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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.

McKague, Sask.
Nov. 5. 1938.

Corleton R. Ball.

Dear Friend:-

Before me I have your letter of January 25. 1938. I thank you very much for it. I also thank you for the reprints you sent me that time.

I have again been collecting plants this summer. I have paid special attention to the Willows. I am sending you a collection of willows through C. O. Erlanson. This year I have made the best collections of willows I ever made before. I have followed your instructions in your letter of placing each sex on a separate sheet.

C. O. Erlanson has also received a collection alike except No. 1.a. and No. 1.b. which is lacking in his.

Please determine the specimens I am sending you and send me a list of the determinations using the numbers and letters. I have duplicates with the same numbers and letters before each name so that I can make the necessary corrections.

Please also make a copy of the det-

terminations for Mr. Erlanson.

Nos. 1.a., 1.b., 1.c., I have never collected before, also no. 3 and no. 15.

I hope you will be pleased with the specimens.

I am herewith enclosing a list of the Willows sent you of my determinations.

If you have any spare specimens of willows of your collecting I would be ever so glad to have some.

Now I must close for this time

Hoping to hear from you again.

Yours Very Truly

August J. Breitung

P.S. I have never been able to find any male plant of *Salix glaucops*. A.J.B.

List of Willows Sent To C. R. Ball
1938 Collection.

- 1.a. *Salix* Fert. 1 mi. west of MCK.
 1.b. *Salix* Leaves 7 mi. east of MCK.
 1.c. *Salix* Leaves 1 mi. west of MCK.
 2.a. *Salix myrtillifolia*. Fert.
 2.b. *Salix myrtillifolia*? Leaves oval
 2.c. *Salix myrtillifolia*. Leaves $3\frac{3}{4}$ mi. west of MCK.
 2.d. *Salix myrtillifolia*. Fert. 5 mi. west of Wallwort
 3. *Salix pentandra* (Horticultural) Fert.
 4.a. *Salix candida*? Fert.
 4.b. *Salix candida*? Leaves
 5.a. *Salix candida* x *petiolaris*? ♂
 5.b. *Salix candida* x *petiolaris*? ♀
 5.c. *Salix candida* x *petiolaris*? Fert.
 5.d. *Salix candida* x *petiolaris*? ♂ leaves
 5.e. *Salix candida* x *petiolaris*? ♀ leaves
 6.a. *Salix myrtillifolia*. ♂
 6.b. *Salix myrtillifolia*. ♀
 6.c. *Salix myrtillifolia*. Fert.
 6.d. *Salix myrtillifolia*. Leaves
 7.a. *Salix discolor*. ♂
 7.b. *Salix discolor*. ♀

- 7.c. *Salix discolor*. Frt.
 7.d. *Salix discolor*. Leaves.
 8.a. *Salix petiolaris*. ♂
 8.b. *Salix petiolaris*. ♀
 8.c. *Salix petiolaris*. Frt.
 8.d. *Salix petiolaris*. Leaves
 9.a. *Salix planifolia*. ♂
 9.b. *Salix planifolia*. ♀
 9.c. *Salix planifolia*. Frt.
 9.d. *Salix planifolia*. Leaves
 10.a. *Salix pedicellaris hypoglauca*. ♂
 10.b. *Salix pedicellaris hypoglauca*. ♀
 10.c. *Salix pedicellaris hypoglauca*. Frt.
 10.d. *Salix pedicellaris hypoglauca*. Leaves.
 11.a. *Salix glaucops*. ♀
 11.b. *Salix glaucops*. Frt.
 11.c. *Salix glaucops*. Leaves
 12.a. *Salix pellita*. ♂ + ♀.
 12.b. *Salix pellita*. Frt.
 12.c. *Salix pellita*. Leaves.
 13.a. *Salix pseudo-monticola*. ♂
 13.b. *Salix pseudo-monticola*. ♀
 13.c. *Salix pseudo-monticola*. Frt.

- 13.d. *Salix pseudo-monticola*. Leaves
 14.a. *Salix candida*. ♂
 14.b. *Salix candida*. ♀
 14.c. *Salix candida*. Frt.
 14.d. *Salix candida*. Leaves
 15. *Salix pyrifolia*. Fruit with fairly well dev. leaves
 16.a. *Salix lutea*. ♂
 16.b. *Salix lutea*. ♀
 16.c. *Salix lutea*. Frt.
 16.d. *Salix lutea*. Leaves
 17.a. *Salix serissima*. ♂
 17.b. *Salix serissima*. ♀
 17.c. *Salix serissima*. Frt. and mature leaves
 18.a. *Salix interior pedicellata*. ♂
 18.b. *Salix interior pedicellata*. ♀
 18.c. *Salix interior pedicellata*. Frt.
 18.d. *Salix interior pedicellata*. Leaves
 18.e. *Salix interior*? Broad leaves. Sep. 19.
 19.a. *Salix Bebbiana perrostrata*. ♂
 19.b. *Salix Bebbiana perrostrata*. ♀
 19.c. *Salix Bebbiana perrostrata*. Frt.
 19.d. *Salix Bebbiana perrostrata*. Leaves
 20.a. *Salix Bebbiana*. ♂

- 20.b. *Salix Bebbiana*. ♀
20.c. *Salix Bebbiana*. Frt.
20.d. *Salix Bebbiana*. Leaves
21.a. *Salix MacCalliana*. ♂
21.b. *Salix MacCalliana*. ♀
21.c. *Salix MacCalliana*. Frt.
21.d. *Salix MacCalliana*. Leaves.

Extension Service, U. S. Dept. Agric., Washington, D. C.

November 25, 1938

Dear Mr. Breitung;

Your splendid collection of willows just received today thro Mr. C.O. Erlanson.

Hasty glance thro them shows that practically all are correctly named. Heartly congratulations.

More important, however, are the staminate specimens of rarely collected species, like *S. pallida* Anderss. and others.

Will give them careful determination promptly and report to you in detail on them.

Cordially Yours,

Carleton R. Ball

Carleton R. Ball

3814 Jocelyn Street N.W.

Washington, D. C.

Digitized by Hunt Institute for Botanical Documentation

Address:

Extension Service, U.S. Dept. Agric.
December 1, 1938

Mr. August J. Breitung,
McKague, Sask., Canada.

My dear Mr. Breitung:

Your letter of November 5 was promptly and the package of willows came somewhat later, through Mr. C. O. Erlanson, of the Div. of Plant Exploration in our Bureau of Plant Industry. I was so struck with the value of your material that I wrote you the enclosed card immediately, but forgot the increased postage and it came back to me.

Your No. 1 is a hybrid and 1a and 1c might have come from the same plant. 1b is very different and may not be a hybrid. If you can find it again and collect flowers and fruit it may prove to be new.

Your *S. discolor* has patches of yellow epidermis on the branchlets. I wonder if they turn rather yellow in the autumn? This happens in *S. Barclayi* and *S. monticola*. They remain yellow through the spring but always dry a dark purplish-black.

You probably have another form of *discolor* with narrower more toothed leaves and usually narrower segments. This is var. *pruinoides* (Pursh). I found it around Saskatoon and elsewhere.

I believe that what you sent as *S. glaucops relley* is the true *S. desertorum* Richardson, named more than 100 years ago and neglected ever since. More study is required but I have a cotype here and will go into the matter fully this winter. It was collected on the Mackenzie River and your locality probably is about its farthest southern extension.

Your collection of early spring specimens of the male plants is exceedingly valuable to science. Such specimens of some species are very rare, especially from far north. I think I have not seen staminate *S. pellita* before.

I cannot give too much praise to your collecting the species in all stages of development. Only in this way can we learn the minor differences. When the series comes from the same plant we really know the range of expression on one individual. It is helpful when collecting foliage specimens in midsummer to take the branchlets which bore flowers earlier and also the new shoots of the season. The latter usually have much larger leaves and stipules.

I am just leaving the city for a short trip so hasten to get this off to you before I go. Later I will put up for you such duplicates as I have. I will try especially to give you specimens of some of the things you may expect to find up there. Will write you more later.

I am sending a copy of the enclosed list to Mr. Erlanson for his information. With high appreciation of your keen collecting and generous distribution,

I am most cordially yours,

Carleton R. Ball
Executive Secretary

McCague, Sask.
Dec. 19. 1938.

Carleton R. Ball.

My Dear Friend:-

I have your recent letter together with the willow determinations. I thank you ever so much for this and your offer to send willow specimens likely to occur here. I'll also be glad to accept specimens from other parts of the Continent if convenient.

I'll endeavor to collect further specimens of 1a, 1b and 1c. in flower, fruit and mature leaves *S. myrtillofolia* x *candida*. Also anything else that seems different to what I have already collected, especially variations in *S. discolor* and *S. lutea*. Probably *S. Mackenziana* occurs here too.

I have seen quite a number of male shrubs of *S. pellita*, ^{at Tisdale} and one shrub 7 mi. south of Tisdale. The only places I saw male shrubs.

S. Bebbiana and *S. Bebbiana perrostrata* seem to intergrade.

I'll send you more willows next year especially any that seem different.

A few days ago I received a letter from

P.S. I still have, after mounting what I desired for myself, four or five duplicate collections of Willows as those I sent you. A. J. B.

W. P. Fraser saying he received a list of the willow determinations. I am very glad you did this. Mr. Fraser has also received a collection of willows the same as yours and C. O. Erlanson's. I think I should have told you about that.

Dr. Fraser and I have in the last few years done our best to round up the Willows of Saskatchewan. Probably there is a lot to do yet.

Dr. Fraser and I were at Tisdale last spring on the same day and the same place but at different hours and therefore did not get to see each other. There Dr. Fraser collected specimens of a *S. lutea* with conspicuous brown fety. aments. I also saw the shrub. They were all of a uniform color on the whole and only shrub seen with that color on aments. He had sent you specimens. Probably you recollect. I will try to collect some next year and see if the same coloration appears again. Hoping to hear from you again.

With best Xmas Wishes to you. Your Friend
August J. Breitung.

Sask. Can

Address:

Extension Service, U.S. Dept. Agric.

February 18, 1938

Mr. August J. Breitung,
McKague, Sask., Canada.

Dear Mr. Breitung:

Your good letter of December 19 was promptly received but did not seem to have had any answer when I left Washington for a field trip from which I am just returned.

After writing you on December 1 with list of determinations, I received from Professor Fraser some specimens not sent before. They contained several collections of *Salix athabascensis* Raup from Prince Albert, Waskesiu, etc.,

These recalled to my mind your Nos. 11a, 11b, and 11c, which I called *S. desertorum* Rich. I told Prof. Fraser I would recheck your collection as soon as I could but did not get to it before leaving. Today I have redetermined those number and they all are good *S. athabascensis* Raup. This species belongs to the Roseae, along with *S. pedicellaris hypoglauca* Fernald, and *S. fuscescens* Anderson, the latter a trailing arctic plant. These two, however, have glabrous branches, leaves, and capsules. In *S. athabascensis* these organs all are pubescent to some degree. This makes it resemble *S. glaucops*, *S. desertorum*, etc, quite closely. The leaves, however, are smaller, more veiny when mature, and the styles are much shorter. I should have been warned by the short styles in your specimens.

When I returned I found another specimen from Prof. Fraser, collected at McKague on July 2, 1938. It is staminate *S. athabascensis*, of which he had several from the other localities.

I have not forgotten your desire for exchange material and have laid out some for you before I went away. Will try and get some to you soon.

Prof. Fraser sent one foliage specimen that must be *S. humilis*, not before collected so far north. It is much like *S. discolor* but the twigs and leaves are densely furry. He knows where the plants are and will try to get flowers and fruit this year.

I certainly appreciate the help you and he are giving in clearing up the ranges of the central Canadian willow species.

Cordially yours,

Carleton R. Ball

at was S. pubescens Oct 1939.

Address: Extension Service
U. S. Dept. Agri.
March 24, 1939

Mr. August J. Breitung,

McKague, Sask., Canada.

Dear Mr. Breitung:

Your letter of March 20 is here and I note especially your comments on the two specimens collected by Dr. Raup in 1928 and 1930 respectively and distributed by him as *S. glauca* L.

I have received from Dr. Raup a very full set of duplicates of his collections of 1932 and 1935 but I do not have any of the earlier material. It may be in the National Herbarium but at the moment I do not have time to go further into the matter as I am about to leave town for a field trip.

The material collected around Athabasca Lake and north-westward in 1932 and 1935 and distributed by Dr. Raup as *S. glauca*, mostly proves on examination to represent not *S. glauca* but that complex which has passed for many years as *S. glaucoops* Andersson. It probably represents *S. desertorum* Rich. and also has been given other names by later authors. Very probably your 1930 species with glabrate leaves may be *S. desertorum*, although that is glaucous beneath when properly dried.

Do not send this material to me until after I have a chance to look it up in the National Herbarium. If it is not there I will be glad to see your specimens.

I finally got around to laying out some duplicates for you and have just wrapped them for mailing. I hope to get them off today or tomorrow. I have put in some specimens of *S. nigra* and *S. amygdaloides*. These belong to a temperate section of the genus but range as far north as the lower edge of central Canada. It is not impossible that isolated plants, especially of the latter, may be found in your territory some time.

- 2 -

I have included also *S. cordata* which ranges well into southern Canada and may appear with you. It differs from *S. lutea* in having pubescent branchlets more reddish brown than yellow and in the much darker green of the leaves.

I have included some species of the Rocky Mountains and westward, some of which, like *S. pseudo cordata* and *S. sitchensis*, may be discovered in your territory. The latter, as you will note, is closely related to *S. myrtillofolia* but is larger in growth with the leaves more oblong-lanceolate and serrulate rather than crenate on the margins.

I have included also a duplicate specimen of *S. Scouleriana* collected by Prof. Frazier as I thought possibly he had not furnished you with a specimen of this collection. This is the first time it has been discovered in that territory, although it is fairly common in the Canadian Rockies and westward. You will wish to be on the lookout for it in your part of the province.

With best wishes, I am

Cordially yours,

Carleton R. Ball,
Executive Secretary

McKague, Sask.

Apr. 12. 1939.

C. R. Ball,
Washington, D.C.

Dear Friend Mr. Ball:-

I have your prompt letter of Mar. 24 and the parcel of Willows. I am very thankful for all.

I have received some willows from the National Herbarium of Canada and a few look very like some from you from California. Those I refer to are from Alberta (The mts.) It does'nt state who determined them. They were collected by Malte & Watson. I'll send them to you for verification some time next fall or winter when I will hope to send more of the rarer willows of this district or area.

Dr. W. P. Fraser has furnished me with *S. Scouleriana* but I was glad to have the specimen from you as a number of specimens gives a better picture. Also he sent me a few leaves of *S. humilis*, also *S. brachycarpa* and *S.*

arbusculoides
~~athabascensis~~ and S. interior pedicellate which
I have not seen here.

I'll be on the lookout for any thing
that seems different to what I have not yet
collected.

I am very busy in the summer and
you'll have to excuse me if you don't hear
from me for a while.

Wishing you the best of Luck

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From Your Friend

August J. Breitung

October 23, 1939

Mr. August J. Breitung,

McKague, Sask., Canada.

Dear Mr. Breitung:

On my return to Washington some two weeks ago, I found many packages of willows awaiting me, including your valuable shipment. I have now had time to study this material and enclose herewith a list of the determinations. I greatly appreciate the time and painstaking effort you are putting into this study of the willows of that area and can assure you that it will be of the greatest value when I get to the monographing of Canadian material. Below I am giving some comments on the specimens you have submitted.

S. fragilis L. and S. alba L.: *S. fragilis* was widely introduced into the United States and Canada in colonial times, partly for sentiment but primarily for the making of gunpowder from its charcoal. Many hybrids between *fragilis* and *alba* have been established in Europe and were introduced along with the species. Other hybrids probably have arisen after both species were introduced to the new world. *S. alba* also was introduced in colonial times but apparently to a rather limited extent and chiefly as an ornamental because of its silvery foliage. Your material seems to represent *S. fragilis* or possible hybrids of it with *alba*. You will find the discussion between these species given in my paper on Canadian willows which I sent you last year or earlier. I regard two of your specimens as hybrids between the two species because they have the short ovate capsules of *alba* but the short pedicels and leaf characters of *fragilis*.

S. Bebbiana: You have a very interesting series of specimens of this species and two collections of the variety *perrostrata*. The only real difference between the two is the amount of pubescence on the leaves. This naturally is a variable character changing with the advance of the season and perhaps with exposure to sun and wind. It is not surprising, therefore, that there should be doubt as to which is represented by a given plant. We must remember that the leaves of the variety are hairy when young and only glabrate but not glabrous at maturity.

S. pseudo monticola: Most of your specimens have rather narrow leaves although it is possible that if seasonal shoots and water sprouts were collected from these plants, broader and more cordate leaves would have been represented. One of the plants seems to represent a hybrid but I am in doubt as to what species.

Miscellaneous, including S. discolor: I am glad to have the specimens listed under miscellaneous. S. discolor variety ericephela has hairy branchlets and bud scales and usually some pubescence on the under surface of the full-grown leaves, especially on midrib and vein. S. discolor itself is glabrous on the vegetative organs as is also the variety prinoides, represented by your Nos. 135 and 441. In this variety the leaves are narrower, more pointed at both ends, and more prominently toothed on the margin like a chestnut leaf, and this is what the word prinoides means. Neither you nor Professor Fraser has collected the variety ericephela in that area.

S. athabascensis: Your splendid series of specimens of this species are extremely helpful and should give us a complete picture of the expressions of the plant under different conditions in that area. As you will note from the list, I have placed under this species four of the plants which you sent in as S. desertorum (?), although one of the four, No. 168, probably is a hybrid.

S. pedicellaris hypoglauca: You will note that I have placed under this variety most of the material you sent as S. desertorum. This variety differs from S. athabascensis in being practically glabrous on branchlets, petioles, and leaves, and the fruits always glabrous, although there may be a trace of pubescence when it is very young. In that area it varies somewhat also in having smaller and narrower leaves. One of the specimens, your No. 106, may be a hybrid of these two.

S. myrtillifolia or hybrids: The series of specimens you sent in as hybrids of myrtillifolia with candida and planifolia is very difficult to determine with accuracy. As you will note, I regard most of them as hybrids although I am by no means sure that most of them are hybrids with candida and I do not think that any of them are hybrids with planifolia. No. 136 I have indicated as a possible hybrid with pellita because it has extremely elongated styles and pellita is the only species in that area which has that. No. 173 I suspect may be a hybrid with petiolaris. The two specimens which I have listed as candida variety denudata may be this variety or they may be hybrids. It is impossible to tell from fragmentary material.

The final series of hybrids which you regard as a cross between candida and petiolaris I have so listed. It is almost certain that they are derived from candida and quite possible that the other parent was petiolaris although this cannot be proved from the material.

- 3 -

Hybrids: We must appreciate that when a cross takes place, part of the resulting progeny may resemble one parent, part the other parent, and part intermediate. The difficulty is that most of the progeny which theoretically could be expected probably never appear either because the seeds are not fertile or they are unable to compete with other vegetation. It is known also that what we call transgressive segregation takes place which means simply that through the unlocking of latent characters some characters may appear in hybrids which were not expressed in either parent. No. 136 under *S. myrtillifolia* or hybrids may be a case in point. The long styles may have come from the unlocking of an inherent character which is not expressed normally by either parent.

I am wondering if you will not find it more convenient as the years go by to number your collections consecutively year after year rather than to start at No. 1 again each succeeding year. Where this latter practice is followed, you might have 20 No. 1s, or 20 No. 406s at the end of 20 years. In referring to these in publications or correspondence it would be necessary to say No. 1 of 1939, No. 406 of 1942, etc., in order to make sure which one was being talked about.

I believe it would be desirable also not to give separate numbers to successive collections made from the same plant but to give them all the same number and designate the different collections by letters, as 104A, 104B, 104C, etc. You used this plan on part of your collections of last year. Probably also it is better not to give the same number to both staminate and pistillate collections made at the same place on the same date. They certainly have to come from different plants and not infrequently the two sexes sent under one number by various collectors turn out to be different species, as it is often difficult for collectors to tell what species are represented by staminate collections.

I am laying out some specimens for you which represent species not occurring in your area. Later on in the winter when I get a package of them accumulated I will send them on to you.

Appreciating the splendid help you are giving in solving difficult problems, I am

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask

April 15, 1940.

Mr. August Breitung,

McCague, Sask., Canada.

Dear Mr. Breitung:

Recently the Office of Plant Exploration in the Bureau of Plant Industry of this Department sent to me for determination a bunch of your 1939 willows from exchange material they had received from you. Most of this I had received direct from you and had determined for you as per the list in my letter of October 23, 1939. A few specimens in this collection were not received previously and, therefore, were not in that list. They are as follows:

- 1 265 *S. pyrifolia* Andersson. Shrub 5 to 8 ft. high. Orley, about 25 miles east of Tisdale, July 12, 1939. *WSN*
- 2 453 *S. pellita* (?) x *petiolaris* (?). This is a peculiar specimen and without flowers or fruit the identify of the parents is in doubt although I feel sure that it is a hybrid. You had labeled it *S. discolor* (?) and it may be that *discolor* was one of the parents. The reason I think that *S. pellita* enters into it is the peculiar spicy smell which is peculiar to *S. pellita* and the related *S. subcoerulea*, etc. The elongated leaves with somewhat revolute and shallowly undulate margins also suggest *S. pellita*, although *S. candida* would give somewhat the same effect. Some of the bud scales are glaucous which is characteristic of *S. pellita*. My reason for assigning *S. petiolaris* to the parentage is the slender, glabrous, dark branchlets, elongated buds, etc. The scanty pubescence on the underside of the leaves could have come from several species. If you are able to get flowers or fruit it may help to settle the question.

In the shipment made to me there was a No. 416, *S. athabascensis*, which you will find in my list. In this shipment there is a No. 461 with a label bearing exactly the same data as were on your earlier 416.

3 athabasc
6 CRP

- 2 -

The plants of the two specimens are identical. As the date is August 20, which is correct for the other numbers between 460 and 461, I assume that the No. 416 was an error and that 461 is correct for both specimens.

393. *S. athabascensis*. The label on the specimen you sent me under this number said that it was the same as No. 38, but no 38 was in the collection sent me or in this collection sent BPI. On the label of the specimen sent to the Bureau of Plant Industry it says "from same shrub as No. 66, 161." In the material sent me the label said that Nos. 66 and 84 were from the same plant. The label of 161 does not show it to be from the same plant as any other number. I am wondering, therefore, about the statement on the label on the BPI specimen of 393 that it is from the same shrub as Nos. 66 and 161.

Cordially yours,

Carleton R. Ball,
Executive Secretary

December 9, 1940

Mr. August J. Breitung,

McKague, Sask., Canada.

Dear Mr. Breitung:

I greatly enjoyed reading your letter of November 5 and examining the specimens which you sent with it. Your trip into the eastern part of the Province must have been very interesting and it certainly resulted in finding *S. amygdaloides* and *S. cordata* at points much farther north than previous records have indicated. I am leaving the city again today but am enclosing a list of determinations and some comments on the material.

S. lucida angustifolia And. (722). This is a narrow-leaved form of the species.

S. lucida intonsa Fernald (710, 714, 750) Fernald's variety was described as having the leaves thinly silvery silky beneath. Your plants are somewhat pubescent on the young branchlets, petioles, and midribs, as well as on the lower side of the leaves. I am putting them under Fernald's variety now.

S. amygdaloides And. (755). This species occurs along the southern border of the Canadian Provinces from Quebec to southwestern Saskatchewan, but so far as I know, has never before been recorded from that far north. Congratulations!

S. exigua lutescens (Rydb.) Schm. (751, 753). These specimens come from the East side of the Province but I cannot place them with *S. interior* and its varieties although one certainly would not expect a Rocky Mountain species out there.

S. cordata Muhl. (792, 889) This seems to be typical of the plant as it occurs in the eastern United States and southeastern Canada. Like *S. amygdaloides*, you have found it much farther north than it previously had been recorded.

S. cordata angustata And. (711) This possibly may be one of the puzzling hybrids with *petiolaris* but it needs further study.

S. pedicellaris hypoglauca (?) Fernald. (542, 549) These are puzzling plants and must have further study. They show some pubescence on the branchlets but the capsules are glabrous and the leaves are not as veiny as they should be. I have got to obtain authentic material of *S. athabascensis* and study it critically before I will know what to do with some of these things.

S. pellita Andersson. None of your specimens will pass for *S. subcoerulea* Piper. I note that you have applied this latter name to the broad-leaved forms but Fernald's type and his other collections were all broad-leaved like most of your plants. The leaves on your broad-leaved specimens are becoming glabrate beneath but this occurs in most species of this group. The specimens with very long and narrow and densely sericeous leaves which you have determined as *S. pellita* probably are late growing, seasonal shoots of this species and it seems likely that you would have found broad-leaved portions on the same plants. Otherwise they would seem to represent a rather distinct variety of *S. pellita*.

S. planifolia and variety *Nelsoni*. The variety has narrow leaves and rather acuminate at the apex. One of your specimens, which I have called *S. planifolia*, is really intermediate between the two.

After I return and have time to study this material further, it is likely that I will wish to write you again.

Cordially yours,

Carleton B. Ball,
Executive Secretary

dupl in file, pellita

October 20, 1941

Mr. August J. Breitung,
McKague, Sask., Canada.

Dear Mr. Breitung:

Your letter of October 6 was promptly received and I am delighted to know that you have had a successful collecting season. Undoubtedly you are still pushing out the boundaries of the known distribution of some of these species.

I note your desire for a few hundred labels for the specimens. These I will be glad to supply. However, it would not be proper for me to have them printed as you suggested because they are your collections rather than my herbarium.

I can send you blank labels printed merely "PLANTS OF SASKATCHEWAN". If you prefer I will have labels printed to read

"PLANTS OF SASKATCHEWAN

August J. Breitung, Collector"

You may wish to insert the name of the town McKague after your name.

Personally, I prefer only a printed heading on plant labels. That leaves all the rest of the label blank so that one can write in much or little as is necessary. Some labels have a bit of printing for every item, such as habitat, locality, collector, date, number, etc. These take up a lot of space on the label and are not always at the point where you want to use them when the label is written. If you would like to have PLANTS OF SASKATCHEWAN at the top of the label and your name and number at the bottom, that would make a good arrangement similar to the one you suggest.

Cordially yours,

Carleton R. Ball,
Executive Secretary

petiolaris var *gracilis*
Now use

June 3, 1942

Mr. August J. Breitung,

Tisdale, Sask., Canada.

Dear Mr. Breitung:

Your letter of May 28 is here and your two queries are noted. The record on *gracilis* is as follows:

S. gracilis Andersson, Cefvers. K ngl. Vet.-Akad. F rh.
15:127. 1858.

S. petiolaris subsp. *gracilis* Andersson in K ngl. Svensk.
Vet.-Akad. Handl. 6:109. 1867.

S. petiolaris var. *gracilis* Andersson in DC. Prodrornis
16(2):235. 1868.

From these citations you will see that Andersson's idea of the relative rank of the entity represented by the name "*gracilis*" steadily diminished through a period of years. Of course we are not entirely sure that these are the ranks Andersson had in mind, but at least they are three ranks in descending order. From a long study of his treatment, I think this is a fair evaluation of the successive ranks in which he placed this plant. We know that he intended the first one as a species and that the two succeeding ones were lower.

Schneider, in the Journal of the Arnold Arboretum, 2:16-19, discussed *S. petiolaris* and Andersson's treatment of what is now regarded as variety *gracilis*. On page 18 he says "Now, if we take *gracilis* for a variety of *S. petiolaris*, we must use the name *rosmarinoides* for it." On page 19 he makes the new combination "*S. petiolaris* var. *rosmarinoides*, comb. nov.". Thereunder he cites "*S. petiolaris* * *rosmarinoides* Andersson in  fv. Svensk. Vet.-Akad. F rh. 15:127. 1858." Schneider was completely in error in this citation because Andersson made no such combination. The combination which he did make on the page cited is *S. gracilis* *rosmarinoides*. This makes *rosmarinoides* a mere variety of a plant which Andersson 10 years later reduced to the rank of a variety of *S. petiolaris*. In his later publications, Andersson never mentioned *rosmarinoides* at all.

- 2 -

From the above it is evident that if this small, narrow-leaved plant is to be recognized as a variety of *S. petiolaris*, it must bear the name *gracilis*. As Andersson first described it as a species and later reduced it successively to subspecific and to varietal rank, we really ought to write the combination: *S. petiolaris* var. *gracilis* (Andersson) Andersson, just as we would do if the second combination had been made by a different author. In actual practice, however, this is not always done.

Your second question concerns *S. Nelsoni* Ball and *S. planifolia* var. *Nelsoni* Ball. I named the species back in my youth when material was scarce and the type specimen and similar collections looked very different from the mountain forms of *S. planifolia*, then known as *S. chlorophylla*. Later I was able to study much more abundant material which bridged much of the gap between these forms and convinced me that *Nelsoni* was only a narrow-leaved variety. I still hold to that belief.

As to the publication of *S. planifolia* var. *Nelsoni* Ball, I am afraid you have me on a hot spot. I cannot find that I ever have published this combination although I have used it for several years. I will publish it soon with other miscellaneous material.

Cordially yours,

Carlton H. Ball,
Executive Secretary

Sask. S.W. ~~Alta~~ Sask.

3814 Jocelyn St., N.W.,
Washington 15, D.C.
August 6, 1947.

Mr. A. J. Breitung,
Cypress Hills Park,
via Maple Creek, ~~Alta.~~ Canada.

Dear Mr. Breitung:

Your packet of three willows from Battle Creek, Ft. Walsh, Cypress Hills Park, arrived at the Dept. Agr. yesterday and I have given immediate determination so that you may have the additional information while collecting.

4756. *S. pseudocordata* (Andersson) Rydb. Bushy shrub 4-6 ft. high, common on river fls (This has been called *S. curtiflora*. It is common in the mountains southward but probably new to Sask. I will check it against *S. monochroma* when I get down to the Dept. but that should have longer petioles and more ovate leaves.
4757. *S. caudata* var. *parvifolia* Ball. Shrub 8 ft. high, fairly common along stream. This occurs in the western mountains but doubtless is new for Sask. One never is sure whether these depauperates are hereditary or physiological but if you found several in well-watered fertile soil they would seem to be a valid variety.
4758. *S. candida* Fluegge. Shrub 4 ft. high in marshy meadow. Browsed by cattle. Associated with *S. planifolia* and *S. discolor*. (all 3 on July 15, 1947). This locality is part of the southern extension in the Plains area. It occurs in Benson and McLean Cos., No. Dak. (centr), and Burke Co. (NW), No. Dak. In Alta., McCalla has found it at Calgary and Morley. Cypress hills lie directly between these to areas.

Any notes on browsing by cattle or other animals will be most welcome as I am compiling all available information on willow uses.

By the way, the specimens were broken in transit. The packing board were 17 $\frac{1}{2}$ by 14 $\frac{1}{2}$ inches. Better cut 'em smaller next time. Cordially yours
Carleton R. Ball

Battle Creek Ranger Station
Via Maple Creek, Sask
Aug 11, 1947.

C.R. Ball

Dear Friend:-

I received your good letter
today and many thanks for it.

I made a good series of collections of
all the willows & especially that *S.*
pseudocardata or ~~*confertiflora*~~ *monochroma*
whichever it is & *S. caudata* (var *par*
nifolia) upon further investigation since
I made the first collections which was
a hurried trip with other people, I find
S. pseudocardata a shrub up to 10 or 12
ft. high and I believe the same as
that which is common along the Bow
River at Banff of which I also
made quite a series in 1945 & 46. I
hope to be able to send you ^{this winter} a complete
series of all my *Salix* colls of 1947. I
don't know from memory whether both
S. pseudocardata & *S. monochroma*
occur in Banff area, but I believe for
S. monochroma Banff is the type locality.
(See over)

S.S. Have you seen the May-june issue of the Canadian Field
Nat?

I have tried to make a complete collection of all the plants of the Cypress Hills and wonder if it wouldn't be an interesting and useful paper I could write. What do you think?

I hope to learn the real differences between *S. pseudocordata*, *S. monochroma* & *S. pseudomyrsinites* next winter.

S. candida seems to grow much taller and more abundant in western Canada than in the east where I saw it only once and 2 ft. or less high while here it grows fully 6 ft. or more high & prefers bogs & marshy places. Perhaps the kind of bogs around Ottawa are of a different chemical or mineral nature, as the general flora bog & otherwise is quite different. As to notes on animals browsing on shrubby I will make more notes that is a very interesting & useful study.

Salix candata (? var. *parvifolia*) of which I made further collections to determine its exact status I found only a short distance above & below Fort Walsh.

There are a lot of other plants that have a peculiar localized distribution here in the Cypress Hills!

yours Very Truly
August J. Breitung

Prof. A. J. Breitung,
215 Rochester St.,
Ottawa, Canada.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

January 26, 1948

Dear Professor Breitung:

Since writing you on Jan'y. 20, I have continued my study of your Cypress Hills and other Sask. material and inclose the 3-page list of determinations.

At the top of page 1 are the few specimens from other localities than the Hills. Then follow 2½ pages of Cypress Hills Specimens, both Sask. and Alberta, in one numerical series.

Nos. 5121 and 5210, received as *S. planifolia* Nelsoni, and which I suggested probably were *S. petiolaris*, I now have compared with a large series of specimens and feel certain that they really are *S. petiolaris*.

No. 5629, received as *S. serissima*, and which I suggested might be *S. lucida*, I will not decide fully until I hear from you about leaf color. I find some specimens of *S. lucida* which match it almost exactly but twig colors alone will not separate the two species.

No. 6039, in the non-Hills specimens, I have determined as *S. athabascensis* Reup. You had collected it previously (Nos. 106, 449, 461, 554, and others). As a matter of fact, I suspect that *S. athabascensis* and *S. fallax* are one and the same species and it probably includes part, at least, of Fernald's *S. hebecarpa*. Of Reup's two species, *S. athabascensis* is the older.

Reup's description of *S. athabascensis* fits your specimen almost exactly, so far as the organs are present. But look at his plate and you will see that its leaves do not match the description at all. Did he describe merely the type, out of 6 specimens, and then photograph one of the others not fitting that description but probably of the same species?

S. fallax is described as having leaves up to 7 cm. long and 3 cm. wide, or about twice as large (on the average) as those of *S. athabascensis*. The styles are described as 0.5-0.8 mm. long, or about twice as long as those of *S. athabascensis*. Yet the closely related and widely distributed *S. pedicellaris* var. *hypoglauca* has a range in leaf and styles which would take in both *S. athabascensis* and *S. fallax*. And that does not seem to worry even Dr. Fernald.

The specimen you sent me has only one poorly developed ament. If your undistributed material has more aments, I will be glad to know what range in capsule, style, and pedicel length you can find on them. Also in leaf width and length.

S. fallax was described from a single number and the leaves are called obovate, but if you will look at his plate you see that they are oblanceolate to narrowly obovate. Later I hope to see more material of both.

Cordially yours,

Carleton R. Ball

Mr. A. J. Breitung,
215 Rochester Street,
Ottawa, Ont., Canada.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

February 4, 1948

Dear Mr. Breitung:

I have your letter of January 24 and the additional specimens of 5629 (*S. serrissima*) and 5121 and 5210 (*S. planifolia* (?) var. "nelsoni" (?). I have read it carefully and have studied the second set of specimens and compared them with the first. Then I took both sets down to my herbarium and spent hours comparing them again with a large series of specimens of *S. lucida* and *S. serissima*, and *S. petiolaris* and *S. planifolia* Nelsoni, respectively.

My conclusion is that these leafy specimens alone never can settle with finality, the identity of these plants. In most cases, foliage specimens are sufficient to fix identity, but here I feel that flowers or fruit will be required to prove it. I certainly hope that some day you may get back to the Cypress Hills and be able to pick up these same plants earlier in the season.

S. serissima (No. 5629). This species develops the glaucous (strongly) under-surface very early in the development of the leaf, usually long before it is fully expanded. *S. lasiandra*, on the other hand, is slow in developing the glaucousness and so immature foliage may be mistaken for *S. caudata*. I have never seen a non-glaucous specimen of *S. serissima*. Because of the thick firm leaves, it is harder to destroy it by too rapid and too hot drying than in the case of thinner leaves. *S. serissima* does have a closer serrating than *S. lucida*. The actual spacing depends, of course, on the size finally reached by the developing leaf, those remaining small being more closely serrate than those growing to be larger. Your leaves are about the right size and serration for *S. serissima* but are small for *S. lucida*. If they had grown to the size of *S. lucida*, however, the serrations would have been that much more distant. I can find no constant differences in twig color or other twig characters.

S. planifolia var. *Nelsoni* or *S. petiolaris*. (Nos. 5121, 5210). In general, *S. petiolaris* has more slender branchlets, and less divaricate, than *S. planifolia* and its varieties. Your specimens have slender twigs, more as in *S. petiolaris*, and these are more ascending. Likewise, the twigs tend to be more leafy in *S. petiolaris* and that agrees with these specimens. One of the numbers, especially, has the reddish shining twigs so commonly found on *S. petiolaris* in the drier Plains area, and which McCalla says are beautifully crimson in early spring. Twigs of *S. planifolia* tend to be dark throughout and those of *S. petiolaris* to yellowish while quite young, which agrees with your specimens. On the whole, the characters seem to favor *S. petiolaris* but nobody will be happier than I if I am proved wrong. You may be interested in checking them against your other collections of *S. petiolaris* in Sask.

There are three ways of handling varieties. One way is not to mention them at all but describe the ~~XXXX~~ species so broadly that it includes all varieties. The second is to describe the species only, and then add: "northern specimens with broader leaves and longer pedicels are recognized as (*S. lutea*) var. *platyphylla* Ball." for example. The third is to recognize varieties in both keys and text (in the latter by a subletter, as *XXI.7 a. var. pervifolia* Ball. Leaves smaller, 3-6 or 10 mm. long. The author should do what he thinks will best serve his readers, and may use both the second and third methods in the same paper.

The two chief troubles with Rydberg were that he usually separated the most closely related species by putting from 2 to 5 less closely related species between them, and that he elevated many varieties to specific rank or described as species forms which were only varieties.

I hope that you go ahead with your paper for I believe that it will be a real contribution to botanical knowledge of an isolated area.

Apparently I forgot to say that many of your Cypress Hills collections had leaves smaller than usual, perhaps a result of drought or elevation, or both.

Cordially yours,
Carleton R. Ball

Prof. August J. Breitung,
442 Preston Street, Ottawa,
Ontario, Canada.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

5 October, 1949

Dear Professor Breitung:

Your letter 23 September came promptly and the two packages of willows arrived two days ago, all in good condition. Yesterday, I sorted them out by Provinces and and in numerical order for each Province. Today, I have studied the Manitoba material, taking this first because I thought it might extend the ranges of some species treated for the new Illinois Flora. It probably has but I have not yet checked.

While sorting, I glanced at each specimen and wish to congratulate you on a very splendid set of specimens. Many of them are quite large, which serves to show the habit of branching and the succession of sizes and shapes of leaf through the season. These facts, with you full notes on habitat, will enable a better knowledge of many species and help to explain some of the variations seen.

I also am greatly pleased that you are naming the collections yourself. We need many more collectors who will try to do this. Only so will they come to know willows and get rid of the prevailing idea that they are impossible. In general, you have done an accurate job so far as I have gone. Now for some notes.

7499. *S. pedicellaris* Ph. has glaucous leaves and therefore is var. *hypoglaucous* Fern. But it has very short, obovate leaves, quite different from the normal for the species and the variety. I think I have one or two more like it and will look them up soon. Perhaps it represents a new variety, just the reverse of var. *temescens* Fernald.

I have just reread your discussion of *S. lutea* in Manitoba, in your letter. I am quite sure that all your Manitoba specimens are *S. rigida* Muhl. (*S. cordata* Muhl., not Mx., and feel certain that you will agree when the distinctions are made clear.

In *S. lutea* the 1-year and seasonal twigs are yellow (unless blackening in/drying). All of the vegetative organs are glabrous from the beginning, including twigs, buds, petioles, and leaves. The leaves commonly are pale green above and strongly glaucous beneath. *S. rigida*, on the other hand, has 1-year and seasonal twigs yellowish-brown to light brown. They may be yellower in spring but darken as the season advances. The only yellow twig in these Man. specimens is the oldest stem on 6396. Still more important, the young twigs, buds, and petioles are always puberulent to pubescent, and often the younger leaves are more or less so on the upper surface. The mature leaves are darker green above and usually only glaucescent beneath.

S. rigida keeps mostly to the humid areas but has been found once in NE Montana. *S. lutea* keeps mostly to the dry plains and westward. I think you have collected it in Sask.

You sent two sheets of *S. rigida* 8023. One has ascending twigs (45°) and the other strongly divaricate twigs (about 90°). Was this intended? Is one of them possibly an other number? The labels are alike.

I agree with your naming of *S. humilis* from Manitoba, altho the narrow-leafed specimens are var. *rigidiuscula* (Anders.) Rob. & Fern. But I think that most or all of Man. specimens named *S. discolor* var. *ericocephala* (Mx.) also are *S. discolor*. Will give them more study. They all have densely pubescent twigs and young leaves, altho some of the older leaves are glabrate beneath. The *discolor* variety is only sparsely hairy at best and the leaf margin are plainly dentate-crenate. Your specimens are mostly entire or very shallowly and remotely undulate crenulate.

There were two sheet of 7711, apparently alike, and I take it that this was an error in packing. When I finish the *humilis* study, will send typed list of these collections. With much appreciation, I am

Cordially yours

Barleton R. Ball

Prof. A. J. Breitung,
442 Preston Street,
Ottawa, Ontario, Canada.

3814 Jocelyn St., N.W.
Washington 15, D.C.

11. October, 1949

Dear Prof. Breitung:

Since writing you recently about your Manitoba willows, I have studied the early (Boivin & Breitung) and late (Breitung) collections from Saskatchewan. I typed these as I wrote them out, and inclose a copy of both lists, with my comments in parentheses.

I have not finished typing the Manitoba list yet but will do it soon and send you a copy. Then I will take up the Alta.-B.C. collections. By the way, R.G.H. Cormack, who is Asst. Prof. in Dept. of Botany, Univ. of Alta., Edmonton, has collected extensively in the Cypress Hills of Alta this past summer. You and he probably would be interested in exchanging lists and comments. If I recall correctly, you collected a few on the Alta. side of the boundary.

As the collection lists and the attached list of species will show, you have found about all of the species which would be expected in central Sask. Of the 23 listed, 19 are certainly present, altho *S. "athabascensis"* may be a different species. Four are somewhat doubtful until I can check them against fuller and widely-collected material. I add some notes on them which you may find useful in checking your material.

I have credited you with *S. subsericea* (no. 6038), which I think that you had collected in the McKague area. I also have recognized var. *lancoifolia* under *S. lasiantha*. It is separated only by pubescent young twigs and petioles. In our Southwest it is densely pubescent but only sparsely so in the northern parts of its range.

S. myrtillofolia is awar and spreading, with small, mostly narrowly obovate leaves, pale but not glaucescent beneath. *S. pseudocordata* is usually taller and erect, with elliptical-lanceolate leaves mostly broader at base and more acuminate, and quite so pale beneath. The one collection (no. 8256) which I have credited to *S. myrtillofolia* has narrow leaves and may prove to be a very depauperate *S. pseudocordata*. Most of your species show depauperate growth in that area, especially in sandy woods.

I am worried about your *S. mackenziana*. The early collections of *S. lutea* were really yellow but the late ones were grayish with young twigs blackened in drying and these you had mistaken for *S. mackenziana* (No. 8372). I have left No. 8374 as *S. mackenziana* until further study but think that it is really *S. lutea* too. Unless drying is done carefully, these troubles are with us. *S. mackenziana* has dark-brown or black twigs.

You collected undoubted *S. tristis* in Man. Your Sask. No. 8287 I have identified as *S. tristis* instead of *S. humilis*. The leaves are typical except for being more or less glabrate, but the late date and sandy-woods habitat may have had something to do with that. Will compare this specimen with wide range of material soon.

If I am worried about *S. mackenziana*, I am more worried about *S. humilis*. Many of your so-named specimens I have identified as *S. Seculeriana* and I feel sure that when you compare them with those you named *S. Scouleriana*? often from same locality, you will agree with me. That was true of many small-leaved (depauperate) collections with leaves much crowded. Some of those with narrower, oblanceolate, leaves, less crowded, I have left in *S. humilis*, with question.

In general, typical *S. humilis* is only sparsely pubescent to glabrate on twigs and not so densely pubescent on leaves, which are thinner and not crowded. Almost all of your specimens, however named, are densely pubescent on twigs and leaves, and the leaves are thick and mostly crowded. I wish you would restudy this material, while I am comparing it with widely-collected specimens.

- 2 -

The question of *S. discolor* and var. *latifolia* is still a bigger worry, which will be discussed fully in treating the Manitoba collections. In the Sask. lot there were but two specimens, I think (Nos. 6065 and 6078).

I had not noted before that *S. brachycarpa* is so much later in developing than the associated species. This may temporary (1949), or local, or just an accident.

I am somewhat disturbed by occasional lack of sequence in numbers, dates, and localities. I assume that numbers were supposed to be in chronological order, but perhaps slips occurred, if the numbers were not assigned in the field.

For example, you collected Nos. 6240 and 6245 at Candle Lake on June 26, and Nos. 6312 and 6325 there on Aug. 1. But in the meantime you had collected No. 6701 at Sask. Landing, in So. Sask., on July 30. Should the last two at Candle Lake have been Nos. 6712 and 6725? Or is the date wrong? Similarly, the numbers from Meadow Lake (9 and 15 mi. south) ~~xxxxxx~~ on Aug. 13, are earlier than those from Crossing of Beaver R. and from Green Lake on Aug. 12.

You certainly have a wonderfully interesting lot of material in these collections and I am greatly enjoying the study of them, even if it is causing more headaches than I need. That is the way we learn more about plants, especially willows.

When I send the list of Manitoba, I will discuss those *discolor* -humilis densely pubescent specimens. Have got to decide what they are.

Cordially yours,

Carleton R. Ball

Prof. A. J. Breitung,
442 Preston Street,
Ottawa, Ont., Canada.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

20 October, 1949

Dear Professor Breitung:

I have reached a stopping point with your Alta. and B.C. collections of 1946 and have typed the lists of determinations, some of them tentative, as noted. Lists are inclosed. If mine differ from yours, yours follow in parentheses.

All of the labels give the year of collection as 1946. I have a faint recollection that in some letter you mentioned them as collected in 1945. No. 2757 (*S. pseudocordata*) from Waterton Lakes is in a folded sheet, as the others, but inside this folder is what seems to be an original collection sheet with the date written very plainly "Sept. 20, 1945".

I have left several specimens under *S. monochroma* Ball, as you named them. However, some of your specimens, and some received from others, open the whole question of the relationship of *S. pseudocordata* and *S. monochroma*. I shall have to take my abundant material and use the centripetal method of study on it. This may cause changes, and I will let you know the results.

I have listed Nos. 3207 and 3272 as *S. calcicola*, as you have named them. But I will study these two, and the two previous western collections, as I now have a suspicion that they belong elsewhere. If I remember correctly, Dr. Boivin planned to name this as a new variety. Will let you have my results presently.

In these collections, there seems to be no connection between collection numbers and collection dates, which makes it hard to list them and also to detect errors. Here are a few questions.

No. 2619 heads the Alta. list and is dated Aug. 29. No. 2618 is not with it but down below in the Pyramid Lake group and is dated Aug. 20. The other two in the Pyramid Lake group are dated Aug. 29. Please see my query in the list, under No. 2618.

No. 3181, *S. melanopsis*, has no date on the label. The number preceding and the number following are nearly a month apart.

I have not completed the citation of the combination: *S. mackenziana* (Hook). It has usually been given as (Hooker) Barrett, but that is a nomen nudum and I must look up the next later combiner.

No. 3206, *S. alexensis*, is very interesting. I do not recall if there are other collections from so far south.

You may feel that I should have settled these questions before typing the lists but, at 76, I like to report as promptly as possible, even with qualifications in some cases. Some day I won't be here any more. But I cannot know what day.

Now I will get busy on the problems in the Manitoba list and with your comments on the Saskatchewan determinations and other problems.

Appreciation your continued generous assistance, I am Cordially yours,

Carleton R. Ball

Prof. A. J. Breitung,
44E Preston Street,
Ottawa, Ont., Canada.

3814 Jocelyn St., N.W.
Washington 15, D.C.

21 October, 1949

Dear Professor Breitung:

Your letter of Oct. 17 came promptly and I now can discuss the Sask. material further. Wrote you yesterday about the Alta-B.C. collections and will finish Man. soon.

1. *S. myrtillofolia*-*S. pseudocordata* complex. Both species occur in western Can. and sparingly north to Alaska. *S. myrtillofolia* is less abundant and more northerly. It does not extend into U.S. The leaves are relatively small, oblanceolate to obovate, and short-acute. The plant is low and often decumbent or ascending. *S. pseudocordata* occurs abundantly in our western States and northward. It is erect, usually much taller, and the leaves are like those of *S. rigida* and *S. lutea*, that is, lanceolate with the bases broadened, and sometimes subcordate. Of course, when leaves do not develop fully, the bases remain narrow. The big problem now is where *S. monochroma* Ball fits in.

2. I agree that *S. fallax* and *S. athabascensis* are the same. But what specimens belong to it, if it is a hairy species of Section Roseae, and what to Section Glaucæe must be settled. Roseae are supposed to be glabrous with the capsules long-pedicelled and styles and stigmas relatively ~~in~~ short., and leaf finely reticulate. Glaucæe are hairy throughout, with short pedicels, long styles and stigmas, and coarse reticulation. There properly may be hairy Roseae but they must have other characters of the Section. More study must be made. *S. desertorum* is the northern glabrate member of Sect. Glaucæe also requiring more study. Most closely related to *S. lauca*.

3. *S. subsericea* is fairly well-marked throughout its wide range. It long was regarded as a variety of *S. petiolaris* because its floral organs resembled those of that species and taxonomy was based on floral characters. Its capsules usually are shorter and blunter than those of *petiolaris* but are long-pedicelled. Because of its hairy leaves it was held to be a hybrid of *S. sericea* and *S. petiolaris*. Over its wide range its leaves are normally hairy on both sides and so remain, especially above, through summer and autumn. Leaves of *S. petiolaris* may be thinly sericeous while unfolding but always become glabrous promptly. Whether *S. subsericea* is species or variety is always debatable, and there always are some sports and hybrids.

4. *S. pedicellaris* var. *temescens* Fern. is an eastern var. with leaf long and narrow. It really is a variant of var. *hypoglaucæa*. Those western specimens had small leaf (depauperated but of normal proportions. Small leaf have many causes: late cold spring; drought; heavy fruiting; sandy or gravelly habitats, competition, etc.

5. I have changed the date of collections made 9-15 miles south of Meadow Lake (Nos. 8346-8356) from Aug. 1 to Aug. 12, on labels and lists. Thanks. from Aug. 13 to Aug. 12

6. I have changed dates of 6312 and 6325 (Candle Lake) from Aug. 1 to July 1, on labels and lists. Thanks.

7. I note your deleted item on No. 6065, which you called *S. discolor* and I named *S. humilis*. Your suspicion of relationship to *S. planifolia* may be correct. I will look up hairy specimens of *S. planifolia*. I have some from Gt. Slave Lake, I think.

8. No. 8321, from Meadow Lake, Aug. 11, you had named *S. petiolaris*, and it is typical. Have you some other number in mind, or perhaps 2 species in 8321?

9. I have changed No. 8355 (*S. pseudocordata*) to 8353 on the label. Thanks.

10. I Note your agreement that Nos. 8372 & 8374 are *S. lutea* instead of *S. mackenziana*, as you had named them. I had entered 8374 as *S. mackenziana* in the list and now have changed it to *S. lutea*.

11. I note also your agreement with my placing of most Sask. material you sent in as *S. humilis*. This covers Nos. 8177, 8178, 8234, 8286, 8362, 8477, and 8481, as well as the 8442 and 8454, which you mention. I assume that you agree on all. I had also

accepted as *S. humilis* several which you had so named, including Nos. 8278, 8285, 8289 and 8346, [^] I take it that you agree with these also. as well as Nos. 8447 & 8454.

12. One fact I forgot to mention in my other letter. You sent two sheets under No. 8231 (Grieg Lake). They are the same species but one has ascending twigs and the other has strongly divaricate twigs. Are these both true No. 8231 or is one some other No. not entered in my list?

13. It is interesting that the hairy-leaved species seem to have rusted most in this late summer. *S. Scouleriana* commonly, *S. humilis* less frequently, *S. candida* twice, and *S. lasiander* (glabrous) only once.

14. When considering differences in appearance of different specimens of the same species we always have to consider all of the ecologic factors. There are many of these, including age of plant, exposure to sun, favorable or unfavorable soil, effect of browsing, season of the year, general climatic conditions (light, temperatures) which change with latitude and longitude.

For example, species like *S. rigida* will have more blackish and brown twigs in the South and East and tend toward light browns, orange, and yellow as they extend west. Twigs will be more shining in drier areas than in the more humid. Some species, as *S. petiolaris*, will grow much taller in the northern part of their range than in the southern, whereas other may become depauperate in the northern ranges. All of these problems keep us guessing, and we have to learn a lot to guess right when dealing with the fragments which constitute herbarium specimens, especiall of woody plants.

Now I'll try to get back to the Manitoba collections and finish them up. Also give a final check to some from the other provinces. I cannot go into the question of *S. monochroma*-*S. pseudocordata* right away but I have to settle it in order to finish the Alaska and Idaho manuscripts. Same holds for the *S. fallax* problems.

Your material is making me very tired and very happy, which constitute the price and the reward of learning.

With all good wishes, I am

Cordially yours,

Carleton R. Ball

Prof. A. J. Breitung,
442 Preston St.,
Ottawa, Ont. Canada.

3814 Jesselyn St., N.W.
Washington 15, D.C.

24 November, 1949

Dear Prof. Breitung :

This is our national Thanksgiving Day, so I am trying to clear up various remnant jobs so that I will have more to be thankful for. There are several "remnants" in connection with your 1946 and 1949 collections and here are notes on a few.

No. 6065 from Candle Lake, which you named *S. discolor* and I named *S. humilis*, I have examined critically and I can't get it out of *S. humilis*. The twigs, buds, and petioles are quite pubescent. The leaves are entire, or the larger very shallowly glandular-undulate. The leaves are rather evenly (but thinly) short-sericeous beneath. All of this says *S. humilis*. On the upper surface, the color and the puberulent veins, especially the midrib, could be found on *S. discolor*. It would be easy to say "hybrid" but there is not any proof. Aments would show it. Stipules also are few and tiny.

No. 6078, which you named *S. discolor* and I listed as *S. humilis*, I now believe to *S. discolor* var. *latifolia* Andersson. This is the former var. *ericocephala* (Mx.). The twigs (and petioles) are only sparsely pubescent. The leaves are already large, altho not fully grown, and the margins are plainly undulate-crenate as in *S. discolor*. They are short-pubescent-puberulent above, as in this var., but only thinly short-pubescent beneath while unfolding and soon becoming glabrate-glabrous, while *S. humilis* remains hairy.

The two specimens of *S. calcicola* (Nos. 3207 and 3272) from Banff Natl. Park are the typical western form with leaf margins quite closely micro-denticulate, like the earlier Boivin 5153 and Forsild-Breitung 14697. When Boivin sent me his collection, he suggested that it was a new variety which he proposed to name var. *glandulosa*. I pointed out that the eastern form is sparsely glandular while the western is closely but finely denticulate, and suggested that it would be better to recognize this close denticulation in the naming. I have written him today, asking if he has named, or is planning to name, a new variety.

In your sheet of *S. calcicola* No. 3272 was an envelope, marked in writing on the back: "Catkin No. 3272". Inside was 1 catkin of *S. calcicola* and 2 old fruiting catkins of what seems to be *S. nivalis* var. *saximontana* or *S. reticulata*. On the front of the envelope, in pencil, is "2619". This, however, is *S. pseudocordata*, so the catkins cannot belong to it. Your 3295, *S. nivalis* var. *saximontana*, bears 1 old 1948 catkin like these. I wonder if these belong to it. I inclose the envelope with catkins.

There may be some other comments due but these are all that I have before me now.

Cordially yours,

Enclosure: envelope

Carleton R. Ball

S. caroliniana Michx. in Ohio

Misses E. Lucy Braun,
5956 Salem Road,
Cincinnati 30, Ohio.

3814 Jocelyn St., N.W.,
Washington 15, D.C.

20 March, 1953.

Dear Professor Braun:

Your packet of 32 willows was recieved some days ago, in good condition. I am sure that a letter came with it but I cannot locate it at this moment.

I am sorry that I put you to the trouble of initialing each sheet. I always assume that mounted specimens are to be returned, and send them as promptly as possible. Only in the case of unmounted specimens, I like to be told regarding their disposition.

You will note that the specimen you sent as *S. serissima* (Bailly) Fernald I have determined as *S. fragilis* Linne. It is perplexing for several reasons. First, it seems to be a vigorous sprout, yet was collected in April, when sprouts almost never are found, except from cut or broken stems. The leaves do resemble sprout leafs of *S. serissima* but they have the almost triangular, denticulate stipules characteristic of vigorous sheets of *S. fragilis*, and the leaf venation belongs to that species. *S. serissima* occurs only in extreme northern Ohio, Ind., and Ill, so far as known.

I was rather surprised that you had no specimens of *S. humilis* Marshall. One perplexing leaf specimen I have labelled *S. humilis* var. *rigidiuscula* (Anderson) Robinson & Fernald, representing a depauperate growth, or else an extra large *S. tristis*.

The prize package, however, is *S. caroliniana* Michx. (*S. longipes* Shuttleworth; S. Wardii Bebb; *S. longipes* var. *Wardii* (Bebb) Schneider). It looks like *S. nigra*, but has the leafs glaucous beneath and the capsule pedicells longer when fully grown. The two specimens, both from Hamilton Co., which I have determined as this are both juvenile but the leafs are already glaucous beneath. Three others, from same County, are also juvenile but appear to be becoming glaucous beneath. Will look at them carefully again tomorrow. These five were all named *S. nigra*, which certainly ought to occur in Hamilton Co.

S. caroliniana is a southern species, but is common here in spots, and follows up the Petemas River to its headquarters. It occurs on both sides of the Ohio River in the Pittsburgh area, and is found on the south side of that river down the valley to the Mississippi. It has been found in three counties of extreme southern Indiana (Franklin, Harrison, and Perry. Franklin Co. corners with your Hamilton Co. Whether all five of the juvenile collections, or only two, prove to be this species, we need a very thorough search for more mature specimens in all of your southern counties. It is almost incredible that it has not been recognized before.

By the way, if you ever consider mounting woody plants with the stems on half the sheets toward the bottom and the other half toward the top? It keeps the sheets level and gets more into each pigeon-hole. Your few sheets were level when unpacked, but noticeably higher at the basal end when all laid with label end down.

(21 March). Two of the three other *S. nigra* specimens appear to be becoming glaucous on leafs beneath. Am returning the package by franked mail today.

P.S. *S. caroliniana* is a sprangly shrub to small tree, and usually is found in more or less rocky ground.

Cordially yours,

ALBERTA

Original in
letter file

Mr. August J. Breitung,
In Palma Apartments,
118 South Carr Drive,
Glendale 5, California.

2914 Jocelyn St., N.W.,
Washington 15, D.C.

16 November, 1953.

Dear Mr. Breitung:

Your letter of Oct. 26, and the packet of willows collected in Waterton Lakes Park, Altb., last summer, were received in fine condition. I have been so crowded with work that determinations have been somewhat delayed.

I wish to congratulate you on your study of this material and on making your determinations before sending it to me. In general your determinations are quite correct, as you will note from the lists. Where I have made any changes, it has been in the matter of varieties, where accuracy by either of us is hampered by the fact that willows are variable and any single specimen does not show all of the range of variation.

This is especially true of such material as the *S. Drummondiana* complex. So much of the material of these precocious-flowering species and varieties in the herbariums is collected very early in order to get the flowers and we have relatively little good mature foliage. Most of your material is well advanced. The leaves of *S. Drummondiana* var. *bells* are very long in proportion to width and have the bases broadened more than in var. *subcucullata*. My guess is that neither of your specimens belongs to var. *bells*, and the last probably belongs as the species.

I inclose copy of the determinations. I have listed plant and habitat characters and made some notes of my own (in parentheses). Because you are working on *Salix*, I have arranged the collections by Sections of the genus *Salix* instead of numerically, as I usually do.

Many thanks for the permission to keep these specimens. This I am glad to do but please remember that if you find that you need any or all of them just let me know and they will be returned.

You will note that one of the two collections of *S. planifolia* had no label, but you probably can look up and find what it is and send me a label for it. Both specimens were more hairy than is usual for *S. planifolia* that late in the season.

Cordially yours,

Carleton R. Ball