

**MINERALS IN ROCK SECTIONS:  
THE PRACTICAL METHODS OF  
IDENTIFYING MINERALS IN ROCK  
SECTIONS WITH THE  
MICROSCOPE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649529056

Minerals in Rock Sections: The Practical Methods of Identifying Minerals in Rock Sections with the Microscope by Lea McIlvaine Luquer

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**LEA MCILVAINE LUQUER**

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IDENTIFYING MINERALS IN ROCK  
SECTIONS WITH  
THE MICROSCOPE**



# MINERALS IN ROCK SECTIONS

## THE PRACTICAL METHODS OF IDENTIFYING MINERALS IN ROCK SECTIONS WITH THE MICROSCOPE

### ERRATA AND ADDENDA.

P. 33, line 23, *for beat read* be at.

P. 66, line 10, *after* appearance *add* (sometimes called "twinkling").

Corrections for mean index of refraction  $n'$ : p. 60, line 1, 1.551 to 1.584; p. 62, line 29, 1.766; p. 66, line 3, 1.601; p. 67, line 24, 1.622; p. 71, line 10, 1.633 to 1.674.

Corrections for Indices of Refraction (mean) in Table on p. 142: Corundum 1.766; Tourmaline 1.674; Tourmaline (precious) 1.633; Dolomite 1.622; Scapolite (Meionite) 1.584; Scapolite (Marialite) 1.551; Calcite 1.601.

Corrections for mean indices of refraction in Scheme (insert folder): Scapolite 1.551 to 1.584; Calcite 1.601 and transfer to Dolomite rectangle; Dolomite 1.622; Corundum 1.766; Tourmaline 1.633 to 1.674.

### FOURTH REVISED EDITION

NEW YORK  
D. VAN NOSTRAND COMPANY  
1913

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THE NEW ERA PRINTING COMPANY  
LANCASTER, PA.

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PREFACE TO FOURTH REVISED EDITION, 1913.

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This edition is practically that of 1908, with necessary minor revisions and corrections, especially the data referring to indices of refraction and strength of double refraction. The values of the refractive indices  $\alpha$  and  $\gamma$  are recorded as well as the mean values. References are also given to "The Methods of Petrographic-Microscopic Research," by F. E. Wright, 1912, for exact (quantitative) methods of determining crystal constants.

LEA MCI. LUQUER.

DEPARTMENT OF MINERALOGY,  
COLUMBIA UNIVERSITY, NEW YORK, May, 1913.

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PREFACE TO THIRD REVISED EDITION, 1908.

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The 1908 edition is essentially the same as that of 1905; the only changes being in the nature of corrections, and the addition of a brief description of the Schröder van der Kolk method of determining refractive indices and also an abbreviated diagram for determining triclinic feldspars in sections showing both Carlsbad and Albite twinning. The Naumann symbols for crystal forms have also been omitted.

LEA MCI. LUQUER.

DEPARTMENT OF MINERALOGY,  
COLUMBIA UNIVERSITY, NEW YORK, April, 1908.

## PREFACE TO REVISED EDITION, 1905.

In preparing the revised edition, Chapters I. and IV. have been rewritten and enlarged and the part relating to the determination of the plagioclases has been greatly amplified. Many additions have also been made to Chapter III. and the Becke method, for the determination of the relative indices of refraction of minerals, has been given in detail.

Some new and useful tables have been introduced; as tables of refractive indices (mean) and double refraction (maximum). A diagram has also been added, showing the relation existing between strength of double refraction, interference colors and thickness of section.

Professor E. Weinschenk's admirable text-book, "Die Gesteinsbildenden Mineralien, Freiburg, 1901, has been specially referred to, and the tables of refractive indices and double refraction have been compiled from Weinschenk's new Tables.

Many new cuts have been added, among them being semi-ideal drawings, showing typical outlines of crystal sections, cleavage, optical orientation, etc. In describing the "Usual Appearance in Sections" of a mineral, it is of course only possible to mention the usual crystal form in which the mineral occurs in a rock. The crystal may be cut in any way by the plane of the section; but a general knowledge of the crystal forms will furnish an idea as to the outline, etc., that the mineral may show in the section.

LEA MCL. LUQUER.

DEPARTMENT OF MINERALOGY,  
COLUMBIA UNIVERSITY, NEW YORK, July, 1905.

## PREFACE TO FIRST EDITION, 1898.

The identification of minerals in rock sections with the microscope, including as it does a knowledge of optical mineralogy, is often difficult for beginners. This may be due to the fact that most of the publications on this subject are quite elaborate in their nature and in either French or German. While detailed descrip-



tions are very necessary, and, in fact, indispensable for advanced investigation, they are apt to prove cumbersome and confusing at first. For these reasons this text-book has been prepared by the writer, with a view of putting before the student only those facts which are absolutely necessary for the proper recognition and identification of the common minerals in rock sections. The foot-notes refer the student to standard publications, in which are given details of the methods and investigations outlined in the text. An elementary knowledge of crystallography and mineralogy is almost indispensable and is here assumed.

The microscopic and optical characters of the minerals are recorded in the usual order in which they would be observed with a petrographical microscope. Nearly all the rock-forming minerals become transparent in thin sections; but when opaque, attention is called to the fact and the characters are recorded as seen with incident light. White light is assumed to be used, unless otherwise stated. The interference colors recorded in all cases are those given by very thin sections of 0.03 mm. in thickness.

The order followed for the minerals is essentially that of Rosenbusch (based on the symmetry of the crystalline form), with a few exceptions made for convenience, such as placing pyrrhotite after pyrite and zoisite after epidote. The statements regarding the occurrences of minerals in the common rock-types have been taken mainly from *Les Minéraux des Roches*, by Lévy and Lacroix.

The terms axes and directions of elasticity, used throughout this book, are very commonly employed in petrographical literature of the present time. These axes and directions should probably more correctly be called axes and directions of vibration or extinction. The reasons for or against the elastic condition of the "ether" are of more interest, however, to the physicist than to the petrographer.

An optical scheme is appended, with the minerals grouped according to their common optical characters.

The writer's thanks are due to Dr. A. J. Moses, Professor of Mineralogy, and to Mr. J. F. Kemp, Professor of Geology, for kind suggestions offered during the preparation of this book.

LEA MCI. LUQUER.

DEPARTMENT OF MINERALOGY.

COLUMBIA UNIVERSITY, N. Y. CITY, October, 1898.

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With convergent light: *Uniaxial Interference Figures and Optical Character, Biaxial Interference Figures and Optical Character, Determination of Axial Angle, Distinctions between Orthorhombic, Monoclinic and Triclinic Sections.*

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