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The Distribution of *Bryobrittonia pellucida* Williams (Musci)

Bryobrittonia pellucida was first described by R. S. Williams¹ from sterile material collected in April 1899 on a bluff of the Yukon River, just below Dawson City, Yukon Territory. This species, which Williams placed in the monotypic genus *Bryobrittonia*, was considered for several decades to belong in the Pottiaceae. In 1953, Steere² described sporophytes from specimens collected in the Brooks Range, Alaska. The presence of large, campanulate calyptrae (Fig. 1A); erect, 8-ribbed capsules; and double peristome are all characters of the Encalyptaceae³. As Steere pointed out, *Bryobrittonia* should be placed in this family and retained as a genus separate from *Encalypta*. *Bryobrittonia* is distinguished by the mammillose upper leaf cells (Fig. 1C) and blunt spatulate-lingulate leaves, while *Encalypta* is characterized by pluripapillose upper leaf cells (Fig. 1D). In the field, the gametophytes are very distinctive in the glistening wide-spreading leaves with erect margins (Fig. 1B). The plants are larger than most *Encalypta* species and often superficially resemble *Dichodontium pellucidum*.

In the summer of 1973, while collecting in the Grande Cache region, north of Jasper National Park, Alberta, Wilbur Peterson and the present author found *Bryobrittonia pellucida* in quantity along a small stream at Sherman Meadows, about 150 km. south of Grande Prairie. Later in the summer they collected the species along small streams in the Yukon Territory in the Whitehorse area, and with sporophytes at Dawson City and in the Mt. Klotz region of west-central Yukon. In 1972, collections were obtained from the Kluane Lake region of southwestern Yukon. All of the collections were from sandy silt banks beside streams. The Alberta collections were from 1220 m. elevation in an area of

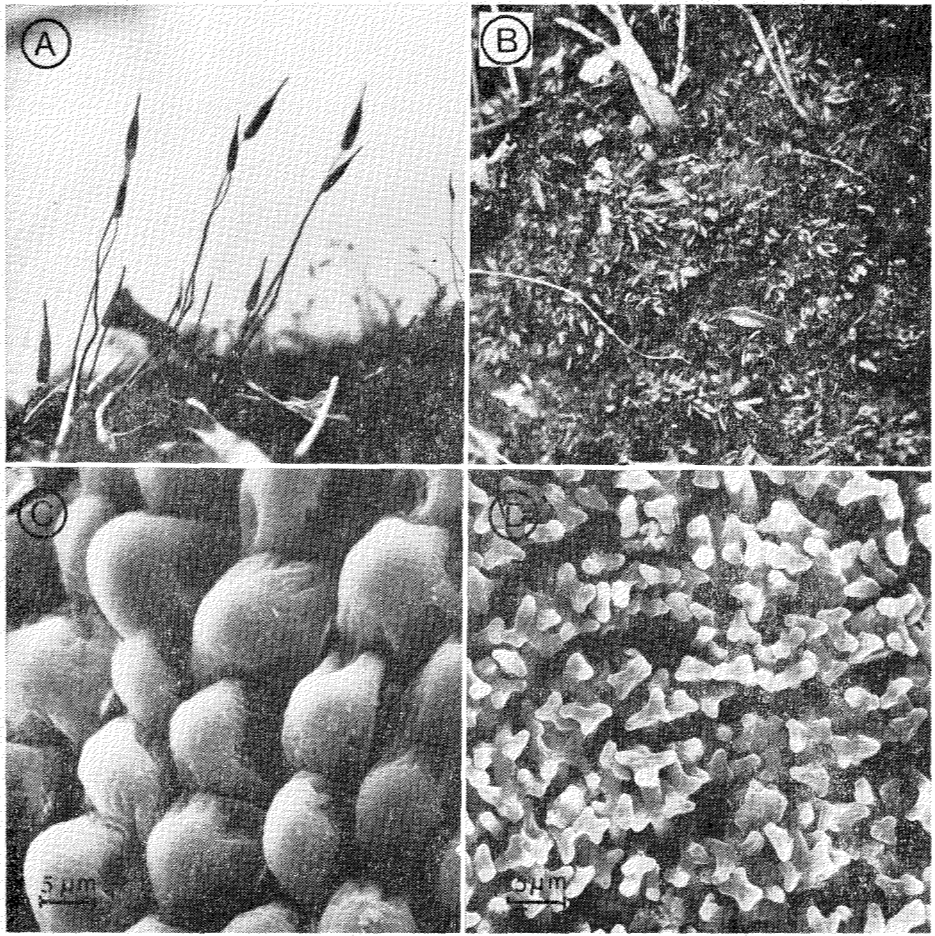


FIG. 1. (A) *Bryobrittonia pellucida*. Calyptrae and sporophytes. (B) *Bryo. p.* Gametophytes growing on a moist sandy river bank. Both photographs taken at the type locality at Dawson City, Yukon, and magnified X2. (C) *Bryo. p.* Scanning electron micrograph of the mammillose upper leaf cells. (D) *Encalypta ciliata*. Scanning electron micrograph of the pluripapillose upper leaf cells.

Pinus contorta and *Picea glauca* in the upper montane zone and are approximately 900 km. south of its previously known range.

The habitat of the Alberta collections agrees well with notes made by Steere², Holmen⁴ and Kuc⁵. These authors, all working in arctic areas, collected the species on moist calcareous silt or clayey soil. In the more southern localities in the Yukon and Alberta the species has been found on shaded silty stream banks, kept moist by seepage. In the southwestern Mackenzie District, it is known from streambanks in *Populus balsamifera*-*Picea glauca* forests (G. H. Scotter, personal communication). The habitats all seem suc-

cessional and probably only available for colonization for a few years before they are destroyed or totally covered by larger vegetation.

After Williams made his collection at Dawson City, *Bryobrittonia pellucida* was not rediscovered until Persson⁶ published details of two collections from the Seward Peninsula, Alaska. Steere² reported numerous collections from the Brooks Range, Alaska, as well as Coppermine, N.W.T., and Prince Patrick Island in the western Canadian Arctic. It has also been reported from Peary Land in northern Greenland⁴, northern Ellesmere Island⁷, and Axel Heiberg Island⁵. Brassard⁸ added

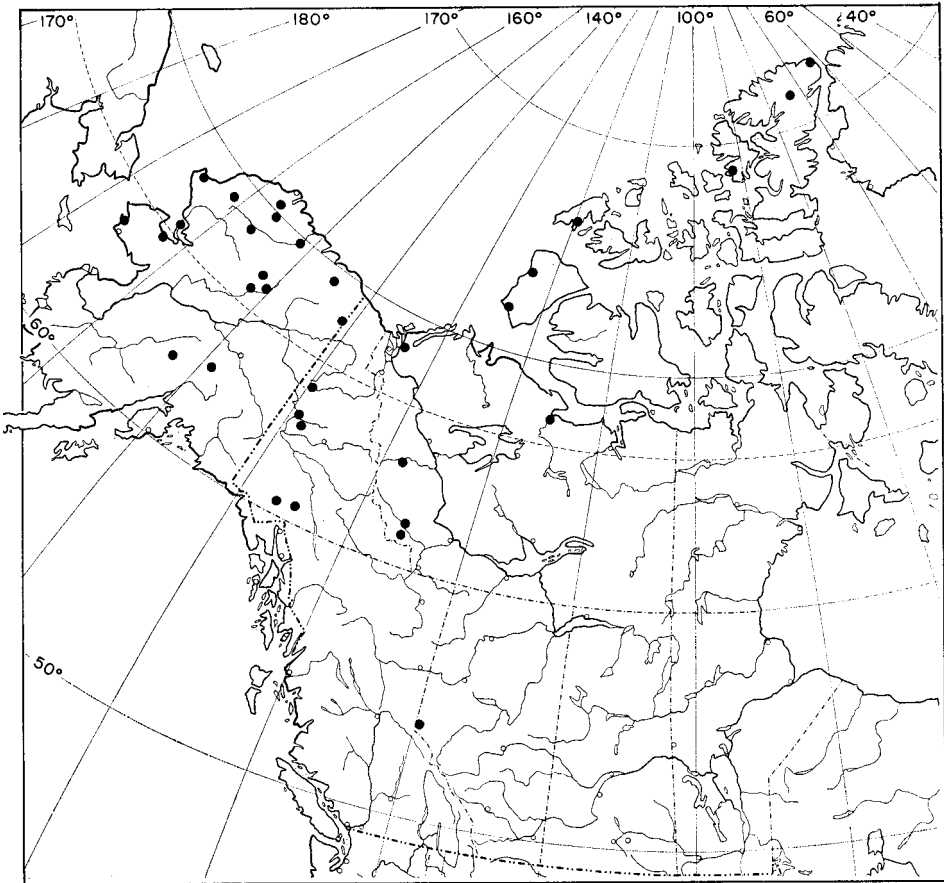


FIG. 2. The distribution in North America of *Bryobrittonia pellucida*.

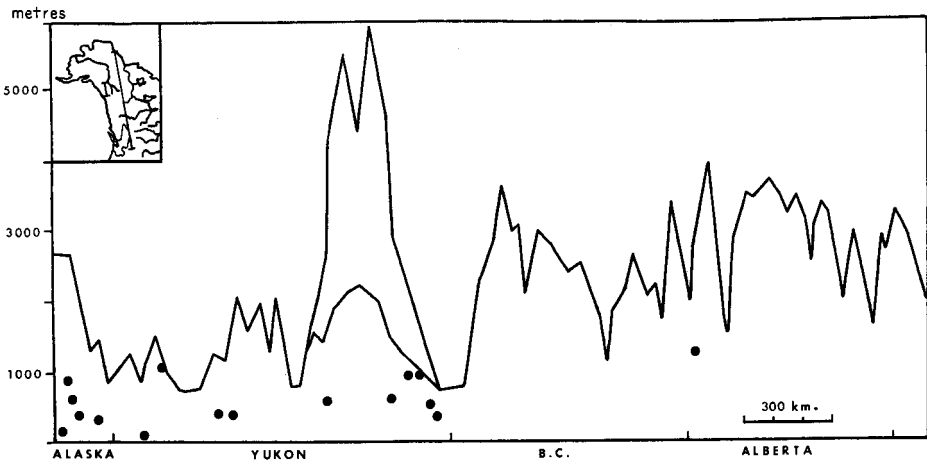


FIG. 3. A longitudinal section of the Rocky Mountains to the north of 48°N latitude showing the altitudinal distribution of *Bryobrittonia pellucida*.

an additional locality on northern Ellesmere. Savicz-Ljubitzkaja and Smirnova⁹ recorded it as occurring in the Polar Urals and eastern Siberia (probably near the Lena River).

Examination of material in the National Museum of Canada has revealed additional locations of the species in the Nahanni River region of the southwestern Mackenzie District, the Mackenzie River delta in northwestern Mackenzie District, and in the Klauane Range region of southwestern Yukon Territory. The distribution of *Bryobrittonia pellucida*, as it is presently known in North America is shown on Fig. 2 and its altitudinal range along the western cordillera in Fig. 3.

REPRESENTATIVE SPECIMENS EXAMINED

Collections are deposited either in the herbarium of the University of Alberta (ALTA) or in the Bryophyte herbarium of the National Museum of Canada (CANM). The following data are representative of the geographical range of *B. pellucida* in North America.

CANADA: ALBERTA. Grande Cache Area. 7.6 mi. S. of Two Lakes Campground, 54°17' N; 119°51' W, *Vitt* 7242, 7235 (ALTA).

CANADA: NORTHWEST TERRITORIES. Mackenzie District. Mackenzie River Delta, SE of Inuvik Airport, 68°18' N; 133°27' W, *Dickson* 1969M478 (CANM); Flat River and Nahanni River Region, 61°16' N; 123°03' W, *Scotter* 13376 (CANM); Flat River and Nahanni River Region, 61°15' N; 124°30' W, *Scotter* 13416; Keele River, 64°12' N; 127°25' W, *Scotter* 14526B (CANM).

CANADA: YUKON TERRITORY. Dawson City, on bank of Yukon River just across and down river of Dawson City (type locality), 64°04' N; 139°26' W, *Vitt* 10771 (ALTA); Ogilvie Mts., Mt. Klotz at headwaters of Ogilvie River, 65°20' N; 140°05' W, *Vitt* 7823 (ALTA); Porter Creek, 3.4 mi. N. of Whitehorse, 60°45' N; 135°43' W, *Vitt* 7445 (ALTA); Klauane Lake Region, 2.3 mi. along road S of mi. 1167.9 of Alaska Hw., on E bank of White River, 61°57' N; 140°32' W, *Vitt* 6135 (ALTA); Klauane Ranges, mi. 1033.5 of Alaska Hw., *Crum and Schofield* 8949A (CANM); Klauane Ranges, mi. 1022 of Alaska Hw., *Crum and Schofield* 8855 (CANM).

U.S.A.: ALASKA. Endicott Mts., Brooks Range, 68°43' N; 156°30' W, *Steere* 17896 (CANM); East Oumalik, 69° 48' N; 155°23' W, *Steere* 15365 (CANM); Gubic, confluence Chandler and Colville Rivers, 69°28' N; 151°30' W, *Steere* 16127 (CANM); Carlo, bank of Nenara R., 63°34' N; 148°50' W,

Sherrard C34 (CANM); Schrader Lake-Peters Lake, Franklin Mts., Brooks Range, 69°22' N; 145°03' W, *Steere* 18628 (CANM); DeLong Mts. (north slope), Brooks Range, 68°53' N; 161°10' W, *Steere* 16517 (CANM); Wiseman, south slope Brooks Range, 67°18' N; 150°17' W, *Sherrard* 14-106 (CANM); Bettles & vicinity, Koyukuk R., 66°55' N; 151°50' W, *Sherrard* 4-5c (CANM).

The geographic range of *Bryobrittonia pellucida* is circumpolar. In North America it is predominantly a species of the western Arctic with what appears to be a continuous eastward extension into the Canadian High Arctic and northern Greenland. It occurs southward in the mountainous regions of the Yukon Territory and of the District of Mackenzie, N.W.T., and is disjunct in the Rocky Mountains of Alberta. Its occurrence increases in altitude as latitude decreases (Fig. 2).

Steere, in several papers, but particularly in that of 1965¹⁰, listed a small group of bryophyte species which he considered to be members of a circumpolar, high arctic element a few of which still have populations in the Alps and in the Rocky Mountains. Crum¹¹ reported *Barbula* (i.e., *Didymodon*) *johansenii* as disjunct in the Canadian Rocky Mountains, and Schofield¹² and Bird¹³ showed a similar distribution pattern for *Hypnum procerrimum*. *Bryobrittonia pellucida* has a distribution pattern very much like both these species and can be considered among those plants which are found in the Arctic and have a southward disjunction in the Canadian Rocky Mountains.

Although the presence of these species in disjunct localities in the alpine or upper montane zones of the Rockies may be the result of recent long distance dispersal from more northern populations, it seems more likely that these species survived at least the Wisconsin glaciation *in situ* in refugia, far south of their continuous Arctic range¹⁴. The importance of alpine refugia has been long underrated in North America and it is likely that many of the arctic circumpolar species will be found in alpine habitats of western Alberta, northwestern British Columbia and particularly in the unglaciated alpine regions of the Yukon.

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A Note on Hot Springs in the Interior of Alaska

Hot springs provide distinct local environments wherever found but are of special interest within the otherwise cold-dominated taiga. Although the areas involved are very small they offer unique biological settings whose study provides interesting insights into the thermal adaptations and the persistence of plant and animal species. Unfortunately, these areas are attractive for local exploitation which usually destroys the sites as natural entities, and most of the larger and more accessible springs have already been modified by such activity. Current interest in geothermal energy may place further pressure on these sites. Accordingly, we have attempted to relocate, and assess the present status of, a number of the 21 hot springs listed for the "Yukon basin" in Waring's classic report of 1917¹.

Dall Hot Springs near Dall Mountain (20 miles northwest of Stevens Village on the Yukon River) was visited by us in June 1971. We landed on Guishiemana Lake and walked southeastwards about 2 miles along the winter haul road to a spot where water at a temperature of 26°C was crossing the road through a culvert. About 250 yards northeast of this point the hot springs had formed a clear basin of about 200 feet across on a sloping hillside. Warm water, ranging in temperature from 37°C to 54°C, bubbled from the ground in several places. The presence of a few old logs indicated that there had once been a structure over one of the warm streams. The soil over much of the area was very unstable. We saw small mammals in the grass, one frog, and the tracks of wolf, bear, and moose. This hot spring had been visited the previous winter by our colleague L. Keith Miller who noted a considerable snow-free area with flowing water when all else in the vicinity was frozen.

Waring reported hot springs near the headwaters of the *Selawik River*. Following the directions of a local pilot, Tony Bernhardt, our