Orchidaceae is one of the largest families of Angiosperms and one of the most specialized lines of flowering plant evolution. Orchids are plants distributed all over the world with exceptional species diversity, unique and often spectacular flowers and various relationships with both pollinators and fungi.

Polystachya vulcanica Kraenzl. is one of 197 species of the pantropical genus Polystachya Hook. classified within exclusively African section Cultriformes Kraenzl. including one-leaved plants. The species is endemic to the Albertine Rift (part of Democratic Republic of Congo, Rwanda, Burundi and Uganda), only known from Kahuzi-Biega, Nyungwe-Kibira, the western Virunga Volcanoes, Kigezi and Ruwenzori, at 1300–2400 m.a.s.l.

The species is an epiphyte growing in montane forest, on mossy branches or sometimes a lithophyte occurring on mossy rocks. It flowers from January to April and from August to December.

Polystachya vulcanica is a plant up to 20 cm tall with filifrom pseudobulbs tightly clustered with a terminal single, linear, semiterete leaf. Its inflorescence is shorter than the leaf, 1- to 5-flowered, flowers are medium-sized, creamy-white, flushed with rose, lip and petals wine-red or purple (fig.1).

Fragments of the lip and gynostemium of Polystachya vulcanica were prepared to transmission electron microscopy. The ultrastructural observations based on ultrathin sections showed that epidermal cells predominantly have centrally located vacuoles and cytoplasm concentrated near the cell wall (fig.2). What is significant, cell wall and cuticle of epidermis form characteristic more or less regular folds. Between these folds, above the cuticle, there are visible secreted materials (fig.3). Specific construction of cell wall and cuticle, such as presence of numerous bubbles within, may to facilitate the secretion and indicate possible pathway of this activity. Substance outside epidermal membranes may play role to attract insects.
Fig. 1: The flower of Polystachya vulcanica Kraenzl. (by Eric Hunt)

Fig. 2: Ultrastructure of the epidermal cells with cuticle of Polystachya vulcanica lip.

Fig. 3: Epidermal outer cell wall and cuticle with secreted materials.