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CYPRIPEDIUM CALCEOLUS

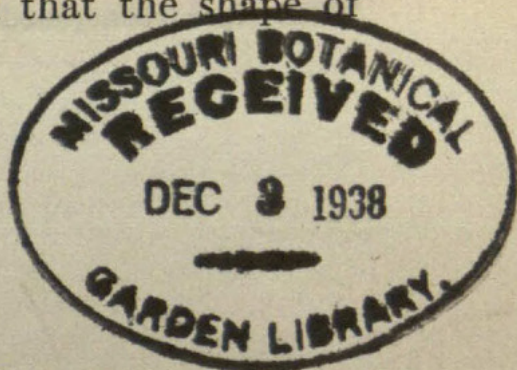
VAR. PUBESCENS

BY

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THE TAXONOMIC and nomenclatorial history of our yellow *Cypripedium*s (*Cypripedium parviflorum* and *C. pubescens*) is most perplexing because it is burdened with the conflicting opinions of both European and American botanists. Beginning in 1791 (Trans. Linn. Soc. 1: 77) with Salisbury's first segregation of a North American yellow *Cypripedium* from the Eurasian *C. Calceolus* L., botanists have been confused as to the true status of our so-called species and varieties. Salisbury's basis for separating *C. parviflorum* from *C. Calceolus* was concerned mainly with the shape of the staminodes. Later, when Willdenow (Hort. Berol. 1 (1804) t. 13) established *C. pubescens* as being different from *C. parviflorum*, he relied for the most part on differences which he noted in the lobes of the column. In making this segregation, Willdenow opened the way for later botanists to invent numerous varietal and specific names for the yellow *Cypripedium*s of North America. W.J. Hooker (Bot. Mag. 57 (1830) t. 3024) disagreed with Willdenow concerning his basis for the separation of *C. parviflorum* and *C. pubescens*, saying that he found the lobe of the column "to be the same in both, or to possess only occasionally trifling differences." Hooker proposed instead that the shape of

[1]



the lips should be used as the basis for the separation of the two species. He stated that the lip was dorsi-ventrally compressed in *C. parviflorum* and laterally compressed in *C. pubescens*.

From the above remarks, one might surmise that both Willdenow and Hooker, as well as Salisbury, had a limited amount of material from which to draw their conclusions. Indeed, it is very possible that each of these men had in hand a different form of the North American plant.

In attempting to segregate a large number of herbarium specimens of our yellow *Cypripediums* into their respective specific or varietal categories, I have been completely baffled. It seemed, therefore, advisable to review all available literature on the subject in an effort to solve the problem. In doing so, I have been impressed by the comparatively few efforts which have been made to solve this puzzling problem. Although many authors have ventured opinions of doubt concerning the specific rank of *C. parviflorum* and *C. pubescens*, most of them have blindly adopted the European concepts of our plants. In the following pages I have recorded some few of the opinions which have been broached by various writers from time to time. I have also proposed a new status for our North American yellow *Cypripediums*.*

In trying to separate *C. flavescens* from *C. Calceolus*, de Candolle (Redouté Les Liliacées (1802) t. 20) said that the yellow-flowered slipper was a great deal like the slipper of the Alps (*C. Calceolus*) and that one would take it at first sight for a simple variety of this plant. He ended by separating the two plants on the basis of coloration of the flowers, on the shape of the staminodes, and on their geographical distribution.

*This paper is concerned only with those species found north of Mexico.

Sims (Bot. Mag. 23 (1806) t. 911) published an illustration of the plant which he knew at the time as *C. parviflorum*. He stated: "It comes very near to the European species, and we suppose has been mistaken for the same by Michaux [Flora Bor. Am. (1803) 161]. . . . The nectarium or slipper is of plain yellow color without veins." Later botanists referred to Sims' illustration as representing *C. pubescens*.

Rafinesque (Med. Flora U. S. (1828) 142) combined all the North American yellow *Cypripediums* into one species which he called *C. luteum*. Along with other characters, he said that the staminode was flattened into an oblong-deltoid lobe, and that the lip was yellow with or without red spots. He added: "Many botanists have made two species, *C. pubescens* and *C. parviflorum* of this, to which the previous [?] and better name of *C. luteum* ought to be restored. I have ascertained that they form only one species, affording many varieties" He also cited eight varieties and gave a short varietal description of each. In conclusion he said: "A multitude of intermediate varieties or deviations may be seen, with undulate or spiral sepals, obtuse or acute lobules, broader or narrower leaves," Later (Atlantic Journ. 1 (1833) 178), in spite of his rather broad species concept as shown above, Rafinesque described a plant from Arkansas as *C. bifidum*, which form seems to be the same as later described by Cockerell and Barker (Proc. Biol. Soc. Wash. 14 (1901) 178) as *C. veganum*. Both are now referred to *C. pubescens* by some authors.

In 1840, Lindley (Gen. & Sp. Orch. Pl., p. 525) admitted that *C. parviflorum* and *C. pubescens* were very difficult to distinguish when dry, adding that both were closely allied to *C. Calceolus*. His characters for separating the two were not very strong, consisting chiefly of a difference in size of the flowers. It would seem that after

Lindley's apparent admission of the weakness of the characters used to segregate these so-called species, following workers would have clarified the situation. In my opinion, Pucci (*Les Cypripediums* (1891) 165) stopped just short of the solution when he said that *C. parviflorum* appeared to be a variety of *C. pubescens* with smaller flowers, and that *C. pubescens*, itself, was somewhat like *C. Calceolus*. In fact, he thought it to be probably only a variety with larger flowers. However, Pfitzer, in 1903 (*Orchidaceae-Pleonandrae* in A. Engler *Das Pflanzenreich*, p. 33), still retained all three species and segregated them according to the following key:

| | |
|------------------------------------|-----------------------|
| Staminode oblong | <i>C. Calceolus</i> |
| Staminode triangular | |
| Lip laterally compressed | <i>C. pubescens</i> |
| Lip dorsally compressed | <i>C. parviflorum</i> |

Since it is probable that European botanists have based their conclusions upon too little material, it will be of interest to include in this discussion some of the observations and viewpoints of botanists and naturalists of this continent who have had ample opportunity to observe our yellow *Cypripediums* in the field.

As early as 1889, Watson and Coulter (*Gray's Man. Bot.* ed. 6, p. 511) realized the difficulty involved in distinguishing *C. pubescens* from *C. parviflorum*. They wrote of *C. parviflorum*: "Flowers fragrant; sepals and petals more brown-purple than in the next [*C. pubescens*], into which it seems to pass."

Although Miss Lounsberry (*Southern Wild Fls. and Trees* (1901) 73) noted striking intergrading of the two so-called species, she followed tradition in retaining them as separate entities. She said: "Occasionally, when it [*C. parviflorum*] is unusually well grown and its relative [*C. pubescens*] is somewhat undersized, they might almost be taken for the same species, were it not that the little

one is fragrant and has a lip of a deeper shade of yellow.”

Rydberg (*Torrey* 2 (1902) 86), writing in defence of his key to the yellow *Cypripedium* in Britton's *Manual of the Flora of the Northern States and Canada* (1901) p. 290), arrived at the following conclusions:

“1. That *C. hirsutum* Mill. has been rightly understood by me, and wrongly so by the English botanists and by Gray.

“2. That either do we have three species of yellow lady's slipper, one large and one small-flowered, both with vertically flattened lip, and a third medium-sized one with laterally flattened lip; or else was *C. parviflorum* Salisb. a small flowered form of *C. hirsutum*.

“3. In either case, the one with laterally flattened lip is neither *C. pubescens* nor *C. parviflorum*.

“4. If there are three species their names . . . would be as follows:

1. *C. hirsutum* Mill. . . .
2. *C. flavescens* [de Candolle] . . .
3. *C. parviflorum* Salisb. . . .”

Miss Niles (*Bog-trotting for Orchids* (1904) 57) arrived at practically the same conclusions as those of Rydberg. She said: “There seem to be three different forms of the Yellow *Cypripediums*, although there are but two distinct North American species north of Mexico; these appear also to intergrade frequently. Close association of habitat has probably something to do with this cross-fertilization of the two species.” She also said: “Finding the two marsh plants, *Cypripedium hirsutum* and *Cypripedium parviflorum*, growing side by side in the Swamp of Oracles [Vermont], I observed marked intergrading, . . . the large species, *Cypripedium hirsutum*, producing variegated sepals and petals, or possibly now and then a brown-pink petal or sepal, imitating the type species of

the smaller moccasin-flower. Both species were fragrant in a slight degree, *Cypripedium parviflorum* being, of course, the more fragrant of the two."

In 1905, House (Bull. Torr. Bot. Club 32: 374) was inclined to follow Rydberg's conclusions entirely. He said that an examination of fresh specimens during a period of two years led him to believe that there were three species of yellow lady's slipper. He recognized *C. pubescens* as a distinct and definite species. However, he admitted that *C. parviflorum* "... differs from *C. pubescens*, apparently in size only, and is usually found in more swampy situations than *C. pubescens*. Conservative treatment may reduce this to a variety of *pubescens*." House also accepted de Candolle's *C. flavescens*, saying that it is "... a species of shady ravines and moist rich woodlands, of decidedly more boreal distribution than the last [*C. parviflorum*], which seems to follow quite closely the range of *C. pubescens* Willd. In addition to the laterally flattened (the greatest expansion being vertical) lip, the lip is often subglobose and conspicuously ascending, and the leaves narrower and more ascending, than in the yellow-flowered species of our flora." After having written in 1918 (Wild Flowers of New York, p. 66): "Since numerous intermediate forms occur it is probable that they [*C. parviflorum* and *C. pubescens*] represent forms of a single species", House, in 1924 (Annot. List of the Ferns and Flowering Pl. of N. Y. State, p. 235) admitted each of them to specific rank, and at the same time said: "I am now inclined to regard it [*C. flavescens*] as an intermediate form or possibly a hybrid between *C. parviflorum* and *C. pubescens*." Herein, House simply exemplifies the confused state of mind or indecision of most botanists in regard to these plants.

A most interesting observation is recorded on a sheet in the Ames Herbarium by A. B. Klugh, at the time

(1906) editor of the *Ontario Natural Science Bulletin*. He said: "My observations on *C. hirsutum* lead me to believe that the so-called species *C. parviflorum* is a mere form of *C. hirsutum* and not even worthy of designation as a variety. While a sweet scent is usually found in the smaller forms and not in the larger I cannot connect this odoriferous quality with either a dorsally or laterally flattened labellum. The smaller form is here usually found in the drier and shadier situations and the larger in the wetter and more open locations. At the same time I have found small, sweet-scented plants among the larger ones in open bogs."

It is interesting to note that Klugh also reversed the usual habitat attributed by most botanists to *C. parviflorum* and *C. pubescens*.

In 1906, Knight (*Rhodora* 8: 93) made the most constructive suggestion offered up to that time by saying: "I have long doubted their specific distinctness", and reducing *C. pubescens* to *C. parviflorum* var. *pubescens*, "... in order that its exact relationship be better expressed." In his very interesting paper, Knight said: "Study of the plants growing in the field and also of some under cultivation in the garden would seem to prove that we have at best a species, *C. parviflorum* Salisb., which would appear to be our small flowered plant which has commonly passed under this name, while the larger flowered form would appear to require the name, *Cypripedium parviflorum* var. *pubescens*, ...". He continued by citing experimental and observational data supporting his convictions: "On May 30, 1901, Mr. F. M. Billings found a clump bearing eleven flowering stalks which could be referred under the description in the current manuals to no other species than *Cypripedium pubescens*. They agreed perfectly with the descriptions in size of flower, compression of lip, shape of foliage and

all characters except color of the blossoms which were bright, not pale yellow. These plants were growing in very rich soil in low shady woods. A portion of the plant was pressed and three flowers from it are now in my herbarium. Mr. Billings transplanted part of the cluster into his garden, putting them into less rich soil and in a sunnier spot than where they naturally grew. In 1905 the characters of these plants were so far changed that they would pass very well for the small-flowered plant, *Cypripedium parviflorum*. The whole plant had become shorter and slenderer with narrower foliage, the lips of the flowers less than an inch in length (some were two inches at the time when transplanted), lips not appreciably flattened laterally and in fact not any longer possessing the characters of the large-flowered plant."

Knight continued by saying that for some few years he had annually transplanted into his garden clumps of plants which agreed in all essential characters with *C. parviflorum*, although some superficial differences were noted, such as various shades of color in the lip. After five years he found that the plants, with regard to foliage and flowers, had increased in size to the extent that they resembled *C. pubescens*. The plants, which were originally found in moss in a cold bog and had flowered later than the middle of June, after being transplanted into very rich soil in a sunny exposure were seen to flower as early as the third week in May. Nearly all the stalks bore two flowers, whereas they had originally borne rarely more than one flower. He also made the interesting observation: "One season two stalks from the same plant bore flowers whose lip on one stalk was laterally compressed while on the other it was strongly compressed from above, there being one flower on each of these stalks." (Professor Ames tells me that he has observed both of the above-mentioned types of flowers growing on the

same stalk). Citing observations made while studying the plants in their natural habitats in Maine, Knight said: "I have repeatedly found many which were intermediate in characters between *Cypripedium parviflorum* and *C. pubescens* and in most instances plants readily referable to one or the other form (sometimes both forms) were growing with these intermediates." He mentioned several intergradations and said that, in fact, almost every combination of characters could be found. He ended his most interesting argument with the statement: "Unless the numerous specimens possessing characters of both forms can be accounted for on the grounds of hybridism we ought to regard them as different phases of the same species."

It is my opinion that Knight's experimental evidence contradicts his final conclusions. If these experiments and observations are correctly interpreted it seems to me there could be but one conclusion: *A multitude of ecological forms but only one species!*

Rolfe (Orch. Rev. 55 (1907) 184) corroborated, in part, Knight's observations. He said: "*C. pubescens* has much larger flowers, sepals and petals often lighter in colour and the lip somewhat compressed laterally, but nearly all the books agree that they intergrade and both forms are now flowering at Kew [England] out of the same batch of roots." He continued: "I think they [*C. parviflorum* and *C. pubescens*] must be forms of a single species, depending upon vigour and the conditions under which they grow." Rolfe also called our attention to an obvious fact by saying: "It is not at all like a case of natural hybridization where the parent species are themselves quite distinct."

Fuller (Orch. of Wis. (1933) 65), however, did not agree with Knight that reversal of form occurred in each of the species after transplanting to a different habitat.

He cited several examples supporting his opinion. Sheet 35728 in the Ames Herbarium and an article by Ames tend to support Fuller's claim. The sheet bears a specimen and photograph of a plant of *C. pubescens* which according to Ames (Am. Orch. Soc. Bull. 2 (1933) 28) has been in cultivation for more than fifty years. The plant's identity has apparently remained the same as when it was first transplanted. The plants were growing in partial shade in garden loam which was generally enriched with leaf mold. It is very probable that this habitat was similar to that from which the plant was first taken, thereby affording no opportunity for a possible reversal in form due to response to habitat. Fuller also disagreed with both Knight and Rolfe as to the lack of distinctness of each species. He said: "In Wisconsin, *C. pubescens* must be considered of equal rank with *C. parviflorum* and distinct. Only few intermediate forms have been observed by the author and there is field evidence that these may be hybrids."

Farwell (Twentieth Rept. Mich. Acad. Sci. (1918) 197), following Rydberg in part, said that there were three distinct forms of Yellow Lady's Slipper in Michigan, and that as far as he knew no intermediate forms were to be found. The species which he proposed and their most critical diagnostic characters were:

1. *C. pubescens* var. *Makasin* or *C. Makasin*: Small flowers; sac $\frac{1}{2}$ –1 inch long, moccasin-shaped, compression vertical (wider than deep); the staminode linear and obtuse.

2. *C. pubescens* Willd.: Flower similar to the above but with a sac $1\frac{1}{2}$ –2 inches long, moccasin-shaped, compression vertical (wider than deep); the staminode oblong and obtuse.

3. *C. parviflorum* Salisb.: Intermediate as to length of sac, sac bulbous or nearly so, slightly compressed lat-

erally, deeper than wide, convex above and below (not so in the others); staminode deltoid and acute.

Farwell was of the opinion that the plant Salisbury described had the deltoid staminode of number three and the small, flat sac of number one. He asserted that no combination of these characters existed as far as he knew. He also implied that Salisbury might have made drawings of dried material of number three and a conventional sac (perhaps number one) was added which resembled *C. Calceolus*.

After stating: "The plants [*C. parviflorum* and *C. pubescens*] closely resemble one another . . .", Wilson (The Garden 89 (1925) 360) said: ". . . in Mr. Burrage's plants several masses had both kinds [of flowers] intermixed, and this supported the previously recorded opinion that not only are they one and the same species, but that one variety might pass into the other when influenced by different climatic conditions."

A more recent work on North American orchids, that by Morris and Eames (Our Wild Orchids, 1929), has some very interesting notes relative to our yellow *Cypripediums*. The authors stated that although *C. parviflorum* was a bog plant it was ". . . adaptive and hardy enough to have spread from its native swamp to upland wood and grassy bank, . . .". (p. 8) Stating that "Extremes of the Yellow [*Cypripediums*] differ so remarkably in form and color that many botanists distinguish three kinds", they concluded, "It seems best to include them all in a single species of very variable habit." (p. 11)

In the original descriptions no measurements whatsoever were given of *C. parviflorum* and *C. pubescens* as to the length and breadth of the various parts of the plants. However, in time, it was found necessary to cite arbitrary measurements in an effort to separate the so-called species. The measurements in general use today

are those proposed for the lip by Ames in *Gray's New Manual of Botany* (ed. 7 (1908) 306). For *C. parviflorum*, he specified that the lip was 2–3 cm. long; for var. *pubescens*, that the lip was 3.5–5 cm. long. The question then arises as to where those plants should be placed which possess lips less than 2 cm. long or more than 5 cm. long. There is also the question of where those plants should be placed which possess intermediate characters and have lips between 3 and 3.5 cm. long.

In 1932, Fuller (*Rhodora* 34: 100) proposed $\times C.$ *Andrewsii* as a hybrid of *C. candidum* Muhl. and *C. parviflorum*. In the same year, Curtis (*Rhodora* 34: 241) also proposed $\times C.$ *Favillianum* as a hybrid of *C. candidum* and *C. parviflorum* var. *pubescens*. Upon examining specimens of Fuller's hybrid (*Curtis* 1072) and Curtis' hybrid (*Curtis* 1123) in the Ames Herbarium, I find that they approach *C. Calceolus* very closely, especially as to the shape of the staminodes. It is highly probable that these so-called hybrids represent a geographical link between the form *C. pubescens*, more commonly found in the East, and *C. montanum* which is confined to the West. As will be pointed out later, *C. montanum* is probably little more than a color form of *C. Calceolus*. Curtis' conclusive statement (l.c. p. 239) that Fuller "... has settled the question as to the possibility of a native cypripedium hybrid" is questionable if not entirely premature.

In 1933, Wherry (*Am. Orch. Soc. Bull.* 2:14) treated *C. parviflorum* and *C. pubescens* as independent species because, as he said, they "... differ in habitat and accordingly in cultural requirements." Wherry's physiological basis for the segregation of species of *Cypripedium* does not seem to be in accord with either Knight or Morris and Eames. As has been previously pointed out, Knight (l.c. p. 93) cited experiments of successful transplantings of both *C. parviflorum* and *C. pubescens* to en-

tirely different habitats from the ones in which they originally grew, and Morris and Eames (l.c. p. 8) said that *C. parviflorum* was so adaptive and hardy that it had spread from its native swamp to upland wood and grassy bank. We do not recall any case where a species exists as such because of its "habitat" or "cultural requirements."

Fernald (Rhodora 28 (1926) 168) separated var. *planipetalum* "from both *C. parviflorum* and *C. parviflorum* var. *pubescens* (Willd.) Knight by its short and comparatively broad, flat, usually purplish petals, by the relatively shorter and broader upper sepal with less acuminate or elongate tip and with rounded rather abruptly narrowed or subcuneate base, and by the cordate staminodium." He made the following observations: "In its broad flat petals *C. parviflorum* var. *planipetalum* strongly suggests the Eurasian *C. Calceolus* L. and such a plate as that of Redouté, *Les Liliacées*, i. t. 19 [*C. Calceolus*] looks almost intermediate between *C. parviflorum* and var. *planipetalum*; and in some Eurasian specimens of *C. Calceolus* the staminodium shows a very strong tendency to be cordate [see Sowerby *English Botany* 9 (1869) t. 1; Keller and Schlechter *Monographie und Iconographie Orchideen Europas* . . . 1 (1927) t. 1, no. 3; H. Correvon *Album des Orchidées de l'Europe* . . . (1899) t. 10; Stein's *Orchideenbuch* (1892) 177, fig. 59]. In both *C. Calceolus* and *C. parviflorum* var. *pubescens*, however, the staminodium is longer-stalked than in true *C. parviflorum* and var. *planipetalum* and the sepals and petals of the Eurasian plant are more consistently purple than in the American series. They are very close, however, and it need not be surprising if, with better knowledge of the variations of the two series, the Eurasian and American plants are eventually treated as one polymorphic circumpolar species." (Professor Ames shares with Fernald this latter viewpoint).

Elsewhere, Fernald (l.c. p. 95), speaking of var. *planipetalum*, said: "... the larger specimens are, in their broad flat petals, so like some plates of the European *C. Calceolus* L. that, without examination of the staminodium, one would as quickly place them with the European as with the American species. In the form of its staminodium the plant of the Newfoundland limestones is somewhat different from either, ... it may well be that *C. Calceolus*, *C. parviflorum* and the plant of unglaciated areas [var. *planipetalum*] of western Newfoundland are geographic phases of one circumpolar type."

Professor Fernald's theory as to the preferable treatment which should be given to North American yellow *Cypripediums* seems to me to be the most reasonable of the proposals which I find in literature. Therefore, after a thorough examination of many sheets of herbarium material and an evaluation of the literature on the subject, I am led to the conclusion that *Cypripedium Calceolus* L. is a polymorphic boreal species to which our North American yellow *Cypripediums* should be referred. I cannot, as yet, go so far as Fernald suggests and combine both the Eurasian and American plants into one true species. At best, our plants should be given only a varietal position in which polymorphism should be recognized as a constant tendency. To this end, I propose the name *Cypripedium Calceolus* var. *pubescens* for our North American yellow *Cypripediums*. I further conclude that future attempts to segregate our yellow *Cypripediums* into other than the comprehensive var. *pubescens* category should be left to the geneticists. It is apparently not a problem for taxonomists!

***Cypripedium Calceolus* var. *pubescens* (Willd.)**
Correll comb. nov.

Cypripedium Calceolus Linnaeus Species Plantarum ed. 1, 2 (1753) 951, in part.

Cypripedium parviflorum Salisbury in Trans. Linn. Soc. 1 (1791) 77, t. 2, fig. 2.

Cypripedium flavescens de Candolle in Redouté Liliacées 1 (1802) t. 20.

Cypripedium Calceolus Linnaeus *sensu* Michaux Flora Boreali-Americana 2 (1803) 161.

Cypripedium pubescens Willdenow Hortus Berolinensis 1 (1804) t. 13.

Cypripedium parviflorum Sims in Bot. Mag. 23 (1806) t. 911, non Salisbury.

Cypripedium luteum Aiton ex Rafinesque Medical Flora 1 (1828) 140, t. 30.

Cypripedium luteum var. *pubescens* (Willd.) Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *glabrum* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *grandiflorum* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *parviflorum* (Salisb.) Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *maculatum* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *biflorum* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *concolor* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium luteum var. *angustifolium* Rafinesque Medical Flora 1 (1828) 142.

Cypripedium bifidum Rafinesque in Atlantic Journ. 1 (1833) 178.

Cypripedium hirsutum Miller *sensu* Morong in Mem. Torr. Bot. Club 5 (1894) 120—*sensu* Fox in Minn. Bot. Studies Bull. 9 (1895) 442, t. 25.

Cypripedium veganum Cockerell and Barker in Proc. Biol. Soc. Wash. 14 (1901) 178.

Cypripedium parviflorum var. *pubescens* (Willd.) Knight in Rhodora 8 (1906) 93.

Cypripedium hirsutum var. *parviflorum* Rolfe in Orchid Review 15 (1907) 184.

Calceolus parviflorus Nieuwland in Am. Midl. Nat. 3 (1913) 118.

Calceolus hirsutus Nieuwland in Am. Midl. Nat. 3 (1913) 118.

Cypripedium bulbosum var. *flavescens* Farwell in Fifteenth Rept. Mich. Acad. Sci. (1913) 170.

Cypripedium bulbosum var. *parviflorum* Farwell in Fifteenth Rept. Mich. Acad. Sci. (1913) 170.

Cypripedium pubescens var. *Makasin* Farwell in Twentieth Rept. Mich. Acad. Sci. (1918) 198.

Cypripedium Makasin Farwell in Twentieth Rept. Mich. Acad. Sci. (1918) 198, *in textu*.

Cypripedium parviflorum var. *planipetalum* Fernald in Rhodora 28 (1926) 168.

Cypripedium planipetalum Morris & Eames Our Wild Orchids (1929) 8, 11.

Roots coarsely fibrous. Plant 1–7 dm. tall, erect, more or less glandular-pubescent throughout (particularly so at the nodes and on the capsules). Leaves many-nerved and plicate, sheathing at the base, oval, ovate or ovate-lanceolate, acuminate, 5–20 cm. long, 4–10 cm. broad at the middle. Flowers one or two, on long slender peduncles, each subtended by a leaf-like floral bract. Floral bracts ovate-lanceolate, acuminate, 1–10 cm. long, 1–4 cm. broad at the middle. Sepals and petals greenish-yellow to crimson-purple. Dorsal sepal 3–8 cm. long, 1–3.5 cm. broad, ovate to ovate-lanceolate, acuminate-attenuated, often simply undulate. Lateral sepals united almost to the apex, bidentate, 2.5–8 cm. long; lamina

broadly oblong-lanceolate. Petals 4–9 cm. long, narrowly linear-lanceolate, flat or spirally twisted. Lip pouch-shaped, 1.5–6.3 cm. long, dull cream-colored to golden-yellow, rarely approaching white, commonly veined or spotted magenta-purple. Staminode bright yellow, spotted with red-madder-purple, varying from spatulate or oblong-linear with a slightly cordate base to triangular-ovate with a somewhat auricled base and obtuse apex, sometimes concave or conduplicate, supported by a thick fleshy stalk.

Variety *pubescens* differs from the species in its polymorphic tendency, varying in the staminode, in size of the flowers and in coloration of the flowers. It also differs from the species in its geographic distribution, *C. Calceolus* being a Eurasian plant while var. *pubescens* is confined to North America. Flowers of the more northern and intermediate forms of var. *pubescens* approach *C. Calceolus* very closely and are strongly odoriferous as in the species.

Variety *pubescens* is not restricted to any specific habitat. In the North it is commonly found in Arbor Vitae, hemlock, spruce, and tamarack swamps and bogs. Throughout its range it is found in sphagnum bogs, thickets, meadows, pastures, open deciduous woods, rocky dry wooded slopes, low moist woods, and open swamps. The variations found in the plants are probably in part due to their various habitats, as well as to their geographic location within the range of the variety. For example, the flowers of the plants found in Louisiana and Mississippi are much larger, on the average, than those of the plants found in Newfoundland. Variations as to color of the flowers and size of the plants may also be partly attributed to the environment of the plant, such as soil conditions, precipitation, temperature and exposure.

The geographic distribution of var. *pubescens* is from

Quebec and Newfoundland south to South Carolina, Georgia, Alabama, Mississippi and Louisiana; southwest to New Mexico and west to the Yukon, British Columbia and Washington. Its flowering season is from April (in the South) to August (in the extreme North).

It is very probable that further study relating to our North American *Cypripediums* will result in the reduction of *C. montanum* Dougl. as merely a white form of *C. Calceolus*. J.D. Hooker (Bot. Mag. 119 (1893) t.7319) points out that "*Cypripedium montanum* is the representative in Western America of the common *C. pubescens* of the Eastern States; and is so closely allied to the latter plant that except in its lip being white (not yellow) and its flowers fragrant, there is little to distinguish them." Franchet (Journ. de Bot. 8 (1894) 229) said that *C. parviflorum* and *C. montanum* approached *C. Calceolus* very closely, and Rolfe (Orch. Rev. 25 (1917) 125) said that the general resemblance of *C. montanum* to *C. Calceolus* was "most marked".

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