

size, form, and arrangement of their component particles. These characters, readily perceptible to the naked eye, and in the great majority of cases observable in hand specimens, are termed *megascopic* or *macroscopic* (pp. 146-156), to distinguish them from the more minute features which, being only visible or satisfactorily observable when greatly magnified, are known as *microscopic* (pp. 161-172). The larger (geotectonic) aspects of rock-structure, which can only be properly examined in the field and belong to the general architecture of the earth's crust, are treated of in Book IV.³⁶

In the discrimination of rocks, it is not enough to specify their component minerals, for the same minerals may constitute very distinct varieties of rock. For example, quartz and mica form the massive crystalline rock, gneiss, the foliated crystalline rock, mica-schist, and the sedimentary rock, micaceous sandstone. Chalk, encrinural limestone, stalagmite, statuary marble are all composed of calcite. It is needful to take note of the megascopic and microscopic structure and texture, the state of aggregation, color, and other characters of the several masses.

Four methods of procedure are available in the investigation and determination of rocks: 1st, megascopic (macroscopic) examination, either by the rough and ready, but often sufficient, appliances for use in the field, or by those for more careful work indoors; 2d, chemical analysis; 3d, chemical synthesis; 4th, microscopic investigation.

i. *Megascopic (Macroscopic) Examination*

Tests in the field.—The instruments indispensable for the

³⁶ The student who would pursue physical geology by original research in the field and abroad may consult Boué, "Guide du Géologue Voyageur," 2 vols. 1835; Élie de Beaumont, "Leçons de Géologie pratique," vol. i. 1845; Penning and Jukes-Brown, "Field Geology," 2d edit. 1880; A. Geikie, "Outlines of Field Geology," 4th. edit. 1891. F. v. Richthofen, "Führer für Forschungsreisende," 1886; Grenville Cole, "Aids in Practical Geology," 1891.