7 Oblong rotational body of dark-brown glass. Size of the original specimen 0.28 x 0.25 mm.

8 Spherical body of colorless glass in breccia. Thin section. Size of the original specimen 0.28 x 0.25 mm.

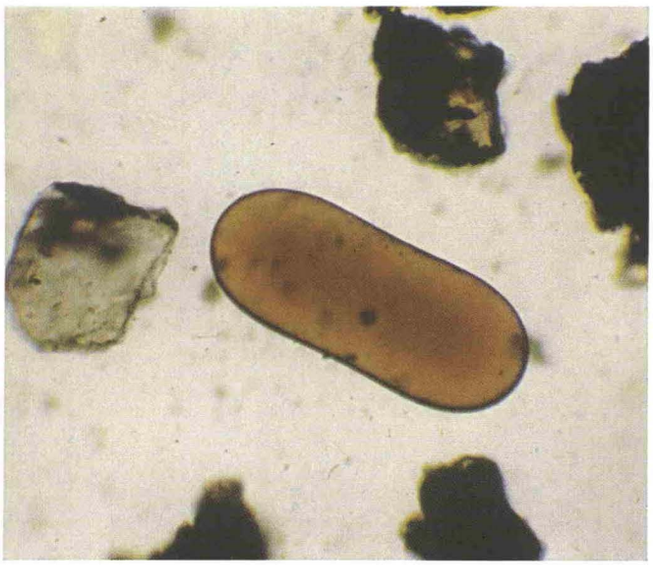
9 Spherical body of colorless glass, inside an unmolten pyroxene granule. Size of the original specimen 0.07 x 0.06 mm.

10 Deformation lamellae produced by a shock wave in plagioclase. Thin section. Size of the original specimen 0.07 x 0.06 mm.

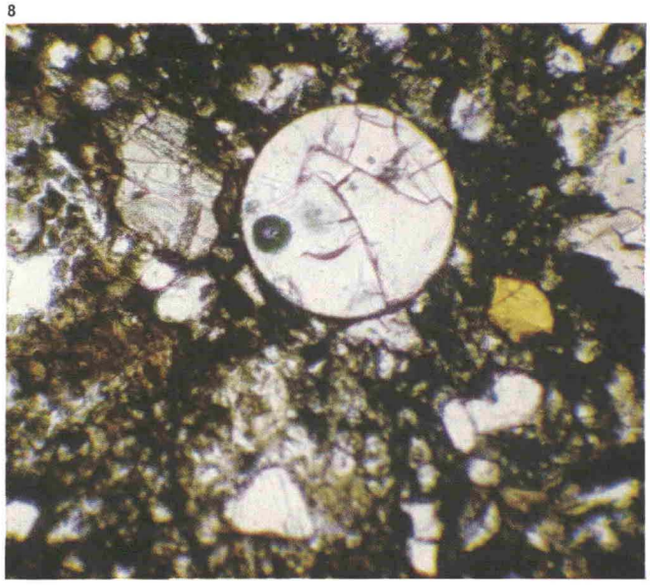
11 Deformation lamellae produced by a shock wave in pyroxene. Thin section. Crossed polarizers. Size of the original specimen 0.7 x 0.6 mm.

12 Crust of brown glass resulting from hypervelocity impact of a small meteorite or a secondary particle on the surface of a basaltic rock. The shock wave transformed the plagioclase (colorless laths) into isotropic glass. Black – ilmenite, grey – pyroxene. Thin section. Size of the original specimen 2.2 x 1.9 mm.

7



8



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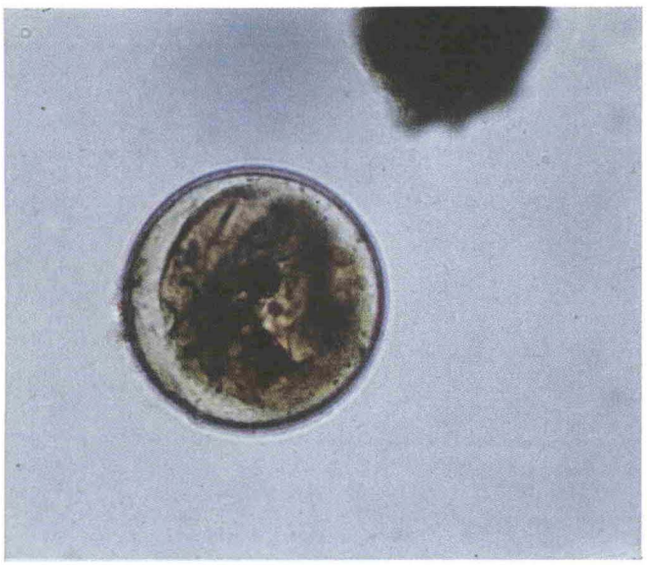

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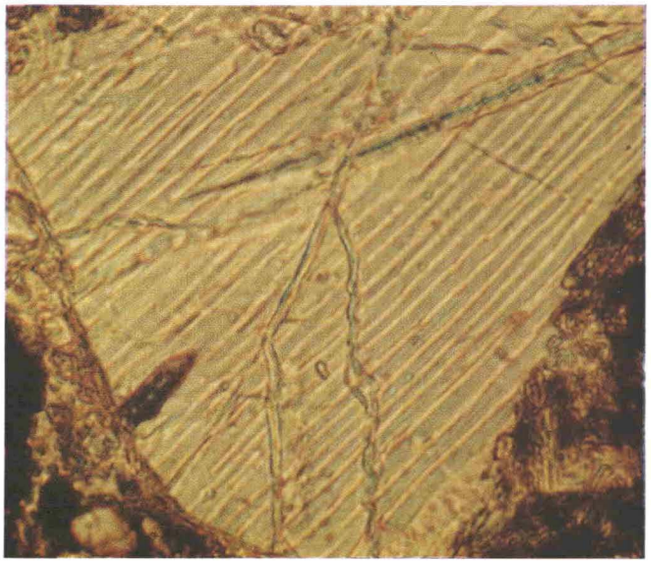

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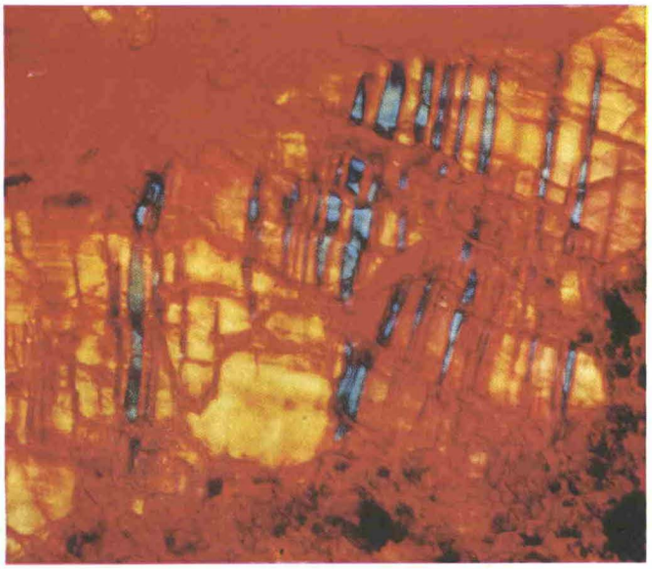
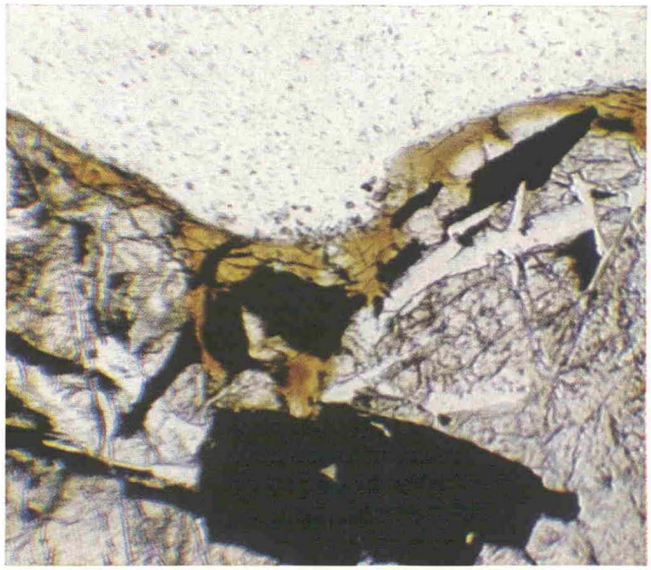


12



plagioclase completely and, while leaving the external dimensions of the granule unchanged, transform it into a glassy substance (diaplectic glass) that differs in density and refraction from molten plagioclase glass. These glasses are found frequently in the lunar soil and in the breccias.

Fig. 11 shows deformation structures produced by shock waves in a pyroxene grain.

Shock waves with peak pressures of more than 500,000 atmospheres produce in the impacted rock temperatures high enough to melt or vaporize all minerals. The various glasses in the lunar soil and in the breccia are proof of this most intense effect of meteoritic impacts on basaltic and anorthositic rocks. The evenly shaped glass bodies originated in part perhaps through condensation from the rock vapor, but mainly they are drops propelled upward from the molten rock. The irregularly shaped fragments are the debris resulting from the subsequent impact fragmentation of larger glass bodies.

On the surface of the larger rock pieces from the lunar soil there are often markings of the impact of small and extremely small meteorites in the form of small, glass-lined craters or solidified glass-melt coatings. The thin section shown in Fig. 12 illustrates exceptionally well the effect of a small meteorite or a small, secondary projectile produced by meteorite impact: The surface of the basaltic rock consists of a rock melt solidified to a brown rock glass. Below this coating, a layer some millimeters thick contains plagioclase transformed into diaplectic glass and pyroxene interspersed with deformation lamellae.

The microphotographs were taken with the following ZEISS instruments: the POL Photomicroscope and the GFL POL Standard Microscope with Camera Attachment.

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