Crystal, an object of science

Details of the growth forms of fluorite crystals. © Grenoble Natural History Museum

The *birth of crystallography*

Observe and explain crystal shapes to understand their nature.

"Angular stones"

During the Renaissance, a discussion began: *do crystals stem from the growth of inert matter or are they somehow sculpted?*
Using his observations of the shape of quartz crystal, Steno, in the 17th century, was one of the first to imagine **crystal growth**.

Explain faces

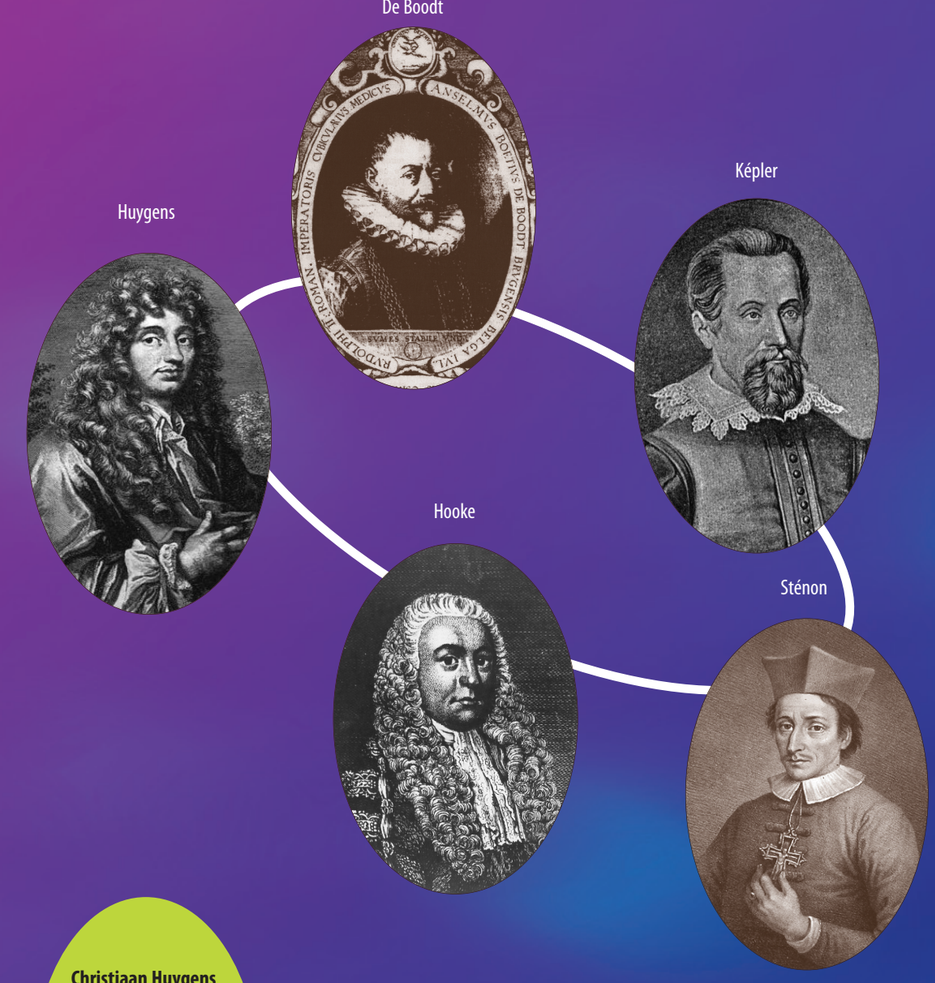
It was only during 18th century, although it was still not possible to look inside the crystal, that "crystallographers" formed a picture of the internal structure of crystals by focussing on their outside geometry. At this time, scientists expand on the idea of Linnaeus, founder of a system for classifying living species, in order to use the crystal forms as classification criteria, but they failed.

Imagine the crystal...

It was the discovery of the **"constancy of angles"** between the various faces of a given type of crystal, which first drove scientists to suggest that crystals must be made out of a **stack of basic building blocks** or bricks. This model allowed them to explain crystal faceting.
The works of Steno, Romé de L'Isle and Haüy and numerous other scientists thereby gave rise to the new science of **"crystallography"**.

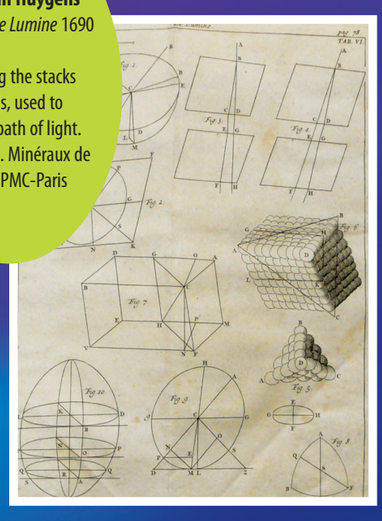
... without "seeing into" one

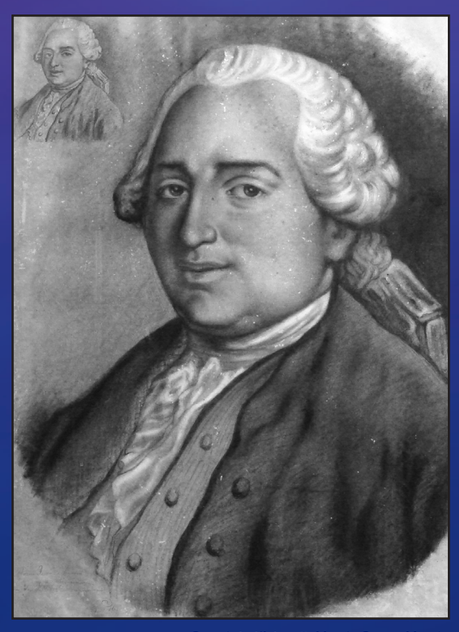
In the 19th century German and French researchers introduced the concept of symmetry to classify crystals. They used mathematics to formalize their classification theory. Thus, by the beginning of the 20th century, even without being able to "see into" a crystal, "crystallographers" had developed the notion of **atomic order** and of periodic repetition to understand both the external form of crystals as well as their **symmetry**.



Christiaan Huygens
Tractatus de Lumine 1690

Page showing the stacks inside crystals, used to explain the path of light. Source : Col. Minéraux de Jussieu. UPMC-Paris



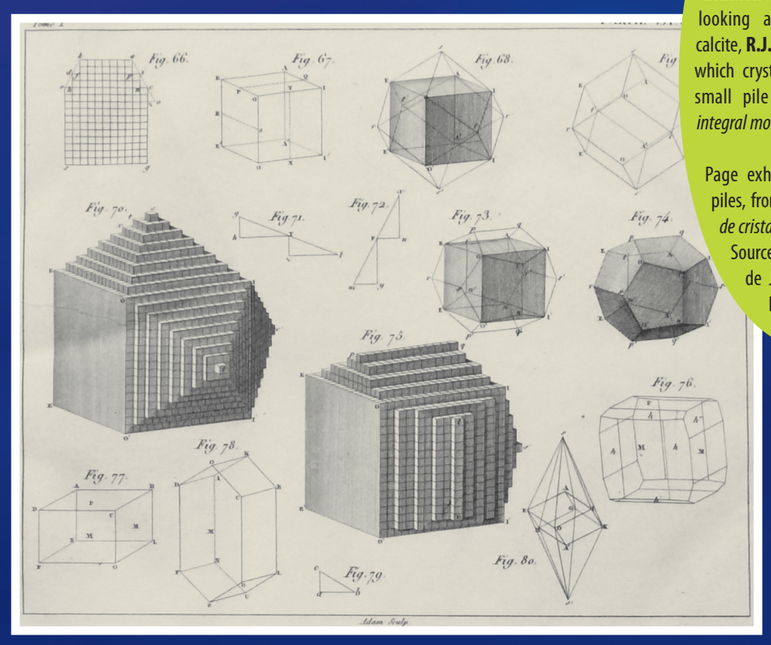


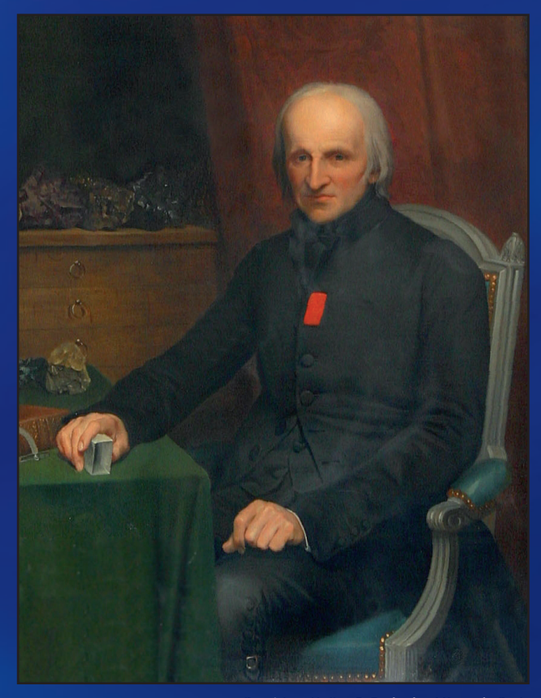
Romé de l'Isle. © Musée Baron Martin

A stack of building blocks

The crystalline forms leave nothing to chance, each chemical has a specific form. By looking at pieces of broken calcite, **R.J. Haüy** built a model in which crystals resulted from the small pile of bricks he called *integral molecules.*

Page exhibiting examples of piles, from **R.J. Haüy** *Traité de cristallographie* (1822). Source : Coll. Minéraux de Jussieu. UPMC-Paris





René Just Haüy. © Ecole des Mines de Paris

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