into great detail in the investigation of the minuter parts of rock-structure, he does not require a large and expensive instrument. For most geological purposes, objectives of 2, 1, and ¼ inch focal length are sufficient. But it is desirable also for special work, such as the investigation of crystallites and inclusions of minerals, to have an objective capable of magnifying up to 200 or 300 diameters. An instrument with fairly good glasses of these powers, according to the arrangement of object-glasses and eye-pieces, may be had of some London makers for £5. But for some of the most important parts of the microscopical study of rocks a rotating stage is requisite, the presence of which necessarily adds to the cost of the instrument. One of the best microscopes specially adapted for petrographical research is that devised by Mr. A. Dick, and manufactured by Swift & Son, of 81 Tottenham Court Road, London, price £18 without objectives.

Among the indispensable adjuncts are two Nicol-prisms, one (polarizer) to be fitted below the stage, the other (analyzer) most advantageously placed over the eye-piece. A quartz-wedge is useful in examination with polarized light. A nose-piece for two objectives, screwed to the foot of the tube, saves time and trouble by enabling the observer at once to pass from a low to a high power. The numerous pieces of apparatus necessary for physiological work are not needed in the examination of rocks and minerals.

3. **Methods of Examination.**—A few hints may be here given for the guidance of the student in making his own microscopic observations, but he must consult some of the special treatises, mentioned on p. 161, for full details.

*Reflected Light.*—It is not infrequently desirable to observe with the microscope the characters of a rock as an opaque object. This cannot usually be done with a broken fragment of the stone, except of course with very low powers. Hence one of the most useful preliminary examinations of a prepared slice is to place it in the field, and, throwing the mirror out of gear, to converge as strong a light upon it as can be had, short of bright direct sunlight. The observer can then see some way into the rock and observe the relative thicknesses and forms of its constituents. The advantage of this method is particularly noticeable in the case of opaque minerals. The sulphides and iron-oxides so abundant in rocks appear as densely black objects with transmitted light, and show only their external form. But by throwing a strong light upon their surface, we may often