“結晶への冒険”
A JOURNEY INTO CRYSTALS

掛け軸展示・体験実習：2018年1月6日（土）～1月8日（月・祝）
場所：岡山県生涯学習センター人と科学の未来館サイピア
講座：2018年1月5日（金）14:30～16:30
場所：岡山大学創立50周年記念館
2018年1月7日（日）13:30～15:00
場所：岡山県生涯学習センター視聴覚室

“結晶への冒険”では、人類と結晶の関わりを有史以前から現代にわたり芸術や科学の目を通して学びます。この催しは、子供から大人までの多くの人に結晶の様々な見方、応用を発見できるよう企画されています：

- 結晶（宝石）発見の歴史
- 結晶のミステリーと科学
- 結晶が未来を変える（応用）

以上のような三部構成で、冒険をお楽しみください。

概要：

国際結晶学連合と岡山大学が企画し、岡山県生涯学習センター人と科学の未来館が共催皆様方を結晶の世界に誘います。案外身近な結晶（宝石）について39枚の「掛け軸」でお示しするとともに、水の働き、岩石が作られてゆく過程、光の回折と干渉などの「体験実習」で楽しんで頂きます。

別に行われる講演会では、フランスからお招きした結晶学連合のHodeau博士が「結晶の不思議（仮題）」について解説します。

詳細は各機関のホームページで。

最後となりましたが、この企画を可能にして下さった関係の皆様に心から御礼申し上げます。特に、掛け軸の日本語訳初稿を作成した岡山大学・グローバルキャンパス岡山所属の高校生に感謝致します。

"Voyage dans le cristal" is a major exhibition, now on display in Grenoble before touring other French cities. The exhibition presents to a general public the science and the beauty of matter in the crystalline state. The exhibition was mounted with the contribution of numerous partner laboratories under the management of the Grenoble Museum of Natural History and the French Association of Crystallography.

à toucher
Coll.MNHN

Crystals provoke wonder, become symbols, inspire study

Already in prehistoric times, in the search for wealth under the earth's surface, Man had discovered multiple faceted stones. Such stones provoked wonder and admiration; from Antiquity onwards, they became subjects of philosophical and scientific enquiry.

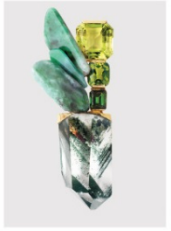
Formes couleurs
Quartz
Isère
Coll. Muséum de Grenoble

Their colours and multiple geometries inspired mysticism and fascination: crystals became symbolic objects, often associated with virtues or supernatural powers.

Diamant
Fac similé du Régent
l' original est au Louvre

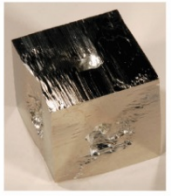
Their transparency, their rarity and their apparent inalterability led early to their use as ornaments.

Taille
Pendentif Jouvence
Coll.
Jean Vendome



Man learnt to cut them skillfully, to enhance their sparkle and light.

Pierres angulaires
Pyrite
Coll. Muséum de Grenoble



Crystallography: the birth and triumph of a science

In the 16th and 17th centuries, natural philosophers held two opposing points of view about crystals: did they grow facetted from inert matter, or were they sculpted solids?

les faces
René Just Haüy
© Ecole des Mines de Paris

In the 18th century, with no techniques yet available for probing deep into a crystal, scientists began to deduce their internal structure from observations of their external geometry.

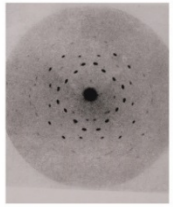
Imaginer le cristal
Gabarits de Carangeot
Coll.MNHN
Modèles en bois de Haüy
Coll. Jussieux UPMC
Goniomètre de Carangeot
Coll.MHNH

Thus, the discovery of the invariance of the angles between the facets for a given type of crystal led scientists to define a crystal as a regular stacking of elementary building blocks. The work of Romé de l'Isle, of abbé Haüy and many others gave birth to a new science : "crystallography". Together with astronomy, mechanics and optics, crystallography is one of the oldest of the physical sciences.

Les découvertes racontées
Main de Berta Röntgen
Coll. Deutsches Röntgen Museum

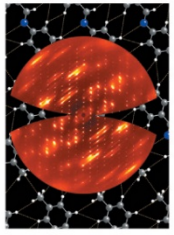
In the mid 19th century, still without any proper tool for seeing a crystal's structure, the concepts of periodicity and molecular order gave the explanation of their shape and symmetry.

Les rayons X
Cliché historique de Laue : permet de voir la structure atomique d'un cristal de sphalérite



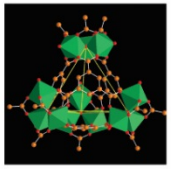
The 1895 discovery of the mysterious "X-Rays" inspired the work of Laue and the Braggs, father and son, who used crystals in order to understand these new rays. In return, their "diffraction" experiments showed how crystals were indeed made of regular arrays of atoms, finally making it possible to "journey" into the heart of a crystal.

"Voir" les cristaux
Cliché récent de diffraction obtenu par rayon X pour déterminer la structure atomique d'une molécule
© IUCr journals



Chimie

Structure moléculaire utilisée comme brique pour construire de nouveaux matériaux poraux
© Institut Lavoisier



Crystals for research and applications : scientists "grow" crystals

From the beginning of the 20th century, the birth of crystal chemistry enabled chemists to "grow" crystals, to "visualize" their structure, and thus to invent new materials.

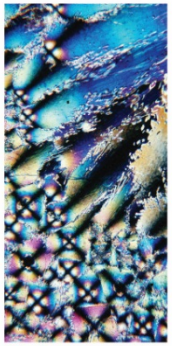
Biologie

Les scientifiques cristallisent les protéines pour les étudier
© IUCr journals

The same methods have spread through the sciences of pharmacy and biology, where fundamental research leads to synthesis of new pharmaceuticals.

Bio-miné ralisation

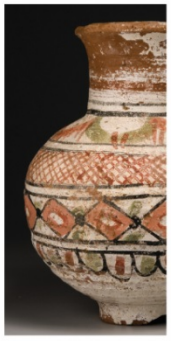
La minéralisation par le vivant : structure d'un spongaire (Solenocoelia)
© JP Cuif



Crystal are all around, they are in shells, pearls, corals and bones.; sedimentary chalks once were life!

Archéologie

Vase à structure polychrome
Coll. Musée de Grenoble



By its composition, its structure, its density, a natural crystal is a messenger from the heart of the earth.

This messenger role of crystals is useful also in archaeology and in studies of heritage objects.

Métallurgie

Cafetière en aluminium

Crystals are at the heart of metallurgy. Metals and alloys are made up of a multitude of crystals, and crystal defects determine the mechanical properties of metal objects and play a key role in forging, laminating, milling.

Optique et micro électronique

Détail : chaque carré est un circuit électronique
Coll.CEA Grenoble STMicroelectronics

Crystals for microelectronics need to be nearly perfect, and either very pure or with minute concentrations of impurities purposely added for tuning their properties.

Crystals also become solid state lasers or light sources in displays, or "LEDs" for traffic signals or Christmas decorations...

Diamant

Expérience sur "l'évaporation" du diamant
Louis Dieulafait

Many applications are based on the two classic crystals, quartz, which marks time in our watches, and diamond, symbol of wealth but just one member of the carbon family. That family gives us graphite, the fullerenes (a "nano football"), carbon nanotubes and graphene.

Crystals are an everyday object, found everywhere

The discoveries of the 20th century have dispelled the mysteries concerning the atomic structure and the physical properties of crystals, giving them "a new place at the heart of modern civilization". Crystals are now research tools used in investigations that cover an immense range, from the composition of our planet Earth to the microscopic structures of materials and the molecules of Life.

展示会場　見取り図：　サイピア　2階