

Cenozoic Volcanism in  
Southwestern New Mexico

*A Volume in Memory of*  
RODNEY C. RHODES  
1943-1975

*Editors*

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# CONTENTS

Foreword . . . . .	v
Memorial to Rodney Charles Rhodes . . . . .	1

## REGIONAL GEOLOGY OF THE MOGOLLON-DATIL VOLCANIC PROVINCE

Progress Report on the Mogollon Plateau volcanic field, southwestern New Mexico, No. 3—Surface expression of a pluton . . . . . <i>Wolfgang E. Elston, Rodney C. Rhodes, Peter J. Coney, and Edmond G. Deal</i>	3
Structure, volcanic stratigraphy, and gravity across the Mogollon Plateau, New Mexico . . . . . <i>Peter J. Coney</i>	29
Volcanic geology of the Mogollon Range and adjacent areas, Catron and Grant Counties, New Mexico . . . . . <i>Rodney C. Rhodes</i>	42
Volcano-tectonic structures in the San Mateo Mountains, Socorro County, New Mexico . . . . . <i>Edmond G. Deal and Rodney C. Rhodes</i>	51
Stratigraphy and structure of the northwestern part of the Mogollon Plateau volcanic province, Catron County, New Mexico . . . . . <i>Rodney C. Rhodes and Eugene I. Smith</i>	57
Tertiary extrusive sheets and related intrusions in the Black Range, New Mexico . . . . . <i>George E. Ericksen and Helmuth Wedow, Jr.</i>	63
Volcanic geology of the northern Black Range, New Mexico . . . . . <i>Ronald V. Fodor</i>	68
Structure and petrology of the John Kerr Peak dome complex, southwestern New Mexico . . . . . <i>Eugene I. Smith</i>	71
Geology and flow directions of volcanic rocks of the North Star Mesa quadrangle, Grant County, New Mexico . . . . . <i>M. J. Aldrich, Jr.</i>	79

## LATE CENOZOIC BASALTS

Major-element variations of late Cenozoic basalts of New Mexico . . . . . <i>Ken-Ichiro Aoki and Albert M. Kudo</i>	82
The Potrillo basalt field, south-central New Mexico . . . . . <i>Jerry M. Hoffer</i>	89

## TOPICAL PAPERS

Tectonic significance of mid-Tertiary volcanism in the Basin and Range province: A critical review with special reference to New Mexico . . . . . <i>Wolfgang E. Elston</i>	93
Petrologic framework of the Mogollon Plateau volcanic ring complex, New Mexico—Surface expression of a major batholith . . . . . <i>Rodney C. Rhodes</i>	103
Gravity survey of the Mogollon Plateau volcanic province, southwestern New Mexico . . . . . <i>Douglas H. Krohn</i>	113
Fission-track ages of Tertiary volcanic and plutonic rocks, Mogollon Plateau, southwestern New Mexico . . . . . <i>Eugene I. Smith, M. J. Aldrich, Jr., Edmond G. Deal, and Rodney C. Rhodes</i>	117
Paleomagnetic studies of volcanic rocks from the Mogollon Plateau area of Arizona and New Mexico . . . . . <i>D. W. Strangway, J. Simpson and D. York</i>	119
Control of mineralization by mid-Tertiary volcanic centers, southwestern New Mexico . . . . . <i>Wolfgang E. Elston, Rodney C. Rhodes, and Edward E. Erb</i>	125

## GLOSSARY

Glossary of stratigraphic terms of the Mogollon-Datil volcanic province, New Mexico . . . . .	<i>Wolfgang E. Elston</i>	131
REFERENCES CITED . . . . .		145

## CONTENTS OF SUPPLEMENTAL POCKET

Figure 2. Reconnaissance geologic map of part of the Mogollon-Datil volcanic province, New Mexico . . . . .	<i>Elston, Rhodes, Coney, and Deal</i>
Table 1. Stratigraphic correlation of mid-Tertiary volcanic rocks, Mogollon-Datil volcanic province, New Mexico . . . . .	<i>Elston, Rhodes, Coney, and Deal</i>
Figure 9. Preliminary tectonic map of the Mogollon-Datil volcanic province, New Mexico . . . . .	<i>Elston, Rhodes, Coney, and Deal</i>
Figure 1. Structure, volcanic stratigraphy, and gravity across the Mogollon Plateau, New Mexico . . . . .	<i>Coney</i>
Figure 3. Reconnaissance geologic map of the Mogollon Range and adjacent areas, New Mexico . . . . .	<i>Rhodes (a)</i>
Figure 2. Geologic map of the Tularosa Mountains and adjacent areas, New Mexico . . . . .	<i>Rhodes and Smith</i>
Figure 2. Geologic map of the northern Black Range, New Mexico . . . . .	<i>Fodor</i>
Figure 2. Geology and flow directions of volcanic rocks of the North Star Mesa quadrangle, Grant County, New Mexico . . . . .	<i>Aldrich</i>
Figure 1. Bouguer gravity map of the Mogollon Plateau, southwestern New Mexico . . . . .	<i>Krohn</i>
Figure 2. Residual gravity and geologic map of the Mogollon Plateau . . . . .	<i>Krohn</i>

## FOREWORD

This volume has been a long time in the making. The call for papers went out in late 1970 and papers were received in 1971 and 1972. Plans called for publication as University of New Mexico Publication in Geology No. 8. Tentative approval had been obtained before the call for papers was issued but by the time papers had been reviewed and edited, the great financial crunch of the 1970's had struck in academia. UNM Press has an established reputation and market in the humanities and social sciences but was uncertain about the physical sciences. In 1973 the plan for University of New Mexico Publication in Geology No. 8 had to be abandoned.

Efforts to find an alternative publisher were successful in May 1975, when the Executive Committee of the New Mexico Geological Society voted to sponsor this volume. Rodney Rhodes' tragic death had occurred just two months before and it was decided to dedicate the volume to his memory. The technicalities of preparing manuscripts for the printer became less overwhelming when Stuart A. Northrop agreed to accept coeditorship. To save printing costs, all bibliographies were combined into one at the end of the volume.

In the meantime, science had not stood still. All authors were given an opportunity to revise their manuscripts. In general, papers that describe particular areas had remained up to date. Papers that interpreted the data required extensive revision. Specifically, all papers of which I am author or coauthor were written or completely rewritten during 1975 and early 1976. All other papers are essentially as they were in 1973. One article that had been cited in the literature as being "in press" was withdrawn by the authors: Seager, W. R., and Clemons, R. E., "Volcanic chronology and structure of the Blue Creek basin region between Clifton, Arizona and Cliff, New Mexico."

In the years between 1970 and 1976 the growth of interest in Cenozoic volcanism in western North America has been astonishing. Volcanic rocks, once regarded as mere overburden by prospectors, have turned out to be a key in the understanding of plate motions, composition of the Earth's interior, the distribution of mineral deposits, and the evolution of planets. My views have certainly changed drastically since this volume was first

conceived, as the implications of plate tectonics and the Apollo program became apparent. It is hoped that this volume will fill some of the need for specific regional information.

This volume recounts some of the progress of the last few years but it also points to the gaps that remain. Information on trace-element and isotopic composition of Cenozoic volcanic rocks of southwestern New Mexico is scanty. Crustal structure is virtually unknown. The timing of events remains uncertain and controversial. Above all, large areas remain unmapped and many conclusions and correlations rest on shaky ground. The work is continuing and whatever we may say this year, next year we may know better.

I would like to thank all contributors for their patience. Apologies are due to those librarians and bibliographers who have tried in vain to track down premature references to University of New Mexico Publication in Geology No. 8. The work of most of the contributors from the University of New Mexico was supported by NASA grant NGL-32-004-011; additional support came from NASA grant NGR-32-004-062 from the NASA Planetology Office and from grants from the Research Allocations Committee, University of New Mexico. Without the unfailing patience of the coeditor, Stuart A. Northrop, this work would never have seen the light of day. He is responsible for all consistencies of style and format. I take responsibility for editor's footnotes.

Special thanks are due to my most inspiring co-workers and severest critics, the present and former graduate students of the Department of Geology, University of New Mexico. Many of them are authors or coauthors of papers in this volume. I am particularly grateful to Theodore J. Bornhorst and Edward E. Erb who spent many unpaid hours filling the void in our research group left by the untimely death of Rodney Rhodes. Finally, sincere thanks are due to my wife, Lorraine, for her patience and understanding during the many evenings and weekends in which this volume kept me away from the family circle.

WOLFGANG E. ELSTON



RODNEY CHARLES RHODES



# MEMORIAL TO RODNEY CHARLES RHODES

## 1943-1975

Rodney Charles Rhodes was born in Durban, Natal, South Africa, on September 16, 1943, and died as the result of a tragic highway accident in Illinois on March 29, 1975. His fiancée, Mary Minor, died in the same accident. They were on their way from Albuquerque to the home of Miss Minor's parents in Benton, Illinois, where they planned to be married in a few days. Rodney Rhodes is survived by his mother, Mrs. Winifred Speed of Durban.

The accident cut short a brilliant scientific career. Rodney Rhodes earned a first-class B.Sc. degree in geology at the University of Natal in 1963, followed by a first-class Honours B.Sc. degree in 1964, and an M.Sc. (cum laude) degree in 1966. After a brief period of employment in the mining industry in South Africa, he came to the University of New Mexico as a Ph.D. candidate in 1966, with a research assistantship in volcanology and astrogeology. His academic record was flawless and, after earning his Ph.D. in 1970, he became a post-doctoral Research Associate in the UNM Department of Geology. Early in 1972 he accepted a position with the Geological Survey of South Africa and was soon promoted to Senior Geologist. In late 1973 he returned to UNM as Senior Research Associate, with the intention of making the United States his permanent home. He had learned to love New Mexico and its people and had found in America the atmosphere of social, political, and academic freedom which allowed him to develop an independent way of living and to pursue the discoveries he had made in Africa and America.

In the short life that was given to him, Rodney Rhodes accomplished more than most of us do in long careers. He had a gift for going straight to the crux of scientific problems. For his doctoral dissertation he described the geology of the heart of the Gila Wilderness, one of the most beautiful and inaccessible areas in the United States. There he documented the Bursum cauldron, certainly one of the largest volcanoes on Earth. From this he developed a model that may be the key to one of the classic problems of geology, the connection between the large volcanic fields that we see in geologically young regions and the great plutons of older terranes.

Rodney Rhodes' work on the Bushveld Complex of South Africa went to the heart of another classic scientific controversy, one that had bewildered geologists and astronomers for a century—the roles of impact and volcanic processes in the origin of large craters on the Earth, Moon, and Mars. His interpretation of the Bushveld Complex as an impact-triggered igneous body may go far toward solving the problem. Recently, he made major contributions to a third fundamental problem, of worldwide scale. From the timing and chemical variations of ring-dike complexes and of basaltic rocks, such as the Karroo basalts and similar rocks of other parts of Gondwanaland, he deduced new information about absolute and relative plate motions.

Rodney Rhodes was a member of the Geological Society of South Africa, the Geological Society of America, and Sigma Xi. He won the Scott Medal of the Biological Society of South Africa in 1967 and a University of New Mexico Fellowship in 1968-69.

In all his work, Rodney Rhodes combined the physical stamina, serendipity, and inductive reasoning of the field geologist, the laboratory skills of the chemist, and the careful attention to significance of the statistician. To those who knew him, Rodney Rhodes was more than a valued co-worker. He was a free human spirit and a true friend.

WOLFGANG E. ELSTON

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