It is evident, therefore, that we may readily tell by this means whether or not a rock contains any glassy constituent. If it does, then that portion of its mass will become dark when the prisms are crossed, while the crystalline parts which, in the vast majority of cases, do not belong to the cubic system, will remain conspicuous by their brightness. A thin plate of quartz makes this separation of the glassy and crystalline parts of a rock even more satisfactory. It is placed between the Nicol-prisms, which may be so adjusted with reference to it that the field of the microscope appears uniformly violet. The glassy portion of any rock, being singly-refracting or isotropic, placed on the stage will allow the violet light to pass through unchanged, but the crystalline portions, being doubly-refracting or anisotropic, will alter the violet light into other prismatic colors. The object should be rotated in the field, and the eye should be kept steadily fixed upon one portion of the slide at a time, so that any change may be observed. This is an extremely delicate test for the presence of glassy and crystalline constituents.

In searching for the crystallographic system to which a mineral in a microscopic slide should be referred, attention is given to the directions in which the mineral placed between crossed Nicols appears dark, or to what are called the directions of its extinction. It is extinguished (that is, the normal darkness of the field between the crossed Nicols is restored) when two of its axes of elasticity for vibrations of light coincide with the principal sections of the two prisms. During a complete rotation of the slide in the field of the microscope the mineral becomes dark in four positions 90° apart, each of which marks that coincidence. When, on the other hand, the prisms are placed parallel to each other, the coincidence of their principal sections with the axes of elasticity in the mineral allows the maximum of light to pass through, which likewise occurs four times in a complete rotation of the mineral. The different crystallographic systems are distinguishable by the relation between their crystallographic axes and their axes of elasticity. By noting this relation in the case of any given mineral (and there are usually sections enough of each mineral in the same rock-slice to furnish the required data) its crystalline system may be fixed. But in many cases it has been found possible to establish characteristic distinctions for individual mineral species, by noting the angle between the direction of their extinction and certain principal faces.