

SOME THOUGHTS ON THE SPECIFIC POPULATIONS OF SULCOREBUTIA

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Group 2b

S. purpurea was originally described by me from plants collected by Alfred Lau at Lagunillas (Lau 331/336) at 3,000 m (9,800'), the highest point between Chaquarani (Cruce) and Quioma (Mina Asientos). They were large, applanate, strongly porrect spined plants with short-tubed, large, purple or red flowers. The root system is intrinsically rapiform but not strongly developed. The body looked to me like a *Lobivia* with large tubercles and broad areoles but the broad flower scale axils were virtually naked (*Lobivia* has narrow, hirsute scale axils). *Weingartia* thus seemed to be the appropriate genus. Later studies on the seeds and the discovery of fine bristles in the flower scale axils proved that *Sulcorebutia* rather than *Weingartia* was a better choice of genus. (This may be purely academic as certain botanical authorities would now include *Weingartia* and *Sulcorebutia* under the umbrella of an enhanced genus *Rebutia*.) The habitat is typical for *Sulcorebutia* - a very dry, stony, bare slope facing northwest. *Weingartias* are found at much lower, moister altitudes, invariably under shrub - by cover.

It is now known that *S. purpurea* has a much larger range of distribution and is very variable in habit. Again, some very local forms have been described unnecessarily as new species - *S. santiaginiensis* and *S. unguispina*. The first undisputed forms of *S. purpurea* occur within 12 km (7½ miles) of Aiquile, following the route from Aiquile to the Cuesta de Santiago. Virtually every stony summit around 3,000 m (9,800') facing northwest will have a form of *S. purpurea*, especially near Novillero, Laguna, and the Reika Pampa and almost as far west as Cauta. All forms are characterized by their large, applanate bodies, strongly spined, broad areoles, and large, short-tubed, deep magenta, purple, or crimson- red flowers. (One dwarf form discovered by the Huntington Botanical Garden Expedition in 1984 [Kimmach 2836-Donald 181] is interesting in that it looks remarkably like a form of *S. markusii* which occurs some 50 km [31 miles] northwest near Villa Vizcarra [Vila Vila]. It deserves recognition.) The spine colors vary from white, yellow, and brown-red to black; epidermal colors from bright green to deep bronzed purple. Spine display varies from adpressed pectinate to fully porrect.

S. santiaginiensis is only a form from Novillero with white to brown, strongly adpressed, interlacing spines and *S. unguispina* only a form from above Molinero with strong, porrect spines. Neither of these forms occur as a single, homogenous population - they merely represent an artificially selected form out of an otherwise very variable population.

S. jolantana is the southernmost form of *S. purpurea* discovered so far - near Laguna, beyond the Rio Molinero but still only a few crowflight kilometers from either Molinero or Novillero but nevertheless, a long way by jeep track. *S. jolantana* is itself quite variable and clearly forms a cline from the plants above Molinero and Novillero, transforming into large, golden-yellow or red-brown spined plants with deep magenta rather than red or purple flowers. Habitat again typical-long, stony, bare slopes facing northwest, around 3,000-3,100 m (9,800-10,200').

Group 2c

These plants occur farther west and north of the *S. purpurea* arc around Vila Vila and east of Torotoro. *S. verticillacantha* var. *cuprea* and *S. markusii* are probably the same species although morphologically they are quite distinct from each other. *S. verticillacantha* var. *cuprea* has nothing whatever to do with the *S. 'steinbachii'* *verticillacantha* populations from across the Rio Mizque to the north. The plants are generally smaller than the *S. purpurea* group, less applanate in habit, with finer, needle-like spines from 10 to 30 mm (0.39-1.18") long, and somewhat narrower areoles. The flowers are red to crimson and smaller but longer-tubed than for *S. purpurea*. *S. markusii* is rather more variable with either crimson or magenta flowers, short, pectinate spines or larger, stronger, curved spines. The epidermis of both *cuprea* and *markusii* is usually deeply bronzed-purple rather than green. A form of *S. markusii*, the "variety" *longispina*, is in marked contrast with a green epidermis, porrect, yellow spines and a bright magenta flower (Lau 333). It occurs adjacent to the main population and can only be accepted as a phenotype, there seems to be no physical barrier to genetic exchange.

Augustin and Swoboda have recently discovered other forms of these two taxa near Sivingani (Saibangani) north of Villa Viscarra (Vila Villa).

The maintenance of some phenotypic variants within this and many other *Sulcorebutia* populations is remarkable but not fully understood.

Group 2d

Perhaps the largest of the species or *Sulcorebutia* occur around Torotoro. Surprisingly, they again resemble *Lobivia* in body form and *Weingartia* in flower. Cardenas described *S. torotorensis* originally as *Weingartia torotorensis*, but, like *S. purpurea*, further studies indicate that *Sulcorebutia* would be more appropriate. The bristles in the flower scale axils are more obvious than for most other *Sulcorebutia* species. The plants grow to over 150 mm (5.9") in diameter and height, ribs lower than for *S. purpurea* but areoles large and oval. Flowers normally bright magenta of average size, more rarely bicolored orange-red to crimson (*Weingartia rubriflora* Knize n.n.); the magenta forms may be lightly clove-scented. Spines also less well developed than for *S. purpurea*, adpressed or porrect, curved, white to yellow, rarely brown except for *S. vizcarrae*. The latter is generally smaller than *S. torotorensis* but with larger spines and deeper colored magenta to purplish-red flowers. Plants in cultivation stem from the Rausch collections mostly and only one clone of the Cardenas form is known and this does differ in several respects from the Rausch plants which are obviously only forms or *S. torotorensis*.

Caution though should be heeded as, again, the *S. torotorensis* forms in cultivation stem from the collections of Rausch (WR 464a), Lau (Lau 327), and Knize, whereas the Cardenas plant is known generally from seedlings - not imported wild plants, apart from the one clone which might be untypical.

The original habitat for *S. vizcarrae* quoted by Cardenas is: "vicinnis Mizque." 2,000 m (6,600') - a very low habitat for a *Sulcorebutia*. This is some way from Torotoro, Rausch's habitat but closer to the Lau habitat for his Lau 324 near Arani. The original photograph resembles plants collected by Krahn between Tin Tin and Chaquarani related to *S. cylindrica*.

The area around Torotoro has, nevertheless, been revisited over the past few years without discover of additional forms that might challenge the acceptance of the name *S. torotorensis* for the plants in cultivation but *S. vizcarrae* is less certain - the Cardenas clone has longer, finer spines and a reddish-purple flower rather than the shorter, thicker spined, magenta flowered forms from Rausch (WR 464). The recently described *S. vizcarrae* var. *laui* (Lau 324) occurs some distance away from Torotoro - near Arani, across the Rio Mizque according to Lau. Again, the plant shows characters of both *Lobivia* and *Weingartia* and would seem to belong to the *Torotoro* population rather than to *steinbachii* that one would expect from Arani (see *S. steinbachii* var. *australis*). The variety *laui* is a gray-green, caespitose plant with straw-yellow, porrect spines, long, narrow areoles, and small magenta flowers. The seed form is also very like the *S. steinbachii* group. The aberrant, long, narrow areole may be an unusual feature peculiar to the plant observed for seedlings are more typical in showing much broader areoles. In many aspects the variety *laui* appears to be an intermediate between *S. steinbachii* and *S. torotorensis* - an interesting plant that needs to be recollected with all exact knowledge of its habitat.

The third distinct population is based on *S. cylindrica* Donald - a plant first discovered by Alfred Lau (Lau 335) behind the railway cantonment at Pajscha, some 10 km (6.2 miles) west of Chaquarani (Cruce). These plants are remarkable in their fantastic root system (not mentioned in the original description due to ignorance because the roots had been cut off the original imported plants).

These roots are exceptionally long and thick - a plant no more than 50 mm (1.97") high can have a root system 60 cm (23.62") long and 6-7 mm (0.24-0.28") thick along its entire length. In habitat the plants remain fairly small, upright, and rarely more than 70 mm (2¾") tall and 30 mm (1.2") diameter, yet in cultivation they elongate to 30 cm (11.8") tall or more and become prostrate. In the wild the plants are usually white spined, yellow flowered, with some clones clovescented - others have a musty odour. The spines are around 10 mm (0.39") long, both adpressed and porrect in display. The flowers are smaller, around 30 mm (1.18") long and wide, than most *Sulcorebutias*. The habitat is typically on the higher reaches of stony slopes, usually of red sandstone, sparsely shrub covered or open. The red sandstone is typical of the hills around Chaquarani. At Pajscha there are two hills behind the cantonment, both of which have yellow flowered forms, but around Chaquarani the color becomes magenta, rose-like, or even white. The root systems are less elongated but still tuberous - rather like a *Dahlia*. These plants which occur on many of those red sandstone hills from 10 km (6.2 miles) beyond Tin Tin to Chaquarani to Pajscha and beyond eastwards in habitat do not grow large but, again, tend to elongate in cultivation just like the others. Several collections of these magenta

flowered forms have been made by Krahm (WK 678), Swoboda (HS 44), and Lau (Lau 337). There are minor variations amongst the adjacent populations - some forms have porrect spination; others adpressed or pectinate but the flowers are very uniform, smallish, 30 x 30 mm (1.18 x 1.18"), and often clovescented. Lau 337, for which there is no exact locality quoted, is a more robust plant, growing quite large in cultivation - up to 150 mm (5.9") tall and 60 mm (2.36") wide with strong stiff spines, yellow, brown, or black in contrast to the soft, flexible spines of *S. cylindrica* (Lau 335).

Lau 337 also has normally magenta flowers but one yellow flowered clone is known in cultivation. Again, it is an interesting form that must be recollected to ascertain its exact habitat.

The fourth principal species of the *Sulcorebutia* population in their northern distribution zone is *Sulcorebutia breviflora*, first described by Cardenas from plants near Siquimiri on the Rio Caine. This population is physically isolated by the narrow gorge of the Rio Caine and its valley spreading eastward from La Viña. The plant grows at a relatively low altitude - around 2,000 m (6,600'). The habitat is on the steep slopes of the Rio Caine canyon from La Viña westward to Siquirami (Capinota prov.).

The population is quite variable, globular and applanate, green plant bodies, usually caespitose but sometimes remaining single to grow into moderate sized specimens - 60 mm (2.36") tall and 40 mm (1.57") in diameter. Spination is from weak pectinate to strong porrect, white to yellow, brown to black, from 5 mm (0.2") to 20 mm (0.70") long. The spines are unusual in their microstructure - resembling those of *Weingartia* rather than *Sulcorebutia* (W. Van Maele, private communication). Their flowers vary enormously in size - from only 12 to 15 mm (0.47-0.59") long and wide up to 30 mm (1.18") long and wide, usually yellow in color but magenta colored forms also occur randomly, especially in *S. caineana* white centered and wholly white flowers also occur especially amongst Lau 313 and Lau 314 but not Lau 315. The petals too show marked variation from a narrow star with petal width around 2-3 mm (0.08-0.12") to broad spatulate, 6 mm (¼") wide.

Cardenas described three species but only one (*S. breviflora*) is necessary:

Sulcorebutia breviflora (*Rebutia brachyantha* Card. nom. illeg.)

Buin. & Don.

S. caineana (Card.) Buin. & Don.

S. haseltorii (Card.) Buin. & Don.

These occur randomly in all populations but some forms may dominate individual colonies. Thus it appears that only four species are required to cover all the *Sulcorebutia* plants growing north of the Rio Caine to Cochabamba. They are:

- (1) *Sulcorebutia steinbachii* (Werd.) Backbg.
- (2) *S. mentosa* Ritt.
- (3) *S. cylindrica* Don.
- (4) *S. breviflora* Backbg.

These conclusions are based on (1) studies of plants of known provenance in cultivation, (2) from reports and personal communications of field workers, and (3) my own observations of the plants and habitats in Bolivia.

A second article will be published analyzing the southern group of *Sulcorebutias* based upon the plants from Chuquisaca and Tarija departments. These plants have no obvious phylogeny with the northern group.

The taxonomic changes recommended in this article and in part II to follow will be summarized in an appendix to part II.

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Preface to Appendix 1

Different schools of thought in the botanical world show a marked variance in their interpretation of the recommendations in the International Code of Botanical Nomenclature upon the assignation and use of subspecific ranks. Similarly most hobbyists dislike polynomials, particularly in regard to writing identification labels. The scheme of rationalisation I propose below will therefore not be universally acceptable to all parties interested in *Sulcorebutia*. The scheme below is an attempt to portray the phylogenetic relationships between all the published taxa within the genus and some likely

new taxa at the appropriate ranks for their degree of diversion and isolation from the principal species. All infraspecific ranks are involved in a strict hierarchical sequence to reflect the status of each accepted unique taxon. Where no readily discernible separation is possible because of the blurring of the separating characters or because there is no obvious discriminator between taxa that occur along a cline, these taxa have been listed as synonymous with their appropriate priority epithet. This is not to reject these taxa as of no value to the hobbyist, as indeed they have great value in demonstrating the extent of diversity of the specific populations, and which should be incorporated in enhanced descriptions of the subsuming taxon, with the individuals concerned conserved as 'cultivars.' The scheme itself will appear clumsy with the delineation of quadri- and pentanomials, which are all anathema to anyone not involved with classification.

I must agree that I, too, would not wish to use these polynomials in the form set out below, but to use only the specific epithet and the additional ranking epithet as appropriate, even though this would not indicate the subtle intervening phylogeny. If one believes that it is possible to have a hierarchical sequence of phylogenetic relationships within an overall specific population reflecting the taxonomic (evolutionary) distances between the component individual taxa, then a formal polynomial scheme must be consequential. The alternative is either a multispecific system with varieties that do not reflect their true status, or a paucispecific system with a swarm of varieties that overemphasises the true specific diversity. The choice, like many decisions in taxonomy, is both personal and intuitive, and depends very much upon one's own interpretation of the rank of variety, and which can vary from school to school. This is one personal attempt to counteract the overgenerous allocation of undeserved species to the genus (or as seems very probable in the not so distant future subgenus or section of *Rebutia*). I have no doubt that there can be improvements to it.

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