

SEM Pollen Morphology of Columnar Cacti *Polaskia* from Tehuacán-Cuicatlán Valley, Mexico

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The Tehuacán-Cuicatlán Valley (TCV) is the main center of diversity and endemism of columnar cacti in Mexico, where they are the dominant plant of these ecosystems [1]. The orographic shadow effect induced by the Sierra Zongolica, prevents the entry of moist winds into the valley causing the prevailing arid and semiarid climate in the valley [2], providing optimal climatic conditions for the establishment of these plants. Columnar cacti belong to the Cactaceae family and the Cactoideae subfamily, most of them are included in the Pachycereeae tribe. Taxonomic studies of the plant, flower, seeds and fruit morphology are currently available [3]. The aim of the present research is to describe the pollen grain morphology of two columnar cacti species of *Polaskia* genus (*P. chende* and *P. chichipe*) from TCV based on their sculpture ornamentation to differentiate them from each other through scanning electron microscopy (SEM) observations.

Anthers from *P. chende* and *P. chichipe* were obtained from specimens deposited in the Herbario Nacional de México (MEXU). Additionally, SEM images were taken at the Instituto de Biología, UNAM. In order to clean the pollen grains, remove protoplasm and cellular residues, all samples were acetolysed through standard treatment of acetic anhydride and sulphuric acid (9:1) according to Erdtman's method (1960) [4]. For SEM analysis, acetolysed material was preserved in 96% ethyl alcohol, dried with critical point technique (Emitech K850) and mounted on aluminum stubs covered with double-sided carbon tape and sputter-coated for 2 minutes with 20 nm layer of gold (Quorum Q150R-ES equipment). The surface sculpture and topography of *P. chende* and *P. chichipe* pollen grains were described with SEM electron micrographs (Hitachi SU1510). The terminology for pollen morphological characters follows Sáenz-Lain (2004) and Punt et al. (2007) [5, 6]. The quantitative parameters considered for SEM study were height, width, diameter and density ($100 \mu\text{m}^2$) of the sculptural elements of the pollen wall.

Surface sculpturing was microequinate with colp membrane, the height of the spinae range between 0.6 -0.8 μm , the width range between 0.8-1.0 μm and the length between spinae $< 4.0 \mu\text{m}$ in both species. The density of spinae $>9/100 \mu\text{m}^2$ and $<7/100 \mu\text{m}^2$ in *P. chende* and *P. chichipe* respectively. The interspinous distance is inversely proportional to the density of the spinae. The diameter of the perforations range between 0.25-0.35 μm in *P. chende* and $>0.35 \mu\text{m}$ in *P. chichipe*, the density of perforations were 15-20/100 μm^2 in both species. The perforation diameter is inversely proportional to the density of the perforations (Figure 1).

Based on the analysis of SEM images the morphology of pollen grains of columnar cacti from the VTC can be described as microequinate surface with spines wider than higher. The subtle sculpture differences in spinae density and perforation diameter are the main characteristics to recognize *Polaskia* species from each other using SEM images analysis [7].

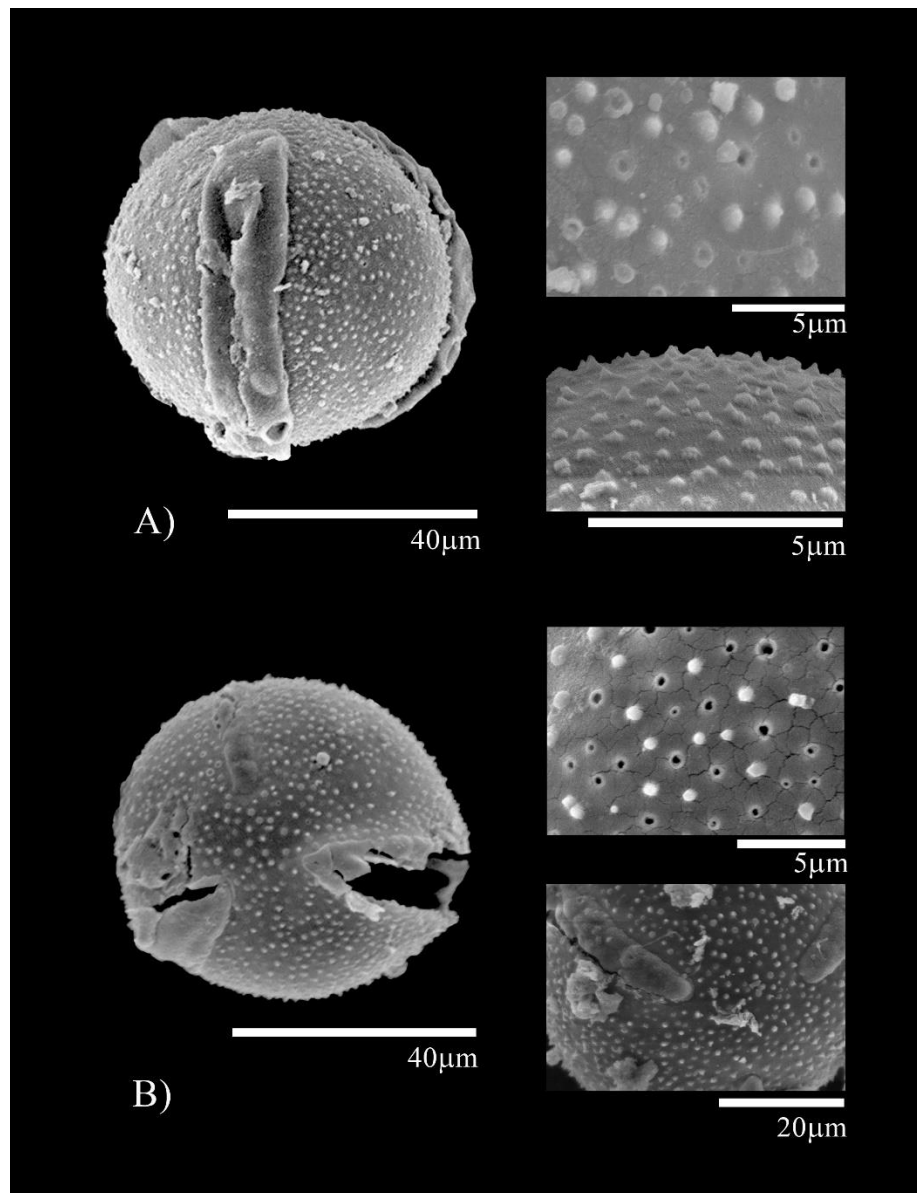


Figure 1. Pollen morphology and ornamentation of: A) *Polaskia chichipe* in equatorial view showing colpal membrane (left), perforations and spines sculpture (right). B) *Polaskia chende* in polar view showing rest of colpal membrane (left), perforations, spines sculpture and colpal membrane (right).

References:

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