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An Introduction to A Social History of North American Slipper Orchids

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INTRODUCTION

My purpose in writing “A Social History of North American Slipper Orchids” is to enhance our knowledge of these very popular plants in a non-technical way. The goals are:

- To provide historical information to demonstrate that our concepts of plants today reflects thousands of years of history.
- To recount some of the lore surrounding lady’s slippers.
- To show how science has broadened not only our understanding of plants themselves, but also how plants interact with a wide web of interdependent life.
- To put a human face to the names we see appended to our species in botanical texts.
- To tell the stories of those explorers who first discovered our species.

What you will not find here are technical descriptions for the species, range maps, habitat descriptions nor intricate details of scientific investigations. The bibliography presents a substantial resource for those interested in pursuing these topics.

In this edition we begin offering a collection of articles on Cypripediums, an effort started under editor Drs. Jyotsna Sharma and Ron Coleman. You will find descriptive comments on many of the species. We are also very pleased to present the first of a multi-part article on the “social history” of Cypripediums written by Hal Horwitz. His extensive research and insight into the genus will make for great reading and expansion of our understanding of these slipper orchids.

Duane Erdmann, Editor

TOPICS

- I. Historical Background
- II. The New World, the Evolution of Botanical Classification and Nomenclature, and Other Slipper Orchids
- III. The North American Species
- IV. Popular Names
- V. Taxonomy
- VI. Pollination
- VII. Mycorrhiza
- VIII. Ethnobotany
- IX. Propagation And Cultivation
- X. Conservation
- XI. Bibliography

A Social History of North American Slipper Orchids

HISTORICAL BACKGROUND

Lady's slippers have a special place in the hearts of all plant lovers – especially orchid enthusiasts. This holds true across the spectrum from those who say, “Oh yes, of course I know lady's slippers, but didn't know they were orchids,” to the most sophisticated of orchid aficionados who have made slipper orchids the most popular and sought after orchids for explorers and growers. The mystique and popularity may have originated with their unique appearance, but imagination and flights of fancy have accorded these plants a special appeal.

Peeling back layers of historical and botanical information about this extraordinary group of orchids reveals myth, medicine, human intrigue, struggle, science and beauty and provides a better understanding of the plants and also an appreciation of botanical history and of those naturalists of prior generations on whose shoulders we stand.

Although this paper concerns the slipper orchids of North America, a more comprehensive knowledge of botanical history is necessary for a sense of perspective. The challenge is how to keep to the narrow subject of North American slipper orchids – a small group of but one of five genera of slipper orchids; after all, advances in other areas of botany certainly influenced our knowledge of slipper orchids. Striking this balance meant leaving out important botanical

milestones and personalities. I have tried to include just enough broader botanical history to keep the historical thread relevant to our subject and hope readers will understand.

North Americans automatically associate the term lady's slipper with the Latin name *Cypripedium*, a name first coined by Linnaeus in 1753. The choice of *Cypripedium* as the genus name for slipper orchids indicates that Linnaeus, grounded in classics, referred to a legend of Venus, the Roman goddess of love. The story goes that while on a hunting trip with Adonis, a storm forced the two to take shelter in a cave. This time together led to an amorous interlude during which Venus lost her slipper. Later, when a mortal came across the slipper and tried to pick it up, the slipper changed into a flower the same golden color of the slipper, with a petal shaped like the goddess' shoe (Berliocchi 2000). This myth about the origin of slipper orchids is memorialized until the present day by the genus name *Cypripedium*. This name and others will be discussed in more detail later, under the subject of botanical nomenclature.

FROM CLASSICAL TIMES TO THE RENAISSANCE

The ancients were primarily interested in plants for their medicinal use. Greek and Roman writers, including Pliny the Elder, Hippocrates, Galen and Dioscorides, wrote important and much used treatises on the subject of plants and the diseases they cured. In the following centuries many others also wrote on the subject, most of whom either copied or added minimally to these classical sources. Unfortunately we have no concrete information about lady's slippers for many centuries. Some authors believed that Apollodorus, an Athenian scholar from the second century BC, was referring to a lady's slipper when he described a plant he named *Cosmosandalon* (Sprengel 1807). Most authorities discount this. In fact we don't know for certain which, if any, of the many plants mentioned in medical books from ancient times until the 17th century, were lady's slippers. It has been said that no real light was shed on the science of botany for nearly two thousand years (Thorndike 1958; Rafinesque 1828).

Throughout this period, from classical times until the eighteenth century, Latin was the universal language of science. The Church dominated higher education and physicians were actually specially trained clergy. This explains why the leading scholars of botany until well into the seventeen hundreds were churchmen/physicians. Later as the study of medicine separated from its ecclesiastic dominance and became established as a separate course of study, botanists came from the ranks of physicians, who were also trained in Latin.

A major breakthrough in the evolution of botanical scientific study came with the invention of the printing press; it allowed mass dissemination of knowledge and a flood of botanical books became available to Europeans. No longer was one author's work subject to the accuracy of scribes reproducing volumes one

at a time. This revolutionary invention allowed for larger works to be more easily produced and provided an efficient means of illustrating plants. The combination of rapid dissemination of information to a wide audience and the visual impact of illustrations ensured an ease of communication heretofore unknown. However, it did not result in uniformity of nomenclature.

THE EARLIEST IDENTIFIABLE LADY'S SLIPPER DESCRIPTIONS

The first printed book with an adequate description of a slipper orchid was written by Conrad Gessner (1516-1565) (Figure 1; page 5) in 1561, *De Hortus Germaniae* (Jacquet 1994; Cribb 1997). Gessner, a theologian and physician, turned to botany later in his career. Unfortunately no image of the plant appeared in the book. The name he applied to the slipper orchid is *Alismatis pulchra species*. Rembert Dodoens (1516-1585) (Figure 2; page 5), a Flemish physician and botanist, published the first illustration of a slipper orchid in his book, *Florum, et coroniararium odoratarumque nonnullarum herbarium historia* in 1568 (Figure 3; page 5). He refers to *Cypripedium calceolus* as *Damasonium nothum* (Figure 4; page 6). Carolus Clusius (1526-1609), a French born physician and botanist published a wonderful illustration of *Cypripedium calceolus* in *Caroli Clusi Atrabatis Rariorum Plantarum Historia* (Figure 5; page 6). His illustration includes two plants; one with two flowers in bloom and one plant with two seed pods (Figure 6; page 7). His name for the plant is *Elleborine recentiorum* (Clusius 1601). A few of the many other names in use are *Elleborine ferruginea*, *Alisma*, *damasonii species quibusdam, sive D. Marie*, *Calceolus marie*, and *Sigillum/Sancte Mariae* (Figure 7; page 7). (Cribb 1997; Jacquet 1994) How confusing it must have been to have these disparate names referring to the same plant!

CONFUSION OF NAMES

It is clear that botanical science was beginning to come out of the dark ages and that the invention of the printing press facilitated the process by allowing widespread communication. However, as is evident from the names we see above, each author gave plant's names that meant something to him, but obviously not others. In the list above, Gessner's term, *Alisma*, refers to a water plant. Did Clusius consider the lady's slipper to be a diminutive Hellebore? With no agreed upon rules yet in place, the whole notion of names, that is communication between one person and another, was very muddled. Many of the names were actually multiple word descriptives, known as polynomials, while others were two word labels. With no rules to govern the process of nomenclature, anarchy reigned. This confusion was only rectified in the mid eighteenth century, when Linnaeus proposed, and the scientific world adopted, his binomial system. We will continue the discussion of botanical nomenclature later in the article.



Figure 1. Conrad Gessner. Swiss theologian, physician and naturalist who first described slipper orchids in his book *De Hortus Germaniae* in 1561.



Figure 2. Rembert Dodoens, a 17th Century Flemish physician/botanist, who published the first engraving of a lady's slipper.



Figure 3. Title page of Dodoens's text that illustrated a lady's slipper for the first time.

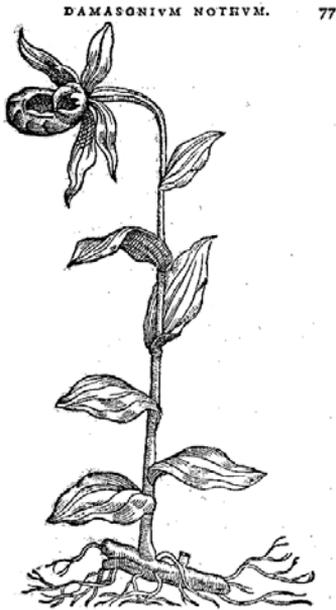


Figure 4. Illustration of *Cypripedium calceolus*. Note Dodoen's name *Damsonium nothum*.

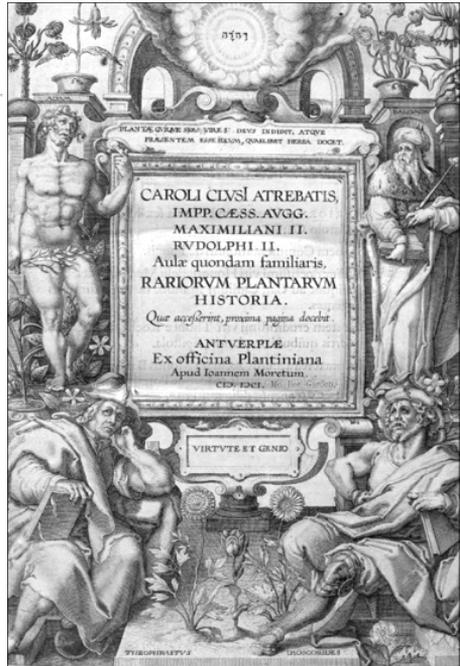


Figure 5. Title page of Carolus Clusius' (Charles De L'écuse) *Atrebatibus Rariorum Plantarum Historia*, published in 1601.

It is interesting that at the same time that more scientific investigation of botany was gathering steam, there were still respected authors publishing theories of spontaneous generation of orchids from the spilled semen of livestock (Wehner 2006). Most writers of this era did not believe orchids produce seeds and the mechanics of orchid pollination was unknown (Reinikka 1995).

INCREASING SLIPPER ORCHID KNOWLEDGE AND THE TRANSITION TO THE NEW WORLD

Until the seventeenth century, the only slipper orchid known to Western European botanists was the yellow slipper orchid now known as *Cypripedium calceolus*. With the discovery of the New World new species were discovered and samples were sent back to Europe for horticulturists to grow and scientists to study. Although the New World provided the material, the recognized botani-



Figure 6. Engraving of *Cypripedium calceolus* in Clusius' book. This is the first illustration of lady's slipper seed pods.



Figure 7. Until Linnaeus published his binomial system of biological classification, plant names varied widely, as is evident in Figures 4, 6 and 7.

A Social History of North American Slipper Orchids

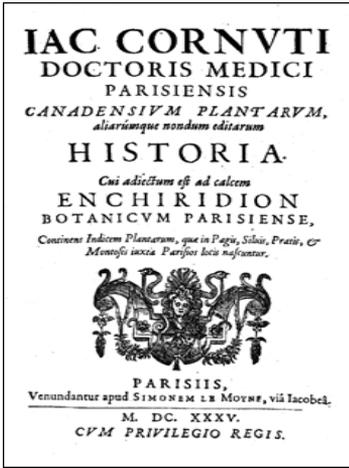


Figure 8. Jacob Cornut published the first botanical text devoted to the new world in 1635.

Canadensium Plant. Historia. 205
CALCEOLVS MARIANVS CANAD.

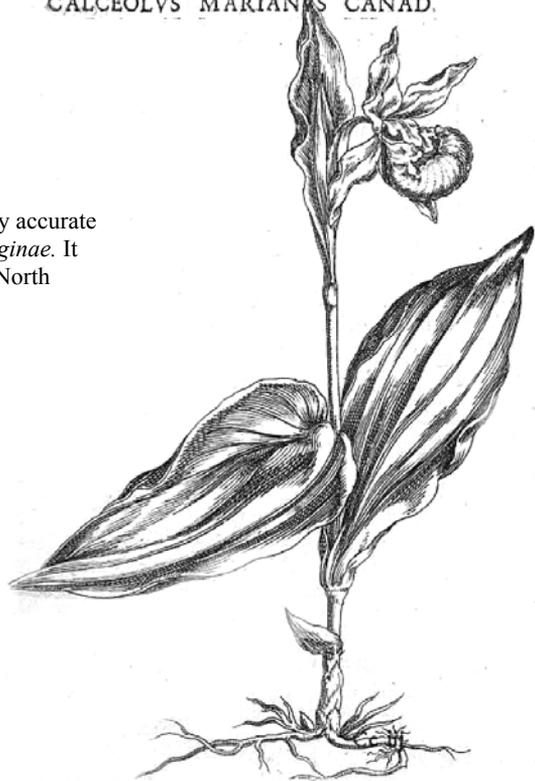


Figure 9. Cornut's remarkably accurate engraving of *Cyripedium reginae*. It was the first illustration of a North American slipper orchid.

cal expertise and publishing houses remained in the Old World, in part because the Old World was where the market was.

The first North American lady's slipper to be described and portrayed was *Cypripedium reginae*. Jacob Cornut (Figure 8; page 8) published his account in *Canadensis Plantarum* in 1635, naming the plant *Calceolus marianus canadensis* (Figure 9; page 8) (Cornut 1635). A physician by profession, he never set foot in North America. The plants he described were primarily from the Royal Gardens and the Medical School gardens in Paris (Dickenson 1998).

The first person to mention *Cypripedium* seeds was John Parkinson (1567-1650), an Englishman who became apothecary to James I and eventually botanist to Charles I. His book *Paradisi in sole Paradisus Terrestris*, published in 1629 (Figure 10; page 9), contains in his description of *Cypripedium calceolus* "...the seede is very small, very like unto the seede of the *Orchides* or *Satyriions*, and contained in such like long pods, but bigger..." This 648 page book was the earliest important horticultural book. And what a clever title (*Paradisi in sole* = Park-in-sun; a play on his name). We should also note that he claims: "There is no use of these in Physicke (botanical medicine) in our days that I know" (Parkinson 1629). In 1640, a year after his death, his *Theatricum Botanicum* or a Herball of a Large Extent was published. In it Parkinson depicted and described a North American slipper orchid that we know as *Cypripedium reginae*. Labeling the plant, "*Calceolus Marie*. Our ladyes Slipper" and to the side of the illustration, "*Americanus*," referring to its origin (Figure 11; page 11). He describes the plant as "A sort thereof hath beene brought from the North parts of America, differing onely in being greater both in stalkes, leaves and flowers, which



Figure 10. Title page of Parkinson's monumental *Herbal* (1629), describing nearly 800 plants

are not yellow but white, with reddish strakes through the bellies of them” (Parkinson 1640; Cribb 1997). Reinikka incorrectly attributes this description to *Cypripedium acaule* (Reinikka 1995). In addition Parkinson seems to be the first to connect slipper orchids with other orchids (Cribb 1997).

If Parkinson’s illustration looks similar to that published by Dodoens eighty years earlier, it is not a unique occurrence. It was common practice through the eighteenth century for woodcuts and engravings to be used over and over by different authors. As interest in the New World intensified and the desire for new plant material increased, the next phase of our story of North American slipper orchids brings us to Virginia and to a relatively new breed of naturalist.

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3. *Calceolus Mariae.* Our Ladies slipper.



Figure 11. Parkinson's image of the North American *Cypripedium reginae*, from his 1840 Herbal, *Theatrum Botanicum*.

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Slippers of the Spirit

The Genus *Cypripedium* in Manitoba

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The orchids of the genus *Cypripedium*, commonly known as lady's-slippers, are represented by some forty-five species in the north temperate regions of the world. Six of these occur in Manitoba.

The name of our province is aboriginal in origin, borrowed from the Cree words *Manitou* (Great Spirit) and *wapow* (narrows) or, in Ojibwe, *Manitou-bau* or *baw*. The narrows referred to – are the narrows of Lake Manitoba, where strong winds cause waves to crash onto the limestone shingles of Manitou Island. The first nations people believed that this sound was the voice or drumbeat of the Manitou.

A look at the geological map of Manitoba reveals that the limestone bedrock exposures of Manitou Island have been laid down by ancient seas and underlies all of southwest Manitoba. As a result, the substrates throughout this region are primarily calcareous in nature. The Precambrian or Canadian Shield occupies the portion of Manitoba east of Lake Winnipeg and north of the two major lakes, to Nunavut. Granitic or gneissic in nature, these ancient rocks create acidic substrates. In the north, the Canadian Shield adjacent to Hudson Bay forms a depression that is filled with dolomite and limestone strata of ancient marine origins.

With a geological map of Manitoba in hand, along with a plant hardiness map and an understanding of the ecological preference of each of the *Cypripedium* species, one can establish a reasonable probability of the range for our six indigenous lady's-slippers.

CYPRIPEDIUM ACAULE, THE PINK LADY'S-SLIPPER

Demanding a low nutrient, acidic substrate, the pink lady's-slipper prefers jack pine forests on a sandy or granite substrate. In mid-June, canoeists on rivers and lakes of the Canadian Shield east of Lake Winnipeg or along the Grassy

River system north and northwest of Lake Winnipeg, expect to encounter this distinctive orchid on portage trails or near their campsites. In southeast Manitoba, the sandy beach ridges that were formed along the shores of post-glacial Lake Agassiz are now dominated by jack pine forest; an excellent habitat for the pink lady's-slipper. Occasionally this orchid is encountered on sphagnum hummocks, deep in black spruce and tamarack bogs.

The epithet *acaule* is from the Greek *a* meaning "without" and *caulis*, Greek for "stem," in reference to the absence of a visible stem. This characteristic accounts for an alternate common name – stemless lady's-slipper. The most popular local name for this species, however, is moccasin flower – an apt description of the labellum or lip of this attractive species.

Unlike our other lady's-slippers, this species has a pendulant lip with an elongated opening hidden by in-curved edges. Only large queen bumblebees are strong enough to force their way into the slipper. The bumblebees soon learn that the effort required to enter the flower is not rewarded with nectar and visits to these flowers are discontinued. As a consequence pollination rates of this orchid are often very low.

As is characteristic of most cypripediums, the pink lady's-slipper is highly variable both in plant size and in flower color. Flowers emerging from the bud are greenish-white; turning shades of pink as they mature. The hue varies from a soft blush pink to a deep rose. White flowered forms, relatively common in eastern North America, are rare in Manitoba. Mysteriously, the flower stems of several populations in 2005 were extremely short; with blossoms barely extending above the reindeer moss surrounding them.

The pink lady's-slipper faces several threats to its survival. Its preferred habitats in Manitoba, especially where they border on rivers or lakes, are being selected as prime recreational cottage development. Over the years, this has led to reductions or complete losses of many populations. Even though this is a species that has proven virtually impossible to transplant, gardeners continue to dig these plants from the wild. To add insult to an already diminishing population, many of the jack pine forests in which it flourishes have been leased for lumbering.

***CYPRIPEDIUM ARIETINUM*, THE RAM'S-HEAD LADY'S-SLIPPER**

The range of this species extends in an arching band from the southeast corner of the province, through the Interlake region across to the Saskatchewan border. Throughout much of its range in North America, the ram's-head lady's-slipper is rare. An exception to this is in Manitoba's northern Interlake region where several sites have an abundance of plants (Figure 1; page 19).

This species is of particular botanical interest; in that it displays the primitive characteristic of having separate lateral sepals - not fused as in other cyripediums. The shape of the pouch along with the placement and appearance of the sepals and petals has led to the fanciful common name of this species. The specific name "*arietinum*" is from the Latin "*arietinus*" meaning "of a ram."

In contrast to the showiness of other lady's slippers, the ram's-head is rather inconspicuous and the small dark flowers blend with the background shadows of its coniferous forest habitat. Careful searching, rather than a casual stroll, will offer the reward of finding this fascinating slipper.

Equally at home in two distinct habitats, the plants have differing growth habits in each. Single stemmed plants predominate in the moist periphery of black spruce and tamarack sphagnum bogs, whereas large clumps of multiple stems are common in spruce or jack pine forests on sand or limestone substrates.

This species has an interesting blooming sequence in Manitoba, with plants of northern populations blooming earlier than those in the south. At the northern extent of its range, in jack pine forests of the limestone karsts, the ram's-head lady's-slipper generally begin blooming in late May. Populations in black spruce and tamarack bogs 275 miles (442 km) to the south, bloom later, around the second week of June. A plausible explanation being that the limestone of the karst region retains heat, while the wetness of sphagnum bogs maintains a cooler substrate.

Pollinated by small bees, this flower has the curious habit of dropping its dorsal sepal over the opening of the labellum once fertilization is complete. Numerous empty seed capsules from the previous year often accompany the new spring growths, suggesting that this species is readily pollinated.

Clear-cut lumbering of jack pine forests in the north and draining of forested wetlands in the south are major threats to the survival of the ram's-head lady's-slipper.

***CYPRIDIUM CANDIDUM*, THE SMALL WHITE LADY'S-SLIPPER**

There is something intangible about the small white lady's-slipper that fascinates everyone who comes in contact with it. The shining white slippers radiate an inner glow that is swift to capture attention, but slow to relinquish it. The scientific name *candidum* is from the Latin *candidus*, meaning "shining or dazzling white."

Particular in its habitat requirements, the small white lady's-slipper prefers mesic to wet calcareous soils in prairies or prairie openings in the wooded grassland (Figure 2; page 19). The present range of the small white lady's-

slipper is restricted to the south central portion of the province where remnant populations, for various reasons, have been spared the plough. Today the largest populations are found in the 5,000 acre (2,023 hectare) Tall Grass Prairie Preserve in southeast Manitoba. Managed by The Nature Conservancy of Canada, this tract of land is protected by a co-operative venture of the Manitoba Naturalists Society, local landowners and the provincial government.

Prior to settlement prairie fires regularly removed excessive thatch and stifled the encroachment of woody perennials, creating an ideal growing environment. Controlled grass fires are now used as the primary management tool in maintaining healthy populations.

In June 2006, at the invitation of a landowner, my wife Joan and I visited our most northerly population of the small white lady's-slipper. The slippers were thriving within hay meadows on a section of land, that aside from removal of a hay crop each year, has not been disturbed. Mowing of the hay in August does not affect the dormant orchids but simulates the natural burning cycle. This prevents a build-up of thatch and deters the encroachment of woody perennials that would be detrimental to the population.

Besides the loss of habitat to agriculture, the small white lady's-slipper faces natural threats to its survival. An early blooming period (late May to early June) makes them vulnerable to late frosts that may damage the flowers and severely reduce the reproductive cycle. The plants themselves are not killed, but their vigor may be reduced, making plants susceptible to disease and insect damage. A more insidious threat comes from hybridization with the yellow lady's-slipper. Environmental changes have encouraged the proliferation of both the large and small yellow lady's-slippers in and around populations of the small white lady's-slipper. With shared pollinators, natural hybridization has resulted in populations with an altered genetic makeup. In 2005, the Manitoba Orchid Society sponsored a research project to study the effects of hybridization. Students from the University of Winnipeg, responsible for this study, found that up to 31% of the two studied populations in the south Interlake may be hybrids.

Thankfully, this species is now protected. In 1981, COSEWIC (Committee on the Status of Endangered Wildlife in Canada) designated it as an endangered species throughout Canada, and in 1992 it received full protection under Manitoba's Endangered Species Act.

***CYPRIPEDIUM PARVIFLORUM*, THE YELLOW LADY'S-SLIPPER**

Common in the southern half of the province, any calcareous substrate; whether it be a prairie meadow, a jack pine forest, a fen, or even a black spruce and tamarack bog – will support the yellow lady's-slipper. It adapts well to

disturbed areas, with roadside ditches now a major habitat in southwestern Manitoba, where little of the original natural environment remains. Because of its varied habitat, the yellow lady's-slipper has the longest blooming season of our cyripediums. On sheltered south facing slopes, blooming begins in late May; while in cool sphagnum bogs of the northern coniferous forest, fresh flowers can be found until mid July.

Two distinct varieties, variety *makasin* (the small yellow lady's-slipper) and variety *pubescens* (the large yellow lady's-slipper) occur throughout its range in Manitoba. The inexperienced or casual observer may not perceive the differences, as both grow in a similar habitat and the flowers are alike in shape and color. Attention to detail reveals their true identity, with variance evident as the first growths emerge. The small variety is the earliest and its shoots are glabrous (hairless) or nearly so. The large variety, emerging about a week later, is as its name suggests, pubescent (covered with soft hairs). Within three weeks the plants begin to bloom and other distinguishing features become obvious.

The flowers of variety *makasin* are small; the lip is 15 to 30 mm in length, with sepals and petals normally a dark reddish to purplish brown color. The petals are most often tightly spiraled with from 4 to 10 twists depending on the length of the petals. The dorsal sepal may have a twist as well. The pouch of *pubescens* is larger, 30 to 60 mm in length; with greenish yellow sepals and petals most often streaked with red. The petals are normally loosely twisted and occasionally, due to environmental influences, are flat. In our experience, the largest flowers i.e., those 50 to 60 mm in length, tend to have a flat bottomed lip and resemble a shoe more than a slipper. *Makasin* has a spicy fragrance that is especially noticeable in the early morning, while the fragrance in *pubescens* is at best faint and often absent.

On close examination of the labellum, a series of crescent shaped, translucent patches are visible in both varieties. It is speculated that these "windows" assist in pollination by tempting pollinators trapped in the labellum with an escape route, leading them upward to an exit past the stigmatic surface and pollinia.

In a suitable environment, the plants of both varieties may develop into large clumps. The small yellow lady's-slipper, and to a lesser extent the large yellow lady's-slipper, will often produce two flowers on a stem. Occasionally the large yellow lady's-slipper will produce flowers that demonstrate the reversion characteristic, similar to that of the ram's-head lady's-slipper, with separated lateral sepals.

In June of 2006, we found a white flowered form of a large yellow lady's-slipper while showing favored orchid sites to friends; Ron Parsons of Daly

City, California and Celeste Lavalla of Warroad, Minnesota (Figure 4; page 19). The discovery was made as we stopped to examine a colony of yellow lady's-slippers in a small triangular patch of grass at the junction of three major highways. We suspect this plant may contain genetic material of the small white lady's-slipper that also occurs in this region.

CYPRIPEDIUM PASSERINUM, THE FRANKLIN'S LADY'S-SLIPPER

Cypripedium passerinum was first recorded in 1920 during Franklin's exploration of the North American portion of the Arctic Ocean. After the death of this famous explorer, Sir John Franklin's widow commissioned a stained glass window as a tribute to her husband. This window now graces the Anglican Church in the town of Churchill, overlooking the shore of the Hudson Bay. Fittingly, some of the largest populations of the Franklin's lady's-slipper in Manitoba, and perhaps in North America, are found within a stone's throw of this church (Figure 3; page 19).

Requiring a cold, long winter, this is the only lady's-slipper in Manitoba's far north. Because of the remoteness of its habitat, few people are familiar with this intriguing orchid. The most southern record of the Franklin's lady's-slipper for the province is in the Duck Mountains located in western Manitoba 150 miles (240 km) north of the US border. Here on the shore of a small cold lake, exists a single colony of 25 - 30 plants. The secret location of this colony was revealed in 2000 by an elderly couple, well into their eighties, who had found this orchid colony some 40 years earlier. They provided a remarkably explicit description of the location. Only a few meters from a popular hiking trail this orchid had gone unnoticed or perhaps simply not recognized by the scores of hikers and fishermen that pass by every spring.

Population numbers of this species, can fluctuate widely from one year to the next. 2006 was an exceptional year at Churchill, with blooming stems of this northern orchid numbering into the thousands.

Both the specific name *passerinum*, and the alternate common name sparrow's-egg lady's-slipper, originate from the resemblance of the spotted white labelum to the egg of a sparrow. The flowers are disproportionately small on a rather leafy plant. In contrast, the seed capsules are large, remaining on their stalks throughout the winter. Great numbers of these stalks often accompany blooming plants, attesting to the strong tendency of this species to self-pollinate. Our only species of lady's-slipper exhibiting this characteristic, self-pollination, occurs as a result of an alignment in the column structure between the pollinia and the edge of the stigmatic surface. The flowers are short lived and the ovary begins to swell before the flower fades.

This plant has an affinity for moist sandy or gravelly locations. The few populations I have observed south of Churchill, are near water. At Churchill, moist meadows are a principle habitat, with the largest number of plants colonizing the willow zone at the periphery of estuarine meadows. Like the yellow lady's-slipper in the south, the Franklin lady's-slipper has adapted to roadside ditches.

CYPRIPEDIUM REGINAE, THE SHOWY LADY'S-SLIPPER

In 1791 Salisbury, an early English botanist, was impressed with this species and assigned the epithet, *Cypripedium spectabile*. *Spectabile* is Latin for "visible" or "conspicuous" and is the root word of "spectacular." The Latin epithet *reginae* "of the queen" had been proposed 3 years earlier and is now the recognized scientific name.

This species is indeed the most spectacular and regal of our lady's-slippers. The plant with broad, emerald green leaves, may reach a height of 3 feet (90 cm) and is topped by one to three large blossoms. The contrast of the rose-colored lip against a background of brilliant white sepals and petals creates a stunning combination. Blooming in late June to early July, after our other slippers are finished, it is impossible to miss against the shadows of its habitat.

The showy lady's-slipper appreciates a wetter habitat than other cypripediums, with the margins of black spruce and sphagnum bogs its usual habitat. Shorter, earlier blooming plants grow in open sunny sites; whereas taller, later blooming specimens are found amongst the trees in the forest. In Manitoba, this species ranges from the southeast, across most of the area west of Lake Winnipeg, to the border of Saskatchewan. In suitable habitat, it is abundant.

Rarely, blossoms are found with a missing labellum – an interesting oddity. More common and more attractive, are the pure white flowers of the *albola-bium* form (front cover). A fen, with the largest numbers of this form, has recently been designated as the "Brokenhead Wetlands Ecological Preserve."

CONSERVATION OF OUR LADY'S-SLIPPER ORCHIDS

Dwindling populations and shrinking habitat of the small white lady's-slipper, and other rare fauna and flora species, is of concern to the provincial government and conservation organizations.

In response to this concern, the Government of Manitoba has enacted legislation and has established an initiative to protect endangered and threatened species. The Endangered Species Act makes it illegal to disturb or destroy an endangered species and its habitat. The Protected Areas Initiative offers security to unique habitats and is responsible for establishing Ecological Reserves, Wildlife Management Areas, Provincial Parks, National Parks and private Conservation Agreements.

Figures to accompany “Slippers of the Spirit” by Lorne Heshka.
Figures: Lorne Heshka. 1. *Cypripedium arietinum*; 2. *Cypripedium candidum* in prairie habitat; 3. Characteristic short, fat seed capsule of *Cypripedium passerinum*; 4. white form of *Cypripedium parviflorum*

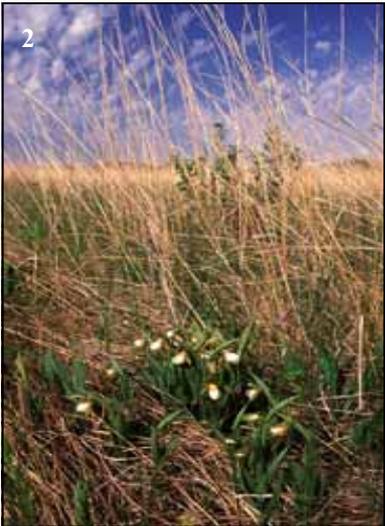




Figure 1. by Kathleen Garness and Figure 2. by Pat Harris — *Cypripedium candidum*



Figure 3. by Lorne Heshka —
C. ×andrewsii

Figure 4. by Charles Sheviak — *Cypripedium ×andrewsii* nothovar. *andrewsii* [*C. candidum* × *C. parviflorum* var. *makasin*] commonly has the dark sepals and petals of the yellow parent, but sometimes variable lip color. In this clone, lips are pale yellow when the flower opens, but change to white within a few days.



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

Figures: Tom Nelson. 13. *Platanthera yadonii*; 14. Close up of *Platanthera yadonii*; 15. *Piperia transversa*; 16. *Piperia colemanii*; 17. *Platanthera yosemitensis*.



Organizations like the Manitoba Naturalists Society, the Manitoba Orchid Society, and Native Orchid Conservation, Inc.(NOCI), have developed and supported conservation oriented programs. These programs include the purchase of critical habitats, the monetary and practical support of University students involved in native orchid research projects, and working with timber harvesters in identifying and excluding important orchid habitats from cutting.

In a unique approach to orchid conservation, NOCI has published “Orchids of Manitoba,” a field guide with a strong conservation theme. The objective of this book is to introduce native orchids to the public; with the anticipation that as individuals become familiar with these fascinating plants, they will insist on protecting them.

Over the past several decades, great strides have been made in protecting the six *Cypripedium* species in Manitoba. Stress placed on the environment, by resource demands of an ever increasing population, will create new challenges. The responsibility of ensuring that future generations will have the privilege of enjoying these “slippers of the spirit” is in our hands.

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Thank-you to Dr. Richard Staniforth of the University of Winnipeg for reviewing this article and suggesting changes, and to my wife Joan who so diligently searches out subjects for my photographs.

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Technical Descriptions of *Cypripedium* Species

Three different *cypripedium* are described. Others will follow in subsequent editions.

Cypripedium guttatum (front cover)

Cypripedium candidum (Figures 1 and 2, page 20)

Cypripedium × *andrewsii* (Figures 3 and 4, page 21)

Cypripedium × *andrewsii*

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Nomenclature: *Cypripedium* × *andrewsii* A. M. Fuller was first published in *Rhodora* 34(402): 100-101, f. 2-4. 1932. It was named after Dr. E. P. Andrews of Portage, Wisconsin, who first brought attention to this hybrid.

Description: *Cypripedium* × *andrewsii* is a naturally-occurring hybrid between *Cypripedium parviflorum* and *Cypripedium candidum*. For a full description of this hybrid and other hybrids between its parents and other species, see treatment in *Flora of North America North of Mexico*, cited under *Cyp. candidum*, elsewhere in this NOC volume. Plants are 16-40 cm tall, 1-2-flowered, leaves oval-lanceolate, acute; sepals and petals greenish, much suffused with madder-purple; sepals ovate-lanceolate, 25-37 mm long; petals lanceolate, 30-40 mm long; lip, 20-25 mm long, conspicuously striped on the interior with violet. Staminiodium orange-yellow, triangular to semi-triangular, 4 mm wide by 9 mm long, blotched with purple. This hybrid usually exhibits morphology and color intermediate between those of the parents. Lips are generally ivory, white or pale yellow; lips can be yellow when the flower first opens, then gradually fade to the more typical white or cream color. Different flowers on the same ramet, therefore, may sometimes exhibit a variety of lip colors. *C. parviflorum* var. *makasin* frequently contributes dark coloration of its petals and sepals to *Cypripedium* × *andrewsii* (see Figure 4, page 21 *Cypripedium* × *andrewsii* not-hovar. *andrewsii*).

Range: Midwestern states to southern Canada: Illinois, Indiana, Michigan, Minnesota, North Dakota, New Jersey, Ohio, Wisconsin; in Canada, Manitoba and Ontario.

Blooming season: May through July (in northern parts of range), coincident with its parent species.

Habitat: Primarily found in locations that harbor both parents: mesic to wet calcareous prairies, fens, woodland edges abutting mesic prairies, shaded dunal swales, and calcareous roadside and railway ditches.

Conservation status: Critically imperiled in Illinois and Ontario, CA; its status as a natural hybrid prevents listing in several other states which do not recognize it as a species of concern but it is rare throughout its range.

Threats: Habitat loss due to fragmentation through agriculture and development, suppression of fire, incursions by invasive species, especially reed canary grass (*Phalaris arundinaceae*), dogwood (*Cornus* sp.) and buckthorn (*Rhamnus* sp.), changes in hydrology, loss of pollinators and environmental challenges to the obligate mycorrhizae that support this species are all responsible for its decline. See article below by Worley, et al. describing how hybridization between *Cypripedium parviflorum* and *Cypripedium candidum* may cause loss of parent species if the naturally-occurring hybrid *Cypripedium ×andrewsii* becomes dominant in the habitat.

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Cyripedium candidum

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Nomenclature: *Cyripedium candidum* Muhlenberg ex Willdenow, Sp. Pl. 4 (1): 142. 1805.

Note on the international connections and history of the nomenclature of this orchid: C. L. Willdenow was Director of the Berlin Botanical Garden from 1801 until his death in 1812. Because of Willdenow's varied and wide-ranging publications his herbarium was, along with Kew Gardens,' one of the largest collections in its time. The North American species *Cyripedium candidum* was first described by the German, Karl Ludwig Willdenow, in 1805, from a collection by the American, Gotthilf Heinrich Ernestus Muhlenberg in Pennsylvania. Muhlenberg (1753-1815), son of Heinrich Melchior Muhlenberg, patriarch of the Lutheran church in America, was a botanist contemporary of Meriwether Lewis, who helped Lewis become familiar with the preservation of botanical specimens and their seeds, for his cross-continent expedition. The type specimen for this orchid is from Dillerville Swamp, Lancaster County, PA and resides in the Philadelphia Natural History Museum.

Range: northern Alabama to southern Canada, wet to mesic tallgrass dolomite-based prairie and calcareous fens primarily. Southern parts of Man., Ont., Sask.; also historically present in Ala., Ill., Ind., Iowa., Ky., Md., Mich., Minn., Mo., Nebr., N.J., N.Y., N.Dak., Ohio, Pa., S.Dak., Wis.

Blooming season: April (south) through July (in northern parts of range).

Habitat: mesic to wet calcareous prairies, sedge meadow edges, fens, calcareous roadside and railway ditches

Description: Plants erect, 11–40 cm. Leaves 3–4(–5), on proximal or middle portion of stem, alternate, erect-ascending; blade lanceolate or elliptic to oblanceolate, 7–20 _ 0.9–5.3 cm. Flowers 1(–2); sepals green to pale brownish yellow, usually spotted and striped with reddish brown or madder; dorsal sepal ovate to ovate-lance-acuminate, 15–35 _ 7–13 mm; lateral sepals connate; synsepal 13–35 _ 7–15 mm; petals spreading to somewhat deflexed, same color as sepals, spirally twisted or spiral-undulate, lanceolate to linear-lanceolate, 23–46 _ 3–5 mm; lip white, obovoid or oblance-ovoid to oblance-fusiform, 17–27 mm; orifice basal, 10–15 mm; staminode lanceoloid or oblong-lanceoloid to ellipsoid. Leaves and stems slightly pubescent.

(Flora of North America Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 15+ vols. New York and Oxford.)

Cypripedium candidum is state-listed variously as endangered, threatened, or as a species of special concern throughout its range. It is listed in Canada as N2, or endangered. Globally, however, it is listed as G4 (apparently secure) because there are protected sites across its entire range. It is a perennial, with horizontal, wiry-rooted rhizomes growing a few centimeters below the surface of the soil, and hence resistant to most prairie fires. It is shade-intolerant and therefore requires substantial management for invasive and woody species. Habitat loss due to fragmentation through agriculture and development, suppression of fire, incursions by invasive species, especially reed canary grass (*Phalaris arundinaceae*), dogwood (*Cornus* sp.), leafy spurge, St. John's wort and buckthorn (*Rhamnus* sp.), changes in hydrology, loss of pollinators and environmental challenges to the obligate mycorrhizae that support this species are all responsible for its decline.

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Cypripedium guttatum

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Description: Plants, 12–35 cm. Stem pubescent, two sheaths around lower portion. Leaves 2 (rarely 3), mid-stem, alternate to nearly opposite, glabrous above, pubescent along veins beneath, wide-spreading, narrowly obovate to nearly circular, 5-15 x 2.5-8 cm. Bract, semi erect, ovate, ciliate, 1.5-3.5 cm. Flowers solitary, erect; dorsal sepal, white with border the same color as body splotches, and similarly colored irregular spots beneath, leans over lip, ovate to nearly orbicular, 12-28 x 6-19 mm; lateral sepals joined, forming synsepal 12-21 x 3-8 mm; lateral petals spreading, lance-like with constriction near apex, 10-20 x 4-9 mm, slightly shorter to equaling lip, inner surface spotted; lip similarly colored, nearly globular to obovoid, 15-30 mm, orifice facing upward, slightly out-turned, slightly thickened margins 10-24 mm; staminode oval to oblong, edges upturned.

Nomenclature: Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 251. 1800. *Guttatum* is from the Latin meaning spotted.

Popular names: Spotted Lady's Slipper; Alaska Lady's Slipper.

Range; Korea, Eastern Europe, Siberia, Tibet, Bhutan, China, Japan, Western North America. In North America, Alaska, Yukon and Northwest Territories.

Blooming Season; June – July in North America. Individual flowers bloom 10 days – two weeks.

Habitat: Moist to dry open deciduous and spruce forest, tundra, meadows, scree, 0-800 m, (Sheviak 1993) In Asia, - 4100 m (Cribb 2007)

Pollination: Studies in Yunnan province, China identified several *Lasioglossum* spp. (Sweat bees) to be pollinators. (Bänzinger 2005.) Bees, bumblebees, small wasps have also been reported as pollinators in Asia. (Vakhrameeva 2008)

Discussion:

Originally described by Linnaeus as a variety of *Cypripedium calceolus* (Jarvis 2009), this species was later described as *C. guttatum* by Swartz based on a

collection from Siberia. It is one of three North American Lady's Slippers found within the Arctic Circle.

With a range of over five thousand miles, *Cypripedium guttatum* is the most widespread of all our Lady's Slippers. A solid white form, *forma albiflorum*, has been reported from Asia (Vakhrameeva 2008).

Reproduction is primarily vegetative. Fruit set is generally low. Often found in large clones of over 100 shoots. (Vakhrameeva 2008)

Natural hybrids occur between this taxon and *Cypripedium yatabeatum* Makino, known as *Cypripedium* × *alaskanum* P.M. Br.

Plant production from seed is commercially possible, and reputable growers in North America produce and offer plants of *C. guttatum* for sale. (Mathis 2005; Steele 1996; NOCC Source List 2007)

Investigators have discovered that *Cyp. guttatum* produces 60 volatile chemicals, (Barkman 1997) proving that the attraction of pollinators is indeed complicated (Stoutamire 1967). Some of these chemicals may protect the plant from predators. (Van der Cingel 2001) Similar to other *Cypripedium* species, the glandular hairs that produce these chemicals are irritating to some. Although various parts of the plant are reportedly used medicinally in Asia (Cribb 2007) no mention of its use is made by native North Americans (Moerman 1986; Garibaldi 1999).

There is little overall conservation threat to *Cypripedium guttatum*, given its extensive and holarctic range and its propensity to form large colonies. In isolated portions of its range, Kazakhstan, for example, habitat destruction for development resulted in placing it on the endangered list. (Vakhrameeva 2008) In North America its status is presently secure.

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A Family Orchid Vacation to the Western United States

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Part III¹

It was July 16 and today I was meeting Ron Parsons and his friend Mary Geritson – whom I had also met at the Native Orchid Conference last summer – at an area in the Six Rivers National Forest near Onion Mountain for a day of botanizing. Jackie and the kids were very happy to stay at the motel and play in the pool. Anything to stay out of the car! I got up very early and drove east out of Arcata into the Klamath Mountains. It was 50 degrees and foggy on the coast, but as I climbed up into the mountains the fog burned off and by the time I got to the rendezvous site, the temperature was hovering in the mid-nineties. In California the coastal range traps all the fog and moisture on the coast, creating an ideal environment for the redwoods, while the interior is dry and hot.

Ron and Mary soon showed up and after loading my gear into their car, we started up a gravel forest road to see what we could find. The Onion Mountain area is well known for its lilies, and several species of orchids grow there as well so I was quite excited. We soon found a few prime specimens of *Piperia candida* and lots of *Goodyera oblongifolia* still in bud. *Goodyera oblongifolia* is one of the more common orchids in the mountain west and I had seen a lot of it growing up in northern Utah and western Wyoming and more recently on the Bruce Peninsula in Ontario, but this species is at its best in the mountains of California. The plants here were giant-sized, nearly twice as big as what I was used to seeing in other parts of the country.

We kept driving up the road and soon started seeing lilies. Ron was worried because it was a drought year, but his fears were unfounded and the lily parade was fantastic. Giant 3-4 ft tall specimens of *Lilium washingtonianum* (Washington lily) soon began appearing along the roadside. Named after Martha Washington, not the state of Washington, these stunning pure white lilies were present in both the normal variety and var. *pupureum*, which is purplish. Next we saw *Lilium rubescens* (redwood lily) a smaller but still beautiful species. When we reached the highest point of the road at around 4,100 ft, we

1. Part I was printed in Volume 7 (2). Part II in Volume 7 (3). Other parts will follow in subsequent issues.

started seeing *Lilium bolanderi* in great numbers. Lots of *Lilium kellogii* and a few *Lilium pardalinum* were growing in a more forested area further on, along with a few past-prime *Cephalanthera austini*. Ron had been excited to show me a good site with dozens of *Corallorhiza mertensiana* but they were well past-bloom. He was surprised, since they were usually in bloom on this date. We finally tore ourselves away and drove back down out of the mountains and as we said our goodbyes I thanked Ron for showing me an incredible place that I never would have found by myself. I would be seeing him in two weeks for orchid hunting in Pennsylvania and New Jersey – one good turn deserves another! I then made the drive back to Arcata, happy to have spent a great day with two like-minded individuals.

It was July 17 and we were headed south to Monterey. We wanted to spend time in San Francisco, so we got up at the crack of dawn and hit the road. Ron had told me about a *Spiranthes porrifolia* site located in the coastal range along a highway a little south of Arcata that went east to the Interstate, so we left the redwoods behind and headed up into the mountains on that road. He had warned me that it was narrow and slow, and he wasn't kidding. After following the narrow, winding road for hours, we finally reached the appropriate spot only to discover that the roadside had been recently mown and there was nothing there ... oh, the plight of the orchid hunter! We continued on and did eventually find a seepage area with lots of *Platanthera dilatata* and the best specimens of *Lilium pardalinum* that we saw on the entire trip, which was some consolation for the missing *Spiranthes*. When we reached Redding and the Interstate – 165 miles later – it was 105 degrees!

We got to the Golden Gate Bridge by 4 p.m., much later than I had hoped. There was a good chance of seeing the very showy *Piperia elegans* on the Marin Headlands near the bridge so we took that exit. Incredible scenery! The wind was whipping the fog in and, as we watched, the bridge became totally obscured from view. The orchids were not to be found; we were probably a little too early in the season. I was disappointed as we had not managed to find this very desirable species yet and this was probably our last chance. Oh well, a good reason to come back.

Then it was across the Golden Gate to the charming “City on the Bay.” We headed to the Exploratorium, an interactive science museum, which Johanna and Christina really enjoyed. Then it was off to Fisherman's Wharf where I treated the family to a sumptuous seafood feast as a thank you for tolerating their orchid-crazed father, who had dragged them nearly to Timbuktu while searching for *Spiranthes*. We reached our motel in Monterey, where we would thankfully be staying for 3 nights, at 11:30 p.m.

My brother Eric and his neighbor Bill Oblock were driving out from Utah to meet us in Monterey on July 18. Eric had wanted to join us on a family “orchid outing” and he and Bill were already camped in the vicinity, awaiting our arrival. Their wives regrettably couldn’t come, so they were having a boy’s weekend out. Eric has been to Monterey many times and had been extolling its virtues to me for months. He would be our tour guide for the next two days.

Thanks to Eric and Bill’s intervention, today was a non-orchid day and was spent sightseeing. It was actually sunny which was a relief. Foggy, overcast days are the norm for the northern California coast and we had certainly seen our share. There is something about the quality of the light in Monterey that is unique. The blue waters of the bay and matching azure-blue skies, coupled with the craggy coastline that is dotted with bonsai-like Monterey pines, all go together to create a setting that has attracted landscape painters and photographers for generations.

The bulk of the day was spent at the fabulous Monterey Aquarium, an unforgettable experience for everyone. It was then off to a fresh seafood dinner at a great Italian restaurant on Fisherman’s Wharf, after which we drove south along the Pacific coastline to show the girls the pounding surf crashing into the rocks. A magical place!

Eric and Bill picked us up at our motel on July 19 and without wasting any time we set out to locate a site that Ron Parsons knows about for *Piperia yadonii* (Yadon’s piperia) an orchid species endemic to Monterey County. Designated as an endangered species by the United States government in 1998 and rated G2, or imperiled, the major threat to its survival is habitat loss from land development. Yadon’s piperia is confined to a handful of sites in the coastal area of north Monterey County — primarily the Del Monte Forest on the Monterey Peninsula — which was where we were headed today. The site is located in the San Francisco Bay (SFB) Morse Botanical Preserve, which was created in 1972 to protect the Gowen Cypress and several other endemics when the area was threatened with development. The preserve is accessed from the famous “17 – Mile Drive,” a private toll road that winds through the scenic town of Pebble Beach and passes some of the most expensive real estate in the country.

It was a remarkably easy orchid-hunt; after paying the toll – one of the few times we’ve had to pay to see an orchid – we went a mile or two on the drive, turned off on the appropriate road and immediately saw many prime specimens of *P. yadonii* right on the roadside (Figures 13 and 14; page 22). Growing in a forest of Monterey pine (*Pinus radiata*) and Gowen’s cypress (*Cupressus goveniana* ssp. *goveniana*) the tall, leafless, densely flowered greenish-white flower spikes really stood out.

The first plants we found were not that tall – maybe 12-20 inches. As is often the case, I spent a long time photographing this group only to drive a few hundred feet more down the road where there were more plants that were twice as tall. Bill was a great help as I photographed. A biology major in college who presently runs his own bakery in Logan, Utah, he was fascinated with the orchids and was devouring Ron Coleman's book *The Wild orchids of California* as I worked. While the others explored the area, we set about stabilizing the plants against the strong ocean winds. When the wooden stakes I had brought proved to be too short for the tallest specimen, Bill resourcefully fashioned a wire coat hanger that he had in his camper into the perfect plant stake.

In the spring *P. yadonii* develops a basal rosette of 2 to 3 leaves at ground level. The inflorescence is borne on a single vertical spike ranging from 12 to 55 centimeters in height and appears between late June and early August. By the time the flower is produced, the leaves have typically senesced. The flowers are very attractive when viewed up close. The most easily distinguished characteristic of *P. yadonii* is its bicolored upper sepal and petals. The dorsal sepal is green with white margins. The upper petals, curving toward the dorsal sepal and sometimes touching its tips, are green on the inner half, white on the outer half. As the flowers mature, the column turns an attractive orange, contrasting nicely with the petal and sepals.

The Monterey Peninsula and Big Sur areas are influenced by a marine climate that is pronounced due to the upwelling of cool water from the Monterey submarine canyon. Rainfall is 40 to 50 cm per year, but summer fog-drip is a primary source of moisture for Yadon's piperia and other plants that would otherwise not be able to persist with such low precipitation. The Monterey Peninsula has a high degree of species endemism. Many species reach their northern and southern limits there. The pines and cypresses that comprise the habitat of *P. yadonii* are relic stands that once extended more widely when the climate was wetter thousands of years ago, but have since retreated to small pockets of cooler and wetter conditions along the coast. The vegetation in the SFB Morse Preserve was quite lush; one of the companion plants of the *Piperia* was the lovely *Mimulus aurantiacus* (sticky monkey flower), a real beauty.

After a few hours, the gang convinced me that I had taken enough pictures – really – so I packed up and we continued on around 17-mile drive. Million-dollar mansions fill the area and I can see why the SFB Morse Preserve was so necessary. The orchid site would no doubt be someone's front yard now, if not for the preservationist's efforts. It was then onto the Carmel Valley where we toured a winery and had a superb meal at a local restaurant recommended by the folks at the winery.

Our next destination was the Point Lobos State Reserve, a place that Eric was very excited to show us. Ron Parsons had told me that the uncommon *Piperia michaelii* (Michael's piperia) could be found growing along a trail there, so there was a double attraction. It was after 6 p.m. when we arrived and as we passed the trail heading to the *P. michaelii* site I looked longingly in that direction but Eric insisted – he is a good leavening agent in my life – we should instead go to an incredible place that he knew about called China Cove. It was incredible. A short hike led down to a sheltered cove with pure turquoise-colored water. The girls played in the surf and I actually sat on a rock and relaxed.

As we left the reserve we stopped at the entrance station, and I showed the attending ranger a picture of *P. michaelii* and asked him if he had ever seen it at the reserve. He studied the picture and surprisingly told me that there had been some growing by the ranger's residence but the landscapers had weeded them a few days ago. He told me that the trail that Ron had told me about was under construction and was closed. He suggested that I instead access the area from the highway, which I decided I would do in the morning.

After stopping in Monterey and indulging in some sinful deserts, we bid Eric and Bill adieu. They would be heading back to Utah in the morning and we would point ourselves east for the first time in weeks and head for Yosemite National Park and eventually New York.

It was July 20. I got up early and, leaving the ladies asleep, drove back over to Point Lobos. Accessing the search area via a beach trail, I was having a great time exploring the various trails of the reserve when I met a man who asked me what I was doing in the closed-off area. When I told him I was on an orchid quest, he became very friendly. It turns out that he was an archeologist doing field studies of Native American sites in the reserve. He didn't know anything about orchids but did tell me that if anyone asked what I was doing, to say that I was with him. Very nice! I found what I thought was the trail Ron had mentioned and unbelievably it was being widened so that it would be handicap accessible and there were no orchids anywhere. Not my lucky day.

The park headquarters was nearby so I walked over and was told that "Ranger Chuck" would be the person to talk to. Chuck Bancroft was indeed very helpful. He seemed to like the idea that I had come all the way from New York to find *Piperia* species and, even though he was very busy, he basically dropped everything for a few minutes to help me out. When I mentioned *P. yadonii*, he told me that he had been mentored by Vern Yadon, the former longtime director of the Pacific Grove Museum of Natural History after whom the species was named. He said he had an orchid that had come up voluntarily in his nearby backyard and wasn't sure what species it was. It turned out to be a very tall and robust past-bloom *Epipactis helleborine* (broad-leaved helleborine).

We returned to his office and he found a picture of *P. michaelii* on the internet and Chuck said that yes, that species *used* to grow in the area where the trail had been widened but he hadn't seen any this year. Drat! Chuck told me that I should go over to the State Parks office – about 10 miles away – and speak to Tom Moss, who is the district ecologist for the parks. He said that there were a lot of *Piperia* growing behind the headquarters building that I should check out.

Unfortunately Tom Moss was not in so I went out the back door and was greeted by the familiar spikes of *P. yadonii* growing in a small area of preserved habitat between the building and a parking lot. There were many plants and even more were growing in a larger area to the east of the building. The plants at this location, which was further inland and undoubtedly hotter, were way past prime. I had been lucky to find the prime specimens yesterday. While writing this article I called Tom Moss again and spoke to him at length about *P. yadonii*. He told me that the plants by the office building grow there naturally and that he does his best to keep the state work crews – who don't know a *Piperia* from a stump - and their weed-whackers at bay. He has been successful and he estimates that there are now upwards of 3-4,000 plants growing on the grounds.

As I was looking around, a nice woman came out of the building and asked me if I was the one looking for orchids. She said that she was no expert but had seen what she thought were *Piperia* while walking her dog recently. Armed with directions to the site, I returned to the motel, where the family was awaiting my arrival. It was still only 10:00 a.m. – I had accomplished a lot so far today – so we checked out and headed for the Fisherman's Wharf to do some souvenir shopping. We then headed to the site, where the ladies ate lunch in the car while I went looking for the orchids. I followed an old road into an area forested with Monterey pine and lo and behold, I came upon a large colony of *P. yadonii*. There were about 50 plants growing in an area that was about 20 x 30 ft. Amazingly, as is often the case with wild orchid populations, there were no other plants anywhere close by. Unlike yesterday's site, the whole understory of the forest was quite barren and the orchids were the only thing growing there at all. Tom Moss tells me that he knows this population and it is part of the SFB Morse Preserve.

By this time it was around 2 p.m. so we headed east towards Yosemite and what would turn out to be a bonanza of newly discovered orchid species. We had now essentially begun the trip home and from this point on would be visiting a lot of the same sites that Stan and Paul had visited on their epic western trip in 2007. We soon left the cool coast behind and by the time we reached the Central Valley it was 107 degrees. We reached West Portal and our motel, near the entrance to the park, by 6 p.m.

Our motel was right across the highway from the beautiful Merced River so I awakened early on July 21 and jogged a few miles up the road to enjoy the beautiful scenery. I saw several stunning western tanagers (*Pirango ludoviciana*), one of my favorite bird species, in the lush riparian habitat. It was already in the upper 70s at 7:30, and I could tell that today was going to be another scorcher.

This was our first time in Yosemite and the scenery was, as expected, incredible. We were headed south to Merced Grove to look for *Piperia colemanii* (Coleman's piperia) so we passed by the entrance to Yosemite Valley and then turned south on the perimeter road. As we approached the turnoff to Merced Grove, Jackie yelled out "turnaround, orchids!" It pays to have a copilot with an eagle eye. Growing right on the roadside were three species of piperia: *P. unalascensis*, *P. transversa* and, the object of our search, *P. colemanii*, all in prime bloom (Figures 15 and 16; page 22). I was thrilled, since this was a site that no one seemed to know about. We had directions to a population inside Merced Grove that required some walking; this roadside location was much more convenient. As I photographed Jackie searched the area and found another population of the same three species behind the nearby entrance station to the park.

Discovered by and named after the noted orchid expert Ron Coleman, *P. colemanii* is very similar to the more common *P. unalascensis*, but differs in several respects, the most notable being the shorter spur length and upcurved lip of *P. colemanii*. Ron had seen the plants many times before and had always considered them to be *P. unalascensis* until he found them growing on the same trail and was able to compare the differences. This led to the description of the species in 1993. *P. colemanii* is a California endemic and grows in a narrow strip stretching from the Sierra Nevada in Fresno County to the Cascade Mountains in Siskiyou County. It is found in just 11 counties with 19 known locations and is considered rare. I felt very lucky to be seeing it today. The *P. transversa* at this site were very tall and robust and was in prime bloom. What a great experience – studying and photographing these species in the beautiful setting of Yosemite National Park!

We then spent a few hours exploring the amazing Merced Grove. Miraculously, these giant sequoias (*Sequoiadendron giganteum*) one of the world's tallest trees somehow survived the loggers thanks to people like John Muir and Teddy Roosevelt. In 1864, Abraham Lincoln paused during the Civil War to set aside Merced Grove and Yosemite Valley as a protected state reserve. This has to be one of the earliest instances of land preservation. Thank heavens! Growing as tall as 250 ft with giant reddish-brown trunks and a buttressed base, they are a sight to behold. Some of the trees here are over 3,000 years old.

Yosemite is a busy place in July and today was no exception. We decided to head straight for the other orchid site – which was also on the way to our motel in the town of Lee Vining, California on the east side of the park – and skip seeing the fabled Yosemite Valley. It proved to be a wise choice; there ended up being a bad accident that caused massive traffic tie-ups in the valley and it would have been dark when we got to the site had we tried to see the valley. We'll see the sights another time. We were in the front of the line but still waited for about 45 minutes while they cleared the accident – an RV had gone over the side – and then headed for the site.

The road climbs and climbs and when we reached about 8,000 ft, we went around a curve and I suddenly saw the mountain meadow below the road where the orchids are. I excitedly parked the car and, since this is a very vulnerable site, I left the ladies happily watching a DVD and ventured out into paradise. It was around 4:30 p.m. and the afternoon sun was filling the alpine meadow with a golden glow. It was peak blooming season for wildflowers and hundreds of broadleaf lupine (*Lupinus latifolus*) carpeted the ground near where we were parked. It was a short, steep, rocky descent into the meadow and there was lots of undergrowth so I was glad that the family was happily entertained in the car.

I initially accessed the stream that empties into the meadow where there was a large population of very tall *Platanthera sparsiflora* and some very beautiful *Lilium parvum* (alpine lily). I then bushwhacked my way through the alders out into the meadow and was greeted by an amazing sight – hundreds of prime-blooming *Platanthera yosemitensis* (Yosemite bog orchid) illuminated by the afternoon light (Figure 17; page 22). One of the newest additions to North America's orchid flora, this species was described in 2007 and is very rare, with only nine known sites, all in spring fed areas between 6,000 and 9,000 ft in Yosemite. Not a showy species, it is most notable for the smell –,akin to sweaty feet – that it emits to attract pollinators. A specimen collected by botanist George Henry Grinnell in 1923, who thought it was related to the green bog orchid, was noticed in 1993 by Ron Coleman who went to the site and amazingly found and photographed the plants. He then contacted orchid expert Dr. Charles Sheviak, curator of botany at the State Museum of New York, who initially thought it was related to an existent species in the Rocky Mountains. This opinion was revised when park botanist Alison Colwell was surveying clovers one day and started smelling something foul, which led her to the orchids. Colwell contacted her boss, Peggy Moore, and they dug up a plant and sent it to Sheviak who determined that it was a new species.

I had been intently photographing for awhile when I heard a sound. I looked up and realized that a beautiful doe was grazing in the meadow, about 25 ft away. I turned my camera on the tripod and since I luckily had my 105 mm lens on,

which is a telephoto, I got a good shot of her. Thinking that the deer would run away, I picked up my tripod to move. Instead she lowered her head, flared her nostrils, snorted at me and acted like she was about to charge. “Ok, I’ll stay over here!” was my response and since there was enough *Platanthera* for everyone, I quietly moved in the other direction. My guess is that she had a fawn somewhere nearby. She kept me company the entire time I was there.

I had to search for a bit to locate the other orchid that I was looking for in the meadow. I finally found, in the wettest part of the meadow, seven prime specimens of *Spiranthes stellata* (starry ladies’-tresses) a new species described by Paul Martin Brown, Lucy Dueck and Ken Cameron in 2008. It is common in mid-elevation wet meadows in Yosemite and occurs as far north as southern Oregon and as far south as Tulare Co. California. This orchid has been known for years and was considered to be a hybrid until DNA sequencing was done and it was moved to species status. *Spiranthes* and the green *Platanthera* that occur in the western United States are two of the most perplexing genera in the orchid family and the fact that they hybridize within each genus only complicates matters.

When I had finished photographing I stood quietly for a few minutes and did my best to absorb the mood of the meadow. The still-grazing deer, the orchids, the alpenglow lighting the scene; it was all very magical and I was aware that before I knew it we would be back in New York and this would all be just a memory.

As I have said before, I am very lucky to have a family that patiently waits while I tiptoe through the orchids, sometimes for hours on end. It was almost 7 p.m. by the time I tore myself away from the meadow but the ladies were non-plussed. It was now what photographers call the “magic hour” the hour before sunset or after sunrise when the light is sublime – and we continued on our way, stopping at Olmstead Point perched high above Yosemite Valley, where I got a good shot of the vista with the top of half-dome visible in the distance. We soon passed through the beautiful Tuolumne Meadows and eventually reached Tioga Pass (elevation 9,945 ft) and the park boundary. As we made the steep descent down the eastern side of the Sierras we stopped in the twilight to investigate several large colonies of *Platanthera aquilonis* growing in roadside seeps. We were glad to finally reach our motel after a long but very fruitful day.

The town of Lee Vining and Mono Lake sit on a high desert plateau on the dry side of the Sierras. Mono Lake, which has no outlet to the ocean, is very alkaline and provides critical habitat for several bird species. Paul and Stan had found an incredible orchid site here in 2007 and we were headed there today.

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