

# MATUZALEM GENUS OF LICHENS – *RHIZOCARPON GEOGRAPHIUCM* (L.) DC. – ITS PROPERTIES AND APPLICATION

## Summary

Lichens have been described as dual organisms because they are symbiotic associations between two (or sometimes more) entirely different types of the microorganism – a fungus (termed the mycobiont) and a green alga or a cyanobacterium (termed the photobiont). *Rhizocarpon geographicum* has a thallus crustose, composed of scattered areoles or areolate to rimose. Prothallus black, poorly to well developed. Areoles delimited by a black hypothallus. Areoles yellow-green, or more greenish or green-grey, round or  $\pm$  angular, flat to convex 0.3–1.5 mm in diameter. Apothecia black to 1 mm in diameter, round or angular, matt, flat to weakly convex with distinct margin when young, becoming convex within distinct margin when old. Apothecia sitting between the areoles. Exciple pale brown to brownish red. Epithemium brown or reddish brown, K $\pm$  red, not containing crystals. Hymenium 100–140  $\mu$ m high, hyaline or more rarely green. Paraphyses clavate with hyaline tips. Hypothecium dark brown, K-. Asci clavate, 8- spored, 100–150 x 20–30  $\mu$ m. Ascospores hyaline to pale green-brown initially, becoming dark green to brown, submuriform or muriform, ellipsoid, 25–40 x 12–16  $\mu$ m, halonate.

Lichens with known, slow growth rates, like *Rhizocarpon geographicum*, have been used to estimate the dates of geological events such as the retreat of glaciers. Yellow map or world map of lichen is frequently used in *lichenometry*. Lichenometry is a method for age dating a landform based on the

rate of lichen growth on the exposed rock surfaces. Lichenometry has been employed widely for dating the ages of glacial and periglacial features in alpine and desert regions. The method depends on the increase (growth) in diameter of lichen thalli through time. On siliceous (quartz-rich) rocks, *Rhizocarpon geographicum* is favored for lichenometry. These bright yellow-green colored lichens are easy to identify and measure in the field. Lichenometry was first developed by Roland Beschel in the 1950's, by measuring lichen diameters on gravestones of different ages.

In an experiment led by the European Space Agency, two species of lichen – *Rhizocarpon geographicum* and *Xanthoria elegans* – were sealed in a capsule and launched on a Russian Soyuz rocket on 31 May 2005. Once in Earth orbit, the lid of the container opened and the samples were exposed to the space environment for nearly 15 days before the lid resealed and the capsule returned to Earth. The lichens were subjected to the vacuum of space and to temperatures ranging from  $-20^{\circ}\text{C}$  on the night side of the Earth, to  $20^{\circ}\text{C}$  on the sunlit side. They were also exposed to glaring ultraviolet radiation of the Sun. In space, the lichens turned dormant and did not metabolize, but once returned to Earth, they resumed to their normal activity and their DNA appeared not to have been damaged.