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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.

January 23, 1929.

Mr. A. H. Brinkman,
Craigmyle, Alberta,
Canada.

Dear Mr. Brinkman:

Your letter of November 21 was duly received and on December 6 the National Museum sent me the willows which you sent to them with your other material. I am very glad, indeed, to have obtained these specimens and am enclosing herewith a list showing the determinations, with a few notes.

I am familiar with the Morley, Banff, and Nordegg Districts, but less so with the Lesser Slave District. I am especially glad to see your No. 4035 from that District. Salix lasiandra is reported once from the Peace River District, and once from the Yukon, though I have not seen the specimens. Your specimen from the Lesser Slave District tends to confirm its somewhat general distribution in that region.

I believe that your specimen of S. balsamifera, No. 3934, represents about the northern limit of its recorded range, though I have not looked this up completely.

You will note that the last number in your list, 4046, is not a willow. This I am turning over to the National Herbarium to be added to the other plants you sent them.

Very sincerely yours,

Carleton R. Ball,
Principal Agronomist in Charge.

CRB:RL
Encl.

Program Planning Division

January 18, 1936

M. A. ~~K~~. Brinkman,
Craigville, Alta., Can.

My dear Mr. Brinkman:

Your good letter of December 1 has remained long unanswered, partly because of my absence from the city and partly because it was some job to determine the facts.

I am sorry that you had not received more of my papers. Your letter came about as I was leaving and I hastily sent you a package of as many as are still available. That would have been 5 or 6 weeks ago. Your card in my exchange file shows that they were sent but the date is not given. If they did not reach you let me know. There were some of the Bot. Gaz. papers in the packet.

When I got to working on the job it seemed to me that the best way to handle it was to make up a check list for you, somewhat like your own. I have it about two thirds done now and will inclose at least the first page with this letter. It contains 26 species and 13 varieties.

I have made 11 columns, inserting Dixon and MacGalla merely because you had them. I will make no Dixon entries, and the few for MacGalla will be for specimens I have determined myself. The third column, of course, is my records in Abrams. The fourth represents determined specimens in my own herbarium, and for the species covered in my papers on Canadian Willows it represents those published records also. The columns for Brinkman, Sanson, Univ. Alta., and Ottawa represent specimens in my own herbarium collected by men of those institutions and represented in their herbariums. The underscoring under the x means specimens. If not underscored in any column it means a published record, as for MacGill and Schneider and Abrams.

As the species names are so different in MacGill, and occasionally in Schneider, I have used letters of the alphabet, except x, to indicate the names they used, as given in the last column. In some cases, of course, MacGill had under one name what we now recognize as two or three species.

I would not worry much about Rydberg's manuals, if I were you. They are highly inaccurate, and extremely padded to make a showing of many species. Sometime the same species occurs under two or three different names. Often these are widely separated in his keys, which makes it worse. In many cases I cannot tell what he had in mind. In his different manuals, the plant described under the same name will be quite different in description. It is almost hopeless to try to unravel his knots. I have made the best guesses I could, as shown in column 2. (Fl. Rocky Mts. 1st ed.)

The mess which is glauca-glaucops-pseudo-lapponum-desertorum I have not yet had time to straighten out. I will put on the ~~ix~~ second page the best suggestion I can give at this time. I think that several new vars. need distinguishing but have no time now.

With best wishes, Cordially yours,
Carleton R. Ball

Program Planning Division

January 21, 1936.

Mr. A. H. Brinkman,
Craigville, Alta., Can.

My dear Mr. Brinkman:

On the check list I sent you recently please make the following additions. For *Barrattiana angustifolia* add x in column 9, as I have a specimen collected by Prof. Moss on Mt. Edith Cavell. For *petrophila*, add an x in column 8, as I listed it from Alberta in Abrams.

I inclose herein the second page of the list. It contains 14 more species and 7 more varieties. *Bella* is inserted in parentheses because I listed it in Abrams from Alberta and because Schneider lists it also. I think that the plant so named belongs to the unnamed variety of *Drummondiana*. There must be a critical study of *S. Drummondiana*, *S. subcoerulea* and *S. bella* before we know what we really have. But that must wait.

I have included *S. pseudo-lappomum* rather reluctantly. You can strike it out if you wish. It is part of the *glaucoops-glaucosa* moss. The typical material from Colorado looks quite different from the northern run of specimens but what will be the position of the species after a critical study I cannot predict.

I certainly hope that these lists will be of some help to you in getting your willows satisfactorily arranged. If there are questions you want to ask, shoot them in and I will be glad to do my best on them.

Cordially Yours,

Carleton R. Ball

Craigville, Alta

Canada

Jan 25th 1936

Dr C R Ball

Program Planning Division

Washington

Dear Mr Ball:-

I very highly appreciate your kindness in taking the great trouble of getting together such a list for me, it gives a value to the Willows of Alberta that no efforts on my part could come near doing. First as some difficulties I cannot follow. You show *S. petrophila* Rydb and *S. athabascana* Ramp for my list, but none have been so named before, so that they will be some of those otherwise named, but I do not know which. As both are probably small collections, there will be no trouble (approximately) in confirming by numbers. Then *alaxenidia* (Anders) Cov, No 4115, *Pseudomyrsinites* And, 4656, *Hebecarpa*, Fern 4858 interior Rowlee, 1589, 1865, 2681, are not shown on list. I believe all these have your naming, according to my list, so that probably among those may be found the two hitherto not on my list.

I have quite recently received a list from Mr McCalla, and as two of the species were named from his findings, I enclose list.

S. cordata, *Luhli*, *Myrtillifolia*, Anders *Bebbiana* Sarg. *Nuttallii* Sarg as *Scouleriana* Barr. *albertana* Rowlee as *Barrattiana* Hook. *candida* Fluegge *pellita* Anders *stricta* (Anders) Rydb as *brachycarpa* Nutt. *glaucoops* *glabrescens* Anders *glaucoops villosa* Anders *MacCalliana* Rowlee *petrophila* Rydb *Nelsonii* Rydb *vestita* Pursh *nivalis* Hook.

Ball

He has others as yet unnamed. *Nelsoni* and *MacCalliana* are types from his herbarium I believe.

I like your way of annotating, the underscoring is very valuable, and the synonyms help tremendously. I enclose a list of the species, and you will find I have no descriptions of that I can find.

I think the *glaucoops-glauca* *buddle* is of old variation, judging from some notes of 1905. Naturally I am sunk before I approach them, under my circumstances. Re Rydberg. *exigua* is reported by him, and not scored by you, all the others of his list you have examined, and *exigua*, a sec, on reperusal, is from Abram's flora, so means none of his left, altogether you have compressed a big heap of information in the list. It will require careful perusal on my part, else I shall not digest it all.

Macoun, I know from other sources how unreliable his list has become by now, and your numerous synonyms help to clear up the material to me, re Rydberg. I think, as you state, he was overfond of species, small species, though I found that he would refuse to name species except by question, even of his own naming, when in doubt, a practice I valued. Possibly he, like Dr Evans, believed in some way that I can not understand in species as separate and distinct. How any field worker can hold that position I do not understand, but held it seems to be. We are slowly getting nearer a clearer working out of districts. At present there remain difficulties. I think we have to get back to two conceptions, a western flora, and an eastern, both pushed back during the ice ages, both following the retreating ice, both struggling for supremacy in N Alberta, and with a consequent large area of tension and mixture of species. Cypress hills is interesting, as is also our handhills, near by, which I have so far failed to examine. The Cypress hills are cordilleran. Both are tertiary fragments, as also is Swan Hills, which unfortunately I failed to examine closely when in the vicinity. Then we have the fact that under careful measures of protection against fire and stock, the Parkland mixture of *Populus tremuloides* and willows, comes into the prairies, and not vice-versa, as usually supposed. All most interesting, but not at all easy to work into districts, but it is slowly working out in my mind, and I think the minds of others. My great thanks for your kindly efforts, highly appreciated. Needless to say, I look forward with considerable interest to your next list, when time is permitted to you.

PJO

(See over)

Program Planning Division

February 28, 1936

Mr. A. H. Brinkman,
Craigville, Alta., Canada.

My dear Mr. Brinkman:

On my return to Washington yesterday I find your letter of Feby. 5th. and the packet of Dixon Willows. I am glad to have seen these, as it clears up some of the puzzles you raised.

S. lucida. His specimens both are S. MacCalliana Rowlee. The absence of glands on the petioles shows with only young leaves that it is not related to lucida, and the hairy capsules with long styles proves it.

S. amygdaloides. I collected this species at Lethbridge on the Belly R., and it would be expected at McLeod.

S. argyrocarpa. The specimen proves to be S. brachycarpa Nutt.

S. ~~discolor~~ ericecephala. This is S. discolor, as the variety has hairy stems and buds.

Now as to what you call "synonyms". The names of species in the last column of my table are preceded by a letter, (a, b, c, etc), and the letter refers to the same letter in one of the numbered columns.

Some of them, as S. speciosa, S. longifolia, S. Saskatchewanensis, and S. rostrata, are straight synonyms, that is untenable names for the same plant.

Some of them, as lucida, S. cordata, S. lasiantha, etc., represent old broad species which have been divided into two or more species or varieties.

Some of the names represent mistakes in identification, as S. Fendleriana, S. Lyallii, and S. desertorum.

My only reason for putting them in was to let you know under what name the species and varieties I recognize would be found in the works of certain authors.

Please note also that the first three footnotes, a, b, and c, are all in the line for S. caudata. I put them on three lines in the last column to save using another sheet of paper. So you will note that footnote b does not refer to S. caudata Bryantiana but to S. caudata itself.

If using these explanatory footnotes is going to confuse your readers, as it evidently confuses you, I would suggest that you omit them entirely. They were merely for "finding" purposes. For instance:

S. lucida is not a synonym of S. caudata. S. lucida is an old and distinct species of the Eastern States and Provinces, not occurring as far west as Alberta. Macoun did not recognize S. caudata and S. serissima had not been published. What Macoun put under S. lucida in Alberta was one or the other of the last-named two species.

S. Fendleriana really is a synonym of S. lasiantha but that was not known to Rydberg, or to me either a few years ago. Rydberg put S. caudata under the name S. Fendleriana.

Dont worry about *S. linearifolia* Rydb. Just forget it. Rydberg put all or part of at least three species into it at one time or another (interior, exigua, and melanopsis). My list merely shows that the name *S. interior* pedicellata will not be found in Rydberg but that he put the plant under *linearifolia*.

S. pedicellaris Pursh is a green-leaved species of Eastern U.S. and Canada. Pursh's types were burned so that fact was not recognized until lately. All the western material is white-leaved below and is var. *hypoglauca* Fernald. Early Am. botanists, except Pursh, thought the plant was the European *S. myrtilloides* but later studies showed the American plant distinct.

I have seen only two of MacGillivray's specimens so lists only two species in his column.

S. alba, *S. fragilis*, and *S. pentandra* are introduced from Europe and Asia, as is *S. Babylonica* also. I listed Canadian material in my first paper on Canadian willows. I have specimens of *fragilis* from Athabasca Landing and of *pentandra* from Calgary area.

S. melanopsis tenerrima was not dropped in favor of *S. interior* pedicellata. I have no specimens from Alberta in my own herbarium and cited none in the paper you mention. I think I had one or two from Ottawa and will look up my lists of identifications and see what I can find.

S. monocroma is related to *S. myrtillofolia*, on the one hand, and to *S. pseudo-myrsinites*, on the other. Most of Sanson's specimens were fragmentary and I am somewhat doubtful of my determinations until further study of better material. For this reason I left the species out of the list, so far as specimens are concerned. I left it in because of the Abrams and Schneider publications.

I have never seen Raub's specimens, except that representing his *hebecarpa*, which I borrowed from Ottawa. Fernald's *hebecarpa* is related to *S. pedicellaris* Pursh and not to *S. Barclayi*. *S. Barclayi* var. *hebecarpa* is the same as *S. Barclayi* var. *puberula* Bebb.

I am in doubt about var. *gracilis* of *S. petiolaris*. There seems to be no line between it and the species. If there is such a variety you have it in Alberta.

I have no record of *S. sitchensis* from Alberta, tho it occurs in B.C. and Idaho and Washn.

S. pellita is a Great Lakes plant. The western plant formerly called by that name is *subcerulea*, or *S. drummondiana*.

The glauca-glaucoops-desertorum-pseudolapponum mixup I have not yet been able to work out. I doubt if the glauca glabrescens of Alaska is the same thing that has been called that in Alberta. I don't know and "nudeosens".

S. Austinae was a mixture of 3 species, as acknowledged by Bebb himself later. Why under the sun Rydberg should drag the name over to the Rocky Mountains (the plants were from the Sierras) and tack it on to any willow is beyond me.

S. subcordata is a variety of *S. arctica*, but has not been found in Alberta so far, tho it occurs in B.C. and Washn.

S. Fernaldi is *S. vestita* erecta And.

S. sitchensis var. *angustifolia* almost certainly is *S. Jepsoni* Schneider, which does not occur in Alberta. If Macoun listed it, the plant so listed almost certainly was *S. subcerulea* or the narrow-leaved variation of *S. drummondiana*.

I am inclosing an annotation slip with each of the Dixon specimens and am returning the packet by mail. You should have these in your collection. The slips give you an official determination with the specimens.

With best wishes, Cordially Yours.

Carleton R. Ball

WILLOWS OF ALBERTA, MOSTLY MACLEOD, by.

Dixon

576. *S. serissima* (Bail.) Fern. Tree, 18 ft. in swampy ground. (June 22 (fl), July 13 (yg. frt.), Aug. 31 (fol). 1924
577. *S. serissima* (Bail.) Fern. Tree, 10 ft., swampy grassland. Dates as for the last.
582. *S. amygdaloides* And. Tree, 30 ft., by Willow Creek, MacLeod. July 3 (fol). 1925
581. *S. interior pedicellata* (And.) Ball. (As *S. longifolia* Muhl.) High ground by creek, MacLeod, June, 1924 (frt.)
568. *S. balsamifera* Barratt Tree 18 ft., swampy grassland. May 18 (fl), July 13, 1924
567. *S. pseudo-monticola* Ball. (As *S. balsamifera* Barr.) Bush, 10 ft., swampy grassland. May 18 (fl), June 1 (frt), July 13 (fol), 1924
580. *S. pedicellaris hypoglaucia* Fern. (As *S. pedicellaris* Ph.) 1½ ft., swampy mossy grassland, June 15, 1924.
579. *S. brachycarpa* Nutt. (As *S. argyrocampa* And.). Bush 1½ ft., low grass- June 22 (fl), June 29 (fol.), 1924
574. *S. MacCalliana* Rowlee. (As *S. lucida angustifolia* And.). Shrub 8 ft., swampy ground, May 17 (fl.), July 19 (fol), 1925
575. *S. MacCalliana* Rowlee. (As *S. lucida angustifolia* And.). Shrub 7 ft., swampy ground, May 17 (fl), June 14 (fr), July 18 (fol), 1925
572. *S. petiolaris* J.E. Smith. Swampy grassland, May 10 (fl), May 30 (Fr), July 17 (fol), 1925
573. *S. petiolaris* J.E. Smith. Bush, 3 ft., swampy ground. May 10 (fl), July 19 (fol), 1925
578. *S. candida* Bluegge. Swamp. May 24 (fl), June 26 (fr), June 13, 1924
583. *S. discolor* Muhl. (As *S. discolor ericecephala* Mx.). Tree, 20 ft. high, grassland. May 3 (yg fr), July 24 (fol), 1925. Prob Lacombe
569. *S. discolor* Muhl. Tree 20 ft. high, grassland. May 4 (fl), July 6 (fol), 1924
570. *S. Bebbiana* Sarg. (As *S. rostrata* Rich.). Bush 20 ft. high, grassland, May 10 (fl), May 17 (yg fr), July 25, fol., 1925.
571. *S. Bebbiana* Sarg. (As *S. rostrata* Rich.). Bush 10 ft high, grassland, May 10 (fl), May 17 (yg fr), July 20 (fol), 1925.

SALIX SPECIES AND VARIETIES OF ALBERTA, CANADA

Feb 28 1936
A.H. Brinkman

Sp. and varieties	1	2	3	4	5	6	7	8	9	10	11	
caudata (Nutt. Heller Brayantiana Ball & Br. parvifolia Ball	a	b	x	x						x	x	a, as S. lucida. b, as fontinaliana c, as lasianura var.
lasianura Benth Abramsi Ball lanceifolia (And.) Bebb		d	x	x	x				x		x	d, as S. Lyalli
serissima (Bail.) Fern.	a			x	x		x	x	x	x	x	
amygdaloides Andersson			x	x			x			x	x	
exigua Nuttall lutescens (Rydb) Sch.			x							x	x	
interior Rowlee pedicellata (And) Ball	e	f		x		x		x	x	x	x	e, as longifolia f, as linearifolia
melanopsis Nuttall			x							x	x	
Ferris Ball microserrulata Ball		g	x	x	x	x			x	x	x	g, as S. curtiflora
lutea Nuttall		h	x	x	x	x			x	x	x	h, as S. cordata
mackenziana (Hook.) Barr.			x	x	x	x			x	x	x	
myrtilloides (Andersson monochroma Ball	x	x		x	x	x			x	x	x	
pseudomyrsinites And.		x	x	x		x			x	x	x	i, as pseudocordata
Barclayi Andersson hebecarpa Andersson rotundifolia "				x					x	x	x	
commutata Bebb pseudomonticola Ball			x	x	x	x			x	x	x	k, as S. monticola
balsamifera Barratt alaxensis (And.) Suvilla	l			x	x		x		x	x	x	l. As S. speciosa
Barrattiana Hooker angustifolia And.	x	x		x		x			x	x	x	
nivalis Hooker	m			x		x			x	x	x	m, As reticulata p
saximontana Mm Rydberg				x					x	x	x	n, as nivalis var.
vestita Pursh erecta Andersson	x			x	x	x			x	x	x	
athabascensis Raup				x	x	x						
pedicellaris hypoglauca Fern. O				x	x		x		x			o, as S. myrtilloides
cascadensis Cockl.	p											
anglorum Chamisso ariolada Schneider	q			x					x	x	x	q, as S. brownii
arctica Pallas				x	x				x			
petrophila Rydberg	r		x	x	x				x	x	x	r, as arctica petraea

	1	2	3	4	5	6	7	8	9	10	11	
brachycarpa Nuttall	s	x	.	x	x	x	x		x	x	x	s, as desertorum
glabelliacarpa Schm.				x	x	x			x	x	x	
Sansoni Ball				x		x			x	x		
glauca L. Schm.	t	u		x	x	x			x	x	x	t, as glauca villosa
glabrescens (And.)				x	x	x			x	x	x	u, as S. glaucops
pseudolappomum v. Seemen				x		x				x	x	
MacCalliana Rowlee		x		x	x	x	x	x	x	x	x	
candida Fluegge	x	x		x	x	x	x		x	x	x	
arbusculoides Anders.	x	xv		x	x	x			x	x	x	v, incl. saskatchavar
(bella Piper) *			x								x	
Drummondiana Barratt	x	x	x	x		x				x	x	
var. unnamed				x		x				x		
petiolaris J.E. Smith	x			x	x		x		x			w, as var. rosmarinoides
subcoerulea Piper			x	x	x					x		
planifolia Pursh		y	x	x	x	x			x	x		y, as chlorophylla
Nelsoni Ball		a		x	x	x	x			x		z, as var. monica
discolor Muhl.				x	x		x		x	x		a, as species
princoides Pursh				x								
Seculeriana Barratt	x	x		x	x	x			x	x	x	
coetanea Ball				x	x	x						
Bebbiana Sargent	b	x	x	x	x	x	x		x	x	x	b, as rostrata
perrostrata (Rydb.)	c			x	x	x				x		c, as species
Schm.												

Craigville, Alta
Canada
Feb 7th 1936

From A.H. P.
Brinkman

Dr C N Ball
Washington
D C

Dear Mr Ball:-

I thank you for your two letters of Feb 9th and 28th. What a mass of details I have walled forth. I thank you for your kindly efforts. First, re synonyms. I see that the effort to understand nos a, b & c were oversights on my part, I ought to have figured it out myself; with the explanation all falls into order in that respect, ~~for~~ especially w with the further explanation re synonyms, broad species, since broken up, and mistakes in identification.

Re linearifolia. I seem to have a record named by Rydberg somewhere, but I have failed to hunt it up, all yours are interior. So till the original specimen turns up again, and is identified, linearifolia is dropped, also I begin to understand something of the puzzle created by linearifolia, longifolia, fluviatilis, interior, melanopsis and exigua in the past.

Thank you for kind return of specimens, it is so handy for reference in this very difficult group. Of course I am seeing clearer with the passing of time something of the problem you are up against, viz, the recognition of the chain of forms which shall be included in a species, and where that chain of forms either breaks down between species, or, in the event of not breaking down, where one species begins and ends, also where a varietal difference may be recognized. Something of the same kind is one of my puzzles in another direction, that of grasses, where, frankly, forms seem to occur which are so medial between two species that a toss of the coin may as well decide as a specific naming. But then, grasses at least are monoicous, (with two exceptions among the Albertan grasses known to me), and the vital organs, are not so difficult to relate with the plants, as in the case of willows, for if not flowering one does not collect, so difficult would it be to try, and name non-flowering grasses, though I can do it with a microscope. To go back to your 21st letter. I have included narratiana angustifolia and petrophila in the columns specified. Pseudo-lapponicum may as well be retained till final work on the group.

So you got as far as Tennessee, I wonder whether you ran across my correspondent Mr Aaron Sharp. I do not know whether he is keen on willows, but he certainly is on Hygrophytes. What a mass of travelling you have managed in your time. Yours of Feb 9th. Re anglorum and var arborescens, they are your records ~~alone~~ so far, others may be expected to turn up in the course of time. Re petrophila. This is included in column 5, but I do not know on which record it is based. Hypoglauca, Fern would account for Athabascensis, that leaves a number still unsettled, and I will refer to them as they occur.

First there is glauca-villosa as glauca L. (Here again the double reference becomes quite plain to me now). I have no record of glauca-villosa, but have one of glauca acutifolia, No 3726 of your naming, I wonder if the supposition on my part is correct. Then I have a record of pseudo-myrsinites, No 4056, I see from remarks that it is possible you may have decided it to be best placed under myrtillifolia, but this again is only a supposition on my part. Then there is Alaxensis, No 4115. As I see no where else it could come except under Alaxensis, I wonder whether that could be the basis of petrophila. You must put up with my want of knowledge evidenced by my suggestions, I am not a willow specialist, only a student. That includes the 5 on the lists named by you, but not shown on list. ^{column 5} Interior now included, hebecarpa, Fern included as Athabascensis, pseudo-myrsinites, glauca-acutifolia and Alaxensis unknown where to place at present. As a matter of fact the Feb 9th ~~letter~~ ^{letter} raised up a number of problems, some of which I have tried to deal with, some referred to here, one or two left for further work.

Next McCalla list. I have to write him very soon, and will suggest to him that he take advantage of your kindly offer. He seems to value his specimens very highly, which is as it should be, but a specimen unnamed, or incorrectly

named does not seem of high value to me. Something like the ball mark on silver and gold, it may not make the silver and gold any the more genuine than it was, but it does add to it's value as an evidence of it's genuineness. Dr Moss is busy, I believe, in getting together some willows left undetermined, in an effort to get list in more or less perfect shape, for he is working in cooperation with me in this matter. And I am including small specimens with this. One is only a twig, no inflorescence, but it is so distinctive, so different from any I have met with, that it may be determinable as it is, anyhow, it's present naming is almost certainly incorrect.

First, re type of Nelsoni. I quote from Cont Bot Lab U of Penn, 1907, p 81. "It was described from specimens collected by Mr McCalla" etc.

That was the basis of my remarks. Re cordata and pellita. I have written to Dr Weigand asking him if it is possible for him to look up McCalla's records of both these, as I believe they are accessible to him, I have also written to Dr Fogg, Curator of Penn's Pennsylvania University Bot Lab, asking him to look up records of those two, and of Stitchensis, Sanson, to see if it is possible to say which species they are. This will, I hope, clear up three problems in time. Re Rydberg's distribution. I found the difficulty you did, to know how far it was safe to include specific references on his inclusive areas, and I dropped the idea, only including references that were specific for Alberta from his Rocky Mountain flora and from his later work on the plains flora. That does not, of course, help much in defining just what the species referred to actually are, but it does throw the onus where it really does belong, on the N Y Bot Garden material, for future reference, where necessary. Your later remarks show the weakness of some of his namings. Re monochroma, pseudo-myrsinites and myrtillifolia. It is on the basis of this that I am suggesting that my own record of pseudo-myrsinites may have since been decided as myrtillifolia.

And now comes the long one of 28th ulto. *of Division material*
Shows that previous namings are very much open to question. And also the need on my part for close study of material and literature when the material permits. Re pseudo-lenticolia, Ball. This was evidently gathered along with 568 as the same species, I cannot from the material (leaves and stipules) differentiate, so can understand the placement of the two species on your list. Pedicepparis hypoglauca, I see the force of your remarks. McCalliana (as lucida var angustifolia) I think I could almost exactly duplicate these from near by. Discolor and eriocephala, I think I shall remember distinction now. Re synonyms etc. I think I have a fair grasp of the idea now. It is altogether valuable to omit in any finished list, even at the risk of some slight misunderstanding. A footnote can explain sufficient for the purpose.

I can follow synonyms largely from your various publications, the larger species and their break up, also to a certain extent, the mistakes of course not, that is where your specialized knowledge comes in.

Thus lucida of Macoun's catalogue, p 450-51 as far as concerns Alberta, refers to caudata (Nutt) Heller, Fendleriana of Rydberg (p 191) is caudata (Nutt) Heller, lasiandra var is treated in your Can Nat article. And so on. S linearifolia, forgotten as suggested; pedicellaris, true, distinction noted. Myrtilloides noted. McCalla's records will be listed under his own authority, also Raup's, as neither have passed through your hands, at least in mass.

It does rather suggest itself that perhaps fragilis might be either native to parts of Alberta, or else naturalized. Moss has a record from the Parklands. *frag*
Melanopsis tenerrima. The basis of my remarks is the following.

mel ton
Proc Nat Acad Sci, Apr 1935 pp 182-3 S melanopsis var tenerrima (Menderson) Ball "Distributed sparingly with the species from southern British Columbia and Alberta south in Idaho" etc. No Alberta record noted however, and synonyms include S linearifolia Rydb (in part) etc.

Can Filed Naturalist, Nov 1926 p 175 shows interior pedicellata (Anderson) Ball and there quotes as synonym linearifolia Rydb, in Britt Man etc.

Re Sanson's records of monochroma. I think I understand now, and why not noted in column 4. Working over these notes makes me understand better

7-III-36
the relationships of list, as *pedicellaris* and *Athabascensis* together. From A.H.
Petiolaris gracilis does not matter much if included. *Sitchensis* I Brinkman
have dealt with elsewhere, *Sitchensis* Sanson var *angustifolia* Webb together
with synonyms given leave the matter unsettled, perhaps the reply from
Philadelphia will help to straighten out. Especially as he seems to include
pellita. I can see you have a nice little job in prospect when you tackle
the *glauca-glaucops-desertorum-pseudolapponicum* mixup.
I got just such another terrible muddle when I tackled the *Scapanias* in
S. undulata, so can grieve with you.
Thank you very much for the kindly help so generously given and so much
appreciated. It comes near the end now, as far as such work as this can
be said to have any end.

I shall make no attempt to publish till a copy of the finished thing is
placed in your hands for approval, it may yet be bigger than at first
anticipated, as so much has proved to be connected with it that has to be
tackled some time, and may as well be tackled now, if the information is
available, I am not expecting perfection in the other part, but recognize
that the thing has to have a start, and that improvements can follow.
This whole thing is very interesting to me, but I do feel that I have unwittingly
imposed on you more than I ought, and more than at the start seemed
probable.

Respects and Best Wishes

Yours Sincerely

A.H. Brinkman

I have put Dixon's namings tho both seem wrong to me. 1022 seems quite
distinct from any other I have seen & so may be nameable. 1024 is
different from others met with. Others I felt reasonably safe in naming
myself.

Craigville, Alta
Canada
Nov 10th 1936

Dr C R Ball

Program Planning Division Program Planning Div.

A A A
Washington
D C

Dear Mr Ball:-

Have just been over some correspondence, how it has

accumulated.

Yours of Oct 27th. Nos 4803, 4804 & 4807 as *S. lutea*. I in list of 1934 gatherings, and yours of Mch 29th 1935 occurs the following. 4764 *S. lutea*. I seem to have mislaid the specimen, but my records show it to be gathered where the first three were found, that will account for the naming as *lutea*. They are, I think, the ones you refer to as possibly var *prinosides* of *S. discolor*. I will endeavour to gather in ripe inflorescence this coming season. ~~S. lasiandra~~ Remembering where I had gathered the previous specimens, and where recorded from, I must confess surprise at finding where I did. There was but one bush or small tree, but it was well grown. ~~S. athabascensis~~, ~~this~~ is another surprise. There is but one or two bushes of it, it grows in spring water, I pass it on one way to town, so can watch it next season. I was not surprised to find 4801 and 4802 named *petiolaris*, rather suspected it must be that. I must tag the bush next time, and make quite sure. ~~A~~ The two sets of *lutea*. The Nos 4898 & 4902 were sufficiently different from 4886 & 4929 for me to think of them as different. The well developed stipules, missing on the first two, the different shaped and colored leaves, the different twigs, all seemed to point to a different species. ~~I~~ I note re *Mackenziana*. These were gathered so far from here that repetition of the gathering is unlikely.

I thank you for notes ~~and~~ specimens.

The map came to hand safely. It is very complicated, contains a great mass of detail and information, and probably could not be intelligently followed without the letter press.

My own map of Alberta (3 sheet) ~~is~~ is about 12 times the size, and so admits of closer following of detail. However, the map shows where our vegetation is connected with yours. Ours short grass lacks *Buchloe*, so is different to that extent. We are also complicated by the different glacial ages that makes our greatest difficulty, but otherwise the difficulties are less, as we cover much less different types of vegetation. I have finished the Geological part, and sent it away for criticism to two geologists who had helped me. I think they will agree with it. The actual districting is also done, three copies have gone to three who know something of the districts, and I am awaiting their criticisms. After which I hope to round the thing off. Then comes the puzzle of publication. When available, will send you a copy, even if only a typed one, I think you will find it interesting, and will add interest to your records of Albertan willows. ~~Dr~~ Moss might as well have sent you the willows promised, it does not help me any. I get a bit disgusted at times, must try and get list in final shape, before sending away to three or four for criticism, after which I hope to send to you for final look over. Thank you for the great help you are giving me, without you I should have had a list of very little value.

Best Wishes

Your Sincerely

Arthur Homan

I find it hard to correlate the different zones in Rydberg & Abrams as less ~~best~~ altitudes are given & even then there is considerable doubt as to a large range of latitudes is covered, such as California to Patagonia. Vol 24 pp 182-3 *S. melanopsis* var *tenerrima* cited for S. Alberta. I see while Rydberg makes *S. australis* a var of *glauca* *glabrescens* Schumacher makes it a var of *tenerrima*. (Am Jour Bot Feb 1925 p 95) you there make *S. australis* a synonym of *tenerrima*.

January 28, 1937.

Mr. A. H. Brinkman,
Craigville, Alta., Canada.

My dear Mr. Brinkman:

I have not been in Washington enough since your joint letter of Nov. 10-21 was received to let me get a chance to dig out the answers to your queries. I have brought the letter down here but lack facts. In the absence of my correspondence, I cannot know what I have told you before. In the absence of my library, I cannot look up references. In the absence of my herbarium, I cannot verify specimens. However, I'll give the best suggestions that I can.

I would put in the list only the names of species and varieties which are recognized as part of the Albertan flora. Synonyms are taken care of by footnotes. Any species of doubtful occurrence I would place in a supplemental list or in a footnote. This covers your "disputed" plants.

S. monticola Bebb has not been found in Canada. S. pseudomonticola Ball is the northern representative and probably is what Macoun had.

"S. subcordata". I cannot recall if Anderson published as a species or a variety. The only plant bearing that name now is S. arctica subcordata (And) Sehn. It occurs from Alaska to B.C. and Washn., but I recall no Albertan specimens. Rydberg always was careless about ranges.

S. desertorum Rich. I think this is a good species. I have seen the type, which is quite immature. It is part of the complex: glauca-glauco-pseudo-lappomum. It appears to be intermediate between glauca and pseudo-lappomum and nearest to the latter. It has oblanceolate, discolored leaves, rather glabrate. We do not know the type locality so cannot compare with similar material from the same place. Raup has collected in that area more than any other person and may know what it is but I have no seen his collections. S. brachycarpa antimima (Sehn.) Raup may be desertorum, as Schneiders type seemed more like desertorum than like brachycarpa. The type of desertorum is not like brachycarpa but much less hairy and more blackening. I would leave it in the list with Raup as authority. S. desertorum is not the same as S. stricta, which is a synonym of S. brachycarpa.

S. Fernaldii Blankinship is a synonym of S. vestita erecta, I think.

S. Austinae Bebb was based on material of three different species, S. lasiolepis, S. ~~antimima~~ Lemmonii, and a possible third, which would be S. Austinae if recognized. I have a lot of unidentified material which may be it. If so, closely related to S. Lemmonii. In any case it does not occur in Canada at all, so do not enter it. Rydberg was plain crazy.

S. brachycarpa glabellcarpa Sehn. is a good variety, I think, and I must have overlooked it. I have the Ottawa (Nat. Museum) specimens in my herbarium, so you can put an X under these two headings. I have seen it only from Jasper Park area.

S. pellita And. is a good eastern species, not occurring in the West, and should not occur in your list, except as footnote. The western plant mistaken for it was in part S. subcoerulea Piper and in part what authors have called S. sitchensis angustifolia (See next page).

S. sitchensis Sanson. I do not know what Raup found in the far north but unless he had it I do not think it occurs in your territory. The plants which Macoun and Farr had, and which have been called var. angustifolia, are not a variety of S. sitchensis in my opinion. They either are S. subcerulea or that narrow leaved form which I thought was an unnamed variety of S. Drummondiana Barr. This may be the same as S. Jepseni Schneider, from Calif. and northward. I cannot find any narrow-leaved variety of S. Sitchensis and have not had time to study the relation of S. Jepseni to this plant of the northern Rockies. Until it can be cleared up I would not list S. Sitchensis unless Raup has it definitely. I would put the other reference in the "disputed" list.

S. flavescens Nutt. is synonym of S. Seculeriana Barr. I don't know what Macoun had from Cypress Hills or in what Province he got it.

Dr. Shantz told me that he had sent you the text and map of the vegetation of the Great Plains. This will enable you to better understand the map.

I have not had time to study your Districts and cannot do it until I get home to a good Alberta map. Hence I cannot give you suggestions regarding distribution of species.

I am glad to know that you have been able to get so much help on the different phases of the work. I only hope that it has been more prompt and accurate than some of mine. There is so much I don't know yet.

I think you should give me no credit for the willow portion other than for assistance. It is just as much yours as any other part.

When I get home I will try to check up on these comments and settle some other questions you raise.

With best wishes for the new year and its opportunities, I am

Cordially Y^rs,

Carleton R. Ball
U.S. Dept. Agriculture,
Washington, D.C.

July 1, 1940

Mr. A. H. Brinkman,

Craigville, Alta., Canada.

Dear Mr. Brinkman:

Your letter begun on May 12 and finished on June 15 I found awaiting me on my return to Washington from a field trip in the South. I am glad to know that the specimens sent to you are of some interest.

Your report on weather conditions for the spring reminds me of many experiences in my own life and many observations in different areas and different years. Here in Washington we had an exceptionally cold and snowy winter, with a very late, cold spring and a final snow on April 10 which remained four days.

I note that you have not been able to find again a specimen of sand bar willow No. 4988. The additional specimen of it which you send in this package convinces me still more strongly that it cannot have been *S. interior*. The leaves before destruction by the worms were densely silvery hairy. It must have been either *S. exigua* variety *lutescens* or *S. argophylla* Nuttall from the Columbia River Basin. Some day you may find it again.

I am glad that you are able to revisit the locality where you found 4998. In the new specimen which you sent as No. 5600 the leaves are very young and not quite half grown. However, they are narrow and pointed at both ends and look as if they belonged to variety *prinosides* rather than to the broad-leaved *S. discolor*. However, one cannot be entirely certain at that stage of development.

You send an additional specimen of the broad-leaved plant collected on July 15, 1939 but I note that the label bears the number 4988 which is the sand bar willow instead of the number 4998 which was the number for *discolor*. I suppose that this was an error in typing.

(Should be 4998 C.H.B.)

The two specimens 5001 and 5002 certainly are *S. Bebbiana* and probably the variety *perrostrata*. It is separated from the species by leaves less hairy when young and almost glabrous when mature. These leaves only partly unfolded are still somewhat hairy. By the way, No. 5001 has two kinds of galls, a stem gall and a cone gall.

Two two specimens of *S. lutea*, Nos. 5003 and 5004 are interesting and I note that you say they are from the same tree. Evidently there was no staminate plant around because the pistillate flowers are sterile. The leaves on these specimens are almost exactly like the leaves of *S. mackenziana*, a species which has long pedicels under the capsules. In your unfertilized specimens the pedicels are a little longer than in normal *S. lutea* and I suspect that if fertilization had taken place they would have elongated still further. The old puzzle of the real difference between *S. lutea* and *S. mackenziana* still holds.

S. lutea normally has yellow twigs, lanceolate leaves rather sharply serrulate, and capsules with pedicels from 1 to 2 mm. long. *S. mackenziana* normally has dark brown or blackish twigs, oblanceolate leaves often subentire, and pedicels 2 to 4 mm. long. On your two specimens just sent, the two-year old wood is dark colored, the one-year old wood is yellow, and the seasonal shoots are dark again. The pedicels, as pointed out above, are only about 2 mm. long but the capsules were not fertilized and growth apparently stopped. It will take a lot more collecting in that northern area to settle the question of the distribution and ^{relationship} of these two forms.

You have spent quite a lot of money on postage in sending these willows to me from time to time. I would like to repay this indebtedness in some way satisfactory to you. I can send you a bank check or post office money order, or could have some labels printed for you if this would be more satisfactory. I will be glad to know what you think about it.

Cordially yours,

Carleton R. Ball,
Executive Secretary

file

July 19, 1940

Dear Mr. Brinkman:

Your letter of July 13 came promptly and the packet a bit later. It was OK but the thin cardboards had doubled and all that saved the willows from breaking badly was the fact that they were still green and flexible.

I inclose list of determinations. Congratulations of the fine and typical material of *S. pseudomonticola* and the post-grazing woolly shoots of *S. brachycarpa*. These are good finds and about the farthest south away from the Rockies and still in the western plains area.

I have driven around the Handhills but have never been in them. Always those special areas hold the promise of new things if only enough prowling can be done.

Sorry about the road gangs and the destroyed willows. Everyone who collects on highway and railway rights-of-way has that experience and it is truly maddening, - but can't be helped.

More sorry about the climate and the crops and the horse that died. Life is full of troubles, and part of them come because men insist on being brutes. It may be bombs next. There is enough in the world for all if men were willing to share and thus raise the level of the whole.

Neighbors generally rise to any emergency if they really know that it exists and I'm counting on yours to come thro. Have you any Government agency that grubstakes you when in distress? Our Farm Security Admin. is helping to rehabilitate many thousands. It is intended as a suggestion to private agencies and to other public agencies that it costs less to rehabilitate than to allow breakdown and cause relief needs.

Thanks for correction of 4988 to 4995. Will correct the label. That *lutea-mackenziana* mixup is puzzling when only fragments are available. Slowly it will unfold as material accumulates.

\$4.00 → 4.76, Can money

I will tuck in a little M.O. as a token of my regard and appreciation to you for getting what I so much need in order to understand the species and their distribution. I cannot cover the whole earth by myself.

With best wishes, as ever

Cordially yours,

Angel in Alta, *S. pseudomonticola*, *S. brachycarpa*
Carlton R. Ball

Excerpts from letter of Mr. A. H. Brinkman, Craigville,
Alberta, Canada, dated August 5, 1940.

In this connection, perhaps I may venture to ask you to put me in touch with people in Washington. In working it up, I think the final result is this: unglaciated areas in Swan Hills (S. of Lesser Slave Lake), Caribou Hills (~~SW~~ of Alberta), Cypress Hills (Alberta, border of Sask. & Alta.), and possibly S. part of Porcupine Hills (S.W. of Alta.), but there remains the Sweet Grass Hills, and possibly the Glacier Park (Montana).

We have in Canada a splendid series of maps, topographical and in part geological, and many of these have been placed at my disposal. Are there such maps for Glacier Park, Montana, the S. extension of Waterton Lake Park, if my information is correct? This is a distinct floral district, and I expect Glacier Park is part of it, and while Standley's book touches the flora rather completely, I have no topographical or geological map.

Parts of Montana were unglaciated. I really ought to know which parts.

Then there is Sweet Grass Hills. Hitherto I have considered Cypress Hills as sufficient for my purpose, but I feel now that a fuller knowledge of Sweet Grass Hills, of its flora, topography, geology, would help, as undoubtedly from its close proximity to Alta. it must be considered as a centre of plant dispersion after the glacial epochs. But I do not know who to approach. Do you happen to know?

Originally it was thought that an extension of Shantz' work to Alberta might give the necessary details, hence the desire to get hold of his map and book. But it left so very much unexplained that the Glacial Epochs were gone over in an attempt to answer some of the questions, and they did so in part, but still left too many baffling problems unexplained; so next the epochs from the Paleozoic to the Quaternary were gone through, entailing, as you may imagine, quite a lot of reading, and the Paleozoic and Cretaceous seas did provide the answer to a very large extent to the peculiar distribution of plants in Alberta. But a few points, such as the influence of the Sweet Grass Hills and Glacier Park, on the distribution, are still left obscure.

Alta. Can

August 14, 1940

Mr. A. H. Brinkman,
Craigville,
Alberta, Canada.

Dear Mr. Brinkman:

Your good letter of August 5 is just received. I am not attempting to answer it now because some of the things will need to be looked up. I am writing, however, to comment on the willow specimen you enclosed.

In an endeavor to find out just where it and we are "at" I reviewed all my material of *Salix petiolaris* and *Salix subsericea* from Canada. To give a background, I note my observations below:

1. The unfolding young leaves of *S. petiolaris* frequently are more or less pubescent but the leaves usually become quite glabrous by the time when they are first expanded. Your No. 3876 from Lesser Slave Lake shows these pubescent young leaves.

2. When plants are stunted or checked temporarily in growth by defoliation, by insects (and perhaps by mowing, grazing, or drought) the leaves on any new growth occurring later in the season are likely to be very hairy. You will recall the little sandbar willow which you sent last year and the leaves of which were densely silvery white. This was your No. 4988 which I called tentatively *S. exigua luteo-sericea*.

3. There is another species, *S. subsericea* (Anders) Schneider, closely related to *S. petiolaris*. It is somewhat intermediate between that species and *S. sericea*, of which you have specimens. *S. subsericea* differs from *S. petiolaris* chiefly in smaller leaves, more or less pubescent on both surfaces when fully expanded, and also in smaller aments, with shorter, blunter capsules on shorter pedicels. These flower characters, as you will see, are intermediate between those of the two species named. *S. subsericea* is known to occur from New England to Ottawa, Canada, and westward in the United States to Wisconsin and northwestern Iowa. It does not seem to have been reported from western Ontario, Manitoba, Saskatchewan, Minnesota, North Dakota, or Alberta, though I have no doubt that it occurs in southern Minnesota.

dupl in file & *S. subsericea*

- 2 -

In looking through my herbarium material, I find 5 specimens from Saskatchewan and Alberta which deserve attention. Three are from Saskatchewan. My No. 2315 from Burrows has had the earlier foliage eaten off by sawfly larvae and the new foliage is quite hairy on both sides. The specimen is somewhat moldy because I could not press it well while on an automobile trip and it may be that the older leaves were somewhat pubescent also. It looks very much like *S. subsericea*. My No. 2340 from Paddockwood on August 22, 1925, has the twigs and leaves more or less pubescent and probably represents true *S. subsericea*. A specimen collected by A. J. Breitung at McKague in 1937 has young leaves pubescent but the older ones are glabrate.

The two Alberta collections are your own. Your No. 4767 apparently had been grazed or mowed and the young leaves of the new growth are quite hairy. It is becoming glabrate. The capsules and pedicels are about right for *S. subsericea* but the whole plant is abnormal because of its injury. Your No. 4808 apparently is from a normal plant. The full grown leaves are still pubescent on both sides. This looks to me like *S. subsericea*.

Now referring to the fragment you have just sent me. It seems to me to show about 4 inches of old growth on which the leaves are glabrous and about 3 inches of new growth on which the leaves are quite pubescent although the transition is somewhat gradual. This looks like one of those cases where there had been arrested growth in a plant of *S. petiolaris* and then a sudden new growth which was hairy. This may have been the result of drought or some other injury. I would be inclined to think that this specimen is *S. petiolaris*.

What all this tells us is that we need to find and mark some plants on which the leaves are hairy when full grown and then collect flowers and fruit from them during the next season. If you can find your No. 4808 you might be able to collect it, or one like it, again this summer and mark the plant for collecting again next spring. I rather believe that we have *S. subsericea* in that area and in Saskatchewan.

Cordially yours,

Carleton R. Ball,
Executive Secretary.

CRB/lc

March 17, 1941

Mr. A. H. Brinkman,
atta,
Craigville, Canada.

Dear Mr. Brinkman:

Your letter of February 17 and the packet of seven willows sent through Dr. W. R. Maxon of the National Herbarium, I found awaiting me on my return to Washington from a southern trip.

I have examined the material with much interest and care. In order to get a better perspective on the different collections by which we have tried to separate *S. subsericea* (And.) Schneider from *S. petiolaris* Smith, I enclose a more extensive discussion of all the material with reference to what has been said by each of us in correspondence.

4796 *S. subsericea* (probably). See enclosed discussion.

4808 *S. subsericea* (And.) Schn. See enclosed discussion.

5046 *S. petiolaris* Smith. Aug. 25, 1940. See enclosed discussion.

5047 *S. subsericea* (And.) Schn. Aug. 25, 1940. See enclosed discussion.

5048 *S. subsericea* (And.) Schn. Aug. 25, 1940. See enclosed discussion.

5050 *S. discolor prinoides* (Pursh) And. (Section 18.32, 16, W 4, around small slough, Craigville, Sept. 13, 1940). The leaves are lanceolate, short-acuminate, with shallowly crenulate-serrulate margins. These characters indicate the variety *prinoides*.

5051 *S. cordata* (?) Muhl. Around a small slough east side 18.32, 16, W 4, Craigville District, Sept. 13, 1940. (As *S. lutea*?) This plant which you stated to come, with *S. discolor*, from a place which you had intended to search for many years but got there only this year, is both interesting and puzzling. The brownish yellow

- 2 -

branchlets are pubescent to puberulent and this holds true for petioles and bud scales also. These characters belong to *S. cordata* and not to *S. lutea* or *S. mackenziana*. The leaves are somewhat like those of *S. lutea* in being relatively small, rather long pedicelled, and fairly white beneath. *S. cordata* has been found recently in eastern and central Saskatchewan by Breitung and may be expected to accompany *S. petiolaris*, *S. discolor*, and *S. subsericea*. If you can find this plant again we need spring and summer collections from it to be sure of what it is. westward

A change of party in the quadrennial national election means much less now than it did 25 to 50 years ago. There is more continuity of policy and, therefore, of work and personnel than once was true. This probably is caused, in part at least, by the much wider popular discussion of public affairs and, therefore, less stamping of the electorate and less demolition of programs. Ca

I appreciate your discussion of Mr. Breitung and his possibilities. I did not know that he was only 27 years old but was sure that he was relatively young. He is most enthusiastic as you have discovered. How wise he will be in judgments remains to be determined. After I sent him some herbarium material, including specimens of *S. subsericea* from the Rocky Mountains, he sent all of his later collections of *S. pellita* under the name *S. subsericea*. His collections of *S. lucida* have extended its range westward and there is no real reason why it should not penetrate your territory as it has about the same habitat as has *S. serissima* (Bailey) Fernald and, therefore, should be able to range well across the plains area of Canada.

Your reference to your unthreshed crops still snowed in takes me back to similar experiences of my boyhood in the Great Plains area. In the winter of 1880-81 we snowed up for keeps in mid-October before grain was threshed or corn picked. The threshing finally got done but corn picking continued all winter by means of a handdrawn sled and a long handled shovel. Spring came late.

Some months ago you expressed interest in the TVA and accordingly I sent you a few publications on it at the end of last week. I hope they reach you safely.

You have definitely added *S. subsericea* to plants of central Alberta but these western collections serve to raise anew the question of whether this is a distinct species or only a variety of *petiolaris*. In any case, I congratulate you on your collections and also on the possibility of adding *S. cordata*. Only tireless local collectors can ever settle these final field problems.

Cordially yours,

copy in file

Carleton R. Ball,
Executive Secretary

alta

April 4, 1941.

Mr. A. H. Brinkman,

Craigville, Alta., Canada.

Dear Mr. Brinkman:

Many thanks for your letter of March 26 and also the copy of the Hanna Herald for March 20 containing your article on education. I think that I can agree quite heartily with most of your discussion, especially that referring to the difficulties of the English language. I am rather doubtful, however, whether the necessity of eternal compromise on our language is the cause of the more reasonable attitude of the Anglo-Saxon peoples as compared with some others. I think it goes deeper in the germ plasm than that.

I am delighted to know that you will keep in touch with *S. cordata* and *S. subsericea* in the field. This will be helpful to our knowledge. I am never sure that there is any such thing as a typical representative of a species. A species is an aggregate of widely varying individuals. The description of the species, unless it is the restricted and artificial description based on a single type specimen, should show a greater range of characters than will be found on any one specimen. Of course it is true that some specimens occupy a somewhat middle ground between the extremes of expressions and therefore may be average or median even if they are not typical in the sense of representing the type. As a matter of fact, the type specimen is likely to be an extreme because it is the extremes which attract attention and, therefore, the type specimen frequently is not typical in the sense of representing the average.

I note your queries concerning *S. petiolaris* variety *gracilis* Anderson. I do not know what it is. Anderson described it as a species in 1858, as a subspecies in 1867, and as a variety in 1868. I am not sure that it is even a variety.

In general the characters on which it was separated are smaller and narrower subentire leaves somewhat pubescent and not becoming completely glabrous at maturity; short, round or oval pistillate aments more leafy pedunculate than in the species; and longer pedicelled capsules which made the aments very lax. As a matter of fact, one seldom finds

- 2 -

these characters on a single plant. He may find small, narrow leaves on one, subentire leaves on another, leafy, pedunculate aments on a third, roundish aments on a fourth, and longer pedicels on a fifth. I have seen three or four plants out of several hundred which might be referred to this variety. I cannot locate one of yours to which I gave the varietal name. I will be glad if you will let me know its number and where collected.

The last remnant of our mid-March snow melted from my north lawn yesterday. I trust that Spring is coming with you.

I am returning your paper thinking that you probably do not have many copies and will wish to circulate it to others from time to time.

Cordially yours,

Carleton R. Ball,
Executive Secretary

Craigville, Alta
Canada
Dec 27th 1941

Dr C.R. Ball
Washington

Dear Mr Ball:-

Got a card from you yesterday, it is nice to be remembered. I had intended to write you before Christmas, but when I came to hunt up the letter, it was missing, and when I found it, it was too late. I had put it by carefully, too carefully. The card was out of the usual, yet perhaps "inasmuch as ye have done it unto one of these" is a lesson we have to relearn, we have become too material for many years past, and it has only got us into the mess we are in the midst of. It is an awful price to pay for mistakes. Although I got your letter in July, I did not write, as I felt you would be busy during the summer and fall months.

Re colour. I have noticed as you say, the darkening of specimens in the press so much so that some get darker than they do in nature. I see I have made some mistakes I ought not to have made. But then, the willows are difficult to me, until I see them in leaf. The mixing of discolor and "ebbian" means more study. Lutea as a rule is well marked off by the very light wood, which hardly changes colour in the press, the straight habit and usually stipules, sometimes quite large. Ebbians when in leaf is distinct enough, but discolor is less so, though usually the sinuate untoothed edges give it away, but this character is not entirely constant. Thank you for notes on fruits, this seems final. I got as far as Calgary this fall, and saw Mr McCalla, who showed me the list of willows from District 1 (Waterton Lake) it was a very fine list, and seemed to have cleared up some disputed points. His best find was the Western White Pine, the first record of crossing the Rockies that I know of.

I am going again over my notes, and will note all that came from the same bush, all called subsericea, this seems necessary, as apparently they differ. I could have picked out even more glabrous leaves, and with you, it does seem that the western forms intergrade with typical petiolaris. Mr Gayclis is glad to have confirmed. It is not uncommon here, if intergrades are included. The petiolaris named subsericea I rather expected, it was distinctly hairy, but was quite a distance away from the original station. I ought to have written before, but besides having mislaid the letter, I have been busy with some "epatics". Dr Frye is writing a handbook, and got in touch with me over some specimens, and as that was but part of the unpublished material, it meant restudy of some, and revising a species, no less than 7 species had been named "capania irrigua". So it has taken lots of time. Interesting, but time consuming. So now the war we ought to have expected has completed itself, and Uncle Sam is for the present taking a walloping, along with Britain in Hong Kong and elsewhere. And U.S.A. seems as unready as was England, the ways of democracy do not make for speed, whatever the eventual result will be, and I have at least no doubt what the final result must and will be. The Anglo-Saxon race, even if slow, is virile, and very obstinate when roused. But in the meantime we must, I suppose, expect much very unpleasant news. Still, the news from Russia and Libya does counter-balance it; more than that, for after all Germany is the main enemy. Well, I will close, wishing you and yours a new year of fulfilled hopes, and as much joy as is good for you.

Best Wishes

Yours sincerely

A.H. Brinkman

5058 } all from the
5067 } original subsericea
5075 } bush
5076 } from a different station

5068 I am reasonably sure

is the same bush as
originally suggested as pseudomonticola

5054 were all, as far as I could
5055 see from the same bush, but
5064 as that bush was not suggested
5085 there is possibility of error, for
it was intimately mixed with others

I have gone over 5076 again.

It is from the subsericea tree, not of my
specimens are definitely with 5076 subsericea; there is some variation however.

office

ALT 2

February 20, 1942

Mr. A. H. Brinkman,

Craigville, Alberta, Canada.

Dear Mr. Brinkman:

Your letter of December 27 was promptly received but I have not had opportunity to check the different numbers which you recorded as coming from the same plants to the best of your belief. Here are my conclusions.

Nos. 5054, 5055, 5064, and 5085, you thought to be from the same plant stating "but as it was not tagged there is possibility of error for it was intimately mixed with others." My review of the specimens shows that 5054 and 5055 are *S. discolor*, collected at 12-day intervals, 5064 is *S. petiolaris*, and 5085 is *S. Bebbiana* variety *perrotstrata*. As these three species are very distinct at all stages, it is obvious that they cannot have come from the same plant.

By the way, there is no 5054 in the list of determinations I sent you. The first number is 5052, but as there is no specimen of 5052 in the herbarium, I assume that this is a typographical error and that the number should be 5054.

Of numbers 5058, 5067, and 5075 you stated "all from same original subsericea bush." I have gone over 5075 again and it is from this tree. Most of my specimens are definitely silky on both sides, although there is some variation." I had named 5058 as *S. subsericea* and the other two older specimens as *S. petiolaris*. The first number is very young and the unexpanded leaves naturally are hairy. In the other two, the half grown leaves are mostly pubescent above but glabrate beneath. The large aments and the capsules seem to be those of *S. petiolaris* and the juvenile specimen 5058 easily could be.

Of No. 5068, which I determined as *S. lutea*, you say "I am reasonably sure is from the same bush originally suggested as *S. pseudomonticola*." I am not sure what number you mean by the bush originally suggested. Your Nos. 5034 and 5037 of 1940 are *S. pseudomonticola*, but 5068 of 1941 certainly is *S. lutea*.

- 2 -

You state that 5072, *S. subsericea*, "is from a different station than 5056, 5067, and 5075." This would appear to be true as it is somewhat different from the others named.

Of 5064, determined as *S. petiolaris* and discussed at the beginning of this letter, I may say that the half developed specimen with its more or less hairy leaves, rather short capsules, and pedicels of intermediate length, could be *S. subsericea* rather than *S. petiolaris* ^{as} to far as this single specimen goes.

Cordially yours,

Carleton R. Ball,
Executive Secretary

P.S. Where collections are from the same plant, it is better to use the same original number for the collections of later months or years. This ties all collections from one plant together, saves confusion and loss of time, and adds to value. We don't change our names each year.

CRB

Craigmyle, Alta
Canada

Apl 15th 1942

Dr C.R. Ball
Dept of Extension
Washington
D.C

Dear Mr Ball:-

Thank you for yours of Feb 20th.

Re giving same number to same plant. I see your point allright, but would not care to carry out the suggestion. Taife 5054; 5055, 5064, 5085, all thought to be from the same tree, it is bad enough now, but had I labelled them the same number, it would have been worse. I could have, and should have in the case of subsericea put = original number, for there was no doubt about the bus, there being but one, as far as I could determine without digging up. Of course, had I labelled the tree, it would have been best, but usually now either I meet a willow without searching for it, and so have no labels, or else I am unlikely to visit the same spot again.

Re 5068, perhaps I had better drop it, for it was some years ago the first specimen was collected, and again I did not label, but in this case there were distinctly but two trees. By the way, how had I better quote subsericea, as a species? or as a var of *S. petiolaris*? The whole set is distinctly variable. Turner has a similar plant, but in that case, he suggests insect damage, & so it would be quite unsafe to quote.

Later on I got the reprints kindly sent, and I note one addition of the Alberta flora.

Re Dr Setchell. "Should a democracy cherish quantity or quality?" etc, and "Who is seeking to discover and subsidize the superior child singly born?"

This wanted saying, and there is more and more a feeling in this direction.

A radio broadcast from Britain told that there is a vast increase in the schol-
scholarships available for students who would otherwise be unable to enter the higher fields of study, but there still remains another small group of people who mature late, unable to avail themselves early of study, in fact very likely not knowing then their qualities. There is in places, ~~the~~ U.S.A. for instance institutions that do try to develop the adult searcher after knowledge, very much to their credit. I know I could have gone very much further had I had the assistance I could not supply of myself.

Personally (and I think you will agree with me). I think any undeveloped ability is a loss to the nation.

"Native and introduced willows?" This is an inducement for your neighbours to collect. *S. discolor*. A small tree, 2-4 or occasionally 7 cm high. I suppose the cm should be m, for that is the height prevalent here, 1-5 m.

I have at last got the willow list about ready for publication, and I think the Ottawa Naturalist will publish, after it has published the "Floral Districts of Alberta", now in their hands. Persild agrees that should come first, as the willows, and any further lists will, as far as my knowledge permits, have the floral districts appended.

There are one or two bad puzzles, and if you have time some time or other, I would like your advice. The worst, the very worst, is *Glaucops*. It is an holy terror, and then some. Writing to MacCalla, Turner states a set of *Athabascensis* becomes *glaucops* by both Dr Ball & Dr Raup. Then *Glaucops*, Anders was determined as *S. glauca glabrescens*, and to make matters still more mixed, Rydberg's *nudescens* has *S. Austinae*, Rydb and *gl. uocops glabrescens* as synonyms, and in case that is not enough, C.E. Smith of Colorado State college in a letter accompanying some exchange material with MacCalla, states *S. pseudolapponicum* V Seem includes *S. glaucops* of Auct. Authors. So you can see the maze of confusion again. So I would like to know where *glaucops* is, and if *glauca glabrescens* still holds good, or if transferred to *glaucops*, does *glauca* and vars *acutifolia* and *poliofolia* still hold good. That is the worst muddle, but there are others.

(See over)

There is one problem that has to be continuously considered when giving any list of Alberta plants, and that is the handbook that is being used. As Rydberg is the only book that at all properly covers the district, it is Rydberg that has been, and is being used, and any list should therefore refer to any records specifically referred to by Rydberg as occurring in Alberta. For botanists rarely study one group alone, willows, or grasses, or carices are studied along with the other groups, as found. Take pellita, recorded by both Farr & Rydberg, (cannot find in Macoun's catalogue). In Abram it is referred to as a synonym of subcoerulea, should that synonym be placed alongside subcoerulea? Then there is sitchensis. It could grow where found, Jaggan, as that is not far across the Rockies, not further than in W. Montana. While Macoun lists var. as just across the border on the Kootenai Pass. Should that have the same note as subcordata? Not known in our territory? I think you must have examined the plant, for I remember some notes by you, buried amongst my correspondence, I expect. Then what is one to do with desertorum? Polunin brings it under cordifolia as a synonym, remarking in his notes that cordifolia-brachycarpa, glauca are an intergrading group. If dropped, what note should be appended? It does not seem well understood, anyhow, you treat Austinae different to Rydberg, as noted above. Should nudescens have a synonym, or what?

Which is correct, pyrifolia or balsamifera, and which is the synonym? Polunin brings under angustartica the anglorum group, as one species with varieties, has that been generally recognized. He is funny in a way, lumping some groups, and finely dividing others, one can but notice it.

By the way, is And. Anders, Andersson the same?

~~Polunin seems to include~~

Raup asked for loan of Athabascensis material, also discolor and hebecarpa. The Athabascensis is not that species, so I am deleting that species from the list. hebecarpa he calls either farrae or another, and as the Athabascensis material is also Farrae, it looks as though both may be the same, tho I do not think so.

In using column 7, should I use the same letters as for Macoun's catalogue, they seem to be possibly the same plants, as say cordata and conticola, and others. Or would it be wise to drop column 7 entirely.

Should Abram's list be underlined, seems as though they should. It is useful because of the illustrations, and the synonyms.

Spring here at last. Son working on land, self getting garden ready. Among other things. I hope willow list is published, and published as typed, for it will then be a reference for future work. It really does tell a lot. I am supposing I sent you a copy of floral districts, but for the life of me I cannot remember for sure. All I sent were typed, so I had to limit my sending. It makes a lot of work to type several sheets.

Well, the war, the very unsettling war goes on its course, and one thing it seems to be doing is to cause the democracies to question their democracy. There is more work to be done on the formulating of a future democracy, and the longer the war lasts, the more it will be altered. I think many things have gone for good. Among others, the despoilation of the native races, though there has been a great improvement in recent years in the treatment meted out to them. But you cannot have a profit making system without exploitation, the two go together, and the industrialist who would act fair is likely to be frozen out by the unfair unscrupulous industrialist. I hope I am permitted to last till the war is over, to see what does occur.

For the time, adieu, with best wishes from

Yours sincerely

A. H. B.

It is to be hoped I am not catching you when you are entirely unable to spend any time to answer the numerous queries, but I hope it will be the last, at least as far as the list goes,

A. H. B.

Alta

WILLOWS OF CRAIGMYLE DISTRICT, SOUTH-CENTRAL ALBERTA, CANADA

Collected in a swampy draw,, S.W. 27. 32. 16. W 4 in May-June, 1942

By A. H. Brinkman

Mr. A. H. Brinkman,
Craigmyle, Alta., Canada.

April 26, 1943

Dear Mr. Brinkman:

After 8 weeks in hospital, I have been home a week and am working over the mass of accumulated correspondence and material. Your letter of March 22 and packet of willows have had a long wait. I'm sorry but now they're done.

5139. *S. candida* Fluegge. May 13. (Pist. fls.; leaf buds just opening)
5140. *S. petiolaris* J. E. Smith. May 13. (Pist. fls. & tiny leaves. Can be distinguished from *S. Bebbiana* & var. by black scales See note below)
5143. *S. Bebbiana* var. *perrostrata* (Rydb.) Schn. May 19. (Pist. fls & tiny lvs)
5146. *S.* " " " " " " (as last but younger)
5147 *S.* " " " " " " May 27 (Yg frt & lvs.)
5148 *S.* " " " " " " " " (Stem fls & yg lvs)
5149. *S. candida* Fluegge. June 6. (Yg frt & yg lvs.)
5150. *S.* " " " 6. (Pist fls & half-grown lvs)
5151. *S. Bebbiana* var. *perrostrata* (Rydb.) Schn. June 6. (Frt & Half-gr. lvs)
5159. *S. planifolia* Pursh. June 8. (tending toward var. *Nelsoni* Ball by narrower lvs. but cannot be sure)
5188. *S. McCalliana* Rowlee. June 14. (Fruit & half-grown leaves).

You have done a splendid job on these specimens for every one is named correctly even if you had one or two doubts. You are a real salicologist now.

By the way, your 5140, *S. petiolaris*, consists of two twigs, the larger being this species. The small carries four fruiting catkins but no sign of leaves yet. It is *S. discolor* Muhl., which you have collected several times before and I think that one of your specimens (no. 4805) came from this same draw. If your remaining specimens of 5140 do not contain any of this discolor mixture, I will be glad to return this twig to you.

Your letter does not say that I am to keep the specimens and you know that I will be glad to return any or all of them on request.

Break weather and long-continued cold are not confined to Alberta. Here March was warm and spring-like, reaching 82 degrees on March 31. April has been cold and March-like, with frosts and 1 inch of hail on April 20. Fruit buds severely injured in E. and SE. US. and early spring vegetables on Gulf Coast.

Greatly ashamed to find that apparently your long letter of April 15 1942, remains unanswered. Will give the best suggestions possible and inclose with this before mailing.

With personal regards and best wishes, I am
Cordially yours

Carleton R. Ball
Executive Secretary

dupl in file & Alta

April 26, 1943

Mr. A. M. Brinkman,
Craigville, Alta., Canada.

Dear Mr. Brinkman:

As I said earlier today, in my reply to yours of March 22, I am greatly ashamed that your long letter of April 15, 1942, remains unanswered. I'll do my best now and hope it helps a little.

"*S. glaucops* Anderss." If I were you I would simply enter it under this quoted name and state that it represents a complex of which *S. desertorum* Richardson is the earliest name. Pending determination of the form represented by the very juvenile type of *S. desertorum*, it seems best to lump it as "*S. glaucops*". Then you could cite the various specific and varietal names which have been applied, just for good measure and to help novices. *S. nudescens* Rydb. is one more synonym in the mess.

S. glauca L. of the far Northw. (Alaska, Yukon, and No. B.C.) is a distinct species, altho closely related. Its var. *glabrescens* probably is good, as there is a glabrate form. I am doubtful of Schneider's var. This species does not come into Alberta, if I recall correctly.

"*S. pallita*" as applied to far western specimens, is a mistake for *S. subcoerulea* Weyer or for the narrow-leaved var. (unnamed) of *S. Drummondiana*. True *pallita* occurs from Sask. eastward. It is not a synonym of *S. subcoerulea*.

S. sitchensis has not been found in Alberta, so far as I can recall without going through all the collector's notes.

Andersson is correct spelling; Anderss., Anders., & Ands. & And. are abbreviations used commonly.

Farrae is not related to *S. hebecarpa*. *S. Farrae* is completely glabrous whereas *S. hebecarpa* (whatever it is) has pubesce on branchlets and capsules.

I probably mixed specimens of *S. "glaucops"* and *S. sthebasensis*. Have not had time to study the latter carefully.

Pollinia, knowing nothing of American willows, mixed things up for fair. Some of his novelties probably are valid but his discussion of relationships of groups is punk. *S. cordifolia* and vars. are abundantly distinct from *S. brachycarpa* and vars. *S. arctica* and vars. are distinct from *S. angulorum* and vars. No one else lumps them.

S. arctica var. *subcordata* is a doubtful var. but I have maintained it pending final conclusion when monographing.

S. pyrifolia Anders. 1867 is antedated by *S. pyrifolia* Schleicher, 1815. *S. balsamifera* ~~Anderss.~~ (Hooker) nomen nudum was published by Barratt in Hooker Fl. Bor. Am. 2:149. 1838, as synonym of *S. cordata* balsamifera Hook. *S. balsamifera* is used both by Gray, Urb. and Britton & Mammal and presumably should be used. I may have been careless in using the two names.

Hastily but cordially yours
Carleton R. Bell

Craigville, Alta
Canada

May 4th 1943

Dr C.R. Ball
Dept of Extension
Washington
D.C.

Dear Mr Ball:-

I was very glad to hear from you. The last from your secretary told of you being in the hospital, but on the mend, and I wondered if all was well with you. Apparently you are well back to your old feelings of health, and of interest in the willows. I know there are many of us who would miss you, we have come to depend upon you so much with critical specimens of willows. That is aside from the personal feelings of at least some of us, who think of you as a very fine gentleman.

Thank you for the commendation re willows. I am not likely to think of myself as well versed in willows, and am well content if I can master to a large extent the willows of this locality. Yes, the willows were meant to keep, but I am enclosing one with this that I should like returned, as it is my only specimen of a critical species. Named by Dr Senn as *lucida*, I doubted its correctness after your experiences with the *lasiandra* complex, so asked Dixon for a specimen, and he spared me enclosed. I make it *lasiandra lancifolia*, and not *lucida*. And if you have spare material of *caudata* and its var *parvifolia* I should like to understand it, as it comes within 3, but not, I think, anywhere else but the boundary of 3. I am enclosing my only copy of the last list, which I hope will be final, the original is with Ottawa (Canadian Field Naturalist) and until (if) published I am without any copy when I let this go, so please return when finished with. There is only one difference with your notes I am treating *desertorum* for the time being as a form or var of *glauca*, following Raup's notes, the only notes dealing with the subject available to me till receipt of yours. You will notice I have treated *alsamifera* as the correct specific name, and *pyrifolia* as a synonym.

In your letter answering mine of Apr 15, 42, you speak of monographing, I do hope this means you are monographing the willows. It would be most lamentable if the call came and your vast store of willow knowledge was lost to us. That sort of thing has happened before.

Re Polunin. I am inclined to be doubtful of any authority who creates vars and forms, and yet lumps species recognized pretty generally. I have this sort of problem with *epaticas*, and frankly, it annoys me. So I can agree with your conclusions re Polunin. One mistake many (or at least some) of our younger workers is making it to use various authorities for the same groups, not difficult in these times of revision of so many groups, and all it does is to get them in a mental muddle. By the way, I got an interesting plant from Breitung (who by the way has been called up for service) it was a monocious specimen of *perrostrata*, I was glad to get hold of this. Suggests the willows may have developed from such a group, before becoming strictly dioecious, as all known to me are now. And now another problem. You will notice I have included *glauca acutifolia*. If you look up your 1928 list to me you will find listed under Nordegg district "3726 S *glauca acutifolia* (And) *Sphagnum muskeg*, near Sunbeam cabin, Nordegg river, July 28." I have used this as my authority for including var *acutifolia* in list, while Raup also evidently collected this var ~~also~~. The *myrtillifolia* var was left unlisted, as nothing was heard about it (3346 S *myrtillifolia* var" and notes thereon.

And please, you do not have to apologize for delay in answering; surely a man has a privilege to be sick on occasions, and that, be allowed for by all concerned; rather let me thank you for, at so early a date after leaving hospital, your going over the list and questions. You will note the floral districts being used and the short explanations. Criticism is in order. This is really an extension of the work of Shantz. Well, I had better quit

With best wishes and regards

Yours Sincerely

A. A. Linkman

From your description of weather at Washington it is evident we had no monopoly on all the bad weather going around, but that you also have your share.

May 31, 1943

Mr. A. H. Brinkman,
Craigmyle, Alta., Canada

Dear Mr. Brinkman:

I am taking a little leave from office and have tried to go over your list of Albertan willows and to make such suggestions as occur to me. Here they are.

Corrections in names used and in Punctuation:

- S. caudata* var. *Bryantiana*, not *Bryantica*
S. fragilis L preferable would be followed by the word "Introduced".
S. melanopsis tenerrima should follow var. *Bolanderiana*
S. pseudocordata (And.) Rydbg. and *S. pseudomyrsinites* are the same plant.
S. balsamifera (Hook.) Barr. should follow *S. pseudocordata*
S. anglorum var. *araioclada*, not *aireoclada*
S. arctica Pallas has no indication of mention by the various authors
S. brachycarpa var. *autimima*, not *antimima*. Should be first variety
S. glauca and vars. Have not had time to check but is not most of this material referable to *S. "glaucopa"* Anders.?
S. pseudolapponum, not *pseudolapponicum*. This and *desertorum* are in "*glaucopa*"
S. candida "*parvifolia* Ball" There is no such var. but a var. *denudata* Anders. and a var. *tenuescens* Fernald
S. arbusculoides you state includes *S. saskatchevana* (not *wana*) in Rydberg but *S. saskatchevana* is a pure synonym of *arbusculoides*

Suggestions as to Arrangement:

All writing is for the reader. The A, B, C's are accuracy, brevity, and clarity. The reader should be able to get the facts as easily as possible. It seems to me that your tabulation makes it just as hard for the reader as possible. In the first place you have arranged the data in 14 numbered columns and every time a reader wants to know what one or 7 or 14 of those columns mean he has to go hunting in the text. (See my suggestion below). In the second place, you have about 35 letters in these 14 columns, in addition to "x". That gives the reader about 50 items to hunt up elsewhere every time he wants to use the table. Readers just won't do that, and ought not to be asked to do it. In the third place, you have 14 citations and 11 floral districts all indicated by the same arabic numerals. This is confusing.

I suggest that you draw vertical lines to separate the 14 columns of cited authors. This will insure that you and the reader do not get over into the next column occasionally. The put the name of the author (1. Macoun / 2. Rydberg) etc vertically at the top of the columns on each page. The reader, at a glance, can see who or what is the authority cited.

Your 35 lettered footnotes could be omitted entirely from the columns, or reduced to 3 or 4 in number. For example: a, listed as a variety; b, listed as a species; c, listed under another name; d, mistaken identity and not known in Alberta.

I doubt if you need footnote d because the species not known to occur in Alta., if included, would be in parentheses and all that would be explained in the text.

If you used just a, b, and c, they would appear at the bottom of each page, below a horizontal line, and a single glance would tell the reader what each meant as he met it in the columns.

If this plan is used, you would insert, under the discussion of Macoun, Rydberg, etc., what name each used in the cases covered by footnote a.

I feel strongly that merely to list the floral districts in which each species and variety occurs does not tell the reader very much, especially if no map of the districts is given.

I would suggest another table, with the vertical columns numbered and named for the 11 floral districts. In the columns I would insert a symbol showing the occurrences in that district. These symbols could indicate relative abundance of the species and varieties in the districts where they occur. For example: a, abundant; c, common, s, scattered; r, rare. These are mere illustrations but you would pick the classification of occurrence which suited you.

The descriptions of the floral districts could well contain some general information on elevations, or references to the vegetational zones.

I forgot to note above that *S. Lyalii* should be *S. Lyalii*.

In your list of authors and institutions (Nos. 1-14), each should be one numbered paragraph instead of the present 1-line designation and that a second set of descriptions thereafter.

By the way, you mss. fails to list footnote i, although in the columns there are more capital I's than any other symbol except x. In fact, most of the entries in columns 11 and 12 are I. Footnotes G and K are the same.

In my recent letter I neglected to answer your March inquiry about *Salix erythrocoma* Andersson. I do not know what it is and doubt if there is any certain way of finding out. Of course, it is some member of the *Lucidae*, and could be *S. lucida*, *S. serissima*, or perhaps another.

I am inclosing your 5-page list and also the 3 pages of discussion, as I assume you wanted it all returned.

I hope that some of the suggestions made will be of use to you. I am so rushed that I cannot give the time which the subject really requires if one is to do a good job.

Hoping that the spring has been better than the winter, I am

Cordially yours,

Carleton R. Ball
Executive Secretary

SALIX SPECIES AND VARIETIES OF ALBERTA, CANADA

Brinkman, J. H.

May 31, 1943

Spp. and varieties

	Macoun	Rydb.	Abrams	Ball	Britt.	Sutton	Gray	MacDougal	Walters	Chapman	Schubert	
	1	2	3	4	5	6	7	8	9	10	11	
caudata (Mutt. Heller)	a	b	x	x								a, as S. lucida
Bryantiana Ball & Br.				x								b, as <i>fundulicarpa</i>
parvifolia Ball				x								c, as lasiandra var.
lasiandra Benth.		d	x	x	x				x		x	d, as S. Lyalli
Abramsi Ball				x								
lanceifolia (And.) Debb			x	x								
sericea (Ball.) Fern.	a			x	x		x					
amygdaloides Andersson			x	x			x					
exigua Nuttall			x	x								
lutescens (Rydb.) Sch.				x								
interior Rowlee	e			x								e, as longifolia
pedicellata (And.) Ball	e	f		x			x					f, as linearifolia
melanopsis Nuttall			x	x								
Farrii Ball		g	x	x								g, as S. curtiflora
microserrulata Ball				x								
lutea Nuttall	h	x	x	x	x							h, as S. cordata
mackenziana (Hook.) Barr.		x	x	x	x							
myrtilloides (Andersson)	x	x		x	x							
monochrysa Ball				x								
pseudomyrsinites And.		x	x	x		x					i	i, as pseudocordata
Barclayi Andersson				x								
hebecarpa Andersson				x								
rotundifolia "				x								
commutata Debb			x	x		x						
pseudomonticola Ball		k	x	x		x	x					k, as S. monticola
helmsii (Barratt)	l			x			x					l. As S. speciosa
alutensis (And.) Coville				x								
Barrattiana Hooker	x	x		x								
angustifolia And.				x								
nivalis Hooker	m			x								m, As reticulata pt
saximontana Kms Rydberg				x								n, as nivalis var.
vestita Pursh	x			x								
erecta Andersson				x								
athabascensis Raup				x								
pedicularis hypoglauca Fernald				x			x					o, as S. myrtilloides
caudata (Mutt.) Heller												
anglorum Chamisso	q			x								q, as S. Brownii
arioclada Schneider				x								
arctica Pallas				x								
petrophila Rydberg	r			x								r, as arctica petraea

	1	2	3	4	5	6	7	8	9	10	11	
<i>brachycarpa</i> Nuttall	s	x	.	x	x	x			x	x	x	s, as desertorum
<i>glabelliparva</i> Schm.				x					x	x	x	
<i>Sansoni</i> Ball				x		x			x	x		
<i>glauca</i> L. Schm.	t	u		x	x	x			x	x	x	t, as glauca villosa
<i>glabrescens</i> (And.)				x	x	x			x	x	x	u, as S. glaucops
<i>pseudolappomum</i> v. Seem.				x		x				x	x	
<i>MacCalliana</i> Rowlee		x		x	x	x		x	x	x	x	
<i>candida</i> Fluegge	x	x		x	x	x			x	x	x	
<i>artusculoides</i> Anders.	x	xv		x	x	x			x	x	x	v, incl. saskatchavari
(<i>bella</i> Piper) *			x								x	
<i>Drummondiana</i> Barratt	x	x	x	x		x				x	x	
var. unnamed				x		x				x		
<i>petiolaris</i> J.E. Smith	x			x	x				x			w, as var. rosmarinoides
<i>subcoerulea</i> Piper			x	x	x					x		
<i>planifolia</i> Pursh		y	x	x	x	x			x	x		y, as chlorophylla
<i>Nelsoni</i> Ball		a		x		x			x	x		z, as var. monica
<i>discolor</i> Muhl.				x	x				x	x		a, as species
<i>prinoides</i> Pursh		x	x	x								
<i>Seculeriana</i> Barratt		x	x	x	x	x			x	x	x	
<i>costanea</i> Ball				x		x						
<i>Bebbiana</i> Sargent	b	x	x	x	x	x			x	x	x	b, as rostrata
<i>perrostrata</i> (Rydb.)		c		x	x	x				x		c, as species
Schm.												

Craigville, Alta
Canada

June 3rd 1943

Dear Mr Ball:-

Thank you for yours of 27th ulto.

Glad I was right so far, that 1724 was not *S. lucida*. In placing with *lasiandra*, the peculiar bracts at the base of leaves influenced me, the gland tipped somewhat long crenate bracts seemed rather to belong to *lasiandra* than to *caudata*, but then, as I stated, I do not know *caudata*.

Thank you for list of *caudata* and vars. All apparently occur either in the cordilleran or the long grass (I am supposing district 1 to be allied to cordilleran) with the possible exception of Cardston, which if West would be in the long grass, but if east could be in the short grass, all seem to be in, or in the vicinity of, the cordilleran of Parkland, the long grass being in each case, I think, marginal to the other two.

The list you can keep, if interesting, for I have since received a copy that I was not too sure of receiving, and that makes the one sent you a spare. Since writing you I have come across one little puzzle that I might as well send along now, for if put by it will be next winter before it is dealt with.

5366 *S. lutea*, sent because it is sufficiently different from the other local plants to raise the question as to whether it may be one of the vars of *lutea*, of which I have no description, probably just a form of *lutea*. 5367 I thought at first might be a narrow-leaved form of *discolor*, but I think it must be just our old friend, *petiolaris*. 5368 could be the same, but I am not satisfied it is, in fact both seem just enough different to raise doubts as to what they really are. 5371 I do not think I have sent a male *lutea* before, hence this. 5369 is *planifolia*, I think it is the original (first) find of this species, but the capsules show typical, I do not think the first was fruiting.

OK 5355 is, I think, just an old friend, *bebbiana perrostrata*, but it seemed different when collected. The other, I am calling *alba vitellina*, it is a plantation tree, rarely an escape, and could, of course, be anything. = *S. fragilis*
Well, spring is here, but one could hardly guess it, it is so cold, and we are still unthreshed. Such is life on the farm. Hope all is well with you, and that you are your old self again.

Respects and regards

Yours Sincerely

5366
A. S. Munckman

Craigshyle, Alta
Canada
June 11th 1943

Dr C.R. Ball
Dept of Extension
U.S. Dept of Agriculture
Washington
Dear Mr Ball:-

I thank you for yours of May 31st.

I have corrected the mistakes pointed out in a new list, - a copy of which I enclose for your keeping.

S. candida parvifolia was on Sanson's list, this has been deleted.

S. "glaucops" Anders has been made to include *glauca glabrescens*, which it evidently does, but the other vars mentioned by you are left standing.

Re columnning. The copy was sent you in a hurry, and so not columnned and headed as should have been the case. I have followed your suggestion by columnning and heading each page, making the reading that much easier.

The references by letter. I can see no better way to put in a compressed form what references are to be made, and presumably where to be found.

The small savings I could make would not make much difference, as they are too often different in some little way. While I should have liked to put the notes under each page, that presupposes that I know just what each page will be when printed (if) and I do not know this, so could not so arrange.

As stated, the fuller description with maps has not been printed, which is not my fault, but I have extended the descriptions somewhat following your suggestions. As to abundance, I should like to add this, but it presupposes a knowledge I do not possess; true, I could come very close, but it would not be as definite as I should like. I can only speak with some authority of the willows of my own district. I have widened slightly the floral districts descriptions to add elevations of Alpine and subalpine, the others follow from these.

Also I have added a few notes widening the others. While a fuller list of plants could be thought desirable, as a matter of fact it is rather surprising how much the trees do tell and separate, and I doubt whether any further list would be justified, especially as I suppose the original descriptions with maps will ~~eventually~~ eventually be printed. As you will note, x refers to those species examined by you, and 1 to those not examined, or not specifically noted as examined, for instance column 1 is duplicated in column 10, and so is probably examined by you, and column 2 is naturally examined by Rydberg. I doubted up to the last whether it was wise to add column 7, but it contained some early references to misidentifications that had some value.

I am returning a copy enclosed with original letter from you. The original I am keeping. Canadian Field Naturalist, page 153, Nov 1926.

Blades hairy, gray, opaque.

Blades short pubescent, subentire

Blades glabrous (or thinly villous when young) green, translucent, denticulate.

Blades 1-6 mm wide

exigua
interior
var pedicellata.

When gathering for exchange I met what I thought was *pedicellata*, but as it has quite entire leaves, is *opaque*, (leaves with a tendency to be cucullate) I thought I may have found *exigua*, anyhow, I enclose a small specimen enough for a determination. I have ample material, so will send on in quantity later on. For comparison I gathered (2 days later) a plant already named *pedicellata*, which shows the plane, translucent, denticulate leaves described. That is also in quantity. While 2 days later, it is probably 2 days earlier, being in water, ~~was~~ while ? *exigua* was elsewhere on a bank not in or near water.

I also found a pretty *lutea*, with full capsules, but it has long reddish petioles which make it look really pretty when growing. Material can be sent on later. Not threshed yet, and about 1 inch of rain 2 days ago. Such is life. Hope all is well with you.

Respects and best wishes

Yours Sincerely
A. A. Linkman

Salix species and varieties of Alberta, Canada
Species and varieties

11-VI-43
From A.H. Brinkman
floral
districts

	Mason's Bot	Rydborg	Abrams & Co	Ball Hort	Brinkman	Sanson	Farr	McCalla	Wm of Alta	Stano	Schreider	Raiph	Dixon	Turner	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
caudata (Nutt) Heller.	a	b	x	x				x	x	x	c				1-3.
Bryantiana Ba., & Br.			x	x						x					3
parvifolia Ball.			x	x		x			x	x					1-3.5.
lasiandra															
lasiandra Benth.	d		x	x	x			x	x	x	i	i	x	x	1.3-6.8.9.11.
Abramsii Ball.				x		x									5.
lancifolia (And) Bebb.			x	x		x		x	x				x	x	3-5.9.
serissima (Bail) Fern.	a			x	x	x		x	x	x	i	i	x	i	1.4.5.8.9.11.
amygdaloides Anders.			x	x				x	x	x	i		x		1.3.
fragilis L. (introduced)				x	x				x						2-4.9.
exigua Nutt.			x	x					x		i				1.2.4.
lutescens (Rydb) Schn				x					x						1.3.
interior Rowlee	e			x	x	x	i	x	x	x	i	i	x	x	1-6.11.
pedicellata (And) Ball.	e	f		x	x	x		x	x	x	i	i	x	x	2-4.9.11.
melanopsis Nutt.			x	x		x		x	x	x	i				1-6.
melanderiana (Rowlee) Schn			x	x		x		x	x	x	i				2.
teneriana (Anders) Ball.				x		x			x						3-5.
Farrae Ball.	g		x	x	x	x	i	x	x	x	i	i			1.2.5-7.11.
microserrulata Ball.				x		x		x	x	x					5.
lutea Nutt.	h	i	x	x	x			x	x	x	i	i	i		1-5.9.11.
famelica Ball.				x		x									5.
(cordata Muhl)							h1								
Mackensiana (Hook) Barr.	i		x	x		x		x	x	x	i	i	i		1-5.6.9.11.
myrtillofolia Anders.	i	i		x	x	x		x	x	x	i	i		x	1-5.6.9.11.
monochroma Ball.			x	x		x		x	x		i				4.6.8.9.11.
pseudocordata (Anders) Rydb.	i		x	j	x	j		x		x	i				1.5.
balsamifera (Hook) Barr.			x	x	x			l	x	x		l	x		1-6.8.9.11.
Barclayi Anders.			x	x		x	i	x	x	x	i				1.5.6.
hebecarpa Anders.				x						x					
rotundifolia Anders.				x						x					
commutata Bebb.			x	x		x		x							1.5-7.
denudata Bebb.				x				x							1.5.
pseudomonticola Ball.	k		x	x	x	x	k	x	x	x		i	x	x	1-6.9.11.

species and varieties

No 2

11-51-43

from H. Brinkman floral district

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	<i>Macmis lat</i>	<i>Rydgberg</i>	<i>Cham's Flora</i>	<i>Hert. & R. Hall</i>	<i>Brinkman</i>	<i>Sanson</i>	<i>Farr</i>	<i>McCalla</i>	<i>None of allerts</i>	<i>Stans</i>	<i>Schneider</i>	<i>Raiph</i>	<i>Diakon</i>	<i>Turner</i>	
<i>alaxensis</i> (And) Coville.	m			x	x	x			x	x					5.6.8.
<i>obovifolia</i> Ball.				x											6.
<i>Barrattiana</i> Hook.	i	i		x		x	i	x		x	i				5-7.
<i>angustifolia</i> And.				x		x		x	x						5.6.
<i>nivalis</i> Hook.	n	i	x	x		x	i	x		x	i				1.5-7.
<i>saximontanum</i> Rydb.		i	x	x			i	x		x	o				5-7.
<i>vestita</i> ex Pursh.	i	p	x	x	x	x	i	x	x	x					1.5.6.
<i>erecta</i> Anders				x		x		x	x	x	i				5.
<i>pedicellaris</i>															
<i>hypoglauca</i> Fern.	q			x	x				x	x		i	x	i	3.8.11.
<i>tenuescens</i> Fern.												i			11.
<i>anglorum</i> Cham.	r			x		x		x		x					6.7.
<i>araioclada</i> Schn.				x		x		x	x	x	i				
<i>kophophylla</i> Schn.				x		x		x							7.
<i>Athabascensis</i> Raup.															
<i>arctica</i> Pallas.				x		x		x				i			5.11.
<i>subcordata</i> (And) Schn.		i		x				x							6.
<i>petrophila</i> Rydb.	s		x	x	x	x	i	x		x	i				5-7.
<i>brachycarpa</i> Nutt.	t	i		x	x	x		x	x	x	i		x		1.3-5.
<i>antimima</i> (Schn) Raup.												i			11.
<i>glabellcarpa</i> Schn.				x				x	x	x	i				4-6.
<i>sansoni</i> Ball.				x		x				x					5.
<i>glauca</i> L.	u	v		x		x		x	x	x	i	i			5-7.9.11.
<i>acutifolia</i>					x							i			5.11.
<i>polifolia</i> (Schn) Raup.												i			11.
<i>desertorum</i> Richards.	i						w					y			6.11.
" <i>glaucops</i> " Anders.	i			z	x	x		x	x	x	i	i		x	3.5-7.9.11.
<i>pseudolapponum</i> V Seem.				x						x	i				7.
<i>McCalliana</i> Rowlee.	i			x	x	x		x	x	x	i	i	x		3-5.9.11.
<i>candida</i> Fluegge	i	i		x	x	x	i	x	x	x	i	i	x	x	1-6.9.11.
<i>arbusculoides</i> Anders	i	zz		x	x	x		x	x	x	i	i		x	4.5.8.9.11
(<i>bella</i> Piper)		i									i				

Species and varieties

No 3

floral district

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Macoun's cat	Lyallii	Albani flora	Hark & R. Hall	Brinkman	Sanson	Farr	McClellan	W. of Alberta	Ottawa	Schneider	Ramp	Down	Turner	
(sitchensis Sanson.)						B	B								
(Drummondiana Barr.)	i	i	x	x		x		x	x	x	i				1.5.6.
(Austiniae Bebb.)		C													
petiolaris J.E. Smith.	i			x	x			x	x		D	i	x		2.4.6.9.11.
gracilis Anders.				x	x										3
subsericea Anders.				x	x										3
subcaerulea Piper.			x	x	x	x		x	x	x		i			1.5.8.11.
planifolia Pursh.		E		x	x	x		x	x	x	F	i		x	3-5.8.9.11
Nelsoni Ball.	G			x		x		x		x		i		x	4.5.11.
discolor Muhl.				x	x			x	x	x			x	x	1-8.8.9.
prinosides Pursh.				x	x				x						3.
Scouleriana Barr.		i	x	x	x	x		x	x	x	i				1.5.9.11.
ceetanea Ball.				x		x									5.
Bebbiana Sarg.	H	i	x	x	x	x	i	x	x	x	i	i	x	x	2-5.8.11.
perrostrata (Hyd.) Schm	K			x	x	x		x	x	x			x		2-5.9.

a as S lucida	m as S speciosa	z is glauca glabrescens
b Fendleriana	n reticulata pt	zz is S saskatchewanensis
c lasiantha var	o nivalis var	A not known in Albert
d Lyallii	p Fernaldii	B probably Drummondiana
e longifolia	q myrtilloides	C not known in Alberta
f linearifolia	r Brownii	= Lemmonii
g curtiflora	s arctica petrea	D as var rosmarinoides
h cordata	t desertorum	E as S chlorophylla
hi is S lutea	u glauca villosa	F as var monica
j as S pseudomyrsinites	v glaucops	G as species
k monticola	w stricta	H as S rostrata
l pyriformis	y glauca forma	K as species

Column 1 is Macoun's Catalogue of Canadian plants, parts 3 & 5. From A.H. Brinkman

- 2 Rydberg's Flora of Rocky Mountains and adjoining plains, species specifically mentioned as occurring in Alberta mostly.
- 3 Abram's Flora of Pacific Coast.
- 4 private herbarium of C.R. Ball.
- 5 Collection of A.H. Brinkman
- 6 Rocky Mountain Museum at Banff, mostly collections of N.E. Sanson.
- 7 Rocky Mountain Flora, Miss E.M. Farr, Botanical Laboratory of University of Pennsylvania.
- 8 Collection of W.C. McCalla.
- 9 University of Alberta, mostly collection of E.H. Moss.
- 10 National Museum at Ottawa
- 11 Schneider's critical notes, various.
- 12 Collection of H.M. Raup.
- 13 Collection of R.M. Dixon.
- 14 Collection of G.H. Turner.

Mr Brinkman's collection is from Long Grass Prairie, Parkland, and Cordillera from near Macleod to Lesser Slave Lake

Mr Sanson's collection is mostly from a wide area around Banff, from the Cordillera to the Alpine

Mr McCalla's collection is mostly from Banff, Edmonton, Waterton Park, Calgary and Jasper Park districts 1-7, less 2.

Mr Moss' collection is mostly from Edmonton, Waterton Park, Jasper Park and Peace River Block, floral districts 1-6.

The Ottawa material covers a series of botanical collections from Macoun to Halte and onwards, and covers nearly all the territory from 1-10 districts.

Mr Raup's collection covers the Peace River Basin, Wood Buffalo Park and the Athabasca Lake regions, districts 5, 6, 11, nearly all the No 11 district being his, Material at Arnold Arboretum.

Mr Dixon's collection is from Lacombe, Macleod and Waterton Lake districts, Nos 1, 2, 4.

As the collections cover literally thousands of plants, citations, even if possible, would occupy too much space, and would not have better helped the purpose of this paper, which is to give a list of the known willows of Alberta, by whom collected, as far as possible in which floral districts, by whom named, and where the collections are to be found. As however the very large majority of the plants have passed through the hands of Dr. C.R. Ball, there should be a general unity of naming, and an x has been used to denote those species passing through his hands. Dr. H.M. Raup is the authority not only for collecting, but for determining those plants shown in column 12, and a few others. These are shown by i, as well as those in columns 1, 2, 7 & 11, though column #1 one is really duplicated in column 10.

The critical notes are almost entirely the work of Mr Ball, only those few being added that were necessary to show those species listed for Alberta by Rydberg and Farr, and even those have mostly been in correspondence with Mr Ball. As Rydberg's Flora is the only one readily accessible which covers Alberta comprehensively, this procedure seemed advisable.

As can therefore be seen, the work is mostly that of Mr Ball, whose ungrudging help in many directions the writer wishes to gratefully acknowledge.

But in the part I have covered I have had the fine co-operation of the persons concerned, to whom I wish to tender my thanks. It is hoped this list will serve as a basis for future work on the willows of Alberta. Not all the problems have been solved, one notably remaining ~~is the~~ for final decisions is the glauca complex, covering S glauca and its varieties, desertorum, glaucops and pseudolapponum.

Floral Districts

The use of floral districts seemed the best way to solve the problem of where collected, by showing in what type of floral district collected in. It will be noted that quite a few species are limited in their choice of floral districts, few having a really wide range of floral districts.

A defect of place naming was that it failed to give the wider habitat, thus Craignyle tells little, but floral district 3 tells more; and this problem is worse in such names as Banff, covering districts 5-7; or Calgary, covering districts 2-5, and other examples of the *same kind could be given*.

It is however necessary to give a brief description of the floral districts, as the larger paper with two maps has not yet been published. The numbers are given after each species or variety at the right of the paper.

No 1. The South West corner of the Province, ranging from the Short Grass to the subalpine, and from the International Boundary to the south parts of the Porcupine Hills.

No 2. Short grass, almost without tree or bush growth except along the rivers and deep coulees.

No 3. Long Grass, with clumps of willows and Poplars frequent throughout.

No 4. Parkland or Poplar-Willow, with wide areas of grassland between, but conifers, except occasional White Spruce, absent or very rare.

No 5. Cordilleran. Marked off by the inclusion of the Western Lodge Pole Pine, (*Pinus Murrayana* Balf. of Rydberg? and in the southern parts by Douglas Fir, (*Pseudotsuga mucronata* (Raf) Spdw. of Rydberg), extending from the subalpine to the Parkland.

No 6. Subalpine, ranging from the top of the Cordilleran (with which it closely intergrades) to the base of the Alpine, with Lodge Pole Pine, Western Balsam Fir, (*Abies lasiocarpa* (Hook) Nutt. of Rydberg) Western Spruce (*Picea Engelmanni* (Parry) Engelm. of Rydberg) It may be taken as a belt approximately 1200 feet wide at Lat 49 and less than 1000 feet at Lat 60.

No 7. Alpine. Above timber line, at Lat 49 around 8000 feet altitude, and at Lat 60 around 4500 feet altitude.

No 8. A region around Lesser Slave Lake containing a mixture of Cordilleran, Western sub-boreal, Eastern sub-boreal and Parkland.

No 9. Western sub-boreal, coniferous, with Lodge Pole Pine, Alaska Birch (*Betula alaskana* Sarg. of Rydberg), white and black Spruce (*Picea canadensis* (Mill) B.S.P. and *P. mariana* (Mill) B.S.P. of Rydberg) and Eastern Balsam Fir (*Abies balsamea* (L) Mill of Rydberg).

No 10. Eastern sub-boreal, mostly distinguished by the presence of Jack Pine, (*Pinus Banksiana* Lamb. of Rydberg) and Canoe Birch (*Betula papyrifera* Marsh. of Rydberg). Coniferous, with Black & White Spruce and Eastern Balsam Fir throughout, also American Larch (*Larix laricina* (Du Roi) Koch of Rydberg).

No 11. The region above (North of) Nos 9 and 10, extending to Lat 60,

The Northern boundary of the Province.

All of these floral districts intergrade, and none are quite stable. None of the boundaries are fixed, but, over a series of years, show alterations of distance, but not materially of composition.

A.H. Brinkman
Craigville, Alta

Suggested Floral Districts for Alberta (See 2nd draft to
correspondence file)

- No 1. Montane. From the international boundary to township 12, possibly beyond. Characterized by the presence of southern species not found elsewhere in the province, and with an infusion of British Columbia plants, probably through the Crows Nest Pass and the Kootenai passes. Reaching to the prairie on the East, and so perhaps including the southern representative of the Willow-Poplar district of further north. Includes the southern sub-alpine, but not the Alpine. Trees, Douglas Fir, Lodge Pole Pine, Limber Pine, and White Bark pine, with Englemann Spruce at higher altitudes. Covers southern parts of Livingstone Range and Porcupine Hills. Cypress Hills would be included as an outlier.
- No 2. Short Grass
Semi-arid, the grasses shorter than in No 3, with *Bouteloua gracilis* common, and willow-Poplar clumps scarce. From the International Boundary and the Boundary of Saskatchewan, its Western boundary the Montane; East of the Calgary-Macleod line to township 20, and from Gleichen following a WNW line, crossing the Red Deer River West of Dorothy, reaching the Saskatchewan boundary at about Lat 51.30. Contains areas of long grass prairie within its boundaries.
- No 2p North face of Cypress Hills, and the deep river coulees not facing South. Contains a Parkland flora not found on the true prairie.
- No 3. Long Grass
Characterized by a long grass flora, though with most of the grass species of No 2, but with *Bouteloua* scarce, and with numerous Poplar-Willow clumps throughout. Stretching west from below Macleod, where it merges into the Montane. In a widening band, from the foothills, West of the Macleod-Calgary line, crossing the Calgary-Edmonton line near Carstairs, and keeping East of that line to below Red Deer, where it swings NW to south of the Lacombe line, and in a general easterly direction to Saskatchewan boundary at, or near Lat 53.30. Its south boundary the north boundary of No 2, merging at its north boundary into the Parkland area, with a general tendency to become Parkland when left undisturbed by fire and grazing, with several small areas of Parkland within its boundary, which have however a preponderately Prairie flora. Includes some small areas of short grass prairie.
- 3p. North face of sandhills and deep coulees of Red Deer River and river flats not facing South.

No 4. Parkland or Poplar-Willow area.

A narrow strip above Macleod generally North by West to West of Calgary, widening above Calgary to well West of Red Deer, Lacombe and Wetaskiwin, from there swinging East by North to the Saskatchewan boundary, at, or about Lat 53.30. Characterized by a continuous or broken growth of Poplar-Willow (Poplar mostly *P tremuloides*) with spruce along rivers, but generally free from other conifers. With considerable areas of long grass prairie, which however have a considerable proportion of Parkland species. On its North boundary mixing with the sub-boreal, characterized by some conifers, its south boundary intergrading with the long grass area.

No 5. Cordilleran or foothill.

From the Montane, with which it intergrades, generally NNW to West of Nordegg, to West of Coalspur Long 117 at or near Coalspur, trending in the same direction to West of Long 118 at Lat 56, in an irregular line to the B C boundary at Lat 58. Its East boundary well West of Calgary, in a general northern direction to NW of Lacombe, NW from there to past Lat 53, re-entering and touching Long 115 West of Edmonton, from there swinging NW to Lat 54, and generally Northern to Lat 54.30, from where its boundaries are West and North boundaries of Nos 9, 8 and 10.

its further Eastern and Northern boundaries unknown North of Lat 56.30. Bordered on its West, and intergrading with the subalpine area. Generally a Lodge Pole Pine district, with considerable Douglas Fir in its Southern portions, and with Limber and White Bark Pine on its Western boundaries, and Balsam Fir frequent. Poplar, largely *P balsamifera* or Balsam Poplar.

No 6. Subalpine

Alpine following roughly the 6000 feet to 7500 feet contour at Lat 56, and gradually falling lower to Lat 54 where it intergrades with the higher parts of the area there. Intergrading with, and possibly hardly separable from the Cordilleran, but with an higher altitude flora. Limber, White Bark and Lodge Pole Pine frequent, also Balsam Fir.

No 7. Alpine

The altitude higher than the subalpine, to mountain tops, with Alplands and Alpine meadows, and rocky areas with their characteristic flora. Largely treeless except at lower altitudes

No 8. Intergrading

An area around Lesser Slave Lake with so mixed a flora plant and tree growth that it belongs to none yet mentioned. Intergrades with the Cordilleran, the sub-boreal, both central and Western, with a considerable infusion of subalpine, and many southern plain and Parkland species. Lodge Pole Pine and Balsam Fir frequent throughout, Jack Pine frequent on its Eastern and North Eastern parts. Reaching from 54.30 Lat to 55.30 Lat N and S of Lesser Slave Lake, where broadest, and from West of Long 116 to East of Long 114 (nearly to Long 115) where it is narrower. (Between Lat 55.13 and Lat 55.50). Intergrading all around

No 9. Central sub-boreal.

The area East of Nos 5 and 8, and North of No 4, reaching to beyond Lat 56, and Westward to Long 115, or nearly north of No 8. Its Northern boundary unknown. Coniferous, largely Spruce, and Jack Pine, with numerous Balsam Fir, and Larch in wetter portions. Poplar mostly Balsam Poplar. South boundary mixing with No 4. Generally close forest, but some open forest.

- No 5 Cordilleran or foothill
Lodge Pole Pine frequent, also Limber and White Bark in its higher portions. Douglas Fir common to frequent south of Lat 51.30. Perhaps not separable from No 6 except by the less number of Alpine species.
- No 6 The subalpine
bordering the montane on its south, the Cordilleran on its East, the Alpine on its West, and probably intergrading with the two first, or with all. Limber Pine, White Bark Pine, Balsam Fir frequent. Both 5 and 6 may be considered as Eastern extensions of the Western flora as regards its trees, but without the southern flowers of No 1
- No 7 Alpine
The alpine meadow lands, alplands, and rock slides and areas lying at higher altitudes than No 6
- No 8 An intergrading mixture of the surrounding areas, Lodge Pole Pine frequent, Jack Pine frequent in its eastern and North eastern parts, also American Larch
- No 9 The areas north of No 4 and East of Number 8, south parts conifers and Poplar-Willow, often *P tremuloides*, mixed with conifers. North parts coniferous forests the poplar present being mostly Balsam Poplar. Largely Spruce, with Jack Pine and Balsam Fir frequent.
- No 10 More characteristically Western, with Lodge Pole Pine and Alaska Birch frequent, and, on its eastern border, Jack Pine and Balsam Fir frequent largely replacing Lodge Pole Pine,
- No 11 Boreal
Limits unknown. Coniferous, less densely so,

- No 10 West sub-boreal
North and West of No 5, intergrading with No 9 north of Lesser Slave Lake. With a considerable infiltration of Western species. Spruce common, also Lodge Pole Pine, and the Alaska Birch frequent. Its south boundary probably along Lat 55.16 to Lat 56.11. Its north boundary unknown.

- No 11. Boreal.
Generally the area north of Lat 56, but its boundaries unknown.

To briefly recapitulate.

- No 1, Montane.
Numerous flower species of the South and West not found elsewhere in the province. Lodge Pole, Limber and White Bark Pines frequent, Douglas Fir common, and in higher parts, Englemann Spruce
- No 2 Short Grass
Short grasses with *Bouteloua gracilis* common, and trees and brush restricted to deep coulees not facing south, north face of Cypress Hills, and the river bottoms. These exceptions covered by 2p
- No 3 Long Grass Area
Longer grasses, and *Bouteloua gracilis* not specially noticeable. Poplar-Willow patches common throughout
- No 4 Parkland
Willow-Poplar areas of considerable areas, with considerable long grass prairie interspersed. On its North boundary some admixture of Jack Pine, and on its West boundary some Lodge Pole Pine. Poplar mostly *P tremuloides*. Spruce in river bottoms etc.

It will be noticed that no attempt has been made to correlate soils with plant growth. It was found to be impossible to generalize widely on this matter. The work of Wyatt has gone a long way towards an understanding of the general soil situation, aided as it has been by the work of Allan (Dr J A Allan) on the Geological side of soil structure.

But whenever any attempt was made to correlate soils and vegetation, on a large scale, the exceptions were too numerous to make acceptable any scheme of correlation. This was equally true of the short and long grass areas, of the Parklands, and of the forested areas.

True, there is a distinct and close relation between soils and vegetation. Given the vegetation, one can often predict the soil, or given the soil, one can at least predict some of its vegetation. But as before stated, no large areas were sufficiently uniform to make the attempt at correlation useful for floral districts.

However treated, floral districts have numerous exceptions, but it is hoped that those interested will make the attempt to compile a list of the main trees, shrubs and flowering plants in the districts best known to them and so make possible a more correct delimitation of the different floral districts.

My thanks are due to Dr Wyatt for literature and maps on soil distribution, and other information.

Alta

June 15, 1943

Mr. A. H. Brinkman,
Craigville, Alta., Canada.

Dear Mr. Brinkman:

Your letter of June 3 and packet of willows are safely here. My identifications and notes on the willows are as follows:

WILLOWS OF CRAIGVILLE DIST., ALTA., BRINKMAN, May, 1943

- 5355 *S. Bebbiana* perrostrata (Rydb.) Schn. (tiny leaves are only moderately hairy and on expansion probably would be glabrate)
- 5360 *S. fragilis* L. (Not *S. alba* vitellina. The leaves, tho small, are glabrate and the capsules are pedicelled)
- 5366 *S. lutea* Nuttall. (This species has relatively hairy scales and rather short pedicels. *S. mackenziana* has dark twigs, with glabrate scales and long pedicels. This specimen is quite young but, altho the twigs are yellow, the scales are glabrate and the pedicels are elongating. There may be a third species in the mix-up)
- 5367 *S. petiolaris* Smith. (The leaves are just developing and some are silvery beneath and pubescent above while others are glabrate to glabrous on both sides) No sign of *S. discolor* in this.
- 5368 *S. petiolaris* var. *subsericea* (And. & Griseb.) This is more hairy on the leaves than is 5367, but some leaves are glabrate already. The capsules are shorter and blunter and the pedicels shorter, as in *S. subsericea*. Probably, after monographic study, this will be regarded as a var. of *petiolaris* rather than as a species. ✓
- 5369 *S. planifolia* Pursh. The aments are unusually small.
- 5371 *S. lutea* Nuttall (stam.) This looks like true *S. lutea* with woolly scales.

I hope that these notes may help with some of your doubts. I can only point out again that every individual plant is different and that these immature or juvenile form are different in appearance from the mature plant. These facts, with the innate cussedness of humans, account for the flood of so-called "new species".

Have just celebrated my 70th birthday (June 12), my 39th wedding anniversary (June 14), and will retire on June 30. Then I will be busy and the start of the *Salix* monograph as one of the first jobs.

Cordially yours,

Carleton R. Ball
Executive Secretary

dupl in file & off

Water shoots are normal

Crainville, Alta
Canada

Dec 22 1943

" Dr C R Ball

Extension Dept

Washington

Dear Mr Ball

Thank you for the namings. Some of the plants were interesting, the I still feel disappointed with the poor showing of B & willows. Probably however, from what you say, *S. discolor* var *pirimoides* may prove an addition. I was glad to have *interior* & *exigua*. They fill a gap. The I still find it difficult to separate the various forms. I suppose I always shall. Your reprint on the taxonomy of willows does concentrate attention where it is wanted. Water shoots are utterly puzzling, as could I would imagine, be left out of the picture, for when they are present more mature stems are also. I had some *Salicandrea* from Mr Eastham, some of the water shoots were utterly puzzling, & but for his assurance that they came off the same tree as some normal branches, I should never have guessed it. A set of *S. sitchensis* helps a bit, as I did not know this species before. Your reprint on *S. chapmanii* gives a pretty good idea of the difficulties you must be continuously having, (see over).

more so in some cases. It is good to know the monograph on willows
is proceeding, so that your accumulated knowledge may be made
available to the rest of us, as far as that is possible by the printed word.
I have not heard from Mr. Britting for many months, & have wondered
whether he has been called up. The last I heard from him he had a
deferment on account of farmwork. I was sorry to hear of the death of Mr.
Chaser. We have far too few good botanists in Canada to spare any of
them. Well, Christmas will soon be here, & by the time you get this it
will be over. But it is in order to hope which that you may be spared
in good health & strength for many years yet.

Best wishes

Yours sincerely
A. H. Pringleman

I suppose I shall know the
var. lanceolata of *S. lasiocarpa*
when I see it, for apparently
I have not found it yet.

dupl in Cordata

Mr. A. H. Brinkman,
Craigville, Alta., Canada.

June 21, 1945

Dear Mr. Brinkman:

I have your letter of June 11 and the packet of willows. It was good to hear from you again, even if it did bring me more problems than I can solve off-hand. I take up your material by numbers assigned.

5708. *S. planifolia* Pursh. In swampy draw, Craigville Dist., Sec. 27, 32, 16, W. 4. June 6. This probably is correct, altho the leaves are narrow, and mature specimens might show it to be var. *Nelsonii* Ball.

5710. Sect. *Lucidae*. *S. serissima* (Bailey) Fern., probably. With the last. The long yellow flower scales, and other floral characters show that this belongs to the Section named. It could also be young *S. lucida* or *S. lasiandra*. The leaves are off type for any of the threes. In *S. lucida* the leaves remain pale green beneath but in the other two they become white. If you can get full grown leaves, it will settle this point. These young leaves appear to be tending towards glaucousness. *S. lucida* has the broadest leaves but also the longest-pointed. But I have broad-leaved specimens of *S. serissima* from Alta. and Sask. This may be a new, broad-leaved var. of *S. serissima*. Full grown leaves will tell much if from same plant. The twig color is nearer *S. lucida*.

5746. *S. pseudo-monticola* Ball. With the last but June 11. This is fairly typical and I think you have collected it before around Craigville.

5744. *S. subsericea* (Andetson) Schneider. Willow patch around a grassed-up slough, Craigville District, T1N. SW 10, 32, 16, W 4. June 11. This has come in frequently from Breitung in Sask. I am writing where I do not have lists of herbarium before me, so cannot recall if you have found it in Alta. It has been regarded as a hybrid between *S. petiolaris* and *S. sericea*, and more recently as a var. of *S. petiolaris*, which probably is correct. It is intermediate between these species in length of peduncle and of pedicel, and somewhat so in length and bluntness of capsule. Additional difference is nearly or quite permanent hairiness.

5445. *S. lutea* var. ? or possibly true *S. mackenziana* (Hook.) Barratt. With the last but June 8. You are quite right in thinking this to be *S. lutea* with longer pedicels than usual. Here is the situation. *S. mackenziana* is a member of the *lutea* group, described with long pedicels. The plant occurring from the NW U.S. up across Canada has blackish twigs and long pedicels, and has been called *S. mackenziana*. Now we are beginning to find a yellow-twigged plant with long pedicels and leaves about the same width as those of *S. lutea* and the black-twigged *S. mackenziana*. In the meantime, I had found a broad-leaved, long-pedicelled *S. lutea* in our Great Basin area and had named it *S. lutea* var. *platyphylla*. The leaves remind you a little of those of *S. pseudomonticola*. Your specimen seems to have narrow leaves but full-grown foliage is much needed. I must reach some decisions on these points before I monograph.

By the way, the black scales of 5744 show you that it could not possibly be long with yellow-scaled *S. interior* and the other *Longifoliae*.

Many thanks for the notes on McCalla, Breitung, etc., Too much war work for monographing. Am behind on identifications.

With all good wishes, and the hope that you can collect the full-grown leaves to settle some of these questions, I am

Cordially yours

Carleton R. Ball, Collab.

Craigmyle, Alta
Canada

June 24th 1943

Dear Mr Ball:-

I am writing in an hurry to ask you when next writing to quote your address, as I gather your official address may know you no longer. Reading over your letter I was rather surprised to find you were younger than me, I had thought of you as being somewhat older, mine was Feb 1873, yours June. And I think our marriages were not much apart, mine in, I think, 1902, I am not sure. So we have been through much the same history, you in the States, me in England and Canada, (35 years each). Thank you for notes, I am having trouble with lutea, seems to be mixing pretty close to Mackenziana, so must use your notes to separate. I find petiolaris this year unusually broad leaved at times, hence the puzzle. Fragilis, I note, This year I found undoubted signs of crossing. All the trees are female, never saw a staminate one in the whole lot, and each year the capsules drop unfertilized, but this year some two or three were in silk, though what crossed with goodness knows. You have my new list ere now, with fragments of two willows; I am now putting by a good sample as dried, as last year I had to wait till finished because the willows were at the bottom of the boxes, so can send on as soon as I am reasonably sure I shall find no more. Well, I hope you are given length of years, so the monograph may be finished, it will be your monument, and so very few of us can leave a monument so worth while. Trees lovely and green, not threshed yet, rains frequent, cannot seed until threshed, such is life here, a most unusual year.

My Regards and respects

Yours Sincerely

Arthur Linkman

Dr C.R. Ball
Extension Service
U.S. Dept of Agriculture
Washington

August 5, 1943

Mr. A. H. Brinkman,
Craigville, Alta., Canada

Dear Mr. Brinkman:

Thanks for your letter of June 11, and that of June 28, and the copy of the new list.

In the list of species, *S. athabascensis* should precede *S. pedicellaris*, as both belong to Section *Rosaeas*. *S. desertorum* should precede *S. glabra*.

The names at the heads of the columns preferable should read down, not up. The rule in English is to read to the right and down. The rule in Japanese is to read to the left and up. I know that some editors insist that such column heads read up but that is a wholly arbitrary rule based on the printers rule that such heads must join the column and, as they are not all of equal length, they start them at the bottom.
and both var. *pedicellata* (Anderss.) Ball,

The two specimens sent seem to be identical, altho both are very immature, something like and ear or a hand from a baby used to tell what the adult would look like. On both specimens, the leaves are mostly opaque yet, except for the translucent midrib. In unexpanded leaves the cells are crowded so tightly together that light cannot get thro. I note also that the most apical leaves on both specimens are denticulate. I am returning both herein.

Prof. Ernest C. Smith, Dept. of Botany, Colorado State College, Ft. Collins, Colo., desires to exchange specimens and I have given him your name. He is building up a collection of willows there, but may wish other plants also.

I retired from government service on June 30. and have been busy since in getting my papers and materials sorted, arranged, and ready to begin my writing. It has been very hot since June 1, and exceedingly dry.

S. lutea and others with yellowish or very light brown twigs and petioles color much more decidedly, when exposure and other physiological conditions are right, than do species with with browner twigs.

I had no idea from your letters or from your collections that you were anywhere near 70 years in age. Congratulations on what you have done and are doing, with your wealth of years.

Cordially yours,

Carleton R. Ball
Collaborator

floral
Districts

[illegible]

Species and varieties list continued

Bismarck Aug 15, 1943

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	floral Districts
nivalis hook.	IV		x	x		x	x	x	x	x	x				1.5-7
saximontanum Rydb.		I	x	x		x	x	x	x	x	x				5-7.
vestita Pursh.	x	6	x	x	x	I	x	x	x	x	x				1.5.6.
erecta Anders.				x	x	x		x	x	x	x				5
fern.															
pedicellaris hypoglauca	29			x	x				x	x		x	x	x	3.8.11
tenuescens fern.				x	x							x	x	x	11.
atrabuccensis Rimp												x	x	x	11
anglorum Chamisso.	47			x	x		x	x	x	x	I				6.7.
arioglada Schm.				x	x		x	x	x	x	I				4.5.6, 7
kolpophylla Schm.				x	x		x	x	x	x					7.
arctica Pallas.				x	x				x	x			x		5.11.
subcordata (And) Sol				x	x			x	x	x					1, 5, 6
petrophila Rydb.	25		x	x	x	x	I	x	x	x	x				5.7.8.
brachycarpa Nutt.	10	I		x	x	x		x	x	x	x	x	x		1.3-5.
glabelliscarpa Schm.				x	x	x		x	x	x	x				4.5.6
Sansonii Ball.				x	x	x		x	x	x	x				5.
antimaina (Schn) Eaup.				x	x	x						x	x		11.
glaucia L.	4	x		x	x	x		x	x	x	x	x	x	x	5-7.11.
glabrescens (And) Schm.				x	x	x	x	x	x	x	x	x	x	x	4.5.9.11
acutifolia Schm.				x	x	x		x	x	x	x	x	x	x	11.
poliogolia (Schn) Raup.				x	x	x					x	x	x	x	11
desertorum Richards.															6.11
Vi. Seelen,															
pseudolapponicum				x	x				x	x	x				7.5.6
"glauca" And				x	x			x	x	x	x				3.5.6
MacCalliana Rowlee,				x	x	x		x	x	x	x	x	x	x	3-7.9.11.
candida Fluegge.	x	x		x	x	x	x	x	x	x	x	x	x	x	1-6.9.11.
var															
subcordata Anders omit			x												? not in our territory. C.R. Ball
arbusculoides Anders.	x	x		x	x	x		x	x	x	x	x	x	x	4.5.8, 9, 11
Anders															5.6
bella Piper															
Drymondioides Barratt.	x	x	x	x	x	x		x	x	x	x				1.5.6.
var (unnamed)				x	x	x									
petiolaris J.E. Smith	x			x	x			x	x	x	x	x	x	x	3. 4.8.9.11.
gracilis Anders				x	x										4.5. 3
subsericea Anders				x	x										5.8.11 3.
subcoerulea Piper			x	x	x	x		x	x	x	x	x	x	x	1.5.8.11.
planifolia Pursh				x	x	x		x	x	x	x	x	x	x	3.4.8.9.11.
Nelsonii Ball				x	x	x		x	x	x	x	x	x	x	5.11
discolor Muhl				x	x			x	x	x			x	x	1-5.8.9.
prinoides Pursh				x	x			x							3

Craigville, Alta

Canada

Nov 23th 1943

Dear Mr Ball"-

Thank you for yours of Aug 5th 1943.

I went away for a month's holiday on July 31st, collected an operation, and got home Nov 11th, not feeling too bad, but not exactly strong, though weighing more than when I left; this explains delay in answering.

I looked around for willows in B.C. but found it a dissapointing country in that particular, however I did find a few, which I am sending, along with fuller and better specimens of some sent earlier. Don't know if I have *S. exigua* from B.C. it seems narrolwy separated from interior *pedicellata*, but as interior also was found (in Alta) the namings should be enlightening to my ignorance. I don't know if I have *V. lancifolia* of *lasiandra*, anyhow it is enclosed, then there are three that seem good willows and new to me, one either willow or poplar, and one ? willow, so when time permits, I hope to hear from you, though I expect you are pretty well crowded with the work entailed by a monograph, which I am very glad you are undertaking.

Re headings of columns, thank you, I am ignorant of the correct method.

Should I hear from Prof, E.C. Smith, I will endeavour to reciprocate, though material is scant in many species, still a few have plenty, and may interest him. You do not mention a private address, so I am sending as heretofore.

I hope correctly. I left in good faith, without the intention of collecting, taking neither press or felts with me, but I might as well have, for I could not continuously resist new specimens, with the consequence that over 100 were collected but not well pressed, lacking the means; that will explain some of those received. So now I am trying slowly to straighten them out, tackling

(See over)

