

International Series of Monographs
on Earth Sciences Volume 7

PRINCIPLES OF METEORITICS



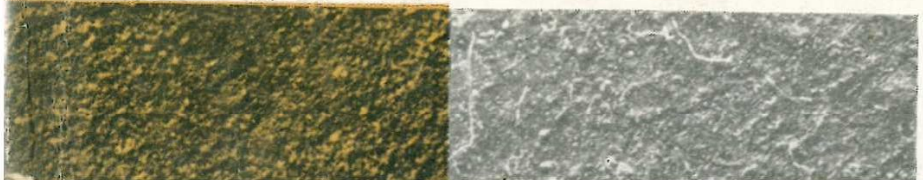
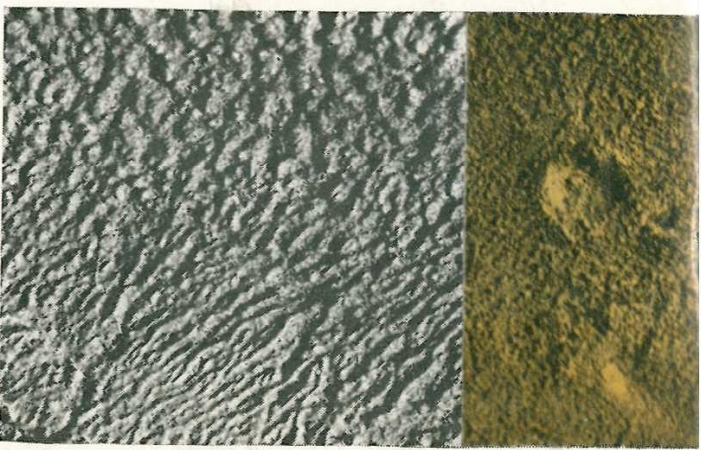
by **E. L. KRINOV**

Scientific Secretary of the Committee on Meteorites of the U.S.S.R. Academy of Sciences



**Pergamon
Press**

OXFORD LONDON NEW YORK PARIS



PUBLISHER'S NOTICE
TO REVIEWERS AND READERS

CONCERNING THE QUALITY OF PRODUCTION
AND PUBLISHED PRICE OF THIS WORK

We much regret that in the interest of speedily making available the information contained in this publication, it has been necessary to produce the text by non-letterpress setting and photo lithography, with the result that the quality of production is not as high as the public have come to associate with and expect from the Pergamon Press.

To have re-set this manuscript by letterpress would have delayed its appearance by many months and the price would have had to be increased further.

The cost of translating scientific and technical works from the Russian in time, money, and publishing effort is very considerable. In the interest of getting the Soviet Authorities eventually to pay the usual authors' royalties to Western authors, the Pergamon Press is voluntarily paying to Russian authors the usual authors' royalties on this publication, in addition to the translators' and editors' fees. This and the somewhat limited market and the lack of any kind of subsidy accounts for what may appear to be a higher than usual published price.

I. R. MAXWELL
Publisher at Pergamon Press

PRINCIPLES of METEORITICS

E.L.KRINOV

Translated from the Russian by

IRENE VIDZIUNAS

*Division of Geological Sciences,
California Institute of Technology*

Translation edited by

HARRISON BROWN

of the said Institute and Division

PERGAMON PRESS

OXFORD · LONDON · NEW YORK · PARIS

1960

CONTENTS

| | |
|--|------------|
| Editor's Note | (ix) |
| Preface | (xi) |
| CHAPTER I. METEORITICS AS A BRANCH OF SCIENCE | 1 |
| 1. Ancient Meteorites; Sources of Meteoritics | 1 |
| 2. The Origin and Growth of Meteoritics | 7 |
| 3. Progress of Soviet Meteoritics | 20 |
| 4. The Scope of Meteoritics | 28 |
| CHAPTER II. MOTION AND FALL OF METEORITES | 32 |
| 1. Meteoric Material in Interplanetary Space | 32 |
| 2. Orbits of Meteoric Bodies | 39 |
| 3. Main Features of the Atmosphere of the Earth | 53 |
| 4. Phenomena Accompanying Meteoritic Falls | 63 |
| 5. Motion of Meteoric Bodies in the Earth's Atmosphere. Atmospheric Trajectories | 71 |
| 6. Circumstances of Meteoritic Falls | 83 |
| 7. Falls of Crater-forming Meteorites. Meteoritic Craters | 102 |
| 8. The Tunguska and Sikhote-Alin Meteorites | 120 |
| 9. Dust Trails of Meteoric Bodies and Extra- Terrestrial Dust on the Earth | 154 |
| 10. Statistics of Meteorite Falls | 170 |
| 11. Rating and Classification of Meteorites. Meteorite Collections and Catalogues | 181 |
| CHAPTER III. MORPHOLOGY OF METEORITES. | 187 |
| 1. Morphology of Meteorites as a Method for Studying the Motion of Meteoric Bodies in the Earth's Atmosphere | 187 |
| 2. Subdivision of Meteorites According to Composition and Macrostructure | 193 |

CONTENTS

| | |
|---|------------|
| <u>CHAPTER III (contd.)</u> | |
| 3. Main Characteristics of Meteorites | 212 |
| 4. Dimensions of Meteorites | 220 |
| 5. Form of Meteorites | 228 |
| 6. Relief of Surfaces of Meteorites. Regmaglypts | 249 |
| 7. Fusion Crust of Meteorites. Phenomenon of Spattering | 264 |
| | |
| <u>CHAPTER IV. CHEMISTRY OF METEORITES</u> | 283 |
| 1. Chemical Composition of Meteorites | 283 |
| 2. Average Chemical Composition of Meteoric Matter | 297 |
| 3. The Isotopic Composition of Meteorites | 309 |
| 4. Gases, Radioactivity and Age of Meteorites | 314 |
| | |
| <u>CHAPTER V. MINERALOGY AND PETROGRAPHY OF METEORITES</u> | 324 |
| 1. Meteoritic Minerals | 324 |
| 2. Mineral Composition of Meteorites | 350 |
| 3. Structure of Meteorites | 360 |
| 4. Metamorphism of Meteorites | 390 |
| 5. Classification of Meteorites | 398 |
| | |
| <u>CHAPTER VI. PHYSICAL PROPERTIES OF METEORITES</u> | 414 |
| 1. Some of the Physical Characteristics of Meteorites | 414 |
| 2. Optical Properties of Meteorites | 418 |
| | |
| <u>CHAPTER VII. TEKTITES AND SILICA-GLASS</u> | 431 |
| 1. Occurrence and Appearance of Tektites | 431 |
| 2. Silicon Dioxide (Silica-Glass) from Meteoritic Craters | 434 |
| 3. Chemical Composition, Structure and Origin of Tektites and Silica-Glass | 436 |
| | |
| <u>CHAPTER VIII. THE ORIGIN OF METEORITES</u> | 443 |
| 1. Hypotheses as to the Origin of Meteorites | 443 |
| 2. Contemporary Views on the Origin of Meteorites | 446 |
| | |
| <u>APPENDICES</u> | |
| I. Catalogue of Meteorites of the U.S.S.R. on January 1 1959 | 454 |
| II. Meteorites of Rare Type | 481 |
| III. Classification of Surface Structure of Fusion Crust of Meteorites | facing 502 |

CONTENTS

| | |
|-------------------------------|-----|
| References | 503 |
| Index of Meteorites | 512 |
| Name Index | 519 |
| Subject Index | 522 |