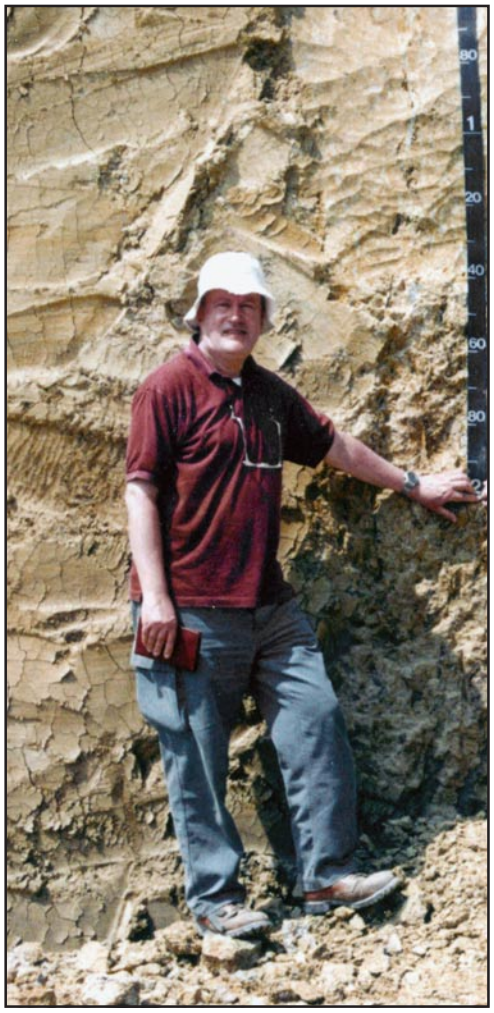
This volume is dedicated to

Professor Arnt Bronger

in recognition of his many years of research in paleopedology and his commitment to growth, continued activity, and collegiality of the Paleopedology Commission.



Special Issue

VI International Symposium and Field Workshop on Paleopedology

International Commission on Paleopedology, International Union of Quaternary Research (INQUA), International Union of Soil Sciences (IUSS)

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Preface

Sergey Sedov and Peter M. Jacobs
Guest editors

The first volume of *Revista Mexicana de Ciencias Geológicas* of 2004 contains the major part of the collection of papers presented at the VI International Symposium and Field Workshop on Paleopedology (ISFWP), held at the Colegio de Postgraduados, Montecillo, Mexico in October 2001. Paleosols –soils formed in the environments of the past– are increasingly attracting the interest of specialists in various branches of geosciences. Paleoecologists interpret various carriers of "soil memory" as an independent and site-specific record of the evolution of terrestrial ecosystems and past climatic change. Geologists utilize buried soils as convenient stratigraphic markers in various continental sedimentary sequences. Archaeologists are more and more aware of the possibilities that paleopedology can offer for reconstruction of environmental conditions of ancient cultures and for the evaluation of past human impact on landscapes. Pedology –the mother-science of paleopedology– has its own interests in ancient soils research. Paleopedology provides a unique opportunity to observe the results of "experiments in the natural setting" of soil formation over given time intervals, and under various sets of environmental conditions, some of which have no analogues at present. These data enrich our knowledge about trends, rates, characteristic times of pedogenic processes, and soil evolution.

This increasing interest in paleopedology brought together participants from different countries, representing different research fields to this regularly occurring symposium on paleopedology, organized by the International Paleopedology Commission of INQUA-IUSS. More than 40 participants from Mexico and abroad attended the VI ISFWP, the first event of this kind organized in Latin America. The presentations were grouped into four thematic sessions, and the organization of this volume follows the session topics. The volume opens with the invited paper of Prof. V. Targulian, which describes the theoretical basis of the concepts of "soil memory" and "soil record," including their origin, structure, and diversity.

Section one, *Paleosol-sedimentary sequences as a record of past environmental change,* contains the largest number of papers. Following the tendency of recent decades, loess-paleosol sequences continue as the most fashionable object of paleopedological research, being considered in four papers. Pustovoytov and Terhorst studied carbon isotope composition of neoformed carbonates in a loess-paleosol sequence in southern Germany, which they interpret as paleovegetation and paleoclimate proxies. Sequences of southern Europe: North Italy (Ferraro *et al.*) and Yugoslavia (Marković *et al.*) were investigated with the classic arsenal of physical,

chemical, mineralogical, and rock magnetic methods. This research allowed refinement of regional pedostratigraphic schemes and additional records of Pleistocene climatic change. Jacobs and Mason demonstrated that thick stratigraphic sections of Holocene Loess in the central Great Plains, USA, contain a regionally repeating sequence of buried soils and loess that provide evidence for climatic control of loess deposition or soil formation.

Floodplain paleosol-sedimentary sequences of the East European Plain provide a reliable record of the Holocene environmental change on millennial timescales both for the forest (Alexandrovskiy *et al.*) and dry steppe (Golyeva and Chichagova) regions. Tephra-paleosol sequences recently have proven to present a valuable source of information for late Quaternary paleoclimate reconstruction in Mesoamerica. Solleiro *et al.* present a new detailed pedostratigraphic scheme for the Nevado de Toluca sequence –the key site for late Pleistocene paleopedological studies in the Transmexican Volcanic Belt. Cumba and Imbellone studied paleopedological phenomena in a very complex loess-fluvial-marine-volcanic sequence in northeastern Argentina, interpreting it as a record of geological events and environmental change on the continental margin. Soil memory carriers are not restricted to the Quaternary. The contribution of Yakimenko *et al.* uses morphological, chemical and mineralogical characteristics of Late Permian paleosols to reconstruct vegetation and landscapes of this period in Eastern Europe.

Section two, *Magnetic properties of Quaternary and pre-Quaternary paleosols and sediments as paleoclimatic indicators* is represented by the paper of Ortega *et al.* Their paper investigates magnetic characteristics of a Mexican tephra-paleosol sequence, showing that behaviour of common rock magnetic parameters is different, and sometimes opposite, to that in loess-paleosol sequences. This finding indicates the necessity of developing specific approaches to interpretation of magnetic parameters as paleoclimate proxies in volcanic paleosols.

Soils that remain unburied on a land surface (or near the surface) characteristically have a complex history of pedogenesis because they commonly have experienced multiple episodes of environmental change. Section three, *Polygenetic models of pedogenesis in relation to Quaternary climatic change,* contains several case studies of geographically and environmentally diverse paleosols. Achyuthan considers the significance of ferricrete to trace the environmental and geomorphological history of a region in southeastern India. Costantini and Damiani interpret clay mineral assemblages as a genetic signal of soil formation and evolution in a sequence of Quaternary soils of varying stages of morphological development. Neoformed carbonates are known to be sensitive environment indicators in soils of arid and semiarid climates. Khokhlova and Kuznetsova undertook a detailed morphological study of calcitic pedofeatures in a sequence of Holocene Kastanozems from Southern Russia to trace evolution of the environment in which Iron-Age nomadic cultures developed. Poetsch performed a detailed micromorphological investigation of amorphous silica neoformation in central Mexican volcanic soils and paleosols –where this component is known to be responsible for cementation of subsoil horizons. Finally the paper of Iriondo and Kröhling, dealing with the Holocene soil cover of the Uruguay Basin, presents a perfect illustration of the principle of multiple responses of soil systems to a given climate, depending upon character of parent materials, a concept articulated in the introductory article by Targulian.

Note that papers organized around the theme of *Paleopedology and archaeology: Paleopedological evidences of ancient man-induced environmental changes* were previously published in a special section in volume 20, number 3 (2003) of this journal.

As guest editors, we wish to thank the reviewers of manuscripts who willingly gave their time and expertise to evaluate the scientific merits of each paper, and did so in a timely manner. Completion of this volume would not have been possible without their help and knowledge. Finally, we thank all the colleagues who provided their valuable voluntary technical support for preparation of this volume: Elizabeth Solleiro, Ana-María Rocha, Maricela Coronado, and Daniel Hernández.