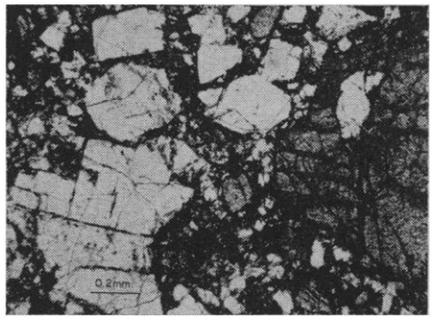

Fig. 1. Gabbro shock-loaded to 250 to 350 kb. Light grains at left are maskelynite; darker grain at right is pyroxene; between is a finely divided mixture of both phases.

are mostly straight; only rarely do they have a curvature indicative of deformation. These cleavage cracks are somewhat less abundant than those in the unshocked gabbro, but additional cleavage cracks may have developed in the feldspar of the unshocked material during the thin-section preparation. When measured 5 months after the experiment, the refractive index of the glass was 1.562, a value intermediate between the mean refractive index of about 1.573 for the crystalline plagioclase and the index of about 1.557 that would be shown by a glass of this composition fused at atmospheric pressure.

The pyroxene in this lower specimen appears crystalline, although the grains show the undulatory extinction and disoriented domains characteristic of severely crushed solids. In contrast with Shergotty, which shows no gross evidence of deformation, the shocked gabbro has a mortar structure with finely divided pyroxene and maskelynite between the larger grains. This structure is not surprising, in view of the observed deformation of the container. Furthermore, some of the damage undoubtedly resulted from the interactions

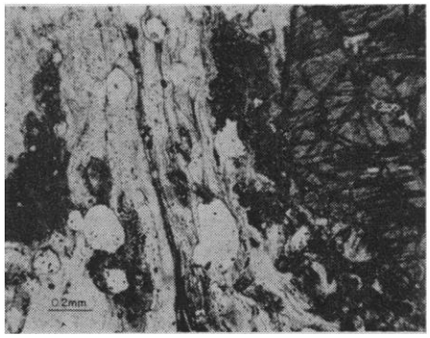

Fig. 2. Gabbro shock-loaded to 600 to 800 kb. Dark material is pyroxene; light material is plagioclase glass. Rounded white areas are vesicles.

of the reflected shocks originating at the poorly matched steel-gabbro interface. Similar brecciated structures occur in some basaltic achondrites, other than shergottites, and have been attributed to shock (*7*).

The upper specimen, which was shocked to 600 to 800 kb, has a strikingly different appearance. The plagioclase has also been transformed to glass, but the glass contains swirled trains of vesicles extending through the thin section (Fig. 2). The refractive index of this glass varies in a range of about 1.560 to 1.562, which is slightly lower than that of the glass in the lower wafer. Some spherulitic aggregates of crystals have formed in this glass. It seems clear that the plagioclase was heated above its normal melting range. The orthopyroxene remained crystalline, with unchanged optic characteristics. This specimen also contained a grain of augite with a subsidiary phase in lamellae parallel to {100}, presumably orthopyroxene (*4*). The augite is unchanged, but the subsidiary phase has been transformed into glass. Apparent injection of this phase into fractures suggests that it was in a fluid state. The difference of behavior of this phase and the major orthopyroxene phase may be a result of a difference in composition or in the physical characteristics of the local environment during shock. The petrographic evidence on the whole indicates an after-shock temperature of about 1500°C, which is in good agreement with our calculation of 1300° to 1700°C.

The similarity of the lower wafer to specimens of the Shergotty meteorite strongly suggests that meteoritic maskelynite formed as a result of strong shock. The experimental reproduction of other features of meteorites, such as polycrystalline diamonds (*8*) and the veins in chondrites (*9*), by shock-loading lends support to this hypothesis.

The absence of features of physical deformation and the coherence itself suggest that the fragment represented by the Shergotty meteorite was in the interior of a larger object at the time of the shock that produced the maskelynite. Only a single 11-pound object, merely broken in two on impact, was recovered at Shergotty, which points to a time previous to entry into the earth's atmosphere for the occurrence of shock.

The name "maskelynite" has sometimes been loosely used for any glassy (or cryptocrystalline) substance of more or less feldspathic composition in meteorites. We suggest that the name would be more useful if it were restricted to material resembling the type maskelynite—that is, a noncrystalline phase that in a pseudomorphous way preserves the external features of crystalline feldspar (*10*).

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10. We thank M. B. Duke for results of his restudy of Shergotty, E. D. Jackson for supplying the specimen of gabbro and G. E. Duvall for checking our thermodynamic calculations. Publication authorized by the director, U.S. Geological Survey.

7 February 1963

Phosphorescence of Rat Kidneys Cooled in Liquid Nitrogen

Abstract. *Cut surfaces of rat kidneys exhibit intense, reproducible, and very detailed phosphorescent patterns after they are cooled with liquid nitrogen and then exposed to shortwave ultraviolet radiation. Ligation of the renal blood vessels for a period of 6 to 24 hours destroys most of this phosphorescence, whereas a ligation of the ureter has no effect on kidney phosphorescence.*

Dental enamel undergoes a change, concomitant with certain pathological conditions, in capacity to exhibit afterglow when exposed at low temperature to shortwave ultraviolet radiation (*1*). We have now studied other organs, and have observed that kidney tissue shows phosphorescence at low temperatures.

Organs were removed and washed in an isotonic saline solution; they were then sectioned with a sharp blade

Fig. 1. *A*, Cut surfaces of white male rat kidneys photographed in artificial light. From top to bottom: kidneys from 1-year-old, 190-day-old, 100-day-old, and 30-day-old rats. *B*, Same kidneys showing phosphorescence.

and pinned, with the cut surfaces facing upward, to a piece of the black cardboard ordinarily used for photographic mounting. The cardboard and tissue were then submerged in liquid nitrogen for approximately 3 to 5 minutes beyond the period of vigorous fuming that accompanies the initial heat transfer. The mounting board was then removed from the liquid nitrogen and immediately illuminated at a distance of 6 inches for 25 seconds with an ultraviolet lamp having a light output area of 16.5 cm by 8.1 cm and producing 110 mw/ ft^2 of short ultraviolet (2537 A) at 2 feet from the light source. A camera with a polaroid back loaded with Polaroid 3000 ASA speed film was focused at the specimen surface. The camera shutter remained closed during the illumination period. After 25 seconds of illumination, the ultraviolet light was turned off and the shutter of the camera was opened. The room was totally dark except for the phosphorescence of the tissue. The camera shutter was left open until all visible afterglow disappeared.

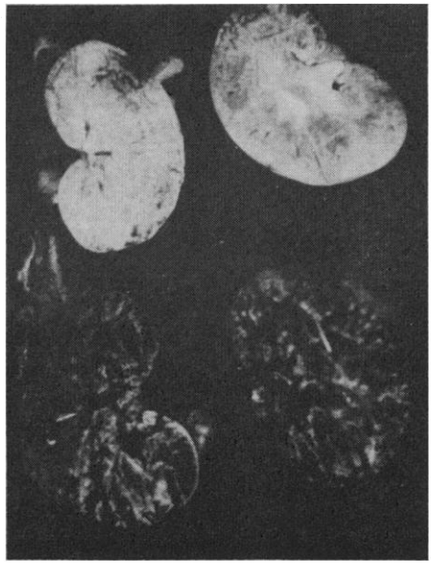

Fig. 2. Longitudinal sections of kidneys from a white male rat. Top, the nonligated kidney shows an intense phosphorescence. Bottom, the kidney which had the renal artery ligated for a period of 6 hours.

Fine structural details were visible in the phosphorescence photographs of a cut kidney surface. Of the many organs studied, only the tooth (if associated with certain kinds of pathology) gave such a specific detailed pattern of phosphorescence activity (*1*).

Figure 1*A* is a photograph, taken in artificial light, of the cut surfaces of four kidneys from white male rats of different ages. In Figure 1*B* are the same kidneys photographed in a totally dark room by the light of their phosphorescence.

To study the effect of renal circulation on kidney phosphorescence, we ligated the renal artery in one kidney of a male rat and left the other kidney intact. After 6 hours the rat was killed with ether and the kidneys were removed. Each kidney was then cut into halves. The halves were pinned to the mounting board with the two pieces of the nonligated kidney on top and the two pieces of the ligated kidney on the bottom. Figure 2 is a photograph of the phosphorescence of these kidney sections. It shows a considerable loss in the intensity of phosphorescence of the kidney which was ligated for the 6-hour period.

In another experiment to explore the effects of 24-hour alteration of blood and urine flow on kidney phosphorescence, four white male Wistar rats were subjected to surgical procedures which resulted in the ligation of the renal artery in the kidney of one rat, the renal vein in another, the renal vein and renal artery in a third and the ureter in the fourth. One kidney in each animal was left intact as a control.

The kidneys showed no phosphorescence when renal veins or arteries were ligated for 24 hours. Phosphorescence was not lost when the ureter was ligated.

One factor to consider in this loss of phosphorescence caused by renal-vessel ligation, is the possible extravasation of blood into kidney tissue resulting from the abnormal pressure and the anoxia caused by the vascular ligations. That such an occurrence might affect kidney phosphorescence is particularly reasonable since perfused blood causes a 41 percent diminution in the intensity of the fluorescence exhibited by kidney slices. This diminution was attributed to an absorption of the exciting wavelength (366 mμ) by erythrocytes (*2; 3*).

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11 March 1963

Angiotensinase with a High Degree of Specificity in Plasma and Red Cells

Abstract. *A peptidase with a high degree of specificity for angiotensin II occurs in normal human plasma and red cells. Preparations from both sources have the same* p*H optimum, require calcium ions, and hydrolyze valyl*^{5}*- or isoleucyl*^{5}*-angiotensin II, but do not hydrolyze* β*-aspartyl*^{1}*-angiotensin II, arginyl*^{1}*-angiotensin II or deaminoangiotensin II. This enzyme, given the name angiotensinase A, requires* α-L*-aspartic acid or* α-L*-asparagine as the* N*-terminal amino acid in its angiotensin substrate, and thus differs from kidney leucine aminopeptidase. Other peptidases known to hydrolyze angiotensin also hydrolyze at least one of the other angiotensin analogs with substitution in the one position.*

The pressor activity of the octapeptide angiotensin II is short lasting, and this may be due, in part, to its rapid destruction by plasma or tissue enzymes called "angiotensinases." By using tritiated angiotensin (*1*) we have shown that within half an hour, peptide fragments are recoverable from the organs of rats infused with it.