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Anthocyanin free pure green and white form, Ontario, Canada
Image: Ross Brown

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Cypripedium californicum. Outside Back Cover
The Sierra Nevada Mountain Range in California.
Image: R. A. Coleman

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Conference Information and Thoughts

The 2018 NOC is scheduled for Thur. evening July 26 – Mon. July 30 at the Smithsonian Environmental Research Center (SERC) by Annapolis, Maryland.

The conference will start Thursday evening July 26 with a Social Reception at SERC.

Friday, July 27 and Sunday July 29 will be Speaker Presentations at SERC.

Saturday, July 28 and Monday July 30 will be Field Trips to observe native orchids.

The notice your editor received said more information is to follow.

Most manuscripts, if they're really lengthy, are relatively easily split into two parts with the second part relegated to the next quarter's issue, and that is what has been done -reluctantly - with this article. However, this particular article, dealing with the North American *Cypripedium*, was submitted with a plethora of images, and each image was of such quality it merited much larger hard-copy space than is afforded by splitting the article! The DVD bearing this article and its images came in a few months ago, and your editor began working on it promptly. There was a technical problem, but the problem was eventually solved thanks to Doctor Eric Olsen, a NOC member of years ago. However the dilemma that still dogged your editor was that by splitting the article it created a few months gap in a story that -by rights - should have been told in a single issue. Alas, with the NOC issue's fold-over format, it's physically not possible to "fold over" an article of forty-some pages long, and for this particular article, the few months wait between issues remained distasteful to your editor.

Seeing the images as work progressed, your editor's wife suggested the entire article should be done on letter-size paper as a small book and have the pages bound and hard-backed in Mexico. That would do more justice to the sizes of the images, but it would take some time, and whether the author or the membership would care to have such a small hard-backed book remains questionable.

The end result, at least for the present, is that your editor has elected to split this article between the first and second quarters of 2018, and produce *both* issues and mail them either at the same time or very closely together. At least this way the readers will be able to have the entire article, with images that are a little larger, and have both issues together, to assist in keeping continuity as the article is read.

By the way, if you have not renewed your subscription for 2018, do it! This article alone is worth the price of the whole year, so don't remain lazy: renew!!

Personally, after spending *many* hours with this article and these images, this editor still feels it would be fruitful to follow his wife's suggestion and re do this article in the letter-size format. If nothing else, it would do much more justice to the images by allowing many of them to be presented in the larger sizes.

At this point, how a letter-size small book would come together is not known, and - in any event - would have to meet the author's approval, but when these two issues are in the mail, it will be worth a try to see what might be done.

The Genus *Cypripedium* of the United States and Canada, Part 1

Ronald A. Coleman

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(All mages are by the author unless otherwise noted)

I have been hunting the wild orchid for over 45 years. Although orchid hunters in the Southwest see mostly little green things, the genus *Cypripedium* has been especially intriguing. Starting with *C. montanum* in Yosemite National Park in the early 1970s, I sought our Lady's Slippers in much of the United States and Canada. The 2017 Native Orchid Conference meeting near Winnipeg, Manitoba, provided the opportunity to finally see and photograph *C. candidum*, a species that had eluded me for many years. After returning from the Conference, I realized the experiences and photographs from decades hunting *Cypripedium* were worth sharing. This overview of the *Cypripedium* of the United States and Canada is a compendium of my field experiences with the flowers, and data from many hours poring over herbarium specimens.

The orchid subfamily *Cypripedioideae* contains five genera of slipper orchids. *Paphiopedilum* and *Phragmipedium*, are well known to hobbyist orchid growers. Two of the others, *Selenipedium* and *Mexipedium*, are lesser known new world genera. The fifth genus, *Cypripedium* Linnaeus, contains about 50 species (see Pridgeon, et al 1997) of mostly northern hemisphere taxa, including four members of what Cribb (1997) calls Section Irapeana which grow in Mexico and Central America. This paper focuses on the twelve species of *Cypripedium* native to the United States and Canada.

Cypripedium are deciduous from perennial rhizomes. Our plants vary in height, and in number and position of leaves. For our twelve species, blooming plants range between 3 cm and 130 cm tall. The number of leaves varies from 2 to 10 or more. The leaves are sometimes basal, sometimes mid-stem and opposite, but more often alternating or sub-opposite along the stem. The flowers are distinguished by a lip presented as a slipper shaped pouch that aids in pollination. The pouch is the largest and usually most colorful part of the flower. The pouch does not contain any food for the pollinator, but produces an often pleasant aroma to induce an insect into entering in search of food. As with other orchids, the pistil and stamen are in a single structure called the column. *Cypripedium* have two fertile stamen, one on each side of the column. A third, but sterile, stamen called the staminode is prominent above the pouch opening with a color that often contrasts with the pouch, lip and petals. Except for *C. arietinum* the two lateral sepals merge into a structure called the synsepal that lies behind the pouch below the dorsal sepal. On several species the synsepal has a bifurcated apex which hints at it origin from two sepals. Our *Cypripedium* are widely distributed in the United States and Canada. Subsequent references to *Cypripedium* refer to our twelve species, and not the genus as a whole.

Plant and flower descriptions below, unless otherwise noted, document my field observations and herbarium research. The nomenclature and synonymy for most taxa are from the referenced literature. Details of distributions relied significantly

on Sheviak (2002) and NAOCC (2017). Common names were gleaned from the publications listed in References. I have not been able to see all mentioned *Cypripedium* color forms personally, but was able to borrow images of several unusual color forms from multiple orchid photographers to complement the set for this paper. The photographers' names are associated with their images.

***Cypripedium acaule* Aiton, Hort. Kew. 3: 303 (1789). (Figs 1 to 4)**

Synonymy:

Cypripedium hirsutum Mill., Gard. Dict. ed. 8: N. 3 (1768), nom. rej.

Cypripedium humile Salisb., Trans. Linn. Soc. London 1: 79 (1791).

Calceolus hirsutus (Mill.) Nieuwl., Amer. Midl. Naturalist 3: 118 (1913).

Fissipes hirsuta (Mill.) Farw., Druggists' Circ. 61: 230 (1917).

Fissipes acaulis (Aiton) Small, Fl. SE. U.S.:311 (1917).

Cypripedium acaule f. *lancifolia* House, Bull. New York State Mus. Nat. Hist. 254: 236 (1924).

The most often used common names for *C. acaule* are Pink Lady's Slipper and Moccasin Flower. It is sometimes referred to as the Stemless Lady's Slipper because the flower scape and leaves rise directly from the underground rhizome. Even non-blooming plants of *C. acaule* are fairly easy to identify. The two basal leaves, ribbed and hairy, are distinctive. They are broadly elliptic, and held from nearly flat on the ground to pointing upward. Plants typically have a single flower,



Fig. 1. *Cypripedium acaule* in habitat showing slightly upturned basal leaves.



Fig. 2. *Cypripedium acaule* with dark pink pouch. The vertical fissure in the pouch is the opening for the pollinator.

but Brown (1995) reported a plant with two flowers. The sepals and petals are shades of greenish-brown to brown; on some plants they are very dark brown. The petals are held either alongside the pouch or slightly spreading. Twisting of the petals varies from none, to a slight twist, to a full twist. The insides of the petals have fine hairs. The pouch is diagnostic. Most *Cypripedium* have a circular opening at the top of the pouch for the potential pollinator. However, instead of an opening at the top, *C. acaule* has a forward facing, closed vertical fissure the length of the pouch, and the pollinator must force its way in. Most pouches are hues of pink, from very pale to an intense almost magenta color, with branching veining in a deeper shade than the color on the rest of the pouch. Some plants produce flowers



Fig. 4. *Cypripedium acaule* with pure white pouch and green sepals and petals. Photographed in New Hampshire.



Fig. 3. *Cypripedium acaule* with bright magenta pouch. Photographed in Manitoba, Canada.

with a pure white pouch and green sepals and petals that have been given the name *C. acaule* forma *albiflorum*. In most of its range the white form is rare, but Keenan (1998) says that up to 25% of the *C. acaule* in New Hampshire have white flowers. The flowers have a faint sweet fragrance.

Cypripedium acaule is widely distributed in the Eastern US and Central Canada. In the East it gets as far south as Georgia and Alabama, and as far north as Newfoundland. In Canada its contiguous distribution extends as far west as the northeast tip of Alberta. Its northwest extreme is a disjunct location in the Northwest Territories. Typical habitat is mesic to dry mixed coniferous-deciduous forests. Sometimes it grows in more moist conditions such as a bog or fen.

In the northern portion of its range, it favors open conditions. Gill (1996) reports that while plants grow and flower in dense forest, an opening of the canopy can result in increased flowering and greater seed set. The blooming season varies with location, starting as early as April in the south and extending to July in the north. Peak bloom tends to be in May and June. Fowler (2005) and Gill (1996) say only 10% of the plants in an area may flower in a given year. Gill additionally reports that flowering of an individual plant is erratic, and the plant may go years between blooms. Brackley (1985) observes that blooming increases after a fire because the fire opens the canopy allowing in more light. *Cypripedium acaule* was adopted as the Provincial Flower of Prince Edward Island in 1947.

***Cypripedium arietinum* R.Br. in W.T.Aiton, Hort. Kew. 5: 222 (1813).**

Synonymy:

(**Figs 5 to 10**)

Criosanthes borealis Raf., Amer. Monthly Mag. & Crit. Rev. 2: 268 (1818).

Arietinum americanum L.C.Bech, Bot. North. Middle States: 352 (1833).

Criosanthes arietina (R.Br.) House, Bull. Torrey Bot. Club 32: 374 (1905).

The most frequently used common name for *C. arietinum* is Ram's Head Lady's Slipper due to the fancied resemblance of the flower to the lowered head of a charging ram. Other common names include Chandler's Cypripedium, and Steeple-cap. *Cypripedium arietinum* is one of our smaller Lady's Slippers. Plants are usually under 20 cm tall with three to five elliptic leaves and a single flower. Two features of the flower distinguish *C. arietinum* from our other *Cypripedium*. The flower has two distinct lateral sepals instead of the fused synsepal in other species, and the pouch is cone shaped rather than pouch shaped. We occasionally find two lateral sepals in other *Cypripedium* but it is a rare exception (see Coleman 1995 and 2002). The petals are untwisted and held forward, essentially clasping the pouch. The top of the pouch is white and covered with fine white hairs. The



Fig. 5. *Cypripedium arietinum* plant and habitat.



Fig. 6. Group of flowering *Cypripedium arietinum*.
Photographed in New Hampshire.

cone portion of the pouch is heavily veined in reddish purple. There are translucent spots in the pouch that allow light to pass through. This feature is also found in other *Cypripedium*. The sepals and petals are greenish-brown to brown and sport white hairs. Luer (1975) and Whiting and Catling (1986) document occasional white forms called *C. arietinum* forma *albiflorum*.

Rafinesque based his genus *Criosanthes* on the unique spreading lateral sepals of *C. arietinum*. Cribb (1997) points out that most authors have not followed Rafinesque, and his names are relegated to synonymy. Cribb adds that



Fig. 8. Side view of *Cypripedium arietinum* showing two lateral sepals instead of synsepal.

recent cladistic analyses place *Criosanthes* clearly within *Cypripedium*.

Cypripedium arietinum has a limited distribution and is always a treat when found. It is in the southern portion of Canadian Provinces from Nova Scotia to Saskatchewan. In the United States it is in the northern states from Maine to Minnesota. *Cypripedium arietinum*



Fig. 7. Side view suggesting charging ram feature of *Cypripedium arietinum*.



Fig. 9. Front view of *Cypripedium arietinum* showing translucent spots in pouch that allow in light for pollinators.

grows in a variety of habitats. It is often found in cedar woods, and in shaded pine to mixed oak woodlands. In the northern part of its range it grows in full sun in grasses along road cuts and the flowers barely reach above the grasses. Morris and Eames (1929) report it from "rich mossy bogs." Luer (1975) reports large populations growing over limestone and sand. Because of their small size and dark color the flowers are very difficult to spot even if you know where to look. A time critical problem facing the orchid hunter is the short life of each flower. Correll (1950) says individual flowers last only one day, but Brackley (1985) observes that such ephemeral flowering is due to pollination. After pollination the dorsal sepal droops down over the opening to the pouch. Unpollinated flowers may last for a few days each. Plants flower from May to June.



Fig. 10. Anthocyanin free pure green and white forms of *Cypripedium arietinum* are relatively rare.

Photographed by Ross Brown in Ontario.

Cypripedium californicum A. Gray, Proceedings American Academy 7: 389 (1868). (**Figs. 11 to 14**)

This species is named for the state from which it was described, and that led to the common name of California Lady's Slipper. *Cypripedium californicum* is the tallest of the genus in the United States and Canada. Blooming plants get up to nearly 130 cm tall but can bloom as short as 10 cm. Large plants have 7 or 8 alternating leaves and can carry over 20 flowers, by far the most on any of our *Cypripedium*. The pouch is white and sometimes has faint red to purplish veining inside. The sepals and petals are greenish yellow to yellow-gold. Petals are flat and spreading. The staminode is white on the outer edges, with a broad stripe the color of the sepals and petals, in the center. The flowers have a faint, slightly sweet aroma.

Cypripedium californicum has the



Fig. 11. *Cypripedium californicum* often forms large blooming clumps.

Photographed in the Sierra Nevada Mountain Range in California.

smallest total range of any of our Lady's Slippers, although *C. yatabeanum* has a far smaller range within the United States. *Cypripedium californicum* is limited to northern California and portions of southern Oregon. It requires habitats supplying a constant source of water for its roots. Plants grow in and among serpentine formations and in serpentine based soils, often in full sun. They are typically found on the banks of streams or in hillside seeps. Another favored spot is bog-like areas near the water's edge. Blooming clumps often exceed a hundred stems. The blooming season starts in early April in the coastal mountains. Flowering lasts to the end of July in the Sierra Nevada Mountains and at high elevations in the Cascade Mountains.



Fig. 12. *Cypripedium californicum* with typical greenish sepals and petals.



Fig. 13. Stem of *Cypripedium californicum* flowers with golden sepals and petals.



Fig. 14. Stem of three flowers of *Cypripedium californicum*.

***Cypripedium candidum* Muhl. ex Willd., Sp. Pl. 4: 142 (1805). (Figs. 15 to 18)**

Synonymy:

Calceolus candidus (Muhl. ex Willd.) Nieuwl., Amer. Midl. Naturalist 3: 117 (1913).



Fig. 15. Roadside habitat of *Cypripedium candidum* where mowing maintains prairie-like conditions. Manitoba, Canada.

The common names for *C. candidum* include White Lady's Slipper and Silver Slipper due to its white pouch. Correll (1950) includes White Frauenschuh among its common names. *Cypripedium candidum* is relatively small, with blooming plants usually under 40 cm. Three to five leaves clasp the stem, pointing upward without fully spreading. Multiple stems from the same rhizome eventually produce clumps of blooming plants. Usually plants bear only one flower, but two flowers

are not uncommon. The sepals and petals are yellowish green with brown striping. The petals are usually twisted, but sometimes are relatively flat. The pouch is white with faint veining. The opening to the pouch is rounded except for a small acute notch at its forward edge. The yellow staminode covered with red dots provides a bright contrast to the white of the pouch. Homoya (1993) says the flowers have "a delicate fragrance."

Cypripedium candidum grows in the Northeast quarter of United States, from Kansas to New York. There is a disjunct site in Alabama. It barely extends into Canadian Provinces of Manitoba, Ontario, and Saskatchewan. *Cypripedium candidum* prefers the bright light of wet prairies like those home to *Platanthera leucophaea*, although *P. leucophaea* blooms later in the year. *Cypripedium candidum* is



Fig. 16. *Cypripedium candidum* plant structure showing the leaves partially clasping the stem even at maturity.

usually shorter than surrounding prairie plants, making it hard to see. It is sometimes found in roadside ditches where the habitat mimics that of the meadows. The ditches are often mowed regularly allowing the *C. candidum* to stand out a little more from its surroundings than it does in the meadows. The mowing has the added benefit of controlling larger invasive plants that could out-compete *C. candidum*. *Cypripedium candidum* blooms from April to June.



Fig. 17. *Cypripedium candidum* plant with two flowers, accenting the pure white pouch characteristic of the species and the small notch on the forward opening. Photographed in Manitoba, Canada.



Fig. 18. A *Cypripedium candidum* with more golden sepals and petals.

***Cypripedium fasciculatum* Kellogg ex S. Watson, Proceedings American Academy of Arts and Sciences 17: 380 (1882). (Figs. 19 to 22)**

Synonymy:

Cypripedium knightae A. Nelson, Botanical Gazette 42: 48 (1906).

Cypripedium pusillum Rolfe, Kew Bulletin 1892: 211.

Two common names are often associated with *C. fasciculatum*. It is called Clustered Lady's Slipper because the flowers are on a cluster at the end of the scape, instead of being scattered along the scape. *Cypripedium fasciculatum* is the only one of our *Cypripedium* with this feature. The other often seen common name is Brownie Lady's Slipper. *Cypripedium fasciculatum* is one of our smallest lady's slippers. The plants are under 18 cm from the base to the top of the flowers and some bloom as small as 3 cm tall. There are two opposing leaves half way up the stem. Even though the plants are small, *C. fasciculatum* bears more flowers per plant than any of our other *Cypripedium* except for *C. californicum*. The flowers are typically borne in clusters of six or seven, but sometimes as many as ten flowers per plant.



Fig. 19. *Cypripedium fasciculatum* plants showing two leaves midway on stem with flowering stem bent by weight of flowers. Photographed in California..



Fig. 20. Cluster of *Cypripedium fasciculatum* flowers with dark sepals and petals and green pouch. Clustered flowers are unique to *C. fasciculatum* among our *Cypripedium*.

The weight of the flowers bends the top of the stem, which straightens and elongates as the seed capsules mature. The flowers are small, with the largest only about 4.5 cm from tip to tip. The pouch, sepals, and petals are usually all the same color. The pouch is less than 1.5 cm across, with an opening about 0.5 cm across. Usually the flowers have brown markings on a green or golden background, although considerable variation in color exists. Sometimes the brown dominates, and the flowers appear dark brown to nearly reddish brown. Other plants have very pale, almost blond flowers, and a few plants have anthocyanin free pure green flowers.



Fig. 21. *Cypripedium fasciculatum* may have flowers with dark brown or reddish brown flower clusters.

Cypripedium fasciculatum grows from the northern half of California into Washington, Oregon, Montana, Utah, Colorado and Wyoming. However, rather than a continuous distribution, Brownell and Catling (1987) report it exists in disjunct populations within its range. It is not known from Canada. The clustered lady's slipper grows mainly in fir forest between 600 and 6500 feet elevation. Most often the plants grow on or near a stream bank, often on fairly steep slopes, or just above the drainage on the forest floor, either in the open or under dogwoods. Flowering starts in mid-March in the coastal mountains of California. At higher elevations peak blooming occurs in mid to late June with flowers sometimes lasting into July.



Fig. 22. *Cypripedium fasciculatum* held by the author's then 10 year old son to show the cluster of flowers and their small size.

***Cypripedium guttatum* Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 251 (1800).**

Synonymy: **(Figs. 23 to 27)**

Cypripedium orientale Sprengel, Syst. 3: 746 (1826).

Cypripedium guttatum var. *redowskii* Rchb.f. in H.G.L.Reichenbach, Icon. Fl. Germ. Helv. 13-14: 166 (1851).

Cypripedium guttatum f. *latifolium* Rouy ex E.G.Camus in E.G.Camus, P.Bergon & A.A.Camus, Monogr. Orchid.: 451 (1908).



Fig. 23. Top view of group of *Cypripedium guttatum* showing white backside of dorsal

The common name for *Cypripedium guttatum* is Spotted Lady's Slipper, in reference to spotting on its petals and pouch. *Cypripedium guttatum* is a short plant, under 30 cm tall. It has two leaves near the base and a single flower. The dorsal sepal is white on the back side (Fig. 23) and a nearly solid reddish-brown hue on the side facing the pouch. The dorsal sepal bends over the opening to the pouch and its white top under the forest canopy is often the first visual clue to the flowers. The base color of the lateral petals is white. They are spotted with the same reddish brown as on the dorsal sepal, and constricted near the apex. The spots merge into

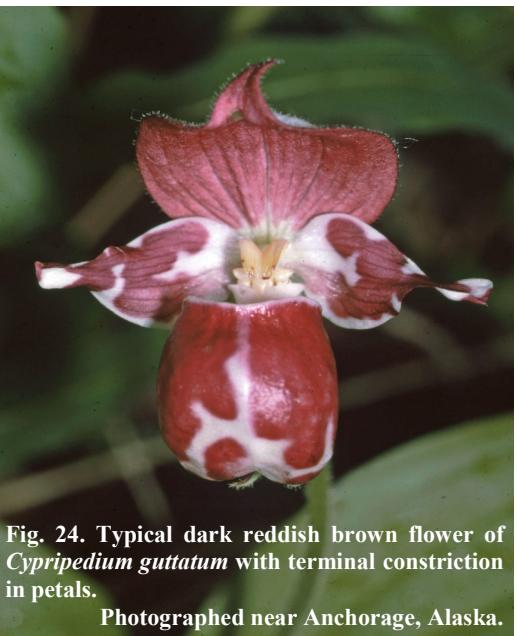


Fig. 24. Typical dark reddish brown flower of *Cypripedium guttatum* with terminal constriction in petals.

Photographed near Anchorage, Alaska.

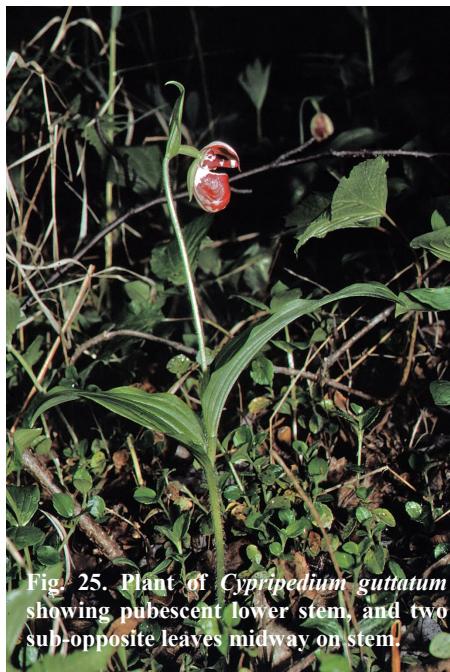


Fig. 25. Plant of *Cypripedium guttatum* showing pubescent lower stem, and two sub-opposite leaves midway on stem.

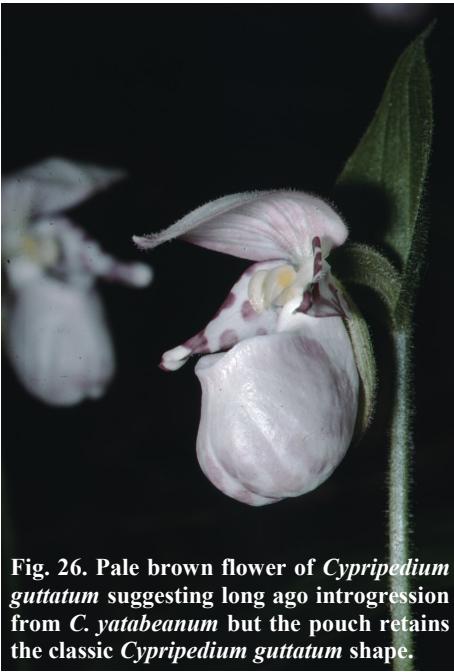


Fig. 26. Pale brown flower of *Cypripedium guttatum* suggesting long ago introgression from *C. yatabeanum* but the pouch retains the classic *Cypripedium guttatum* shape.



Fig. 27. Side view of *Cypripedium guttatum* with dorsal sepal bent over pouch opening.

more irregular markings on some flowers. The pouch is also a base white covered with reddish brown spots. The spots on the pouch often merge into large blotches and on some flowers, the pouch is almost solid reddish brown. On some plants the reddish brown of the spots is a lighter brown, even tan or pinkish, suggesting perhaps ancient hybridization with *C. yatabeanum*. The staminode is white to tan with a few small reddish brown spots. *Cypripedium guttatum* is found in Alaska, the Yukon, and the Northwest Territories. It is more widely distributed in Asia. *Cypripedium guttatum* grows in pure or mixed deciduous forests and in spruce forests. It sometimes grows on steep banks of lakes and streams, or in flat forested areas just above the bank. It inhabits edges of meadows near the surrounding forests. The blooming season is short in the northern regions where *C. guttatum* grows. It usually starts blooming in mid-June and finishes by early July.

***Cypripedium kentuckiense* C.F.Reed, Phytologia 48: 426 (1981).**

Synonymy:

(Figs. 28 to 32)

Cypripedium daultonii nom. nud.

The often seen common names for *Cypripedium kentuckiense* are Kentucky Lady's Slipper and Ivory Lady's Slipper, in reference to the state for which it is named and the color of its pouch. It is sometimes referred to as the Southern Lady's Slipper because of its distribution. Sheviak (2002) includes the common name Purloined Slipper. *Cypripedium kentuckiense* is the largest flowered of our Lady's Slippers with a natural spread often greater than 12 cm. Just the flower has a greater extent than some entire blooming plants of *C. fasciculatum*. Flowering plants approach one meter in height. Only *Cypripedium californicum* is taller, but its flowers are smaller. Flowering plants have three to six alternate ovate leaves along the stem and most bear only one flower. The flowers look like a supersized *Cypripedium parviflorum*. However the color, size, and shape of the pouch make it



Fig. 28. Habitat of *Cypripedium kentuckiense* in Tennessee.



Fig. 29. Plant of *Cypripedium kentuckiense* showing spreading ovate leaves.

unique. The pouch is ivory to pale yellow and the forward end of the pouch appears blunted. The sepals and petals are green but almost totally covered with brown to madder stripes, or dots aligned to look like stripes. The petals usually have multiple twists. Weldy, et al (1996), determined that dorsal sepal width and the pouch's orifice length are sufficient to separate *C. kentuckiense* from *C. parviflorum* var. *pubescens*. The dorsal sepal width of *C. kentuckiense* is always greater than 3.5 cm and that of *C. parviflorum* var. *pubescens* is always less than 2.9 cm. The orifice length of *C. kentuckiense* is always greater than 3.0 cm and that of *C.*



Fig. 30. *Cypripedium kentuckiense* with dark brown sepals and petals and ivory pouch.



Fig. 31. *Cypripedium kentuckiense* with light brown sepals and petals and ivory pouch.

parviflorum var. *pubescens* is always less than 1.3 cm. Brown (2004) reports a color form from Arkansas with pure green sepals and petals, and a white pouch.

Cypripedium kentuckiense grows in the southern states of Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, Texas, and Virginia. Weldy, et al (1996) report that Arkansas has more plants than any other state. They also discuss a population of *C. kentuckiense* from Virginia that has characteristics suggesting both *C. kentuckiense* and *C. parviflorum* but analysis confirmed that those plants were *C. kentuckiense*. It favors habitats ranging from mesic deciduous forests to seeps and stream bottoms. The blooming season is from April to June.

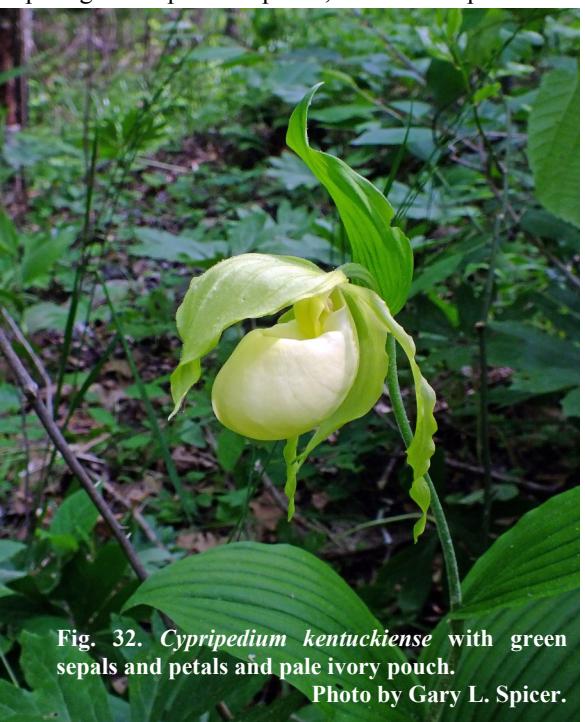


Fig. 32. *Cypripedium kentuckiense* with green sepals and petals and pale ivory pouch.

Photo by Gary L. Spicer.

***Cypripedium montanum* Douglas ex Lindley, Genera and Species of Orchidaceous Plants 528 (1840).**

Synonymy:

(**Figs. 33 to 38**)

Cypripedium occidentale Watson, Proceedings American Academy of Arts and Sciences 11: 147 (1876).

Because of its typical habitat, this species has the common name of Mountain Lady's Slipper. *Cypripedium montanum* blooms on plants ranging between 25 and nearly 70 cm tall. Mature plants have 5 or 6 alternating, slightly fuzzy, leaves. The

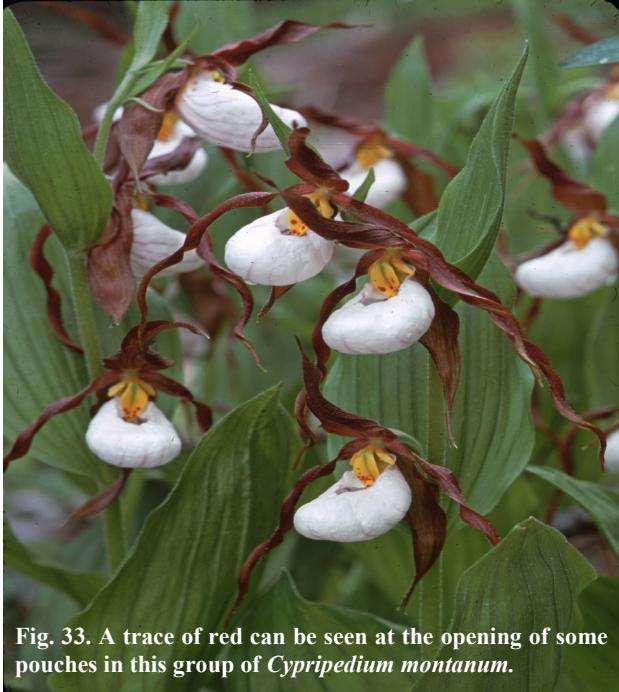


Fig. 33. A trace of red can be seen at the opening of some pouches in this group of *Cypripedium montanum*.



Fig. 34. The yellow staminode with red spotting on *Cypripedium montanum* provides a bright contrast to the white pouch and dark sepals and petals.

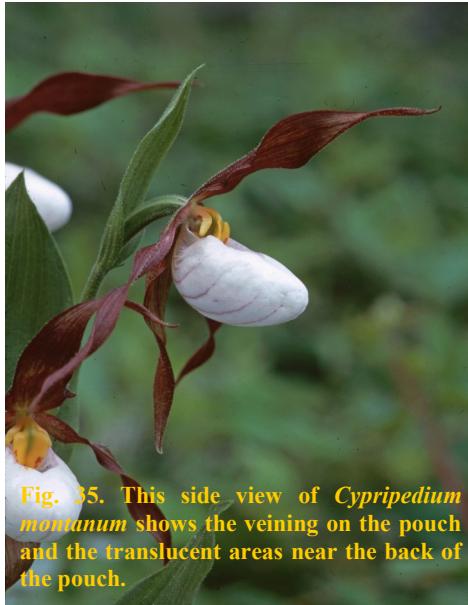


Fig. 35. This side view of *Cypripedium montanum* shows the veining on the pouch and the translucent areas near the back of the pouch.



Fig. 36 *Cypripedium montanum* pouch with potential pollinator inside. Also visible are the red stripes on the back interior of the pouch.

plants sometimes bear three flowers, but most often have one or two. The largest flowers have a natural spread of approximately 10 x 10 cm. The petals are twisted and drooping. The white pouch is veined with purple, with purple lines inside, and occasionally with a purple rim around the opening. The typical pouch measures about 1.6 x 3.0 cm, with an opening about 1.1 x 1.3 cm. The color of the sepals and petals varies from an intense brown to a light tan. The petals are slightly hairy near the pouch, with multiple twists. The backs of both sepals and petals are covered with fine hairs. The staminode is bright yellow with red spots. The flowers have a sweet, pleasant fragrance. Sheviak (1990) named a rare anthocyanin free color form from Canada *C. montanum* forma *praetertinctum*, on which the sepals and petals are a clear light green, the pouch without purple markings, and the staminode without red spots.

Cypripedium montanum grows in California, Montana, Idaho, Wyoming, Oregon, Washington, Alaska, Alberta, and



Fig. 37. *Cypripedium montanum* forma *praetertinctum* has clear light green sepals and petals and the lip is without purple markings, and the staminode without red spots. Photo by Charles Sheviak from British Columbia.

British Columbia. I primarily think of this as a Northern California species because I've spent 20 years studying it there. However Catling (1983a) observes that the range of *C. montanum* in Canada is greater than its range in the United States. *Cypripedium montanum* has adapted to multiple montane habitats below about 7,000 feet elevation. Often it is found near a stream or on the edge of a hillside seep. *Cornus stolonifera*, the creek dogwood, is a common companion plant. *Cypripedium montanum* also grows in relatively dry conditions on hillsides in mixed and coniferous forest, under oaks, firs, and madrones. The blooming period of *C. montanum* varies with elevation. Blooming begins in late March in coastal California, and continues until early July at the northern limits of its range.



Fig. 38. Plants of *Cypripedium montanum* often carry two flowers.

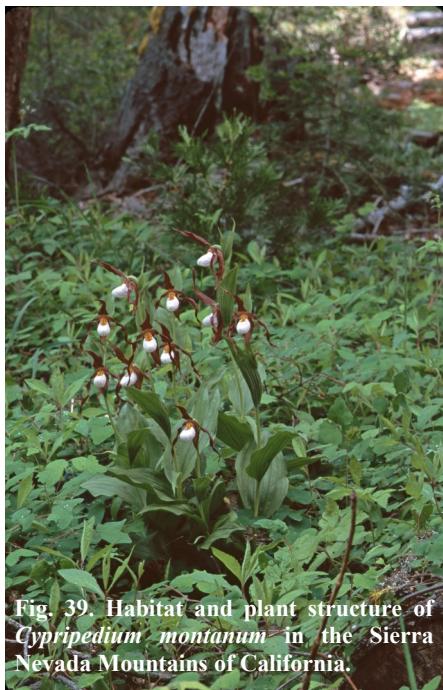


Fig. 39. Habitat and plant structure of *Cypripedium montanum* in the Sierra Nevada Mountains of California.

Cypripedium parviflorum Salisbury Trans. Linn. Soc. London 1: 77 (1791).

(Figs. 39 through 42)

Cypripedium parviflorum is the most widespread and most confusing of our Lady's Slippers. It is unmistakable due to its yellow pouch. However extreme variation of *C. parviflorum* across its range has led to confusing nomenclature and a plethora of synonyms and varieties since Salisbury described it in 1791. The literature contains names such as *C. hirsutum*, *C. flavescent*, *C. pubescens*, and *C. veganum*. Of these, three were eventually demonstrated to be synonyms; one is now treated as a variety. Correll (1938) considered the North American Yellow Lady's Slippers conspecific with the European *Cypripedium calceolus* and his approach was followed by many, including Case (1964), Luer (1975), and Gupton and Swope (1986), for the next forty plus years. Atwood (1984) recognized that

the Yellow Lady's Slippers in North America differed from the European ones at the specific level. Atwood based his decision on differences in the staminode, which in *C. calceolus* is obovate (widest near the middle), and in *C. parviflorum* is "V" shaped (widest at the base and tapering uniformly to the apex). Atwood called the large flowered Yellow Lady's Slippers *Cypripedium pubescens*. Sheviak (1993, 1994, 1995, and 2010) updated the treatment of what he called the *Cypripedium parviflorum* Complex. He recognizes a single yellow lipped species in the



Fig. 40. Habitat and plant structure of *Cypripedium parviflorum* var. *parviflorum* in Georgia.

United States and Canada with four varieties: *C. parviflorum* var. *parviflorum*, *C. parviflorum* var. *pubescens*, *C. parviflorum* var. *makasin*, and *C. parviflorum* var. *exiliens*. Sheviak (1995) considers *C. parviflorum* var. *planipetalum*, a varietal name often seen in the literature, as synonymous with *C. parviflorum* var. *pubescens*. Sheviak's treatment is the basis for the following discussions.

Notwithstanding the four varieties, even an experienced orchid searcher can be challenged to identify which Yellow Lady's Slipper is being observed. Size of the plant, size of the lip, color of the sepals and petals, size and shape of the petals, and twisting of the petals vary from region to region, and even within colonies. Sheviak (1995) believes some factors in the variation depends on soil type and exposure to sun. Plants in the open have ascending narrow leaves while those in shadier conditions have leaves that are spreading and broader. Knight (1906) reported that plants referable to *C. parviflorum* var. *parviflorum* were more robust to the point of resembling *C. parviflorum* var. *pubescens* when grown in richer more shaded habitats. Likewise plants looking like *C. parviflorum* var. *pubescens* grew to resemble *C. parviflorum* var. *parviflorum* when grown in a sunnier, harsher environment. All varieties of *C. parviflorum* share the common name Yellow Lady's Slipper.

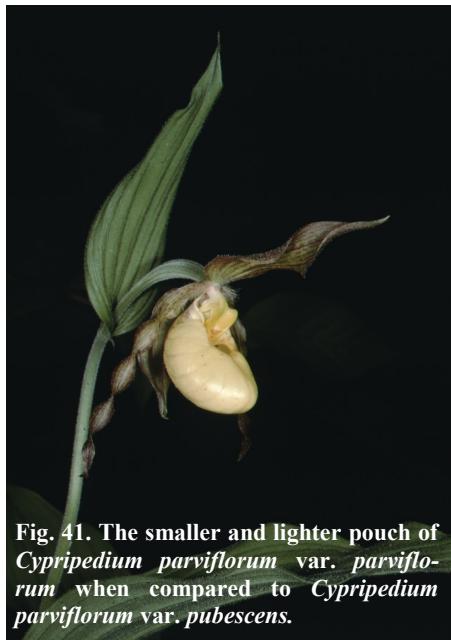


Fig. 41. The smaller and lighter pouch of *Cypripedium parviflorum* var. *parviflorum* when compared to *Cypripedium parviflorum* var. *pubescens*.

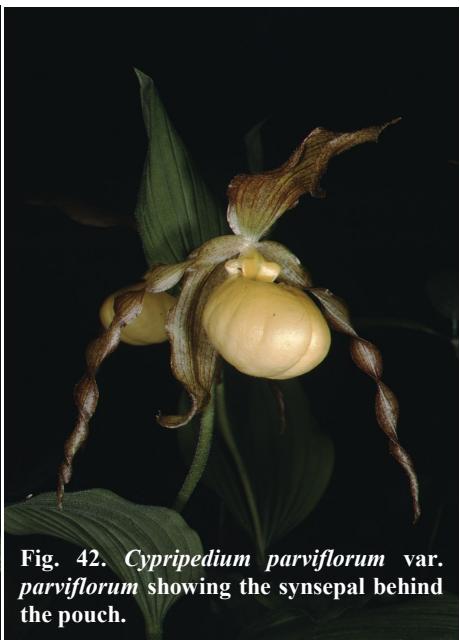


Fig. 42. *Cypripedium parviflorum* var. *parviflorum* showing the synsepal behind the pouch.

Sheviak (2002) helped distinguish among the varieties by publishing a key to the three then known. Sheviak's key is adapted here to include *C. parviflorum* var. *exiliens*.

Key to the Varieties of *Cypripedium parviflorum*

- 1a Upper-most entirely tubular bract glabrous or with very few hairs
- 2a flowers small; pouch 15–29 mm; sepals and petals usually suffused with dark reddish brown or madder, or spotted and blotched; scent intense, sweet.
var. *makasin*
- 2b flowers small; pouch 16–26 mm; sepals and petals dull green tan with small clusters of rust colored spots; scent intense, sweet.
var. *exiliens*
- 1b Upper-most entirely tubular bract densely to conspicuously silvery-pubescent
- 3a flowers large to small, pouch 20–54 mm; sepals unmarked to commonly spotted, striped, and reticulately marked with reddish brown or madder, rarely extensively blotched; scent moderate to faint, rose or musty.
var. *pubescens*
- 3b Flowers small, pouch 22–34 mm; sepals and petals densely and minutely spotted with dark reddish brown or madder and appearing uniformly dark (rarely coarsely spotted and blotched); scent moderate to faint, rose or musty.
var. *parviflorum*

***Cypripedium parviflorum* Salisbury var. *parviflorum* Trans. Linn. Soc. London 1: 77 (1791).**

Synonymy:

Cypripedium luteum Aiton ex Raf., Med. Fl. 1: 140 (1828).

Cypripedium bifidum Raf., Atlantic J. 1: 178 (1833).

Cypripedium parviflorum f. *albolabium* Magrath & J.L.Norman, Sida 13: 372 (1989).

Cypripedium parviflorum var. *parviflorum* is called the Small Yellow Lady's Slipper because it is smaller than *Cypripedium parviflorum* var. *pubescens*. These are medium sized plants, usually between 10 cm and 50 cm with three to five leaves. On *C. parviflorum* var. *parviflorum* the uppermost entirely tubular bract is densely to conspicuously silvery-pubescent. The sepals and twisted petals have a light green base color, but often appear light brown to dark brown due to being mostly covered with closely spaced brown dots. The spacing between dots increases near the base of the sepals and petals, clearly revealing individual dots. The yellow pouch is usually between 20 and 35 mm. The



Fig. 43. The habitat and plant structure of *Cypripedium parviflorum* var. *pubescens* in New Mexico.

flowers have a sweet rose-like fragrance. Summers (1996) reports an albino form of *C. parviflorum* var. *parviflorum* with a white pouch from Missouri.

Prior to Sheviak's work, distributions for *C. parviflorum* var. *parviflorum* encountered in the literature showed a far greater range than we now ascribe to it. Based on our current understanding *Cypripedium parviflorum* var. *parviflorum* is concentrated in the Mid-Atlantic States. It is not known from Canada. It grows from New York south to Georgia, and westward to Nebraska, Oklahoma, and Kansas. *Cypripedium parviflorum* var. *parviflorum* grows in mesic to dry deciduous forests and blooms from April to June.

***Cypripedium parviflorum* Salisbury var. *pubescens* (Willdenow) Knight, Rhodora 8: 93 (1906). (Figs. 43 to 50)**

Synonymy:

Basionym: *Cypripedium pubescens* Willdenow, Hortus Berolinensis 1: pl. 13 (1804).

Cypripedium flavescens A. P. de Candolle, Les Liliacees I: pl. 20 (1802).

Cypripedium hirsutum Miller, Mem. Torrey Club 5:121 (1894).

Cypripedium veganum Cockerell & Barker, Proceedings of the Biological Society of Washington. 4:178 (1901).

Cypripedium parviflorum var. *planipetalum* Fernald, Rhodora 28:168 (1926). (**Fig 55**)

Cypripedium calceolus Linnaeus var. *pubescens* (Willdenow) Correll, Botanical Museum Leaflets 7:14 (1938).

Cypripedium calceolus Linnaeus var. *planipetalum* (Fernald) Victorin & J. Rousseau, Contributions de l'institut Botanique de l'université de Montreal 36: 68 (1940).

Common names for *C. parviflorum* var. *pubescens* include Yellow Lady's Slipper, Large Yellow Lady's Slipper, and Whippoorwill-Shoe. *Cypripedium parviflorum* var. *pubescens* is the largest of our yellow varieties, with some plants reaching over 80 cm tall with four to six ovate-lanceolate, plicate leaves. As with *C. parviflorum* var. *parviflorum*, the upper-most entirely tubular bract of *C. parviflorum* var. *pubescens* is densely to conspicuously silvery-pubescent. Other than that character the plant is highly variable throughout its range, with the pouch



Fig. 44. The relatively larger yellow pouch of *Cypripedium parviflorum* var. *pubescens*.

Fig. 45. *Cypripedium parviflorum* var. *pubescens* often has dark brown sepals and petals similar to *Cypripedium parviflorum* var. *makasin* but the flower is much larger.



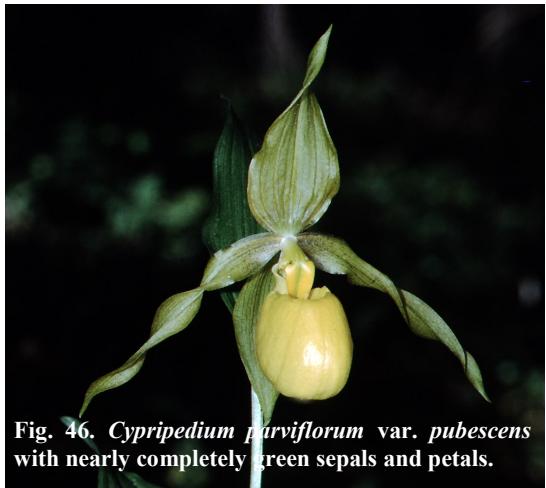


Fig. 46. *Cypripedium parviflorum* var. *pubescens* with nearly completely green sepals and petals.

varying greatly in size, and in color from light to dark yellow. In robust specimens the pouch exceeds 50 mm, but can be much smaller depending on growing conditions. The pouch is generally considered a darker, brighter yellow than the pouch of *C. parviflorum* var. *parviflorum*, although great variety in intensity and color abound. The inside of the pouch has lines of reddish dots on the bottom back, and around the opening. Some pouches have reddish dots on the forward exterior.

The sepals and petals vary from dark brown to reddish brown to greenish. The dark color in the sepals and petals is due to brown to reddish stripes over the yellowish green base color that turn to dots near the pouch. On some plants the petals may be totally untwisted with wavy margins while others will have multiple complete turns. The staminode is yellow with red dots. Summers (1996) also reports an albino form of *C. parviflorum* var. *pubescens* with a white pouch from Missouri, but in a different county than the albino form of *C. parviflorum* var. *parviflorum*.

This is perhaps the most widely distributed and most common *Cypripedium* in North America. Cribb (1997) shows its distribution as extending from Newfoundland to Alaska and south to Oregon in the West. In the East along the Atlantic



Fig. 47. *Cypripedium parviflorum* var. *pubescens* with red dots on exterior of pouch. The V shaped staminode distinguishes *Cypripedium parviflorum* from *Cypripedium calceolus*.

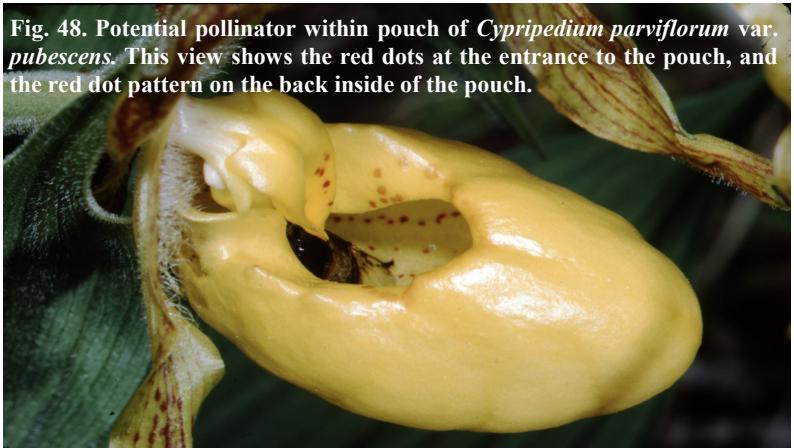
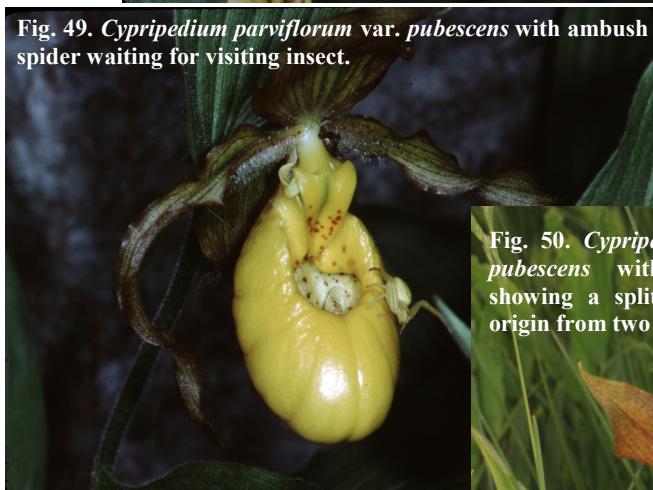


Fig. 48. Potential pollinator within pouch of *Cypripedium parviflorum* var. *pubescens*. This view shows the red dots at the entrance to the pouch, and the red dot pattern on the back inside of the pouch.



Coast *C. parviflorum* var. *pubescens* is in every state except Florida, and extends west to Louisiana and eastern Texas. The extreme southwestern limit of its range is in Arizona. *Cypripedium parviflorum* var. *pubescens* grows in moderate shade to nearly full sun in prairies, meadows, barrens, deciduous forests, boreal forests and other coniferous forest. It favors calcareous soils. Flowering starts as early as the last week in May, and is usually over by the first week of July.

Fig. 49. *Cypripedium parviflorum* var. *pubescens* with ambush spider waiting for visiting insect.

Taken in Manitoba.



End Part 1, The Genus *Cypripedium* of the United States and Canada.

