

The Native Orchid Conference Journal



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NOC Conference - Manitoba - 2005

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The 4th annual meeting of the Native Orchid Conference Inc. (NOC) was held July 9 to 13, in a peaceful, pleasant conference center situated along the banks of the Red River just north of the city of Winnipeg, Manitoba, Canada (<http://www.mts.net/~stbens/retreat/index.html>). A wine and cheese reception greeted early arrivals on Friday evening. There were posters and book sales during registration on Saturday morning followed by a welcome by NOC President, David McAdoo and Vice-President and local host, Lorne Heshka, who commented that it was an excellent year for orchids. Recent heavy rain had water courses in full flood; the land was saturated and water pools were evident. Wetlands to be visited would be very wet but the native orchids

would be in their prime for organized viewing opportunities which is what delighted enthusiastic participants. We were warned that water would be deep, deeper than rubber boots, which made me content that I would be wearing my old runners instead of boots. There would be mosquito accompanists on field trips also and some mused about their possible role as orchid pollinators. If one was appropriately covered and using repellent, bugs were not a problem (Figure 1).



Figure 1. Graham Giles (UK) was well attired against biting insects while photographing two color forms of *Corallorhiza maculata*.

One mosquito had the misfortune to choose me to bite aggressively and painfully. I collected that specimen with a measured swat which preserved the diagnostic features. I used the following link to identify it as *Ochlerotatus (Aedes) dorsalis* which is characterized by pale colored body scales and a pointed abdomen (<http://biomicro.sdstate.edu/Hildrethm/mosquito/sdmosquito.html#vexans>).

Saturday was dedicated to presentations on the prairie habitat and the rare Western Prairie Fringed Orchid (*Platanthera praeclara*). Tall Grass Prairie, characterized by Big Bluestem Grass (*Andropogon gerardii*) and home to the Western Prairie Fringed Orchid, receives an average 50 cm (20 in) of rainfall annually. Agriculture has reduced this unique prairie habitat of central North America to critical levels. As little as 1% of the original habitat remains.

Donna Danyluk and Ian Ward used a music-synchronized, 12-minute slide program to skillfully portray the peaceful passage through seasons of life on the Tall Grass Prairie. We learned that the poorly drained soils left by the glacial Lake Agassiz are home to aspen parkland prairie where groves of trees and shrubs are interspersed with areas of wet prairie, and how managed burns emulating natural grass fires are employed to reinvigorate the habitat.

Marilyn Latta, Past-President of the Manitoba Naturalist's Society (MNS) <http://www.manitobanature.ca/mbtgrprbr.html> provided a detailed account of how the Tall Grass Prairie Preserve located near Tolstoi, Manitoba, came into being. In 1987, MNS received an Outreach Award to identify Tall Grass Prairie remnants. They created an informative brochure and after three years of intensive work and data collection, proposed that a reserve be created. They identified 1787 hectares (4416 acres) of Tall Grass Prairie, the largest sites being two of 121 ha (300 ac) each. Some of the smaller yet significant sites were found wherever the railroad passes through prairie. Railroad rights-of-way, while only 30 m (99 ft) wide, have historically been subjected to controlled burns which remove woody plants and thatch thus preserving the prairie flora. The Manitoba Tall Grass Prairie Preserve today comprises some 3237 ha (8000 ac).

Dr. Charles Sheviak, New York State Museum, Albany, NY, explained how *Platanthera praeclara* came to be named as a distinct species. He had been looking at dried herbarium specimens, 'flat brown things,' of *Platanthera leucophaea* (Eastern Prairie Fringed Orchid). There was a lot of variation in flower size and number. When he eventually saw two spikes of cultivated specimens blooming side-by-side, he realized that there were in fact two, albeit close, sister species exploiting similar yet geographically separated habitats. Not only were the flowers of one much larger than those of the other but the floral column especially was very different with pollinia and viscidia much

further apart in the western form. The species were likely being served by different pollinators. The Western Prairie Fringed Orchid was published as *Platanthera praeclara* Sheviak and M. L. Bowles in *Rhodora* 88(854): 278-288, 1986. The specific epithet celebrates this orchid's noble stature.

Dr. Richard Westwood (University of Winnipeg) and Christie Borkowski presented an interesting overview of the pollinator relationship with *P. praeclara*. One question being addressed is why the northern population has a lower seed set than that of the south. Is this due to pollinator limitation, low pollinator density, or to pollinator inefficiency? They identified pollinators in Manitoba as two night-flying sphinx moths, the rare Wild Cherry Sphinx, *Sphinx drupiferarum*, and the more common Bedstraw Hawkmoth, *Hyles gallii*. These moths have tongues (probosci) 32 to 39 mm long which is long enough to reach nectar in the partly filled, 45 mm long spurs of *P. praeclara*. Westwood and Borkowski have learned that the sugar concentration of nectar does not change over time but that the nectar level does increase at night when pollinators are active. Ultraviolet illumination at night resulted in more flowers visited which could be a possible management tool to increase pollination. Future investigation of pollinator ecology will include an inventory of moth larval host plants, competing nectar sources, and the effect of artificial light sources around orchid populations.

Dr. Jyotsna Sharma, University of Florida, explained how 75% of the historic populations of *P. praeclara* have been lost over the past 130 years. Little has been known about the mycobionts, population genetics, or how to effectively propagate the orchid. Her investigations in seven US populations have shown that the northern and southern populations have different mycobionts, (*Ceratorhiza* and *Epulorhiza* spp.). Small populations are especially at risk: once genetic diversity is lost, it is lost forever. She has found that individuals in smaller populations are homozygous (more similar) while those in larger populations are more heterozygous (more diverse). Additional research is needed to resolve temporal and spatial differences in genetic diversity.

Nancy Sather spoke about her work at the Minnesota Department of Natural Resources on the recovery of *P. praeclara* in that state. Populations fluctuate widely. Based upon one 19-year tracking study, she has learned that all surviving plants have one dormancy episode or as many as 3 episodes of 1 to 8 years. Flowering plants have higher survival and flower more frequently. There is a 2-year delay from a year of peak seed production to a year of peak recruitment. Periodic prescribed burn every four years or mowing in mid summer are the present management tools. Future studies will focus on the impact of an annual burn, soil type, and on the possible impact of climate change.

Marge From of the Henry Doorly Zoo, Omaha, Nebraska, spoke about their work with micropropagation and population augmentation as conservation

tools. Seeds collected upon capsule dehiscence in September - October germinate poorly (<6%) but some seedlings have been raised to test re-introduction methods. Survival so far has been poor.

The Annual General Meeting of NOC was held Saturday evening followed by two presentations on orchids other than *P. praeclara*. Ronald Coleman, Tucson, Arizona, provided an interesting account of the impact of fire on the 'sky islands' of the Santa Catalina Mountains near Tucson. The Aspen Fire of June 16, 2003 consumed some 85,000 acres. Most orchid habitat was burned. The forest was closed until July of 2004 which precluded observation but in 2004, Ron noted that *Platanthera limosa* had survived upstream where plants were more protected from erosion. *Malaxis soulei* emerged in lightly burned areas, but the population of *Malaxis abieticola* may in the Santa Catalina Mountains have been destroyed as all the known localities were heavily burned. *Coral-lorhiza maculata* and *C. wisteriana* both re-emerged but *C. striata* survival is uncertain. The southernmost colony of *Listera convallarioides* in the USA has had its habitat destroyed because of heavy post-fire run-off. *Dichromanthus (Spiranthes) michuacanus* grew in close proximity to Alligator Juniper (*Juniperus deppeana*) between 5000 and 7000 feet but the junipers are now all dead so the survival of the orchid is uncertain in this region.

Christine Dudding ended an exciting day of lectures with an overview of her plans to study population genetics of *Triphora trianthophora*. The Three-Birds Orchid typically grows on a southeast 60° slope in deep litter pockets under beech (*Fagus grandifolia*). Blooming occurs two to three days after the first cool down in August with the first flowers opening between 10 am and 2 pm. This can be a challenging species to find in bloom. Best wishes to Christine with this study.

Sunday, July 10, was hot and muggy, but enthusiastic participants armed with bug nets, insect repellent, cameras, and lots of water took to the field to visit the Woodridge Bog and the Tall Grass Prairie Preserve, both located about 100 km south of Winnipeg. Many participants also had a copy of the field guide *Orchids of Manitoba*. This 158-page, soft cover, full color volume published by Native Orchid Conservation Inc. was 'hot off the press' and just in time for the NOC field trips. Members of Native Orchid Conservation Inc. had flagged interesting specimens and served as guides. Our group first visited the spruce-cedar (*Thuja occidentalis*) Woodridge Bog. This extensive forested wetland hosts 17 orchids. The Yellow and the Ram's-head Lady's-slippers, (*Cypripedium parviflorum* and *C. arietinum*, respectively) and the Small Round-leaved Orchid (*Amerorchis rotundifolia*) had finished blooming but there were still many Showy Lady's-slippers (*Cypripedium reginae*) in full bloom. Especially interesting were the many small species located just within the forest edge. I was especially pleased to see the Lesser Rattlesnake Orchid (*Goodyera repens*) in flower. The small leafy rosettes were mostly mottled but

there were some with plain green leaves. Others were excited to find several White Adder's Mouth orchids (*Malaxis monophyllos* var. *brachypoda*). We convened at the Ukrainian Museum in Gardenton for a delicious and refreshing lunch of perogies (potato and cheese-filled dumplings), cabbage rolls and salad.

Our afternoon visit to the Tall Grass Prairie Preserve was well worthwhile (http://www.gov.mb.ca/conservation/wildlife/managing/cwhp_tallgrass.html; Figure 2). As we neared the site, we were delighted to spot blooming specimens of *P. praeclara* in roadside ditches. Western red lilies (*Lilium philadel-*



Figure 2. Tall Grass Prairie Preserve sign.

phicum var. *andinum*) dotted the landscape. We did not have to walk far before we found handsome specimens of both species to examine more closely and to photograph. There was a strong wind so some shielding was needed to avoid having a 'motion picture' (Figure 3). Still, the wind blew the mosquitoes somewhere else which was fine for everyone. Care had to be taken when approaching the orchids as there were tiny seedlings at the base of some. Interestingly, none of the inflorescences observed showed signs of pollinator activity. Pollinia had neither been removed nor deposited on stigmas. Before we left a specimen, we fluffed up the grass to restore the spot as best we could.



Figure 3. Claude Poirier and Jyotsna Sharma examine a Western Prairie Fringed Orchid in the Tall Grass Prairie.

Monday, July 11, was a second day of lectures, again with a Manitoba theme but also with some other interesting topics. Lorne Heshka provided an overview of Manitoba's orchid habitat which ranges from prairie in the south to tundra in the north. Of particular interest were the string fen channels of southeastern Manitoba where the Rose Pogonia (*Pogonia ophioglossoides*) is in the northwestern part of its range. We learned that in the Duck Mountains, the Sparrow's-Egg Lady's-slipper (*Cypripedium passerinum*) is in the southern most part of its range. In the northern tundra, where there are shallow lakes over the ever frozen ground, there are 10

species of orchid including the Blunt-leaf Rein Orchid (*Platanthera obtusata*). Ian Ward followed with a photographic discovery of Manitoba's orchids from the widespread *Amerorchis rotundifolia* which usually blooms white with spots but is pink-flowered near Churchill, to the Great Plains Ladies-tresses (*Spiranthes magnicamporum*) which is only found in prairie habitat.

Dr. Charles Sheviak told an interesting tale about his travels to learn more about the real story behind *Platanthera hyperborea* in North America. His investigation has taken him to Labrador, Seward, Alaska, and to Churchill, Manitoba, where the 'green' *Platanthera* spp. are abundant, self-pollinating, and all tetraploid (4N). He pointed out that among the distinguishing features is the shape of the viscidium which in *P. huronensis* is oblong, in *P. dilatata* linear, and in *P. aquilonis* round. *Platanthera huronensis* is of hybrid origin but is now stabilized. *Platanthera hyperborea* described by Linnaeus from Iceland has oblong/linear oblong viscidia. The outcome of this on-going investigation may be quite intriguing: stay tuned.

Roger Turenne of the Manitoba Chapter, Canadian Parks and Wilderness Society (CPAWS) presented an overview of the process to bring into being, a national park representing the Manitoba Lowlands. His video presentation may be seen by clicking on 'A National Park waiting to be Born' at www.cpawsemb.org/. Progress is presently stalled because of local community resistance. Turenne emphasized that citizen knowledge and support is required for all such initiatives.

Doris Ames, President of Native Orchid Conservation Inc. (<http://www.nativeorchid.org/>) related progress made by this 150-member organization (Figure 4). Foremost in the minds of all participants was their impressive field guide to the 'Orchids of Manitoba,' which was launched at the conference.



Figure 4. Doris Ames (right) and Marilyn Light at the Brokenhead Ecological Reserve.

We also previewed a public education video. Of particular interest was the recently established 820-hectare Brokenhead Ecological Reserve south of Lake Winnipeg which we would visit the next day. Twenty-eight of Manitoba's 36 native orchid species grow in this calcareous wetland habitat.

Marilyn Light, North American Region-Orchid Specialist Group, showed the range of native bees that visit the Yellow Lady's-slippers (*Cypripedium parviflorum* var. *pubescens*).

Some bees may be too big and some too small but those having the appropriate thorax depth for a particular flower can be effective agents of pollination. She showed how native bees may see these beautiful orchids. Using an 18A filter, co-investigator Michael MacConaill photographed the flowers with all but ultraviolet light reflectance and absorbance patterns appearing on film. Using a color slide image of the same flower, the images were overlaid and the color shifted 200 nm to the right to accommodate the bee's visual spectrum. The resulting image showed a deep pink flower with a darkened staminode tip where UV light is absorbed.

Dr. Carla Zelmer, University of Manitoba, presented an interesting overview of symbiosis and orchid mycorrhizal associations. She explained that non-green orchids such as the Coralroots (*Corallorhiza*) were holomycoheterotrophs, completely dependent upon partners for carbon. Orchid symbioses may be conditional and may only function under certain environmental conditions. She emphasized our need to know how to favor symbiosis through habitat management.

The conference ended with a useful demonstration of mycorrhizae and how they are isolated. Drs. Carla Zelmer and Jyotsna Sharma showed participants fresh mounts of sectioned roots, fungal isolates, and pure culture techniques (Figure 5).



Figure 5. Dr. Carla Zelmer during the orchid mycorrhizae workshop.

On the last day of the conference, participants visited the Brokenhead Ecological Reserve. Once again, Doris Ames and fellow members had marked interesting orchids. They were present to guide people through a woodland trail and out into a sedge meadow where we saw the White Bog Orchid (*Platanthera dilatata* var. *dilatata*). There are plans to develop a boardwalk which will both facilitate visitor movement but also significantly reduce trampling damage to the fragile forest floor. Within the wooded portion of the reserve were many handsome specimens of the Round-leaved Rein orchid (*Platanthera orbiculata*) (Figure 6). I was delighted to see two color forms of the Spotted Coral-

root (*Corallorhiza maculata*) growing side by side. Although the flowers were past prime and the plants fruiting, they were still quite recognizable as the red and yellow forms. We left the reserve at noon to allow preparation-time to those lucky individuals taking a side trip to the Churchill area.

The 5th Annual meeting of the NOC will be held in Oregon, USA. Carol Ferguson, Southern Oregon University, and Ron Coleman happily announced plans for the event to be held in Ashland, Oregon, June 9-12, 2006. Their informative flyer listed some of the field trips planned to see many of the 14 possible species blooming in June. Details are expected in January 2006. This opportunity is not to be missed.



Figure 6. *Platanthera orbiculata*.

Additional Reading:

Alligator Juniper - <http://www.naturesongs.com/vvplants/alligatorjuniper.html>

Center for Plant Conservation - *Platanthera praeclara* http://centerforplantconservation.org/ASP/CPC_ViewProfile.asp?CPCNum=9293

Lilium philadelphicum var. *andinum* (Nutt.) Ker-Gawl. (syn. *Lilium umbellatum* Pursh).
Western Red Lily or Western Wood Lily is the floral emblem for the province of Saskatchewan and a protected plant both in Canada and in the USA. http://plants.usda.gov/cgi_bin/topics.cgi?earl=plant_profile.cgi&symbol=LIPH

Pleasants, John M. and S. Moe. 1993. Floral display size and pollination of the Western Prairie Fringed Orchid, *Platanthera praeclara* (Orchidaceae). *Lindleyana*. 8, 1: 32.

Species at Risk. Western Prairie Fringed Orchid http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=200



The “Discovery” of *Platanthera praeclara*

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As part of the focus of this year’s conference in Winnipeg, I was asked to discuss how I came to recognize *Platanthera praeclara* Sheviak and Bowles and to discuss the differences between it and *P. leucophaea* (Nutt.) Lindl., the rare but well-known prairie species with which it had been confused. To illustrate the process of discovery, I really need to go back to the beginning:

I am originally from Illinois, and as a boy I collected insects. When I was 9, in the spring of fourth grade, I was out looking for new places to collect. I pulled my way through a thicket of the willow *Salix exigua* Nutt. and emerged out onto a prairie that was a sheet of pink from the shooting star *Dodecatheon meadia* L. At that moment I became a botanist, and within the year I had been introduced to *Calopogon tuberosus* (L.) BSP. and had become much enamored of orchids. By the time I got to the University of Illinois as a freshman, I was itching to do something with orchids in Illinois, and had already begun in high school to rough out a manuscript. At the University I found my first botanical mentor, G.N. Jones. He took me under his wing and advised me that, with regard to orchids, “We know what they are, and we know where they are. What we don’t know, is why they are where they are.” I took this to heart and embarked on an ecological/biogeographic study within a traditional floristic framework. Over the course of several years of literature, herbarium, and field work, I found a number of new county records, some major range extensions, and some really bizarre habitats. It seemed, then, that we really didn’t know where they were.

During the course of this study, I encountered a *Spiranthes* that had been variably treated in the past, but which could not be comfortably accommodated within any recognized taxon. This was my introduction to systematics, and it led to the description of *S. magnicamporum* Sheviak and ultimately to the elucidation of the nature of the notorious *S. cernua* (L.) L.C. Rich. complex. It also showed me the value of studying plants in cultivation over a number of years, because this sometimes disclosed considerable phenotypic plasticity and could thus help in the interpretation of variation seen in the field and herbarium.

While conducting the herbarium work for my Illinois study, I had noticed considerable variation in the size of flowers of *P. leucophaea* (Figure 1; page 13) within Illinois, and to an even greater extent across the range of the species. In

particular, plants in the East--Maine, New York, etc.-- were very small flowered, whereas those from west of the Mississippi were particularly large. Within Illinois, however, it seemed that considerable variation in the herbarium specimens could be explained as preservational artifacts: flowers that were very tightly pressed maintained their original size, whereas those that were not could shrink substantially. I thus dismissed the observed differences as probably not significant, at most perhaps clinal, and I didn't pursue the matter. I did not ignore it, however, and before moving to the East, remembering my experience with *Spiranthes*, I collected a couple live plants from the Chicago area to grow on for observation. As an aside, I might mention that I obtained these plants from the land of a fellow whose house was built in open prairie. He was weeding *P. leucophaea* out of his vegetable garden!

After a few years of watching these plants increase in size and flower number without any other notable change, I was contacted by my old friend and colleague Marlin Bowles, who had been working on the pollination of the plants. He asked if I'd noticed that the more western plants (Figure 2; page 13) were larger-flowered than those we knew in Illinois. I said yes, but related my observations on the role of preservation. But his mention piqued my curiosity. One of my colleagues at the Museum in Albany, an entomologist, was from the Fargo area and knew the plant there; we had talked about it in the past. So I asked him if he could get me a couple live plants sometime, and the next time he went back home, he collected a couple from a roadside ditch. I potted these up and kept them with the Chicago plants.

The next summer the first flowers on the Chicago and North Dakota plants opened on the same day. It was a Sunday morning, and, munching on my breakfast doughnut, I walked out to our patio where I was growing the plants in pots. There, side by side, were the first 2 flowers, and the story was immediately obvious.

For many years the purple fringed orchids, *Platanthera psycodes* (L.) Lindl. and *P. grandiflora* (Bigel.) Lindl., had been a confusing pair variously treated as species or varieties based primarily on rather vague characters like flower size and depth of fringing of the lip. In 1974, however, Warren Stoutamire published the results of his study of the group (Stoutamire, 1974). He emphasized column structure and attendant pollination mechanics. He noted that the dimensions of the comparatively broad column of *P. grandiflora* served to place pollinaria on the compound eyes of lepidopteran visitors, while the much smaller and more compact column of *P. psycodes* affixed the pollinaria to the proboscis. Together with the orientation of the pollinaria necessary to contact the stigma, the mechanics provided a physical barrier to cross pollination, reproductively isolating what were thus clearly two distinct species.

This work was refreshingly clear and unambiguous after the years of obtuse

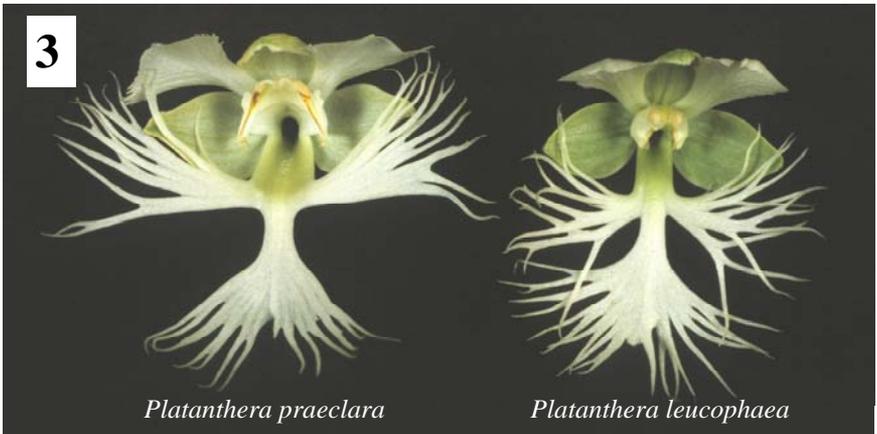
measurement, tedious cytology, and subjective assessment that characterized my work on *Spiranthes*. But it was not really new: The same differences and processes noted by Stoutamire had been reported over a century earlier by Asa Gray (Gray, 1862)! Unfortunately, in the intervening years, this level of attention to critical detail had fallen out of favor as focus shifted to more visible, but unfortunately less significant, features.

So there I was, Sunday morning, standing there with my doughnut staring in amazement at two perfectly distinct species. The pair of flowers mirrored the situation in the purple-fringed species reported by Gray and Stoutamire (Figure 3; page 13). In the smaller-flowered, more eastern plants, the column was small, rounded, and compact, with the viscidia facing each other and closely spaced. In the larger-flowered western plant, the column was large and angular, with prominent rostellum lobes that thrust forward and spread widely so that the viscidia borne at their tips were widely spaced. Here again, two species with superficially similar flowers functioned very differently in pollination. The column of the eastern plants placed pollinaria on the proboscis, while that of the western placed them on the compound eyes. This provided a mechanical barrier to hybridization, and the two species were effectively isolated. In the field of systematics, where the operative question is whether or not groups of plants constitute distinct species, it does not get any better than that. It then took 3 years to get a paper published.

Subsequent study provided a more detailed picture. The plants were well-known to be pollinated by long-tongued sphingid moths and were classic examples of the syndrome known as sphingophily: white-flowered, nocturnally fragrant with fragrance peaking at dusk, and long tubular nectar-bearing spurs. The earliest report of pollination, in eastern plants in Illinois, was by Robertson (1893). He furthermore described the behavior of the moths and the deposition of pollinaria on the proboscis, even providing a measurement of the spacing of the viscidia. In our study, we found the viscidia of eastern plants were spaced only 1.5 to 3 mm apart, whereas in the western the range was 6-7 mm. As in many other orchids, in order for a pollinium to contact the stigma, the stalk bearing it must bend so that the pollen meets the stigma, rather than the anther, of a subsequent flower. Because of the different configurations of the two columns, this movement is different in the two species (Figure 4). In the small eastern column, access to the stigma is very restricted, and the pollinaria accordingly bend forward so that the pollinium will slide between the rostellum lobes. In contrast, the wide-spread rostellum lobes of the western plants require a different movement, and the pollinaria bend either to the right or left, depending on which side of the flower they are from. These movements are obviously necessary for pollination, but they have an additional result: they essentially prohibit hybridization in the wild. A laterally-bent pollinarium from a large column cannot be inserted into the narrow opening of the smaller column, and a forward-directed pollinarium of the small column will likely



Figures 1, 2, and 3 from ‘The “Discovery” of *Platanthera praeclara*’ by Charles J. Sheviak (page 10). **1.** *Platanthera leucophaea* (Nutt.) Lindl. **2.** *Platanthera praeclara* Sheviak & Bowles. **3.** Flowers of *Platanthera praeclara* (left) and *P. leucophaea* (right). Note the very broad column of *P. praeclara* with wide-spreading, angular rostellum lobes, and the much smaller column of *P. leucophaea* with short, rounded, and closely-spaced rostellum lobes.





2005 Native Orchid Conference annual meeting in Manitoba, Canada. **1.** David McAdoo, President of NOC, Inc. **2.** The attendees arriving at Brokenhead Ecological Reserve. **3.** *Platanthera praeclara* inflorescence from above. **4.** A 'strap-leaved' seedling of *Platanthera praeclara*.





Figures 1 and 2 from ‘The Lost Treasure of Panaca Spring: *Spiranthes diluvialis*’ by Carol Siegel (page 21). **1.** Inflorescence of *Spiranthes diluvialis*. **2.** Habitat of *Spiranthes diluvialis*.



Cypripedium reginae



Photo: Jyotsna Sharma

Figures to accompany 'Churchill' by Mike Parsons (page 24).

Amerorchis rotundifolia forma *lineata*



Photo: Mike Parsons

Cypripedium passerinum

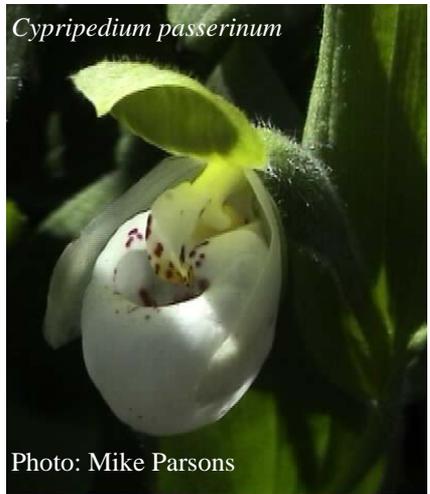
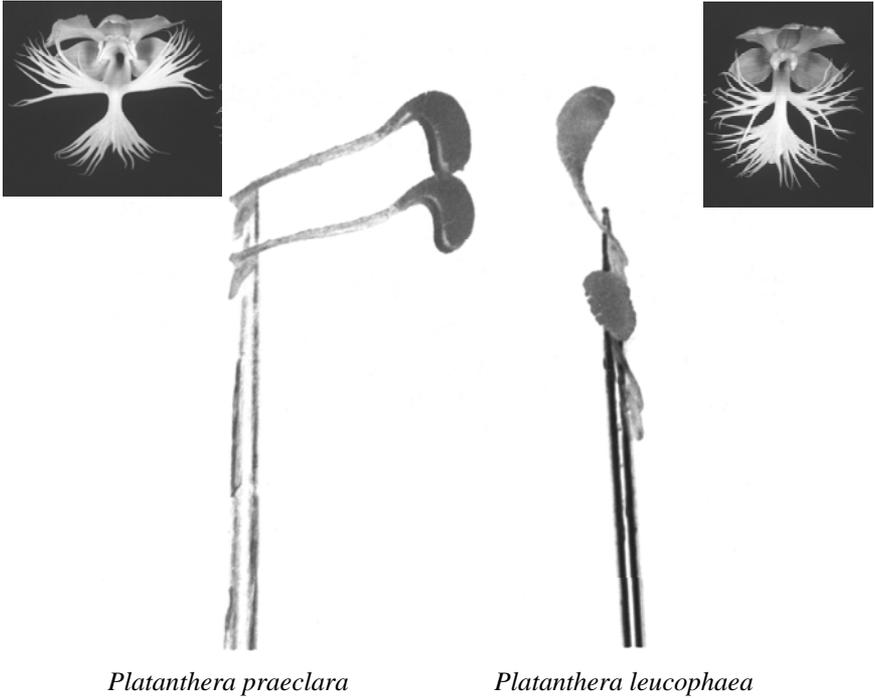


Photo: Mike Parsons



Platanthera praeclara

Platanthera leucophaea

Figure 4. Pollinaria of *Platanthera praeclara* (left) and *P. leucophaea* (right). Two pollinaria of each species were removed with needles and are shown as they oriented themselves after removal. The pollinaria of *P. praeclara* were from the left side of the columns of two flowers (as viewed by a pollinator), and have bent far to the right, putting them in position to contact the stigma located to the right of the left rostellum lobe. The pollinaria of *P. leucophaea* are from the right side of the columns, and have bent primarily forward and only very slightly to the left, enabling them to pass between the rostellum lobes and contact the stigma.

miss the stigma of the large column held proportionately higher above the opening to the spur.

Given that pollination mechanics was the basis for recognizing two species, it was important to clearly document morphological differences that could be used in the herbarium for determination of specimens. This was especially so, since *P. leucophaea* was a current focus of the Federal Endangered Species Office, and it was making its way through the process toward listing as threatened. We were about to divide the species in half. Accordingly, we went to rather extraordinary lengths to demonstrate morphological distinctions and

verify that certain measurements were reliable. We felt the need to go beyond what would be necessary to demonstrate species status to fellow biologists, and thought instead about generating numbers that would be unambiguous to others in judicial proceedings. Accordingly, I measured 13 characters in each of 56 specimens, with the two species approximately equally represented. These were subjected to various statistical analyses that indeed served to demonstrate the completely discontinuous nature of the variation, and furthermore point to key features that could be used in the herbarium for identification. Because of the rarity and conservation status of the plants, it was important that those working to protect the species could reliably identify herbarium specimens and hence obtain locality information from them. This objective was clearly achieved.

Then came an unexpected problem. The paper was essentially written, and I was just dotting 'i's and crossing 't's. One of those remaining details was study of the type specimen. *Platanthera leucophaea* had been collected and described from "Kiamesha, Red River" along the Texas border in present-day Oklahoma. Thomas Nuttall, its discoverer, encountered the plant on calcareous prairies during the course of an 1819 collecting trip in the Arkansas Territory. We had determined the present range of the western plant to be from northeastern Oklahoma to southeastern Manitoba, eastward into Missouri, Iowa, and Minnesota. In contrast, the eastern plant reached its western range limit in eastern Missouri and Iowa. It did not take any great interpretive effort to realize that Nuttall had described the western plant, and so the paper was written on that basis, and we described the eastern plant as new. This was a particularly pleasing outcome for me, because this had always been a treasured plant to me in Illinois, and now I would have the opportunity of describing it. Furthermore, as a current employee of the state of New York, describing a new species from that state might prove to be politically useful. Then the type arrived on loan from the Philadelphia Academy of Natural Sciences. It was the eastern plant.

This was a wholly unexpected and rather baffling situation, and a full year of intermittent archival and literature work was required to decipher it. It's a long and rather tedious story, and I certainly won't go into it here. The basic problem, though, was that Nuttall was known to have lost specimens of other species and, following publication, replaced them with other specimens obtained elsewhere (Stuckey, 1967). I deduced that he might have had access to plants from Ohio, so the big question was, what did he actually find in Oklahoma? This involved tracking down a duplicate specimen at the British Museum (Natural History), and two other collections made at the type locality by a later collector. All were eastern plants, but each of these collections was compromised in one way or another, and none was unequivocal evidence of that species at Nuttall's collection locality. The resolution finally came through archival work that involved digging through John Torrey's correspondence with an

Army Surgeon of the 1840's, and elucidation of the surgeon's military record to determine where he was stationed and hence where he might have collected. In this way it was possible to show that he had collected the eastern species at Nuttall's type locality, thereby substantiating the validity of the Nuttall specimens. It was not what I had expected to be doing when I was munching on my doughnut.

With the surprising determination that Nuttall had in fact collected the eastern plant in southern Oklahoma, I had to redraft the paper accordingly (Sheviak and Bowles, 1986; Sheviak, 1987). It was not exactly disappointing that, rather than describing an old favorite, I would instead describe one of the most spectacular plants in North America. This then left another, much more enjoyable challenge: the choice of an appropriate name. This was a little more complicated than is usually the case, because of the fluid generic concepts in the group. The American species with 3-parted, usually fringed lips were currently included in the large, diverse genus *Platanthera*. In the past, however, all of *Platanthera* was subsumed into a very heterogeneous *Habenaria*. Conversely, all the fringed-lipped species were sometimes placed in *Blephariglotis*, or, more reasonably, those with three-parted lips separated from the others as *Fimbriella*. The significance of such amoeboid genera to the choice of a name stems from the need for the name to be unique across any generic concepts. We had to be sure the name hadn't already been used in *Platanthera*, of course. But we also had to be sure that it had not been previously published under *Habenaria*, *Blephariglotis*, or *Fimbriella*. Furthermore, we had to allow for the possibility that as generic concepts continued to evolve, our American species might be grouped with similar Asiatic species and that such a union might bring in yet additional species described in still other genera. In other words, we needed a name that was not only new in the known genera, but one that would hold up to any future world-wide reshuffling. We needed a name that was both appropriate and unusual, something that was not likely to have been used before in any related genus: "*spectabilis*," "*albiflora*," and the like, and even constructions such as "*longicalcarata*" [long-spurred] and "*camporum*" [of the plains] were likely to have been used elsewhere. This was going to take some work. I'd like to say that my familiarity with the Greek and Roman classics permitted me to draw readily from my readings of Homer, Plato, Pliny, and others. Needless to say, however, that was not the case. After considering numerous combinations of traditional botanical terms, I took to thumbing through a Latin dictionary over lunch. Remarkably, it did not take long to stumble on the word. "*Praeclara*" virtually jumped off the page with its singularly appropriate series of translations: very bright, beautiful, splendid, glorious, distinguished, noble. Furthermore, it proved to have been used only very rarely in all of botanical nomenclature, and never in the orchids. This was clearly THE name.

Working up *Platanthera praeclara*, one of the most spectacular species in

North America, was exciting. I felt truly privileged to do so. I cannot say that it was the product of any great investigative effort, however. In a sense, I was just at the right place at the right time. I know that I was not the first person to see both species. A notable 19th century Illinois collector, E.J. Hill, collected *P. leucophaea* in Chicago and probably near his home in Kankakee; he also collected *P. praeclara* in Minnesota. I was clearly the first person to see them side by side, however, with or without doughnut. With the right background knowledge, it was a simple matter for me to recognize the significance of what I was seeing. What followed was just a matter of filling in the blanks in a standard form. It was a “discovery” in a sense, but one that was so obvious it was just a matter of time before it was noticed. In fact, that such a spectacular species in such a popular group could have escaped notice until the end of the 20th century says a great deal about our knowledge of the North American flora. It seems then, that in fact we really don’t know what they are.

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Photo: Jyotsna Sharma

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The Lost Treasure of Panaca Spring: *Spiranthes diluvialis*

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I met Jim Coyner while enjoying a bowl of clam chowder in a restaurant in Salt Lake City. His orchid society had asked me to speak on “The Sex Life of Orchids,” and we were having dinner together that night. He began passionately discussing his life-long quest to find *Spiranthes diluvialis* (Figure 1; page 15) everywhere he could. No one had seen it in Nevada since the 1930’s, and he had fervently- though unsuccessfully- searched for it there for many years. Wouldn’t it be marvelous to re-discover this threatened orchid!

It’s said that ‘when you are ready, a teacher will appear.’ Our club, The Greater Las Vegas Orchid Society, had long had a passion for this lost orchid, and we, too, wanted to find it. We needed a mentor to show us the way, and there, over a Utah bowl of chowder, he announced himself. Jim, a retired US Fish and Wildlife Service biologist, would join us two years later on our treasure hunt to find *Spiranthes diluvialis*.

On a magnificent summer day, July 30, 2005, six members of our club (Clarice Dean, Myra Glassman, M.D., Gail Harris, Steve Ninemire, Carol Siegel, and Diana Smith) drove three hours north to meet Jim in the Nevada town of Panaca, a quaint Mormon farming community which dates back to the 1860’s. As we approached a mile north of Panaca on the county road, we could hear children splashing and yelling as they jumped and played in the beautiful warm waters of Panaca Spring. The large and constant flow of sweet, warm water from the spring creates a desert oasis in Meadow Valley. Issuing from a fault contact between alluvium and Paleozoic limestone, the water is 85° F and flows from 1800 to 6227 gallons per minute.

Surrounding the spring was a marshy meadow with gorgeous wildflowers in full bloom. The riparian community included lizard’s tail, alfalfa, horsetail, sedges, tall grasses, cattails, sunflowers, and large stands of tall orange Indian paintbrush. The earth was squishy under our feet at the edges of the spring when suddenly Jim came upon a stand of the tall white orchids. Moments later, the rest of our Las Vegas searchers excitedly stumbled upon a large population of at least 75 *S. diluvialis* specimens, some with seed pods already developing. Imagine our delight at finding this treasure thought lost for more than 70 years!

Spiranthes diluvialis is found growing in riparian environments at elevations of 4,000-7,000 ft. in full sun with companion plants of equal or slightly taller height (Figure 2; page 15). The earth at the base of the plant is always damp enough to form a mud ball when squeezed. It is often associated with grasses,

sedges, willows, asters and late-blooming orange Indian paintbrush. Its pollinators are long-tongued bees like bumblebees (*Bombus* spp.) who seek out nectar, and it is thought that an undetermined mycorrhizal fungus must be present in the soil for the orchid seed to germinate and grow.

Spiranthes refers to the spiral rows of flowers and *diluvialis* comes from *diluvium*, flood or deluge, and so is “of the flood,” alluding to the species’ habitat. It is uncommon in arid areas and is thought to have originated in a Pleistocene (1.8 million-11,000 years ago) pluvial period (when there was more rain in the dryland area than at present). It is commonly called Ute’s Ladies’-tresses: “Ute’s” because many populations were found in the Uinta Basin of Utah, on and around the Ute Indian Reservation, and “Ladies’-tresses” because the arrangement of the floral bracts looks like braided hair. It blooms in July and August in moist to wet meadows, stream banks, and marshes. Seeds are shed in September. New growth begins in late September or early October, emerging from the base of the plant as sympodial growth having a green rosette form. The new growth overwinters and develops a flowering plant the following year if conditions are favorable.

Ute’s Ladies’-tresses looks like a tall white birthday candle, up to 20-inches tall, growing from tuberous roots. The flowers are arranged in a spiral around the spike at the top of the stem. Its sepals and petals are oriented perpendicular to the stem, and the orchid has ringent (gaping at the mouth) flowers. The upper stem is somewhat glandular-pubescent. The persistent leaves are mostly restricted to the base of the stem and are reduced to bracts further up on the stem.

It has been found in Colorado, Idaho, Montana, Nebraska, Utah, Washington and Wyoming, but this is the first place it has been found in Nevada in decades. Jim Coyner had searched unsuccessfully for several years in the same place where we found it. We like to think it was our Las Vegas club that proved the charm, but it may have been the heavy Nevada rains this year. This species has the frustrating habit of many *Spiranthes* - inconsistency in the population size from year to year. *Spiranthes* can survive underground until conditions are just right and then and only then will they burst into bloom.

Jim relates, “Most notable is the Cub Creek population in Dinosaur National Monument where populations are closely monitored.” Plant count in this population may vary anywhere from zero to one hundred. I speculate where environmental factors are not favorable for above-ground growth, the plant is kept alive by the symbiotic mycorrhizal fungi providing food to keep the plant alive.

Jim believes that *S. diluvialis* is a pioneer plant that easily establishes in disturbed soils. After an irrigation dam was constructed in the Uinta Basin about

thirty years ago, a population of *S. diluvialis* established itself in the gravel pit area where the gravel was mined for the dam. Moreover, in the Duchesne River, where illegal bulldozing left piles of debris, *S. diluvialis* found a place to grow. Even in areas that have been mowed or grazed, the orchid has found a foothold.

Jim became interested in the orchid while at the US Fish and Wildlife Service after reading Dr. Chuck Sheviak's work on *S. diluvialis*. Jim and his colleague, Larry England, USFWS botanist, felt it was a candidate for listing under the Endangered Species Act. They revisited the sites where the species had been collected historically. Plants were found in some but not all recorded habitats, and the plant was subsequently listed as threatened by the USFWS. Recently, application has been made to remove it from this status, and a decision is pending.

It has been suggested that the orchid depends on natural stream processes and probably on some native ungulate grazing. Dams, diversions, and urbanization have eliminated the periodic flooding of habitat and threaten the survival of the orchid. Heavy recreational use has trampled plants, and weed infestation has posed a serious threat. The United States Department of Agriculture, Natural Resource Conservation Service, has recommended restricting the use of herbicides in the orchid habitat and avoiding livestock grazing during the flowering-fruiting period. It has been suggested that restricted pesticide use would protect the orchid's pollinator.

In Chuck Sheviak's elegant article in 1984, "*Spiranthes diluvialis* (Orchidaceae), A New Species from the Western United States," he first describes the new species that had previously been confused with *S. romanzoffiana*, *S. cernua*, and *S. porrifolia*. Several herbarium specimens had come from widely-scattered areas but were all alike. *Spiranthes diluvialis* was declared a separate species. It is of a hybrid origin deriving from *S. romanzoffiana* and *S. magnicamporum*. It is an amphiploid with four sets of chromosomes instead of two. *Spiranthes magnicamporum* has 30 chromosomes or 15 pairs and *S. romanzoffiana* has 44 chromosomes or 22 pairs. Their hybrid has retained all 74 chromosomes or 37 pairs in its cells. According to Dr. Sheviak, *S. diluvialis* reproduces sexually and is limited to low elevations in mesic or wet meadows, along permanent streams, around springs and major desert lakes. This suggests its origin as a hybrid in a wetter Pleistocene pluvial time. At that time, *S. magnicamporum* was present, and *S. romanzoffiana* occurred at lower elevations than it does today. The allopolyploid was formed. Gradually, as its habitat became drier, the parent *S. romanzoffiana* retreated to higher, cooler, and wetter areas. *Spiranthes magnicamporum*, requiring warm, moist sites, was completely eliminated from the region. The hybrid, combining adaptive features of both parents, survived. As arid conditions grew, the hybrid became more limited and restricted to areas of permanent water.

In 2004, James Morefield of the Nevada Natural Heritage Program wrote to me in an e-mail, “One of my highest orchid priorities has been to establish whether or not *Spiranthes diluvialis* is still present in Nevada... I have pretty much given up hope of rediscovering *Spiranthes diluvialis* in the Panaca area.” Well, we found it! We are proud to have rediscovered this orchid and will look again next summer for more hidden lost treasure in Nevada with our friend, Jim Coyner.

Additional Reading:

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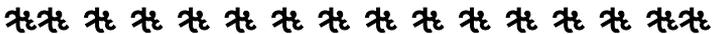
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Churchill

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It has always been a dream of mine to visit Churchill, Manitoba, Canada, so when Lorne and Joan Heshka invited me and my wife Carol to go, we jumped at the chance. They had just chaired the Native Orchid Conference in Winni-

peg, Manitoba and were ready and willing guides for our long trek to the north of Manitoba. We had arranged to meet them at St. Benedict's (the site of the conference) after the last field trip, as this is where most of us had stayed during the conference. The rest in our party were: Ronald and Jan Coleman, Chuck and Jean Sheviak, Martin and Betty Falxa, David McAdoo, Jim Fowler and Walter Ezell (who both later left us at Thompson).

We were soon on our way up highway 6 at midday in a convoy heading for our first night stop at Grand Rapids. Once on our way, it was not long before we had our first stop. This was to see *Platanthera aquilonis* which grew in the wet areas on the grass verges. It was here that Chuck Sheviak explained to us the major differences between this orchid and *Platanthera huronensis*. After looking at many specimens during the trip, I was still confused, especially after finding white, yellow and even green types in the areas we covered. Just before reaching Grand Rapids we took a pretty, quiet track towards Long Point beach. Here we found some *Cypripedium reginae* still in reasonable condition with even a couple of forma *albolabium* to give us a good start. Other orchids present were the ubiquitous *Platanthera obtusata* and *Goodyera repens* var. *ophioides*, together with *Cypripedium parviflora* and *C. pubesens* that had gone over. *Malaxis brachypoda*, *Listera cordata*, and *Platanthera orbiculata* were all in full bloom and were even better further north as was the emerging *Spiranthes romanzoffiana*.

We had a good night at Grand Rapids but it was still at least 4 hours drive before we reached Thompson. There we were to meet the train, so we had time to see several more sites. The most spectacular was at Pisew Falls where there was an interesting bridge across the river which gave us some spectacular views of the falls. The only time we saw *Calypso bulbosa* var. *americana* was on the paths around the falls and only in seed. We also saw *Goodyera repens* var. *repens* - the species without the tessellated basal leaves. Arriving at Thompson in good time we found out the train was late. The decision was made to have a good meal before boarding as we were not sure when our next meal was coming.

We did not know what to expect from a train that took all night to get to Churchill, but it was quite an adventure to find out. Lorne gave us some basic rules and then we found we could pivot our chairs into a home made bed. It was strangely comfortable lying in the seats looking out to some wonderful views of lakes and trees. It was not quite the 'Orient Express,' especially the express part. I often thought that there was a man with a red flag in front of the train but it was only the guards popping out occasionally to check the ball bearings in the wheels. Breakfast was a great treat in the morning and the restaurant car was just what I expected, with good food and a picture window for the event. By midday we came into the tundra area of Churchill and were greeted by Heather who took us to the research station outside of the town. There we

were to reside for 6 nights with at least 20 college students who, surprisingly, were extremely quiet, and were very interested in our trip. We were soon known as 'The Orchid Lot' and Lorne and David gave them all a slide show during our stay. Here we were split into small dormitories in bunks and I was to room with Ron and Martin. The food was great with regular three course meals with one evening a main course being Caribou, and they even gave us a candlelight party at the end.

It was not long before we were on the orchid trail and found some great sites for *Cypripedium passerinum* and *Amerorchis rotundifolia*, the latter being so common that at times it was difficult not to tread on any. Of course *C. passerinum* was the main highlight for most of us. It had stayed in bloom, although the weather had been quite hot the previous week. At a site near Cape Merry there were great bunches of them which stayed in bloom to the end of the week. As for *Amerorchis*, this was also in fine bloom on our first few days and we did manage to find some forma 'lineata' and 'beckettiae.' This was also the site for *Listera borealis* which was well past its best.

There are 10 species of orchid recorded in Churchill, and we saw nine of them, *Calypso bulbosa* var. *americana* is only occasionally found. *Platanthera huronensis* and *P. aquilonis* in their various guises, *S. romanzoffiana* emerging nicely, and the ubiquitous *P. obtusata* with var. *collecteana* were all found near the coast near the wreck of SS 'Ithica.' *Listera cordata* and *Corallorhiza trifida* were also seen but were well past their best and showing signs of seeding.

When we were not looking for orchids, we were searching for mammals (especially polar bears) and were fortunate to see three adults and one cub. The first sighting was the best as a mother and cub were heading for the dreaded garbage tip. We had to be very careful as they can move very fast, and we all had to keep a watchful eye. Even at the research station we were not allowed out unless we were accompanied by two other adults as polar bears are unknown to attack three or more persons. So the smokers in the station had to find two friends to go out if they wanted a quick smoke.

On our first day out Lorne spotted a wolf that kept a parallel line with our van, and then Carol spotted an Arctic hare which was a good start. On the Churchill river there were hundreds of Beluga whales and several of us went on boat trips. Martin and Betty went on a zodiac, and a few of us went earlier on the ferry to the open day at the fort; there, Jean claimed to have seen a Caribou. Arctic and red fox were also added to the list but few of us saw them.

After a few days when the orchids were going over, and mammals were hard to find, Betty and I tried to get the rest interested in all the birds that came up to Churchill. It was hard work and they pointed out that they only wanted to see uncommon species, so I didn't mention the common eider, although it is far

from common.

Parasitic jaegers were nesting nearby, and arctic terns were always watching us. Hudsonian godwits with whimbrels were nesting in the trees above the orchids and tundra swans were seen on the nearby ponds with red-necked phalaropes circling in the pools. Willow ptarmigan just losing their white feathers often appeared by the roadsides, and surf and white winged scoters were just offshore. In fact 78 species were seen on the way to, and at, Churchill. A quite an impressive list, so eat your heart out, Christina (who also saw the Northern Lights) and Stefan who saw the yellow rail on the prairie and certainly let me know that it had been seen. After a few days our party was getting keener with Chuck explaining to us the difference between Arctic and Pacific Loon. I thought he had claimed that he knew nothing about birds! Ron was now trying to get good pictures of Canadian Geese, Osprey's and Bald Eagles, but it was David who surprised me the most by stating that he had seen a whooping crane from the train. It wasn't until Betty and Carol said they had seen it too that it became believable. This bird is usually found a province away and then heads south. There are only a few in the world which like ross's gull the birders call a 'top' bird.

In the evenings when it was not raining we went to Hudson Bay to take pictures of the sunsets. These were magnificent - with the wreck of the 'Ithica' in the distance and the assortment of rock colors. Even when it was raining with a little sun, we had rainbows that joined at both ends in the big skies. The only downfall was the mosquitoes and black flies, which certainly were not kind to Jan, who had bad bites around her ankles. The weather became cooler as we stayed, and we were pleased we had brought a few sweaters. At least the bugs did not appear so much when it was cold.

We headed to Winnipeg as soon as we picked up our car at Thompson, but there was still time for one more stop on the way at Little Limestone Lake. This site was mentioned in the talks at the conference, and it was a beautiful last stop before we headed home.

I would like to thank Lorne & Joan for making this trip possible for us and all in the party that accompanied us. It was a really special holiday for us.



END NOTES

5th Annual Native Orchid Conference Meeting June 9 –12, 2006

Southern Oregon University Ashland, Oregon, USA

Ashland, Oregon is situated in the convergence of three mountain ranges. This unusual geological convergence gives rise to a unique and diverse flora which supports twenty-five native orchid species, fourteen of which typically bloom in June.

Programs will be held in the Science Building on the SOU campus. Conference presentations will include both regional and out-of-area speakers. Members with presentation proposal inquiries are invited to contact Dr. Carol Ferguson at SOU: *ferguson@sou.edu*.

Field trips will be half-day and full day excursions led by area botanists. Trips are planned to Crater Lake, Illinois Valley, and the Russian River using transportation provided by university vans.

Details of conference registration and schedules are expected to be available on the Native Orchid Conference website by January 2006 at <http://groups.yahoo.com/group/nativeorchidconference/>.



Please remember to send in your Membership Renewal Form (enclosed in this issue).

Best wishes to all for a wonderful new year!

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