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SOME MINERAL INCRUSTATIONS SELECTIVE UPON CRYSTAL FORMS

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SPHALERITE INCRUSTING GALENA

Crystallization upon the surface of a crystal bounded by several forms may be so ordered that deposition takes place upon the faces of one of the forms only. The effect is caused by the relatively greater adsorptive power of such faces, which facilitates the development of crystal nuclei upon them and localizes the ensuing crystallization. Among a number of such instances that have been described are incrustations of bournonite and of pyrite upon the (100) faces of galena cubo-octahedrons in preference to the (111) faces, and of chalcopyrite upon the (111) faces in preference to the (100) faces.

An additional instance of selectivity in deposition upon the crystal forms of galena is afforded by a specimen of sphalerite and galena from Freiberg, Germany, presented to the American Museum by Mr. Ernest Weidhaas. The specimen exhibits a number of interlocking galena cubo-octahedrons, averaging about 1.5 cm. in size, arranged upon drusy quartz. The (111) faces of the crystals are overgrown by closely aggregated sphalerite crystals that range in size up to 0.5 mm. A few minute chalcopyrite crystals are interspersed with the sphalerite crystals. The (100) faces of the galena crystals are either entirely free from the incrustation, or are occupied by a few scattered crystals only. The incrusting crystals are slightly embedded in the surface of the galena, and evidently were deposited while the galena was still growing.

The sphalerite crystals are not parallelly arranged upon the incrusted faces. It cannot be concluded, however, that the crystals are not oriented to the galena. A number of different orientations may be present, and the distribution of the incrusting crystals among these orientations may not be such as to give the effect of parallelism. A parallel arrangement would be noticeable to the eye only if the incrusting crystals were predominantly oriented in a particular position.

SELECTIVELY COATED QUARTZ CRYSTALS

The absorption of a foreign substance selectively by the forms of a quartz crystal is not uncommon. The $(10\bar{1}1)$ faces of quartz may thus be selectively filmed by colloidal iron oxide or colloidal clay material, while the $(01\bar{1}1)$ and $(10\bar{1}0)$ faces remain unfilmed (Fig. 1).

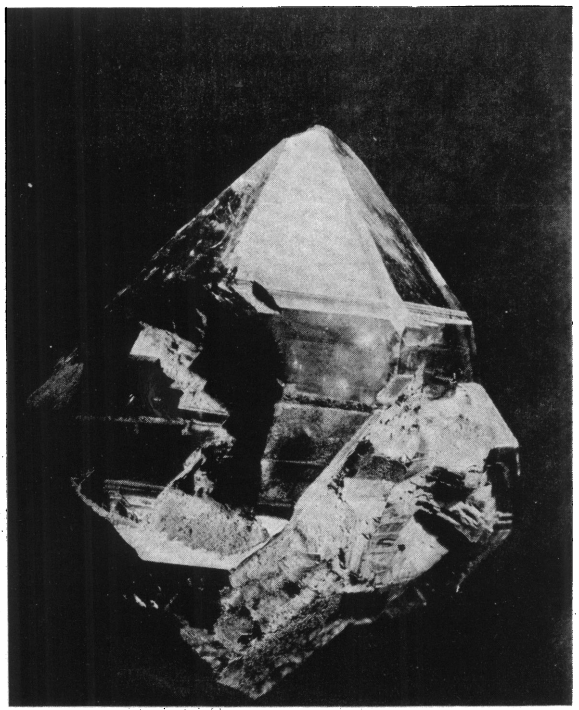

Fig. 1. A selectively coated quartz crystal. The faces of $(10\bar{1}1)$ have included during the last stages of growth of the crystal an amount of colloidal clay substance, while the faces of $(01\bar{1}1)$ and $(10\bar{1}0)$ are not coated and present the ordinary transparent quartz of the crystal. The clay charged zone is cream white in color and is about 1 mm. thick. Alexander County, North Carolina. × 1/2

Similarly, the pigmenting substance of amethyst is frequently adsorbed, during the growth of the crystal, by the faces of $(10\bar{1}1)$ in preference to the faces of other forms that are present on the crystal. The effect gives rise to a three-fold segmental coloration in cut basal sections of amethyst. Smoky quartz crystals sometimes exhibit a similar distribution of the pigmenting substance.

A suite of quartz crystals recently donated by Dr. A. C. Hawkins presents a further instance of selective deposition. The specimens were found embedded in clay, apparently arising from the decomposition *in situ* of the feldspar of a pegmatite, at La Grange, Troup County, Georgia. The forms present on the crystals are $(10\bar{1}1)$, $(01\bar{1}1)$, $(10\bar{1}0)$ and $(11\bar{2}1)$. Both right- and left-handed crystals are represented. The faces belonging to $(10\bar{1}1)$ and $(11\bar{2}1)$ have included, during the last stages of growth of the crystals, an amount of grayish white foreign material. This matter occupies a uniform, translucent zone about 0.1 mm. thick at the surface of these forms. The other faces and the interior of the crystals are colorless and transparent (Fig. 2). On a few

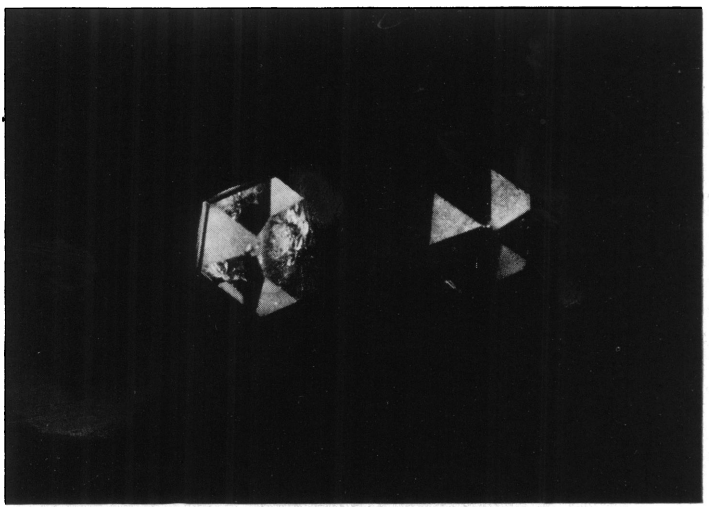

Fig. 2. Quartz crystals exhibiting a selective coating of the faces of $(10\bar{1}1)$; the three alternating faces of $(01\bar{1}1)$ are not coated. The crystals are viewed along the *c*-axis. La Grange, Troup County, Georgia. × 3

crystals, however, the faces of $(10\bar{1}0)$ are coated in addition to those of $(10\bar{1}1)$ and $(11\bar{2}1)$. The coating is invariably absent from the faces of $(01\bar{1}1)$. The weak adsorbing power of this form appears to be characteristic of quartz. The included substance cannot be resolved under the microscope and its nature is unknown. The mode of occurrence of the quartz crystals, however, suggests that it may be colloidal clay substance, similar to the so-called *cotterite* variety of quartz.

CHALCOPYRITE INCRUSTING SPHALERITE

An incrustation of chalcopyrite selective upon the forms of sphalerite was noted on a specimen of sphalerite in association with bournonite an quartz from Casapalca, Peru. The sphalerite crystals present large faces of $(1\bar{1}1)$ and (110) with minor (111) and, occasionally, (100). The crystals are distorted and complexly twinned. The chalcopyrite occurs as a very thin, even crust over the faces of $(1\bar{1}1)$ and is lacking on the faces of the other forms. The incrusting crystals exhibit a marked tendency for distribution along the edges of growth terraces and striations present on the $(1\bar{1}1)$ faces. Where the incrustation is dense this effect is obscured and the entire face is uniformly overgrown.

The individual chalcopyrite crystals composing the crust are too minute to be distinguished by the unaided eye. That the crystals are oriented to the sphalerite is proved by the appearance of a bright satin-like sheen, due to simultaneous reflection from many parallel crystal facets, when the crust is held in certain angles.