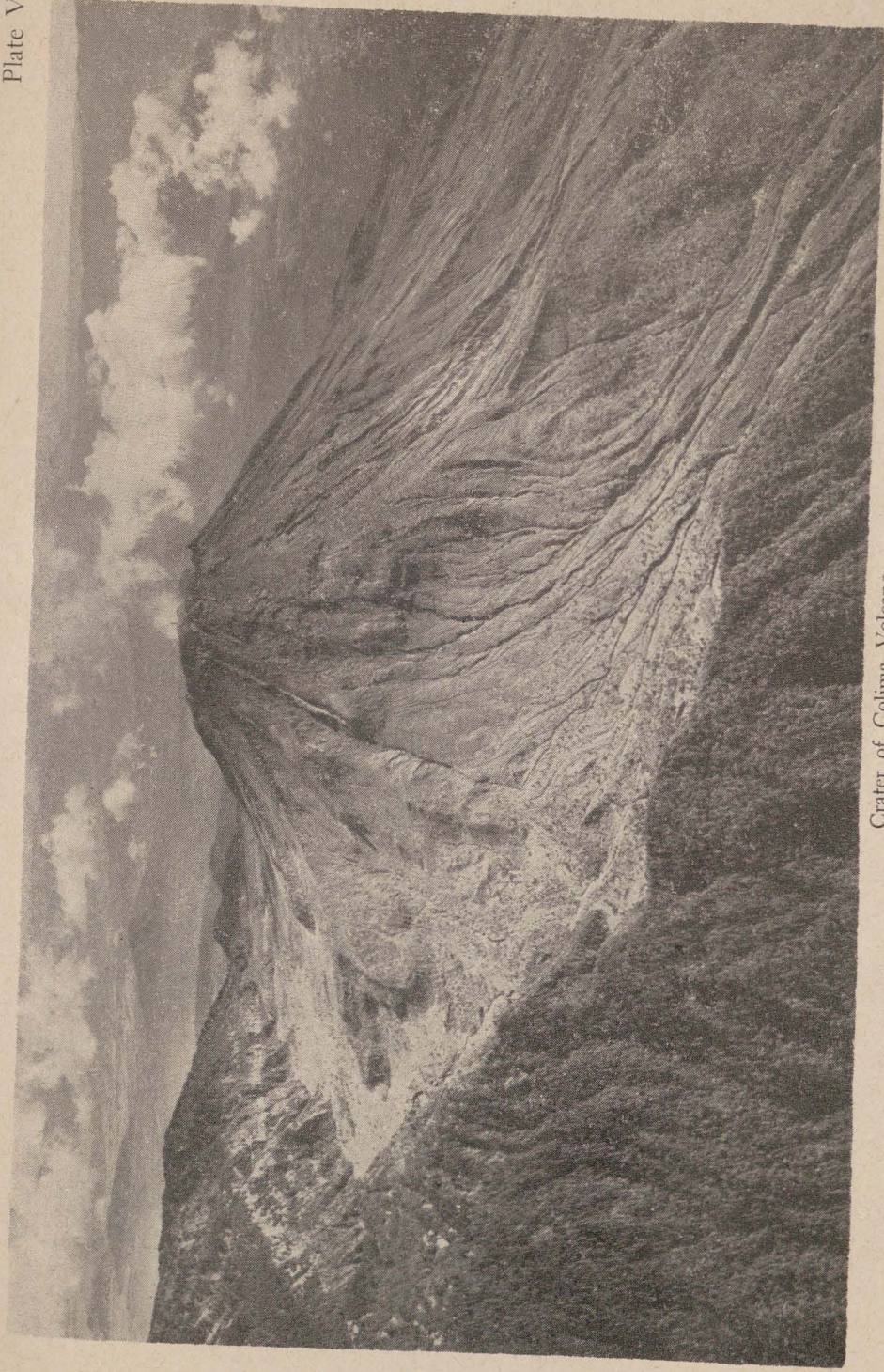


MEXICAN NATIONAL REPORT  
ON  
VOLCANOLOGY  
PRESENTED TO THE XIV<sup>th</sup> GENERAL ASSEMBLY  
OF THE INTERNATIONAL UNION  
OF GEODESY AND GEOPHYSICS

Zurich, Sept. 26 - Oct. 7. 1967

MEXICO, 1967



Crater of Colima Volcano.

## MEXICAN NATIONAL REPORT ON VOLCANOLOGY

XIV General Assembly of the I.U.G.G.

Zurich, Switzerland, Sept. 28 - Oct. 7, 1967

(Prepared by F. Mooser and M. Maldonado-Koerdell)

### I. ACTIVE VOLCANOES

During the period 1964-1966 only Colima volcano has shown signs of activity. While a slight column of steam has been rising steadily above the crater, the plug of viscous andesite has continued to surge, producing a tongue of black lava on the northern slope of the cone which nearly reached its base (see photo). During February, 1966, Prof. R. Stoiber, of Dartmouth College, accompanied by two students, climbed into the crater and made several attempts at sampling the numerous fumaroles and solfataras, all of which were of the low temperature type.

One of the students, S. Constantino, of the National Autonomous University of Mexico, wrote a thesis on the tectonic position of Colima volcano, describing also the state of the cone as of February, 1966.

Various ascents to this volcano were made by Prof. Félix Sobota, of Guadalajara, who has been a constant observer of its activity in the last ten years and has published several illustrated articles in local newspapers.

All other volcanoes on the Mexican mainland have been quiescent, although some have shown signs of a slightly increased fumarolic activity, such as Popocatepetl and Chichón. No significant news has reached us from Bárcena and Mt. Everman volcanoes, on the Revillagigedo Islands in the Pacific Ocean (Fig. 1) but an expedition was being organized from Guadalajara (with Prof. Sobota), while this report was prepared.

### II. TECTONOPHYSICS

The study of factors involved in the formation of the Trans-Mexican Volcanic Belt has received attention from one of the authors (F. Mooser, *in press*) during the last three years. At the beginning of 1967 two-thirds of this approximately 1000-Km long and 100-Km broad volcanic zone had been mapped by photo-geology at a scale of 1:50,000 in the offices of the Comisión Lerma-Chapala-Santiago of the Ministry of Hydraulic Resources. This new detailed survey has led to the discovery and precise location of volcanic cones in a far greater number than previously determined. At the same time,

water ratio of the wells varies from 1:5 to 1:8; their enthalpy extends from 450 to 650 BTU per pound.

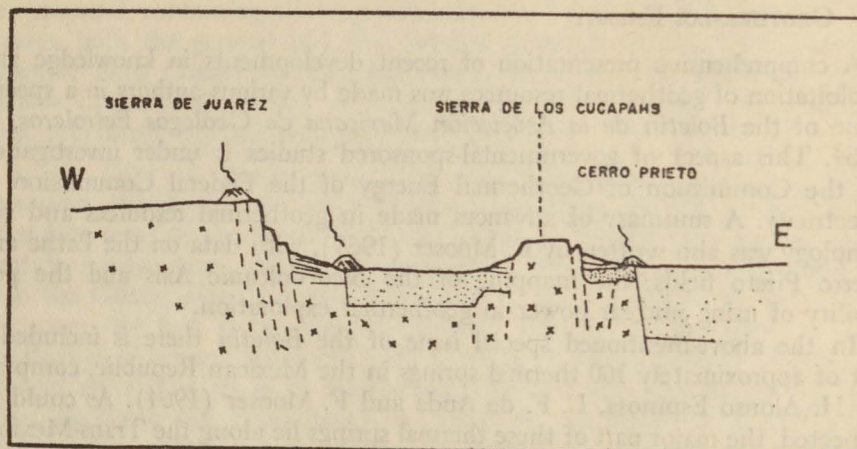


Fig. 5. Tectonic structure of Cerro Prieto field, Baja California, Mexico.

#### IV. PALEO-VOLCANOLOGY

A reconstruction of the volcanic cycles that formed the basin of Mexico City was attempted by F. Mooser (1963) in connection with the tectonic evolution of the Trans-Mexican Volcanic Belt. The process began in the Middle Tertiary, originating the northernmost broad fracture alignment followed principally by andesitic emissions of lava. Later, specially in the Pliocene, large andesitic volcanoes appeared in the central portion along perpendicular fractures, thus giving rise to the Sierra de las Cruces and the Sierra Nevada, which define the western and eastern borders of the basin. During late Tertiary and Quaternary, the third and southernmost alignment developed along east-west fractures, forming the basaltic Sierra del Chichinautzin and Iztaccihuatl as well as Popocatepetl volcanoes.

Another paper, discussing the general evolution of Tertiary and Quaternary volcanism of Mexico, was read by M. Maldonado-Koerdell (1965) at the Summer Meeting of the International Association of Volcanology in Rome. It deals with the geo-historical and paleogeographic data of Mexico during that geological "middle age" of apparent quiescence (in the sense of time-consuming processes on the surface) and phenomenal crustal and sub-crustal effervescence (violently manifested at times through fissure and explosive volcanics), with multiple and complicated fracturing and faulting,

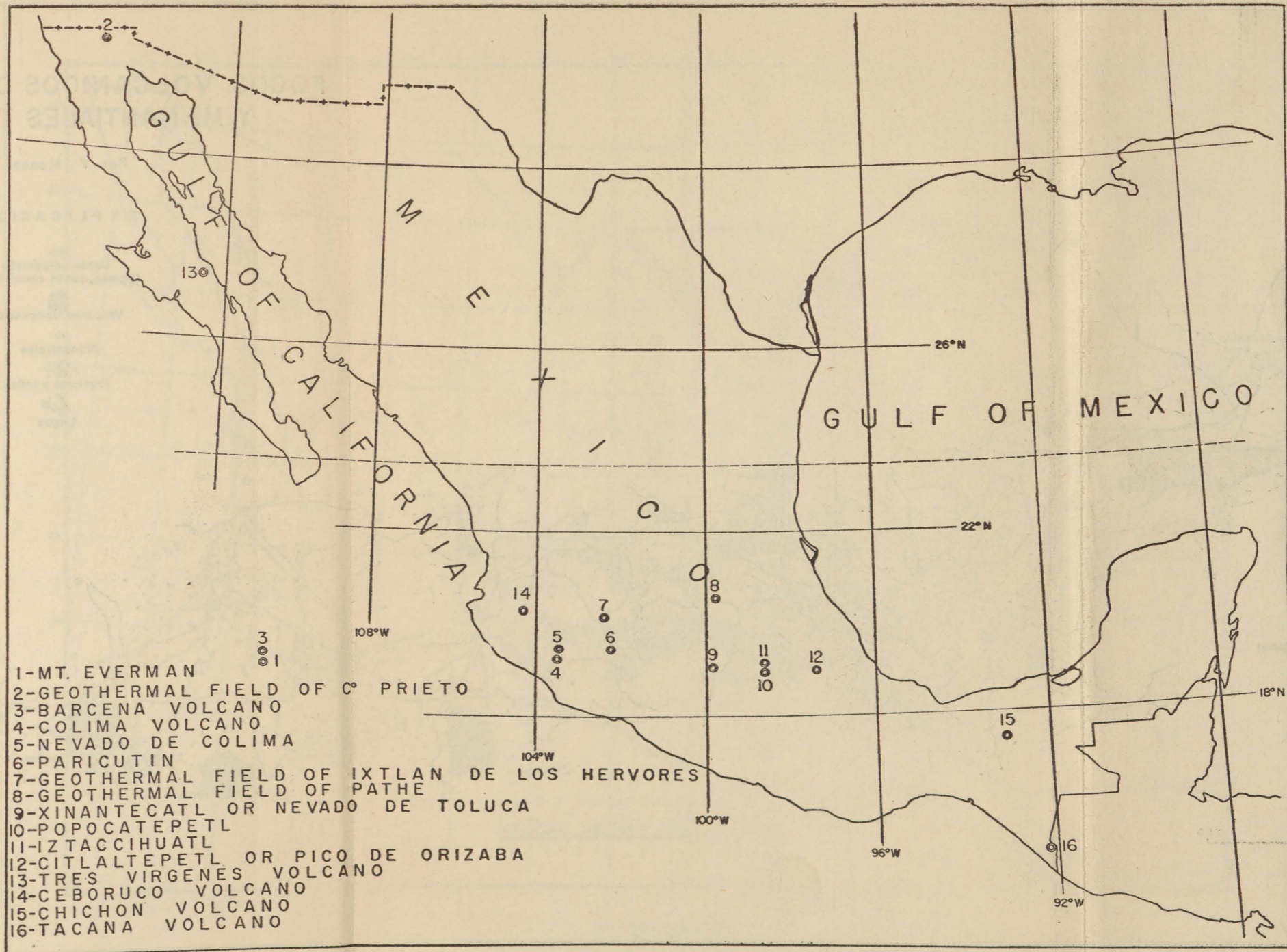


Fig. 1. Distribution of Mexican volcanoes.

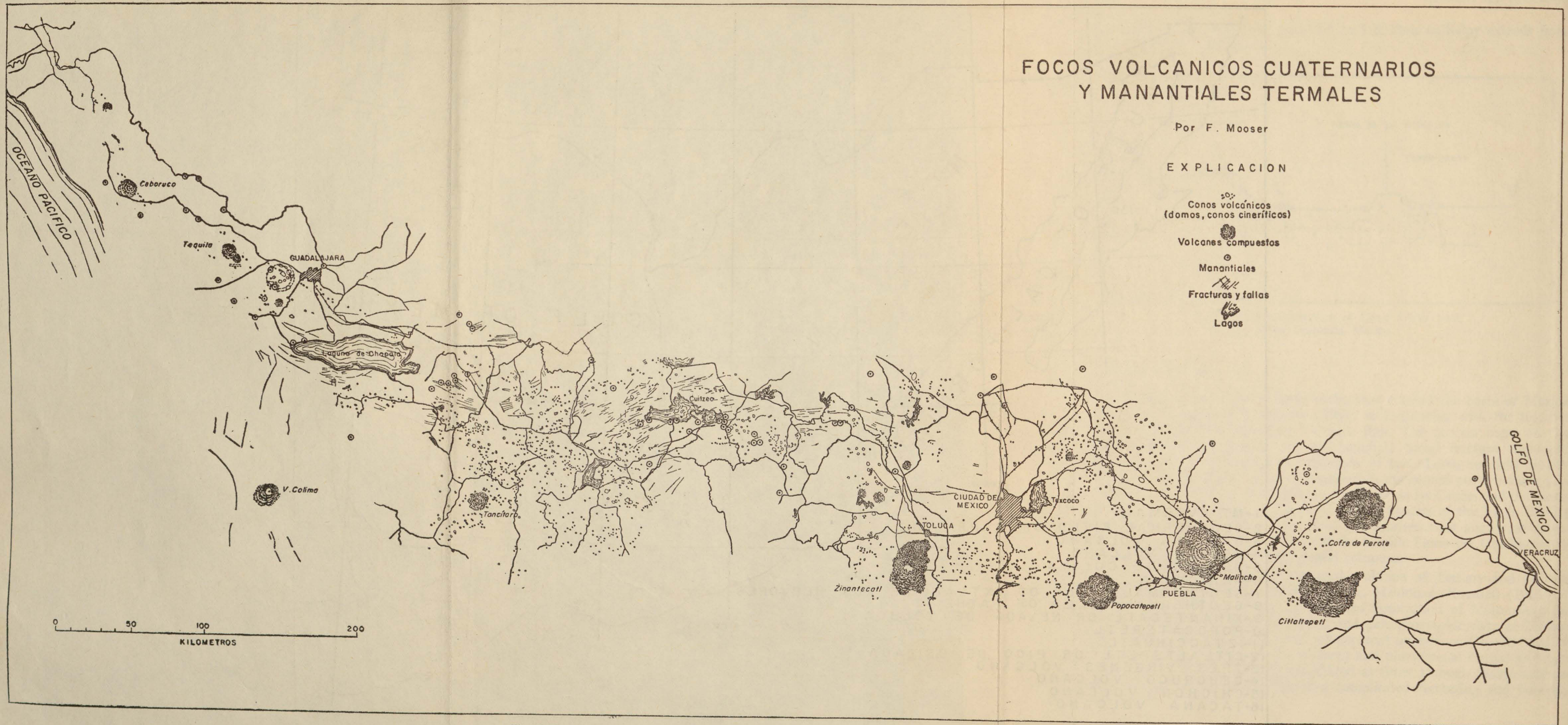


Fig. 2. Quaternary cones, thermal springs, faults and lakes in the Trans-Mexican Volcanic Belt.



Fig. 3. Trans-Mexican Volcanic Belt.

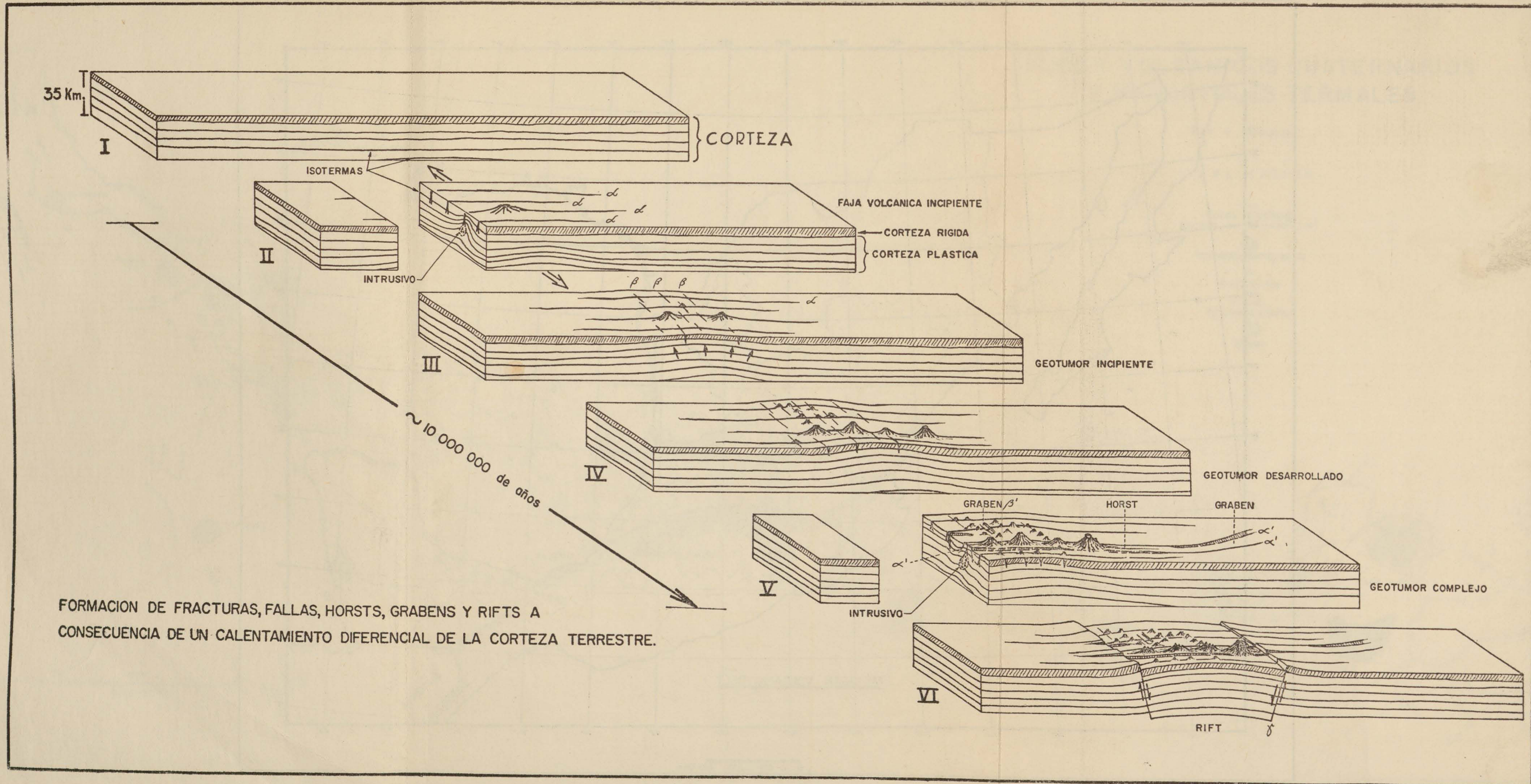


Fig. 4. Development of a volcanic belt.

and originating a peculiar pattern that has exercised a definite influence on volcanism in Mexico. At least, for the Quaternary, there were zones of weakness curiously enough aligned with the general trend of pre-Tertiary structural units that have been interpreted in the light of seismicity and volcanism as originated since then.

The western and southern areas of Mexico have been studied tectonically by Z. de Cserna (1965). A report on the portion of the highway between Chilpancingo and Acapulco, Gro., demonstrates the existence of a large geologic section ranging from the Paleozoic to the Quaternary with intrusive and eruptive rocks. This section may eventually be used for paleovolcanologic studies.

## V. GEOCHRONOLOGY

Three age determinations based on radio carbon have been made on samples gathered in the Valley of Mexico, in order to determine the age of Early Man. F. Mooser and I. Cornwall, the latter of London University, correlated various tefra horizons between the Valley of Mexico and the Valley of Puebla with the intention of establishing a relation between volcanic eruptions and early lithic cultures. At the present we know that human implements discovered by E. A. and J. M. Goodliffe (1967, in press) lie well below a pumice eruption of Popocatepetl at a site named Tlapacoyan in the Valley of Mexico. This eruption occurred according to the age determinations some 14,700 years ago (report in press).

## BIBLIOGRAPHY

- ALONSO ESPINOSA, H. & F. MOOSER. 1964. El Pozo M-3 del Campo Geotérmico del Cerro Prieto, B. C., México. *Boletín de la Asociación Mexicana de Geólogos Petroleros*, xvi (7-8): 163-177, 11 figs., 1 table.
- ALONSO ESPINOSA, H., L. F. DE ANDA & F. MOOSER. 1964. Focos Termales en la República Mexicana. *Boletín de la Asociación Mexicana de Geólogos Petroleros*, xvi (7-8): 145-152, 1 fig., 1table.
- CONSTANTINO, S. E. 1966. Geología de los Volcanes de Colima. Professional Thesis (Geology), School of Engineering, N.A.U.M., 1 illustr. vol.
- DE ANDA, L. F. & E. PAREDES. 1964. La Falla de San Jacinto y su Influencia sobre la Actividad Geotérmica en el Valle de Mexicali, B. C., México. *Boletín de la Asociación Mexicana de Geólogos Petroleros*, xvi (7-8): 179-181, 2 figs.

- DE CSERNA, Z. 1965. Reconocimiento Geológico en la Sierra Madre del Sur de México, entre Chilpancingo y Acapulco, Estado de Guerrero. *Boletín del Instituto de Geología* (Universidad Nacional Autónoma de México), N° 62, viii-76 pp., 11 figs., 12 pls., 1 map.
- GOODLIFFE, E. A. & J. M. GOODLIFFE. 1967. Excavations at the Cerro de Tlapacoya, Valley of Mexico, 1965-1966. *Boletín del Instituto Nacional de Antropología e Historia* (in press).
- MALDONADO-KOERDELL, M. 1965. Geohistoric and Paleogeographic Data and Evolution of Volcanism in Mexico. *Bulletin Volcanologique*, xxviii: 65-67.
- MOOSER, F. 1964. Provincias Geotérmicas de México. *Boletín de la Asociación Mexicana de Geólogos Petroleros*. xvi (7-8: 153-161, 3 figs.
- 1965. Progress Report on Recent Developments of Geothermal Energy and Volcanology in Mexico. *Bulletin Volcanologique*, xxviii: 69-73, 1 map.
- 1967. Development of a Theory on Crustal Thermal Heating and Volcanism. *Geofísica Internacional* (in press).