In the recent decades (since the 1980s), discussions on the future of pedology—a branch of science encompassing investigations into the genesis, geography, cartography, and classification of soils and serving as a conceptual basis and an integrating component for a vast field of natural sciences—have been raised in world soil science several times. Sometimes, especially among foreign scientists, these discussions sound alarming: scientists argue that pedology suffers from a serious crisis. More often, well-balanced opinions based on some objective indices of the current state of the science are expressed. A number of questions that have to be answered arise in the course of these discussions. Why has the number of publications devoted to the geography and genesis of soils become smaller? Why has the range of university lecture courses on these subjects become reduced? Why are solid theoretical generalizations and works synthesizing the knowledge and opening new horizons in the field of pedology so rare?

The collective monograph under review—Soil Memory (edited by V.O. Targulian and S.V. Goryachkin)—is directly related to the latter question. Though it does not answer this question directly, it clarifies the kind of generalizations that are highly claimed by our science. This book demonstrates that pedology still has a powerful capacity for integrating virtually all the branches and directions of soil science and that the theory of pedology has great potential for further development.

The monograph consists of four parts and 23 chapters; its total volume is 688 pages. Nearly 40 authors contributed to it. This is a really fundamental work. After looking through the extensive contents, one may be surprised by the diversity of particular scientific subjects under the common umbrella of a definitely expressed concept. Indeed, this monograph encompasses virtually all the branches of modern soil science.

The first part of the monograph—Soil Memory: General Approaches to the Problem—consists of seven chapters devoted to the theoretical concepts of soil memory, the diversity of particular forms of soil memory and their information carriers, study methods, and the general structure of information recorded in soils and the soil cover. The specificity of soil records of changes in the environmental conditions is analyzed. The memory of particular genetic horizons and the memory of entire soil profiles are compared.

The second and the largest part of the monograph—Mineral Carriers of Soil Memory—consists of nine chapters. They give us a comprehensive picture of different mineral carriers of soil memory: particle-size fractions, clay minerals, iron-bearing minerals, concretions, illuviation coatings, soil pores, etc. They accumulate and store information about the pedogenetic processes and previous stages of soil development.

Biogenic carriers of soil memory are discussed in the third part of the monograph (three chapters). Microbiomorphs (phytoliths, pollen, spores, plant detritus, etc.), humic substances, and fungal communities are considered from the viewpoint of their capacity to record and store information about soil history.

The fourth part includes four chapters and is devoted to the memory of anthropogenically modified soils. New features appearing in soils under the impact of anthropogenic activities and the problem of the stability and reversibility of these features are discussed. Such features carry information about the character of the anthropogenic impact on soils in the past; i.e., they may also be considered an element of soil memory. In particular, soils of plowlands, hayfields, and forest cuttings and soils and cultural layers (habitation deposits) of ancient settlements are analyzed.

The authors of the monographs had to solve a number of theoretical problems crucial for the presented concept. Above all, it was necessary to identify the notion of soil memory and to discern it from the already known notions of pedogenic records, irreversible changes in soil properties, soil relicts, and paleopedogenic reconstructions. In other words, it was neces-
sary to demonstrate that soil memory can be considered a specific soil quality. Several definitions of soil memory are given in the book, and, in most cases, they cannot be reduced to the already known concepts. However, taken together, the latter leave little space for soil memory as a specific concept. The existing concepts superimpose on one another, and the difference between them is not always evident. It seems that the most promising way to discern soil memory as a specific soil quality is to enlarge its conceptual definition and include into it not only the relatively simple functions of storage and selection of information (recorded in soil properties) but also more complex functions of information sorting and information control of soil development. In this case, the notion of soil memory will become more discernable, and the functions of soil memory will be closer to the functions of memory in living organisms. Indeed, this is a serious challenge with respect to soil as a bio-abiogenic body differing in its functioning from living organisms. Nevertheless, it seems feasible to use the term soil memory in a broader context similar to that in biology. It should be noted that the authors and editors of the book realize the need for such an approach. They emphasize (p. 17): {The perception of soil memory as information about the results of pedogenic processes accumulated in soil bodies sets us thinking about the role of this information in the current and future functioning of soil systems, i.e., about the future behavior of soils. We deal with an analogous problem while trying to understand how the memory of a particular person and/or society affects the person/society's behavior at present and in the future.} It is probable that the practical realization of this idea will require the use of principally new methods of soil analyses combined with advances in other sciences, such as mathematical modeling, the theory of heredity, informatics, etc.

At least, the concepts and approaches of informatics are of indispensable value for the analysis of the essence and particular mechanisms of soil memory. This conclusion can be drawn from the theoretical analysis of information stored in the soil cover, which is given in one of the chapters. The notion about the information capacity of the soil cover is discussed in detail; the types and kinds of soil morphogenesis are considered from the viewpoint of information carriers at different levels of the spatial organization of soils (elementary soil particles, peds, horizons, genetic profiles, micro- and mesocombinations of soils, and the entire soilscape of particular geosystems). This approach is well substantiated in its general theoretical form. However, it will become better shaped and more comprehensive after being realized using particular examples illustrating how the morphogenetic information is recorded at different hierarchical levels of soils and soilscape and what mechanisms of information transfer and exchange operate at each of these levels.

The chapters devoted to soil records of environmental changes in the Holocene are based on solid empirical materials. It is shown that the information potential of autonomous soils of eluvial landscapes can be expanded considerably upon examination of the soil cover patterns rather than particular soils buried under various natural or technogenic sediments. Approaches to the evolutionary interpretation of the properties of hydromorphic soils (including buried soils) in geochemically subordinate (accumulative) landscapes are clearly outlined. It is shown that the soils of such landscapes possess a lithogenic memory about the history of the sedimentation. It can be supposed that the future progress in the analysis of soil memory within the entire geochemical catena (from autonomous eluvial landscapes to subordinate accumulative landscapes) will depend on our ability to analyze the whole set of data and establish correlations between soil records stored in eluvial, transitional, and accumulative landscapes.

In general, the factual materials and ideas outlined by specialists in different fields of soil science are harmonically aggregated into the monograph; taken together, they expand and clarify the notion of soil memory. We should pay due tribute to the editors of this book for their fruitful and successful work on linking different chapters into a single whole. Owing to their efforts and energy, we have a real monograph rather than a collection of papers.

From my point of view, the authors and editors managed to shape a holistic picture of soil memory. However, while reading the book, one feels that the links between the central idea of the book and the materials presented in separate chapters are not always explicitly defined. This should not be attributed to some drawbacks in the arrangement of the materials. In fact, this situation reflects the subjective picture, as the notion of soil memory is differently embedded into the particular fields of soil studies (mineralogical, biological, chemical, and physical). In some of the fields of soil science, the concept of soil memory has already been applied successfully in the past; the materials representing these investigations are harmonically built into the general structure of the book. For other fields of soil science, the idea of soil memory is a newcomer, and the book under review represents the first attempt to apply this idea in practical studies. This experience might be developed in the future and have a fruitful continuation. It may also be the first and the last attempt to integrate existing knowledge under the umbrella of the concept of soil memory. However, even in the latter case, this attempt is worthy of a positive estimate. Indeed, a negative theoretical result, as well as a negative experimental...