

OBSERVATIONS ON CANADIAN BIRCH (*BETULA*) COLLECTIONS AT THE MORGAN ARBORETUM. VI. *B. PAPYRIFERA* FROM THE ROCKY MOUNTAINS

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THE FOLLOWING RECORDS morphological observations carried out on white birch (*B. papyrifera* Marsh.) collections made in August, 1961, in the Rocky Mountains, and includes chromosome numbers which have been determined from their seedling progeny. All the specimens were collected in Alberta except those from one stand in British Columbia. The specimens are of interest as they clearly indicate that the morphological variability exhibited by this species is in agreement with our studies of this species from other areas (Brittain and Grant, 1965, 1966, 1967).

OBSERVATIONS AND DISCUSSION

The localities, together with the chromosome numbers, stomatal guard cell measurements and remarks on the different specimens, are listed in Table 1. The fruiting and folial characters of representative specimens are shown in Plate 1. These have been selected to show the range of variation which exists.

When mature, the white birches in the Rocky Mountains are large trees which differ from the very large birches of the Pacific Coast. The latter are usually referred to as *B. papyrifera* var *commutata*. The Rocky Mountain birches lack the characteristic compact rounded crown with its slender branches and the very dark brown bark of many of the coastal specimens. The most noticeable characteristic of a large proportion of the montane trees is the bronzy, generally close, bark. In some individuals, however, the bark is decidedly loose, freely exfoliating and pinkish white or greyish in color.

While individual characteristics for each of the different collections are given in Table 1, comments on a few of the outstanding morphological variants are presented here.

Standing apart from all the other specimens is number 168, collected in the Waterton Lakes National Park. The difference between the long narrow leaves of this specimen and other accessions in this collection is striking, though number 145 from Jasper National Park resembles it more closely than the others (Plate 1). In contrast to number 168 is number 64 from Jasper National Park which is distinctive in having large coarse leaves, large catkins and very loose white bark (Plate 1). Other specimens with marked individual characteristics are numbers 159 with its very large leaves which are rounded at the base and sides, and number 48 with circular or subcircular leaves and abruptly narrowed tips (Plate 1).

Somatic chromosome numbers of 70 and 84 were determined from seedling progeny, agreeing with numbers for the majority of accessions from British Columbia (Brittain and Grant, 1966) and eastern Canada (Brittain and

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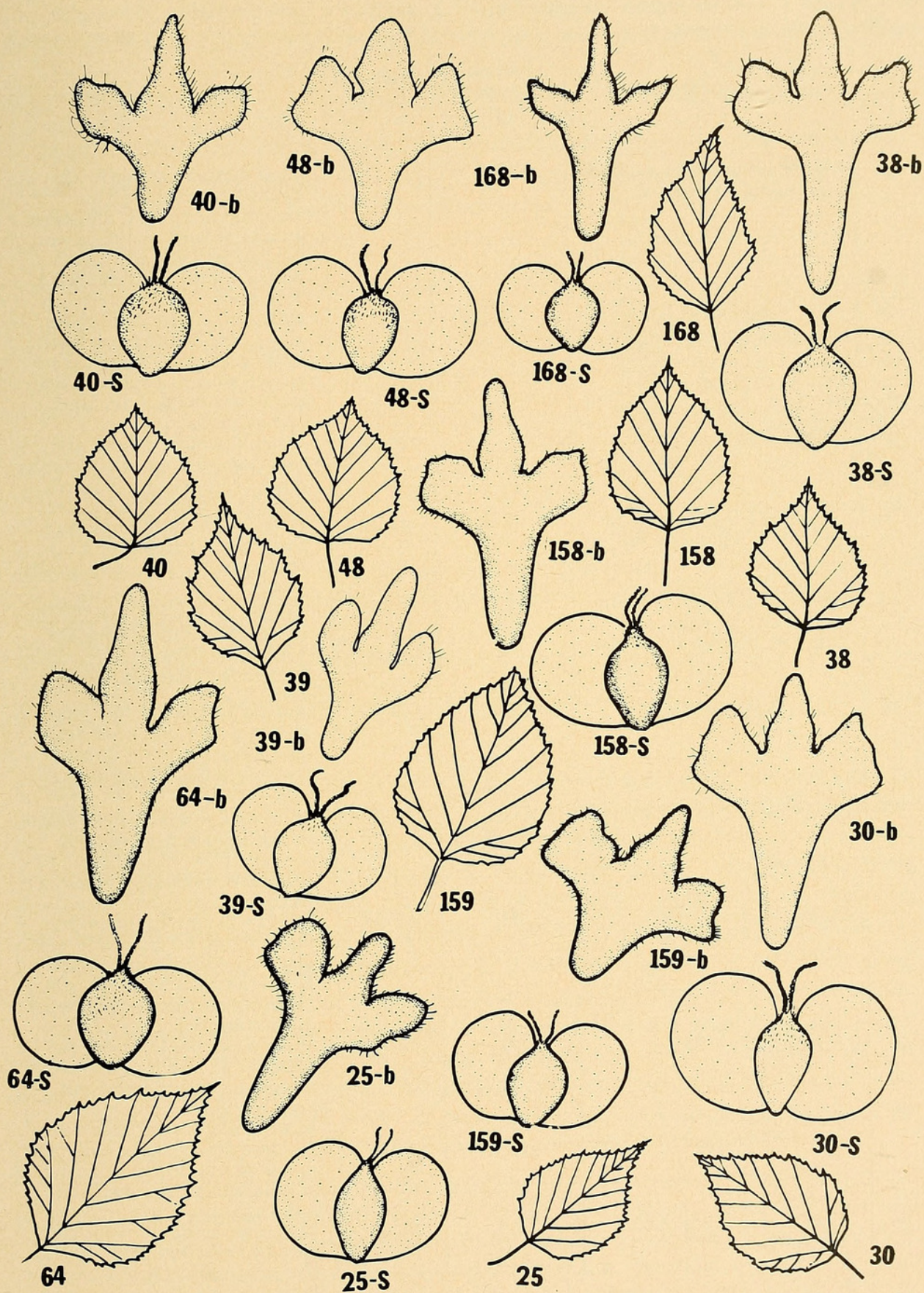


PLATE 1. Bracts and samaras ($\times$ ca. 6) and leaves (reduced ca. $3/5$) of representative specimens. The numbers refer to accession numbers as given in Table 1. b = bract; S = samara.

TABLE 1. — Observations on collections of *B. papyrifera* from the Rocky Mountains¹

Acc. No.	Locality	Somatic chromosome no.	Stomatal size (μ) ²	Special characteristics
25	Near Kananaskis, at base of Pigeon Mountain	70 ³		Leaf almost circular with abruptly attenuated tip, resembling No. 48, otherwise except for minor differences, No. 36 and No. 158; dead white or greyish bark; d.b.h. 7.62 cm. ⁶
26	No. 1 Highway, between Kananaskis and Banff.	70:84 ⁴		Resembles Nos. 39 and 40, except for fertile bract with short peduncle; subequal in length to broad median lobe; d.b.h. 10.16 cm, bark dark brown, close.
30	Banff National Park.		35.44	Most like Nos. 36 and 145; buds sticky; tree with 3 trunks; d.b.h. 7.62, 10.16, 15.24 cm; bark grey with bronzy tint.
36	Banff National Park, 10 mi. E. on Highway No. 1.		41.86	Differs only in minor detail from No. 30 and 158; d.b.h. 10.16 cm; bark bronzy-brown close.
38	Banff — Radium Highway 17 mi. W. of pass; alt. 1464 m., British Columbia.	70		Similar to No. 30, but fertile bract very long and narrow with short median lobe; close, brownish bark with bronzy tint.
39	Yoho National Park.	84	39.19	Similar to No. 40, but lobes rounded and lack very long fine hairs; d.b.h. 11.43 cm; bark dark grey, with bronzy tint.
40	Lower Waterfowl Lake.	70	38.81	Very long fine marginal hairs on fertile bract; closely resembles Nos. 39 and 49; d.b.h. 12.70 cm; bark grey or dirty white.
48	Jasper National Park, 14 mi. E. of Jasper; alt. 1022 m.	84	40.88	Leaf form closely resembles No. 25; but fertile bract with shorter peduncle, subequal in length and median lobe; d.b.h. 15.75 cm; bark greyish, feebly exfoliating.
49	Jasper Nat. Park.	84	38.12	Most closely resembles Nos. 36 and 145; d.b.h. 28.45 cm; dark cream to bronze bark, exfoliating.
56	Jasper Nat. Park, 2 mi. E. Miette Junct.; alt. 1037 m.	84		Most closely resembles Nos. 30, 36, 158 and 145 except for minor characters; d.b.h. 24.13 cm; bark pinkish, feebly exfoliating.
64	Jasper Nat. Park, Edith Cavell Junct.	84 ⁵	37.13	Differs from others in larger coarsely serrate leaves, bracts and achenes large, approx. as broad as long; d.b.h. 15.24 cm; dull white bark, very freely exfoliating.

TABLE 1. — (*Continued*)

Acc. No.	Locality	Somatic chromosome no.	Stomatal size (μ) ²	Special characteristics
145	Jasper Nat. Park, Edith Cavell Jct., alt. 1220 m.	84	37.13	Resembles No. 30 and 36, d.b.h. 20.32 cm; dull white bark.
158	Banff Nat. Park, 2.2 mi.S. Eisenhower Jct., alt. 1591 m.			Resembles No. 30, 36, 145, except in bark character; d.b.h. 10.16 cm; bark creamy-white or pinkish; strongly exfoliating.
159	28 miles W. of Calgary.	70		Differs from all others in very large broadly ovate leaves with rounded base; fertile bract with short peduncle; sub-equal in length to median lobe; d.b.h. 27.94 cm; bark creamy-white, slightly exfoliating.
168	Waterton Lakes Nat. Park, W. side of Lake; alt. 1297 m.	84 ³	38.91	Differs from all others in very long narrow leaves; most closely resembles No. 145.

¹All collections are from Alberta with the exception of No. 38 from British Columbia.

²Average of 20 measurements.

³Determination from two seedlings.

⁴Two seedlings with different chromosome numbers.

⁵Determination from five seedlings.

⁶d.b.h. = diameter at breast height.

Grant, 1965, 1967). However, no plants were found with a chromosome number of $2n = 56$, although a few plants had been found with this number in collections from the other areas. Guard cell measurements are consistent with those determined for *B. papyrifera* from other areas. No hybrids were detected although *B. fontinalis* Sarg. was of frequent occurrence in this area and hybridization between these species is well documented (Dugle, 1966).

The illustrations (Plate 1) will make it evident that the type of variation shown in these specimens is similar to that found in other regions of Canada (Brittain and Grant, 1965, 1966, 1967). We have been unable to discern any consistent pattern either in tree form, foliage, the finer characters of the seed, or in chromosome number to warrant the segregation of these specimens into subtaxa. The lateral lobes of the fertile bract were remarkably consistent in all specimens: they were invariably of the ascending type.

There has been nothing in the development of these *B. papyrifera* seedlings to differentiate them from those from other areas. The stem of the young seedling is glandular at first, but this character is lost in later development. The growth rate of the seedlings while less than the average of those from the lower mainland of British Columbia differed little from that of seedlings from other areas, varying from 76 to 101 centimeters per three years of growth.

SUMMARY

A morphological and cytological study has been carried out on a collection of *Betula papyrifera* Marsh. from the Rocky Mountains of Alberta and British Columbia. As in eastern Canada and in western and south central British Columbia, *B. papyrifera* showed considerable variation in minor characters. One character found in common for all specimens was the ascending lateral lobes of the fertile bract. The mature trees differ somewhat from those of the Pacific Coast in crown shape and bark color but not sufficiently to warrant their separation into subtaxa. Somatic chromosome numbers of 70 and 84 were determined for seedling progeny. No hybrids were detected.

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