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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.

THE ARNOLD ARBORETUM
HARVARD UNIVERSITY

From H. M. Raup

FIMER DEWEY MERRILL, S.D., LL.D., Director,

and Administrator of Botanical Collections

JOHN GEORGE JACK, Assistant Professor of Dendrology,
Emeritus

ALFRED REHDER, A.M., Associate Professor of Dendrology,
and Curator of the Herbarium

JOSEPH H. FAULL, Ph.D., Professor of Forest Pathology

IRVING WIDMER BAILEY, S.D., Professor of Plant Anatomy

KARL SAX, Ph.D., Professor of Cytology

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Jamaica Plain, Massachusetts, U.S.A.

April 13, 1937.

Dr. Carleton R. Ball,
3814 Jocelyn Street N.W.,
Washington, D. C.

Dear Dr. Ball:

Thank you very much for your letter of March 30. I have been away for about a week, and am just now catching up with correspondence.

I look forward to the time when I can talk over some of the willow problems of the north with you, and hope that you will find it possible to stop here sometime and see my material. I am very much interested in the queries you have raised. I am quite aware that your S. brachycarpa Sensoni is not far removed from my var. psammophila. I had compared it, as you will note, with Gaspé material of the S. brachycarpa complex, although I did not cite the same numbers which you have in your discussion of Sensoni. Judging by your description and Professor Fernald's verbal accounts of the habits of the plants in the field, I think our plants have a much more upright and strict habit than any form of brachycarpa which I have seen. Furthermore, the leaves are much more densely ~~covered~~ with long hair in var. psammophila than in any of the forms I have seen. I shall look forward to your opinion after you have seen the material.

My spelling of poliophylla is a mistake. I have consulted Mr. Rehder, our local authority on International Rules, and he thinks that it is so obviously a mistake in spelling that it can stand without correction. He thinks that the context makes the origin of the name sufficiently clear to make a correction unnecessary. I had not noticed in this connection that you had already cited the Preble specimens under your var. Aliceae, but judging from your photograph I am still inclined to think that our form is distinct from it. However, further comparison of specimens is necessary before such a conclusion can be reached.

Turnor's name has been spelled, in the geographic literature, in both ways; but what appears to be the most authentic account of Turnor's travels, published by the Champlain Society, has it "or". Consequently I have spelled it so in the name.

With regard to S. glauca var. acutifolia, I confess to the same doubts as you have. I would like to show you, however, some of our material from the crystal ~~the~~ rock regions about Athabaska and Great Slave Lakes. This material is really the basis for my keeping up the variety. Much of it is quite distinct from the S. glauca which we have collected in the region of the Paleozoic rocks farther west. My concept of S. desertorum is based very largely upon a rather full sheet of material from the original collections of Richardson, in the Gray Herbarium. We also have, here at the Arboretum, a photograph of a similar sheet in the British Museum, with fragments from the plants. It

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If Rydberg had waited until he had more, and more mature, specimens we would not have so many species to deal with. Anyone can make a new species from one specimen.

I am sorry that Persild is letting Floderus mess up the American willows. After seeing what he did to those of Kamchatka and Greenland, I realize how hopeless such an outlook is. The spevies actually existing in the area ignored. Practically all specimens pronounced to be hybrids, and hybrids of species not occurring in the area. Physiologically that would be possible, but only thro lapse of such eons as would serve to fix species. Then to claim to be able to distinguish not only double hybrids, but also triple, quadruple, and even quintuple hybrids. And hybrids of hybrids! It is nauseating. Anyone with even simple experience with the actual making of hybrids, would realize how impossible such parental recognition. Common transgressive segregation permits the progeny to vary outside the limits of either or both parents of a simple hybrid. Why then attempt to postulate such ridiculous entities as quadruple and quintuple hybrids? And nroy one scintilla of experimental evidence is offered.

The worst of it is that botany accepts such twa ddle as fact and bestows honor on its perpetrator. I have examined critically large numbers of the German so-called subforms, sub-subforms, and sub-sub-subforms, all with their Latin hexi-, septi-, and octonomials, and have duplicated several of the series from material collected by me from one single plant. And yet their literature continues to reek with such entities solemnly set forth. The University of California would not believe what I said about multiple hybrids and sub-sub-subforms until I put up a demonstration for the graduate seminar. Then the slow of belief were converted.

Specifically I should have stated that Floderus, in naming material from East Greenland, West Greenland, and Baffin Land, refused to recognize such species as *S. anglicorum*, *S. anglicum cordifolia*, and sometimes *S. arctophila*.

I shall be a way from Washington for three or four weeks more on this trip. Should you send any of your northern material before my return, it will be properly stored and cared for.

I ceratinly plan to visot the Arboretum and Gray Herbarium again in the not too distant future. There are some specimens I wish to consult and I do want to talk over many matters with you. Summer plans cannot be made yet, however, because we are braaking in a lot of new plans and in new States.

Cordially Yours,

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

is just possible, as you suggest, that desertorum may have to be used to cover more of group than it now does. S. niphoclada has bothered me a good deal. I have never seen authentic material of it, but we have a photograph of the co-type which is in the U. S. National Herbarium. I have some unpublished manuscript on the Mackenzie basin willows which contains some notes on this species, and will include with this letter a transcript which will show the state of my ideas regarding it.

A great deal remains to be done on this and other complexes among Mackenzie basin Salices. Mr. Porsild has an excellent collection from the Great Bear Lake region which I hope to see before long. It has been determined by Floderus, and I am particularly curious to see what he has done with some of our problems.

Best regards.

Sincerely yours,

Ray H. M. Porsild

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HMR-S
Enclosure.

(over)

April 22, 1937.

Mr. Hugh M. Raup,
Arnold Arboretum, Harvard Univ.,
Jamaica Plain, Massachusetts.

My dear Mr. Raup:

Your letter of April 13th is before me here, in the midst of a field trip. I cannot make a very accurate discussion of *Salix* problems at this distance from herbarium and literature. Some comments are possible and may be helpful.

The glauca complex includes *glauca*, *glaucops*, *desertorum*, *nipoclada*, *lingulata*, *pseudolapponum*, *wyomingensis*, and *cordifolia*, as well as *brachycarpa*, *chlorolepis*, and others. Several varieties have been proposed also.

S. desertorum is the key species because it is the oldest in name, if I recall correctly. Its identity must be finally and firmly established before anything can be done with the material.

S. glauca is the next problem. If the American species is *glauca*, then the line of demarcation between *S. desertorum* and *S. glauca* must be established.

Then the next step will be working out the varieties of both these species. Perhaps that third step would wait on determination of there are other valid species in the complex.

When those two species have been delimited we shall know what to do with most of the other names mentioned. I am by no means sure that some of the Rocky Mountain material does not belong to *S. cordifolia* Ph.

The whole matter of hairiness needs serious consideration. By far too much weight has been given to it, in my opinion, based on long observation in the field. Some of the problems are these. The nature and quantity of leaf and twig hairs at unfolding from the bud? Which are deciduous and which permanent, and how permanent? After the sloughing off of the epidermis from young pubescent twigs, when and how does the pubescence reappear on the new epidermis? What is the rate and average final condition of hairiness on leaves, of fruiting twigs, of dehairing seasonal shoots, water sprouts, etc., on the same plant and in the same species but different plants? Same holds for capsules. Also, how does artificial drying affect hairiness of young, mid-mature, and old leaves, under different conditions of oxygenation? I don't know the answers, but I see the effects. The answers affect taxonomy. Without exception, I think, willow leaves are hairy at "birth".

The variation in hairiness in the species making up this complex is about as bad as anything I know. *S. nipoclada* type specimen is beautifully hairy. Most of the material from northern Alaska is. As you pass to the southward it becomes less so. Why? Climate? Different variety by nature? I don't know. I have a lot of southern material that is not *S. nipoclada* but has the narrow leaves and very pubescent twigs.

From H.M. Raup
13-IV-37

H.M. Raup. Apr. 13, 1937
unpublished note

Salix niphoclada Rydb. -- See Bull. N. Y. Bot. Gard. i. 272(1899) and Bot. Gaz.

lxvi. 339(1918); lxvii. 59(1919).

Two collections from the Mackenzie basin, neither of which has been seen by the writer, bear the name, S. niphoclada Rydb. One of these is the type, secured by Miss E. Taylor along the Mackenzie River 30 miles north of the Arctic Circle, July 18, 1892, no. 18839 (0) (Co-type in the U. S. Natl. Herb.) The other was collected on Artillery Lake by Seton and Preble, Aug. 6, 1907, no. 78300 (0), and appears to have been determined by J. M. Macoun. The writer has before him, however, a photograph of the co-type in the National Herbarium.

Schneider maintained S. niphoclada as a good species after having studied the type material, but the Seton and Preble specimen he referred provisionally to S. desertorum. He stated quite clearly, however, his confusion regarding the relationships among these two species and S. brachycarpa Nutt., and noted especially his imperfect impression of S. desertorum. The writer has shown elsewhere (Rhod. xxxiii. 243) that his conception of the Mackenzie basin form of S. brachycarpa was also imperfect, and that he confused it with the eastern S. chlorolepis Fernald. Here the matter stands at present, for want of further material. It is the writer's opinion that both brachycarpa and desertorum are phases of the complicated group of which Salix glauca is the commonest form. It should be noted that, judging by the photo-

from H M Paup
13-W-37

graph of the co-type of S. niphoclada, it is possibly another phase in this complex, bearing a very close resemblance to S. brachycarpa var. antimima as understood by the writer, with which it might conceivably be identified.

from H. M. Raup
Apr 1937 13-IV-37

Hoderm is most inconsistent in his treatments of arctic willows. To him practically all spec. recently determined are called hybrids, and usually triple or quadruple hybrids at that.

Generally, he effects this by refusing to acknowledge the existence of the species which actually occur in any given area and then naming all collections as hybrids of species which do not occur in the area. The following examples will illustrate this point.

The willows of the Louise A. Boyd expedition to East Greenland and from Grayson were practically all designated as triple hybrids of *S. arctica*, *S. arctophila* & *S. glauca*. Not one of these 3 spec. names there but *S. anglica* is the dominant species. Ben refusing to recognize the *S. an-*

2
former, even as a parent of the birds,
he was left more free to insist
on the hybrids he reported.

In naming the collections
of the Porsilds from West Greenland
and of Dr. Matte from Baffin Land,
Labrador he again refused to ad-
mit the existence of *S. anglonum*
or of *S. arctophila*, endemic in
West Greenland, and ~~made~~ ^{made} a list
of *S. arctica*, *S. larum* which do
not occur there.

Draft of letter
by Ball to Raup
but not sent.
about April, 1937
W. A. Archer

THE ARNOLD ARBORETUM
HARVARD UNIVERSITY

JAMAICA PLAIN, MASS., U. S. A.

March 1, 1939.

Dr. Carlton R. Ball,
Chief Agriculturist,
Planning Division, A.A.A.
U. S. Department of Agriculture,
Washington, D. C.

Dear Dr. Ball:

I am sending you a package containing 94 sheets of willows collected in the Lake Athabaska District. I believe it is a fairly representative set of my collections from that area in late August and early September, 1932, and in the summer of 1935. I hope that you can make some use of them.

I shall be in the field, provided all goes well, throughout the coming summer. We are planning a trip to the South Nahanni River region, about 200 miles west of Fort Simpson. This is in the southern part of one of the larger botanical "blind spots" of the northwest, and we hope it will net something worthwhile not only in the way of novelties, but also by way of range extensions. I will keep you in mind as I am collecting willows. We should be able to get a fairly good seasonal run through the willows, for we will be down in the north early in June. Our work has never been of such a nature that we could come back to points visited earlier in the season, although such would be desirable for collecting from marked shrubs. This year we will be settled in one place for at least six weeks, and should be able to follow through in some cases.

Dr. Malte and his co-worker Watson must have done a good deal of this in their collecting during the season of 1925. I notice that we have a considerable set of their willows which may have come to us through you. At least your determinations are on them. Last winter I was at Ottawa for a couple of weeks and got out a duplicate set from the whole Malte-Watson collection of 1925. With the exception of the willows and few grasses, this collection had never been studied. I believe it is the finest collection from the southern Canadian Rockies that I have ever seen, and although I have not looked through them all, I suspect that the willows held up to this high standard.

Is there any chance of your being in these parts this spring? I hope you will find occasion to stop off here. I have thought I would get to Washington sometime this winter or spring, but am not at all hopeful about it just now.

Sincerely yours,

Hugh R. Raup
H. M. Raup,
Assistant Professor
of Plant Ecology.

Aristea Canada

Address: Extension Service
U. S. Dept. Agri.

March 13, 1939

Dr. H. M. Raup,
Assistant Professor of Plant Ecology,
The Arnold Arboretum,
Harvard University,
Jamaica Plain, Massachusetts.

Dear Professor Raup:

I am enclosing herewith a list of the 94 specimens you so kindly sent me. This is arranged by species and varieties with the collection numbers under each. These assignments have been made without a too critical study but just as I was looking through the material.

The leaves on No. 6012 are not very narrow even in their juvenile condition and I am sure this represents the species rather than the variety.

The two numbers under *S. planifolia* which have pubescent branchlets are very interesting to me as I had never seen permanent pubescence on specimens of this species.

It is possible that more than three numbers really belong to *S. planifolia* Nelsoni. Much of your material has rather narrow leaves and some of it is too young for certain variety identification.

The three numbers which I have indicated as possibly being variety *monica* have short and broader elliptical or ovate-elliptical leaves, very similar to those occurring on the Sierran plant.

The No. 6159 which I have indicated as a variety of *arbusculoides* is quite different in leaf form from normal specimens of that species, the leaves being much shorter and broader. The fact that they are more densely pubescent and that the glandular serrulations are closer may be caused by their juvenile condition.

The abundant material received as *S. glauca* seems to me to belong more definitely to the *S. desertorum* complex. It may be that the narrowly oblanceolate group represents depauperate *glauca* but I feel sure that the broad-leaved group I have separated represents *S. glaucops* Andersson which in turn probably represents *S. desertorum*. I wish, therefore, to

look further into this matter.

Nos. 6886 which I have segregated as a questionable variety of *S. Scouleriana* is a peculiar thing and will require more study for definite determination. My specimen has a single and apparently not very well developed ament. Presently I will soak up a capsule and examine it more carefully but it seemed to me that this is a long-styled form. You may have fuller material.

I note that most of your specimens of *S. Bebbiana* have short-pedicelled capsules and that is true of many other specimens that I have seen from the Northland.

I am deeply under obligation to you for the splendid material of your three new species and one new variety. *S. Turnorii*, if it belongs in the section *Cordatae*, will be most closely related to *S. pseudo-cordata* (Andersson) Rydberg, which has the leaves green on both surfaces. From a casual inspection it occurs to me that this species may belong to the section *Roseae* along with *S. Athabascensis*, *S. fuscescens*, *S. pedicellaris*, etc. The dark brown, indurated capsules with short, thick style and stigmas certainly resemble the fruits of the *Roseae* rather than those of the *Cordatae*.

Your *S. silicicola* is very interesting. Undoubtedly it is the same form which I described recently as *S. alaxensis* var. *obovatifolia*. Your description and specimens agree quite closely and are better specimens than I had in hand at the time. If I have not sent you a copy of that paper I will put one in the mail tonight. Your description does not mention the broad, semi-clasping petioles but they are evident on the last two numbers cited although not so evident on the type specimen and not as well developed on any of these as on one or two which I had. I have not looked up my correspondence to see when I received your descriptions, but if I had them before I described my varieties I must either have overlooked yours or completely forgotten it.

Again thanking you for your generous courtesy, I am

Cordially yours,

Carleton R. Ball,
Executive Secretary

January 23, 1941

Dr. Hugh N. Raup,
Gray Herbarium,
Harvard University,
Cambridge, Mass.

Dear Dr. Raup:

A year or two ago you were kind enough to send me duplicates of many of your willows from the Lake Athabasca area.

Recently, in looking critically at your No. 6886, which was distributed as *S. Scouleriana* Barr. forma *poikila* Schn., I came to the conclusion that it does not belong to that species. The specimen I have bears but a single small ament, but the relatively small scales, the silvery rather than woolly pubescence of the capsules, and the long styles are not characters of *S. Scouleriana*. It seems to me that it belongs to section *Phylicifoliae* and that the plant is closely related to *S. planifolia* Pursh. The yellowish green leaves with numerous, rather closely parallel, secondary veins, further indicate this relationship. The plant differs from *S. planifolia* in having the leaves densely pubescent beneath, and thinly pubescent above, and in having the young shoots and budscales more or less densely pubescent.

It differs from *S. pulchra* Chamisso, which ranges through the Yukon and Alaska Territories, in the sessile ament, and apparently in having lanceolate rather than linear stipules. *S. pulchra* has a variety *Tukonensis* which has pubescent branchlets and some pubescence on the leaves but this specimen is much more densely pubescent than any specimen of the variety which I have seen.

This plant may bear about the same relationship to *S. planifolia* which your *S. athabascensis* bears to *S. pedicellaris*.

If you have time to examine the probably more abundant material in the Gray Herbarium, I will be interested to know your conclusion regarding it.

Cordially yours,

Carleton R. Ball,
Executive Secretary

dupl in herb (2 of Phylly) + in sect.

Canada

January 25, 1942

Dr. H. M. Ramp,
Arnold Arboretum,
Jamaica Plain, Mass.

Dear Dr. Ramp:

Your recent letter, which I inadvertently have left at home, was most interesting to me.

I have asked Dr. Jackson of the Fish and Wildlife Service (formerly Bureau of Biological Survey) to determine the location of Moose Island in Lake Athabasca. He has just shown me a map of the Lake published by the Geological Survey of the Department of Mines of Canada. This shows that Moose Island is quite a large island on the north shore of the Lake southeast of Beaver Lodge Lake and in latitude approximately $58^{\circ} 50' N$ and Longitude $108^{\circ} 20' W$. This should enable you to locate the island without difficulty. It would seem to be about one degree east of where your plant was collected.

I am interested in your peculiar species of willow collected by Arsene in the vicinity of Morelia, Michoacan. Your statement that it seems akin to *S. Bonplandiana* and your descriptive notes on pubescence seem to indicate that it may be *S. jaliscana* Jones (Contrib. West. Bot. 12:77. 1908; enlarged and amended description by Schneider in Bot. Gaz. 65:16-17. 1918).

The type was found in Jalisco and Schneider cited another specimen from that State. I have seen good material from Guerrero and Oaxaca, two states which lie southward from Michoacan. I also have a specimen from the northern part of Sonora. Some years ago Alice Eastwood collected a specimen in Arizona which I once saw but before I had become acquainted with *S. jaliscana*. I am now inclined to think that her specimen represents that species, which would be a still northern extension of the range above Sonora.

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I have not studied *S. jaliscana* as I will have to do before I monograph. It may prove to represent a pubescent form of *S. laevigata* Bobb or *S. Bonplandiana* Kunth. The old fruits in the type specimen Jones stated to be glabrous but suggested that they probably were pubescent when young. This happens in several other species of that and related groups.

Cordially yours,

Carleton R. Ball,
Executive Secretary