



Steve Clemesha with *S. alata* (red throat) x *flava* (red tube, green lid), a clone he bred.



S. oreophila x *minor*. This plant is slightly and evenly pubescent - a characteristic it has inherited from *S. oreophila*. Photos by S. Clemesha.



S. alata x *psittacina* x *catesbaei*. Even though two grandparents of this plant produced red flowers, this clone has clear yellowish-white flowers, without a trace of pink.

SARRACENIA — THE HAIRY ONES

by Steve Clemesha

Hair or pubescence on *Sarracenia* is a rather controversial subject. There is not agreement on which species produce it naturally and which ones are hybrid descendants. Hair on them is often difficult to see and some plants with me produce hair late in the growing season, but are hairless early in it. To further complicate matters, some plants with me were entirely hairless in the summer of 1985-86 but this season (1986-87) they are showing pubescence.

I suspect growing conditions and, especially, full sun influence production of pubescence. My plants grow outdoors with no protection at all for the whole year. They receive full-sun most of the day. Summers are warm, but temperatures above 30°C are uncommon, and winters are cold enough to cause *Sarracenia* to go dormant, but mild enough to allow me to grow *Nepenthes* with no protection but shade cloth.

Pubescence, or hair, on *Sarracenia* differs. In some it is very dense, while in others it is sparse. Hair on some is very short and fine so is difficult to see, while in others it is more coarse, longer and easily seen. In most cases it is difficult to see, except in full sun. It is easily overlooked, and I have had some plants up to 18 years and was unaware they were pubescent till I looked for it last season. The only plants I consider pubescent are those I can see it on without any magnification. My eyes are quite good, and I do not wear glasses. I do not know what purpose, if any, the pubescence serves. Possibly it makes the pitcher outsides less slippery so insects can walk on them more easily or reduces transpiration in hot weather. In all cases, except where stated, observations have been made on my own plants.

The underside of the "umbrella" of the flower of some pubescent species also is pubescent, but some of my hairless *S. leucophylla* plants also have this characteristic. *Sarracenia* all have hairs and bristles on the pitcher insides so possibly its presence outside is only a minor adaptation.

PUBESCENCE ON SARRACENIA SPECIES

***S. purpurea* ssp. *purpurea*.** I have plants of this from Ohio, Michigan and Algonquin in Canada. I also have fma. *heterophylla* from an unknown locality. In the spring of this and last year all plants were hairless but later in the season last year all were finely pubescent, though much less densely than in ssp. *venosa*. I suspect my local climatic conditions caused this pubescence. It does show that this subspecies has the potential to produce hair, especially as all my plants produced it.

***S. purpurea* ssp. *venosa*.** All my plants of this are pubescent year-round. Ssp. *venosa* lacks the smooth, shiny appearance and feel of ssp. *purpurea*.

***S. flava*.** A clone of the heavily-veined form that I received in June, 1985, was not fully established in southern hemisphere seasons last season and made its best pitchers in mid-summer. They were finely and densely pubescent in the upper part. Whether it will remain as pubescent when it is fully established and produces its best pitchers in spring, remains to be seen. This spring it flowered, and still in late spring has made no good pitchers—probably because it still is not fully adapted to our reverse seasons. So far it is the most pubescent form of *S. flava* I have seen. A clone of the typical red-throated form showed no sign of pubescence on any of my plants the entire 1985-86 growing season, but this year fine pubescence is present near the tops of the large spring pitchers.

***S. flava* red-tube, green-lid.** I have had a clone of this at least 12 years, producing 2 crops of pitchers each year. The main one is in spring, a few poorer leaves follow, then soon

SARRACENIA, THE HAIRY ONES (Continued)

after Christmas a set of smaller pitchers follows. Last season the spring pitchers were hairless, but the summer ones were slightly pubescent in the upper part. This season the spring pitchers are pubescent, though less so than the summer pitchers last year. A recently received clone of this colour form is pubescent this spring also.

I have heard of a clone of the typical red throat form that is in cultivation in South Africa that is pubescent. It was raised from seed sent from U.S.A. and was the only pubescence plant in the batch of about 30 plants.

A hybrid I made between the above mentioned red-tube, green-lid form and a hairless, heavily-veined plant is pubescent like the former parent.

S. leucophylla. My only pubescent clone is the one referred to by Thomas Alt of Germany in C.P.N. 14, June 1985, p. 50. It is closely and densely pubescent, much more so than on *S. purpurea* ssp. *venosa* and the hair is easier to see than on that sub-species. It can easily be seen at least a meter away and it is persistent and still visible on dead pitchers in winter. A few hairs are present also on flower buds and sepals and the underside of the floral "umbrella" is the most pubescent I have seen. The pitchers are slender but slightly shorter than those of my other plants of this species. The flowers of this remarkable clone differ from those of my other *S. leucophylla*. The sepals are greener and the petals more the colour of a *S. leucophylla* hybrid such as *S. x Areolata*. I pressed the petals and sent them to Don Schnell. He thought, and I agree, that the plant has some of the pubescent form of *S. alata* in its breeding. He considers the latter could be descended from hybrids involving *S. purpurea* ssp. *venosa* 'Louis Burk'. I have noticed that in hybrids between pubescent plants and hairless *S. leucophylla* that the seedlings often have more pubescence than the pubescence parent.

S. alata. The two best examples of this that I have are two, three-year-old seedlings. The seed they were raised from was mixed and also contained *S. alata* hairless form and *S. Areolata* x self or *S. alata*. Some of these are hairless, and some pubescence. Three of the plants have flowered. Though *S. leucophylla* colouring and spotting was evident in the pitchers, all flowers were the colour of *S. alata*. Whether the plants that show no *S. leucophylla* influence really are full-blooded *alata* I have no way of knowing, but two of them are very densely pubescent, especially in the lower parts which are silvery white from over a meter away. The other pubescent clones of *S. alata* and *S. x Areolata* in the batch vary in the amount of pubescence they have. Two plants of *S. alata* pubescent form I imported produce pubescence on some pitchers, but not others. All the pitchers are rough to touch, unlike the hairless forms which are very smooth.

S. rubra ssp. rubra. I was sent a plant of a pubescent form of this species in the spring of 1985. Its pitchers are finely and densely pubescent throughout the growing season. My only other clone of this ssp. was hairless in spring but was pubescent in mid-summer, though much less so than the other clone. Hybrids between two other clones and hairless species are pubescent indicating that the *S. rubra* parents were pubescent.

S. rubra ssp. jonesii. In spring, all my plants of this were hairless but by mid-summer all the larger plants of all clones, including the yellow albino form, were lightly pubescent. The plants are from two different localities.

S. rubra ssp. gulfensis. What I have stated about ssp. *jonesii* is true of this sub-species also, but the pubescence on ssp. *gulfensis* is finer and harder to see than on ssp. *jonesii*. With me, ssp. *gulfensis* is the least pubescent of the *S. rubra* sub-species.

S. rubra ssp. wherryi. I have plants of this from 3 different known localities and others from unknown localities. All are finely and densely pubescent throughout the growing season.

S. rubra ssp. alabamensis. Both my clones of this are finely and densely pubescent throughout the growing season like ssp. *wherryi*.

S. oreophila. Both my clones of this are from extreme N.E. Alabama and not from near Birmingham where it once grew near plants of *S. rubra* ssp. *alabamensis*. Both my *S. oreophila* clones have pubescence on most pitchers, especially the lower parts. When present

it is fairly dense and persists till the pitcher dies. Being fairly dense and less fine than on the *S. rubra* ssp. it is easier to see. A minority of pitchers lack hair and I can find no trace of it on the curved, flat leaves.

To date I can find no trace of any pubescence on any of my plants of *S. minor* or *S. psittacina*. I have both species from 4 widely-separated localities. Hybrids from *S. psittacina* in my collection have little or no trace of pubescence except for the cross with *S. purpurea* ssp. *venosa*. There are a few gland-like dots that might be hairs on the cross with *S. rubra* ssp. *rubra*.

Species Pubescence. My plants of *S. purpurea* ssp. *purpurea* are from at least 3 widely-separated localities and all have pubescence. *S. oreophila* and *S. rubra* ssp. *alabamensis* like *S. purpurea* ssp. *purpurea* grow in habitats where no other species of the genus grow. For this reason I do not believe that pubescence on them is the result of their being descended from hybrids with other species. All my plants of *S. rubra* are pubescent and I believe this to be a pubescent species. My *S. flava* that have pubescence look pure but it is possible that a trace of *S. rubra* or *S. purpurea* is in their distant past. On the other hand, *S. oreophila* is pubescent and there seems to be no reason why its closest relative should not be in some plants.

Disagreement has been expressed concerning the origin of the pubescent *S. leucophylla*. One thought was it is a true form, another that it is descended from *S. purpurea* ssp. *venosa* 'Louis Burk' hybrids. I thought it was descended from *S. rubra* ssp. *wherryi* hybrids and I still think it may have some of that in it. Its flowers show a link to *S. alata*, as Don Schnell pointed out. In view of its petal colour, this would seem beyond reasonable disagreement.

The other point of disagreement concerns the pubescent form of *S. alata*. This seems to be more numerous than pubescent *S. leucophylla*, which would support the claim made by some that it is a true genetic form. Against this is the claim that it is descended from hybrids with *S. purpurea* ssp. *venosa* 'Louis Burk'. Because of my own breeding with these plants and the ones I have received, I think if this *alata* is a hybrid descendant then it is descended from hybrids with *S. rubra* ssp. *wherryi*. The presence of *S. leucophylla* in hybrid breeding seems to increase pubescence. I have some hybrids between *S. alata*, *S. leucophylla* and *S. rubra* ssp. *wherryi* that were sent to me from Alabama, and they are almost as pubescent as the pubescent form of *S. leucophylla*. It would be possible to breed *S. alata* and *leucophylla* hybrids with this plant, and in one or two generations some pubescent plants like these species should result.

PUBESCENCE IN HYBRIDS

As I have had some of my plants 18 years, or near it, I have bred them without realizing they are pubescent. There have been some interesting results. I can find no trace of pubescence on seedlings in their first year, but it often shows up the second year after seedlings stop producing juvenile pitchers.

Because plants appear to show no influence of another species, one often concludes they are pure and not a hybrid descendant. I have some (*S. rubra* ssp. *rubra* x *S. leucophylla*) x *S. leucophylla* and the same cross involving *S. rubra* ssp. *gulfensis*. The plants differ from *S. leucophylla* only slightly in the hood shape. I would not be sure they were not pure if I had not bred them myself. In both cases, *S. leucophylla* was the pollen parent both times.

In yellow-flowered plants, a trace of pink in the petals is a sure sign a plant is descended from a red-flowered species. The colour can persist for several generations, but it also can be dropped entirely any time from the second generation, providing yellow-flower genes are in both parents. I have 3 examples of this. One is a hybrid between a field-collected *S.* x *Catesbaei*, and the other parent is *S. alata* x *S. psittacina*. Both these parents have pink-red flowers, but one plant of the hybrid has clear yellow flowers with no trace of pink. The pitchers show influence of *S. psittacina* and *S. purpurea*. The second example is a hybrid between the same *S.* x *Catesbaei* and *S. alata* = *S.* x *Illustrata*. I have two plants of the cross.

(Continued next page)

SARRACENIA, THE HAIRY ONES (Continued)

Both have short, wide-mouthed pitchers that show the influence of *S. purpurea*. One plant has pink petals, while the others are pure yellow. Two *S. alata*-like seedlings with some *S. leucophylla* spotting have clear yellow flowers.

***S. purpurea* ssp. *purpurea* Hybrids.** My only mature hybrid from this is a cross with *S. psittacina*. It is completely hairless. My plants of the yellow form of *S. rubra* ssp. *jonesii* x fma. *heterophylla* are pubescent in summer, a bit more so than their parents. My other ssp. *purpurea* hybrids are seedlings in their second year, but already some are showing pubescence that is about as dense as that on ssp. *venosa* hybrids. The ones showing it so far are crosses with *S. flava* 'typica', *flava* red-tube, green-lid and *flava* heavy veins. The first two are pubescent plants mentioned earlier, while the last is hairless so far. My largest *S. flava* x *S. purpurea* ssp. *purpurea* is a cross with the all-green *S. flava*. So far, all seedlings like the *flava* parent are hairless. Less than one plant in 10 of my ssp. *purpurea* x *S. alata* and x *S. leucophylla* are pubescent, but these that are have as much pubescence as ssp. *venosa* crosses. The *alata* and *leucophylla* parents are hairless. A cross between the two sub-species of *S. purpurea* looks so far as if it will be as pubescent as ssp. *venosa*.

***S. purpurea* ssp. *venosa* hybrids.** All my plants of these were bred from Carolina plants. I doubt if the result of breeding from Gulf Coast plants would be much different. All my ssp. *venosa* hybrids are pubescent to about the same degree, regardless of the other parent. Pubescence on individual pitchers varies a bit throughout the season making comparison of plants difficult.

***S. flava* hybrids.** In CPN 12(3):67, Fig. 2, a photograph of *S. flava* red-tube, green-lid x a hairless *S. alata* red-throat is shown. All plants of that cross are lightly pubescent. The hair is more scattered than on the *S. flava* parent, but is less fine and easier to see. I have crossed the same *S. flava* with a hairless dark clone of *S. leucophylla*. The resulting hybrid is identical to the *S. x Mooreana* in CPN 13(2):42, Fig. 2. My clone produces attractive pitchers throughout the growing season, unlike my other *S. x Mooreana*-a field collected plant of the red-throat form. It is attractive only in spring. The pitchers of the plant I bred are all pubescent and much more so than on its one pubescent parent. The hybrids I have made between *S. flava* (various forms) and *S. oreophila* all have some pubescence. The cross between the red-tube, green-lid form and *S. oreophila* is only 3 cm. high and already pubescent.

***S. oreophila* hybrids.** The cross of this species and *S. minor* is an extraordinary one. The pitchers are tall and stout and the hood is a bit small to cover the pitcher mouth. It is evenly, though not densely pubescent and the pubescence is fairly easy to see. Pubescence in *S. oreophila* x *S. alata* is dense and easily seen, and, as in *S. oreophila*, mainly in the lower part of the pitcher. The same is true of *S. oreophila* x *S. leucophylla*. The pubescence is greatest on hybrids with the very pale *S. leucophylla* that has yellow flowers. Don Schnell said, and I agree with him, that this unusual clone he found is probably an *S. alata* hybrid descendant.

***S. rubra* hybrids.** I have found when the various sub-species of *S. rubra* are crossed with other species the resulting seedlings usually are pubescent, except in the case of ssp. *gulfensis* which in the case of my plants is the least pubescent of the *S. rubra* sub-species. It is likely that more pubescent clones of it exist which would give a different result.

My only mature *S. rubra* ssp. *alabamensis* hybrid is a cross with *S. leucophylla*. It is finely and densely pubescent, more so than on the ssp. *wherryi* parent. A minority so far are only slightly pubescent. This cross is also very like *S. leucophylla*. The only significant difference is in the hood and upper pitcher colouring. It is patterned as in *S. leucophylla*, but the colour is duller as is common in *S. leucophylla* hybrids. It is not as dull as in the hybrid *S. Areolata*. These seedlings are not full size yet and I expect a back cross to *leucophylla* would be very similar to a pure one and a selfing of the seedlings could result in some seedlings being more pubescent still. *S. rubra* ssp. *wherryi* x *S. alata* also are fully pubescent but it is less easily seen than in the *S. leucophylla* hybrid. These *alata* hybrids look much more like *S. rubra* ssp. *wherryi* than they do *S. alata*. Those bred from the red throat form of *S. alata* look rather like *S. rubra* ssp. *wherryi* with a red underside to the lid.

Complex Hybrids and Back Crosses. Most of my hybrids in this group have *S. purpurea* ssp. *venosa* in them. The degree to which they are pubescent varies according to the amount of ssp. *venosa* that is in them.

I have three-year-old seedlings of *S. mitchelliana* x *S. leucophylla* and *S. exornata* x *S. alata*. Less than one quarter of these show any pubescence at all, and in those that do it is very fine and hard to see. The *S. leucophylla* cross is an exception to what I have noticed about *S. leucophylla* in a cross increasing the pubescence in the seedlings. It is likely that selfing my slightly pubescent back crosses will result in some plants that are more pubescent. If that is so, pubescent forms looking like *S. alata* and *S. leucophylla* could be bred both in cultivation and in the field. The *S. purpurea* used in my breeding is a Carolina one, and it is possible, though unlikely, that the results when breeding from Gulf Coast forms would be different.

I have a field-collected plant of a hybrid of mixed parentage form. It is one of the most pubescent plants in my collection. I think it is likely that it is a selfing of the hybrid and that it would be one of the most pubescent seedlings in its batch. This plant is not as pubescent as my best *S. alata* and *S. leucophylla*, but it is not far behind. I think it will be easy to breed pubescent plants like the last 2 species from this plant, and I will try it. As the plant is a field-collected one, the same thing could happen in the wild.

Although many *Sarracenia* species and hybrids have some pubescence, the degree varies greatly, and in only two is it conspicuous, these being the pubescent forms of *S. alata* and *S. leucophylla*. It is possible and likely that these are descended from hybrids involving *S. rubra* ssp. *wherryi*, *S. alata* and *S. leucophylla*. It, also, is possible that *S. purpurea* ssp. *venosa* hybrids have been the ultimate source of pubescence. I do not think pubescence on *S. rubra* ssp. is the result of hybridization. That is true also of the very fine pubescence found on some plants of *S. flava*. There can be no doubt that pubescence on *S. oreophila* and *S. purpurea* ssp. *purpurea* is not the result of their being hybrid descendants.

In hybridization (except where only one parent is pubescent and that minimal inheritance of pubescence seems dominant) often seedlings are more pubescent than their parents. In hybridization beyond the first generation pubescence is gradually lost if breeding is away from pubescent parents. If it is desired to maintain or increase it then, selfing, selection or back crossing is necessary.

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