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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.

1938

Address:

Extension Service, U. S. Dept. Agric.

October 18, 1938

Prof. W. P. Fraser,
Dept. of Biology, Univ. of Sask.;
Saskatchewan, Saskatoon,

Dear Professor Fraser:

Returning to Washington yesterday, I find your letter of Oct. 1 and the accompanying packet of willows. My determinations are as follows:

1. *S. arbusculoides* And. (not *S. sericea*). Waskesiu (170 mi. north of Saskatoon), in P.A. Natl. Forest, July 21, 1938.
2. *S. arbusculoides* And. As last but June 5, 1938.

You collected this species there once before. It was No. 1 of a previous list. I collected it at Athabaska Landing, Alta., the farthest east for me. It is the northern representative of *S. sericea* but has much smaller, less silky leaves, not darkening in drying, and the styles are much longer.

3. *S. myrtillofolia* And. (not *S. pseudo-myrsinites*). The serrate rather than crenate leaves do suggest pseudo-myrsinites. Naicam, June 2, 38.
4. *S. lutea* Nuttall. Tisdale June 2 and August 26, 1938. The brownish catkins seem to be due in part at least to frosting. The short pedicels are lutea, as also yellow twigs.

5. *lasianдра* Benth. Langham, May 24, August 9, 1938. On North Saskatchewan River, 30 miles west of Saskatoon. Only plant observed. This is a very good find. It is typical of the species.

6. *S. mackenziana* (Barratt) Hooker. (not *S. lutea*). Langham, June 26, 38.

These three almost identical twigs from different plants are a remarkable collection. I think you are helping to solve a real problem.

In the first place, *S. mackenziana* seems never to be collected from the Mackenzie Basin and seldom if ever in northern Canada. It is to be distinguished by the enormously elongated pedicels, 3-4 mm. long. The plant of the northwestern U. S. (Montana to Washn.) which has this character has blackish rather than yellowish twigs. I have called it *S. mackenziana* because of the pedicels, and the lack of authentic material from Canada. Your plants have yellow twigs (Andersson described his as greenish (Monog. Salicum, p. 160. 1867). Your plant ought to be the true *mackenziana*.

In the second place, Andersson described a *Salix prolixa* (Monog. Salic. p. 94. 1867). which he placed in the Section Roseae, with *S. pedicellaris*. It came from Lower Fraser River, B.C. I have always suspected that it belonged to the cordatae. Like your plants, the leaves are small and veiny. Seasonal shoots would have larger leaves, of course. Will try to go into this problem next winter.

Many thanks for the specimens, which you really ought not to mount.

Cordially yours,

Carleton R. Ball

Stark Case

Address:

Extension Service, U.S. Dept. Agriculture

February 18, 1939

Professor W. P. Fraser,
Department of Botany,
University of Saskatchewan,
Saskatoon, Sask., Canada

Dear Professor Fraser:

On returning to Washington recently I find your letter of Feb'y. 1 and the accompanying packet containing a specimen from McKague. This, as you had recognized, is *S. athabascensis* Raup.

I have checked Breitung's Nos. 11a, 11b, and 11c, and as you also had recognized, these prove to be *S. athabascensis* Raup. It was stupid of me to have missed it, but I scarcely had seen the species at the time and was not expecting it. As I wrote you last, it is an aberrant species and closely simulates small-leaved *glaucoops* or *desertorum*. The short styles, however, should have gotten into my consciousness.

I am writing Breitung today, giving him the redetermination.

It is a great joy to have you and Breitung clearing up the unknown area in northern Saskatchewan. All areas are problem areas, and transition areas, in a sense. However, more collecting has been done in the Rockies of Canada and around Hudson Bay (west side) than in the interior. Recently Brinkman has worked the prairie section of Alberta, Dutt and Dutilly have explored the west side of Hudson Bay and the areas northward, Gradner has been busy in Labrador, and is working the east side of Hudson Bay in 1939. In a real sense, you two are bridging the gap between the east and west of Canada.

As I told you, I collected sparingly as far north as Paddecoford and Athabasca Landing in 1925 but did not get into the bogs at all. I forgot to mention McCabe, a zoologist, who is collecting in the dry interior of Brit. Columbia. The willow flora of Canada now is by way of being known and I hope to map the species presently. When I publish I will be glad to give full credit to those who have made it possible.

Cordially yours,

Carleton R. Ball

Sask. Can

Address: Extension Service
U. S. Dept. Agri.
May 4, 1939.

Prof. W. P. Fraser,
Department of Biology,
University of Saskatchewan,
Saskatoon, Sask., Canada.

Dear Professor Fraser:

Your letter of April 27 was promptly received and the package containing the two willows mentioned arrived this morning after having passed customs and quarantine inspection. Determination of the two specimens is as follows:

S. amygdaloides Andersson. Large tree, about thirty feet tall, moist ground near creek. Maple Creek, Sask. J. L. Bolton, May 13, 1938. (The plant from which Dr. Russell collected leaves in June, 1936).

S. amygdaloides Andersson (not *S. lasiandra* Benth).
Back of Swift Current Creek, three miles west of Stewart Valley, Sask. J. L. Bolton, June 28, 1938). ✓

This last specimen adds one new locality for *S. amygdaloides* in southern Saskatchewan. I crossed the river at Swift Current and went north from there in 1925 but did not see *S. amygdaloides* in that area, although I had collected it earlier on the Belly River at Lethbridge, Alberta. However, I was on a survey rather than a botanical trip and did not have time for much browsing about for rare materials.

The Swift Current specimen represents typical seasonal shoots and mature foliage of this species. The long petioles, ovate-lanceolate, yellowish green leaves, less glandular serratures, very small vein islets on the lower surface, and absence of glands on the top of the petiole at the base of the leaf, distinguish this from *S. lasiandra*. There is an appearance of glands on the side of the petiole at the base of the leaf in this specimen, but these are marginal serrations so located because of reduction of blade tissue. They are

quite different from the glands of *S. lasiandra* which are not in line with the marginal serrations but occur on the top of the petiole or midrib just below the base of the blade and often are prolonged into subfoliaceous structures.

I greatly appreciate your sharing your limited material with me. I am very glad to have these specimens representing important localities in the extreme northwestern distribution of this species and will greatly appreciate fuller material if and when Mr. Bolton is able to obtain it.

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask. Len

October 13, 1939.

Mr. W. P. Fraser,
Department of Biology,
University of Saskatchewan,
Saskatoon, Sask., Canada.

Dear Professor Fraser:

On my return to Washington recently, I found your letter of September 20 and accompanying package of willows. I have just had time to give attention to these and find them a most interesting and valuable collection.

S. arbusculoides Nos. 1 and 2, and *S. athabascensis*, Nos. 1 and 2, are correctly named and the staminate material will be very helpful in getting complete and accurate descriptions of these species.

The four sets of *S. Scouleriana*, one of them mounted, are splendidly representative material of this species and place its occurrence there on an unassailable basis as the material is typical. It is very gratifying that you were able to find a few staminate aments at that relatively late date. I am especially pleased with the information that the species extends for at least twenty-five miles and have added this information to the sets for inclusion in the herbarium. While not familiar with the Prince Albert River, I will look it up presently in a good atlas. I assume that it is part of the drainage system of the north Saskatchewan River.

I am especially pleased with your collections of *S. Bebbiana* from the exact spot whence came your No. 9 of last year which I thought might represent the northeastern form of *S. humilis*. On comparing your 1938 specimen again with your *Bebbiana* specimens from the same locality, and with other material from the northeast, I am sure that your No. 9 in 1938 also is *S. Bebbiana* and not *S. humilis*. There is a considerable resemblance to *S. humilis* but the larger stipules, somewhat glandular crenulate margins, and indented midrib and veins on the upper surfaces belong to *S. Bebbiana*. Many thanks for clearing up this doubt.

Your series of fourteen specimens of *mackenziana* (or *lutea*) from Langham are the most helpful specimens I have received in many years. *S. lutea*, generally speaking, has yellow branchlets and relatively short pedicels from 1 to 2 mm. in length. What we have been calling *S. mackenziana* has dark brown or blackish branchlets and long pedicels from 3 to 4 mm. in length. *Lutea* was known to range from the Rocky Mountains westward to the Sierra Nevada and northward into the southern edge of Alberta and Saskatchewan. *Mackenziana*, as understood, had a more northwestern range, being especially common in the Great Basin of the Snake and Columbia Rivers in Idaho, Oregon and Washington, and also extended northward into the mountains of British Columbia and Alberta. In recent years collectors in northern Alberta, northern Saskatchewan and adjacent Mackenzie have been sending in a little material which seemed combined characters of these two species. As most of the specimens have been rather fragmentary, it has been impossible to arrive at a decision as to just what they represented. From your material it now becomes apparent that there is a plant in that northern area with yellow twigs and long pedicels. Very probably this is the true *mackenziana*. I think probably all fourteen of your 1939 specimens belong to it. The only pistillate specimen which has shorter pedicels is quite young and the pedicel presumably would have elongated considerably before the fruit matured. On some of your specimens the fruiting branchlets are yellow whereas the leafy shoots of this season have turned almost black and in one or two cases the yellow branchlets of last season are darkening somewhat.

It may be that we have ^{here} either a phenomenon somewhat comparable to that occurring in *S. Barclayii* in the Arctic and in *S. monticola* in the Rocky Mountains, where the branchlets in nature are a bright yellow but become almost black during the process of drying and have been so described in the manuals of botany by those who depended on dried material for their knowledge of the plants. It is possible that the more complete darkening of the specimens from the Columbia Basin is due to the difference in climatic conditions and the more rapid fermentation during the drying process. It may be, however, that the darker specimens represent a variety or form. In any case, your specimens give abundant proof that there is a plant with yellow branchlets and long pedicels and will help to make certain what should be considered the typical form of this misunderstood species. I have not yet had time to compare your material with other collections from that area and northward, but will do so later and write you again concerning the problem.

The whole question of the northern limits of true *S. lutea* is involved. It is very difficult to distinguish these species from staminate specimens with their immature foliage.

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Many thanks for permission to keep this material which I am exceedingly glad to add to my collection. As I shall reach the age of retirement in a few years, I expect to be able to begin the task of monographing the North America species before too long a time.

I was greatly pleased to have a visit from Mr. and Mrs. William C. MacGill of Calgary on October 10. I had never met him before although I was familiar with his collections. He was much interested to see the extensive series of specimens of *S. MacCalliana* which I had ranging all the way from western Manitoba to central British Columbia, a much wider distribution than he had thought. I in turn was immensely pleased to see his collection of excellent photographs of native plants in their habitats and his photographic enlargements of the flowers of many of them. I greatly hope that he will be able to sell sets of these prints for inclusion in many herbariums where they would be of the greatest interest and value to taxonomic workers, many of whom cannot see all species under field conditions.

With personal regards, I am

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask, Can

October 16, 1939.

Mr. W. P. Fraser,
Department of Biology,
University of Saskatchewan,
Saskatoon, Sask., Canada.

Dear Professor Fraser:

As I wrote you on October 13, it was necessary to review the question of *lutea* and *mackenziana*. Naturally, I have not had time to do this on an extensive scale but I have looked carefully at all the Canadian material under both names and I have come to the conclusion that all of the material from central Saskatchewan and from the prairie portions of Alberta represents the true *S. mackenziana*. This is what one would expect considering that the type came from the Mackenzie drainage.

Just how far *lutea* may extend into the mountains of Alberta and British Columbia remains for further study, but that does not particularly concern our consideration of material from central Saskatchewan and northward.

It is true that some of your specimens, as well as some of those collected by Breitung and by John Macoun, have relatively short pedicels, or around 1.5-2 cm. in length. However, in practically all cases these either are young specimens in which full pedicel length has not been reached or they are unfertilized and, therefore, apparently lacking in chemical stimulation for the elongation of both capsule and pedicel.

As a result of this preliminary study I regard your numbers 1 to 14 sent me recently as all representing *S. mackenziana* (Hooker) Barratt and have labeled them accordingly. Also your 938 *det.*

Practically all of the Saskatchewan material has yellow twigs similar to those on the type specimen. In a few cases these show some brown coloration and the very young later developed branchlets of the season are black, probably as a result of drying delicate young tissues.

- 2 -

What will have to be done with the darker twig material from the Columbia River Basin which also has the long pedicels remains for further study. After examining several specimens from Washington today, I note that all of them show some yellow branchlets, the younger shading off into yellowish brown and dark brown, and the very young branches quite black. I still suspect that this darkening is a result of enzyme action during the drying process as discussed in my last letter.

Many thanks for supplying the material which has begun to straighten out this long time perplexing problem.

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask. Can

November 4, 1939

Prof. W. P. Fraser,
Department of Botany,
University of Saskatchewan,
Saskatoon, Canada.

Dear Professor Fraser:

Your letter of October 26 is received and I greatly appreciate your correction of my understanding of the collection of *S. Scouleriana*. I will be glad to add this note to the specimens.

Many thanks also for the additional information from Mr. Bolton on the distribution of *S. amygdaloides* in southern Saskatchewan.

I have examined most carefully the two mounted specimens from Swift Current and Elbow respectively, suspected of being *S. exigua*. I also have compared them carefully with an extensive series of this species and of *S. interior* and its variety collected in southern Canada.

Bolton's specimen from Swift Current I feel sure to be *S. exigua lutescens* (Rydberg) Schneider. This variety occurs in the Rocky Mountains from New Mexico to the Watertown Lakes district of Alberta as noted in my paper in the Canadian Naturalist. It has been found at Calgary and more recently at Craigmyle, Alberta. It differs from the species in having the leaves more densely and more permanently silvery pubescent with longer hairs. Much of the material and practically all of that from Canada has leaves rather prominently spinulose-denticulate. I shall be much interested in seeing Bolton's material of it collected later in the season as his specimen was taken in May. Most of the other Canadian material represents rather early summer collections.

After a thorough examination and comparison of your specimen from Elbow, I still feel that it must be referred to *S. interior pedicellata* (Andersson) Ball. Of the two shoots on the sheet sent,

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the one with the narrow leaves is quite typical of this variety. This is a shoot of last year and probably bore aments in 1939. The other shoot, apparently developed this year, has much darker bark and broader leaves, with some gray pubescence, especially on the younger leaves. This is not uncommon in specimens of *S. interior* especially in dry areas or in a dry season. At its present stage of development, this shoot with leaves somewhat pubescent and so young that the characteristic venation has not yet developed, bears a superficial resemblance to *S. exigua*, but I feel certain that a month later this resemblance largely would have disappeared.

Again let me assure you that your painstaking study of Saskatchewan willows is aiding materially in clarifying ranges and in settling some of the vexing problems which long have beset us. I shall be continuously grateful for your help. Also, many thanks for the two mounted specimens.

Cordially yours,

Carleton R. Ball,
Executive Secretary

November 23, 1940

Professor W. P. Fraser,
Department of Botany,
University of Saskatchewan,
Saskatoon, Canada.

Dear Professor Fraser:

Your letter of November 12 and accompanying package of willows I found awaiting me on my return to Washington yesterday. I have identified the specimens and am enclosing a copy of the list of identifications.

This is an interesting collection from several points of view.

You are quite right in supposing that several of the specimens were of the same species. As I probably have written you previously, *S. "glaucops"* Andersson is the catchall name for a plant very abundant in different forms from the southern Rocky Mountains northward. It has had about ten specific names of which *S. desertorum* Richardson probably is the oldest. Because of the very juvenile condition of the type specimens, and because of lack of material from the type locality, it has never been definitely determined just what *S. desertorum* Richardson really is. With increasing collections from the Machenzie area it may be possible to get at the real identity of *S. desertorum* and then we can begin to determine which, if any, of the other specific names should be recognized. In the meantime, *S. "glaucops"* is the safest thing, as it indicates the relationship of this plant to *S. glauca* L. of the Old World and the Alaska Yukon area.

The other species are what would be expected in the area, although it is probable that when I have time to study distribution some of them may represent new extensions of range. No. 14 which I have determined as a variety of *S. Drummondiana* is a very interesting plant which occurs from Glacier Park northward in the Rocky Mountains. It differs from *S. subcoerulea* Piper in having shining branchlets, never glaucous or pruinose and in having a more pungent odor from its glands. We need flowering and fruiting specimens very much as most of the collections are of foliage only. It differs from true *Drummondiana* in having narrower and more oblanceolate leaves less silky on the veins of the upper surface.

- 2 -

Your No. 22, *S. myrtillifolia brachypoda* is a very valuable collection. The most marked characteristic of this variety is the whitening of the under surface of the leaves and it may be that eventually it will have to be separated as a species. Unfortunately many of the collectors in the far North are unable to dry their specimens properly and the glaucous coating of the leaf surface is lost by fermentation in the press. For this reason we do not know the complete distribution of this variety in the Arctic where the species extends to the Yukon Territory and Alaska.

I thank you heartily for your permission to keep this material. I note, however, that some of it is rather fragmentary in size and I surmise that you have robbed yourself in order to send me a specimen "for keeps". It is very important, of course, that your herbarium have an adequate representation of your collections and I will be glad to return any or all of these specimens to you if you so desire.

Cordially yours,

Carleton R. Ball,
Executive Secretary

January 10, 1941

Professor W. B. Frazier,
University of Saskatchewan,
Saskatoon, Canada.

Dear Professor Frazier:

Your letter of December 30 and accompanying packet of willows were promptly received but I have not been able to give them earlier identification. Although the material from Yellowknife Bay on Great Slave Lake was quite fragmentary, most of it is determinable, and No. 6 I am especially glad to have because I think it is similar to the type of *S. desertorum* which I hope to study presently.

I am glad to have your record of a collection of *S. amygdaloides* from the banks of the Saskatchewan River at Riverhurst about forty miles south of Saskatoon. Gradually we will learn the northern limits of this species in the prairie provinces.

I am especially glad to have the specimens of *S. lasiandra lancifolia* from Waskesiu Lake. I have referred this material to the variety because of its hairy branchlets, petioles, etc. There is no difference between the species and the variety in the shape of the leaves. I still have one worry, however, about this and Mr. Breitung's material. The young leaves, before becoming fully expanded are green on both sides. I assume that you are sure that the juvenile material and the branchlet with mature leaves white beneath are from the same plants.

The eastern *S. lucida* and the western *S. caudata* and their varieties have leaves green beneath when mature. As the young leaves of *S. lasiandra* and its varieties also are green beneath, it is very difficult to be certain of *S. lasiandra* in juvenile condition where it occurs within the range of either of the other species. I will have to restudy Breitung's collections because, unless he had fully grown leaves, his material might turn out to be juvenile *S. lasiandra*, although it does not seem probable. By the way, you spoke of the Waskesiu locality for *S. lasiandra* as "the farthest west and north I know in Saskatchewan." I wonder if you meant east and north?

- 2 -

No. 5, *S. interior*, is about the most aberrant specimen I have seen as I have indicated in the list. The material is too young to make certain whether it represents the species or the narrow-leaved variety *pedicellata*. The twigs with densely white hairy leaves are an extreme expression. Several species of the *Longifoliae* produce these hairy leaves when defoliated by sawfly larvae in midsummer, but I have never seen so densely a hairy one before. You spoke of it probably having been grown for ornament but this particular ornamental character would not be present under normal conditions as the leaves would be green, nearly glabrous, and relatively unattractive. Am I to understand that the woolly-leaved twigs and the juvenile normal twigs came from the same plant? If they did not and this white hairy specimen is the normal expression of that plant throughout the year, then we have an entirely different problem on our hands.

Many thanks for your kind permission to keep the material, and with best wishes for the New Year.

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask.

September 2, 1941

Professor W. P. Fraser,
Department of Biology,
University of Saskatchewan,
Saskatoon, Canada.

Dear Professor Fraser:

I am regretful that your letter of July 28 has remained so long without reply. The package of willows was promptly and safely received.

S. lasiandra or S. lasiandra lancifolia

It is exceedingly helpful to have the four collections (41-1 to 41-4) from the shrubs which you collected in 1940 in Prince Albert National Park, which I determined as *S. lasiandra* variety *lancifolia* (Andersson) Bebb. This variety is distinguished from the species only by pubescent branchlets. Pubescence, as you know, is an exceedingly variable characteristic both in quantity and in permanence. There are specimens from the western mountain areas on which the pubescence not only is dense but appears on one-year and two-year branchlets as well as on seasonal growth. It is probable that I have been determining specimens with relatively meager and evanescent pubescence as the variety when they should have been determined as the species.

Of the specimens you have just sent me, Nos. 41-2 and 41-4 have the young branchlets thinly pubescent. In the other two numbers, the branchlets are practically glabrous. As none of the older branchlets show either pubescence or evidences of its former presence on the portion behind the bud scales, I am inclined to think that all of these collections, together with your specimens of last year, should be determined as *S. lasiandra* Benth. This conclusion holds for your No. 41-5 which you state you have collected from another group a mile distant from the ones discussed above.

S. interior Rowles (Defoliated by insects)

I have studied your four collections (Nos. 6, 7, 8, and 9) with much interest. Unfortunately, I cannot locate your specimens of last year. I am interested to know that many chrysomelid beetles were present on these

- 2 -

shrubs. Injury of this kind normally is the work of insects in the larval stage but I do not know how many species of insects are involved in different parts of the country.

These specimens are peculiar as compared with other similar collections in that there are no remnants of original glabrous leaves. It may be that if longer shoots had been cut there would have been such remnants farther down on the stems. If this extreme hairiness is the result of insect defoliation earlier, this defoliation apparently was continuing because some of the new hairy leaves also have been eaten. I find that there are a few new leaves on the lower part of these twigs which are completely glabrous and have the yellowish-green color of the leaves of *S. interior*. The color of the older branchlets and the hairiness of the flower scales also indicate this species, although they do not exclude *S. exigua*.

I am inclined to believe, therefore, that this is the species represented. It certainly is too bad that the destruction of the plants probably will prevent later and fuller collections.

Thank you for the material and again regretting this delay, I am

Cordially yours,

Carleton R. Ball,
Executive Secretary

Sask., Can.

September 11, 1940

Prof. W. P. Fraser,
Department of Biology,
University of Saskatchewan,
Saskatoon, Sask., Canada.

Dear Professor Fraser:

Your letter of September 4 was promptly received and suggestions noted. I have reexamined your Nos. 5 and 10 collected near Saskatoon in 1937, and Breitung's Nos. 5 (a to e) and 16 of 1938 and 1937 respectively. All of these specimens show their candida ancestry very plainly. The leaves, bud scales, and branchlets are white woolly or gray woolly like candida, only much less densely so. They are not at all silvery silky like sericea and subsericea. The other parent of these supposed hybrids may not be S. petiolaris but certainly they are derived from S. candida.

When you find S. subsericea you will think that you have a specimen of rather small leaved S. petiolaris but with the leaves and branchlets somewhat silky hairy.

Many thanks for offering to send the material mentioned but as I have specimens of Breitung's collections and yours, this will not be necessary. By the way, the Breitung numbers are the numbers he placed on these collections before distributing them. The series began at 1 in each successive year. In recent years he gave all collections from the same plant the same number but distinguished the successive date collections by the letters.

Cordially yours,

Carleton R. Ball,
Executive Secretary

P.S. I have just received rather extensive collections from Fathers Lepage and Dechamplain made in the Rimouski and Gaspé areas of Quebec. I am learning how variable S. pellita can be and am beginning to suspect that the dividing line between it and S. argyrocarpa may not be as definite as heretofore supposed. It is possible that the latter is only the montane and boreal aspect of the former.

I will be glad to see your Rocky Mountain collections at any time when you have them ready but please remember that you do not need to give me specimens for keeps especially if your material is limited.

dupl in Fraser + subsericea GRB