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EVALUATION OF *DRABA OLIGOSPERMA*, *D. PECTINIPILA*, AND *D. JUNIPERINA* COMPLEX (CRUCIFERAE)

Robert W. Lichvar¹

ABSTRACT.— Since *Draba pectinipila* Rollins was described in 1953, it has been assigned to several different taxonomic categories. It has been recognized at the species and variety level and has also been placed in synonymy under *D. oligosperma* Hook. Then Dorn (1978) described *D. juniperina* and contrasted it to *D. pectinipila* and *D. oligosperma*. To clarify the status of these three taxa, the evaluation included field and herbarium observations and scanning electron microscope studies.

A proposal to give *Draba pectinipila* Rollins protection under the Endangered Species Act prompted extensive field studies on this and two closely related taxa. Rollins (1953) described *D. pectinipila* from the alpine habitat of Clay Butte, Park County, Wyoming. It is now known from two other alpine locations in British Columbia and Colorado. Since this taxon was described, it has been assigned to several different taxonomic categories. Before further action could be taken to protect the plants, the taxonomic status had to be reevaluated.

Hitchcock (1964) gave *Draba pectinipila* varietal status under *D. oligosperma* Hook. His only comment was that this variety was the only fairly distinct variant for the species. Mulligan (1972) placed it in synonymy under *D. oligosperma* without making field observa-

tions. Then Dorn (1978) described plants from the low elevation areas near the Utah-Wyoming border, mentioned by Rollins (1953) under *D. pectinipila*, as *D. juniperina*. To clarify the taxonomy of this species complex, *D. pectinipila* and *D. juniperina* are compared to one another and to *D. oligosperma*.

METHODS

This analysis of *Draba oligosperma*, *D. pectinipila*, and *D. juniperina* included field and herbarium observations and scanning electron microscope (SEM) studies. Field observations included habitat, plant aspects, and flowering dates. Herbarium specimens were studied for shape, and scape characteristics. The herbarium analysis was done at the

TABLE 1. Character differences between the three *Draba* species.

Character	<i>D. oligosperma</i>	<i>D. pectinipila</i>	<i>D. juniperina</i>
Habitat	exposed rocky slopes and ridges	alpine slopes	pinyon-juniper woodlands
Scape pubescence	glabrous	pubescent	pubescent
Scape height	1-4 (9) cm	(4) 5-9 (11) cm	(5) 7-15 cm
Mature fruit pedicel length	0.1-0.5 (1.0) cm	0.5-1.2 (1.4) cm	0.5-1.0 cm
Petal color	yellow	yellow	yellow
Silique tip	mostly rounded	tapered	tapered
Silique base	rounded	rounded	tapered
Style length	0.1-1 mm	0.3-0.8 mm	0.6-1.5 mm
Flowering dates	May-July	July-August	April-May
Basal leaf trichomes	fine	medium	coarse
Valve trichomes	simple (90%+)	doubly pectinate (90%+)	doubly pectinate (90%+)
Distribution	Western U.S. and Canada	British Columbia, Wyoming, Colorado	Wyoming, Colorado, Utah

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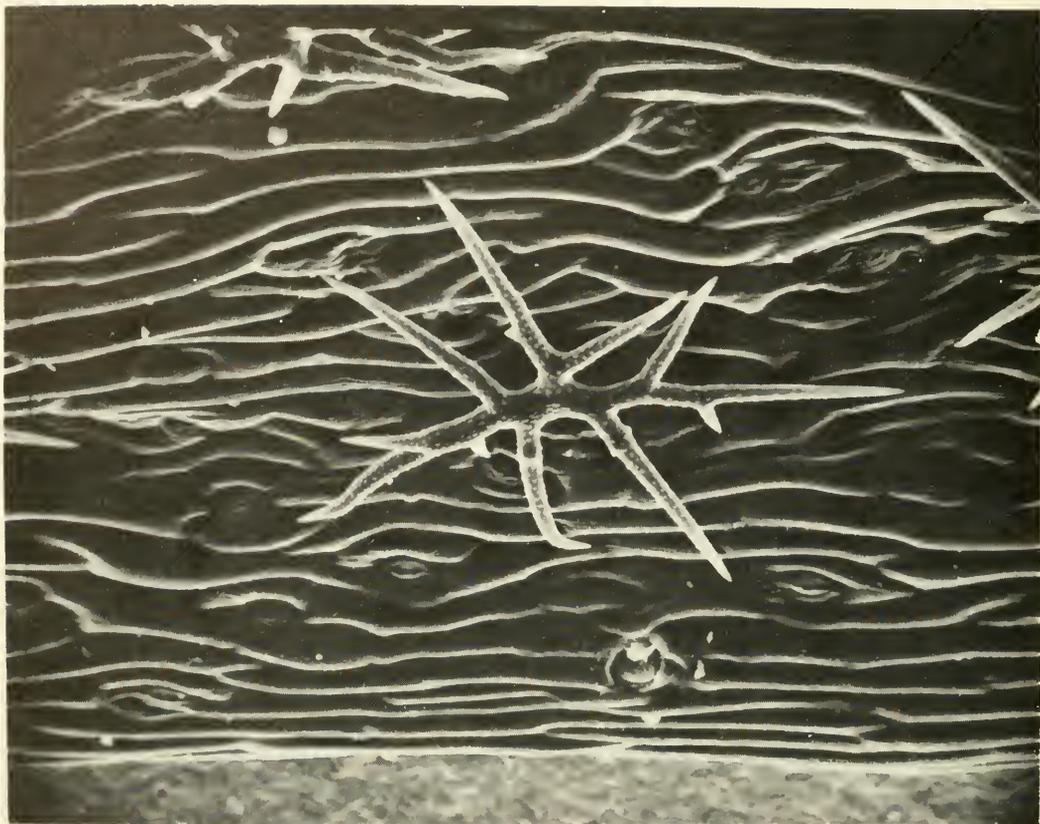


Fig. 1. Leaf trichome of *Draba pectinipila* X200 (Lichvar 2066).

Rocky Mountain Herbarium, Laramie, Wyoming; the Gray Herbarium, Cambridge, Massachusetts; and the University of Colorado Museum, Boulder, Colorado. The following specimens were most pertinent to this study: At RM: Dawson, s.n.; McCoun, s.n.; Dorn, 897; Nelson, 1223; Lichvar, 2066; Johnston, 1424, 1442A, 1434; at GH: Rollins and Porter 51269; Williams, 476; at COLO: Beaman and Erbsch, 1208, 1276; Johnston, 1273, 2314; Calder, Savile, and Ferguson, 13780.

RESULTS AND DISCUSSION

Comparison of field observations, herbarium, and SEM analysis showed considerable differences between taxa in this complex. These taxa have overlapping ranges with areas of sympatry. Of the three taxa, *Draba oligosperma* has the widest range and is the most variable in habitat specificity. *Draba oligosperma* occurs from lower basin areas to

high alpine ridges on either sandstone or limestone formations. *Draba pectinipila* is always found on limestone in an alpine habitat, and *D. juniperina* is found on sandstone formations in association with a pinyon-juniper woodland at lower elevations. When *D. oligosperma* and *D. pectinipila* are sympatric, *D. pectinipila* is readily identifiable in the field by its taller, more erect stature and the high percentage of pectinate hairs on the fruit valves. Near the Flaming Gorge area of Wyoming, Utah, and Colorado, *D. juniperina* is not found in the same habitat as *D. oligosperma*. *Draba oligosperma* occurs on sandstone or gravelly outwash ridges and outcrops, but *D. juniperina* is almost always found in association with pinyon-juniper woodlands or adjacent sagebrush that overlies a sandstone formation.

Certain characteristics separate *Draba pectinipila* and *D. juniperina* from *D. oligosperma* (Table 1). The correlation of characters that are similar between *D. pectinipila*

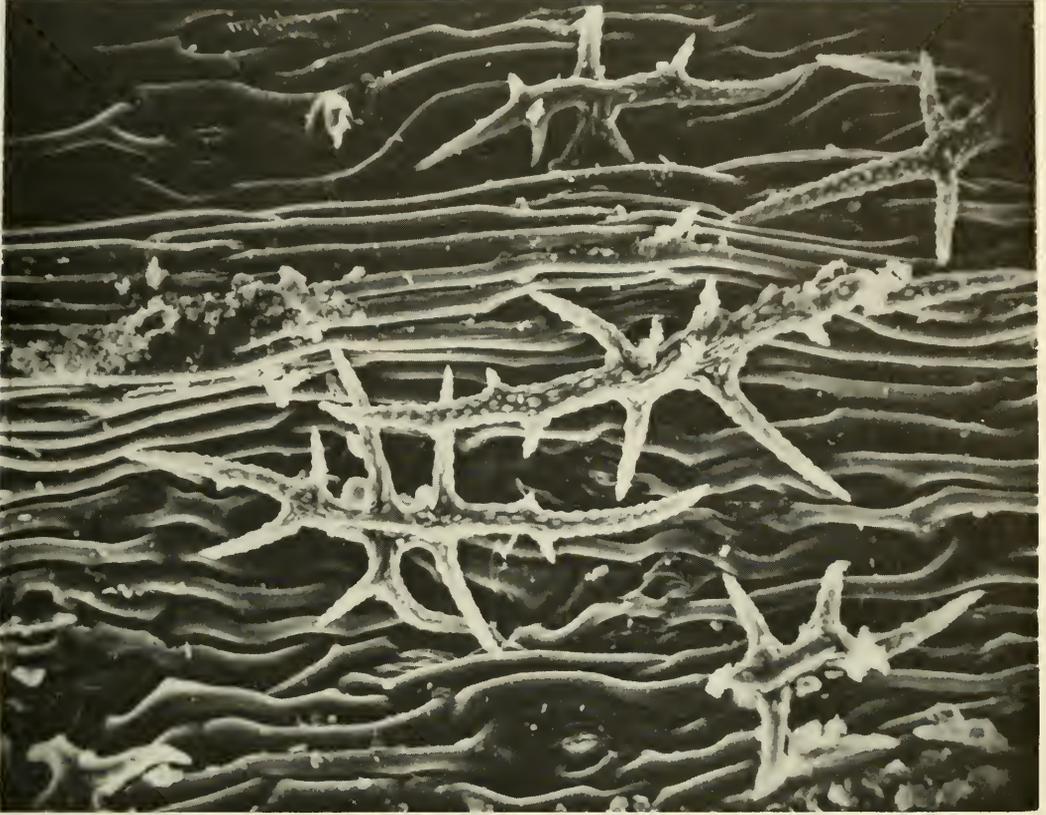


Fig. 2. Leaf trichome of *Draba oligosperma* X200 (Lichvar 1981).

and *D. juniperina* are the tapered fruit tips with doubly pectinate hairs on the valves of the fruits and the taller scapes that are pubescent. *Draba oligosperma* has rounded fruit tips with mostly simple hairs and shorter scapes that are glabrous. To distinguish between the two taxa with a more limited distribution, *D. pectinipila* and *D. juniperina*, habitat, style length, and leaf trichomes may be used. *Draba pectinipila* is an alpine taxon found on limestone and has tapered fruits above with styles 0.3–0.8 mm long, but *D. juniperina* is found at lower elevations in the basins on sandstone in a pinyon-juniper woodland and has tapered fruits above and below, and styles 0.6–1.5 mm long.

Rollins (1953) noted that the lower elevation taxon, *Draba juniperina*, had not only ta-

pered fruits above and below but also coarse hairs on the basal leaves. Scanning electron micrographs (Figs. 1, 2, 3) show that *D. juniperina* (Fig. 3) has doubly pectinate leaf hairs twice the diameter of *D. pectinipila* (Fig. 1). *Draba oligosperma* (Fig. 2) is intermediate in leaf trichome diameter.

Recognition of each of these species can be justified at the species level for three reasons. First, specimens or plants of each of these taxa can consistently be separated in either the field or herbarium. Second, when any combination of these species occurs sympatrically in the field they are easily and consistently identifiable. Finally, based upon trichome characters, those used to distinguish these species are consistent with those used throughout the genus of *Draba*.

Key to the Species

1. Scapes glabrous; 1–4 (9) cm long; fruits with 90 percent or more simple hairs ...
 *D. oligosperma*

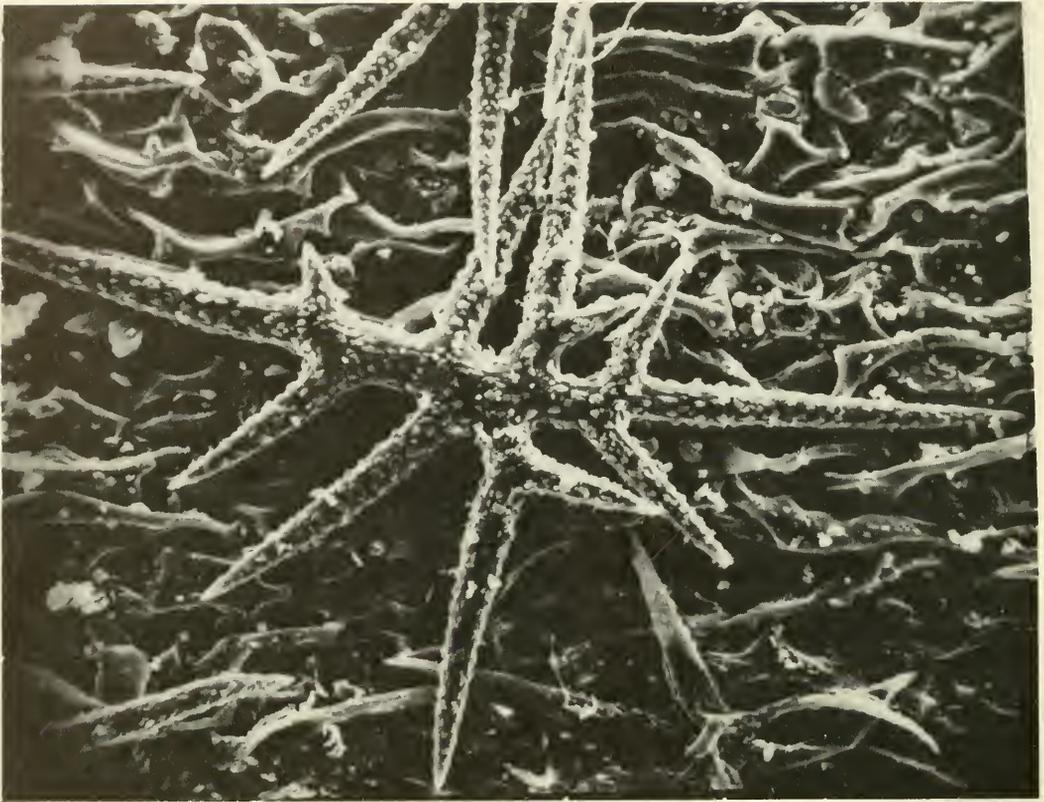


Fig. 3. Leaf trichome of *Draba juniperina* X200 (Lichvar 2821).

- Scapes pubescent, 4–12 cm long; fruits with 90 percent or more doubly pectinate hairs 2
- 2(1). Plants alpine with fine hairs on basal leaves; siliques tapered above, rounded below; styles 0.3–0.8 mm long *D. pectinipila*
- Plants of pinyon-juniper woodlands with coarse hairs on basal leaves; siliques tapered above and below; styles 0.6–1.5 mm long *D. juniperina*

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