

Fig. 1. *Sulcorebutia rauschii*, an exceedingly beautiful species. Fig. 2. (right) *Sulcorebutia candiae*, a striking species with purple-brown body and golden yellow spines and flowers. Figs. 1 & 2, photos Abbey Garden; figs. 3-12, photos by author.

In defense of *Sulcorebutia* Backeberg

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In the December issue, Volume 40 on page 241 of the *Cactus and Succulent Journal* my colleague Professor Martin Cardenas stated that *Sulcorebutia* was an unnecessary name. In the rejection of this generic name as superfluous, Martin Cardenas is virtually alone. The I.O.S. working party on the taxonomic relationships within the genus *Rebutia* K. Sch. decided unanimously that there was no case for the inclusion of *Sulcorebutia* within the genus *Rebutia* S. lat. This was fully reported at the I.O.S. Congress in Vienna August 1963, and published in the *Swiss Journal Sukkulentenkunde* VII/VIII 1963¹ and also again in English in a shortened form in the *Cactus and Succulent Journal of Great Britain* in 1965².

In an age of consolidation and reduction of the number of genera, when wider generic and specific concepts are understood and accepted and wholesale revisions taking place (viz *Borzicactus* after Kimnach, *Ariocarpus* after Anderson, *Neoporteria* after Rowley and Donald, *Rebutia* after Buxbaum, Buining and Donald) it may seem strange perhaps to make a particular exception. At a superficial glance externally one would agree with Martin Cardenas that *Sulcorebutia* is very similar to *Rebutia* particularly regarding the appearance of the flower. But this resemblance is very misleading for on closer examination of every character and detail of taxonomic importance *Sulcorebutia* can be shown to be quite distinct from *Rebutia* s. lat. Using a system similar to that explained by Gordon Rowley³ in 'Cactus and the Computer' one finds that *Sulcorebutia* is related almost equally to *Lobivia* and to *Weingartia* rather than *Rebutia*. There are two remarkable plants that cover both transitions—*Lobivia pseudocinnabarina* Backbg.⁴ lies between *Lobivia* and *Sulcorebutia*, and *Weingartia* sp. FR 816 (Ritter) which lies between *Sulcorebutia* and *Weingartia* and in particular between the species *Sulcorebutia glomeriseta* (Card.) Ritter⁵ and *Weingartia multispina* Ritter⁶. Back crossing of these transitional species seems to establish that they are not Fl hybrids. Nowhere have there

been found plants to mark any transition between *Rebutia* and *Sulcorebutia*. Deliberate crossing between these genera fails to produce fertile seed; yet *Sulcorebutia* freely crosses with *Chamaecereus* as does *Lobivia* while *Rebutia* does not, *Sulcorebutia* also crosses with *Weingartia* while *Rebutia* does not, similarly *Rebutia* does not cross with *Lobivia*.

Martin Cardenas has criticized European taxonomists as lacking field experience of *Rebutia* and hence are not in a position to produce a worthwhile classification of these plants⁷. This may be true of myself yet it is not true to assume that there is no one in Europe without this experience, nor is it true to assume that there is no one in South America communicating direct to Europe on such experience. Walter Rausch of Vienna and Friedrich Ritter of Olmue, Chile, have both covered the habitat zones of *Sulcorebutia* and *Rebutia* very thoroughly several times, not just once, to name only two such people who have a wealth of such experience. Their evidence more than anything else convinced us here in Europe of the need to keep *Sulcorebutia* distinct from *Rebutia*.

One can sympathize with Martin Cardenas as a Bolivian National the galling effect of people such as myself telling him how to classify the plants that grow in his homeland. Yet taxonomy is not a national prerogative; it is international and universal. Just as the plants it tries to classify, it knows no, nor accepts any national boundary. We try to apply botanical logic to the systems we study and in this case we find differently from our Bolivian colleague, but we do not deny his right to believe and say otherwise.

Over the last ten years it has been my privilege to examine many hundreds of plants from Bolivia. One is immediately struck by the tremendous amount of individual variation that exists with each so called species. I entirely agree with Martin Cardenas that at specific and lower levels Curt Backeberg was over hasty in describing new taxa without field data. I also believe that both Martin Car-

denas and Friedrich Ritter themselves have been too generous in describing new taxa despite their knowledge of the plants on the ground. Originally these new species appeared seemingly distinct individuals, but with more and more material available for study, the sharp distinctions between each species has become blurred, so much so that there appears now to be a natural cline covering *Sulcorebutia steinbachii*, *S. polymorpha*, *S. tiraquensis*, *S. glomerispina*, *S. totoensis*, *S. lepida*, *S. mentosa* and *S. sucrensis* as one proceeds from Cochabamba east and southwards along the Cordillera towards Santa Cruz and to Sucre. The individual species being found at convenient access points from the main routes. Similar but less extensive clines can be found to cover other *Sulcorebutia* species within well defined limits e.g., the yellow flowered groups comprising *Sulcorebutia candiae*, *S. menesesii*, and *S. xanthoantha* and *Sulcorebutia kruegeri*, *S. arenacea*, *S. caineana* and *S. breviflora* (*brachyantha*).

Professor Cardenas stresses the fact that only the floral characters are stable enough to warrant taxonomic importance and hence the body morphology is unimportant in distinctions between *Rebutia* and *Sulcorebutia*. I believe him to be mistaken because of the body structure of *Sulcorebutia* is lobivoid and not rebutioid. The rib structure of *Rebutia* is achieved by end-on abutment of individual tubercles into which the rib is resolved, but in *Lobivia* and *Sulcorebutia* and *Weingartia* the rib already exists upon which the tubercles are raised and which abut each other obliquely. Hence the two rib structures are fundamentally different. Similarly the sitting of the areole on the tubercle is lobivoid for both *Sulcorebutia* and *Weingartia* being sited on the upper half of the tubercle and sunken whereas in *Rebutia* it is centrally placed and generally raised on the tubercle. The areole shape and structure are also fundamentally different for *Sulcorebutia* from *Rebutia*, being much larger, very long and very narrow quite unlike the small round or oval areoles of the latter. In *Weingartia* one can also see a tendency towards the *Sulcorebutia* type areole and also in *Lobivia pseudocinnabarina* although basically remaining lobivoid in having a longer minor axis than in *Sulcorebutia*. Superficially the fruits of *Sulcorebutia* and *Rebutia* appear similar and both at maturity dehisce basally, the pericarp of both also becomes papery. The immature fruits of *Rebutia* are much more flattened than for *Sulcorebutia* which are more globose with a very short neck to which are attached the floral remains. The fruits of *Weingartia* are to all intents and purposes identical with those of *Sulcorebutia*. The flowers also of similar structure for *Weingartia* and *Sulcorebutia*

and distinct from *Rebutia*. The latter has a narrow restricted receptacle with a reduced nectarium and the insertion of the filaments occurring in two or three distinct zones. The external surface has narrow lanceolate scales only. In *Sulcorebutia* and *Weingartia*, however, the receptacle is relatively speaking wide and open with a normal nectarium and insertion of the filaments over the whole internal surface. The external surface bearing broad spatulate scales. It is only in the length of the receptacle that *Sulcorebutia* may differ from *Weingartia*, being considerably reduced in the latter to give a relatively short tubed flower compared with the former generally speaking, but there are several *Sulcorebutia* species which also have short receptacles.

Finally the seed structure of *Sulcorebutia* points to strong affinities with both *Weingartia* and *Lobivia* and away from relationship with *Rebutia*.

When all these points are scored between *Rebutia* s. lat., *Weingartia*, *Sulcorebutia* and *Lobivia*, it is immediately apparent that the closest relative of *Sulcorebutia* is *Weingartia* and that both of these genera are quite close relatives of *Lobivia* and have only a slight affinity with *Rebutia* s. lat. Nine principal characteristics divided into thirty subsidiary characteristics were chosen. The thirty subsidiary characteristics could be allocated on a present/absent basis to each genus. The following square table shows the distribution of shared characteristics:

L	15	10	10	1
W	10	15	13	4
S	10	13	15	4
R	1	4	4	15
	L	W	S	R

The nine principal characteristics used were:

(i) rib structure, (ii) podarium, (iii) areole siting, (iv) areole structure, (v) floral emergence, (vi) receptacle structure, (vii) filament insertion, (viii) fruit and (ix) seed.

There is no doubt that other characteristics could have been used but the purpose of this exercise was simply to explore the probable relationships within the four genera rather than a rigorous analysis. From the table of shared characteristics it would be prudent only to suggest that *Sulcorebutia* is justifiable and acceptable as a separate genus at least as much as is *Weingartia* and that there is little justification in associating *Sulcorebutia* with *Rebutia* s. lat.

The following species are proper to the genus:



Fig. 3. *S. arenacea*

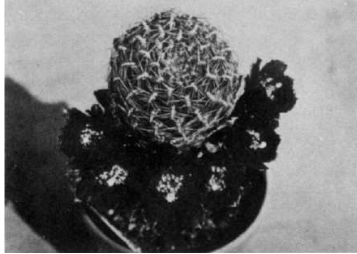


Fig. 4. *S. sucrensis*



Fig. 5. *S. kruegerii*



Fig. 6. *S. steinbachii* v. *gracilior*



Fig. 7. *S. verticillacantha*

arenacea	(Card.) Ritt. Nat. Cact. & Succ. J. 16 (1961); 81. syn. <i>Rebutia arenacea</i> Card. Cact. & Succ. J. Amer. 23 (1951); 93.
breviflora	Backbg. Die Kakt. Lex. (1966); 414. syn. <i>Rebutia brachyantha</i> Card, (illeg. homonym <i>Rebutia brachyantha</i> (Wessn.) Buin & Don).
caineana	Kakt. u.a. Sukk. 16, (1965); 74. (Card.) Donald nov. comb, syn. <i>Rebutia caineana</i> Card. Cact. & Succ. J. Amer. 38 (1966); 143/4.
candiae	(Card.) Buin & Don. Sukkde. VII/VIII, (1963); 104. syn. <i>Rebutia candiae</i> Card. Cact. & Succ. J. Amer. 33 (1961); 112. (Backbg. nov. comb, in Kakt Lex is superfluous).
caniqueralii	(Card.) Buin & Don. Cact. & Succ. J. G.B. 27 (1965); 57. syn. <i>Rebutia caniqueralii</i> Card. Cact. & Succ. J. Amer. 36 (1964); 26 (Backbg. nov. comb, in Kakt Lex is superfluous).
caracarensis	(Card.) Donald nov. comb, syn. <i>Rebutia caracarensis</i> Card. Cact. & Succ. J. Amer. 42 (1970); 37-38.
crispata	Rausch Kakt. u.a. Sukk. 21 (1970); 103.
flavisissima	Rausch Kakt. u.a. Sukk. 21 (1970); 105.
frankiana	Rausch Kakt. u.a. Sukk. 21 (1970); 104-5.
glomeriseta	(Card.) Ritt. Nat. Cact. & Succ. J. 16 (1961); 81. syn. <i>Rebutia glomeriseta</i> Card. Cact. & Succ. J. Amer. 23 (1951); 95.
glomerispina	(Card.) Buin. & Don. Cact. & Succ. J. G.B. 27 (1965); 80. syn. <i>Rebutia glomerispina</i> Card. Cact. & Succ. J. Amer. 36 (1964); 40.
haseltonii	(Card.) Donald nov. comb, syn. <i>Rebutia haseltonii</i> Card. Cact. & Succ. J. Amer. 38 (1966); 143.
hoffmanniana	(Backbg.) Backbg. Die Kakt. Lex. (1966); 415. syn. <i>Lobivia hoffmanniana</i> Backbg. Die Cact. III (1959); 1434. (It is possible that this plant is still a <i>Lobivia</i> and identical with <i>Lobivia pseudocinnabarina</i> Backbg.)
inflexiseta	(Card.) Donald nov. comb, syn. <i>Rebutia inflexiseta</i> Card. Cact. & Succ. J. Amer. 42 (1970); 36-37.
krahnii	Rausch Kakt. u.a. Sukk. 21 (1970); 104. syn. <i>Sulcorebutia weingartiana/weingartioides</i> Hort. non <i>Sulcorebutia weingartioides</i> Ritter nom. prov. F R 944.
kruegeri	(Card.) Ritt. Nat. Cact. & Succ. J. 16 (1961); 81. syn. <i>Aylosteria kruegeri</i> Card. Cactus (Fr) 1958; 260.

lepada	Ritter Nat. Cact. & Succ. J. 17 (1962); 13.
markusii	Rausch Kakt. u.a. Sukk. 21 (1970); 103-4.
menesesii	(Card.) Buin. & Don. Sukkde 7/8 (1963); 104. syn. <i>Rebutia menesesii</i> Card. Cact. & Succ. J. Amer. 33 (1961); 113. Backbg. nov. comb. in Die Kakt. Lex. is superfluous.
mentosa	Ritt. Succ. 43 (1964); 102.
mizquensis	Rausch. Kakt. u.a. Sukk. 21 (1970); 102-3.
polymorpha	(Card.) Backbg. Die Kakt. Lex. (1966); 416. syn. <i>Rebutia polymorpha</i> Card. Kakt. u.a. Sukk. 16 (1965); 115.
pulchra	(Card.) Donald nov. comb. syn. <i>Rebutia pulchra</i> Card. Cact. & Succ. J. Amer. 42 (1970); 38-39.
rauschii	Frank Kakt. u.a. Sukk. 20 (1969); 238-239.
steinbachii	(Werd.) Backbg. Cact. & Succ. J. G.B. 13 (1951); 96. syn. <i>Rebutia steinbachii</i> Werd. Notizbl. Bot. Gart. u. Mus. 11 (1931); 268. Backbg. Die Kakt. Lex. (1966); 416.
steinbachii var. gracilior	
steinbachii var. rosiflora	Backbg. Cactus (Fr) (1963), 80/81; 5.
steinbachii var. violaciflora	Backbg. Cactus (Fr) (1964), 80/81; 6.
sucrensis	Ritter nom. prov. FR 946. (possibly identical with <i>S. caracarensis</i>).
tarabucoensis	Rausch. Kakt. u.a. Sukk. 15 (1964); 92.
taratensis	(Card.) Buin. & Don. Cact. & Succ. J. G.B. 27 (1965); 57. syn. <i>Rebutia taratensis</i> Card. Cact. & Succ. J. Amer. 36 (1964); 26. (Backbg. nov. comb. is superfluous in Die Kakt. Lex.)
taratensis var. minima	Rausch Kakt. u.a. Sukk. 19 (1968); 112.
tiraquensis	(Card.) Ritt. Nat. Cact. & Succ. J. 16 (1961); 81. syn. <i>Rebutia tiraquensis</i> Card, in Cactus (Fr) 1958; 257 (Backbg. nov. comb. in Die Cact. V I (1962) is superfluous).
tiraquensis var. electracantha	Backbg. Descr. Cact. Nov. I 11 (1963); 14.
tiraquensis var. longiseta	(Card.) Donald nov. comb. syn. <i>Rebutia tiraquensis</i> v. <i>longiseta</i> Card. Cact. & Succ. J. Amer. 42 (1970); 188.
totorensis	(Card.) Ritt. Nat. Cact. & Succ. J. 16 (1961); 81. syn. <i>Rebutia totorensis</i> Card, in Cactus (Fr) 1958; 259



Fig. 8. *S. glomeriseta*



Fig. 9. *Lobivia pseudocinnabarina*

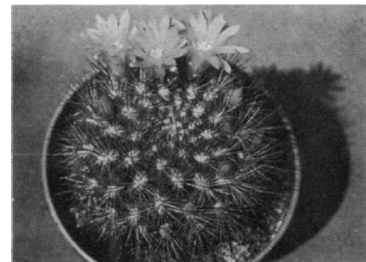


Fig. 10. *Weingartia pulquiensis*



Fig. 11. *S. tiraquensis*



Fig. 12. *S. tiraquensis* v. *electracantha*

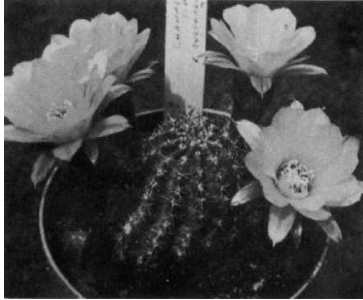


Fig. 13. *Chamaecereus*
X *Sulcorebutia* hybrid

(Note: Fig. 1 is of a plant obtained from Frank; fig. 3 is a plant obtained from Cardenas by the Rio Ayopaya; fig. 4: FR 946.)

tunariensis	(Card.) Buin. & Don. Cact. & Succ. J. G.B. 27 (1965); 80. syn. <i>Rebutia tunariensis</i> Card, in Cact & Succ. J. Amer. 36 (1964); 38. (Backbg. nov. comb, in Die Cact. Lex. (1966) is superfluous),
vasqueziana	Rausch Kakt. u.a. Sukk. 21 (1970); 102.
vizcarrae	(Card.) Donald nov. comb. syn. <i>Rebutia vizcarrae</i> Card. Cact. & Succ. J. Amer. 42 (1970); 185.
verticillacantha	Ritt. Nat. Cact. & Succ. J. 17 (1962); 13.
verticillacantha	Ritt. loc. cit.
var. verticosior	
weingartioides	Ritt. nom. prov. FR 944.
xanthoantha	Backbg. Die Kakt. Lex. (1966); 418. (probably identical with FR 774 and <i>S. candiae</i>).
zavaletae	(Card.) Backbg. Die Kakt. Lex. (1966); 460. syn. <i>Aylostera zavaletae</i> Card. Kakt. u.a. Sukk. 16 (196); 177.

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