

Crystallography [from Greek κρυσταλλος (krustallos) ice, crystal + γραφειν (graphein) to write] is the branch of science devoted to the study of molecular and crystalline structure and properties, with far-reaching applications in mineralogy, chemistry, physics, mathematics, biology and materials science.



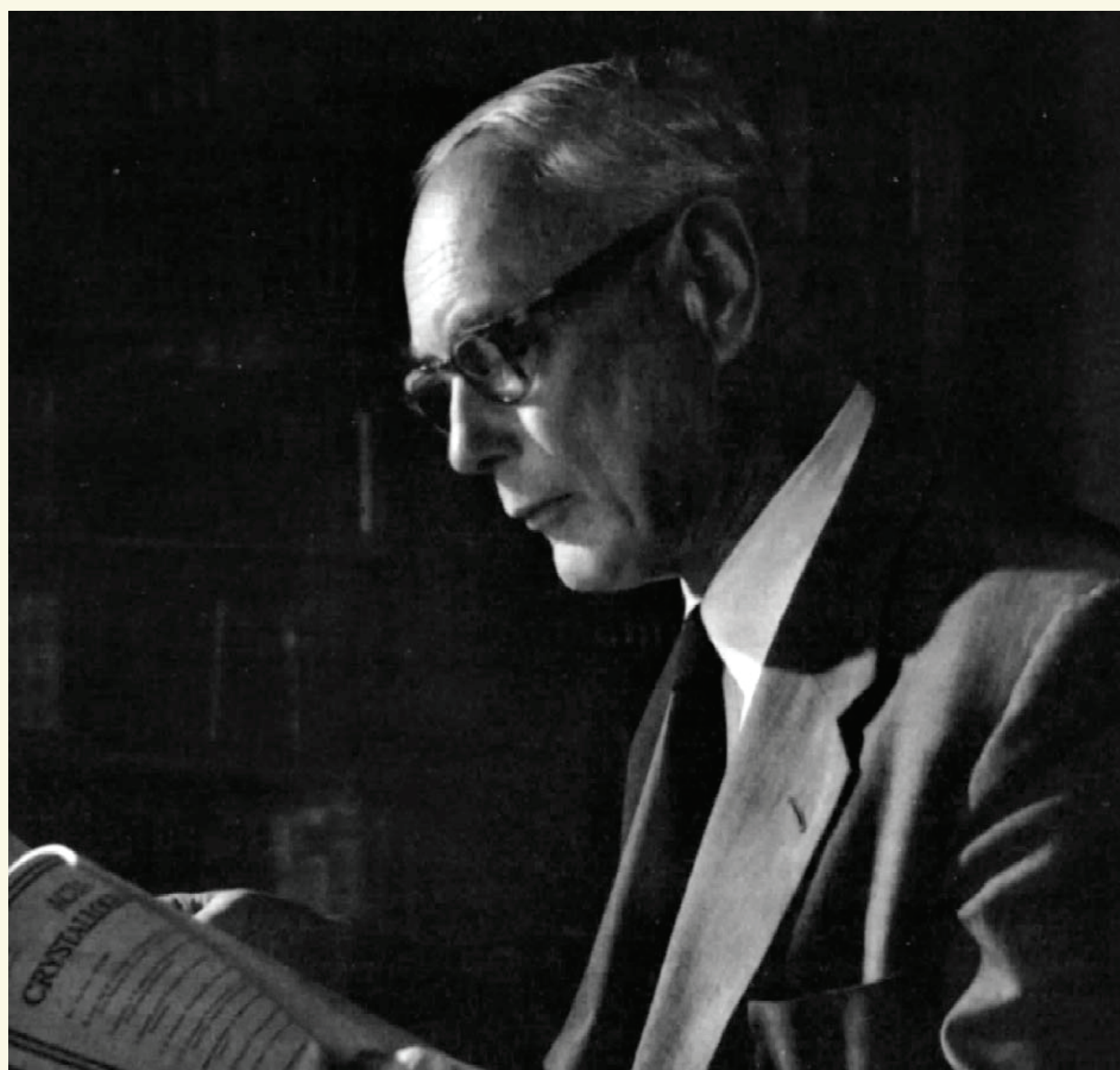
Creation of the IUCr

The International Union of Crystallography was formed after the ravages of the Second World War to provide a focus and direction for the international community of crystallographers. It was formally admitted to the International Council of Scientific Unions (ICSU) on 7 April 1947. Its First General Assembly and Congress were held at Harvard University from 28 July to 3 August 1948. Here the formal inauguration of the International Union of Crystallography took place, in the presence of some 350 crystallographers from eleven nations.

Aims of the IUCr

The aims of the International Union of Crystallography are:

1. Promote international cooperation in crystallography
2. Contribute to the advancement of crystallography in all its aspects, including related topics concerning the non-crystalline states
3. Facilitate international standardization of methods, of units, of nomenclature and of symbols used in crystallography
4. Form a focus for the relationship of crystallography to other sciences



P. P. Ewald

A Founding Father

Paul Peter Ewald (1888–1985) is credited, as a young man, with triggering the train of thought that led Max von Laue to undertake the diffraction experiments that began the science of X-ray crystallography. Already in 1944, while war was still raging, Ewald proposed an international union for crystallography, an idea (nurtured by Lawrence Bragg in 1946) that led, with international support, to the formation of the IUCr in 1947. Ewald was dismayed by the wartime closure of the main crystallography journal, *Zeitschrift für Kristallographie*, and was foremost in founding a new journal run by the Union: *Acta Crystallographica*, which became the leading journal in the field.

The premier Academic Prize in crystallography, awarded by the IUCr every three years since 1987, is named in his honour.

An International Union

The members of the Union are national Adhering Bodies, which can be National Academies or national crystallographic societies. The Delegates of Adhering Bodies meet at the General Assembly every three years to oversee the Union's activities and its efforts to achieve its Aims. There are currently about 40 national members.

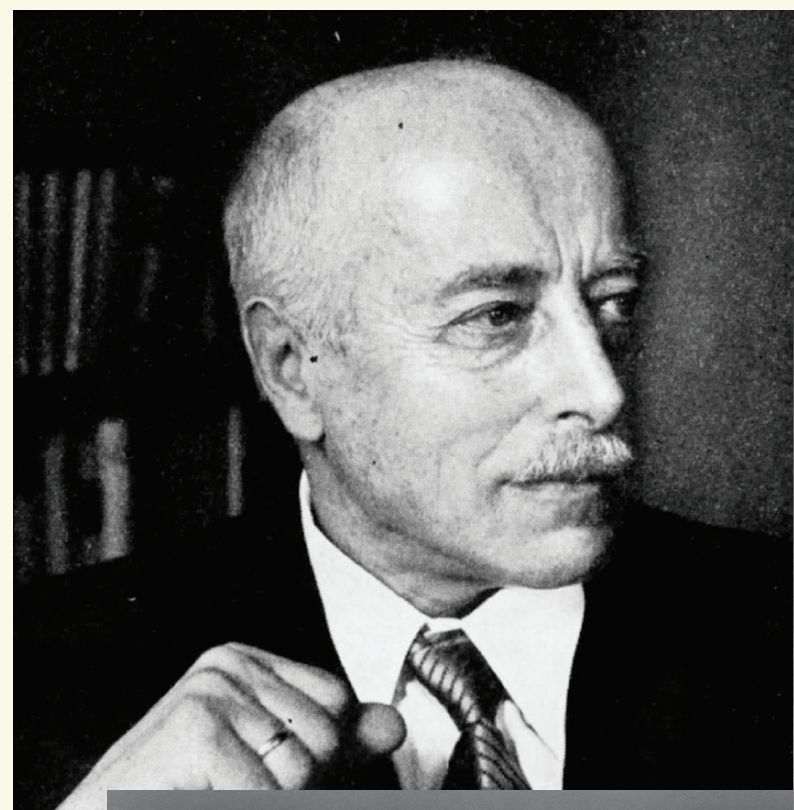
Regional Associates represent larger geographic areas, providing a focus for meetings and sharing of facilities on a continental scale. Currently there are three Regional Associates: ACA (American Crystallographic Association), AsCA (Asian Crystallographic Association) and ECA (European Crystallographic Association).

ECA meetings have been hosted in affiliate African countries (Morocco, South Africa), and the IUCr is energetically promoting a Crystallography in Africa programme to build capacity on the continent.

Building a science that endures

In 1912 and 1913, a remarkable series of experiments was carried out using the newly discovered X-rays to explore matter at the atomic scale. Max von Laue in Germany showed that X-rays could be scattered from the repeating regular units of atoms in a crystal, and information could be obtained about the size and shape of these units. In Australia, William Henry Bragg and his son, William Lawrence, refined the technique and demonstrated how the positions of individual atoms could be deduced from the pattern of the diffracted radiation. Laue and the Braggs won Nobel Prizes for their pioneering work (Lawrence Bragg at the exceptionally young age of 25 years).

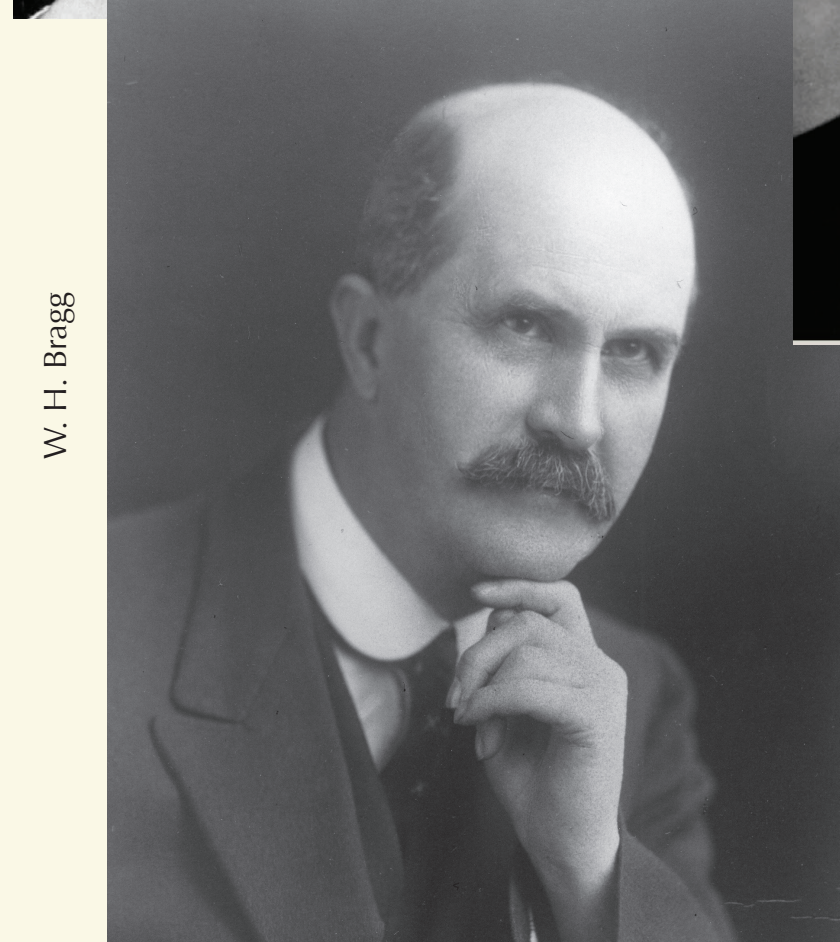
To mark the centenary of these experiments establishing the modern science of X-ray crystallography, the IUCr has declared the year 2014 to be the International Year of Crystallography, and will mark the anniversary with a broad range of educational activities.



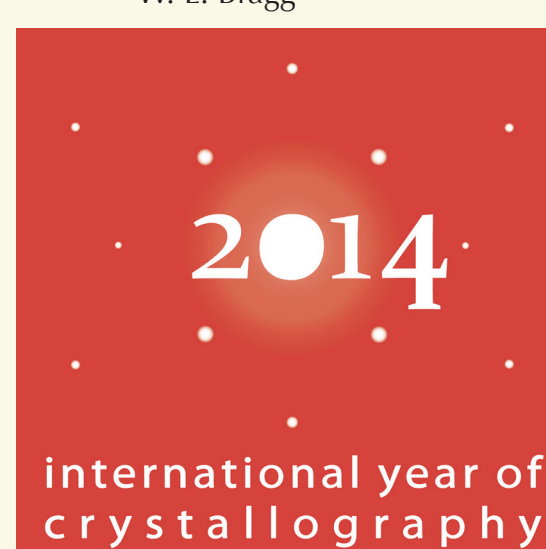
Max von Laue



W. L. Bragg



W. H. Bragg



Glittering prizes

Since the establishment of the Nobel Prize in 1901, numerous individuals working in crystallography and X-ray diffraction have been recognised for their achievements in physics, chemistry and medicine.

The IUCr web site lists 40 names, including physicists Röntgen (for the discovery of X-rays), Laue, the Braggs, de Broglie (the wave nature of the electron), Shull and Brockhouse (neutron diffraction); chemists Pauling (the nature of the chemical bond), Kendrew and Perutz (studies of globular proteins), Dorothy Hodgkin (structure of insulin), Klug (crystallographic electron microscopy), Curl, Kroto and Smalley (fullerenes); and in physiology and medicine, Crick and Watson for the double-helix structure of DNA.

More recently, the Chemistry prize has been won by V. Ramakrishnan, Thomas Steitz and Ada Yonath in 2009 for studies on the structure and function of the ribosome (pictured), Dan Shechtman in 2011 for the discovery of quasicrystals, and Robert Lefkowitz and Brian Kobilka in 2012 for studies of G-protein-coupled receptors.

Milestones in the history of the IUCr

1947: IUCr accepted into ICSU
 1948: First General Assembly of IUCr
 1948: *Acta Crystallographica* launched
 1952: *International Tables for X-ray Crystallography*
 1957: *World Directory of Crystallographers*
 1968: *Acta Crystallographica Sections A and B* launched
 1968: *Journal of Applied Crystallography* launched
 1983: *Acta Crystallographica Section C* launched
 1987: First Ewald Prize
 1991: Adoption of Crystallographic Information File (CIF)
 1992: First publication in IUCr/OUP Book Series
 1993: *Acta Crystallographica Section D* launched

1993: *IUCr Newsletter*
 1994: Web-based services launched
 1994: *Journal of Synchrotron Radiation* launched
 1999: Online access to electronic journals
 2001: *Acta Crystallographica Section E* launched
 2002: All back issues (to 1948) available online
 2005: *Acta Crystallographica Section F* launched
 2007: Online access to *International Tables*
 2008: First open-access journal
 2014: **International Year of Crystallography**
 2014: **IUCr** launched
 2014: All IUCr journals move to online-only publication

Promoting scientific advancement

The scientific activities of the Union are carried out through its 21 individual Commissions, which focus on individual fields such as crystal growth, inorganic and mineral structures, structural chemistry, powder diffraction, synchrotron radiation, neutron scattering, theoretical crystallography, aperiodic structures, nomenclature, teaching, and crystallography in art and cultural heritage. Many of the Commissions, responsible for experimental practice, link to large national and research infrastructures, including synchrotron facilities, neutron sources, supercomputing centres, structural genomics laboratories and curated structural databases.

A Learned Society Publisher

Uniquely among the Scientific Unions of ICSU, the IUCr publishes its own primary research journals. *Acta Crystallographica Sections A–F*, *IUCrJ*, *Journal of Applied Crystallography* and *Journal of Synchrotron Radiation* communicate the highest quality peer-reviewed research findings across the many scientific areas to which crystallography is relevant. The journals require deposition of supporting data sets for published crystal structures. These data sets are thoroughly assessed as part of the publication process. The IUCr has always seen the need for archiving data and literature together, to preserve the complete record of the science. It is currently exploring actively the possibility of archiving not only processed experimental data, but even the primary data collected at the experimental station.

The IUCr produces *International Tables for Crystallography*, a multi-volume encyclopaedic reference work that sets the standards for nomenclature, scientific descriptions of crystallographic symmetry, the essentials of fundamental theory, and experimental best practice.

The IUCr also publishes a highly respected series of textbooks and monographs.

Nurturing the next generation

Thanks to the income from its journal and book publishing activities, the IUCr is in a position to provide practical help to nurture the development of crystallography. It does this through sponsorship and support for schools and meetings, financial support for young scientists, and a Visiting Professorship programme that brings expertise to developing scientific communities. There is also a President's Fund available for *ex gratia* payments to alleviate hardship, and grants may be made for specific projects sponsored by Commissions.

With the help of a generous endowment from the family of Professor Ewald, founder of the Union, outstanding achievements within the crystallographic community are recognised by the award of the triennial Ewald Prize.

