CHROMOSOME NUMBERS IN GREAT PLAINS SPECIES OF PENSTEMON (SCROPHULARIACEAE)¹

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Freeman, Craig C. (Herbarium, Division of Biology, Kansas State University, Manhattan, KS 66506). Chromosome numbers in Great Plains species of Penstemon (Scrophulariaceae). Brittonia 35: 232–238. 1983.—Chromosome numbers are reported for 79 populations of Penstemon representing 20 species. All but two species counted here are diploids. First counts are reported for seven taxa, all as n = 8 or 2n = 16.

The first chromosome counts for the genus Penstemon were reported by Winge (1925). Since then, there has been a slow accretion of chromosome numbers for the genus. Major reports are those of Clausen, Keck and Hiesey (1940), Keck (1945), Nisbet and Jackson (1960) and Crosswhite and Kawano (1965). The present study adds to the chromosome counts for the genus with first reports for seven taxa and second, third or fourth counts for others, especially from populations geographically remote from the source of previous reports. Presently, nearly 40 percent of the species in the genus have reported chromosome numbers.

Materials and Methods

Bud materials for meiotic counts were collected in the field and fixed in a modified Carnoy’s solution (4 chloroform : 3 absolute ethanol : 1 glacial acetic acid, v/v/v/v). Buds were subsequently refrigerated in the fixative until used. Counts were made from microsporocytes using the aceto-carmine squash technique of Turner and Johnston (1961).

Mitotic counts were also obtained from a number of populations. Seeds collected in the field or taken from herbarium specimens were placed on moist filter paper in petri dishes at room temperature until germination occurred (5–10 days). To facilitate radicle elongation in some slow-germinating taxa, embryos of selected seeds were removed and placed on moist filter paper in petri dishes whereupon root tips normally developed in several days. Root tips were submerged in a saturated aqueous solution of paradichlorobenzene for 90 minutes at room temperature, and subsequently squashed in aceto-orcein using the technique of Tijo and Levan (1950).

Camera lucida drawings for all counts were made with a Zeiss Universal microscope at a magnification of 2000×. Unless otherwise indicated, voucher specimens for all counts are deposited in the Kansas State University Herbarium (KSC).

Results

Chromosome counts obtained in this study are listed below, together with voucher specimen information. Camera lucida drawings of meiotic and mitotic figures for selected taxa are presented in Figures 1–18. All but P. digitalis (2n = 96) and P. tubaeflorus (2n = 32) are diploids.

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Penstemon albidus Nutt. (Fig. 1)

COLORADO: Baca Co.: 3 mi W of Saunders, Kansas. *Freeman 475 (n = 8)*. Las Animas Co.: 7 mi N & 3.5 mi W of Andrix. *Freeman 480 (n = 8)*. Kansas: Grant Co.: US 270, 1.5 mi S of the Cimarron River. *Freeman 140 (n = 8)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 442 (n = 8)*. Nebraska: Brown Co.: S side of Plum Creek. *Freeman 1184 (n = 8)*. Kansas: Grant Co.: US 270, 1.5 mi S of the Cimarron River. *Freeman 140 (n = 8)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 442 (n = 8)*. Kansas: Grant Co.: US 270, 1.5 mi S of the Cimarron River. *Freeman 140 (n = 8)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 442 (n = 8)*. Kansas: Grant Co.: US 270, 1.5 mi S of the Cimarron River. *Freeman 140 (n = 8)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 442 (n = 8)*. Kansas: Grant Co.: US 270, 1.5 mi S of the Cimarron River. *Freeman 140 (n = 8)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 442 (n = 8)*.

Chromosome numbers were determined from ten populations. These counts agree with the previous report by Løve and Løve (1982).

Penstemon ambiguus Torrey var. ambiguus (Fig. 2)

COLORADO: Yuma Co.: US 385, 3.5 mi S of the Phillips Co. line. *Freeman 507 (2n = 16)*. Kansas: Kearney Co.: Kansas 25, 11.1 mi SW of Lakin. *Freeman 141 (n = 8)*. Morton Co.: Kansas 27, S of the Cimarron River in the Cimarron National Grasslands. *Freeman 100 (n = 8)*. *Freeman 138 (n = 8)*. NE MEXICO: Quay Co.: 0.5 mi N of Logan. *S. Stephens 79848 (KANU), (2n = 16).*

Chromosome numbers were determined for four populations. These counts agree with the previous report by Nisbet and Jackson (1960).

Penstemon angustifolius Nutt. ex Pursh var. angustifolius (Fig. 3)


Chromosome numbers were determined from three populations. These are the first reported counts for the typical variety. It is noteworthy that the mitotic count reported for the collection of *C. L. & M. W. Porter 7677 (RM)* was obtained from seeds 22 years old, the specimen collected on August 19, 1958.

Penstemon angustifolius Nutt. ex Pursh var. caudatus (A. A. Heller) Rydb. (Fig. 3)

COLORADO: Huerfano Co.: Lathrop State Park W of Walsenburg. *Freeman 433 (n = 8)*. Las Animas Co. 1-25. 2.5 mi N of Trinidad, *Freeman 434 (2n = 16)*. Pueblo Co.: Colorado 10. 4.7 mi W of the Otero Co. line. *Freeman 485 (2n = 16)*. Yuma Co.: US 385, 3.5 mi S of the Phillips Co. line. *Freeman 508 (2n = 16)*. NEW MEXICO: Colfax Co.: US 56, 1.3 mi E of Springer. *Freeman 432 (n = 8, 2n = 16)*. Union Co.: New Mexico 325, 5 mi E of Folsom. *Freeman 437 (n = 8)*.

Chromosome numbers were obtained from six populations. These counts agree with the report for the variety by Nisbet and Jackson (1960).

Penstemon auriberbis Pennell (Fig. 4)

COLORADO: Las Animas Co.: 7 mi N & 2 mi W of Andrix. *Freeman 477 (n = 8, 2n = 16)*. Pueblo Co.: I-25, 3.1 mi S of Colorado 165. *Freeman 487 (n = 8)*.

Counts were determined from two populations and represent the first reports for this species.

Penstemon buckleyi Pennell (Fig. 5)

KANSAS: Barber Co.: US 281. 5.2 mi S of Sayer. *Freeman 381 (2n = 16)*. Kiowa Co.: US 54, 0.8 mi E of Greensburg. *Freeman 445 (2n = 16)*. Meade Co.: US 160, 60 yds W of the Clark Co. line. *Freeman 443 (n = 8)*. OKLAHOMA: Greer Co.: Quartz Mountain State Park NE of Magnum. *Freeman & Wetter 358 (n = 8).*