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A new *Melocactus* from the Brazilian state of Sergipe

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Photographs by Marcos Vinicius Meiado

Summary: The dwarf *Melocactus sergipensis*, sp. nov., is described from a single lowland locality in the NE Brazilian state of Sergipe. It is compared with members of the M. VIOLACEUS species group, from which it may have been isolated on calcareous rocks within a former dense, high caatinga forest. Its longer term survival in the wild is in serious doubt, since the surrounding habitat has been converted for agriculture, and thus it is accorded the IUCN Red List status of Critically Endangered.

Resumo: A nova espécie aqui descrita, *Melocactus sergipensis*, sp. nov., ocorre numa única localidade em Sergipe. Trata-se de uma espécie de pequeno porte, e é aqui comparada com outros membros do grupo informal de M. VIOLACEUS, dos quais pode ter sido isolada em afloramentos baixos de rocha calcária situados em caatinga alta e densa, hoje destruída. A sobrevivência a longo prazo desta espécie na natureza encontra-se seriamente ameaçada, pois a área circundante já foi convertida em terra agrícola, e, de acordo com os critérios da IUCN a categoria para esta espécie é Criticamente Ameaçada (CR).

Zusammenfassung: Der zwergige *Melocactus sergipensis*, sp. nov., wird von einem einzigen Fundort in den Tieflagen des Nordost-brasilianischen Staates Sergipe beschrieben. Die Art wird mit den Vertretern der M. VIOLACEUS-Artengruppe verglichen, von denen sie möglicherweise durch das Vorkommen auf Kalkfelsen innerhalb eines früher dichten, hochwachsenden Caatinga-Waldes isoliert war. Das langfristige Überleben in der Natur ist zweifelhaft, da die Umgebung des Habitats für die Landwirtschaft genutzt wird, und die Art wird deshalb gemäss den IUCN Red List-Kriterien als "kritisch gefährdet" eingestuft.

Introduction

The relatively small, north-eastern Brazilian state of Sergipe has hitherto had only a modest number of cactus species recorded from it, in fact less than 20 are reported in Taylor & Zappi (2004: 40) and none of these is endemic to the state. This situation has now changed with the discovery of the unusual, dwarf *Melocactus* described here: *M. sergipensis* N. P. Taylor & M. V. Meiado (its local vernacular name is 'cabeça-de-frade').

The plant was discovered by research student Eronides Bravo Filho, in June 2014, while conducting a floristic survey of Cactaceae in the state of Sergipe, and was subsequently studied by his supervisor, Prof. Marcos Vinicius Meiado, who more recently located a second small population only 2–3km distant. Its habitat and population behaviour are quite distinctive, since it is found in dense colonies on limestone outcrops from which a source of ground water causes inundation of the surrounding flat lands.

These have been converted to agriculture, for the cultivation of maize, which has replaced the dense, high caatinga forest that formerly characterized the inland parts of Sergipe. (Other terrestrial cacti historically recorded from the vicinity are all forest species, such as *Pereskia aculeata*, *Brasiliopuntia brasiliensis* and *Pilosocereus pentaedrophorus*; Taylor & Zappi, *loc. cit*.). Indeed, this former arboreal vegetation may have been the agent causing the isolation and evolutionary divergence of *M. sergipensis*, since *Melocactus* is

Figure 1. The Paratype locality of *M. sergipensis* – low-lying limestone outcrops in destroyed high caatinga forest.

not normally found in closed vegetation unless upon included rock outcrops, as in this case. Elsewhere in the genus species found on limestone outcrops are generally rare or in very disjunct populations, though often locally abundant, e.g. *M. azureus*, *M. ferreophilus* and *M. levitestatus*. Thus, that *M. sergipensis* is currently known from only a single small area is in keeping with such calcareophilus taxa. Sadly, this species, newly described here, must be regarded as at the greatest risk of extinction, since the local land owners regard it as a nuisance, their main interest being the production of maize.

Relationship of *Melocactus sergipensis*

With the exception of the complex of species known as the M. OREAS Group, comprising *M. bahiensis*, *M. conoideus*, *M. brederooianus*, *M. braunii*, *M. inconcinnus*, *M. ernestii* and *M. oreas*, the genus *Melocactus* in Brazil is relatively well understood and its species well-defined (Taylor, 1991; Taylor & Zappi, 2004; Hunt *et al*. 2006). Attempts to elucidate the relationships at species level utilising molecular techniques (gene sequence comparison) have been frustrated by a lack of resolution (Marlon Machado, *pers. comm*.), suggesting that its taxa are recently evolved.

However, from the small, pinkish fruits and vegetative morphology *M. sergipensis* appears to belong to the M. VIOLACEUS Group, which includes 7 species in Eastern Brazil. Of these, two are widespread: *M. zehntneri* in the open caatinga thorn forest from southern Bahia northwards to Ceará, on a variety of substrates, near sea level to 1,000m; and *M. violaceus*, found mainly along the coast (more rarely inland), from Ceará state to Rio de Janeiro, but always in sand or quartz gravel (cf. Menezes *et al.*, 2012: Fig. 2).

The remaining 5 species have much more limited ranges and most have rather specialized ecology: *M. concinnus*, *M. paucispinus* and *M. glaucescens* are restricted to highlands of the Chapada Diamantina and adjacent mountain systems in Bahia and Minas Gerais, on substrates derived from quartzitic material and sandstone, while *M. salvadorensis* largely replaces *M. zehntneri* in the caatinga of south-eastern Bahia, where it is endemic to the Rio Paraguaçu (Rio Jacuípe) and Rio

Figure 2. Group of *M. sergipensis* at the Holotype locality.

Figure 3. *M. sergipensis* at the Holotype locality with characteristically grooved limestone substrate.

Figure 4. *M. sergipensis* at the Paratype locality, 16th September 2014.

de Contas (Rio Gavião) drainage systems. This leaves only *M. lanssensianus*, which is represented by rare, disjunct, cleistogamous forms found on granite in mountainous areas in the states of Pernambuco and Paraíba.

All of these have ranges that are geographically distant from Sergipe. However, in overall appearance and if using the key to *Melocactus* in Taylor & Zappi (2004: 367–369), *M. sergipensis* compares somewhat with *M. concinnus*, yet is easily distinguished on its morphological characters, edaphic preference and lowland ecology.

Given the above, it seems unlikely that *M. sergipensis* is closely related to any of the 5 more restricted species, but should be compared with *M. zehntneri* and *M. violaceus*, both of which are recorded from Sergipe (Taylor & Zappi, 2004: 113–114, Maps 45–46). Its dwarf stature immediately invites comparison with *M. violaceus*, but it differs markedly from that species in its grey-green to glaucous stem, much larger spines and seeds, and rupicolous ecology.

M. zehntneri, on the other hand, is known to be extremely variable, both in its morphology and edaphic tolerance, so could *M. sergipensis* be a part of this polymorphic species? We believe it is distinct, because although *M. zehntneri* is variable in some characteristics, it remains relatively constant in the form of its spination of short, stout and curved spines arising from areoles that are borne in pronounced notches in the ribs – both features in strong contrast to what is observed in *M. sergipensis*. Its stem size and rib number are also considerably larger than in *M. sergipensis* and, most of all, the number of areoles per rib is 6 or more between ground level and the cephalium, whereas in *M. sergipensis* there are only 3–4 areoles per rib below the cephalium. In this respect it appears that our new species has a fore-shortened juvenile phase, soon forming a cephalium following the development of only a small number of vegetative internodes. Its seeds are also larger than in any other species in the M. VIOLACEUS Group. We feel these characteristics justify its description as a new species:

Melocactus sergipensis N. P. Taylor & M. V. Meiado, **sp. nov.** Dwarf in stature like *M. violaceus* Pfeiffer, but differing in the grey-green to glaucous epidermis, stouter, longer spination, to 40×2.2mm, and much larger seeds; possibly related to *M. zehntneri* (Britton & Rose) Luetzelb., but stem to only 9.5×14.5cm [vs 11–48×13–25cm], ribs only 8–9(–11), spines proportionately more

Figure 5. The diminutive flowers of *M. sergipensis* ex Holotype locality.

Figure 6. *M. sergipensis* ex Holotype locality in fruit.

slender, ± straight, and each rib bearing only 3–4 areoles visible between ground level and the cephalium; in its combination of few ribs each bearing only 3–4 areoles, glaucous stem, white-woolly cephalium, small flowers and fruits, and large seeds, differing from all other members of its genus. **Holotype**: Brazil, Sergipe, Mun. Simão Dias, 10°46'15.7"S, 037°53'39.3"W, 312m asl, limestone outcrop in maize plantation, June 2014, *E.S. Bravo Filho* 15 (ASE 31075). **Paratype**: *loc. cit*., 2–3km south, small limestone outcrop in maize plantation, 16th September 2014, *M.V. Meiado s.n.* (ASE).

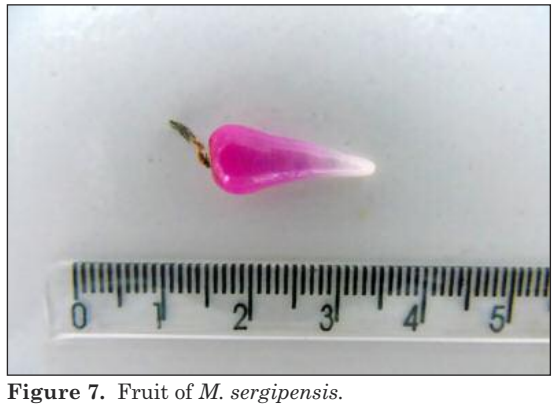
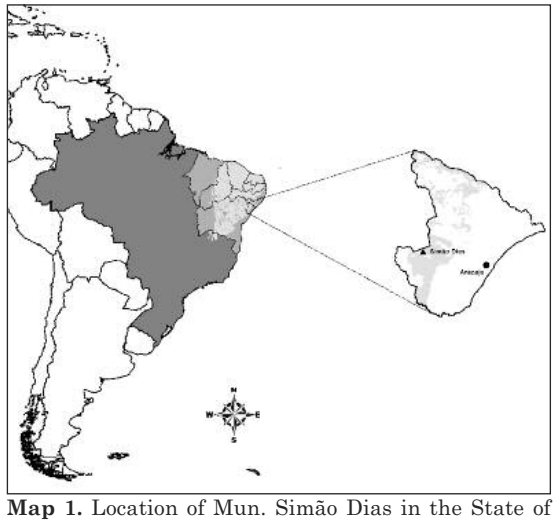


Figure 7. Fruit of *M. sergipensis.*

Description

Stem subglobose, light grey-green to somewhat glaucous, 5.5–9.5×8–14.5cm; ribs 8–9(–11), relatively broad, but edge acute, slightly notched at the areoles; areoles only 3–4 visible per rib below the cephalium, 19–23mm apart along the ribs, 5–6mm in diam., bearing whitish to grey trichomes and 8–10 spines. Central spine 1, slightly upward-curved, 18–30×1.6–1.8mm near base, reddish brown to horn-coloured; radial spines 7–9, ± straight, lowermost longest, 28–40×1.5–2.2mm near base, some partly horn-coloured, others grey-white. Cephalium generally rather small, 3–8cm in diam., often conical in shape, with white bristles and much woolly trichomes, the marginal bristles reddish, more rigid. Flowers 21–23×4–5mm, intense pink, anthesis beginning at 1pm; with 23–25 perianth-segments visible from above, the segments 4.1–4.15×<1.4mm; pericarpel 4.0–4.3×2.8–3.0mm; nectar-chamber 4.2–4.7×3.8–4.2mm, remainder of tube 6.8–7.0×3.8–4.0mm; stigma-lobes 5, white. Fruit 15–19×6–8mm, intense pink above, paler to white below, expelled from the cephalium between 8 and 10am. Seeds c. 12–22 per fruit, black-brown, 1.6–1.9×1.0–1.2mm.



Map 1. Location of Mun. Simão Dias in the State of Sergipe, Brazil. The pale shading in the North-East including the western parts of Sergipe indicates the limits of the Caatinga.

We would like to thank Ricardo Rivelino Dantas Ramos from the Universidade Federal do Vale do São Francisco for kindly preparing this distribution map.

Conservation status

As noted already, *M. sergipensis* is in imminent danger of Extinction-in-the-Wild (EW), with a total population of only c. 120 mature individuals. Here it is accorded an IUCN Red List assessment of Critically Endangered [CR, based on criteria A3, B1ab(iii)c(i–iv)+2ab(i–iii,v)c(i,ii,iv), C1+2a(ii)]. Some 30 individuals have been rescued from the habitat at the type locality and are in cultivation *ex situ* at the Itabaiana campus of the Federal University of Sergipe. This action was taken in view of the current land owner's negative attitude to the plant and thus the risk that it will be destroyed as part of "cleaning up" the agricultural land in which its limestone outcrop habitat is situated. Given this risk, seed from various individuals of *M. sergipensis* should be deposited in a seed bank as an insurance against its total extinction. In view of the interest amongst hobbyist collectors this species may also be threatened by its removal from the habitat for private cultivation, the second site being close to a public road.

Here it is worth drawing attention to the plight of a number of recently described cactus species from eastern Brazil. In their chapter documenting the 'History of discovery etc.' of the cacti of eastern Brazil, Taylor & Zappi (2004: 19–21) note that from the three decades beginning in the mid-1960s many of the new taxa discovered have been from extremely localized habitats and now figure amongst the region's threatened species. This trend has both continued and become more disturbing, with nearly all discoveries subsequent to the year 2000 being regarded at the time of description as either Endangered, Critically Endangered or potentially Extinct-in-the-Wild, examples being *Arrojadoa marylaniae* Soares Filho & M. Machado (2003), *Cereus estevesii* P.J. Braun (2004), *Pilosocereus frewenii* Zappi & N.P. Taylor (2011) and *Rhipsalis flagelliformis* N.P. Taylor *et al*. (2014). Sadly, it seems likely that this trend will continue and our apparent inability to preserve species in their wild habitats flags up the increasing importance of the role for *ex situ* conservation in the preservation of biodiversity.

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