weathering changes. The data (reproduced in Figure 11) conclusively show that the compressive strength decreases with increasing void ratio or porosity. Kowalski states the general relationship between strength R and void ratio ξ as $R = d\xi^{-c}$, where the value of the constants d and c depend on the kind of rock, its water saturation, kind of strength (compressive, shear, tensile), and the direction of loading with respect to bedding or other possible anisotropies.

Mogi (1965) has published the results of triaxial compression tests on ten dry rocks including porous andesites, tuffs, and trachytes. He concludes that the mechanical properties of the rocks under confining pressure depend mainly on mineral composition and porosity. In general the yield strengths, ultimate strengths, and Young's modulus decrease and the macroscopic ductility increases with increasing porosity. Further, in the porous rocks Young's modulus increases dramatically with increasing confining pressure, presumably because the porosity is reduced by compaction. For general relationships the reader is referred to Brown et al. (1964) who have established a strength-porosity relation involving different pore geometry and orientation.

Water Saturation

Closely allied to porosity is the role of fluid saturation. Two aspects of the subject need to be separated (a) the effects of the pore fluid pressure and (b) the physicochemical effects involved in altering the minerals of the rock so as to change the gross mechanical behavior of the aggregate. The role of pore fluid pressure and the concept of effective pressure have been described for rocks by Handin et al. (1963) and Robinson (1959) among others. The ultimate strength and ductility of porous rocks depend on the effective confining pressure (the difference between the external confining pressure and the pore pressure) when the pore fluid is chemically inert and