Short snippets from readers and comment on topical items

CactusTalk

Author: Al Laius except where otherwise stated

Layout by Alice Vanden Bon

Chichimecactus: a new genus

Chichimecactus has been described as a new monotypic genus by Bárcenas et al (2021) for the species originally described as *Strombocactus corregidorae* (Arias & Sánchez-Martinez, 2010).

This reassessment is based on a molecular study of a small number of chloroplast genes, which shows that *S. corregidorae* is not closely related to *Strombocactus disciformis*. The resultant family tree shows these species to be in separate branches (clades), such that the latter species is more closely related to other cactus genera such as *Ariocarpus* and *Turbinicarpus* than it is to *S. corregidorae*.

This dilemma was resolved by separating *S. corregidorae* into the new genus *Chichimecactus* with the sole species *C. corregidorae* (Fig. 1), which is characterised as follows:

"Diagnosis: – New genus similar to *Strombocactus*, from which it differs primarily by having larger, globose to cylindrical stems, with strongly keeled tubercles; longer, black, persistent spines; and seeds with flat periclinal cell-walls, lacking a strophiole".

Key features are differences in the seed, principally the presence of a strophiole (an appendage to the seed coat) in *Strombocactus* whereas this is lacking from the seed of *Chichimecactus*.

This new genus is named for the Chichimeca Nation which inhabited the harsh area of the Mexican state of Querétaro where *C. corregidorae* is endemic.

This molecular study included a range of other small-growing cacti and from the resultant molecular family tree the following tentative conclusions can be drawn, although these were not discussed by the current authors:

The following genera are supported by these new data: *Strombocactus*, *Chichimecactus*, *Ariocarpus*, *Turbinicarpus* (including *Gymnocactus*), *Rapicactus* (as revised by Lüthy, 2003), *Epithelantha* and *Lophophora*.

The genus *Thelocactus* also appears to be supported, but only a small sample of two species was included in this study.

Strombocactus disciformis subsp. *esperanzae* is shown to be distinct from *S. disciformis*, meriting separate species status.

The genus *Acharagma* is not supported since the species *A. roseanum* and *A. aguirreaum* are shown to be very distantly related. This genus is therefore polyphyletic because its component species do not have a unique common origin.

A significant caveat is that this study compared only a small number of genes from the chloroplast genome, whereas genes from the nuclear genome were not considered. This therefore does not take into account the possibility of a hybrid origin for *Chichimecactus*. However, it will be a long time before cactus evolutionary family trees can be based on comparisons of whole genomes, since sequencing of such large amounts of DNA is still somewhere in the future because of the complexity and expenditure required. The current family tree and resultant taxonomy must therefore be seen as an interim solution based on the available data. The future taxonomy of this group of genera and species will most likely look different once significantly more data are obtained.

Fig. 1 ***Chichimecactus corregidorae*** **(Photo: Tina Wardhaugh)**

I thank members of the BCSS Forum for a lively discussion of this topic and especially Tina Wardhaugh for supplying the photo.

LITERATURE:

Arias, S & Sánchez-Martínez, E (2010) Una nueva especie de *Strombocactus* (Cactaceae) from the Moctezuma River, Querétaro, Mexico. *Rev. Mex. Biodiversidad* **81**: 619–624.

Bárcenas, R T, Hernández, H M, Hernández-Ledesma, P & Montoya Gómez, L M (2021) *Chichimecactus* (Cactoideae, Cactaceae), a new genus based on molecular characterisation of highly endangered *Strombocactus* species. *Phytotaxa*, **512**(3): 147–158.

Lüthy, J M (2003) *Rapicactus* Buxbaum & Oehme. Revisione del genere. Revision of the genus. *Cactus & Co.* **7**: 4–43.

Colin C Walker

Letter to the Editor

I returned to our house in Bahia, Brazil today (24 June 2022) after six weeks in the UK. The *Melocactus paucispinus* you see in Fig. 2 measures 11×16cm (height × diameter). It was a 4cm-diameter seedling that my wife Daniela rescued from habitat at a locality south-east of Jacaraci, southern Bahia, in March 2021 – that is only 15 months ago. It was lying on top of the sand from which it had been dislodged by an animal, probably by a donkey, its

Fig. 2 ***Melocactus paucispinus***

roots exposed. This shows the extraordinary speed of development of these plants when offered ideal conditions of light, moisture and nutrients (a balanced 1:1:1 NPK, inorganic fertiliser sprinkled in granular form and watered in), and it has quadrupled in size, and many times more in volume, in a year and three months. When I left for my stay in London on 13 May the cephalium had not yet appeared. Daniela returned to our Brazilian home on 6 June and sent me a mobile phone image of the plant with its newly formed cephalium, which had appeared in just 23 days! I have long suspected that *Melocactus* species are capable of rapid growth, but I never imagined this could be so remarkably fast as this example has proved.

Nigel Taylor

A first phylogenetic hypothesis for *Conophytum*

Powell, R F, Boatwright, J S, Klak, C and Magee, A R (2022) A first phylogenetic hypothesis for the diverse genus *Conophytum* (Ruschieae, Ruschioideae, Aizoaceae) suggests convergent evolution of floral syndromes. *Perspectives in Plant Ecology, Evolution and Systematics* **55** (2022) 125671

The dwarf-succulent genus *Conophytum* N.E.Br. is one of the largest in the Aizoaceae with more than 100 recognised species. The genus is primarily restricted to the winter-rainfall region of the Northern and Western Capes of South Africa and south-western Namibia. *Conophytum* taxa are found in several biomes in the region (including the Fynbos, Desert and Nama Karoo) but are most strongly associated with the Succulent Karoo biome to which many species are endemic and nearly all have at least a presence. The result of a very recent radiation event, *Conophytum* displays a remarkably high degree of speciation. This rapid evolution of members of the Aizoaceae typically results in considerable practical challenges in phylogenetic studies in the form of low levels of sequence resolution and divergence. However, a recent research paper by Robyn Powell and colleagues in Cape Town has shed much needed light on the phylogeny of *Conophytum*.

The phylogenetic data from six chloroplast DNA regions from 59 species (just over half of the genus) were combined allowing the first phylogenetic hypothesis for *Conophytum* based on molecular data to be produced. A major finding was that *Conophytum* was recovered as monophyletic including species previously recognised as separate genera, namely *Berrisfordia* L.Bolus (*C. khamiesbergense*), *Herreanthus* Schwantes (eg *C. herreanthus*) and *Ophthalmophyllum* Dinter & Schwantes (eg *C. longum*). In doing so this confirmed the major revisions to the genus made by Steven Hammer over the last few decades. While six well-supported clades were recovered and could be aligned reasonably well with some of the infrageneric sections identified by Hammer, this was not possible for some of the larger and more morphologically variable sections (eg Wettsteinia and Minuscula).

One of the notable features of *Conophytum* is the diversity in a range of floral characters, some of which are specific to the genus. In order to examine their evolution several floral traits were mapped onto the phylogenetic tree: phenology (seasonality of flowering), anthesis (opening and closing time of flowers), flower colour (mainly yellow and pink-purple) and flower structure (where five different morphologies were previously identified by Sigrid Liede and Steven Hammer). This analysis showed that certain traits such as position of anthers and stigmas, flower colour and winter-flowering have evolved multiple times across the genus. The switch to nocturnal flowering (usually accompanied by the presence of a strong scent) is relatively rare in the Aizoaceae but is seen in approximately 25% of *Conophytum* taxa. This also exhibits a strong phylogenetic pattern and may have evolved several times across the genus in response to environmental drivers. The authors conclude that such diversification in floral characters may have enabled *Conophytum* to better exploit a range of pollinators.

Andrew J Young

Fig. 3 ***Conophytum hermarium*, Critically Endangered in habitat**