Penstemon thompsoniae *growing on gypsum near Bylas, Arizona on San Carlos Apache land. Photo by Carol D. Crosswhite.*

**Desert Plants as Indicators of Geology and Soil Types.** The last issue of Desert Plants had a note dealing with *Castilleja* growing on soils rich in selenium. There are numerous other specific relationships of desert plants with soil chemistry and geology. For example, the *Penstemon* pictured above grows only on gypsum (calcium sulfate) soil. Numerous other gypsophilous (gypsum loving) plants exist. In fact, most plants which grow on gypsum are either distinct gypsum-loving species or special gypsophilous races of more widely distributed plants. Serpentine soils also have a distinctive flora of specific serpentine plants.

Members of the Ericaceae family (such as Manzanita) invariably grow on highly acid soils. The association is so strong that no one has yet found a Manzanita growing on alkaline soil! Many plant families are flexible in their acid-alkaline requirements. Within large genera it is not uncommon for there to be marked differences among the species. For example, in *Penstemon* the presence of *P. cobaea* indicates limestone soil whereas *P. grandiflorus* does not.

The rather uncommon *Crossosoma bigelovii* grows so regularly on rhyolite rock that it is commonly referred to as "rhyolite bush." Although this shrub has been found a few times on granite, this is understandable since the latter rock is very similar to rhyolite, being its intrusive equivalent; the major difference is that granite forms from magma cooling slowly underground while rhyolite forms from the same magma cooling more rapidly above ground. A hitherto unknown genus of Crossosomataceae was discovered in recent years in southern Arizona and named *Apacheria* by Dr. Charles T. Mason. Not surprisingly, it proved to have the same proclivity for rhyolite as *Crossosoma.*

Creosotebush (*Larrea tridentata*) grows on soils having a prominent carbonate layer. This specificity can be seen very clearly at the Boyce Thompson Southwestern Arboretum where hills with different geologic histories come together. The species is common on two hills of alkaline alluvium having limestones abundant enough that a calcium carbonate "caliche" layer has formed by leaching and precipitation of the lime. Where the limestones end and the parent rock is either schist or rhyolite, the carbonate layer disappears and the Creosotebush stops abruptly at exactly the line of change, with not one bush transgressing the line.

Often vegetation proves quite useful for mapping geologic formations or soil types by airplane with only an occasional check of "ground truth" on the surface. Although generally not publicized and kept as a "trade secret," prospecting for copper, gold and other minerals has been successfully accomplished by looking in herbarium collections of universities and plant research institutions for specimens of certain indicator species and then going to the locations from which the plants were collected! This technique is said to have been useful in both Australia and South Africa. Once the species are well-known to the prospector, they can be searched for on the ground as well.

In general, the soil and rock preferences of desert plants have been very poorly studied. Although plant distributions have long been known to correlate with climatic factors, it is becoming increasingly clear that edaphic (soil) factors may often be just as important. In some cases where plants grow on a wide variety of soils having different parent rock types, their distributions may nevertheless be governed by other soil characteristics such as texture and particle size. Such is apparantly the case with the Saguaro Cactus.