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MINERALOGICAL NOTES

A REPEATED TWIN IN NATURAL DIAMOND FROM TORTIYA, IVORY COAST

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ABSTRACT

The geometry of a cyclic twin in natural diamond is established by X-ray methods. It consists of five tetrahedral crystals in (111) twin position, all having a common [110] direction.

The diamond here studied was found in the Tortiya Mine (Casanova, 1968), worked by the Société Anonyme de Recherches et d'Exploitations Minières en Côte d'Ivoire (SAREMCI) and situated 420 km NNW of Abidjan (Ivory Coast, West Africa). This detrital deposit occurs on a conglomeratic formation, with granitic, quartzitic, and metavolcanic elements, which belong to a Precambrian eugeosyncline (Birrimian, 2100–2300 m.y.). Diamonds occur in the conglomerate matrix, their source remains unknown, and no kimberlite has been found in the region as yet.

The Tortiya deposit yields diamonds for jewelry, and industrial diamonds and bort which are generally round and dark colored (brown and black), with various inclusions. The morphologies of these diamonds are octahedra, 50 percent; dodecahedra, 25 percent; cubes and diamonds without crystalline forms, 25 percent. Among the twinned crystals, the Spinel law twin is the most frequent, coupling crystals which are mostly combinations of octahedra and dodecahedra. We also found the interpenetration twin of the Fluorite type, coupling two octahedra.

The twin which we describe here was found among borts (Fig. 1). It is a five branched brown star (width 1 mm) with re–entrant angles, apparently consisting of five tetrahedra having in common (111) planes and [110] direction. Such twins of cubic crystals have been described in gold (Wallerant, 1909), in native copper (Lasaulx, 1882; Palache *et al.*, 1944, p. 100), and in synthetic diamonds (Wentorf, 1963). So far as we know, the only reports of this twin in natural diamond are those

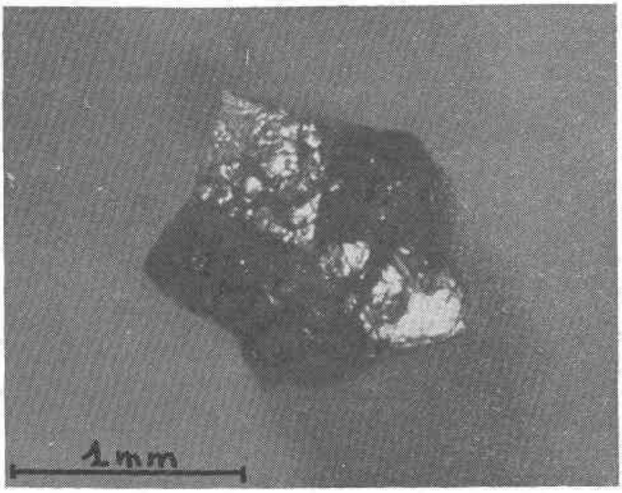

Fig. 1. Cyclic twin in diamond from Tortiya Mine, Ivory Coast.

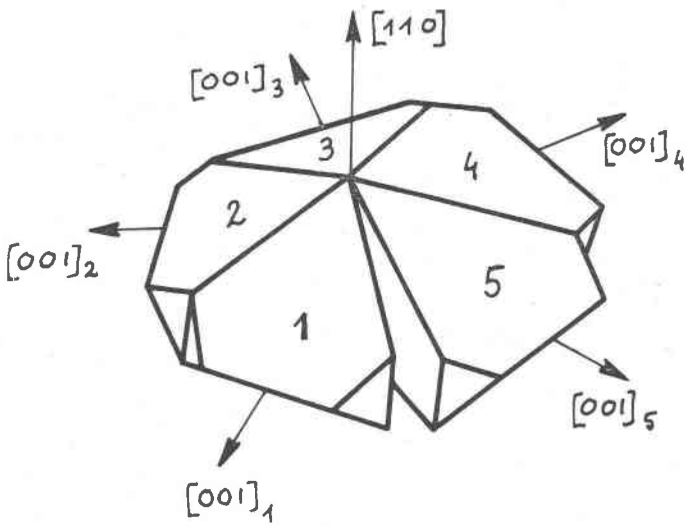

Fig. 2. Idealized morphology of the twinned diamond. The void between crystals 1 and 5 was not observed in our sample. Compare Fersman and Goldschmidt (1911, Plate 40).

summarized by Fersman and Goldschmidt (1911). As our sample did not allow any optical measurement, we have used X-ray methods. A rotation crystal photograph around the axis of the cyclic twin confirmed that this axis is a [110] direction; no powder ring was apparent. We recorded the (*hhl*) layer of the reciprocal space on the Rimsky retigraph, and obtained five superimposed rectangular lattices, with the following angles between [001] axes: 70°, 71°, 70°, 71°, 76° (the theorical value is 70°32′, and for the void, 7°20′). The void was not observed in our sample. The indices of diffraction spots are {004}, {111}, {220}, {113}, {331}, {224}, {333}, {440}, and {444}. The geometry of this twin in natural diamond is thus confirmed by X-ray methods (Fig. 2). It consists of five crystals united by contact in (111) twin position, all having a common [110] direction.

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CRYSTALLOGRAPHY OF A HIGH-TEMPERATURE PHASE OF REALGAR

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Abstract

Synthetic high-temperature realgar has $a = 9.58$, $b = 9.67$, $c = 9.08$ Å, $\beta = 100°50'$, and space group $C2/c$ (or Cc).

Arsenic sulfides were crystallized at about 350°C, using basically the sublimation technique described by A. Schuller (1894). Among the crystalline products, small (less than 0.10 mm in diameter) tabular

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