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## ON PINGUICULA MACROCERAS LINK IN NORTH AMERICA

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Link, 1820, described a new species of *Pinguicula* under the name *P. macroceras*, based on a sheet collected by Pallas in Unalaschka and later on preserved under no. 422 in the herbarium of Willdenow at Berlin. Reichenbach (1823) gave a picture of *P. macroceras* in his "Icones" (tab. LXXXII, fig. 169-170); but Chamisso (1831) demonstrated that it represented his own *P. microceras*, a plant of Unalaschka too.

In Willdenow's herbarium existed two other specimens of *Pinguicula*, both collected by Pallas and first mentioned by Link (1820) under the names *P. camtschatica* and *P. daurica*. Ledebour (1847/49) was acquainted with this fact, but related the two specimens to *P. macroceras*, which should be "*P. vulgari et leptocerati maxime affinis et vix diversa*". Herder (1871/72) followed him, but asserted that *P. macroceras* would be only a big-flowering form of *P. vulgaris*!

Nowadays most botanists treat it as *P. vulgaris*, the Japanese writing *P. vulgaris* var. *macroceras* Herder, while only a few authors attribute the rank of species to *P. macroceras* (Rydberg 1917, 1922, 1954; Komarov 1930, 1951; Boivin 1948).



In several papers Hultén (1949, 1958, 1960) discusses the problem and says: "It is . . . hardly possible to separate them"—i.e. *P. macroceras* and *P. microceras*—"specifically from the European plant"—*P. vulgaris*—"although the length and form of spur and lips are very different in some cases". (Hultén 1958, 230). Recently Ernst (1961) relates *P. macroceras*, *P. camtschatica*, *P. daurica* and *P. microceras* to *P. vulgaris*.

In a former paper (Casper, 1962) I first gave an account of my own views on the point in question. Now further studies on specimens in American herbaria enable me to confirm the meaning of Boivin (1948, 220) who wrote: "... *P. macroceras* est certainement spécifiquement distinct du *P. vulgaris*".

According to Link (1820) *P. macroceras* is characterized by the following diagnosis: "scapo foliisque glabris, calcare turbinato corollae laciniis longiore".

Unfortunately the type-specimen of Pallas was lost during World War II at Berlin and therefore, is not available for comparative studies (cf. Hultén, 1960). But there is no doubt that the specimens collected later by several botanists at the same locality are equivalent to those of Pallas: their flowers are typically long-spurred, and the long spur is the main characteristic in the diagnosis of *P. macroceras* given by Link.

Tables 1 and 2 reproduce the quantitative analysis of the length of spur (SPL) and corolla (C-L). Dried material of *P. vulgaris* from all parts of its area with particular consideration of Scandinavian specimens and of *P. macroceras* from the American part of its distribution was measured. These tables show the exact numerical composition of the investigated material.

#### KEY TO *P. MACROCERAS* AND *P. VULGARIS*:

Corolla lobes of the lower lip subobovate-oblong, more or less covering each other, or at least touching; lower lip of the calyx split up to half of its length.

Length of the corolla (15) 18-27 (36) mm. (spur included), length of the spur (3) 6-9 (11) mm. ....

.....*P. macroceras* LINK var. *macroceras*

Length of the corolla (10) 14-22 (29) mm. (spur included), length

TABLE I: Length of the corolla (C-L)

mm	11	12/13	14/15	16/17	18/19	20/21	22/23	24/25	26/27	28/29	30/31	32	Summa
GK	1	2	3	4	5	6	7	8	9	10	11	12	
P. macroceras	1	2	17	14	33	63	82	86	72	25	9	2	416
s.l.	0,2	0,5	4,2	3,5	8,2	15,4	20,2	21,2	17,6	6,2	2,3	0,5	100%
P. macroceras	-	-	2	1	15	28	62	73	69	23	9	2	284
s.s.	-	-	0,8	0,4	5,4	10	22,1	26,1	24,5	8,3	1,6	0,8	100%
P. vulgaris	9	47	86	107	115	84	57	26	6	2	-	-	539
	1,7	8,7	16	19,8	22,4	15,5	10,6	4,8	1,1	0,4	-	-	100%

TABLE II: Length of the spur (SPL)

mm = GK	1	2	3	4	5	6	7	8	9	10	Summa
P. macroceras	10	19	26	26	36	51	99	100	41	11	419
s.l.	2,4	4,5	6,2	6,2	8,6	12,2	23,6	23,9	9,8	2,6	100%
P. macroceras	-	-	1	-	9	39	92	99	37	11	288
s.s.	-	-	0,4	-	3,2	12,8	32,2	34,5	12,6	3,8	100%
P. vulgaris	2	11	82	141	150	97	37	9	5	2	536
	0,4	2,0	15,3	26,4	27,9	18,1	6,9	1,7	0,9	0,4	100%



of the spur 1-3 (5) mm.; lobes of the lower lip of the calyx almost entirely separated. A plant relatively frequent on the Aleutian Islands. .... *P. macroceras* var. *microceras* (CHAM.) CASPER  
 Corolla lobes of the lower lip oblong, not covering nor touching each other; lower lip of the calyx split up to  $\frac{2}{3}$  of its length; length of the corolla (10) 14-21 (29) mm. (spur included), length of the spur (1) 3-6 (10) mm. .... *P. vulgaris* L.

It is at once apparent from a study of figure 1 that there is a really quantitative difference between *P. macroceras* and *P. vulgaris* with regard to the length of spur and corolla. Link, therefore, was right in characterizing *P. macroceras* as a species very different from *P. vulgaris* by means of the length of its spur. In *P. macroceras* the spur measures (1) 6-9 (11) mm., the corolla (15) 18-27 (36) mm. (spur included), in *P. vulgaris* the spur (1) 3-6 (10) mm., the corolla (10) 14-21 (29) mm. (spur included).

Other characteristics also distinguish *P. macroceras* from *P. vulgaris*. The typically obovate large, broad rounded lobes of the lower lip of the corolla of *P. macroceras* were seen already by Ledebour (1847/49), who enlarged Link's diagnosis by this data. In most cases the lobes more or less cover one another (fig. 2). As opposed to these facts the corresponding lobes of *P. vulgaris* have an oblong form and are distinctly separated from one another (fig. 3).

In *P. macroceras* the two lobes of the lower lips of the calyx are oblong and grown together only to the half of their length. *P. vulgaris* has a smaller calyx and the lobes of the lower lip are grown together to  $\frac{2}{3}$  of their length.

The geographical distribution of *P. macroceras* reaches from Japan and Kamtschatka over the Aleutian Islands to the Pacific coast regions of North America (Casper, 1962): the area of an amphi-pacific plant. The map (fig. 4) shows exactly the known distribution in North America. The records are based on the study of specimens in herbaria. From the Aleutians over Pacific-Alaska, British-Columbia, Alberta, Washington, Montana, Oregon its area extends south into Northern California (Del Norte County). The northern and eastern borders of the area are not sufficiently known. Further studies are necessary to clear up especially

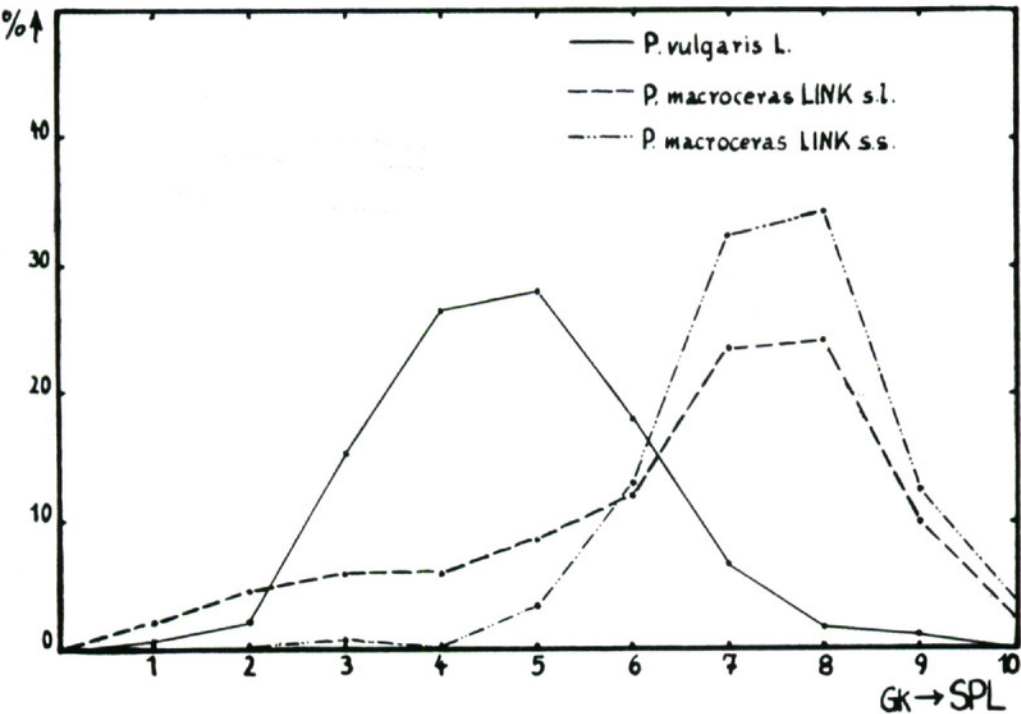
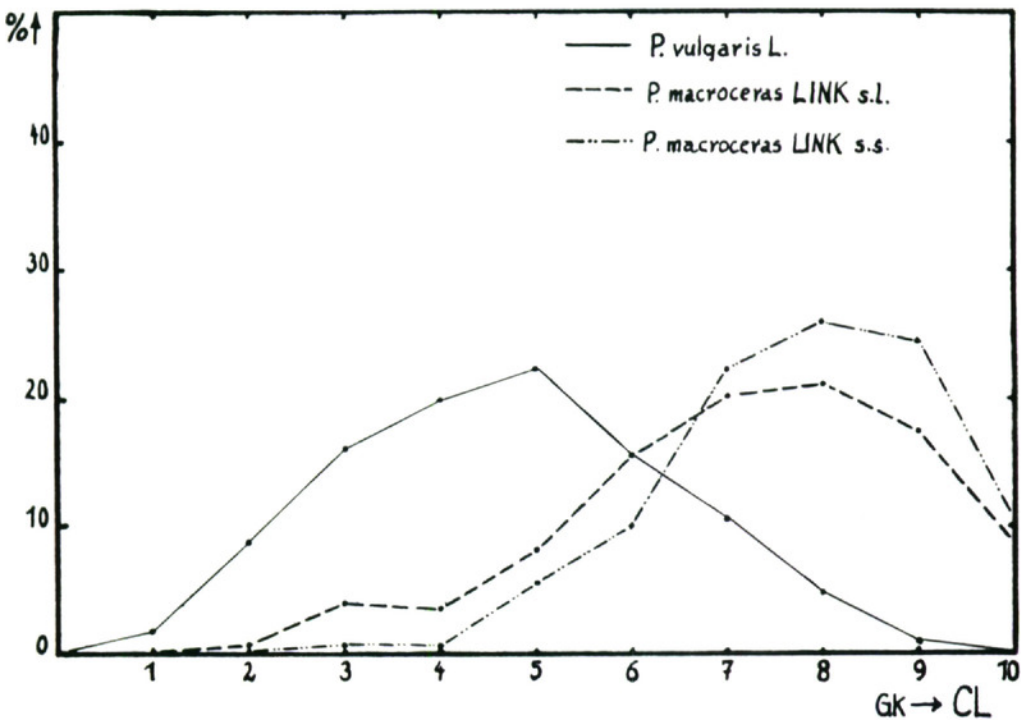


Figure 1



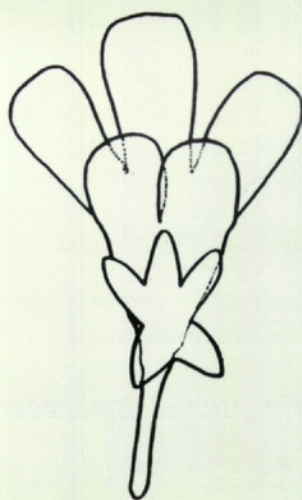
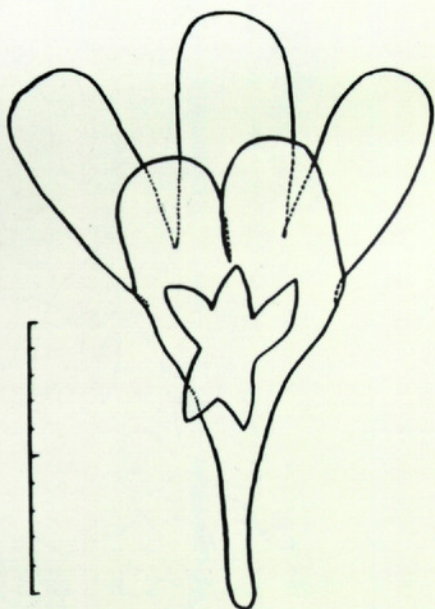
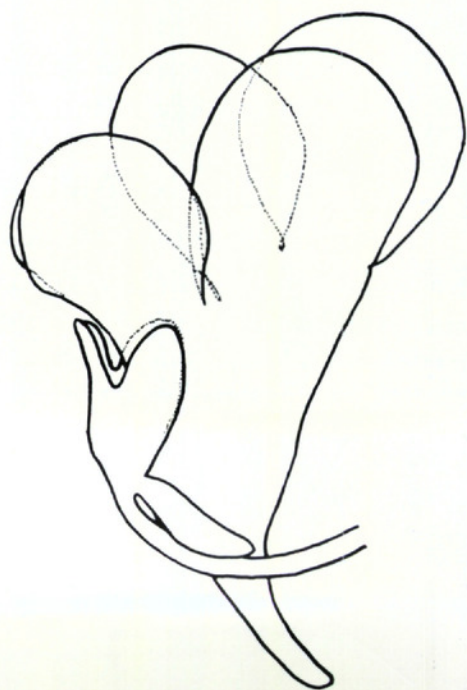
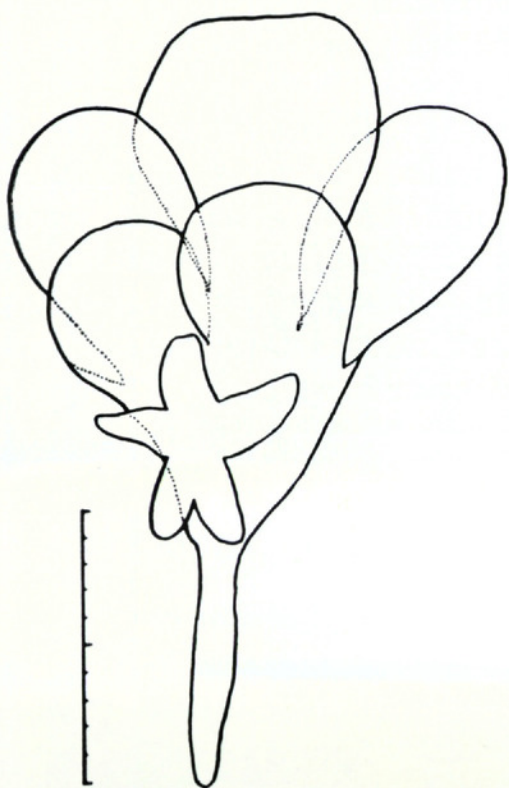


Figure 2 (above)

Figure 3 (below)

the contact-zone with *P. vulgaris*, which is distributed in America from Labrador to Nome and Coronation Gulf, but is not known from the most eastern parts of Asia (Casper, 1962).

A peculiar problem is associated with the name *P. microceras* Chamisso. The author described the plant as follows: “. . . species unalaschcensis alpina, nana, iam cornu brevi, laciniis corollae multo brevior . . .” (1831, 568). Mainly it was the small acute conical spur — the type specimen shows a spur of 1.5 mm. length — that induced Chamisso to separate his plant from *P. macroceras* or *P. vulgaris*. The other

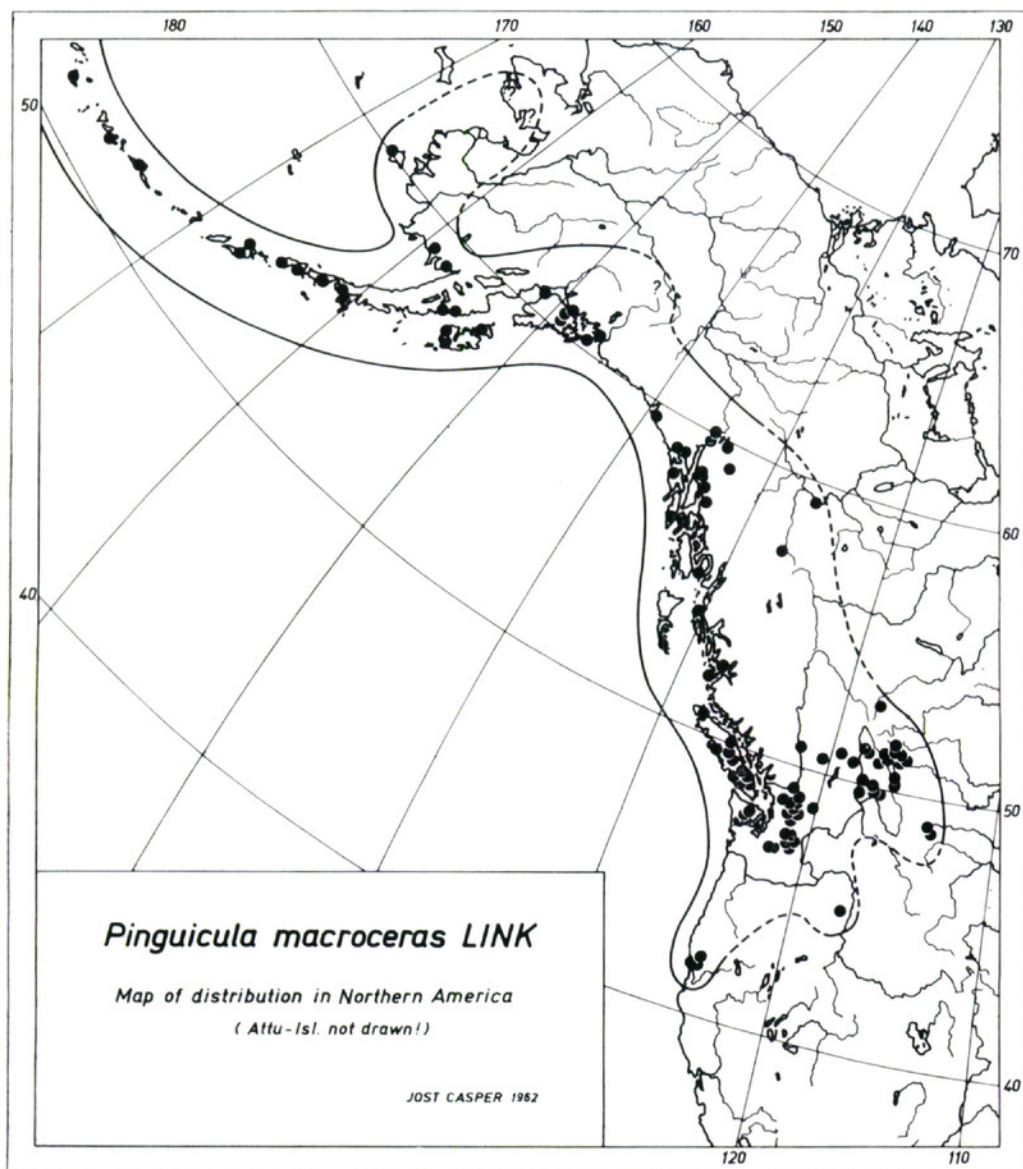


Figure 4



characteristics are similar to those in *P. macroceras*. Figure 1 shows two curves concerning *P. macroceras*. The first one — *P. macroceras* s.s. — excludes all *microceras* types from the Aleutians, the second one — *P. macroceras* s.l. — includes these types. It is apparent that in the case of *P. macroceras* s.l. the curve is depressed and displaced to the left by the *microceras*-material. But the particular character of the curve in relation to *P. vulgaris* is not changed.

Evidently *P. microceras* is a short-spurred form of *P. macroceras*, restricted to "the mountains and . . . arctic places, while *macroceras* types prevail more to the south" (Hultén, 1949: 1425; Casper, 1962). Already Chamisso (1831) understood *P. microceras* as "alpin" as opposed to the "subalpin-montanen" *P. macroceras*. Hultén (1949: 1425) is right in his statement, that "all the transitions exist between *P. macroceras* and *P. microceras*. But when he states that ". . . the same variation in the form and size of the flower can be observed in material of *P. vulgaris* from other parts of its range, for instance from Scandinavia . . ." he is mistaken as figure 1 shows. The curves confirm Hultén's own words: "It should be admitted, however, that plants approximating to the two extreme forms are more common on the Aleutians than they are in Scandinavia" (1960: 328). "All the transitions" concern only *P. macroceras* and *P. microceras*, but not *P. vulgaris*! The short-spurred *microceras*-type belongs to *P. macroceras* but never to *P. vulgaris*.

*P. macroceras* Link is a good species, sufficiently distinguished from *P. vulgaris* by its long spur, its obovate rounded lobes of the lower lip of the corolla and its deeply separated lobes of the lower lip of the calyx. Its area is typical amphi-pacific. Chromosome numbers are not known.

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#### RECORDS<sup>1</sup>

ALASKA. Aleutians: Adak Id. (CHI 1162067), (DS 374181). Amchitka Id. (US 173872). Atka Id. (MIN 355434, DS 243871). Attu Id. (MO 1705350), Bassett Creek (MO 1304358), Cape Khlebnikof (UC

<sup>1</sup>The list includes only half of the whole material studied.



730334). Kuiu Id., Washington Bay (MIN 530054). Unalaska (UC 081604), Iliuliuk Lake (UC 081605). Kodiak Id.: Olga Bay (TRT 91769), Red River, Alitak (US 220252). Raspberry Id., Port Vita (MIN 525347), Eagle River, Juneau (DAO 11226). Hinchinbrook Id., Cordova (DS 150701). Glacier Bay (UC 533512). Yakutat (MO 822106). New Metlakatla (MO 1764214). Baranoff Id. (MO 1764215). Muir Glacier (MO 1764216). Chumagin Ids: Popoff Id. (MO 1764220). Windham Bay (MO 17464221).

**BRITISH COLUMBIA.** Log Cabin (v 12025). Ogilvie Mts. (v 12225). Prince Rupert (v 6330). SW Gowgaia Bay (v 34881). Goose Island (v 21541). Vancouver Island: Mt. Splendor (v 11034), Gordon River (MO 1764210, DS 20540), Port Hardy (UBC 23524), Moat Lake (v 29750), Forbidden Plateau, Meadow Lake Stream (v 15821), Ucluelet (v 4586), Henderson Lake (v 4584), Mt. Joan (v 15910), Cowichan Lake, N.E. shoulder Mt. Landalt (v 28690 + 28691), Mt. Arrowsmith (v 22882), Strathcona Park, Mt. Rooster Comb (v 10473). Coast, Cypress Creek (UBC 24652), Lillocet (v 5971). Cheam (v 4588). Fairmont H. Springs (v 13980). Canal Flat (v 15343). Kootenay, Gray Creek, Clarke's Pt. (v 12978, UBC 5691). Coast, Hollyburn Ridge (UBC 62839), between Black Mt. and Hollyburn (DAO 11259). Whistler Pass (UBC 5692). Dam Mt., Goat Lake (UBC 5693). Kaslo, White Water Mine (UBC 5694). Haffner Creek, Marble Canyon Campground (DAO 11261). Hat Creek Valley, Marble Mts. (WTU, herb. J. W. Thompson 17197). Cassiar, Ingenika River (UBC 51290). Tenquille Lake (UBC 83843), Finch Ridge (UBC 48506). Atlin District, Nakina Lake (DAO 11262), Lake Atlin (UBC 51295, UC 494021). Yohs National Park, Emerald Lake (UBC 65608), Twin Falls (MIN 267961), Sorrent fan (MIN 241875), Sir Donald Trail (MIN 241874). Selkirk Mts., Lower Sandford Morains (MIN 241873). Victor Lake, 11 mi. W. of Revelstoke (DS 352516). Columbia Valley, Albert Canyon (UBC 74339).

**ALBERTA.** Banff (v 26321, DAO 11188), Middle Springs (DAO 11190), Sulfur Mt., (MIN 241872), Bow River (DAO 11458), Hillsdale Cabin (VT), between the Mistaya and Bow River Valleys (UC 707445). Jasper, Lake Beauvert (TRT 124265). Lake Louise (v 26323). Selkirk Flora, Waterfall at gorge of Columbia (PH 526504).

**WASHINGTON.** Olympic National Forest: Deer Lake (WTU 110683), Heart Lake (WTU 33020), Mt. Angeles (WTU, herb. J. W. Thompson 24361), Mt. Colonel Bob Lookout (WTU, herb. J. W. Thompson). Mount Baker National Forest: Mt. Baker, Boulder Glacier (WTU 32274), Mt. Baker Lodge, Bagley Lake (WTU, herb. J. W. Thompson 24361), Mt. Hermon (UC), Skagit River Gorge, Newhalem (MIN 357710), Skagit Pass (WTU 16083), Mt. Higgins (UC 518084), Baldy Peak (MO 1764206). Mt. Rainier (MO 1764208), Van Trump Park (WTU 88707), Comet Falls (WTU 37612), above Main Cowlitz Glacier (MO 1764204). Kittitas Co.: Mt. Stuart (MIN 191336), North Fork of Teanaway River, Wenatchee Mts. (BH 4453), Iron Peak (UC



931294), Fish Lake (WTU 75350, UC 710875). Cascade Mts., Stevens Pass (UC 185022). *Okanogan Co.s Horse Shoe Basin* (VT). Snohomish Co.: Mt. Dickerman (MO 1027818), Columbia Peak, N of Monte Cristo (WTU 35468). Yakima Region (UC 173684).

MONTANA. Glacier National Park: N of Logan Pass (UC 028325), Grinnell Lake (UCLA 40261), Grinnell Falls (WTU 129482), Iceberg Lake (CHI 953072, 953073).

OREGON. Wallowa Co.: Ice Lake, bog (WTU, herb. J. W. Thompson 8179), on trail from Wallowa River (ILL, herb. G. N. Jones 7497). Josephine Co.: near Kerby (UC 76680), other side of Tennessee Pass (MO 925823).

CALIFORNIA. Del Norte Co.: French Flat, Gasquet, Smith River (UC 501348), near Camps (MO 1261851), Douglas Park, 9 mi. E of Crescent City (DS 179461), Rock Creek Lodge (WTU 183910).

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