A New Species of Corallorhiza (Orchidaceae) from West Virginia, U.S.A.

John V. Freudenstein

Department of Biological Sciences, Kent State University, Kent, Ohio 44242, U.S.A.

Current address: Museum of Biological Diversity, The Ohio State University, 1315 Kinnear Rd., Columbus, Ohio 43212, U.S.A.

Abstract. Corallorhiza bentleyi Freudenstein is described from West Virginia, U.S.A. The species is eleistogamous and is currently known from only one population. It is most similar to C. striata Lindley, specifically variety involuta (Greenman) Freudenstein from southern Mexico, particularly in the structure of the labellum and size of the flower.

Corallorhiza Gagnebin comprises 11 species (including the one herein) of temperate-montane leafless orchids (Freudenstein, 1997). The genus is limited to the New World, except for C. trifida Chatelain, which is circumboreal. The centers of diversity are southern Mexico and the northeastern United States and Canada. The present taxon is currently known from only a single population but should be sought elsewhere in the region; given its eleistogamous nature, plants could be dismissed easily as individuals of the much more common C. maculata (Rafinesque) Rafinesque in bud.

Corallorhiza bentleyi Freudenstein, sp. nov.

TYPE: U.S.A. West Virginia: Monroe Co., ca. 43 km NW of Roanoke, Virginia, 18 July 1998, Freudenstein 2550 (holotype, AMES). Figure 1.

Species Corallorhiza striatae var. involutae (Greenman) Freudenstein maxime similis, sed callo amphiore labelli et floribus cleistogamis differt.

Plants to ca. 20 cm tall, reddish to yellow, with up to 20 flowers. Leaves reduced to sheaths. Rhizomes coralloid, roots absent. Flowers closed, perianth connivent, perianth segments 3-veined, those other than the labellum with very faint darker reddish striping, sometimes with yellowish perianth and reddish ovary and rachis. Dorsal sepal lanceolate, 5.9-6.1 mm long, 2.1-2.5 mm wide. Lateral sepals lanceolate, somewhat falcate, strongly cymbiform, 5.5-6.1 mm long, 2.1-2.5 mm wide. Lateral petals narrowly ovate, weakly cymbiform, acute, 5.0-5.8 mm long, 2.2-3.0 mm wide. Labellum unlobed, ovate, acute, with prominent, thickened, involute margin, 4.9-5.7 mm long, 3.1-3.5 mm wide and with slightly upturned apex; callus formed from two fused lamellae at the base of labellum, ca. 1/2 as long as the labellum, 2.5-2.8 mm long, 1.5-1.8 mm wide. Column curved forward, 3.0-3.8 mm long, 0.8-1.0 mm wide, with a small depression adaxially at its base. Rostellum triangular. Pedicellate ovary narrowly obovate, 6.0-9.0 mm long, 2.5-3.0 mm diam., without adaxial mentum at summit.

Etymology. The species is named for Stanley Bentley, of southwestern Virginia, who discovered and first recognized the distinctness of this population.

This unusual Corallorhiza is known from a single population in an area ca. 4 m x 4 m on an abandoned revegetated railroad grade, with neither tracks nor ties present, in Appalachian deciduous forest of Acer pensylvanicum L., Liriodendron tulipifera L., Quercus, and Rhododendron. The population has increased in number since it was discovered in 1996. Four plants in fruit were noted that year, with eight stems in 1997, 20 in 1998, and 27 in 1999 (S. Bentley, pers. comm.). Although individuals of Corallorhiza are often clonal, the variation in color seen in this population suggests that more than one clone is present. Searches in the immediate area have not yet uncovered additional individuals. Neither were specimens detected in a monographic study of the genus (Freudenstein, 1997) or in a recent search of material at WVA. However, it seems likely that other individuals may exist, since the site was an active railroad earlier in the 20th century, and the plant could almost certainly not have been growing at its present location at that time.

The species is clearly most similar to Corallorhiza striata Lindley, which is the only other species to have an unlobed labellum with involute margins, fused lamellae at the base of the labellum, and the absence of a small spur (often called a "mentum") at the summit of the ovary. Corallorhiza striata is a morphologically variable species that has a wide distribution across North America. The population of C. striata nearest to the West Virginia
locality is in central New York, where the species is very rare. However, the flowers of *C. bentleyi* differ strikingly in size from northern North American *C. striata*, being only one-half to one-third their size. Remarkably, *Corallorhiza bentleyi* is most similar to the small Mexican forms of *C. striata* that have been called *C. involuta* Greenman, but were most recently recognized as *C. striata* var. *involuta* (Greenman) Freudenstein (Freudenstein, 1997) because of the essentially continuous cline of decreasing flower size from northeastern North America southwestward to southern Mexico. The taxa differ in the proportions of the fused lamellae at the labellum base, being ca. half the length of the labellum in *C. bentleyi* and ca. one-quarter the length in *C. striata* var. *involuta*.

*Corallorhiza bentleyi* and northern *C. striata* also differ in flowering phenology. *Corallorhiza striata* is
an early-flowering species; in northern Michigan, where the plant can be locally frequent, it is typically in flower during the first week in June. Corallorhiza bentleyi flowers much later, during mid to late July. In montane regions of Mexico, C. striata var. involuta is also in flower during mid to late July.

The other clear difference between C. bentleyi and C. striata var. involuta is that the flowers in the former are cleistogamous. Corallorhiza striata varies in the degree to which the perianth expands, with the northeastern plants often having widely expanded flowers that are at least sometimes insect-pollinated (Freudenstein, 1997), while flowers of southwestern and Mexican populations tend to be less widely opened, but no truly cleistogamous flowers have been reported previously in this species. Many instances are known of species in which both chasmogamous and cleistogamous flowers are produced on the same plant, including Viola spp. (Russell, 1965), Ajuga ira (L.) Schreber (Ruiz De Clavijo, 1997), Lamium amplexicaule L., and Impatiens pallida Nuttall (Stewart, 1994; see Uphof, from Orchidaceae include Cheirostylis notialis D. & Potucek (Mered’a & Potucek, 1998).

Although cleistogamy is rare, autogamy is known in many temperate orchid species and is accomplished in different ways (Catling, 1983). The flowers of most Corallorhiza have a distinct pollinium stalk derived from the rostellum (a hamulus; Freudenstein, 1994). In C. striata the hamulus is well developed and functions in insect pollination. Cleistogamous forms of C. odorotborhiza have essentially no hamulus (Catling, 1983; Freudenstein, 1994). Corallorhiza bentleyi does have a hamulus, but since the flowers do not open it is not utilized; the pollinia germinate in situ and grow down to the stigma on either side of the rostellum.

The cleistogamous nature of C. bentleyi could be a clue as to its origin. Two possibilities exist: either it was dispersed by chance from Mexico to West Virginia, or it is a relichtatal population of a taxon with a formerly more extensive distribution. The chances of an orchid seed being transported this distance and finding the appropriate fungus with which to interact seem remote. Since there are no currently known cleistogamous populations of C. striata in Mexico, the evolution of cleistogamy would probably have occurred after dispersal, arguing against a recent dispersal. The relic hypothesis seems more likely, since it is easier to conceive of a formerly more extensive distribution that has contracted with changing environmental and perhaps pollinator conditions. The absence of a pollinator would have favored any tendencies toward autogamy and cleistogamy, and it is perhaps simply fortuitous that the current population has survived.

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Literature Cited


