

*On the origin of the name 'quartz'.*

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QUARTZ is the commonest of minerals and reference to any dictionary will show that it is crystalline silica, but how or when this substance acquired the name quartz seems to be a still unsolved mystery.

Theophrastus, the pupil and successor of Aristotle, in his book on stones (19), mentions among other stones used for engraving seals, a stone called crystal (*κρύσταλλος*). This name, apparently, is derived from *κρύος*—icy cold, and *στέλλειν*—to contract. It would seem from this that the ancient Greeks, as implied by Pliny, believed crystal (modern quartz) to be a variety of supercooled ice. In point of fact the formation of crystal in nature is explained by the earliest writers in a different way. Diodorus Siculus (*circa* 30 B.C.) suggests that crystal was formed from water hardened by heavenly fire, while Pliny the Elder (*circa* A.D. 60) says that crystal is 'a substance which assumes a concrete form from excessive congelation', and goes on to explain that crystal is only to be found 'in places where the winter snow freezes with the greatest intensity' (15, Book 37, 2, 9). Pliny's description of crystal, however, leaves no doubt that he applied this name to the crystalline variety of silica which is now called quartz.

This meaning of the word crystal survived until almost the end of the XVIIIth century and was then replaced by the name quartz. How and why did this change occur, and what is the origin of the name quartz?

Apparently the first direct reference to a substance called 'quartz' is to be found in a little booklet entitled 'Eyn Nützlich Bergbüchlein' published anonymously in Augsburg probably in 1505 and subsequently republished in 1518, 1527, 1534, and 1539. Hoover (3) and Adams (1) ascribe the work to a learned Freiberg physician Ulrich Rühle von Kalbe (Calbus), and claim that it is the earliest printed manual on ore-deposits. Its author, among other things, gives a number of names and technical terms used by the Saxon miners. 'In describing silver veins, of peculiar interest is the mention of the association of bismuth (*wis-*

*muth*), this being, we believe, the first mention of that metal, galena (*glantz*), quartz (*quertz*), spar (*spar*), hornstone (*hornstein*), ironstone and pyrites (*kies*), are mentioned as gangue materials. . . . So far as we know, this is the first use of any of the terms in print' (3, p. 612).

Another Saxon physician interested in mining matters, Georg Bauer, better known as Agricola, mentions the name quartz in his first book on mineralogy and mining entitled 'Bermannus sive de re metallica' published in Basel in 1530. In this book, which I have consulted in Italian translation (2), there are two passages in which the name quartz (*quarzo* in Italian) is mentioned. Here is the first passage in English translation (pp. 449 verso, 450 recto): 'The sparks of the same gold are seen to be almost attached to a species of a certain very white stone called by us [Saxon miners] quartz, and which is excavated in Cottenheide, and as far as I know your Nevio has seen it.' The second passage reads thus (p. 466, verso): 'This is another kind of stone, which at times is transparent, and is called by us quartz; sometimes it is very white, sometimes yellowish and sometimes bluish.' The third reference to quartz in Agricola's works is in his 'Interpretatio Germanica vocum rei metallicae' (1546) where, in classifying stones according to their fusibility, Agricola places in his third and most refractory class 'quertze oder kiselstein'.

These, as far as I know, are the only references to quartz in Agricola's works. Elsewhere he speaks of *crystallum*, *silicum*, *silex*, *silice*, &c. In Hoover's translation of Agricola's 'De re metallica' these names are translated as quartz or silica.

Neither Kalbe nor Agricola provides us with a precise description of the stone called quartz (*quertze* or *quertz*) by the Saxon miners, but one can assume that it is a vein-stone, usually white in colour and very refractory. There is no suggestion whatever that quartz is identical with *crystallum*, which is described separately, and it is probably safe to assume that originally quartz referred only to the compact vein-quartz. The name quartz is a puzzle to German etymologists and no derivation of it has been as yet proposed. Here is my tentative attempt to explain its origin.

The Saxon miners called large veins—*Gänge*, and the small cross veins or stringers—*Querklüfte*. The name ore (*Erz*, *Ertz*) was applied to the metallic minerals, to the gangue or to the vein material as a whole. In the *Erzgebirge*, silver ore is frequently found in small cross veins composed of silica. It may be that this ore was called by the Saxon miners 'Querklüfertz' or the cross-vein-ore. Such a clumsy word as

'Querkluffertz' could easily be condensed to 'Querertz' and then to 'Quertz', and eventually become 'Quarz' in German, 'quarzum' in Latin, and 'quartz' in English.

An additional support for this hypothesis comes from Cornwall where the old name for crystalline silica was 'cross-course spar'. This name is mentioned by Garby (10) in 1848 in the following passage: 'Radiated Quartz is exclusively found in cross-courses, and is thence called by the miners cross-course spar.' I am informed, however, by Mr. Arthur Russell, that this name is very old, and that it was mentioned by some authors prior to Garby. The term 'course' in Cornish mining dialect means a lode or a vein. It is quite plausible that the term 'cross-course spar' is an adaptation of the German term 'Querkluffertz', as the revival of mining in England during the Renaissance period was greatly influenced by the Saxon miners. The name spar was persistently applied to crystalline silica in Cornwall. Thus Borlase (6) writes: 'I must reckon what the surface of the land in most parts of Cornwall, yields in great plenty, I mean an opaque whitish debased crystal, commonly (but indeed erroneously) called white spar. . . . This stone by the Germans is called Quartz, and because we want a name for it in English, it will be so called for the future.' A similar opinion is expressed by Pryce (17): 'What is vulgarly called Spar with us, and which is so plentifully scattered upon the surface of every heathy common, is not the real Spar; and is, by most Lithologists better known by the German name of Quartz, for want of a proper English appellation.'

Leaving the verification of my guess to expert philologists, I shall now follow the subsequent history of the name quartz.

Writers on minerals and stones of the XVIth and the XVIIth centuries—such as Gesner, Cesalpino, Boetius de Boot, Caesius, Aldrovandus, and Lovell—never mention the name quartz. Apparently this name had not then left the confines of its native Saxony. But that it was used in Saxony is testified by an English traveller E. Brown, who in a book (7) published in 1685 states that in the Freiberg mines 'much of their ore is washed, especially the poorest, and that which is mixed with stones, quarts, or spars'; and also by Henckel, the director of Freiberg mines, who in 1725 published his famous book 'Pyritologia' (12). Discussing pyrite, Henckel, for example, writes that it is found 'in Marbles, called in the language of Miners, *horn-stone*, and resembling *quartz*' (English translation, p. 44). He also mentions that silver is found in quartz (p. 44) and that the rock-crystal (*Bergcrystal*) is sometimes indistinguishable from quartz (p. 74). It is clear, however, that

Henckel considers quartz and rock-crystal to be distinct species of stones.

As already mentioned the name 'quartz' has appeared in an English book in 1685. This name is again mentioned by Woodward in his catalogue. Apparently a certain Herr von Schonberg, either a mineral collector or a mining engineer, sent some mineral specimens to the famous Doctor John Woodward and one of them bore the following label: 'Cristalli candidae, Eibenstock in Saxonia. Dursichtige Weise Quartz Strahlen; i.e. transparent, white, radiated Quartz.' This is how it is recorded in Woodward's catalogue published in 1728 (22, p. 13). That the name quartz was strange to Woodward is shown by the fact that it is not mentioned in his comprehensive account of minerals and rocks (23).

Apparently the name quartz also reached Sweden in the first half of the XVIIIth century. Wallerius in his Mineralogy (21) mentions quartzum (with reference to Linnaeus) and places it in the Genus XIII, together with agate, silex, flint, onyx, &c., and again in Genus XV (probably vein-quartz). The crystalline variety of silica (Crystallus hexagona non colorata, Crystallus montana) is described by Wallerius as a distinct species in Genus XVI. This shows that the name quartz was still applied to a compact variety of silica and not to rock-crystal.

A great advance in mineralogy was made by the application of chemical analysis. The first to introduce the qualitative methods of chemical analysis in a systematic way in mineralogy was the professor of chemistry in Berlin, J. H. Pott. In his 'Lithogegnosy' (16) he described chemical tests on various minerals and his conclusions were that quartz, crystal, flint, sand, &c., were of similar composition (French translation, p. 169). He also made a very important discovery that sand after fusion with alkali yielded 'liquoris silicum' which coagulated into a jelly on addition of an acid. In spite of this observation quartz and crystal were still described as separate species. It is also clear from the following quotation that Pott confused quartz and felspar: 'J'appelle Quartz cette espece de Pierre blanche qui se trouve abondamment avec les Mines, & qui fait feu étant frappée contre l'Acier. Il y en a de transparent, cristallin & pur, qui n'entre pas en fusion avec les Terres Alcalines. Mais la plus grande partie des Quartz est plutôt opaque & d'une couleur de lait; & pour la distinguer de l'autre, je l'appellerai *Quartz Spathique*, ce dernier entre parfaitement en fusion avec les Terres Alcalines' (p. 32). It is a remarkable fact that such a

common mineral as felspar began to be distinguished from other minerals only in the XVIIIth century. As shown by Zenzén (24) the name Feldtspat (i.e. field-spar) was invented in 1740 by Daniel Tilas, a Swedish mineralogist (20). It is obvious that felspar and quartz were confused by Pott and, as we shall presently see, also by Mendes da Costa. In 1757 Emanuel Mendes da Costa, a British-born Jew of Portuguese descent, published what I think is the best manual on rocks of that period. It is called 'A natural history of fossils' (14) and only the first part of the first volume was ever published. The part published contains a description of all the rocks known to science at that time. In describing granite Mendes da Costa writes, that it is composed of quartz and mica, but it is obvious that he uses the name quartz as did Pott to embrace felspar. This is clear from the following quotation: 'the basis [of granite] is of a milk white opake glossy *quartz*, of a tabulated structure, called Feld-Spath by the German writers, intermixed with lumps of a fine transparent and cristalline quartz . . .' (pp. 273-274). The same dual meaning of the name quartz is found in Mendes da Costa's notes appended to the translation of Cronstedt's Mineralogy (9). On pp. 57-58 of this book the name quartz is used synonymously with 'cristallus montanus' and the foot-note by Mendes da Costa is as follows: 'I shall adopt this name of quartz in English as it has already gained access into the other European languages' (p. 57). But on page 72 Rhombic Quartz, Spatum scintillans, or Feltspatum is mentioned and the corresponding foot-note is as follows: 'The Germans and other nations call this substance Feld-spat, that is feild or vague spar; a name very inadequate to its nature, as it touches no wise on the sparry class. I have therefore, in my Lectures, given it the English name of Rhombic Quartz, a name very significant, as the name quartz expresses its class; and the quality of it, of always breaking into angular (rhombic) fragments, is also expressed by the adjective of rhombic.' This confusion between quartz and felspar did not last long and the application of the quantitative chemical analysis to minerals by Bergman (5) finally separated the two minerals. From then on, quartz became synonymous with rock-crystal.

The reason for this replacement of one name by another, viz. crystal by quartz, is obvious. It is because in the XVIIth century the name crystal acquired a wider meaning and its retention as the name of a particular mineral would lead to ambiguity. This necessity of change is reflected by Mendes da Costa in the following words: 'The author uses the term *Quartz cristals* for the true cristals; for all foreign

authors call figured spars also cristals; and distinguish them by the name of spath or spar cristals' (9, p. 5, footnote).

The study of crystals began with Nicolaus Steno, a Dane residing in Italy, who in 1669 published his famous book (18). In this work he was very careful to distinguish between quartz, which he called *cristallus* or *cristallus montium*, from other types of crystalline minerals, which he called '*angulata corpora*' (singular—*corpus angulatum*). But that the name crystal was applied to other '*corpora angulata*' besides quartz is shown by the title and the substance of a work of another learned Dane, Erasmus Bartholinus (4), published in the same year 1669. The works that followed, such as those of Guglielmini (11), Hottinger (13), and Cappeller (8), show the confusion caused by the use of the name crystal in two senses, and the re-emergence of the old Saxon mining term—quartz, was probably a welcome solution of this dilemma. In any case in the second half of the XVIIIth century quartz became established as a name of a particular mineral and the name crystal became a generic term synonymous with the old term '*corpus angulatum*'.

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