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## A Social History of North American Slipper Orchids Part 2

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### THE NEW WORLD AND THE EVOLUTION OF SCIENTIFIC CLASSIFICATION

The first university-trained minister/naturalist to make America his home was John Banister (1650-1692). Sent here by the Bishop of London, Henry Compton (1632-1713), Banister arrived in Virginia in 1678 at the age of 28. He was

sent as a missionary charged with sending his patron attractive plants and seeds. Banister's personal goal was to publish a book that he planned to title *Catalogus stirpium rariorum* (Catalog of Rare Plants) (Petersen 2001). Banister's first specimens and descriptions were shipped home promptly, not only to Bishop Compton, but also to Dr. Robert Morison (1620-1683), one of Banister's professors at Oxford. With an early consignment he wrote to Dr. Morison ... We have "Three kinds of Lady-slipper, we call them, Mockason flowers; the Indians call their Shoes so which they much resemble..." (Ewan 1970). His catalog records the "three kinds" as: *Calceolus Mariae luteus* (now known as *Cypripedium parviflorum* var. *pubescens*), *Calceolus Mariae luteus minor biflos*. (now *C. parviflorum* var. *parviflorum*) and *Calceolus Mariae purpureus* (now *C. acaule*).

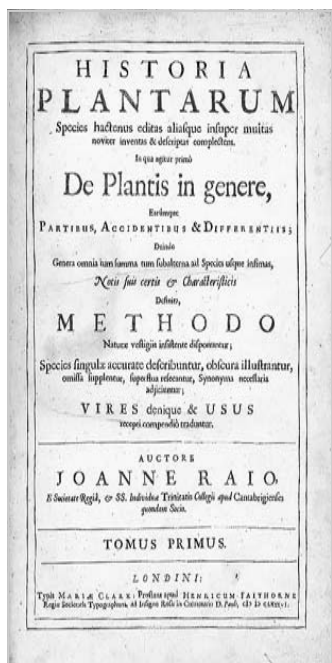
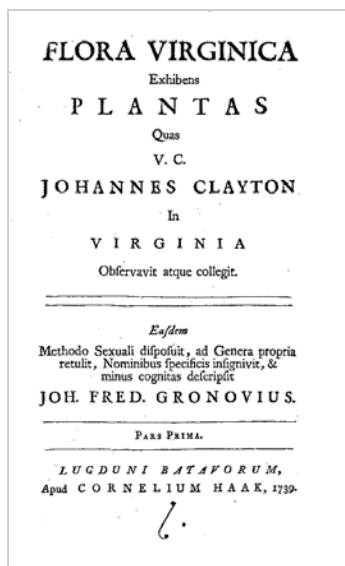


Figure 1. John Ray, *Historia Plantarum*

Compton and Morison shared Banister's material, including many accurate drawings, with Robert Plukenet, also a protégé of Bishop Compton. Plukenet in turn, shared this material with his contemporary, John Ray, another naturalist who had begun his professional life

as a minister. These men were part of a network of natural history enthusiasts and scientists in Europe and Great Britain who corresponded regularly, shared botanical samples and often visited one another. Plukenet, Ray and others published botanical texts using Banister's information. In fact Banister's exact phraseology can be found in John Ray's *Historia plantarum* (Figure 1; page 1) as well as in Leonard Plukenet's *Phytographia* and later in Gronovius' *Flora Virginica* (Figures 2, 3; page 2). Unfortunately Banister's contributions were often not acknowledged. When another member of this community of naturalists, Carl Linnaeus, visited Oxford in 1736, he examined Banister's specimens and did credit him in his publications. However, much of the new world material that Linnaeus attributes to Gronovius, Ray and Plukenet actually came from Banister (Peterson 2001; Ewan 1970). Human nature being what it is,



*NEOXYIA radicebus palmatis.*  
Bifolio affinis aquatica, floribus dilute luteis fimbriatis,  
radice palmata. *Clayt. n. 15.*

CYPRIPEDIUM foliis ovato-lanceolatis. *Linn. Fl. Lapp.*  
§. 418.

Helleborine Calceolus dicta Mariana, caule folioso, flore  
luteo minore. *Plukn. Mant. p. 101. T. 418. f. 2.*

Calceolus flore maximo rubente purpureis venis notato, fo-  
liis amplis hirsutis venosis, radice Dentis Canis. *Macraefine.*  
Variat flore flavo. *Clayt. n. 40.*

CYPRIPEDIUM folio caulino ovato oblongo, termina-  
trici setaceo plano. *Linn. Hort. Cliff. p. 430.*

Helleborine Virginiana Ophioglossi folio D. Banister.  
*Plukn. Alm. p. 182. T. 93. f. 2*

Helleborine aquatica, flore in summo caule unico car-  
neo, barba purpurea fimbriata, foliis Ophioglossi, ra-  
dice fibrosa. *Clayt. n. 77.*

EPIDENDRUM caule erecto simplicissimo nudo, racemo sim-

Figure 2. Gronovius *Flora Virginica* title page

Figure 3. Gronovius *Flora Virginica* Cypridium information

using other peoples' material and claiming it as your own has not changed much since the eighteenth century.

Had Banister the funds, he would have published his Catalog of Rare Plants and be much better known today. Repeatedly asking his English contacts for support, he continually scrambled to make ends meet. Tragically his life was cut short at the age of forty-two in an accidental shooting while botanizing (Ewan 1970).

Another early natural history explorer was Mark Catesby (1682-1749). After two trips and exhaustive collecting along the south Atlantic states and the Bahamas, he went home to England and eventually published The Natural History of Carolina, Florida and the Bahama Islands in segments from 1729 to

1747. In these two volumes and an appendix he provided the first color images of North American slipper orchids (Figure 4; page 3). At the time of publication Catesby's work represented the highest achievement in Natural History arts (McBurney 1997).

Botanical science in the middle of the eighteenth century remained Eurocentric. Although interest and explorers proliferated in the New World, the center of publishing remained firmly in Europe. This was where the wealth to back publishing ventures resided, where the market for the books and the publishing houses were. In addition exploration beyond North America increased the interest in natural sciences in Europe and gave researchers there an even wider grasp of natural history. Perhaps the most famous person of the age to take advantage of networking, travel and intellect to further the science of natural history is known to us as Linnaeus.



Figure 4. Catesby's *Cypripedium parviflorum*

Carolus Linnaeus (known as Carl von Linné after his knighthood) (1707-1778), was born in Southern Sweden (Figure 5; page 4). His father was a Lutheran pastor with a great interest in plants, a passion that he instilled in his son. Disappointing his father by not training for the ministry, Carl instead went into medicine, where he could devote himself to botany. The curriculum for medicine included botany since plants were the source of medicines. In the years leading to his degree, Linnaeus botanized widely and in the year of his graduation published his first book on classification of all living things, *System Naturae* (1735). Over the years that he taught at the University of Uppsala, beginning in 1741, Linnaeus traveled widely, meeting with other scientists across Europe, studied plant collections from all over the world, and was instrumental in sending his students on scientific expeditions to the new world. When travelling, Linnaeus met with leading botanists and studied plants sent back to Europe from the New World. His obsession was organizing – plants and animals – and he constantly revised and updated his publications. One work that remains the basis of all plant classification is *Species Plantarum* (1753) (Figure 6; page 5).

Given the information at his disposal and extensive personal research, it is surprising that Linnaeus conceived of only two slipper orchid species in the first



Figure 5. Young Linnaeus

edition of *Species plantarum*. One he named *Cypripedium calceolus*. Additionally he named three varieties – *Cypripedium calceolus* var.  $\beta$  (beta), *Cypripedium calceolus* var.  $\gamma$  (gamma) and *Cypripedium calceolus* var.  $\delta$  (delta). The second species Linnaeus placed in *Cypripedium* we now know as *Calypso bulbosa* (Figure 7; page 6). Today Linnaeus' nominate species and three varieties are considered four distinct species. More on that later.

Linnaeus' contribution to the world of science, binomial nomenclature, brought order to the pre-existing chaos. The concept of genus and species was a major step forward by placing related plants into genera, and using specific epithets to identify groups of identical plants within each genus. So important was this concept that the publication date of *Species Plantarum*

in 1753 is by consensus the basal date of nomenclature for all vascular plants (Jacquet 1994; Bhattacharyya 2005). For example Linnaeus had first used the term *Cypripedium* in his *Flora Lapponica* in 1737 (Cribb 1997); however, the publication date of *Species Plantarum* was chosen as the basal date or publication of this genus, since it was the first to use his binomial system. All names used previously were superseded by Linnean binomials. Although this was a great step forward, other notions of plant taxonomy remained to be formulated. Concepts of higher levels of taxonomy, such as families, subfamilies, orders, classes, divisions and kingdom would evolve over time.

A later edition of *Species Plantarum* (1805), edited by Carl Willdenow, a German pharmacist/ physician/ taxonomist and professor of botany at the University of Berlin, describes *Cypripedium calceolus*  $\beta$  (beta) as *C. pubescens*, *C. calceolus*  $\gamma$  (gamma) as *C. spectabile* (now known as *C. reginae*), and *C. calceolus*  $\delta$  (delta) as *C. guttatum*. To these original four taxa Willdenow recognized *C. candidum*, *C. parviflorum*, *C. humile* (now *C. acaule*) from North America and two Asiatic species, *C. ventricosum* and *C. macranthos* are described. More information on Carl Willdenow will be found later in a discussion of *Cyp. candidum*.

Linnaeus's system of organizing plants into genus and species worked well; however, he categorized genera based on an artificial sexual system. This was

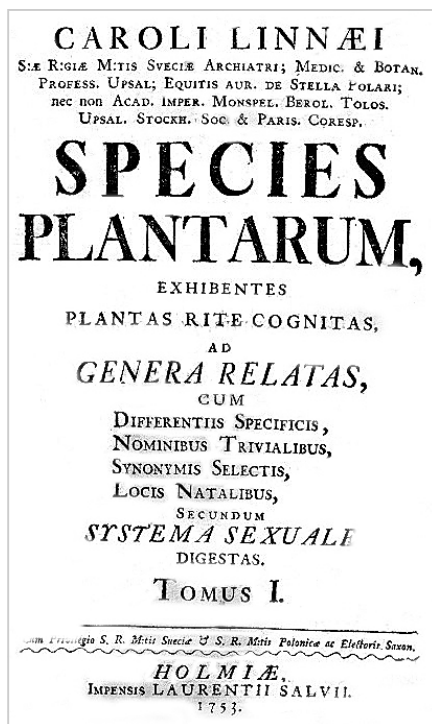


Figure 6. *Species Plantarum* title page from volume one

actually a step backward from some of his contemporaries, who strived to create a natural system of classification – based on all physical characters. One of these was Michel Adanson (1727-1806), who studied theology, classics and philosophy before changing course and devoting himself to natural history. His book, *Familles des Plantes*, was the first to include the genus *Cypripedium* into a concept of the orchid family (Adanson 1763; Cribb 1997) (Figure. 8; page 7). Adanson's comprehensive system was met with mixed reviews, and there was hostility between him and Linnaeus. The notion of a natural system of classification is universally accepted today, even if not the precise concept Adanson proposed; and Linnaeus's sexual system of classification was rejected long ago.

Over the course of time, some botanists proposed that the slipper orchids should be a separate family, *Cypripediaceae* (Lindley 1833; Ras-

mussen 1985; Vermeulen 1966). This view has generally been rejected, especially since recent molecular investigations show this group within the orchid clade (Cribb 1997).

## SCIENTIFIC NAMES –THE WHYS AND WHEREFORES

Many people refer to the scientific names of plants as being in Latin; but this is not always the case. A sizeable number are derived from Greek and a few are from other languages (Stearn 1992; Mayr 1998). Most names, generic and species have been Latinized, even if the core word is derived from another language. In the case of North American slipper orchids, for instance, we find *C. californicum*, a place name given a Latin ending, and *C. yatabeanum*, the name of a Japanese botanist given a Latin ending.

As to why Latin is used as the standard language of botanical names, that is easy. Historically, it was the universal language of science. Linnaeus could go all across Europe and parts of Asia and be understood because he and other



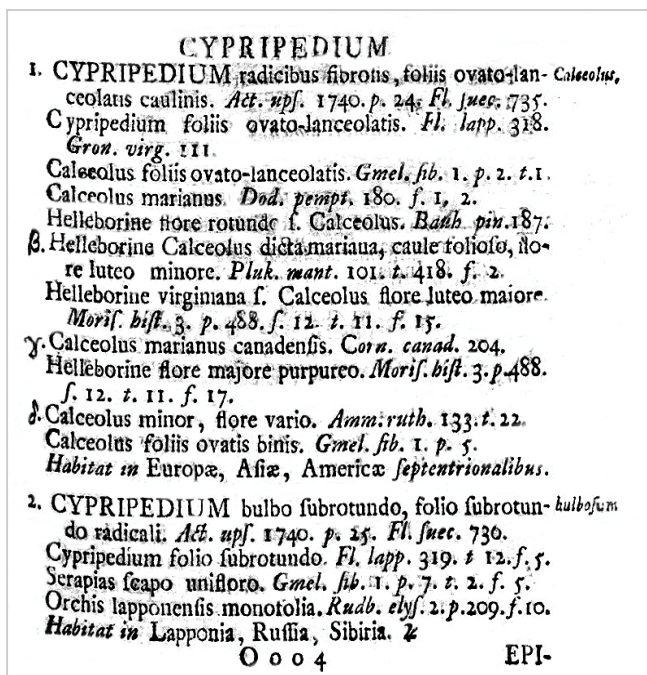


Figure 7. *Species Plantarum* Cypripedium page 1753

scientists spoke Latin. His only other language was Swedish, and that would not have helped much. Secondly, Latin is a “dead language”, so no nationalist feelings are hurt by using it.

A word about pronunciation. Much is made – by some – of the proper pronunciation of scientific names. Stearn sums up his feeling by saying, “How they are pronounced really matters little provided they sound pleasant and are understood by all concerned” (Stearn 1992). This is especially true given that botanical Latin is really not classical Latin and differs from Church Latin (Mayr 1998).

With the foregoing as a background, let’s see how “*Cypripedium*” was derived. The simple explanation is that *Cypripedium* is derived from two Greek words, meaning Cyprus and sandal: “Cyprus” because it is the birthplace of the goddess Venus, and “sandal,” alluding to the shape of the pouch. Digging a little deeper we find that *Kypris* is indeed Greek for Cyprus; but ...*pedium* is incorrectly Latinized – it should be *pedilon* (Cribb 1999; Mayr 1998; Schultes 1963). For the ultimate discussion on the subject, Perner explains the error in naming and the use and misuse of the word in all five genera of slipper orchids (Perner 2009). In the end, however, the name applied by Linnaeus



stands, in spite of its errors. The ruling body of botanical nomenclature, The International Code of Botanical Nomenclature, has conserved this name for purposes of continuity.

Why did Linnaeus choose this name, given that most authors of his time referred to the plant with reference to Mary? An interesting suggestion was proposed by Grace Niles. “Being a devout Lutheran, he dropped the prevailing (epithet) name of 1700, *Marianus*. He combined his generic name with the ancient generic name, *calceolus* as the specific epithet” (Niles 1902).

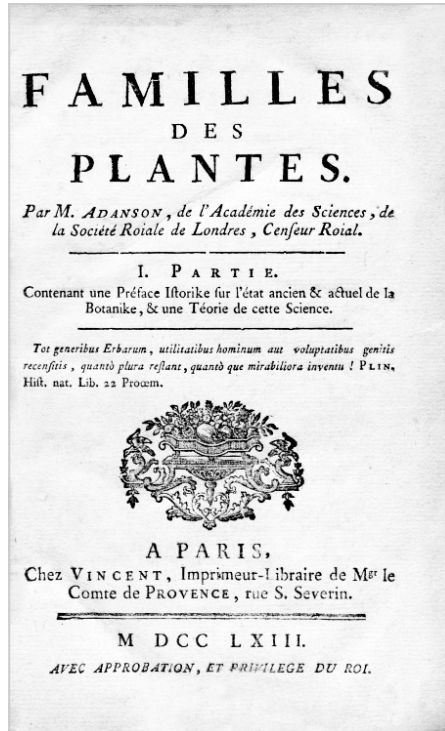


Figure 8. Adanson, *Families of Plants*

Next time — *A review of our species.*

*NOET NOET NOET NOET NOET NOET NOET NOET NOET NOET*

## A Social History of North American Slipper Orchids

### Technical Descriptions of *Cypripedium* Species

Two different cypripedium are described. Others will follow in subsequent editions.

*Cypripedium yatabeanum*

*Cypripedium* ×*alaskanum*

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### *Cypripedium yatabeanum*

Charles J. Sheviak

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*Cypripedium yatabeanum* Makino, Bot. Mag. Tokyo 13:91. 1899.

*C. guttatum* var. *yatabeanum* (Makino) Pfitzer; *C. guttatum* ssp. *yatabeanum* (Makino) Hultén

**Description:** Plants with long-running, branching rhizomes, often forming loose colonies. Leaves 2 (very rarely 3), subopposite to closely alternate on the middle portion of the stem. Flower solitary; sepals white to yellowish or greenish with brownish or tan markings; dorsal sepal 15-23 x 9-18 mm, obovate to ovate; petals same color as sepals, 10-14 x 5-8 mm, acuminate-subpandurate to acuminate-pandurate (constricted near the middle), flat with undulate-revolute margins, spreading, much shorter than the similarly colored ob lance-fusiform to ob lance-ovoid lip; lip 17-32 mm.

**Range:** Aleutians East Borough, Alaska and possibly more widely scattered Aleutian Islands; coastal Northeast Asia

**Habitat:** Subarctic maritime meadows and heaths.

**Blooming Season:** Late spring-early summer (June-July)

*Cypripedium yatabeanum* differs from its close relative, *C. guttatum*, primarily in its generally brownish markings and especially in a proportionally narrower flower, with short petals and a more conical lip. Such typical plants have been recorded from only a single island near the Alaskan Peninsula. A much wider distribution in the past, however, is indicated by the broad occurrence of hybrids of these two species. This is an important pattern in Alaskan biogeography. Numerous comparatively southern species ranged far northward into the interior of Alaska during a warmer post-glacial interval. Subsequently, with a return of colder conditions, they retreated southward, but not before hybridizing with related species. This process has left behind a broad zone of introgressed populations and amphiploid species derived from this hybridization. Virtually all Alaskan material referred to *C. yatabeanum* and evidently all published photographs, such as those from Kodiak Island, in fact are of such hybrids, and not the species itself. The difficulty of collecting in the Aleutians, however, and the paucity of records from the region, suggests that the species might still occur undetected at scattered localities.

Figure 1, back cover; and Figure 2, page 22.

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## *Cypripedium* $\times$ *alaskanum*

Charles J. Sheviak

*Cypripedium*  $\times$  *alaskanum* **P.M. Brown**, *N. Amer. Native Orchid J.* 1(3): 199. 1995.

*Cypripedium guttatum* Sw.  $\times$  *C. yatabeanum* Makino

**Description:** Plants with long-running, branching rhizomes, often forming loose colonies. Leaves 2 (very rarely 3), subopposite to closely alternate on the middle portion of the stem. Flower solitary; sepals white to yellowish or greenish with brownish, tan, orange, dull reddish or pale pinkish tan markings; dorsal sepal 12-28 x 6-19 mm, obovate to ovate or suborbicular-elliptic; petals same color as sepals, 10-16 x 5-9 mm, acuminate-subpandurate to acuminate-pandurate (constricted near the middle) to lanceolate-subpandurate (constricted

near the apex), flat to slightly spiraled with undulate-revolute margins, spreading, slightly to much shorter than the similarly colored oblance-fusiform to ovoid or subglobose lip; lip 15-32 mm.

**Range:** South-coastal Alaska and the Aleutian Islands.

**Habitat:** Open boreal forest, thickets, and subarctic maritime meadows and heaths.

**Blooming Season:** Late spring-summer (June-August)

*Cypripedium*  $\times$  *alaskanum* is a highly variable plant that is widespread across southern Alaska. It has long been confused with *C. yatabeanum*, because as a parent this species often lent both a narrow aspect and variable, often duller coloration to the hybrid. Nonetheless, populations vary greatly. Colors may be enhanced in some individuals, with bright, intense hues not seen in either parent. Northward even into central Alaska some populations of primarily typical *C. guttatum* include evidently introgressed individuals with pale pinkish markings and others with short petals and yellowish ground color. Conversely, extensive populations of *C.  $\times$ alaskanum* may include individuals very similar to *C. yatabeanum*, but as segregates of a hybrid gene pool, they should not be included within that species. This variability of color and form and the subtle variation seen in populations of *C. guttatum* over a wide area can make identification of particular plants difficult and often rather arbitrary; consideration of population structure should guide determination.

Figures 1-4, pages 22-23.

*NDCJ NDCJ NDCJ NDCJ NDCJ NDCJ NDCJ NDCJ NDCJ NDCJ*

## **Notes on the Taxonomy, Nomenclature, Identification, Distribution and Conservation of the Bicolored Orchid Hybrid, *Platanthera ×bicolor***

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Although *Platanthera ×bicolor* is one of the best known native orchid hybrids in North America, there are recurrent questions about its taxonomy, identification, distribution and conservation. Hybrids are often treated superficially in identification guides so that information needed is often difficult to obtain. The following review addresses many of the questions that have come to my attention recently.

### **TAXONOMY**

The most extensive study of this hybrid is the excellent thesis of Nancy E. Ferdinandsen-Cowden (1993). Brown (2002) clarified the application of the name *Platanthera ×bicolor* (Rafinesque) Luer to refer to hybrids of *P. blephariglottis* (Willdenow) Lindley [*sensu stricto* excluding var. *conspicua* (Nash) Luer] and *P. ciliaris* (Linnaeus) Lindley. Luer (1972) had applied this name to hybrids of the latter with *Platanthera blephariglottis sensu lato* (including var. *conspicua*). Sheviak (2002) astutely noted that, with further study, var. *conspicua* may warrant species rank. Brown (2002), without much further study nor reference to either Hardin's (1961) quantitative analysis or Ferdinandsen-Cowden's (1993) thesis, elevated *conspicua* to the rank of species and *Platanthera ×lueri* Brown was proposed for hybrids of *P. conspicua* (previously *P. blephariglottis* var. *conspicua*) and *P. ciliaris* (Brown 2002). Despite the lack of analysis, these actions are likely to be appropriate, as suggested by Sheviak (2002) prior to their implementation by Brown.

In briefly reviewing the taxonomy, it is important to say a little more about the work of Hardin (1961) and Ferdinandsen-Cowden (1993). Folsom's (1984) work on this group mostly has to do with *P. ciliaris* and *P. cristata* (Michaux) Lindley and is thus not directly relevant. Hardin's very useful analysis suggested a continuous geographic cline of variation in *P. blephariglottis* from

north to south which led him to reject varieties and to recommend that *P. blephariglottis* and *P. ciliaris* be treated as a single species. Ferdinandsen-Cowden's well conceived and well written thesis results led her to conclude that *P. ciliaris* and *P. blephariglottis* should be treated as varieties of one species. One may well ask why, in the face of quantitative data supporting lumping, the taxa have been split into three species and two hybrids. The simple answer is that some influential current workers wanted it that way. *Platanthera blephariglottis* differs from *P. ciliaris* in flower color, geographic distribution, flowering time, ecology and some morphological features. *Platanthera blephariglottis* and *P. conspicua* appear to differ from each other in spur length and other characters (pers. obs.), these differences resulting in a bimodal pattern. Furthermore the white *P. conspicua* appears to be ecologically different from the orange *P. ciliaris*. The actual number of sites where taxa intergrade is relatively small considering the number of localities of parents, especially for *P. ciliaris*. These are the defensible reasons for the splitting to three species and two hybrids, but there are other considerations as well.

For example there are a number of recent cases in North American orchids, and specifically in pairs of taxa in *Platanthera*, where a few floral features had a bimodal pattern leading to elucidation of isolating mechanisms and the subsequent logical application of a biological species concept. This led to the recognition of two species where there was one previously. *Platanthera orbiculata* (Pursh) Lindl. and *Platanthera macrophylla* (Goldie) P.M. Brown are now generally considered distinct species but were varieties of a single species until the illuminating work of Reddoch and Reddoch (1993, the new combination however being made by P.M. Brown prior to their publication). These latter two species are distinguished primarily by spur length. Consequently the examination of specimens of *P. blephariglottis* in some larger collections (AMES, GH, NEBC), where a bimodal pattern of spur lengths seems to apply, leads to a conclusion that they are also likely to be best treated as distinct species, i.e., *P. blephariglottis* and *P. conspicua*.

Returning to the details of the work of Hardin (1961) and Ferdinandsen-Cowden (1993), it is possible to find some support for the splitting, despite the fact that their work was interpreted as not supporting it. For example, the very substantial range of variation in *P. blephariglottis* in North Carolina in Hardin's (1961) work may have been the result of plants of both taxa present but existing at different elevations in the state, and thus supporting the broad scale north-south cline, despite an actual lack of geographic overlap. Hardin (1961) did draw attention to a steeper gradient in spur length of *P. blephariglottis* between North Carolina and Georgia where the effect of higher elevations would be likely to decrease abruptly. With regard to



Ferdinandsen-Cowden's (1993) work, her canonical correlation plot was effective in largely (but not completely) separating flower color groups (see Fig. 5, p. 74 in that reference), thus supporting morphological differentiation to a degree. The amount of morphological overlap requiring varietal rank over subspecies or species rank is difficult to ascertain. The substantial geographic and ecological distinctness along with flowering time and flower color suggests species or subspecies rank according to current practice (Hamilton & Reichard 1992). Although we may consider morphology sufficient in this case, with other features, to separate species, the fact is that the plot (Fig. 5, p. 74) diagram is still a concern with regard to the recognition of the hybrid (see below).

Of course a change in rank of *conspicua* might have awaited some additional analysis of data, in the absence of that analysis, there is a choice of pursuing what is most likely to be acceptable, and the splitting seems most likely to be supported by further detailed work. The work of Hardin (1961) and Ferdinandsen-Cowden (1993) was useful and exemplary and will likely be revisited again and again as we improve our understanding of this group. However, I agree with Ferdinandsen-Cowden's statement: "I doubt that we will ever entirely understand the evolutionary relationships among these taxa."

Rafinesque's type specimen of *P. ×bicolor* was likely destroyed (Pennell 1945, Merrill and Hu 1949, Stuckey 1971). The type is not in the Darlington Herbarium at West Chester, Pennsylvania, where some of Rafinesque's types reside (S. Bartholomew-Began, pers. comm.). It is not at other locations of his types including PH (Stuckey 1971, A. Freire-Fierro, pers. comm.) and NYS (C.J. Sheviak, pers. comm.). Although Rafinesque types are also at Paris (MNHN-P), it has not been possible to locate the type there (C. Loup, pers. comm.). The lack of a type however, is not especially problematic in establishing identity. *Platanthera ×bicolor*, based on a type from New Jersey where both *P. blephariglottis* and *P. ciliaris* occur, and where *P. conspicua* is absent (Sheviak 2002), is taken to refer to *P. blephariglottis* × *P. ciliaris*. Similarly, *P. ×lueri*, with a type from Florida where both *P. ciliaris* and *P. conspicua* are present, and where *P. blephariglottis* is absent, must refer to *P. ciliaris* × *P. conspicua*.

A list of *Platanthera* hybrids with hybrid combinations is available in Brown (2008). Those wishing to follow some of the most recent taxonomic discussion can obtain a useful update in Brown and Stewart (2009). Here and in the recent work of Baumbach and Lückel (2009), Rafinesque's genus name *Blephariglottis* is resurrected and the Bicolored Orchid is listed as *Blephariglottis ×bicolor* Raf. A number of questions remain unanswered and some more work is desirable before this resurrected genus can be fully embraced.

## NOMENCLATURE

*Platanthera* × *bicolor* (Rafinesque) Luer, Native orchids of Florida, 151. 1972. (*P. blephariglottis sensu stricto* × *P. ciliaris*)

**Basionym:** *Blephariglottis bicolor* Rafinesque, Fl. Tellur. 2: 39. 1837.

**Synonyms:** *Habenaria holopetala* (Lindley) Gray, *sensu* Niles, Bog-trotting for Orchids 256. 1904. Not *Platanthera holopetala* Lindley, Gen. Sp. Orchid. 291. 1835 (with white flowers and from Canada is referable to *Platanthera blephariglottis* (Willdenow) Lindley). *Habenaria* × *bicolor* (Rafinesque) Beckner, Amer. Orchid Soc. Bull. 37: 480. 1968. Not *Habenaria bicolor* Conrath and Kränzlin, Vierteljahrsschrift des Naturforschenden Gesellschaft in Zürich li. 131. 1908 (which represents an African *Habenaria*, see <http://plants.jstor.org/visual/preart0003306> )

There are occasional questions about *P. ×lueri* which are appropriately addressed here. The earliest name for the combination of *Platanthera ciliaris* × *P. conspicua* is *Habenaria ×schweinfurthii* Luer (Amer. Orchid Soc. Bull. 37: 400) but this is a later homonym for *Habenaria ×schweinfurthii* Reichenbach f., (Otia Bot. Hamburg, 1. 58. 1878.), which has been treated as a synonym of *Habenaria cirrhata* Reichenbach f. (Flora, 1865, 180. 1965; see Summerhayes 1932). Although the name *schweinfurthii* is not available in *Habenaria*, it is available in *Platanthera* but still cannot be used because it was published without reference to a type. The next name that clearly refers to *P. ciliaris* × *P. conspicua* is *Habenaria ×rafinesqii* Beckner (Phytologia 20. 217. 1970) which is reported only from Florida and was supplied to replace the illegitimate names (in *Habenaria*) *bicolor* and *schweinfurthii*. This it did temporarily, but with the recognition of the genus *Platanthera* and *P. conspicua*, it became another potentially useful name without a type. Consequently *P. ×lueri* P.M. Brown (North American Native Orchid Journal, 8: 14. 2002) with a type and a description and reference to the parents is the correct name for *P. ciliaris* × *P. conspicua*.

## RECOGNITION AND IDENTIFICATION

The parents of *P. ×bicolor* differ in flower color, length of spur and fringe, flowering time (*P. blephariglottis* earlier, *P. ciliaris* (and *conspicua*) later, see Luer 1975, p. 184, ecology and distribution. With respect to the latter *P. ciliaris* often occurs in drier habitats and has a more southern distribution than *P. blephariglottis*. *Platanthera blephariglottis* was once thought to be simply a white form of *P. ciliaris* and many authors have suggested that morphological differences between these two species are poorly defined. Correll (1950, p. 64) for example noted that “the separation of dried material is usually extremely

trying,” and recall Hardin’s (1961) conclusion (above). The limited morphological differentiation between the species of course makes the hybrids potentially difficult to identify without intermediate flower color, but the latter seems relatively reliable. Pale yellow plants are rarely, if ever seen far from both of their putative parents. Although the pale yellow color and circumstantial evidence is much of what defines this hybrid at the present time, the extreme rarity of pale forms of the orange *P. ciliaris*, as compared to the much more variable intensity of the purple in purple fringed orchids (*P. psycodes* etc.) makes identification of *P. ciliaris* less of a problem (Luer 1975) than might be expected. Another source of support for the hybrid concept applied to yellow-flowered plants is the fact that Stoutamire (1971 in Ferdinandsen-Cowden 1993 p. 21) is said to have created plants similar to what is called *P. ×bicolor* by crossing *P. blephariglottis* and *P. ciliaris*.

These latter points are very important because of the weakness of the morphological evidence available to define *P. ×bicolor*. In the most comprehensive study to date, using a variety of statistical procedures, Ferdinandsen-Cowden (1993) found that morphological characteristics alone could not separate the hybrid from the putative parents but flower color grouping did support morphological differentiation, but with some overlap perhaps explained by the identification problems outlined below. However, one of the problems here as far as the recognition of the hybrid is concerned, is that according to Ferdinandsen-Cowden’s (1993) diagram, the putative hybrids resemble *P. ciliaris* more closely in floral morphology, and do not occupy an intermediate position, as expected for a hybrid, on her canonical correlation plot (Fig. 5, p. 74). Although the information is not given, a very large part of the variation in this analysis is likely involved with explaining the separation of *P. blephariglottis* and *P. ciliaris* (the latter including *P. ×bicolor*). The relationship between color and hybrid origin is not at all clear. Regardless of the difficulties, the prevailing opinion is that the putative hybrid should be recognized.

The question of the extent to which *P. ×bicolor* can be consistently identified is a fascinating one. What could be easier to identify than a hybrid between a species with white flowers and one with orange flowers? The answer that often comes back is “nothing” because the hybrids have yellow flowers, – but that is the wrong answer! Suppose the hybrids can also have white or orange flowers? A yellow-flowered first generation (F1) hybrid can backcross with a white parent and produce a very pale yellow plant and further backcrosses could lead to a white-flowered plant which however has retained characteristics of the now distant orange-flowered parent, such as relatively large flowers or ability to grow in a relatively dry habitat. While flower color is easy to observe, these other hybrid characteristics are much more difficult to evaluate or even to see. It is conceivable that we are sometimes looking at a species that is actually a



Figure 1. Variation in fringe and spur length of *P. blephariglottis* at Hazleton, Pennsylvania. That on the left may be “pure *P. blephariglottis*” but that on the right with longer spurs and longer fringe segments may be a backcross that resembles *P. conspicua*. On the other hand it may be just an extreme variant of *P. blephariglottis*. See color version Figure 5; page 21. Photos by R.E. (Bob) Sprague, taken at Hazleton, Pennsylvania. Used with permission.

hybrid. This is especially true of what we regard as “pure species” in hybrid swarms, as noted by Klier et al. (1991) in their study of hybridization in *Cypripedium*. The presumed “pure species” may in fact be mostly not “pure.” Although they are extremely close to the species, with hybrid characteristics, however obscure, they have to be called hybrids according to the International Code of Botanical Nomenclature (IUCN (Vienna) H.4, McNeill et al. 2006). Basically what looks like *P. blephariglottis* or *P. ciliaris* in a hybrid swarm could be a hybrid. Hybrids and likely *P. ×bicolor*, range from those that are clearly or very likely hybrids to those that cannot be easily distinguished from a parent to those that can only be distinguished with comprehensive analysis using DNA and/or special tools (such as the Hybrid Identification Tricorder model 3H0, developed by the Vulcans but currently not available on Earth).

The identification situation is worse with *P. conspicua* and *P. ciliaris* which are closer morphologically but again have ecological, distributional and flowering time differences associated with the flower color (Luer 1975). A key to this complex group (see below) is very tentative and of unusually limited value but may prove helpful to a degree in providing an overview and in guiding future studies.

A diagram illustrating variability (Figure 2; page 18) is more useful in understanding the likely situation. It illustrates the point that plants referable to

*P. conspicua* might originate outside of the present range of that species through hybridization of *P. × bicolor* and *P. blephariglottis*. The photos of white flowered plants from Hazleton range from those with spurs only slightly longer than the ovary, short lip fringe and relatively broad and short lip lamina referable to *P. blephariglottis*, to those with spurs much longer than the ovary and longer and narrower lips with a long fringe, these resembling *P. conspicua* (Figure 1; page 16). The characteristics of *P. conspicua* in these flowers may have been derived from backcrosses with *P. blephariglottis* leading to white color, but retaining the large flowers of *P. ciliaris*. These “hybrid derived *P. conspicua*” may still be different from southern *P. conspicua* in being adapted to a different climate, habitat and flowering time. Although they are properly referred to as hybrids, as part of a hybrid swarm, viable seed and rapid pollinator selection could lead to a new taxon (growing in the absence of putative parents) within the short period of a few decades. On the other hand *P. blephariglottis* may be much more variable in Pennsylvania than it is further north and such variation occurs in pure colonies of white-flowered plants, not just in hybrid swarms. Either way introgressive hybridization could have played a role.

The following key and diagram (Figure 2; page 18) provide an overview of identification and its limitations. Note that *Platanthera integrilabia* (Correll) Luer is also related to this group but not implicated with *P. × bicolor*, and distinctive in its essentially entire lip, so not considered in depth here.

### Key to *P. × bicolor* and related taxa

(provides an overview but not certain identification)

1. Flowers white.....2
  2. Flowers with spurs > 30 mm long and much longer than the ovary (approx. 2 times as long); fringe segments of the lip long; lip lamina long and narrow .....***P. conspicua***
  2. Flowers with spurs > 26 mm long and as long as or slightly longer than the ovary (to 1.25 times as long); fringe segments of the lip relatively short; lip lamina short and broad .....***P. blephariglottis***
1. Flowers orange or whitish orange .....3
  3. Flowers orange .....***P. ciliaris***
  3. Flowers whitish orange .....4
    4. Flowers with spurs much longer than the ovary; lip lamina long and narrow.....***P. ×lueri*** (*ciliaris* × *conspicua*)
    4. Flowers with spurs as long as or slightly longer than the ovary; lip lamina shorter and broader .....***P. ×bicolor*** (*blephariglottis* × *ciliaris*)

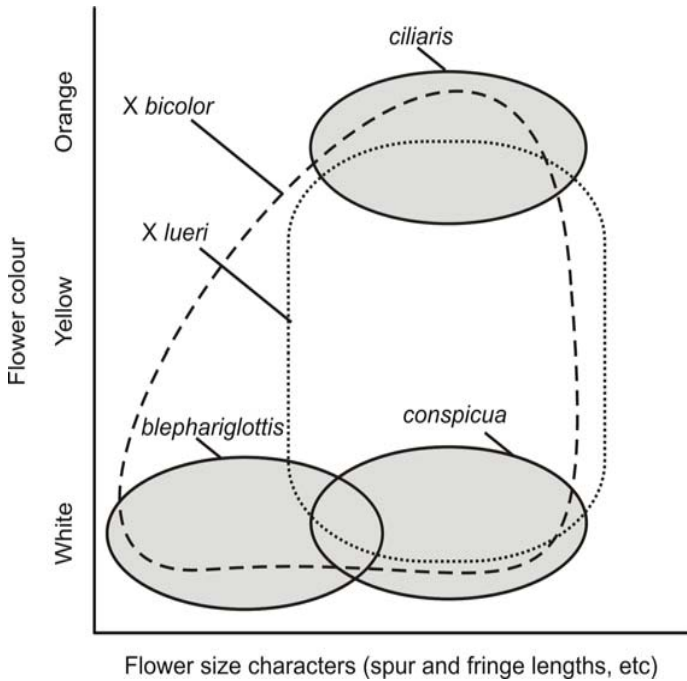


Figure 2. Possible flower size and flower color characteristics of species and hybrids in the *P. blephariglottis*, *P. ciliaris*, and *P. conspicua* group. The boundaries for the presumed morphological and color variation within each taxon are shown. For example, through backcrossing, *P. ×bicolor* has a very extensive range of appearance (within the dashed line) that includes large portions of the space occupied by all other taxa. Note that the *P. blephariglottis* × *P. conspicua* is not shown on the diagram and has not been reported to date since these taxa very rarely overlap geographically. Apparent intermediates between them would most likely be extreme variants of the species or backcrosses involving *P. ×bicolor* or *P. ×lueri*. See pictures and color forms in Figures 4-7 on pages 19-21.

DISTRIBUTION

The Bicolored Orchid may be expected to occur wherever the parental species overlap and flower at the same time. This general area would include the states of Connecticut, Delaware, Georgia, Indiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, and Virginia. One or both of the parents are rare or endangered in some of these states and there are no well documented literature

(Continued on page 27)





Figures to accompany “Notes on the Taxonomy, Nomenclature, Identification, Distribution and Conservation of the Bicolored Orchid Hybrid, *Platanthera ×bicolor*” by Paul Catling

Figure 4. *Platanthera blephariglottis* with relatively short spurs and fringe segments. Photo by Zach Bradford from Hazleton, Pennsylvania. Used with permission.



Figure 5. Colour variation in *P. ×bicolor* at Hazleton, Pennsylvania. Both of these are similar to *P. ciliaris* in their long spurs and long fringe segments, but as far as we know “pure *P. ciliaris*” is never this pale. Photos by R.E. (Bob) Sprague, taken at Hazleton, Pennsylvania. Used with permission.



Figure 6. *Platanthera*  $\times$  *bicolor* at Hazleton, Pennsylvania. The plant on the left has relatively short spurs and fringe segment characteristic of the *P. blephariglottis* parent. The plant on the right more closely resembles *P. ciliaris* but the latter is always (or almost always) deep orange. Pale and yellow-flowered plants like this are extremely rare (or non-existent) outside of hybrid swarms. Photos by R.E. (Bob) Sprague, taken at Hazleton, Pennsylvania. Used with permission.

Front cover. *Platanthera*  $\times$  *bicolor* at Hazleton, Pennsylvania. This plant has a longer inflorescence and flowers with relatively shorter floral parts than *P. x lueri* (Figure 7; page 23). Although the two photos are correctly identified and different, the truth is that they could not be identified with certainty without the location information. Photo by Zach Bradford from Hazleton, Pennsylvania. Used with permission.



Figure 7. *Platanthera*  $\times$  *lueri* (= *Platanthera ciliaris*  $\times$  *P. conspicua*). U.S.A. Florida. Jefferson County: Pine Woods Plantation, SE of Lloyd; gentle seepage slope along creek, with *Pinus serotina*, *P. elliotii*, *P. taeda*, *Magnolia virginiana*, *Pinckneya bracteata*, *Toxicodendron vernix*, *Morella cerifera*, *Osmunda cinnamomea*, *Polygala chapmanii*, *Hyptis alata*, *Eupatorium* spp., *Xyris* spp., *Carphephorus paniculatus*, *Scleria reticularis*, *Lachnanthes caroliniana*, *Clethra alnifolia*, *Viburnum nudum*, *Ilex glabra*, *Eriocaulon decangulare*, *Lycopodium alopecuroides*, *Pluchea* sp., *Sphagnum* sp., *Platanthera conspicua*, *P. ciliaris*. Photo by Richard Carter (19924), 29 Aug 2010, with W.W. Baker. Photos at VSU and DAO. Used with permission.



Figure to accompany “*Cypripedium yatabeanum*” by Charles Sheviak.  
Photos by author.

Figure 1 (back cover).

Figure 2. Flower of a plant on Unalaska, Aleutian Islands, suggesting *Cypripedium yatabeanum* in color and somewhat in shape. Although the petals are appropriately short and pandurate, the lip is obtuse. Very likely this plant is merely an extreme form of the hybrid *C. ×alaskanum*, which is variable and abundant on the island. See illustrations for *C. ×alaskanum*.

Figures to accompany  
“*Cypripedium ×alaskanum*” by  
Charles Sheviak. Photos by author.

Figures 1-3. Flowers of three plants from Unalaska, Aleutian Islands, showing variation in flower color and shape within a population. The flower in Figure 1, and to a lesser extent that in Figure 2, suggest *C. yatabeanum* in shape and proportions, and might key to that species. The obtuse lips, however, and the variable and rather brilliant colors, belie their hybrid ancestry. The flower in Figure 3 demonstrates the influence of *C. guttatum* in the dark reddish color and more globose lip. See also Figure 2 under *C. yatabeanum* for another extreme form from this population.





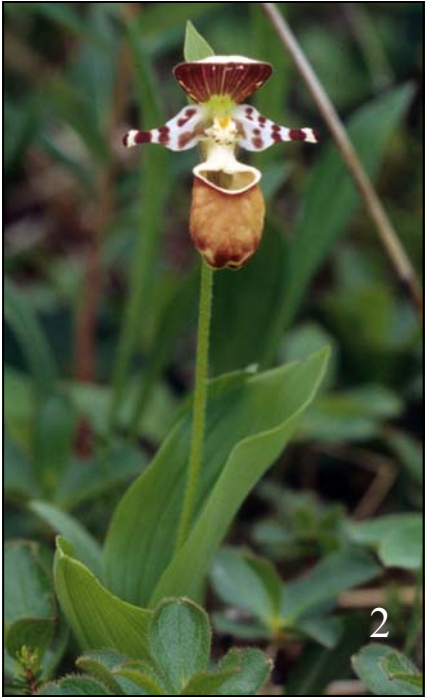


Figure 4. In southern mainland Alaska, extensive populations of typical *C. guttatum* sometimes include plants with dull coloration and a narrower aspect to the flower or lip. Such plants may indicate introgression from *C. yatabeanum*.



Figure 1. *Spiranthes odorata*



Figure 2. *Spiranthes odorata* can reach a height of 3 feet



Figure 3. *Spiranthes odorata*





Figure 4. *Spiranthes odorata*



Figure 5. *Spiranthes odorata* leaves

Figures to accompany “A Family Orchid Vacation to the Western United States” by Tom Nelson. Photos by Tom Nelson.



Figure 18. *Platanthera tescamnis*



Figure 19. *Platanthera dilatata*  
var *dilatata*



Figure 20. *Platanthera huronensis*  
white flowered form

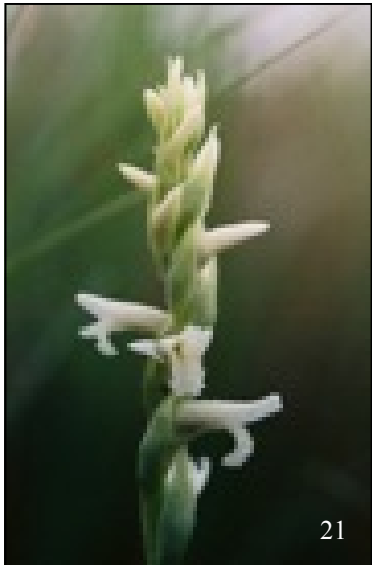


Figure 21. *Spiranthes diluvialis*

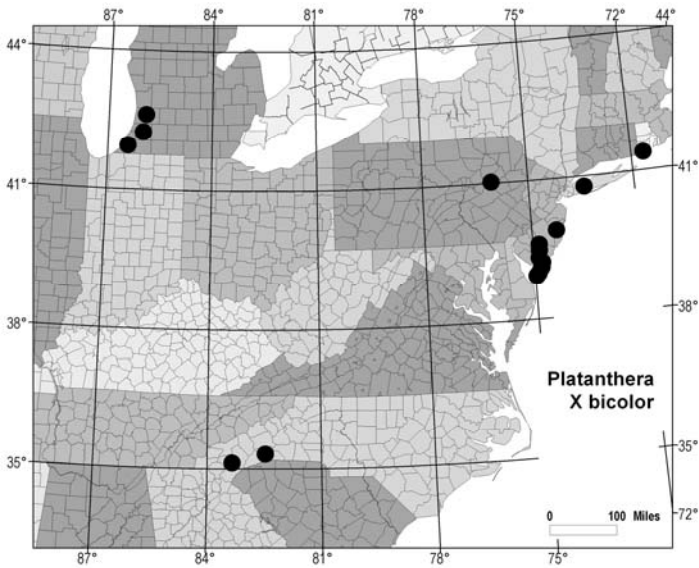


Figure 3. Distribution of *P. x bicolor* based on specimens in North American herbaria and literature reports (see Table 1; page 27).

(Continued from page 18)

records as is the case for Indiana (Homoya 1993). Some authors have reported that *P. x bicolor* is likely to be found anywhere the parents occur together in the same location (e.g., Case 1987), but the parents often grow in different places and there are relatively few reports of this hybrid in the literature. The estimated number of historically known locations for *P. x bicolor* in North America is less than 20, and many of these are vague locations mentioned by photographers and botanists. Table 1. lists the reliable documentation that has been found for those states listed above.

The best known and likely largest hybrid populations have been those at Hazleton, Pennsylvania and Swain Station, New Jersey (see Table 1; page 27). The population at Swain in New Jersey was notable in also having hybrids involving *P. cristata*. Folsom (1984) cites *P. x chanellii* Folsom (*P. ciliaris* × *cristata*) from this site and justifying specimens are at NY and PH. Some of the Michigan populations are also large (up to 25 flowering hybrid plants) and have existed for approximately 50 years.

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**Table 1.** Distribution of *Platanthera x bicolor* in North America based on specimens labeled as such in herbaria. Where literature reports were found

indicating presence, they are listed. Some personal communications regarding hybrid populations are also provided. Literature indicating absence is only listed where it is considered particularly helpful. Specimen information on the hybrid was requested from 104 herbaria. Those which responded are underlined (below) and for those with specimens, the specimen data and herbarium acronyms are provided. Acronyms are from Thiers 2010: ALMA, AMES, ANSP, AUB, BALT, BGSU, BH, BHO, BING, BKL, BOON, BRU, BSN, BUF, BUPL, CCL, CCSU, CHAS, CHRB, CINC, CLEMS, CLM, CM, CMC, COLG, CONN, CONV, CUW, DEN, DOV, DUKE, DWC, ECH, EMC, CMC, FMUH, FUGR, FWVA, GA, GAS, GH, GMUF, GRCH, JHMV, JMUH, KBSMS, KE, KIRI, LYN, MARY, MASS, MCA, MICH, MOAR, MSC, MU, MUHW, MUS, MVSC, NA, NBYC, NCBS, NCSC, NCU, NEBC, NHES, NMMA, NY, NYS, OBPF, ODU, OS, OWU, PAC, PH, PHIL, ROCH, RUHV, RWPM, SCHN, SLRO, SPR, SUHC, UNCC, URV, US, USCH, USCS, VAS, VMIL, VPI, VSC, WCSU, WCUH, WFC, WGC, WILLI, WMU, WNC, WP, WSCH, WUD, WVA, WV, YOU, and YU.

Corrections to this table are welcomed.

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**Connecticut:** No literature reports.

**Delaware:** Although *P. ×canbyi* (Ames) Luer (*P. blephariglottis* × *cristata*) persisted at a site in Delaware for 60 years, there is no report of *P. ×bicolor* (Tatnall 1946).

**Georgia:** Not reported but the putative parents apparently overlap in the north-eastern part of the state (Jones and Coile 1988).

**Indiana:** No records (Homoya 1993).

**Maryland:** Not reported by Brown and Brown (1984).

**Massachusetts:** Apparently not present.

**Michigan:** Smith and Snow (1976) report hybrids in Berrien County and Case (1987, p. 98) reports three stations in southwestern Michigan where *P. ×bicolor* outnumbers its parents. Specimens: **Allegan Co.:** SE corner sect 27?, R15W; T3N, “large hybrid swarm, flowers varying from cream to yellow, both parent colors present,” 23 June 1962, *W.P. Stoutamire 4013* (MICH). sec. 34 – T3N, R15W, “*Habenaria ciliaris* occasional in bog with *H. blephariglottis* and many hybrids between them,” 1 August 1961, *F.W. and R. Case, O.H. Clark and H.S. Veltman* (MICH). **Van Buren Co.:** S of Bankson’s Lake, sec. 23 T43 R13 W, “hybrids common,” 31 July 1962, *F.W. Case*, (MICH). County

unknown: Tobico, swamp, “observed once,” 19 July 1896, *G.M. Bradford* (MSC). There are also photos of the hybrid from an unspecified location in Allegan Co. at MU.

“A site in Berrien Co., Michigan had a typical floating sphagnum mat grading into a tamarack forest on the edge of a small lake. The interesting thing here was the partitioning of the site among the different taxa. The open sphagnum mat with low ericads was occupied by *P. blephariglottis*; this species did not occur elsewhere in the bog. The *P. ciliaris* were limited to the zone of tall herbs and open shrubs bordering the tamaracks. Scattered around in between and in the tamaracks were the plants of *P. ×bicolor*. These varied greatly; although one was a clear yellow, most were combinations of orange and white. One was very much like *P. blephariglottis*, with relatively small flowers and a reduced fringe, but with a narrow yellow stripe down the middle of the lip. At the other extreme was a beautiful, large-flowered *ciliaris*-like plant with orange flowers, but with lips orange with a white fringe” (C.J. Sheviak, pers. comm. 2010).

**New Jersey:** This (as Nova Cesarea) is the type locality of *P. ×bicolor*, but Rafinque’s specimen was probably destroyed (see text). Specimens: **Atlantic Co.:** on road between Hammonton and Joe’s Bridge, 1 mile below Hammonton, [39.6172, -74.8247], 3 Aug. 1940, *J.R. Mumbauer*, (PH 01090067). Mizpah, [39.4870, -74.8357], flowers yellow, 14 Aug. 1916, *F.W. Pennell* 8197, (PH 01090074). **Cape May Co.:** Swain Station, 19 Aug. 1935, *W.W. Tunnner and H.W. Blaser*, (BH 000 012 056). N of Swain, 5 Aug. 1916, *K.K. MacKenzie* 7195, (NY 1452710). bog W of Bennett, 17 Aug. 1940, *T. Darling jr. s.n.*, (US 3328941). Swain’s Station, Cape May, 26 July 1919, *L. Griscom s.n.*, [ex herb. H.M. Denslow 1539, as *Habenaria ×bicolor*], (NYS). Swain, 9 Aug 1919, *E.T. Wherry s.n.* [ex herb. H.M. Denslow 1541, as *Habenaria ciliaris* × *blephariglottis*, *H. ciliaris* dominant], (NYS). Swain, 9 Aug 1919, *E.T. Wherry s.n.*, [ex herb. H.M. Denslow 1542, as *Habenaria ciliaris* × *blephariglottis*, *H. blephariglottis* dominant], (NYS). Open bog ca. 1.5 miles E of Mount Pleasant [39.2205, -74.7783], 13 Aug. 1940, *W.M. Benner* 9379, [flowers yellow, as *H. ciliaris*], (PH 01090063). Court House [39.0874, -74.8253], north by P.R.R., 6 Aug. 1909, *S.S. Van Pelt* [as *P. ×canby*], (PH 01090070). Swain [39.1258, -74.8000], 11 Aug. 1916, *W. Stone* 15224, (PH 01090060). Swain, 11 Aug. 1916, *W. Stone* 15221-3, [all labeled as hybrids, one indicated to be very pale yellow with a whitish hood], (PH 010900680). Bog 1 mile W of the station, Bennett, 21 July 1912, *O.H. Brown*, [as *H. blephariglottis* × *ciliaris*], (PH 01090066). Swains Station, growing with two parents, 25 July 1919, *O.H. Brown*, [as *H. blephariglottis* × *ciliaris*], (PH 01090059). Cape May Court House, 17 July 1906, *C.S. Williamson*, [originally as *P. ×canby*] (PH 01090071). Bennetts, 29 July 1912, *O.H. Brown* [as *P. ×canby*], (PH 01090072). Swain, intermediate in color between the two species, 10 Aug. 1929, *E.T. Wherry*, (PH 01090065). Swain, 11 Aug. 1916, *W.*

*Stone 15219-15230*, [pale yellow flowers with spurs longer than the ovary including numbers 2, 4, 5, 6, are referable to *P. ×bicolor*, – the others are species and hybrids including *P. blephariglottis*, *P. ciliaris*, and *P. canbyi*, all from the remarkable hybrid population along the railway above Swain station.], (PH 01090058). N of Swain, moist pine barrens, 5 Aug. 1916, K.K. MacKenzie 7197, [as *Blephariglottis blephariglottis* × *cristata*], (PH 01090069). **Cumberland Co:** open boggy thicket, Laurence Branch, Hunters Mill [39.3234, -74.8604], flowers pale creamy yellow, 13 Aug. 1935, *B. Long* 47347, (PH 01090065). **Ocean County:** Bamber [39.8923, -74.3132], moist sand in pine barrens, flowers pale lemon yellow, 25 Aug. 1909, *B. Long*, (PH 01090075). County uncertain: Highland, 9 Aug 1919, *H.S. Smart s.n.*, [ex herb. H.M. Denslow 1540, as *Habenaria ciliaris* hybrid form, color lemon-cream], (NYS).

**New York:** Reported from Long Island in the New York Flora Atlas (Welby and Werrier 2010). Suffolk Co.: Three Mile Harbor, moist ground, 5 Aug 1928, *R. Latham* 5770, [as *Habenaria blephariglottis* – flowers cream-colored], (NYS). Three Mile Harbor, L.I., moist sandy woods, one plant, 3 Aug. 1928. *R. Latham* 5787, [as *Habenaria blephariglottis* – flowers deep yellow], (NYS). Along Stephen Hands Path, N of Rt 27, East Hampton Township, in thicket margin along mowed road shoulder opposite highway maintenance yard, one plant, flowers yellow w/ *H. ciliaris* #1603, 15 Aug 1979, *Sheviak, Mitchell, Dean, & Lotowycz* 1604, [as *Habenaria ×bicolor*], (NYS).

“The NY site on Long Island was a small ditch along a minor road. There was a narrow mowed road shoulder that abruptly dropped to the lower level of the ditch. The soil was sand and a sparse thicket occurred along the roadside right to the edge of the mowed strip. A few plants of *P. ciliaris* and the one of *P. ×bicolor* were in the edge of the shrubs” (C.J. Sheviak, pers. comm.).

**North Carolina:** Sargent’s (1954) reports of a lemon yellow *Habenaria* from Yellow Mountain and The Devil’s Courthouse in the Blue Ridge near Highlands may refer to *P. ×bicolor*. The hybrids reported from Brunswick County, North Carolina by Hardin (1961) likely refer to *P. ×lueri* P.M. Brown.

The following, from the mountains, may be referable to *P. ×bicolor* but the annotations raise doubt about its identity. However the reference to flower color makes this specimen seem reliable. Hendersonville, Margaret C. Campbell s.n.; [annotation 1: Buff. undated, unsigned, in Ms. Campbell’s hand, perhaps referring to flower color being light yellow], [annotation 2: *Habenaria ciliaris*, by Don Correll in 2/20/36], [annotation 3: *bicolor?* [undated, unsigned], [annotation 4: This orchid might possibly be *H. canbyi* since both *H. cristata* and *H. blephariglottis* grow at Hendersonville. *H. canbyi* has not been reported as having been found further south than Del., by L.B. [Lane Barksdale], undated], [annotation 5: If this is not *H. ciliaris*, it must be

*H. canbyi*. The latter is not reported below Delaware, by W.L.B. [Lane Barksdale], undated], [annotation 6: *Platanthera*  $\times$  *bicolor*, by Nancy E. Cowden in 1998], [annotation 7: Either: *Platanthera ciliaris* or *Platanthera*  $\times$  *bicolor* (= *P. ciliaris*  $\times$  *blephariglottis*), It is hard enough to distinguish between dried specimens of *P. ciliaris* & *P. blephariglottis*. But, it is impossible to distinguish a dried specimen of their hybrid (*P.*  $\times$  *bicolor*) from *P. ciliaris*, by James P. Folsom in 1979], (NCU82420)

Judging by their position on the outer coastal plain, all of the following would likely be referable to *P.  $\times$ lueri* Brown. **Bladen Co.**: pocosin border, 1 mile west northwest of Bladenboro on NC. 211, 3 August 1957, *Harry E. Ahles 33309 with R.S. Leisner s.n.*, [annotation 1: *Platanthera*  $\times$  *bicolor*, by James P. Folsom in 1979], (NCU133171). **Brunswick Co.**: Open, undrained pine field, 2 miles E of Longwood, color variable – orange to white, 26 Aug. 1960, *J.W. Hardin 2342*, (NCSU). **Cumberland Co.**: pine savannah, 3.6 miles south of Autryville, vicinity of Beaverdam Creek, 7 August, 1957, *Harry E. Ahles 33600 with R.S. Leisner s.n.*, [annotation 1: *Platanthera*  $\times$  *bicolor*, by James P. Folsom in 1979], (NCU133173). **Cumberland Co.**: savannah-like habitat, probably old pond shore, 6.8 miles south of Fayetteville on NC. 87, 7 August, 1957, *Harry E. Ahles 33529 with R.S. Leisner s.n.*; annotation 1: *Platanthera*  $\times$  *bicolor*, by James P. Folsom in 1979, (NCU133172). **Duplin Co.**: marshy pond border, 5.1 miles northwest of Beulaville on NC. 111, 2 August 1957, *Harry E. Ahles 33214 with R.S. Leisner s.n.*, [annotation 1: *Platanthera*  $\times$  *bicolor*, by James P. Folsom in 1979], (NCU133174). **Hoke Co.**: Fort Bragg, MacRidge Impact Area buffer zone, SW corner, 400 m. W. of Little Rockfish Creek. Elev. 63 m., Sphagnous ecotone to pine-hardwood-cypress tributary, burned within 9 months. Rare, with both parents, *Rhynchospora pallida*. 16 August 1992, *B.A. Sorrie 6759 with M. Russo s.n. and J. Larke s.n.*, [labelled as *Platanthera*  $\times$  *bicolor* (Raf.) Luer = *P. blephariglottis* var. *conspicua*  $\times$  *P. ciliaris*], (NCU568556). **Hoke Co.**: border of pocosin, 3.9 miles west of Montrose, 9 August 1957, *Harry E. AHles 33800 with R.S. Leisner s.n.*, [ annotation 1: *Platanthera*  $\times$  *bicolor*, by Folsom in 1979], (NCU133175).

**Ohio:** Apparently not present.

**Pennsylvania:** Reported from “several sites” in Pennsylvania by Rhoads and Black (2007), but there is definite information for only one population. The Hazleton site is probably the most well known in North America. Many photos from this place are posted on the web and it has been featured in a number of articles (e.g. Larocque 2009). With thousands of *P. blephariglottis*, at least 100 *P. ciliaris* and 25 *P.  $\times$ bicolor* (Larocque 2009), it is one of the largest hybrid stations known. Specimens: **Luzerne Co.**: Green Ridge, 0.7 mi. NW, Valmont Industrial Park, scattered among *P. ciliaris* and *P. blephariglottis* in boggy opening under power lines, 31 July 1996, *A.F. Rhoads and T.A. Block s.n.*, [labeled as *Platanthera*  $\times$  *bicolor*], (MOAR).

**Rhode Island: Washington Co.:** Town of Charleston, moist sandy soil under power lines on King's Factory Road ½ mile S of Wood River Junction P.O., flowers creamy white, hybrid of *P. ciliaris* and *P. blephariglottis*, 8 Aug 1975. *G. Tucker s.n.*, [as *Platanthera*], (NYS).

**South Carolina:** No definite records. Judging by their position on the outer coastal plain, both of the following would likely be referable to *P. ×lueri* Brown. **Jasper Co.:** Swamp and low ground, 7.1 miles south of junction with S.C. Hwy. 170, on County Road 92, 7 September 1956, *C. Ritchie Bell 4878*, [annotation 1: *Habenaria blephariglottis*, by Donovan S. Correll in 1963; annotation 2: *Platanthera ×bicolor*, by James P. Folsom, 1979], (NCU 133177). Flowers yellow, both supposed parents present, open savannah, 0.7 miles south of Hardeeville on US. Rt. 17, 8 September 1956, *Harry E. Ahles 18180 with C. R. Bell s.n.*, [annotation 1: *Habenaria blephariglottis*, by Donovan S. Correll in 1963; annotation 2: *Platanthera ×bicolor* flower size & color intermed. between that of *P. ciliaris* and *P. blephariglottis* – Spm length more like that of *P. blephariglottis*, by James P. Folsom in 1979], (NCU133176)

**Virginia:** No reports found.

**West Virginia:** Despite the sphagnum glades in the mountains and the Cranberry Glades in Pocahontas County, neither *P. blephariglottis*, nor *P. ×bicolor* is reported from West Virginia (Harmon et al. 2006).

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## CONSERVATION

The fact that a rare native taxon can be driven to extinction by hybridization with an invasive alien taxon has lead to a number of recent articles concerning conservation policy for hybrids (Allendorf et al. 2001, Ellstrand et al. 2010). Although there have been few detailed studies, hybridization involving native orchids does not appear to be a problem for the species involved or their native relatives. Cozzolino et al. (2006) found that parental fitness of food-deceptive Mediterranean orchids was not reduced where hybrids occurred in regions of sympatry. These authors recommended conservation of areas where hybridization occurs because these areas are the stage for evolutionary processes including rare advantageous gene transfers.

Whitham and Masschinski (1995) in a particularly good discussion of hybrid policy suggest that natural hybridization among native species “can have many positive effects and should be preserved as part of a dynamic ecosystem.” Later Allendorf (2001) noted that “taxa that have arisen through natural hybridization should be eligible for protection.” Klier et al. (1991) noted that



hybrid *Cypripedium* sites in North America are “scientifically important because of the glimpses into the dynamics and evolution ... they afford.” Protecting a hybrid population may protect more genetic diversity than exists within either of the parental species. Just as there are laws and criteria protecting species, there should be laws and criteria protecting hybrids and hybrid occurrences. It is thought provoking to remember that in some cases what we treat as species based on a few appearance characteristics may be backcrossed hybrids and we are actually breaking the rules of the International Code of Botanical Nomenclature (McNeill et al. 2006) to call them species.

**Reasons to protect an area of hybrid occurrence** can be summarized as follows (see Whitham et al. 1991 and Whitham and Maschinski 1995 for more information):

- (1) Evolutionary opportunity (Represents what may be an important opportunity for evolution – centres of speciation, increased genetic diversity, transfer of adaptive genes, modification of reproductive barriers, new ecotypes with ecologically important roles, 30-80% of all vascular plant species may have arisen through hybridization events (Stace 1987), etc.)
- (2) Ecological Research Opportunity (An indicator of an unusual situation where taxa with differing ecological requirement can co-occur and where various unusual plants and animals co-exist.)
- (3) Recreational opportunity (Finding and photographing wild orchids is increasingly popular. Many hundreds of people have traveled far to visit special places where there are impressive displays of orchid hybrids. More people enjoying native orchids means more support for the protection of wild orchids. In some areas orchid tourism has led to economic benefits that are significant on a regional scale.)
- (4) Research and Teaching opportunity (there are numerous ecological and evolutionary questions regarding hybridization and the fundamentals can be best understood in an outdoor laboratory setting where interactions are preserved).
- (5) Biodiversity enhancement opportunity (Contribute to centres of biodiversity for other organisms (fungi, arthropods including pollinators and hybrids as bridges for host shift etc.)
- (6) Economic Opportunity (important commercially as sources of new variants of crops and horticultural plants. Many crops and ornamentals originated as natural hybrids).

Most of the reasons for protection outlined above apply to stations of *P. ×bicolor*. The location at Hazleton, Pennsylvania, has provided a remarkable recreational opportunity (3). If each person who visited that site in 2010 (estimate 1,000) has spent \$100 in the area the local economy has benefited by \$100,000. At this location, with thousands of plants of the parents, there is no

indication of a negative effect of recreation and a degree of disturbance may be beneficial.

We may learn improved techniques of management of orchid populations from managing for the perpetuation of these hybrid occurrences (3). Both parents are employing the site to make a major contribution to the colonization of other sites (1, 2). This continuous movement of populations over the landscape is essential to the survival of species and is characteristic of much of the population of many terrestrial orchids. Not only does this process have to be protected to protect the species but, in protecting the process, evolution is also being protected. As well as being concerned with species and representative landscapes, our conservation efforts should protect natural processes or their surrogates (an old mine site in lieu of natural fires which no longer burn) as well as natural phenomena that we value. This includes occurrences of *P. ×bicolor* and other examples of orchid hybrid occurrences.

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Charles J. Sheviak, the unrivalled expert on North American orchids including particularly the genus *Platanthera*, provided helpful comments (as always). Carol Ann McCormick, Asst. Curator at NCU provided extensive information on North and South Carolina. Richard Carter, Valdosta State University, provided an excellent photo of *P. ×lueri* from Florida. R.E. (Bob) Sprague and Zach Bradford provided photographs of *P. blephariglottis* and *P. ×bicolor* taken at Hazleton, Pennsylvania. G. Mitrow assisted with the development of Figure 2.

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## The Different Appearances of *Spiranthes odorata* in South Florida

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*Spiranthes odorata* is one of the latest and earliest native blooming Lady Tresses each calendar year in south Florida. Its name “*odorata*” refers to the pleasing fragrance it omits. There are many common names given, which include Scented, Fragrant, Marsh and Underwater. All can represent a characteristic about these Lady Tresses (Figure 1; page 24).

The habitat where *Spiranthes odorata* grows is varied. I’ve seen it in marsh wetlands, on edges of canals, within cypress swamps growing in standing water and in pine Flatwoods with moist ground soil.

Its oblong leaves are present when the plant flowers and grow from the base upwards.

Many Lady Tresses can be confusing in their appearance, making identification a challenge. *Spiranthes odorata* can fall into this category by the orchid enthusiast because of its variance in size and color within the lip.

*Spiranthes odorata* can reach a height of 3 feet (90 cm) in certain habitat but is usually shorter than 12 inches (30 cm). The tall plants are impressively striking looking when their flowers are fresh. In the one location I’m aware of that these tall specimens grow, all the plants are over 2 feet tall (60 cm). Their rapid growth can sometimes cause them to droop over and not stand erect because the flowers become heavy, especially when wet, and stalks are not strong enough yet to support them. Of the tall plants I have examined, the lips are white with crystal edges (Figure 2; page 24).

In many other locations in Florida, I’ve found *Spiranthes odorata* of the more typical size of Lady Tresses. Besides the smaller size difference, the inner portion of the lip can be creamy yellow, greenish or white. Regardless of the color of the inner lip, the outer edges are always crystal like, the plant usually provides a fragrance and the leaf structure is the same (Figures 3, 4; pages 24-25).

I find the main keys to the identification are the leaves, time of year of flowering and checking for fragrance, although the aroma at times can be difficult to detect (Figure 5; page 25).

The flowering period usually begins in November.

In summary, *Spiranthes odorata* is one of the truly versatile Lady Tresses. Its habitat ranges from terrestrial to aquatic, its size differences from 3 feet (90 cm) to 6 inches (15 cm) and the different colored inner lips.

Some locations in south Florida to look for *Spiranthes odorata* are:

- Big Cypress National Park
- Corkscrew Swamp
- CREW Hiking Trails
- Everglades National Park
- Fakahatchee Strand Preserve
- Florida Panther Refuge
- Loxahatchee Slough
- Six Mile Cypress Slough

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## A Family Orchid Vacation to the Western United States

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### Part IV—Conclusion

It was the morning of July 22 and we drove out to the lake and followed the boardwalk towards the lakeshore. The girls were ahead of me when suddenly Johanna came running towards me to tell me that there were orchids everywhere up ahead. When I reached the spot I couldn't believe my eyes. There are freshwater springs in this area and hundreds of orchids were growing in the marshy area by the boardwalk. *Platanthera sparsiflora* and *P. tescamnis* (Intermountain rein orchid) and their hybrids grow here and I was trying to determine what exactly I was looking at when Jackie asked me if that was an orchid growing to my left. It was. I had totally overlooked a diminutive *Epipactis gigantea* in my excitement over the *Platanthera*. As I explored I found some very tall *Platanthera dilatata* var. *dilatata* and hundreds more *Epipactis*. The scenery was great and I wanted to stay longer, but our destination for the evening was Delta, Utah which was 441 miles away, so I reluctantly packed up my camera (Figures 18, 19; page 26).

We wanted to experience some of the “old west” flavor of the region, so even though we didn't really have time, we decided to visit the famous ghost town of Bodie, about 12 miles to the north. It was well worth the trip. The site of a major gold strike with a population of 80,000 in its heyday, it was inhabited up into the 1940s and is now being preserved as a California state park. Everything is there just as the last inhabitants left it – right down to dust-covered dishes on the kitchen tables. The elevation is over 8,000 ft and there were beautiful clumps of *Iris missouriensis* blooming in the nearby wet meadows.

Hwy 6 crosses Nevada and is known as the “Loneliest Road in America.” They are not kidding. Once we passed the old mining town of Tonopah, all of the truck traffic went south to Las Vegas and we literally saw only a handful of other cars in the 110 miles to Ely, the next town. Not a good place to have car trouble... I grew up in country like this and really love it. It's the perfect antidote to the closely- built cities of the eastern states. The basin and range topography unfolds endlessly to the horizon and aside from a few ranches there is

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1. Part I was printed in Volume 7 (2). Part II in Volume 7 (3). Part III in Volume 7 (4).

little sign of humanity. One beautiful valley was unexpectedly marred by what appeared to be a giant natural gas facility; no doubt a legacy of the “drill baby drill” mentality of the Bush years.

It was almost dark as we left Eli and I was sad to be missing the dramatic scenery of Great Basin National Park on the Utah Nevada border, but it had been worth it to see Bodie. We passed exactly one car in the 90 miles to Delta. At one point I pulled over, turned off the headlights and had everyone get out of the car to see the incredible celestial display that stretched from horizon to horizon. With no moon and no light pollution whatsoever, it looked as if one could reach out and touch the stars. The only other time we have seen a star show like this was when we got off the ferry at 1 a.m. in far-off Port Aux Basques, Newfoundland; two far-corners of the earth that we have been fortunate enough to see. We finally arrived at the motel after midnight, exhausted.

The next morning we were able to pick up Interstate 70 near Delta, which made driving much easier although I missed the solitude. We crossed the San Rafael Swell in Central Utah, a giant dome-shaped anticline of sandstone, shale and limestone that was pushed up millions of years ago. The scenery was incredible and the people that built the road across this maze of cliffs and canyons were truly incredible.

We have spent a lot of time in the canyon country of Utah and our next stop was the Tamarisk Restaurant – one of our favorites – in Green River, Utah. The tamarisk tree, a native of Egypt, was introduced into this area in the early 1900s and took over virtually all of the riverbanks, crowding out the native vegetation. A few years ago scientists introduced a beetle, also from Egypt that has now wiped out the Tamarisk in the entire area. An unintended consequence of this has been the destruction of the riparian habitat that several endangered migratory songbird species relied on. When humans meddle with nature, the results are always unpredictable. So the restaurant, built on the banks of the Green River now has a view of scores of dead tamarisk trees. All of this information was relayed to us by our very friendly waitress.

After a delicious lunch complete with pie and ice cream, we walked out into the 104 degree heat and discovered that the car wouldn't start. This had been happening intermittently throughout the trip and had certainly made driving to remote areas a nail-biting experience. Whenever mechanics looked at the car it would be fine and a diagnosis impossible; I was just hoping to make it home where the problem could be dealt with. I went back inside and asked the friendly waitress who the most honest mechanic in town was – very important at a time like this. She made a call and a colorful local soon arrived, gave the starter a few taps with a hammer, and bingo! It started. I'll remember that trick.



Outfitted with a new starter and a little poorer, we happily headed to nearby Moab, our destination for the day. I had pushed so hard the day before so that we would have time to sight-see in this fantastic area. It was 107 degrees when we got to Moab, so I took the kids to the pool and Jackie was happy to relax in the air-conditioned room. It had cooled down considerably by 7 p.m. so we headed over to Arches National Park, one of our favorite places on earth, to watch the sunset. Most of the tourists had left for the day and we had it pretty much to ourselves. It was a good call.

It was July 24 and we were headed to Buena Vista, Colorado – 341 miles away – today but there was one orchid stop that I wanted to make first. There are a few sites for the very rare *Platanthera zothecina* (cloistered bog orchid) in the Moab area. The orchids grow in “hanging gardens” areas where springs seep through the sandstone cliffs and rare and unusual plants can often be found. We were in Moab in August of 2008 and I had visited one site along the Colorado River and although it was too late for blooming plants, I managed to locate one set of leaves amongst the copious amounts of poison ivy. I wasn’t even that lucky this year. I searched the alcove for about 30 minutes and couldn’t find a trace of the orchids. It wasn’t as if I was looking for a diminutive *Malaxis* or *Listera*; these are fairly large plants and not hard to see. They just were not there. Paul and Stan had seen them around the same date in 2007. I have heard that orchids are very capricious in nature and can go dormant for years at a time and then suddenly reappear. Maybe that is the case here. The good news is that Moab is a place we visit a lot, maybe some year.

From the orchid site we continued along the two-lane road that follows the mighty Colorado River through a very scenic area. The famous Hollywood director John Ford filmed a lot of his westerns with John Wayne here and the scenery is breathtaking. We rejoined Interstate 70 after about 20 miles and headed east into Colorado. At Glenwood Springs we turned off onto Hwy 82 and after pausing to photograph majestic Mt. Sopris headed up the Roaring Fork River valley to Aspen. I was involved with the Aspen Summer Music Festival for several years and know the area well. Aspen sits at 8,000 ft and is surrounded by some of Colorado’s highest peaks, and of course, beautiful groves of quaking aspen (*Populus tremuloides*). Buena Vista is on the other side of Independence Pass (elevation 12,100 ft) and the drive over the pass is one of the most scenic in North America. At one point the road is only about 1½ car widths wide with a sheer cliff on one side and a thousand foot drop on the other. As we climbed higher we entered the subalpine zone and it was spring again. *Platanthera aquilonis* and *Platanthera dilatata* and what appeared to be hybrids of the two were plentiful along the road. We stopped at 11,000 ft and took a nice sunset hike along a beautiful creek that drains out of a lovely alpine lake. Unfortunately it was dark when we reached the pass – one of the consequences of trying to pack too much into one day.

July 25 was our last day in the field and we really made the most of it. We left Buena Vista and headed north towards Leadville, Colorado. At 10,000 ft, Leadville has the distinction of being the highest year-round city in the US. As we headed north from Leadville and climbed higher we entered National Forest lands and were treated to an unparalleled alpine wildflower show. Lassen and Olympic had been phenomenal but paled in comparison to Colorado's spectacle this year. The hills were truly alive.... Paintbrush (*Castilleja*) was the predominant species and was present in all shades of yellow, red and white. Entire mountainsides were covered with masses of paintbrush and other choice wildflowers. This was a result of record-breaking rains and the skies were dark and threatening again today making for ideal photographic conditions. Standing tall amidst the paintbrush in the dry mountainside habitat were pure white specimens of *Platanthera huronensis* (green bog orchis) (Figure 20; page 26). *P. huronensis* hybridizes with *P. dilatata* and the plants with whiter flowers may be the result of ancient or recent gene flow between the species.

We soon rejoined Interstate 70 and headed east for our final two orchid stops of the trip. It was Saturday and as we approached the Denver area it becomes noticeably more crowded with people but the scenery was still fantastic. What a weekend playground these folks have. I've heard about the massive traffic jams that can occur in this area and was glad that we seemed to be lucking out in that respect. We left I-70 and headed north again towards the town of Eldora, west of Boulder.

The orchid site was near a well-known trail head and the gravel road we were following was lined with the parked cars of Saturday hikers. There were hundreds of Gunnison's mariposa lilies (*Calochortus gunnisonii*) blooming in the sagebrush (*Artemisia tridentata*) creating an incredible spectacle along the roadside. We parked at the appropriate spot and Johanna and Jackie soon located past-prime specimens of *Platanthera purpurascens* (short-spurred bog orchis) the object of our search. In rapid succession, before I could even turn around, they had also located past-prime *Coeloglossum viride* and *Coral-horhiza maculata* close by. Well trained orchid hounds!

We then headed for Boulder and the last stop of the trip. The drive down scenic Boulder Canyon was very enjoyable, but when we reached the city, I became totally lost. We had directions to a site for *Spiranthes diluvialis* (Ute ladies' – tresses) on the east side of Boulder; we were on the west side and I couldn't orient myself. Needless to say we were totally fatigued after almost 4 weeks on the road and were in no mood for any foolishness. I pulled over and started asking people for help. It took a few tries, but finally a very friendly college coed patiently looked at the directions and figured out where we were headed and sent us on our way. Whew!

*Spiranthes diluvialis* was federally listed as an endangered species in 1992 and is not a common orchid. When we went to see *Cypripedium fasciculatum*, Buddy Smith had told me that a population of *S. diluvialis* has recently been discovered near Logan, Utah and I hope to see it some day. *Spiranthes diluvialis* is an amphidiploid hybrid product of *S. romanzoffiana* (hooded ladies'-tresses) and *S. magnicamporum* (Great Plains ladies'-tresses) and exhibits characteristics of both ancestral parents.

The site we were headed to today is on preserved farm land within the city limits of Boulder. I hopped over the fence, went past the old barn and out into the former pasture and after a few minutes searching was able to locate two plants that were just starting to bloom. The season was a little late in 2008, so I'm sure there were more that weren't up yet. I was luckily able to take a few pictures before the rain came in and it started to pour; I was just glad that I had managed to find anything at all and see this species (Figure 21; page 26).

By this time it was 6 p.m. so we got in the car and tried to make some miles. I-70 east of Denver was wide, smooth and straight and was a motorist's dream. There was very little traffic so I set the cruise control on 90 mph and before we knew it, we were in Kansas. The next two days, although spent totally in the car, were enjoyable. The Flint Hills of Kansas are pleasant and the arch of St. Louis majestic. We enjoyed a dinner stop in St. Charles, Missouri, the original capitol of the state. The "old town" on the banks of the Missouri River has buildings dating back to the 1700s – a nice respite from our 10,000 mile cross-country marathon. It is great to have seen the country from sea to shining sea and the great National Parks and other incredible wild places that we visited – not to mention finding 32 species and varieties of orchids – are memories that we will treasure forever.

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I would first and foremost like to thank Jackie, Johanna and Christina for undertaking this incredible journey with me. Over the last 3 years we have traveled to the far corners of the United States and Canada in search of wild orchids. These remarkable ladies have allowed me to pursue my dream and gone uncomplainingly wherever the next species is. We have now seen 90 species of native orchids. Paul Martin Brown and Stan Folsom, as always, provided expert trip-planning advice and site information. Ron Parsons (California) and Kermit Williams (Oregon) provided site information and assisted in the field. Frank "Buddy" Smith, Mary Gerritson, Eric Nelson and Bill Oblock were great company in the field. Ann Kelsey (Utah) Mellisa Rathbun-Holstein (Washington) Carol Ralph, Larry Ulrich and Roger Raiche (California) and Shirley Curtis all provided site information. Ranger Chuck Bancroft and Tom Moss provided information about *Piperia yadonii* and *P. michaelii*.

## Species found on Western Trip 2009

<i>Cephalanthera austini</i>	<i>Piperia candida</i>
<i>Coeloglossum viride</i> var. <i>virescens</i>	<i>Piperia colemanii</i>
<i>Corallorhiza maculata</i> var. <i>occidentalis</i>	<i>Piperia transversa</i>
<i>Corallorhiza mertensiana</i>	<i>Piperia yadonii</i>
<i>Corallorhiza striata</i>	<i>Platanthera aquilonis</i>
<i>Cypripedium californicum</i>	<i>Platanthera dilatata</i> var. <i>albiflora</i>
<i>Cypripedium fasciculatum</i>	<i>Platanthera dilatata</i> var. <i>dilatata</i>
<i>Cypripedium montanum</i>	<i>Platanthera dilatata</i> var. <i>leucostachys</i>
<i>Epipactis gigantea</i>	<i>Platanthera huronensis</i>
<i>Epipactis helleborine</i>	<i>Platanthera purpurascens</i>
<i>Goodyera oblongifolia</i>	<i>Platanthera sparsiflora</i>
<i>Listera banksiana</i>	<i>Platanthera stricta</i>
<i>Listera convallarioides</i>	<i>Platanthera tescamnis</i>
<i>Listera cordata</i>	<i>Platanthera yosemitensis</i>
<i>Listera cordata</i> var. <i>nephrophylla</i>	<i>Spiranthes diluvialis</i>
<i>Piperia unalascensis</i> forma <i>olympica</i>	<i>Spiranthes stellata</i>

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Tom's orchid photo galleries: [www.pbse.com/tomdean](http://www.pbse.com/tomdean)

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**Saturday, July 30—Tuesday, August 2, 2011**

Mt. Cuba Center, located in northern Delaware, will be hosting the 2011 Native Orchid Conference. The July 30 and 31 lectures and presentations will be held at the Center. On August 1 and 2 we will go on field trips to observe native orchids in their natural and varied habitats within the region.

For more information, contact Phil Oyerly at:

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