**Echeveria rosea** Lindley (Crassulaceae): a hummingbird-dependent succulent epiphyte

The stonecrop family Crassulaceae has a worldwide distribution with exception of Australia and the Polynesian area. There are about 1,500 species of Crassulaceae distributed in 33 genera, which are characterized by their rosetted succulent leaves. The family is often viewed as a typical northern temperate element, although its highest species richness is concentrated in Mexico (about 325 species) and South Africa (about 250 species). Most species grow saxicolous and/or terrestrial in dry areas and show Crassulacean Acid Metabolism (CAM) as photosynthetic pathway, which is an adaptation to arid conditions. In contrast, only seven species in three genera (*Echeveria*, *Kalanchoe*, *Sedum*) have been reported to grow mainly epiphytic (Kress 1989). Furthermore, Crassulaceae species are known for a variable floral morphology, which is attractive for a diverse spectrum of pollinators.

A general approach to specify the pollination biology of the Crassulaceae family includes the establishment of five major pollination syndromes based on floral types,

1. **Melittophily** or bee pollination is assumed for species with short tubular corollas, which is the most frequent and least specialized floral characteristic in Crassulaceae (Figs. 1 & 2),
2. **Psychophily** or pollination by butterflies is associated with long-tubed salver-shaped flowers or flowers with petals forming a tube-like structure, which have an intensive coloration (red, yellow) and a perfume-like scent production over day (Fig. 3),
3. **Sphingophily** or pollination by hawkmoths corresponds to long, whitish corolla tubes and nocturnal strong sweet scent,

---

1. *Sedum praealtum* and *Bombus* sp. Tlacolulan, Veracruz, México.
2. *Villadia elongata* and *Apis melifera*. Huayacocotla, Veracruz, México.