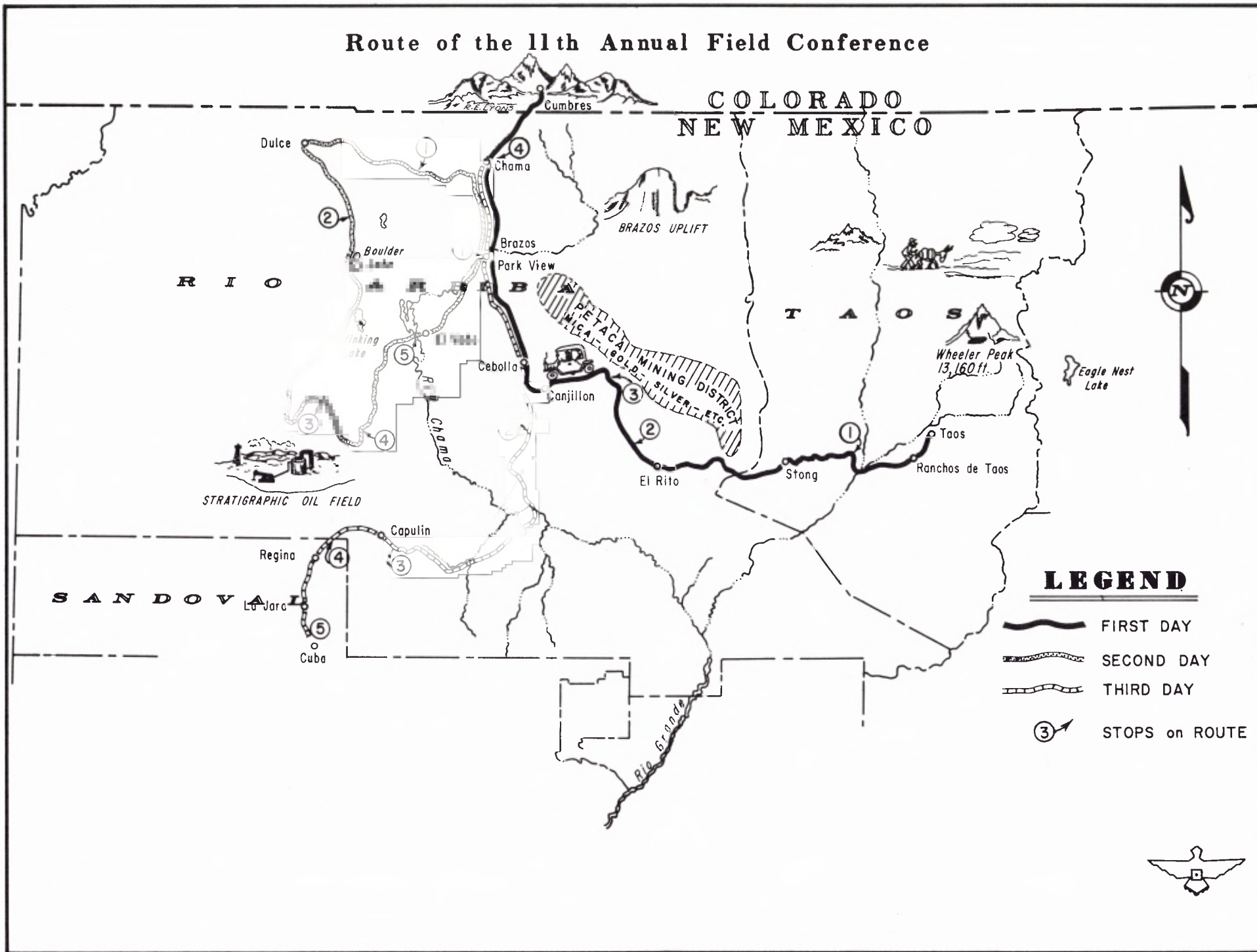
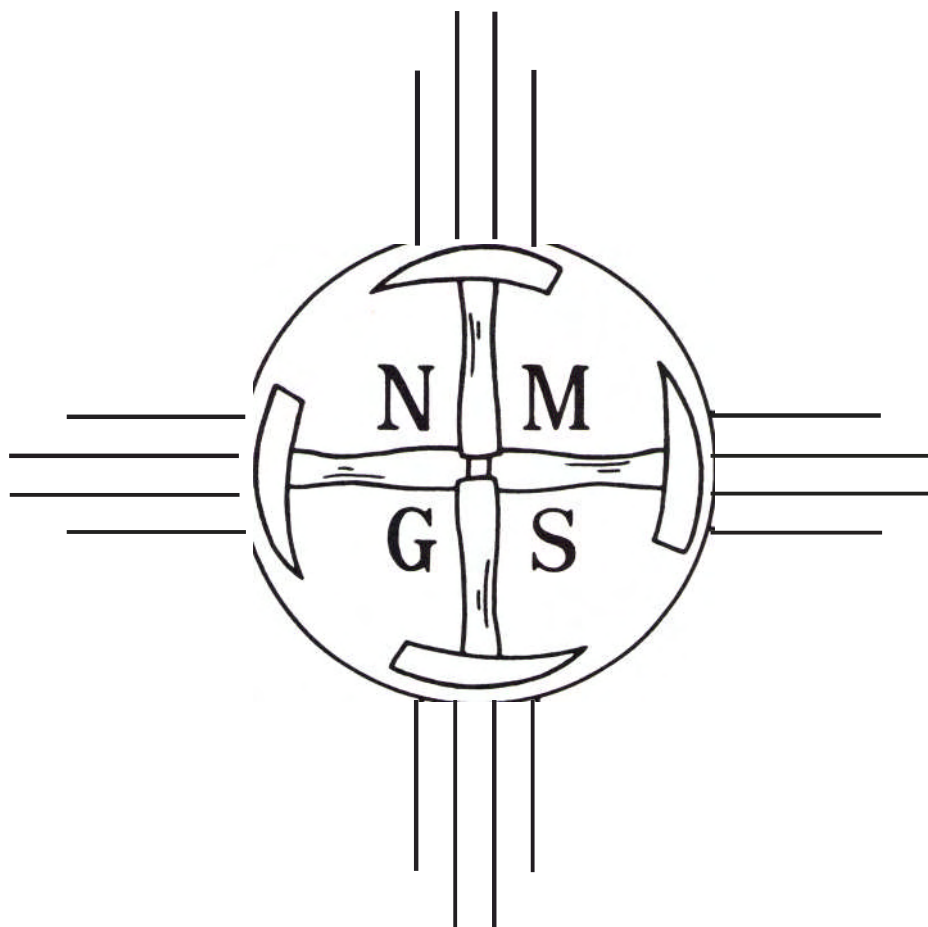


Route of the 11th Annual Field Conference



NEW MEXICO GEOLOGICAL SOCIETY



Guidebook
of
RIO CHAMA COUNTRY

Edited by

Edward C. Beaumont and Charles B. Read

ELEVENTH FIELD CONFERENCE

October 14, 15, and 16, 1960

GEOLOGIC PAPERS

Precambrian rocks of the Tusas Mountains, Rio Arriba County, New Mexico	William R. Muehlberger	45
The Vertebrate fauna of the New Mexico Permian	Alfred Sherwood Romer	48
Triassic rocks and fossils	Edwin H. Colbert	55
The Dakota sandstone and Mancos shale of the eastern side of San Juan Basin, New Mexico	Carle H. Dane	63
Late Cretaceous and Early Cenozoic in the San Juan Basin	George Gaylord Simpson	75
Geology of the southeastern part of the Chama basin	A. J. Budding, C. W. Pitrat, and C. T. Smith	78
Stratigraphy of the Chama quadrangle northern Rio Arriba County, New Mexico	William R. Muehlberger, Gordon E. Adams, Theodore E. Longgood, Jr., and Billy E. St. John	93
Structure of the central Chama platform, northern Rio Arriba County, New Mexico	William R. Muehlberger	103
Exploration for oil and gas in the Chama basin	Robert A. Bieberman	110

PAPERS OF GENERAL INTEREST

Early explorations of Rio Arriba County, New Mexico and adjacent parts of southern Colorado	Carle H. Dane	113
The Jicarilla Apache Indians of northern New Mexico	Sidney R. Ash	128

IN POCKET

Geologic map of the Rio Chama Country
by
Clay T. Smith and William R. Muehlberger

CONTENTS

President's Message	3
Acknowledgements	4
Executive and Field Conference Committee	5
List of Publication of the Society	7
Schedule for Field Conference	8
Foreword	9
Index Map and Conference Route	10

ROAD LOGS

Log for Friday, October 14 Taos to Chama	11
Log for Saturday, October 15 Chama to Parkview	25
Log for Sunday, October 16 Chama to Cuba	35
Alternate Log	43

ACKNOWLEDGMENT

The New Mexico Geological Society and the Conference Committee wish to express appreciation to those who have generously contributed their time and services in connection with the preparation of the Guidebook and the business of planning and running the field conference. Members of the geologic staffs of oil companies, educational institutions, and State and Federal Surveys alike have generously contributed time, and in some instances parts of vacation periods, in connection with the preparation of the Guidebook and the planning of the conference. Transportation for logging and other duties has also been most generously furnished.

The Committees and individuals responsible for the preparation of the Guidebook have drawn freely from both published sources of information and unpublished data that are the results of investigations by persons at the present time engaged in studies in the area of the field trip. In particular the Society wishes to acknowledge the original contributions by Professor Clay T. Smith and his colleagues at the New Mexico Institute of Mining and Technology, and Professor William R. Muehlberger and his associates at The University of Texas. To these principal contributors, as well as to others that are mentioned in the pages that follow, the New Mexico Geological Society is indebted.

In addition, the Society expresses its gratitude to those companies and individuals who have advertised and otherwise contributed to the financial success of the conference.

Frank E. Kottlowski, President,
New Mexico Geological Society

TO OUR SECOND DECADE . . .

. . . at its beginning, we welcome you on this Eleventh Field Conference of the New Mexico Geological Society. Those of you that think of New Mexico as a land of desert sands and blooming cacti will enjoy this pine-clad Chama region with its cool swift streams and snowcapped peaks; not to mention the oil wells and pegmatite deposits, for amid beauty we should be practical! The rocks range from as old as you wish to as young as they come; study of their features should benefit all diverse members of our profession.

This field conference will pass in a few days, but the reward for the many months of hard work by the field trip committee is contained in the pages of this guidebook, as it joins the other notable published contributions of our Society. We are grateful to those members and non-members who have given their time and knowledge — both more precious than money or materials — to prepare the road logs, lead the field trip, write the geologic articles, and make the maps. These are the guidebook, and they take their place as significant original additions to the geologic literature, with the reward of the authors being, in part, the attention of the readers. But just as important to the dissemination of geologic knowledge during the field trip are the unsung tasks — housing, registration, meals, advertising, and others. The reward? Perhaps a listing of the workers' names — and, for sure, an unkind comment if something goes wrong. Thanks and appreciation are owed to all who served, as well as those in authority who allowed use of company and equipment and time to support this conference.

As always, the bulk of the task falls upon the Field Conference Chairman and the Editors of the Guidebook, but, as always, this is a joint undertaking reflecting the best efforts of our membership. Each member, to adequately fulfill his personal responsibilities to the Society, to the geologic profession, and to himself, should contribute a share of the effort required by the projects sponsored by the Society.

As the only geologic society embracing all parts of the State — and any adjoining areas — and representing all of the various facets of the geological profession, we serve a need, if somewhat overlapping others' efforts, satisfied by no other professional group. In addition to this fall field conference, we plan a spring technical session in Roswell, the continuing of our grants for graduate students, and coordination with the other geological societies in and near New Mexico. This cooperation will provide judges and awards at the State Science Fair and its regional sessions, and may lead to a better planning of dates and places for field trips.

Tentatively we have aimed next year's field conference, in cooperation with our friends of the Arizona Geological Society, at the "Tonto Rim" country of east-central Arizona and westernmost central New Mexico. This conference would add another significant chapter to our regional geologic contributions.

Enjoy the cool mountain air, see the outcrops along the caravan's route, and use this guidebook as your main reference to the geology of the Rio Chama Country.

Frank Kottowski

President

EXECUTIVE COMMITTEE

Frank E. Kottlowski	President	New Mexico Bureau of Mines and Mineral Resources
Richard D. Holt	Vice-President	Humble Oil and Refining Company
Elmer H. Baltz, Jr.	Secretary	U. S. Geological Survey, Ground Water Branch
Roy H. Dubitzky	Treasurer	Standard Oil Company of Texas
Edward C. Beaumont	Past President	Consultant, Albuquerque

FIELD CONFERENCE COMMITTEES

Clay T. Smith	General Chairman	New Mexico Institute of Mining & Technology
---------------	------------------	---

Guidebook Committee

Edward C. Beaumont	Co-Editor	Consultant, Albuquerque
Charles B. Read	Co-Editor	U. S. Geological Survey, Fuels Branch

Reviewing Sub-Committee

James L. Albright	Pubco Petroleum Company
Frank J. Devlin	Sunray Mid-Continent Oil Company
Roy H. Dubitzky	Standard Oil Company of Texas
Chester M. Garrett	Sinclair Oil and Gas Company
John W. Henderson	Skelly Oil Company
James J. Iannucci	Sinclair Oil and Gas Company
Gerald N. Keller	Sunray Mid-Continent Oil Company
William R. Kendall	Skelley Oil Company
Charles F. Lamb	Standard Oil Company of Texas
Kenneth O. Nilsson	Sunray Mid-Continent Oil Company
F. H. "Steve" Stevens	Consultant, Albuquerque

Road Logging Committee

Roy H. Dubitzky	Chairman	Standard Oil Company of Texas
Sidney R. Ash		U. S. Geological Survey, Ground Water Branch
Elmer H. Baltz, Jr.		U. S. Geological Survey, Ground Water Branch
George M. Lamb		Standard Oil Company of Texas
William R. Muehlberger		The University of Texas
Frank L. Pritchett		Great Western Drilling Company
Clay T. Smith		New Mexico Institute of Mining & Technology

Housing Committee

G. C. "Butch" Brown	Chairman	Union Oil Company of California
Boyd Ripplinger		Union Oil Company of California

Registration Committee

William R. Speer	Chairman	El Paso Natural Gas Products Company
Ken E. Carter		Consultant, Durango
Curtis J. Little		Consultant, Albuquerque
Roy L. Pritchard		El Paso Natural Gas Company
David M. Thomas		El Paso Natural Gas Products Company

Catering Committee

Arnold D. Buzzalini Chairman Skelly Oil Company

Caravan Committee

Antonius J. Budding Chairman New Mexico Institute of Mining & Technology

Publicity and Advertising Committee

Afton A. Koenig Chairman Sinclair Oil and Gas Company

Finance Committee

Roy H. Dubitzky Chairman Standard Oil Company of Texas

Advisory Committee

Frank J. Adler	Phillips Petroleum Company
Edward C. Beaumont	Consultant, Albuquerque
Vincent C. Kelley	University of New Mexico
Frank E. Kottlowski	New Mexico Bureau of Mines and Mineral Resources
William R. Speer	El Paso Natural Gas Products Company

TRIP LEADERS

Roger Y. Anderson	University of New Mexico
Elmer H. Baltz, Jr.	U. S. Geological Survey, Ground Water Branch
Antonius J. Budding	New Mexico Institute of Mining & Technology
Carle H. Dane	U. S. Geological Survey, Fuels Branch
Vincent C. Kelley	University of New Mexico
William R. Muehlberger	The University of Texas
Stuart A. Northrop	University of New Mexico
Frank L. Pritchett	Great Western Drilling Company
Boyd C. Pruett	Lion Oil Company
Clay T. Smith	New Mexico Institute of Mining & Technology
Roy W. Turner	Intex Oil Company

**PUBLICATIONS
OF THE
NEW MEXICO GEOLOGICAL SOCIETY**

1. Guidebook of the San Juan Basin, New Mexico and Colorado; First Field Conference, 1950; edited by Vincent C. Kelley et al.; 153 pages, 40 illustrations. (out of print)
2. Guidebook of the south and west sides of the San Juan Basin, New Mexico and Arizona; Second Field Conference, 1951; edited by Clay T. Smith and Caswell Silver; 163 pages, 69 illustrations. (out of print)
3. Guidebook of the Rio Grande country, Central New Mexico; Third Field Conference, 1952; edited by Ross B. Johnson and Charles B. Read; 126 pages, 51 illustrations. (out of print)
4. Guidebook of southwestern New Mexico; Fourth Field Conference, 1953; edited by Frank E. Kottowski et al.; 165 pages, 67 illustrations. \$5.00
5. Guidebook of southeastern New Mexico; Fifth Field Conference, 1954; edited by T. F. Stipp; 213 pages, 83 illustrations. \$5.00
6. Guidebook of south-central New Mexico; Sixth Field Conference, 1955; edited by J. Paul Fitzsimmons; 193 pages, 70 illustrations. Prepared with the cooperation of the Roswell Geological Society. \$7.00
7. Guidebook of southeastern Sangre de Cristo Mountains, New Mexico (Raton Basin); Seventh Field Conference, 1956; edited by A. Rosenzweig; 154 pages, 61 illustrations. \$7.00
8. Guidebook of southwestern San Juan Mountains, Colorado (Four Corners Area); Eighth Field Conference, 1957; edited by Frank E. Kottowski; 258 pages, 109 illustrations. \$7.00
9. Guidebook of the Black Mesa Basin, Northeast Arizona; Ninth Field Conference, 1958. Edited by Roger Y. Anderson and John W. Harshbarger. 205 pages, 105 illustrations, hard binding. Prepared in cooperation with the Arizona Geological Society. \$8.50
10. Guidebook of west-central New Mexico; Tenth Field Conference, 1959. Edited by James E. Weir, Jr. and Elmer H. Baltz. 162 pages, 83 illustrations, hard binding. \$8.50

Available by mail (25¢ charge) from New Mexico Bureau of Mines and Mineral Resources, Socorro; and over the counter at the Bureau of Mines, or at the Geology Department, University of New Mexico, Albuquerque, New Mexico.

SCHEDULE

Thursday, October 13
4:00 - 10:00 p.m.

Registration, Sagebrush Inn, Taos, New Mexico.

Friday, October 14
7:30 a.m.

Caravan assembles at Kit Carson State Park, Taos.

Saturday, October 15
7:30 a.m.

Caravan assembles on south edge of Chama on N. M. 17 at junction with U.S. 84.

Sunday, October 16
7:30 a.m.

Caravan assembles immediately south of U. S. 84-N. M. 17 junction on south edge of Chama.

4:00 p.m.

Field conference ends near Cuba, New Mexico.

FOREWORD

The Eleventh Annual Field Conference of the New Mexico Geological Society will investigate the general geology of parts of three rather distinct structural provinces — the great Rio Grande structural trough, or complex graben, the southwestern prong of the Rocky Mountain System, and the marginal areas of the Colorado Plateaus.

The first day of the field conference deals principally with two of these provinces, namely, the Rio Grande trough and the Brazos uplift, which are a part of the Rocky Mountain System. The remainder of the trip will be in and adjacent to the Rio Chama country, most of which is situated in areas in or marginal to the Colorado Plateaus.

The town of Taos is on the margin of the Rio Grande trough. To the east are the rugged Sangre de Cristo Mountains, the segment adjacent to Taos sometimes being referred to as the Wheeler Range. To the west, and along the route of the conference during the first few hours of the trip, is the lava capped Taos Plateau within the Rio Grande trough. The Rio Grande has cut a deep gorge into Cenozoic rocks in this part of the trough and the numerous flows and associated sediments will be visible at the crossing of the Rio Grande near Taos Junction. West of the river the conference will cross a great lava plain and then will skirt the Tusas Mountains, which define the western margin of the Rio Grande structural trough and are a part of the southwestern lobe of the Rocky Mountains.

Rather late on the first day of the trip the caravan will descend into the area variously referred to in this Guide-book as the Chama platform and the Chama basin. The editorial staff prefers to be neutral — hence the name Rio Chama country.

The remainder of the trip, embracing the second and third days of the conference, will be in and adjacent to this country where rocks ranging in age from Precambrian to Cenozoic will be viewed closely or from a distance. The structure of the Rio Chama country, which is believed by some to be quite complex and by others to be relatively simple, should be a major topic of discussion at many of the stops. At other stops the main interests will be in the stratigraphic sequences and their lateral variations.

Although immediately adjacent to the San Juan Basin, one of the larger subdivisions of the Colorado Plateaus and one of the great petroleum provinces of the Southwest, the Chama River country has lagged behind in resources development. Although known for many years to contain some commercial pools, exploration until very recently has been fraught with disappointments. Apparently at least some of the keys to discovery have now been found, and it would appear that the Chama River country is coming into its own.

Physiographically the country is most picturesque. The massive and towering cliffs of the Brazos Box are one of the fine sights of the Southwest. Much of the region is high, rolling plateau country with elevations in excess of 7,000 feet.

The dominant culture of the Rio Chama country is colonial Spanish, with an overprint received from the timber companies during the last few decades. Spanish is still the prevalent language in the area. The most common construction remains adobe and many fine examples of adobe buildings in the Spanish colonial style will be seen.

The New Mexico Geological Society, and, in particular, the Eleventh Field Conference Committee, extend a hearty welcome to all and hope you enjoy and profit from the conference and will return to future conferences.

Edward C. Beaumont
Charles B. Read
Editors