) Dry hills upper end of Great Bend of Mo. Here noticed for the first time as a native of N.A.
Muhlenbergia glomerata. Prairies. Up. Mo.
" ambigua Torr. Sioux Country — Banks of Okaman Lake

Agrostis cryptandra. Banks of Spirit Lake, Little Sioux river &c.

Arundo phragmites. Common in all wet prairies and swamps between the Miss & Mo. rivers.

Spartina cynosuroides. Common in wet prairies.

Aristida pallens. Arid situations. Up. Mo.

Poa nemoralis. Shady woods & ravines on the Mo.

Koeleria cristata. High sandy prairies on the Mo & up. St. Peters.

Festuca tenella. Valley of the Up. Mo.

Bromus purgans. Borders of woods.

Uniola striata. Hills Up. Mo.

Elymus (or a new genus bet. Elymus & Hordeum) (described) Heavy ferruginous loams on the Mo, Jacques & Sheyenne.

Andropogon oligostachyon. High prairies of the Miss & Mo. rivers.

Sesleria dactyloides. Hills and valleys of the Mo.

Leptoria paniculata. Heavy ferruginous soil, valley of Up. Mo.

Andropogon furcatus. Swamps in prairies.

" scoparius. High prairies bet. Miss & Mo.

Equisetum hyemale. Low woods. banks of the Mo & Up. Miss.

1

Engelmann in Botany of
Geology & Nat. Hist of the Up. Mo.
4. to.

Ranunculus recurvatus. Mouth of Mo. to Niobrara Riv.

Myosurus minimus. Mo. bottoms opp. St Joseph, & on the upland prairie near Ft Pierre.

Delphinium tricorne. Extends to Mouth of Big Sioux

Hydrastis Canadensis. Found only on Carbonif. limestone region to C. B. perhaps rarely to Big Sx.

Actaea rubra. C. B.

Asimina triloba. extends up the Mo. to Big Sx.

Nelumbium luteum. —— and on the broad wet bottoms about Omaha, rare

Argemone Mexicana. Found only at Bellevue, Neb.

Dicentra Cucullaria. In shady woods to mouth of Big Sx.

Nasturtium sessiliflorum ~~[illegible]~~. Along Mo.

" limosum. Low bottoms near C. B.

Arabis Canadensis. Common along the Mo. to Ft Union

" laevigata. Shady woods to mouth of Platte.

" dentata. C. B.

Dicentra laciniata. C. B.

Draba Caroliniana. C. B.

Lepidium ruderale. Along Mo. to Mts.

Viola tricolor. C. B.

" delphinifolia C. B.

Silene antirrhina. C. B.

" stellata Dixon's Bluff.

Alsine Michauxii. Mouth of Big Sx.

Cerastium arvense. C. B.

Moehringia lateriflora. Along Mo to C. B.

Stellaria longipes. C. B.

2 Malvastrum coccineum. Makes its appearance about 43°. continues to Mts.

Ptelea trifoliata. around C.B.

Rhus trilobata. First makes its appearance at 43° & occurs abundantly on dry sterile hills to Mts.

Vitis indivisa. Big Sx.

Rhamnus lanceolatus. C.B.

Euonymus Americanus ~~Mo. bottom to~~ Mouth of Platte.

Aesculus glabra. Mo. bottoms to Big Sx.

Acer rubrum. Highest limit on the Mo Lat. 42°.

Psoralea lanceolata. Bellevue to Yellowstone.

" floribunda Big Sx to Bad Lands.

Hosackia Purshiana. Sandy bottoms of Mo.

Astragalus racemosus abundant on " "

Desmodium Dillenii Big Sx.

" paniculatum }
" nudiflorum } Bellevue N.T.

Lespedeza hirta. On Mo.

Crotalaria sagittalis Big Sx.

Lupinus perennis. ~~Bl~~ Platte valley.

Thermopsis rhombifolia. C.B to Ft Pierre.

~~Gleditschia triacanthos~~ Cercis Canadensis. } occurs as high as Big Sx.

Gymnocladus Canadensis. Abundant — Big Sx.

Gillenia stipulacea. Mouth Big Sx.

Chamaerhodos erecta. Var Nuttallii. Big Bend & Yellowstone.

Crataegus punctata Big Bend.

" tomentosa var mollis. Mouth Big Sx.

Hippuris vulgaris In standing pools. Up Mo.

3)

Opuntia Rafinesquii var fusiformis. Eng & Bigel.

" Missouriensis — Near Big Bend of the Mo found all over the territory explored by the Expedition (on the Mo river)

Dunion's hills was about the most Eastern locality of this sp.

Ribes floridum. — and all along the Mo.

" aureum " " " " "

Hamamelis Virginica. Abundant in limestone woods along the Mo. to mouth of the Platte.

Sium lineare. Mo. river, - mouth to Nets.

" angustifolium C.B.

Cicuta maculata Sargents Bluffs.

~~Peucedanum foeniculatum C.B.~~

Cornus stolonifera. Wooded bottoms of Mo. " from mouth to source.

" sericea Abundant along Mo. bottoms

Lonicera hirsuta Bellevue, Neb.

Oldenlandia angustifolia Along Mo to C.B.

" purpurea Bellevue Neb.

Kuhnia eupatorioides. C.B. —

Eupatorium serotinum. Bellevue.

Grindelia squarrosa. Common on high prairies from 43° to Nets.

Lepachys columnaris. Torr & Gr. C.B. +

Helianthus petiolaris. Sargents Bluff.

" rigidus. Bellevue.

" hirsutus Big Sx.

Bidens bipinnata. L. Bellevue.

4. Hymenopappus tenuifolius. Big Sx. +
Gnaphalium obtusifolium. C. B.
Artemisia frigida. Lat 43° to Mts,
Senecio integrifolius. C. B. to Mts,
Cacalia atriplicifolia Belleview.
Lactuca Ludoviciana Nutt. Ft Mandan. Bad
Lands. down to Big Sioux.
Utricularia inflata. C. B.
Aplectrum fasciculatum. Great Bend of Mo.
" aristatum C. B.
Chelone glabra. along Mo to 43°
Gratiola Virginica. Quite common along Mo.
Veronica anagallis C. B.
" Scutellaria "
" canadensis
Melampyrum Americanum. Along the Mo to mouth
of the Platte.
Lophanthus nepetoides. C. B.
Marrubium vulgare "
Onosmodium virginicum Bellevue. to Ft Pierre
Lithospermum hirtum. C. B
" canescens "
" longiflorum " to Bad Lands.
" Mandanense Nutt. Big Sioux
Hydrophyllum Macrophyllum. As high up the
Mo. as White River.
Phlox reptans L. above C. B.
" pilosa " "
" divaricata C. B —

5. Calystegia Spithamea C. B. +
Cuscuta glomerata }
" gronovii } on Mo.
" decora
Solanum Carolinense. C B.
Polygonum tenue. C. B. to Mts.
" orientale "
Benzoin odoriferum. Along Mo. below Ni-
-obara river.
Shepherdia argentea. Big Sx to Mts.
Euphorbia glyptosperma. Common all
over the western plains.
" inaequilatera. with last.
Morus rubra. Very abundant to Big Sx. &
of small growth to Mts.
Urtica gracilis —— to Niobrara.
" Canadensis —— " "
Quercus tinctoria. C B T Big Sx
" rubra "
" macrocarpa – Extends to Mts.
" obtusiloba Bad lands.
Juniperus Virginiana. Along the Mo to
Mts.

Carices of Nebr. by Prof. Chester Dewey.

Carex stipata. Little Sx.
" cristata " "
" eburnea. Mo river.
" Crawei. " "
" Shortii " "
" riparia " "
" vesicaria " "
" ampullacea " "
" monile " "
" trichocarpa " "
" laevi-conica Dew. Big Sx

The foregoing in
Vol 12. (1861) pp 182-209 ~~2~~ 3
of (Phil Trans)?

(a Hayden report
20 yrs ago)

The Phyla, Classes, and Orders of Plants

By Charles E. Bessey Ph.D.

The Plant World is here regarded as readily di-
-visible into fourteen phyla, thirty-three classes, and many more orders. Elsewhere* I have set forth ~~as well as~~ somewhat fully ~~detail~~ the principles underlying ~~a natural classification~~ the taxonomy of plants, and have given in considerable detail such a resulting classification. In this paper there appear for the first time the key to the phyla of plants which I have used in some of my University classes in ~~systematic~~ botany. The synoptical view of the phyla, classes and orders which follows this key will, I hope, prove helpful to teachers and students, as well as others who are interested in the broader aspects of plant classification.

*. A Synopsis of Plant Phyla. University of Nebraska Studies, Vol. VII. October, 1907.

The Phyletic Idea in Taxonomy. Science. vol XXIX. January, 1909.

Outlines of Plant Phyla. University of Nebraska. Department of Botany. September, 1909.

Phyla, Classes, & Orders

2

KEY TO THE PHYLA OF PLANTS.

A. Cells typically with poorly developed nuclei and chromatophores; reproducing by fission and spores; mostly blue-green, brown-green or fuliginous (or colorless), never chlorophyll green.

I. Unicellular to filamentous plants. Phylum 1. Myxophyceae.

B. Cells typically with well-developed nuclei and chromatophores; reproducing by fission and spores, and mostly by gametes also: chlorophyll-green, sometimes hidden by other coloring matter (or colorless).

I. Plants of but one obvious generation, typically aquatic.

a. The fertilized egg developing into a zygote only.

1. Unicellular, to filamentous many-celled plants (rarely a plate of cells): isogamic to heterogamic.

Phylum 2. Protophyceae.

2. Filamentous many-celled plants, mostly breaking up early into single cells; isogamic.

Phylum 3. Zygophyceae.

3. Tubular filamentous (or saccate) coenocytic plants, usually attached basally by rhizoids; isogamic to heterogamic. Phylum 4. Siphonophyceae.

4. Cellular filamentous to massive plants, attached basally by rhizoids (or roots): isogamic to heterogamic; the green color hidden by a brownish pigment.

Phylum 5. Phaeophyceae.

b. The fertilized egg developing into a spore-fruit.

1. Cellular filamentous to massive holophytic plants, attached basally by rhizoids (or roots); heterogamic: the green color mostly hidden by a red or purple pigment.

Phylum 6. Carpophyceae.

2. Cellular filamentous hysterophytic plants, often much degenerated, without chlorophyll; heterogamic.

Phylum 7. Carpomyceteae

II. Plants of two obvious, alternating generations, typically terrestrial.

a. Gametophyte generation larger, and longer-lived than the dependent sporophyte generation.

1. Gametophytes from prostrate and thalloid to erect leafy shoots; sporophytes from globose to cylindrical or stalked, neither expanded nor rooted.

Phylum 8. Bryophyta.

b. Gametophyte generation smaller and shorter-lived than the independent sporophyte generation.

1. Both generations holophytic and independent.

(a) Gametophytes typically flat and thalloid, normally attached by rhizoids, mostly monoecious; sporophytes consisting of large-leaved, solid stems, which are rooted below. Phylum 9. Pteridophyta.

(b) Gametophytes typically flat and thalloid, normally attached by rhizoids, mostly monoecious: sporophytes consisting of mostly solid, cylindrical, jointed and fluted stems, bearing small, whorled leaves at the nodes, and rooted below.

Phylum 10. Calamophyta

(c) Gametophytes, typically tuberous or globose, with few rhizoids or none, often dioecious; sporophytes consisting of solid, cylindrical, continuous (not jointed) and not fluted stems, bearing small spirally arranged (or opposite) leaves, and rooted below. Phylum 11. Lepidophyta.

2. Gametophytes hysterophytic, dependent upon and nourished by the sporophyte.

(a) Sporophylls open, ovules and seeds naked (gymnospermous)

(1) Gametophytes dioecious: sperms ciliated and motile; sporophytes producing microspores and megaspores in spiral or whorled sporophylls, or these aggregated into cones. Phylum 12. Cycadophyta.

(2) Gametophytes dioecious: sperms not ciliated, not motile; sporophytes with sporophylls in cones. Phylum 13. Strobilophyta

(b) Sporophylls closed, ovules and seeds covered (angiospermous).

(1) Gametophytes dioecious: sperms not ciliated, not motile; sporophytes with sporophylls in flowers. Phylum 14. Anthophyta.

Phylum I Myxophyceae. Slime Algae.

Phyla, Classes, & Orders

Systematic Arrangement. (Cyanophyceae)

Phylum I. MYXOPHYCEAE. The Slime Algae.
Usually blue-green, poorly developed cells, or filaments.

Class 1. ARCHIPLASTIDEAE. Without nuclear membrane. (Species about 2000)

Order Coccogonales. Unicellular.

~~Family 1. Chroococcaceae. Cells rounded. Chroococcus, Gloeocapsa, Merismopedia.~~

~~Family 2. Chamaesiphoniaceae. Cells elongated. Chamaesiphon.~~

Order Hormogonales. Filamentous.

Class 2. HOLOPLASTIDEAE. With nuclear membrane. (Species about 20)

Order Glaucocystales. Dividing in one plane.

Phylum II. PROTOPHYCEAE. The Simple Algae. Green Slimes.
Normally chlorophyll-green, with well developed single cells, or filaments.

Class 3. PROTOCOCCOIDEAE. Unicellular. (Species about 450)

Order Palmellales. Cells not in colonies.

~~Family 1. Pleurococcaceae. No zoospores. Pleurococcus.~~

~~Family 2. Protococcaceae. With zoospores. Protococcus, Tetraspora.~~

~~Family 3. Synchytriaceae. Colorless parasites. Olpidium, Synchytrim.~~

Order Coenobiales. Cells in colonies.

~~Family 4. Hydrodictyaceae. Vegetative cells not ciliated. Scenedesmus, Hydrodictyon.~~

~~Family 5. Volvocaceae. Vegetative cells ciliated. Gonium, Pandorina, Volvox. (Animals.)~~

Filamentous Algae.

Class 4. CONFERVOIDEAE. Filamentous, or a plane. (Species about 640)

Order Microsporales. Unbranched.

~~Family 6. Microsporaceae. Microspora.~~

Order Schizogoniales. Unbranched.

~~Family 7. Prasiolaceae. Prasiola.~~

Order Ulvales. Plant a plane or tube.

~~Family 8. Ulvaceae. Ulva, Enteromorpha.~~

Order Chaetophorales. Usually branched. Zoospores and ciliated gametes.

Order Coleochaetales. Branched, fusing into discs.

~~Family 17. Coleochaetaceae. Minute disc-like plants. Coleochaete.~~

Phylum III. ZYGOPHYCEAE. The Conjugate Algae.
Chlorophyll-green, sluggish filaments, often fragmenting into single cells.

Class 5. CONJUGATE. Typically filamentous, green plants, with cellulose walls. (Species about 1300)

Order Zygnematales. Filamentous. Pond Scums.

~~Family 1. Mesocarpaceae. Chromataphore single, long, axial. Mougeotia, Gonatonema.~~

~~Family 2. Zygnemataceae. Chromatophores two, short, axial. Zygnema, Zygogonium.~~

~~Family 3. Spirogyraceae. Chromatophores 1 to 9, parietal, spiral. Spirogyra.~~

The Desmids.

Order Desmidiales. Filaments usually early fragmenting into single cells.

The Diatoms.

Class 6. BACILLARIOIDEAE. Brownish-green plants, with silicified walls. (Species about 5700)

Order Eupodiscales. Filaments commonly cylindrical, usually fragmented into single cells. The Round Diatoms.

~~Family 7. Coscinodiscaceae. Cells short, ends not ribbed. Coscinodiscus.~~

~~Family 8. Actinodiscaceae. Cells short, ends ribbed, Actinodiscus, Arachnoidiscus.~~

~~Family 9. Eupodiscaceae. Cells short, ends with "eyes." Eupodiscus, Actinocyclus.~~

~~Family 10. Soleniaceae; 11. Chaetocerotaceae; 12, Biddulphiaceae; 13, Euodiaceae; 14. Anauliaceae; 15, Rutilariaceae.~~

Order Naviculales. Filaments flattened, usually fragmented into single cells. The Long Diatoms.

Phylum IV. SIPHONOPHYCEAE. The Tube Algae.
Normally chlorophyll-green filaments composed of one or more coenocytes. The Vaucherioid Plants.

Class 7. VAUCHERIOIDEAE. Filamentous, septate or tubular.

Order Cladophorales. Septate, the segments coenocytic. (Species about 800)

The Cladophoras.

6

Phyla, Classes, & Orders

Green Felts.

Order Siphonales. Tubular, irregularly branched, chlorophyllose.
~~Family 3. Phyllosiphonaceae. Endophytic. Phyllosiphon.~~
~~Family 4. Codiaceae. Filaments compacted into a large plant body. Codium, Penicillus.~~
~~Family 5. Vaucheriaceae. Filaments single, free. Vaucheria.~~
Order Siphonomycetaceae. Filaments tubular, irregularly branched, chlorophyll-less.

ales (Phycomycetaceae)

(The Bryopsidoid Plants

Class 8. BRYOPSIDOIDEAE. Globular to stipitate or dendroid, septate or continuous. (Species about 300)
Order Valoniales. Globular coenocytes to compound septate plants.
~~Family 12. Botrydiaceae. Minute, globular, terrestrial green plants. Botrydium.~~
~~Family 13. Chytridiaceae. Minute, globular, endophytic, colorless plants. Chytridium.~~
~~Family 14. Valoniaceae. Large, usually septate, marine plants. Valonia, Struvea, Halicystis.~~
Order Dasycladales. Regularly branched, non-septate, marine plants.

Phylum V. PHAEOPHYCEAE. The Brown Algae.
Brown-green filamentous to large, massive plants, marine.
Class 9. PHAEOSPOREAE. Reproductive organs external, isogamic to heterogamic. (Species about 550)
Order Ectocarpales. Zoospores and isogametes similar and motile.

The Kelps.

Order Tilopteridales. Zoospores and heterogametes dissimilar, eggs non-motile.
~~Fam. 19. Tilopteridaceae.~~

Order Cutleriales. Zoospores and heterogametes dissimilar and motile.
~~Fam. 17. Cutleriaceae; 18. Splachnidiaceae.~~

DICTYOTINEAE

Class 10. ~~TETRASPOREAE~~. Reproductive organs external, heterogamic. (Species about 180)

Order Dictyotales. Plants erect, flat, leaf-like, zoospores and gametes non-ciliated.
~~Family 20. Dictyotaceae. Dictyota, Padina, Zonaria.~~

The Rockweeds.

Class 11. CYCLOSPOREAE. Reproductive organs in sunken conceptacles, heterogamic. (Species about 350)
Order Fucales. Usually flattish, branched.

Phylum VI. CARPOPHYCEAE. The Higher Algae.
Mostly
Red to purple filamentous to massive plants; marine. — mostly
Class 12. BANGIOIDEAE. Antherids and oogones developed from ordinary cells of plant body; propagation by monospores. Red or purple plants. (Species about 50 doubtfully belonging here)
Order Bangiales. One chromatophore in each cell.
~~Family 1. Bangiaceae. Including the genus Porphyra.~~
Order Rhodochaetales. Several to many chromatophores in each cell.
~~Fam. 2. Rhodochaetaceae; 3. Campsopogonaceae.~~

The Red Seaweeds.

Class 13. FLORIDEAE. Antherids and oogones specially developed; propagation by tetraspores. Red or purple plants. (Species about 3000
Order Nemalionales. Mostly filamentous plants. Sporophores produced directly from fertilized egg.

Order Gigartinales. Parenchymatous plants; sporophores produced by nearby auxiliary cells branching in tissues.

the surrounding

Order Rhodymeniales. Filiform, cylindrical, to foliaceous plants; sporophores produced by nearby auxiliary cells growing outward in plant body.

Order Cryptonemiales. Filiform, branched, often complanate; sporophores produced by remote auxiliary cells.

Phyla, Classes, & Orders

9

The Stoneworts.

Class 14. CHAROIDEAE. Antherids and oogones specially developed; no tetraspores. Green plants. (Species about 160)
Order Charales. Erect, with whorled branches.

10

Phylum VII. CARPOMYCETEAE. The Higher Fungi.
Terrestrial, chlorophyll less, filamentous, parasites and saprophytes, producing spore-fruits.

The Sac Fungi.

Class 15. ASCOSPOREAE. Spore-fruits containing one or more asci with ascospores. (Species about 29,000)
Order Laboulbeniales. Erect, minute, few celled, bearing simple ascigerous fruits.

The Beetle Fungi.

~~Family 1. Laboulbeniaceae. Parasitic on beetles. Laboulbenia, Ceratomyces, Dichomyces.~~
Order Perisporiales. Filamentous, with simple, mostly spherical spore-fruits.

Primitive Sac Fungi

~~Family 2. Erysiphaceae. Superficial parasites upon higher plants. Erysiphe, Microsphaera.~~
~~Fam. 3. Perisporiaceae; 4. Microthyriaceae.~~
Order Pyrenomycetales. Filamentous, with mostly compound closed spore-fruits.

Black Fungi.

Order Pyrenolichenes. Lichen-forming fungi, allied to the preceding families.

The Lower Lichens.

The Slit Fungi

Order Hysteriales. True fungi; saprophytic, apothecia opening by a slit.
~~Family 90. Hypodermataceae; 91. Dichaenaceae; 92. Ostropaceae.~~
~~Family 93. Hysteriaceae. Carbonaceous or leathery, elongated. Hysterographium, Hysterium.~~
~~Fam. 94. Aerospermaceae.~~

Black Lichens

Order Graphidales. Lichen-forming fungi, allied to the preceding families.

The Little Cup Fungi

Order Phacidiales. True Fungi, spore-fruits open (apothecia).
~~Family 36. Stictidaceae. Fleshy, yellow. Stictis, Propolis.~~
~~Family 37. Tryblidiaceae. Leathery or carbonaceous, black. Tryblidium, Scleroderris.~~
~~Family 38. Phacidiaceae. Leathery or carbonaceous, black Phacidium, Rhytisma.~~

Order Caliciales. True fungi, and lichen-forming fungi; apothecia spheroidal, pulverulent.

Cup Fungi

Order Pezizales. True fungi; apothecia at length cup-shaped, fleshy or leathery.

The Higher Lichens.

Order Discolichenes. Lichen-forming fungi allied to the preceding families.

The Helvellas.

Order Helvellales. True fungi; apothecia open from the first, fleshy or gelatinous.
~~Family 87. Rhizinaceae. Sessile. Rhizina.~~
Family 88. Geoglossaceae. Stalked, capitate. Mitrula, Geoglossum.
Family 89. Helvellaceae. Stalked, capitate. Morchella, Verpa, Helvella.

The Little Tubers

Order Aspergillales. True fungi; spore-fruits minute, mostly not subterranean. (Relates to Perisporiales)

The Tubers.

Order Tuberales. True fungi; spore-fruits large, tuberous, subterranean, fleshy, internally ascigerous.
Family 95. Tuberaceae. Eventually opening. Tuber.
Family 96. Balsamiaceae. Not opening. Balsamia.

Phyla, Classes, & Orders

Pocket Fungi

Order Exoascales. ^ True fungi; apothecia much reduced and simplified.

Reduced Sac Fungi.

Order Hemiascales. ^ True fungi; no apothecia, asci single, scattered.

Brand Fungi.

Class 16. TELIOSPOREAE. ^ Parasitic, much reduced plants producing erumpent sori (but no definite spore-fruits), consisting of telioasci and teliospores. (Species about 4200)

Order Uredinales. Typically with sporidia, pycniospores, aeciospores, urediniospores and teliospores.

The Rusts.

The Smuts.

Order Ustilaginales. ^ Typically with sporidia and teliospores.

Family 113. Ustilaginaceae. Germinating teliospore producing

Basidium Fungi.

Class 17. BASIDIOSPOREAE. ^ Spore-fruits containing one or more basidia with basidiospores. (Species about 14,000)

Order Hymenogastrales. ^ Spore-fruits large, tuberous, subterranean, fleshy, with internal hymenium. — The False Tubers.

~~Family 115. Hymenogastraceae. Resembling Tuberaceae. Secotium, Hymenogaster, Octaviana.~~

The Stink Horns

Order Phallales. ^ Spore-fruits large, fleshy, at first tuberous and subterranean, later stalked and emerging.

~~Family 116. Phallaceae. Stalk cylindrical, capped with spore-mass. Ithyphallus, Dictyophora.~~

~~Family 117. Clathraceae. Stalk ovoid and reticulated, or branched. Simblum. Clathrus.~~

The Hard Puff-balls.

Order Sclerodermatales. ^ Spore-fruits small to large, roundish, eventually pulverulent.

~~Family 121. Sclerodermataceae. Often stalked. Scleroderma.~~

Bird-nest Fungi.

Order Nidulariales. ^ Spore-fruits small, spherical or top-shaped, leathery, containing peridioles.

~~Family 120. Nidulariaceae. Sessile upon the ground. Nidularia, Crucibulum. Cyathus.~~

The Puffballs.

Order Lycoperdales. ^ Spore-fruits large, fleshy, at first subterranean, later emerging.

~~Family 118. Lycoperdaceae. Sessile or short-stalked. Lycoperdon, Bovista, Geaster.~~

~~Family 119. Tylostomataceae. Long-stalked. Tylostoma. Battarea.~~

~~Podaxon.~~

~~Family 122. Sphaerobolaceae. Sessile, the spore-mass ejected at maturity. Sphaerobolus.~~

Order Hymenomycetales. ^ Spore-fruits large, umbrella-shaped, bracket-shaped or variously branched: hymenium eventually external.

Toadstools, etc.

Order Exobasidiales. Reduced and degraded plants related to the preceding families; basidia undivided.

~~Fam. 129, Exobasidiaceae; 130, Tulasnellaceae; 131, Dacryomycetaceae.~~

Ear Fungi

Order Auriculariales. ^ Reduced and degraded plants related to the preceding families; basidia divided transversely.

~~Family 132. Auriculariaceae. Hymenium exposed, on a gelatinous, foliose or vague spore-fruit. Auricularia.~~

~~Fam. 133. Pilacraceae.~~

Order Tremellales. ^ Reduced and degraded plants related to the preceding families; basidia divided vertically.

Jelly Fungi.

Phyla, Classes, & Orders

The "Imperfect Fungi."

FUNGI IMPERFECTI. Including 16,000 to 17,000 species with regard to which our knowledge is quite imperfect. They are generally regarded as conidial states of Ascosporeae. The classification here given is merely provisional. The Spot Fungi.

Order Sphaeropsidales. Conidia developed in pycnidia.

The Black-dot Fungi

Order Melanconiales. Conidia developed on a stroma.

~~Family 141. Melanconiaceae. Including Gloeosporium, Colletotrichum, Melanconium, Pestalozzia, Cylindrosporium, etc.~~

Order Hyphomycetales. Conidia developed upon separate conidiophores which do not form a stroma.

The Moulds.

Order Ricciales. The Riccias. Sporophyte globose, sessile, without columella or elaters. Liverwort Pepper

Phylum VIII. BRYOPHYTA. The Mossworts.

Chlorophyll-green, small, massive, sexual plants (gametophytes), producing a small, spore-bearing generation (sporophyte). — Liverworts

Class 18. HEPATICAE. Gametophytes mostly bilateral, often thalloid, creeping; sporophytes usually splitting and containing elaters. (Species about 4000) and elaters, — Hornworts.

Order Anthocerotales. Sporophyte elongated, with a columella, two-valved.

Family 1. Anthocerotaceae. Gametophyte a flat thallus. Anthoceros.

Order Marchantiales. Sporophyte rounded, without columella, indehiscent, usually short-stalked, containing elaters,

Family 2. Ricciaceae. Gametophyte small, mostly radiate; no elaters. Riccia, Ricciocarpus.

Family 3. Marchantiaceae. Gametophyte large, thallose, branching, with elaters; Marchantia, Conocephalus.

Order Jungermanniales. Sporophyte stalked, four-valved; with elaters. — Scale Mosses

Mosses.

Class 19. MUSCI. Gametophytes multilateral, usually erect; sporophytes mostly dehiscent by a circular lid, and without elaters. (Species about 12600)

Order Andreaeales. Sporophyte short-stalked, opening by four to six longitudinal slits. — Black Mosses.

~~Family 6. Andreaeaceae. Small mosses. Andreaea.~~

Order Sphagnales. Sporophyte short-stalked, opening by a circular lid. — Peat-Mosses

~~Family 7. Sphagnaceae. Large bog mosses. Sphagnum.~~

Order Bryales. Sporophytes mostly long-stalked, generally opening by a circular lid, usually with a peristome.

Suborder Acrocarpi. Sporophytes terminal on the main axis of the gametophyte. — True Mosses

Suborder Pleurocarpi. Sporophytes terminal on short lateral axes of the gametophyte.

Phylum IX. PTERIDOPHYTA. The Ferns.

Chlorophyll-green, small, sexual plants (gametophytes), producing a large-leaved, rooted generation (sporophyte). (Here restricted to the ferns alone, and including about 2500 species)

Class 20. EUSPORANGIATAE. Sporangia developed from internal cells. (Fashioned) Ferns.

Order Ophioglossales. Gametophyte tuberous, subterranean; sporophyte with large leaves, some parts sporogenous.

~~Family 1. Ophioglossaceae. Including Ophioglossum, Botrychium, etc.~~

Order Marattiales. Gametophyte flat, green, superficial; sporophyte with large compound leaves; sporangia hypophyllous.

~~Family 2. Marattiaceae. Large tropical ferns. Angiopteris, Marattia.~~

Order Isoetales. Gametophytes dioecious, rounded; sporophyte with erect, crowded, narrow leaves; sporangia epiphyllous, basal.

~~Family 3. Isoetaceae. Aquatic, rush-like plants. Isoetes.~~

Modern Ferns.

Class 21. LEPTOSPORANGIATAE. Sporangia developed from superficial cells. Land Ferns

Order Filicales. Spores of one kind; gametophytes foliose, monoecious.

Phyla, Classes, & Orders

10

Water Ferns.

Order Hydropteridales. Spores of two kinds; gametophytes dioecious, rounded.

Phylum XI. LEPIDOPHYTA. The Lycopods.
Minute gametophytes, producing branching, small-leaved, rooted sporophytes. (Species living about 900 but very many extinct)
Class 22. ELIGLATAE. Isosporous; leaves without ligules.
Order Lycopodiales. Gametophyte much larger than the spore.
~~Family 1. Lycopodiaceae. Dendroid, evergreen plants. Lycopodium.~~
Fam. 2. Psilotaceae.
Lower Lycopods
24 Higher Lycopods.
Class 23. LIGULATAE. Heterosporous; leaves with ligules.
Order Selaginellales. Small plants; stems not thickening.
~~Family 3. Selaginellaceae. Moss-like plants bearing terminal cones. Selaginella.~~
Order Lepidodendrales. Palaeozoic and Mesozoic trees, long extinct.
~~Fam. 4, Lepidodendraceae; 5, Bothrodendraceae; 6, Sigillariaceae; 7, Pleuromoiaceae.~~

Calamites.

Phylum X. CALAMOPHYTA. The ~~Horsetails.~~
Minute sexual plants (gametophytes), producing cylindrical, jointed and rooted sporophytes. (Species living about 20, but very many extinct)
Class 24. SPHENOPHYLLINEAE. Palaeozoic trees with solid, jointed stems, long extinct.
The Wedge-leaved Calamites
Order Sphenophyllales, including ~~Fam. 1. Sphenophyllaceae.~~ With the characters of the class.
23
Class 25. EQUISETINEAE. Palaeozoic to recent plants with hollow, jointed stems.
The Horsetails
Order Equisetales. ~~Spore-bearing cones terminal.~~ With the characters of the class.
~~Family 2. Equisetaceae. With one living genus, Equisetum.~~
24 Old Calamites.
Class 26. CALAMARINEAE. Palaeozoic plants, often trees, with hollow stems, long extinct.
Order Calamariales, including ~~Fam. 3. Protocalamariaceae; 4, Calamariaceae.~~

With the characters of the class.

Phylum XII. CYCADOPHYTA. The Cycads.
Minute gametophytes developed in naked seeds produced by the large, leafy-stemmed and rooted sporophytes; sperms motile. (Species living about 140 ~~70 known~~ but very many extinct)
Class 27. PTERIDOSPERMEAE. Palaeozoic, fern-like plants, long extinct.
The Seed Ferns.
Order Pteridospermales. With the characters of the class.

The Common Cycads.

Class 29. CYCADINEAE. Mesozoic to present plants with pinnate leaves.
~~Family 7. Cycadaceae. Mostly tropical trees. Cycas, Dioon, Macrozamia, Zamia.~~
Order Cycadales. With the characters of the class.

The Flowering-Plant Ancestors.

Class 28. BENNETTITINEAE. Mesozoic plants with pinnate leaves, long extinct.
~~Fam. 6. Bennettitaceae.~~
Order Bennettitales With the characters of the class.

The Conifer Ancestors.

Class 30. CORDAITINEAE. Palaeozoic trees with large parallel-veined leaves, long extinct.
~~Fam. 8. Cordiataceae.~~
mostly
Order Cordaitales. Branching Trees, with elongated, parallel-veined leaves. (Extinct)

Order Ginkgoales. The Maidenhair Trees. Branching trees with fan-shaped, parallel-veined leaves. (All extinct but one species)

Order Gnetales. The Joint-Firs. Anomalous woody plants of doubtful relationship.

XIII

Phylum XIV. STROBILOPHYTA. The Conifers.
Minute gametophytes developed in naked seeds produced by the large, leafy-stemmed and rooted sporophytes; sperms not motile. (Species about 450)
Class 31. PINOIDEAE. Mostly trees with increasing stems and small mostly persistent leaves; sporophylls mostly in cones.
Order Coniferales. Microsporophylls and megasporophylls in cones.
Conifers proper.

The Yews.

Order Taxales. Microsporophylls in cones, megasporophylls in very small cones or solitary.

I

Phylum XV. ANTHOPHYTA. The Flowering Plants.
Minute gametophytes developed in seeds enclosed in pistils in flowers, produced by the large, leafy-stemmed and rooted sporophytes; sperms not motile.
Class 32. MONOCOTYLEDONEAE. The Monocotyledons. Leaves of sporophyte alternate, from the first usually parallel veined; fibrovascular bundles of stem scattered. (Species somewhat more than 20,000)

Order Alismatales. Pistils separate, superior to all other parts of the flower.

Order Liliales. Pistils (usually 3) united forming a compound pistil, superior; perianth in two whorls (of 3 each), corolla-like.

Order Arales. Compound pistil mostly tricarpellary, superior; ovules solitary.

Order Palmales. Compound pistil mostly tricarpellary, superior; ovules usually 1; perianth reduced to rigid scales.

Order Graminales. Compound pistil reduced to 2 or 3 carpels; ovule solitary; perianth reduced to small scales, or wanting.

Aquatics with an inferior ovary.

Order Hydrales, ~~with one family, 32. Hydrocharitaceae.~~
Order Iridales. Compound tricarpellary pistil inferior; whorls of perianth mostly alike and regular.

Order Orchidales. Compound tricarpellary pistil inferior; perianth irregular.

Class 3 DICOTYLEDONEAE. The Dicotyledons. Leaves of young sporophyte opposite, sometimes remaining so, usually reticulate veined; fibrovascular bundles of stem in one or more rings. (Species about 90,000)

Subclass THALAMIFLORAE. All parts of the flower inserted on the flower-axis. Axis of the flower (thalamus) normally cylindrical, hemispherical or flattened, bearing on its surface the hypogynous perianth, stamens and pistils (or the stamens may be attached to the corolla).

Super-Order Thalamiflorae-Apopetalae-Polycarpellatae. Carpels typically many, separate or united; petals separate.

Super-Order Thalamiflorae-Gamopetalae-Polycarpellatae. Carpels typically many, united; petals united.

Super-Order Thalamiflorae-Gamopetalae-Dicarpellatae. Carpels typically two, united; petals united.

Sub-class DISCIFLORAE. Axis of the flower normally expanded into a disk or cup bearing on its margin the perianth and stamens, (or the latter may be attached to the corolla).

Super-Order Disciflorae-Apopetalae. Petals many to few, separate to united, Separate. Carpels superior to inferior

Super-Order Disciflorae-Gamopetalae. Petals united. Carpels few, united, inferior

United States

Department of Agriculture,

Washington, D. C., September 18th, 1899.

Mr. Charles E. Bessey ----------, of the State of

Nebraska ----------, is hereby appointed

a Collaborator

in the Division of Forestry,

in the United States Department of Agriculture, at a salary at the rate of

Three Hundred (300) ---------- Dollars

per annum, to be paid from the fund appropriated for "Forestry Investigations, Division of Forestry." ----------

---

He is hereby required to take the Oath of Office immediately and file the same, together with a statement of legal and city residence and personal record, with the Appointment Clerk in the Office of the Secretary, and report for duty, in writing, to the Chief of the Division of Forestry, --

---

and be subject to the rules and orders of the Secretary of Agriculture. This appointment to take effect on September 18th, 1899.

James Wilson

Secretary of Agriculture.

Robert W. Furnas's work in Forestry.

Born. Ohio. 1824.

When he came to Nbr. 1855

Friend of Morton

Some of his work at Brownville and elsewhere.

Some of his writings.

Some of his work in societies.

Agrl.
Hort.
Forestry Cong.
Nath Forestry Assn.

What he stood for.

Always plant trees.

What he saw done.

The dotting of the State with trees.

Written by C.E. Bessey

The Work of Robert W. Furman in Forestry.

Born in the heavily timbered region of western Ohio, where he saw how ruthlessly man destroys the forest, he came in his early manhood to the Great Plains of Nebraska. He knew what a forest is, and it must have seemed strange to him indeed to find here a region with only scanty fringes of low trees along the streams, and none at all on the great swells of land stretching for miles between the watercourses. In the thoughts of the old forests in his boyhood home, with their oaks, chestnuts, walnuts, hickories, elms, ashes, maples and poplars, many of which attained to a height of considerably more than one hundred feet, and compared them with those which he found in his adopted home his heart went out to the trees, and the forests they make. To him, as to many another, upon transplanted from the forests to the plains, trees became dear friends. The cutting of which was akin to murder, a crime not to be condoned. I can appreciate this feeling, coming as he did, from one of

the most heavily wooded regions of the east, and a conifer even now to a feeling of keen sorrow whenever a tree is removed, and to a deep resentment against the man whose ax brings about its destruction.

So with Mr Furnas. The trees were his friends. To hurt them, hurt him. They were to be conserved, not cut down and removed. How naturally this led him to the planting of trees can easily be understood. So he became a tree planter. He planted trees for himself. He taught and encouraged others to plant trees. He became the friend of J. Sterling Morton, another man transplanted from the eastern forests to the Great Plains, and these two encouraged one another in their love of all things sylvan. With like fealty a third soon joined them, and completed in the early days the trio of those who planted trees on the plains, and preached the gospel of forestation to the people of Nebraska. ~~The first and second of these philanthropists have gone to~~ The third one of this illustrious

two is still with us, but the others have gone to wander in the groves of Paradise, where the trees are always green, and where no vandal ever mars their beauty, or destroys their life.

How can we measure the accomplishment of a life, such as that of Mr. Furman's. Go to Brownville where the sturdy trees he planted half a century ago stand as living monuments to his memory. Go into the groves, and listen to the whispering of the leaves, the singing through the tree tops, the louder tones when the storm wind surges and sways through the forests,—all, all speak of him who planted them, and tenderly cared for them when they were young and weak. Many thoughts under his care, and as the years that grew them size and strength, bore heavily upon him, until he walked

RW Furman 5

feebly ~~under~~ in their shade. They spread ~~at last~~ their strong branches protectingly above him as though they would give him, if they could, something of their vigor after long life. ~~[illegible]~~ And when at last ~~worn~~ worn out ~~from~~ with his long ~~[illegible]~~ life work, he lay down to sleep like a tired child at the end of ~~the~~ his day of play, his trees welcomed him to their protecting shade. ~~where~~ There let his body rest while the trees continually sing their requiem; in the beauty of Spring, the promise of Summer, the fruition of Autumn, and the quiet ~~still~~ ~~waiting~~ preparation of Winter.

And not alone in his old Brownville home are to be seen these evidences of his life. ~~That~~ For soon from it ~~[illegible]~~ the influence of his ~~[illegible]~~ example began to flow out in ever widening circles until in every part of the state the movement was felt. as when one drops a ~~pebble~~ stone into

~~a~~ quiet waters the rippling circles flow outward in every direction until the whole surface is is agitated with the rhythmic beat of the waves. Go into any ~~[illegible]~~ neighborhood in Nebraska and ~~[illegible]~~ see the trees growing everywhere. — on farms, along the highways, along the ~~town~~ village streets, on the city lots, on the public squares and in the city parks, and many of them will be found to have ~~come~~ originally from the hands of ~~Mr~~ Furnas, or of those who followed ~~his~~ good example. Truly it is better ~~to~~ be remembered in the thousand upon thousand of sturdy trees in the state, than by marble or granite shaft. These living monuments ~~remind~~ us of the life of an active growing. ~~growing, active~~ unflagging man. They are fit mementoes of one who loved and ~~[illegible]~~ planted and cared for trees.

RW Furman 7

to Nebraska. I was fortunate enough to be appointed a delegate with him to represent this state in a meeting of this society in Denver. Although many years had passed since our first meeting he was still as greatly interested as before in the problems that were discussed in the convention. It was this perennial interest that kept him young. ~~and~~ that made ~~all these~~ so useful to the community for so long a time. He lived in the present. and was interested in present problems and present plans. And this is the reason why people did not think of him as an old man. His body grew old. but his mind was the mind of the young man of the time in which he lived. He lived as a tree lives, which each year puts forth ~~its~~ leaves of that season. Like the trees he loved so well ~~much~~; which do ~~did~~ not clothe themselves in the foliage of the past. ~~but~~ his thoughts were as new as ~~those which come~~ to the young man.
rather of the past. but

Through all his life. Mr James always and everywhere spoke for the trees. To persuade what we have, to plant more, to retain such parts as we have and to extend them by plantings. These were the things he stood for. When many men spoke discouragingly about tree planting upon the plains he never faltered in his belief that trees would grow, and grow well, when properly planted. And he was right. His faith was worthy more in the end than all the doubts of the scientific pessimists. And it was a splendid faith. It was born of a union of optimism and loyalty. It was a faith that never faltered. When drought and disaster came he stood firm. He never retreated. He held his post, and in the end the whole community found that he was right. The old tree leaves which are as new and fresh as those on the merest sapling, and so with the thoughts of this vigorous old man, Robert W Furman, whose memory we honor this day

Some of his writings

Such a man's work commits so large by of deeds in the field and forest that it seems futile to attempt to measure it by his published writings. During the half century that he lived in Nebraska he wrote much and often. In the public press his name often appeared in connection with timely articles on many subjects, often that which was dear to his heart, the planting of trees. ~~One of~~ In his annual reports of the State Board of Agriculture, which he published for many years, he took occasion here and there to speak a good word for tree planting, and still more he gave the fullest encouragement to younger men who came much later than he to take up his work. Many men would have been jealous of the newcomers who came into his field, but he welcomed them, and gave them ~~all~~ the help he could. This trait of unselfishness marks him as a great and generous minded man, who was far more interested in trees and forests than in gaining credit for himself.

RW Furman 10

Some of his work in Societies.
Agricultural
Horticultural
Forestry Congress,
Forestry Association.

It is a matter of history that ~~he~~ took prominent part in organizing and supporting the ~~State Agricultural~~ Society, & the ~~State~~ Horticultural Society, both of which (fostered forestry and the planting of trees) and until his death he took his part in every meeting of both of these societies. For many years he was an officer in the National Forestry Society, and attended its meetings taking part in its discussions. It was many years ago at one of the ~~many pleasant~~ meetings of this society ~~that~~ I first met Mr Furman. He was then in his ripened perfected manhood, full of vigor, and quick and ready in thought ~~and word~~. It was a great pleasure for me, a young man to meet him and to find that he was always ready to give advice and information. This was long before I came to Nebraska. Again, after the lapse of a considerable period ~~it was~~ often I had come

Abstract made
June 9-77

SILVER CITY

A Case of Selection.

By C. E. Bessey

Oct 6th 1876

A Case of Selection.

In the year 1872 a portion of the ornamental grounds of the Agricultural College was prepared in the usual manner for a lawn. It was carefully sown with seed of Blue Grass (*Poa pratensis*) and for several successive years was mowed several times each season, using for the purpose an ordinary field mowing machine. During this time the Blue grass predominates so greatly over the other adventitious plants, that the latter were scarcely noticeable. In the year 1875 however, a horse lawn mower was put to work on this part of the lawn, and the grass was not allowed to grow more than three or four inches before cutting. The result of this has been to retard the growth

of tall growing plants, while it has encouraged those whose natural light is ~~not more than~~ three or four inches, or less.

In a year after this frequent close mowing was begun, the Blue grass had very visibly decreased, while White Clover (Trifolium repens), which had appeared before this only in restricted patches spread rapidly over almost the whole surface. At the same time there was a rapid ~~increase~~ spread of a weedy grass - Panicum glabrum - over very considerable areas; this last is all the more remarkable as it had not been noticed at all before the frequent mowing.

Here then we have a case where new conditions bring with them favoring influences for two species of plants which consequently increase, while through the unfavoring conditions another species is diminished in number,

It can readily be seen how ~~the~~ frequent close mowings acts unfavorably towards Blue grass ~~Poa pratensis~~, for while it is well known that this is not a very tall grass, yet it naturally grows much taller than three or four inches. Any cutting, especially if frequent, would ~~tend~~ to weaken the strength of ~~the~~ plants, and if we add to this the prevention of seeding year after year, we have, as it appears to me, a sufficient cause for the decreased growth.

On the other hand White clover is largely of a prostrate habit; it spreads greatly by its running stems which are so close to the ground that no mowing machine could injure them, and besides the flowering stems are, many of them, so short ~~that~~ as to escape unhurt where the mower was run

over them. This of course allows generous seeding - and so permittes a further spread of the species.

In the case of the Panicum this species is also of a prostrate habit. The flowering stems usually spreading radially from the central root cluster. When the machine, which cut off the flowering stems of the Blue Grass, passed over this Panicum, few if any of the spikes were injured, and so not only was the individual growth of each plant unchecked, but an abundance of seed was permitted to ripen for the next year's growth.

This is a clear case of natural selection, man simply being a sort of final cause - bringing about the new conditions.

Written Oct 3. 1876

Memorial address By C.E. Bessey
On University of Neb.
1908

JUSTIN S. MORRILL.

Born at STAFFORD, Vt. April 14, 1810 (now 88 years old)
A farmer's boy. Grew up on a farm.
Educated in the common schools and academies.
(Degree of Master of Arts from Dartmouth, 1857)

I

In 1858 first bill to grant lands for state colleges; vetoed by Buchanan
In 1862 second bill, approved July 2, by Abraham Lincoln.

This gave 30.000 acres of land for each senator and representative.
The interest on the proceeds to be for
the endowment, support and maintenance of colleges
"where the leading object shall be, without excluding other scientific or classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts"--"in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life".
-------This law provided for annual reports upon "progress", "improvements", and "experiments".

In 1869 this University chartered with this fund as the main one.
(many others in U.S.)

II

About 1882 movement for experimental facilities in these colleges.
The so-called Hatch Bill passed in 1887
"to aid in acquiring and diffusing"--"practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and application of agricultural science".
----under the direction of these colleges as "departments"
"to be known and designated as agricultural experiment stations".

III

Still later a bill by Mr. Morrill to further endow the colleges, finally passed in 1890.------the proceeds to be devoted ---
"to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematics, physical, natural and economic science, with special reference to their application in the industries of life".

Looked at as to results,---
1. About 50 colleges and Universities in U.S.
2. From 10.000 to 15.000 students annually.
3. Total income of $3.0000000 to $4.000.000 to the colleges and universities per year.

(Influence on science in colleges and universities)

For us---
1. Made possible the charter of this university.
2. Foundation on which rests Industrial College, and its scientific and practical departments.
3. 400 to 500 students share benefits every year.
4. Our present income from Morrill's aid---$25.000 from act of '62
$15.000 " " " '87
$23.000 " " " '90
463.000

We have four birth days.
July 2. 1862
Feb. 15. 1868
March 2. 1887
Aug. 30. 1890

Bessey Memorial Association
STATION A
LINCOLN, NEBRASKA.