

A NEW SPECIES OF CAULANTHUS (CRUCIFERAE) FROM NEVADA

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Rollins, Reed C. (Gray Herbarium, Harvard University, 22 Divinity Avenue, Cambridge, MA 02138) and Patricia K. Holmgren (New York Botanical Garden, Bronx, NY 10458). A new species of *Caulanthus* (Cruciferae) from Nevada. Brittonia 32: 148–151. 1980.—*Caulanthus barnebyi* from northern Nevada is described, illustrated, and compared with its nearest relative, *C. glaucus* S. Wats.

In evaluating new material of the Cruciferae from heretofore relatively unexplored areas of Nevada, an undescribed species of *Caulanthus* has been uncovered. This was first collected near Quinn River Crossing in 1942 by H. D. Ripley and R. C. Barneby (*Ripley & Barneby 4561*, 24 May 1942; collection apparently lost) and again in 1969 by Barneby, for whom the species is named. Subsequently, in 1978 and 1979, it was studied in the field by each of us independently at the different localities listed below. The new species is a close relative of *Caulanthus glaucus* S. Wats., which occurs in southwestern Nevada and adjacent California, but it possesses an entire instead of prominently two-lobed stigma like that of *C. glaucus*. When Jepson (1936) included *Caulanthus* in *Streptanthus*, he accommodated both types of stigma in *Streptanthus* and at the same time used this difference in part to set up subgenera within the genus. Because of the marked stigma difference, the placement of the new species requires special consideration. Payson (1923) admitted to *Caulanthus* species both with an entire stigma and with a two-lobed stigma. He believed an entire stigma to be primitive and the degree of lobing to indicate the degree of specialization, stating that “the most deeply lobed stigmas are found in those species that are most specialized in other respects.” In spite of the stigma difference between *C. glaucus* and the new species, there is no doubt but that these two belong together in one genus. The real question raised is whether *Caulanthus* should be maintained as a genus distinct from *Streptanthus*. Here we merely point out that the situation involving *Streptanthus* and *Caulanthus* is like that of many pairs of genera in the Cruciferae where arguments for merging them or keeping them apart can be almost equally convincing. This matter was commented on previously (Rollins, 1971) and it was concluded then that the taxonomy of the group is best served by accepting both *Streptanthus* and *Caulanthus*. Our new species definitely falls into *Caulanthus* as accepted by Payson (1923) and by the authors of most of the recent manuals covering the area where this genus occurs.

Caulanthus barnebyi R. C. Rollins & P. K. Holmgren, sp. nov. (Fig. 1)

Herba perennis crassa glabra et glauca, caulibus erectis simplicibus vel superne ramosis 5–10 dm altis, foliis petiolatis inferne dentatis superne integris, inflorescentiis racemosis elongatis, sepalis erectis nonsaccatis purpureis 11–13 mm longis, petalis spathulatis vel late linearibus erectis brunneo-purpureis, antheris rectis 3.5–5 mm longis, pedicellis divaricatis 8–15 dm longis, siliquis divaricatis vel patentibus teretibus 7–12 cm longis, seminibus oblongis immarginatis 1.5–2.0 mm longis, cotyledonibus accumbentibus vel oblique incumbentibus.

Plants perennial, glabrous and glaucous; *stems* one to several, not hollow, stout, erect but usually arising laterally from near apex of a buried or slightly emergent tough woody root-crown, simple or sometimes branched above, often crooked, the lowermost portion usually purplish, 5–10 dm tall; *leaves* fleshy, petiolate, separated by substantial internodes, the lower not rosulate; *juvenile*



FIG. 1. *Caulanthus barnebyi* Rollins & P. Holmgren. A. Habit, $\times 1/12$. B. Lower part of stem, $\times 1/2$. C. Inflorescence, $\times 1/2$. D. Infructescence, $\times 1/2$. E. Flower, $\times 2$. F. Silique, $\times 2$. G. Stigma. A, drawn from Kodachrome slide; B, C, E, drawn from *N. & P. Holmgren 8738*; D, F, G, drawn from *N. & P. Holmgren 9250*.

and lower leaves similar, usually coarsely dentate, broadly obovate with a flattened and slightly wing-margined petiole; blade 4–9 (15) cm long, 3–7 (11.5) cm wide, the petiole 3–6 cm long; middle cauline leaves larger, broadly obovate to ovate, obtuse, usually entire, the blade to 15 cm long and 9 cm wide; upper

cauline leaves becoming narrower and acute upward but retaining a definite petiole; *inflorescence* elongated, ebracteate, the flowering pedicels slender, divaricately ascending to more widely spreading; *sepals* erect at anthesis, reddish purple, not saccate, linearly oblong, 11–13 mm long, 3–4 mm wide; *petals* spatulate to broadly linear, erect, flaring to slightly recurved just below apex but not unguiculate, 15–19 mm long, 3–4 mm wide, the veins prominent, dark reddish brown to purple on a cream-colored ground; *stamens* erect, the filaments slender, nearly equal, 3.5–4.5 mm long, the anthers straight, slightly apiculate, 3.5–5.0 mm long; *glandular tissue* prominent, surrounding petal bases and subtending to nearly surrounding filament bases; *fruiting pedicels* stout, straight, divaricately ascending, 8–15 mm long, markedly expanded at summit; *infructescences* 2–4 dm long; *siliques* terete, divaricately ascending to more widely spreading, straight to somewhat arcuate, 7–12 cm long, 1.5–2.0 mm diam, not stipitate; *style* obsolete, the stigma capitate, mound-shaped, not lobed; *seed* oblong, wingless, slightly compressed, 1.5–2.0 mm long, 1.0–1.2 mm wide, brownish; *cotyledons* accumbent or sometimes obliquely incumbent.

TYPE: UNITED STATES. NEVADA. Humboldt Co.: S end of Black Rock Range, T37N, R26E, ca 4800 ft, 15 Jun 1979, *Reed C. Rollins, Kathryn W. Rollins, Arnold Tiehm & Margaret Williams 79242* (HOLOTYPE: GH; ISOTYPES: NY, RENO, and others to be distributed).

Additional specimens examined: UNITED STATES. NEVADA. Humboldt Co.: steep talus and rock-ledges of isolated tuffaceous butte, Quinn River Crossing, 15 Jun 1969, *R. C. Barneby 15051* (GH, NY, UC, UTC, WTU); frequent on talus below tuffaceous and igneous cliffs, N end of Black Rock Desert, ca 3 km N of Quinn River Crossing on W slope of ridge extending into valley, near Nevada Hwy. 140, 48 km SSE of Denio, T43N, R32E, elev. 1300 m, 20 May 1978, *Noel H. & Patricia K. Holmgren 8738* (BRY, GH, NY, RENO, UTC, WTU); near same locality, on rocky talus of basaltic and lacustrine mixture, 4 km N of Quinn River Crossing on west-facing slope of isolated ridge system, 4 Jun 1979, *Noel H. & Patricia K. Holmgren 9250* (GH, ND, NY, RENO, UC, UTC, WTU); near crest of light colored clay hillsides covered with dark volcanic rock, S end of Black Rock Range, T37N, R26E, ca 4800–5000 ft, 3 Jun 1979, *Arnold Tiehm & Laurie Birdsey 4975* (GH, NY, RENO).

As mentioned above, the most singular difference separating *C. glaucus* from *C. barnebyi* is found in the stigma. The stigma of *C. glaucus* is deeply cleft with erect lobes. The lobes are up to 2 mm long but most commonly about 1 mm long. In contrast, the stigma of *C. barnebyi* is a low capitate mound showing no cleft or lobes. The older fruits of both species retain the stigma which is completely sessile in *C. barnebyi* but raised slightly above the valve apex in *C. glaucus*. This feature is easily observed and can serve alone as a marker for identification. Additional distinguishing features involve flower size and color. The petals of *C. barnebyi* are strongly veined, the veins being deep maroon or brownish purple on a creamy-white ground. On the other hand, the petals of *C. glaucus* are yellowish with less prominent veins that are brown in color. Flowers of the latter are smaller than those of *C. barnebyi*. On the average, the fruiting pedicels of *C. barnebyi* are shorter than those of *C. glaucus* but the overlap is substantial and this feature cannot be used definitively for purposes of distinguishing individual plants.

There is no doubt about the closeness of these two species from the evolutionary standpoint. The stigma difference is probably related to the pollinating systems but we have no information on how these operate. Many of the habitual features, and the stems, leaves, branching, inflorescences, fruits, and seeds are very similar in the two species. No attempt has been made up to now to grow *C. barnebyi*. However, plants of *C. glaucus* were grown in growth chambers at Harvard University and a chromosome count of $n = 10$ was obtained (Rollins & Rüdénberg, 1971). This number is unusual in *Caulanthus* because most species

so far counted are $n = 14$. A chromosome count of *C. barnebyi* would be very informative. Although Payson (1923) was unsure as to whether plants of *C. glaucus* were annual, biennial or perennial, for he says "duration of root unknown," it is clear from more recent collections and the field observations in Inyo County, California, by Rollins in 1967 on a population in Marble Canyon and by Holmgren in 1978 on a population in the Last Chance Range, that the species is definitely perennial. The root often penetrates rock crevices and the somewhat woody caudex is usually buried, ordinarily giving rise to several stems near the apex. Most early collections (those Payson saw) consist of stems broken off at the crown and do not show the root itself.

The aecial state of a rust occurs on *C. barnebyi*, particularly on the leaves. Dr. Clark Rogerson has determined this to be *Puccinia aristidae* Tracy which has been found on several species and genera of Cruciferae. In Nevada it has been reported from *Capsella bursa-pastoris*, *Lepidium perfoliatum* and *Thelypodium sagittatum*. The uredial and telial states of this rust occur on species of *Aristida*, *Distichlis*, and *Hilaria*.

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