What gives a crystal shape? Symmetry, periodicity and... twins

During the 19th century, the notions of frequency (periodic repetition) and atomic order became important in the study of form and symmetry in crystals.

Bravais' idea was as follows: the stronger the bonds between molecules in the plane of a crystalline face, the more the face develops. The planes which are most likely to appear are those with higher molecular density.

Combining symmetry and lattice systems

At the end of the 19th century, the hypothetical molecules are replaced by more complex web-like patterns containing atoms and potential new symmetries. These symmetry patterns were hypothesised by Sohncke and then later recorded by Schoenflies and Fedorov. This albeit abstract theory was to be confirmed in 1912, together with the periodicity of the crystals, by the first X-ray diffraction experiments.

Linking the form of the crystals to their atomic structure

Georges Friedel carried on from Bravais and observed a large number of natural crystals. He was able to prove that the frequency of appearance of a face is linked to the density of the points of the lattice, and, therefore, to the internal intimate structure. This is the Bravais-Friedel law.

We can see that by the beginning of the 20th century, before being able to "see inside" crystals, crystallographers had already established a body of experimental and theoretical knowledge of them.