

# Atlas of Optical Crystallography

Olaf Medenbach

Institut für Geologie, Mineralogie und Geophysik

Ruhr-Universität Bochum

44780 Bochum/Germany

[olaf.medenbach@rub.de](mailto:olaf.medenbach@rub.de)

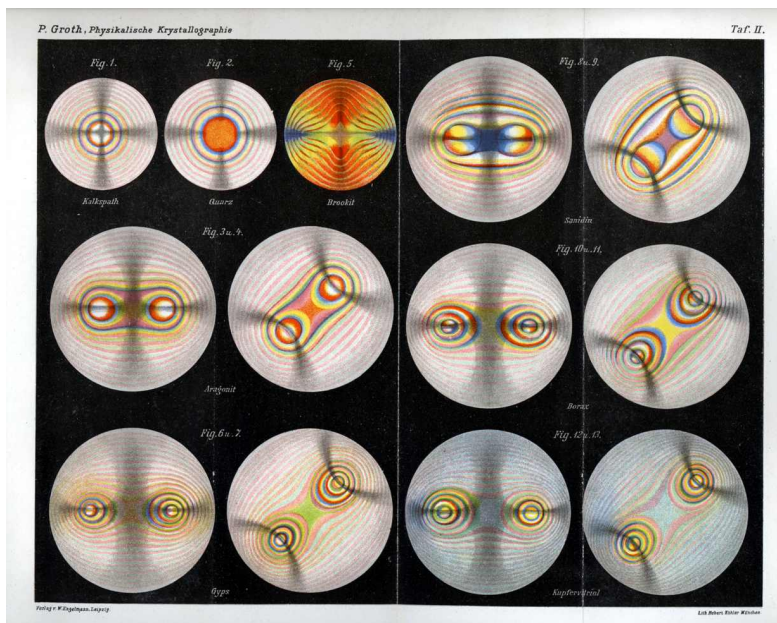
## General

This Atlas has been designed to illustrate and explain the colourful and artistic phenomena of optical crystallography which can hardly be covered within the curriculum because of lack of time and/or appropriate demonstration materials. It is a didactic and attractive addition to the textbooks of Optical Crystallography.

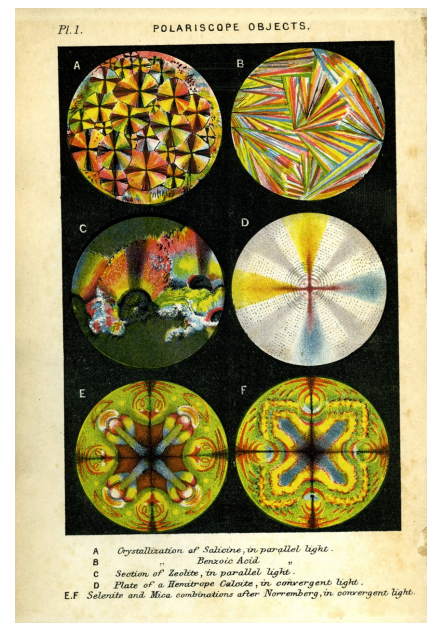
Powerpoint was chosen for the presentations because this program is widely distributed and straightforward to use for classroom presentations and for studies on your home computer.

The Atlas should be a living and growing source of information, and I will do my very best to increase the data and quality of the presentations. Any suggestions and hints would be very much appreciated.

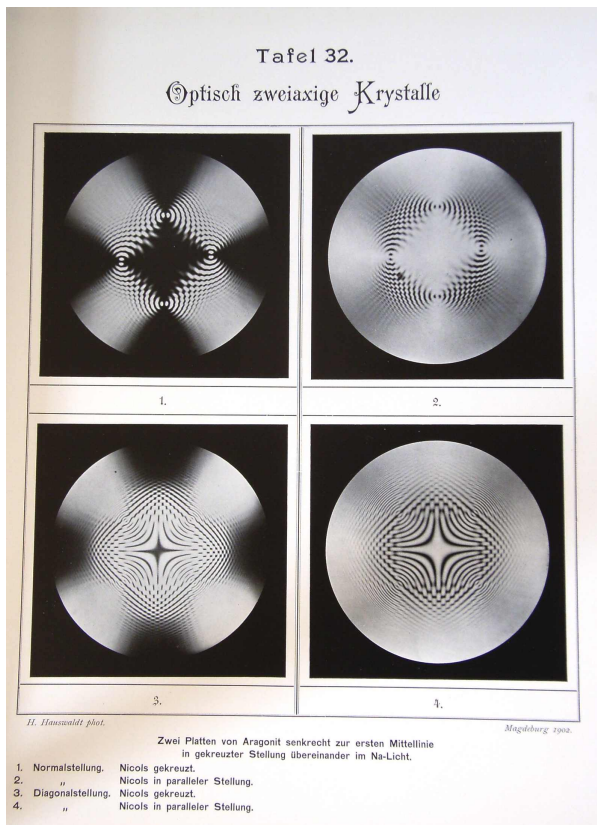
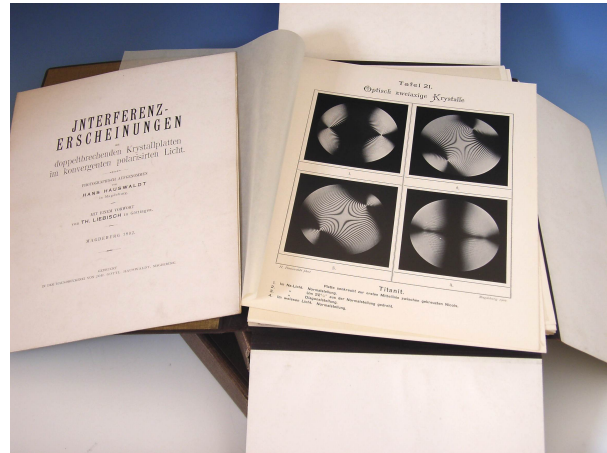
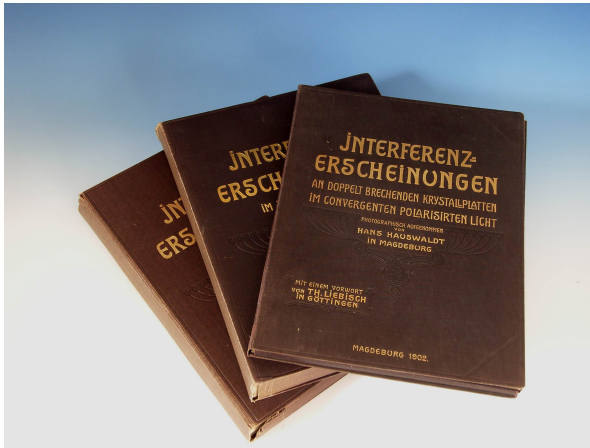
The idea of presenting interference phenomena in pictures is not new. Old textbooks such as Wright (1888) or Groth (1905) show beautifully executed hand painted interference figures.



Groth, P. (1905): *Physikalische Krystallographie*. Leipzig



Wright, L. (1882): *Light*. London



Hauswaldt, H. (1902, 1904 und 1907):  
Interferenzerscheinungen. Magdeburg

The most outstanding Atlas was published by Hans Hauswaldt in three large format volumes which appeared in 1902, 1904 and 1907. The Hauswaldt pictures, though only in B/W, are of an outstanding quality as they were taken with a large format camera, and mostly in monochromatic light, and a lot of textbooks up to the present day use these as illustrations. Modern technology and media however provide the ability to present full colour illustrations in excellent quality at almost no cost. Therefore the time is ripe for a refurbishment such as this "Atlas of Optical Crystallography".

May the beautiful appearances of interference phenomena shown here please the observer, and animate the student to search for a better understanding in this field of science.

Bochum/Germany, July 2007  
Olaf Medenbach

## Useful literature:

### Textbooks

- BLOSS, F.D.: An introduction to the methods of optical crystallography. Holt, Rinehart & Winston, New York, 1961
- BLOSS, F.D.: Optical Crystallography. MSA monograph series, Washington, D.C., 1999
- BURRI, C.: Das Polarisationsmikroskop. Basel 1950
- FLEISCHER, M., Wilcox, R.E. und MATZKO, J.J.: Microscopic determination of the nonopaque minerals. USGS Bulletin 1627, Washington, 1984
- HARTSHORNE, N.H. und STUART, A.: Crystals and the polarizing microscope. Handbook for chemists and others. London 1934
- MÜLLER, G. und RAITH, M.: Methoden der Dünnschliffmikroskopie. Clausthaler tektonische Hefte Bd. 14, 1976
- NESSE, W. D.: Introduction to Optical Mineralogy. Oxford University Press. New York, Oxford, 2004
- RINNE-BEREK: Anleitung zur allgemeinen und Polarisations-Mikroskopie der Festkörper im Durchlicht. 3.Aufl., E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 1973
- ROSENBUSCH, H. und WÜLFING, E.A.: Mikroskopische Physiographie der petrographisch wichtigen Mineralien, 2.Bd., Stuttgart, 1921/24
- TRÖGER: Optische Bestimmung der gesteinsbildenden Minerale. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 1971
- WAHLSTROM, E.E.: Optical crystallography. 5<sup>th</sup> Ed., John Wiley & Sons, New York, 1979
- WINCHELL, H.: Optical properties of minerals. Academic Press, New York and London, 1965

### Universal Stage and Spindle Stage Microscopy

- BEREK: Mikroskopische Mineralbestimmung mit Hilfe der Universaldrehtischmethode. Gebrüder Borntraeger, Berlin, 1924
- BLOSS, F.D.: The spindle stage, a turning point for optical crystallography. Am.Mineral. **63**, 433-447, 1978
- BLOSS, F.D.: The spindle stage. Principles and Practice. Cambridge University Press, Cambridge, 1981
- BLOSS, F.D.: Optical Crystallography. MSA monograph series, Washington, D.C., 1999
- BURRI, C.: Das Polarisationsmikroskop. Basel 1950
- BURRI, PARKER und WENK: Die optische Orientierung der Plagioklase. Birkhäuser Verlag, Basel, Stuttgart, 1967
- EMMONS: The Universal Stage. The Geological Society of America, 1959
- GROTH, P.v.: Elemente der physikalischen und chemischen Kristallographie. München und Berlin, 1921
- MEDENBACH, O. (1985): A new microrefractometer spindle-stage and its application. Fortschr. Miner. **63**, 111-133.
- NIKITIN: Die Fedorow-Methode. Gebrüder Borntraeger, Berlin, 1936
- REINHARD: Universal Drehtischmethoden. B.Wepf & Cie., Basel, 1931

- ROSENBUSCH, H. und WÜLFING, E.A.: Mikroskopische Physiographie der petrographisch wichtigen Mineralien, 2.Bd., Stuttgart, 1921/24
- SARANTSCHINA: Die Fedorow-Methode. VEB Deutscher Verlag der Wissenschaften, Berlin, 1963
- WALDMANN, H.: Glashohlkugel für Kristall- und Edelsteinuntersuchungen. Schweiz.Mineral.Petrogr.Mitt. **27**, H. 2, 1947

### Refractive Index Determination

- BERGER, P.J.: UT-Methoden, Erfahrungen mit dem LEITZ'schen U-Tisch-Refraktometer. Z.ang.Mineral. **IV**, H.2/3, S.240, 1942
- BLOSS, F.D.: The spindle stage. Principles and Practice. Cambridge University Press, Cambridge, 1981
- EMMONS, R.C.: The double variation of the refractive index determination. Am.Mineral. **14**, 414, 1926
- GROTH, P.v.: Elemente der physikalischen und chemischen Kristallographie. München und Berlin, 1921
- HURLBUT, C.S. jun.: The jewellers' refractometer as a mineralogical tool. Am.Mineral. **69**, 391-398, 1984
- JUDA, J. und MEDENBACH, K.: Untersuchung von Feinstäuben nach der I-Variationsmethode im Phasenkontrast. Z.wiss.Mikrosk., 1959
- LARSEN, E.S. und BERMAN, H.: The microscopic determination of the nonopaque minerals. US Geol.Surv.Bull. 848, 2. Aufl. (1934)
- MEDENBACH, O. (1985): A new microrefractometer spindle-stage and its application. Fortschr. Mineral. **63**, 111-133.
- RINNE-BEREK: Anleitung zur allgemeinen und Polarisations-Mikroskopie der Festkörper im Durchlicht. 3.Aufl., E. Schweitzerbart'sche Verlagsbuchhandlung, Stuttgart, 1973
- ROSENBUSCH, H. und WÜLFING, E.A.: Mikroskopische Physiographie der petrographisch wichtigen Mineralien, 2.Bd., Stuttgart, 1921/24
- SCHUMANN, H.: Spezielle Reflexionsmessungen an durchsichtigen Festkörpern. TMPM **10**, 73-96, 1965