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## Preface for the First English Edition

Soils provide us with food, feed, fiber, and fuel. Furthermore, they support many different forms of life on Earth. This book aims to promote the understanding of soils, their development, their functions and their distribution, and enable closer contact with this important natural resource.

For most of the chapters, the first English edition of this soil science textbook represents a translation of the German 16th edition published in 2010, originating from the first edition in German in 1937. In keeping with the organization and contents that made the German editions bestsellers, the textbook covers all major aspects of soil science. However, the chapters on soil development and classification and soil geography were completely revised and adapted to international classification systems. A number of figures have also been redrawn and revised for the first English edition. This textbook aims to provide an up-to-date account of the current state of knowledge in soil science. This textbook is designed as a basic textbook for use in soil science courses and other courses that explore current developments in this field and is an invaluable resource for students in agriculture, forestry, ecology, and environmental sciences. It will also be very useful as a basic work that provides scientists and professionals with a profound introduction to specific topics as well as the most relevant literature. It will guide students through soil physical, chemical, and biological processes and introduce them to soil geography, soil classification, and threats to soil functions. This book represents a joint effort by German authors who have diverse complementary backgrounds in soil science and who developed this book over the past decades. The group of authors has worked closely together, creating a textbook that has continuity in depth and style and that is state of the art at the time of publishing. The authors wish to thank the publisher for their excellent cooperation. We hope that the present and future generations will use the knowledge in this book for a better understanding of soils. We welcome any comments from all those who use this text.

The authors acknowledge the eminent help by Jacinda Richman, Annett Büttner, and the publisher along the way to realizing this edition.

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The authors

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## Preface and Brief Historical Outline for the 16th Edition

**Scheffer/Schachtschabel** is renowned as the standard textbook on soil science both for students in the fields of agriculture, forestry, and natural sciences in German-speaking countries, and for scientists and users concerned with soils.

Written by the agricultural chemist Friedrich (Wilhelm) Scheffer, the first edition was published in 1937 under the title “Agrikulturchemie, Teil A: Boden” (Agricultural Chemistry, Part A: Soil). Its 112 pages contained an evaluation of soils according to their capacity for producing plants, whereby the focus was on the properties lending fertile soils their high productivity.

This first edition therefore only dealt with a portion of what was considered “soil science” at the time, since in “Teil B: Pflanzenernährung” (Part B: Plant Nutrition), Scheffer provided a detailed explanation of the air, heat, and nutrient balance of soils as the basis for plant production. The second edition of “Teil A: Boden” (Part A: Soil) (1944) included a more detailed description of humic substances as a product of microbial transformation of organic matter, clay minerals based on X-ray diffraction, and of the soil types including their genesis.

The third edition, published in 1952 and expanded to 240 pages, was called “Lehrbuch der Agrikulturchemie und Bodenkunde, 1. Teil Bodenkunde” (Agricultural Chemistry and Soil Science, Part 1 Soil Science). From now on, it was written by Fritz Scheffer in collaboration with Paul Schachtschabel (Fig. 1) and was revised at regular intervals of 4–6 years.

With the ninth edition (1976), the textbook was finally given its present name “Scheffer/Schachtschabel: Lehrbuch der Bodenkunde” (Scheffer/Schachtschabel: Textbook of Soil Science), which remained as a “trademark” for all later editions. From this time on, new information was compiled by a team of authors, which was expanded or developed according to the specialized requirements. In the last three decades, this was mainly ensured by the authors Blume, Brümmer, Hartge, Schachtschabel, and Schwertmann. A more extensive description of the evolution of “Scheffer/Schachtschabel” can be found in Blume et al. (2007).

With the continuously increasing number of pages in the last editions (the 15th edition comprised 593 pages), the contents of “Scheffer/



**Fig. 1** Prof. Dr. Dr. h.c. F. Scheffer (left) and Prof. Dr. Dr. h.c. P. Schachtschabel (right) at the International Soil Science Conference in 1960 in Madison, USA

Schachtschabel” had also become differentiated to such an extent that a new concept became necessary for the 16th edition. This involved focusing on the condensation of the knowledge to the essentials, to do better justice to the textbook character, and still maintain the integrity of the respective subject matter. The contents of the 16th edition represent the basis for this English translation.

In the 16th edition, Chap. 4 “Soil Organisms and Their Habitat” was completely revised by Prof. Dr. E. Kandeler, and Chap. 5 “Chemical Properties and Processes” by Prof. Dr. R. Kretschmar, while all of the other chapters were updated by including the current state of research. Chapter 6 presents more recent insights into soil structural development, soil mechanics, and the water balance, and the section on soil color was also revised. Parts of Chap. 7 were rewritten for the English edition. The names for the soil horizons (Sect. 7.3) and the soil classifications (Sect. 7.4) were mainly presented according to the World Reference Base for Soil Resources (WRB) and the US Soil Taxonomy, and the chapter on German classification was reduced. Section 7.5 now discusses the properties, genesis, ecology, and use of all significant soils on Earth, primarily according to the WRB. Similar to the WRB and the US Soil Taxonomy, the Reductosols were also treated as oxygen-poor soils without water surplus and were supplemented with the

Asphaltic Reductosols. New additions included soils characterized by a yermic horizon in continental hot and cold deserts. The same applies for Zoosols, i.e., soils with profound conditioning by animals (in addition to earthworms and steppe mammals in Chernozems, also termites in subtropical regions and penguins in Antarctica). Section 7.6 is now dedicated to Paleosols on Earth, Mars, and Titan. More than thirty representative soil profiles are shown on three color pages, as well as a deep colored soil section on the planet Mars compared to a soil from India.

Chapter 8 Soil Geography was restructured accordingly, while Chap. 9 Soils–Plant Relations was completely restructured and expanded with the physical properties of soils (Sects. 9.1–9.4). The sections on nutrient supply (9.5) and on plant macronutrients (9.6) were also largely rewritten; Sects. 9.7 (micronutrients) and 9.8 (beneficial elements) were revised. Chapter 10 deals with the threat to soil functions by chemical and nonchemical degradation, possible remediation measures, and methods for the assessment of chemical soil contaminations. The significance of soil protection is discussed in detail in Chap. 11, including the fundamental laws and chemical issues involved in soil protection.

Methodical details are not discussed in any of the chapters, since there are enough other textbooks and practical manuals for this purpose; furthermore, the literature was reduced, since modern specialized literature today is easily accessible to those interested in soil science.

The chapters were divided among the authors as follows:

1. Brümmer † (Blume, Stahr)
2. Stahr
3. Kögel-Knabner
4. Kandeler
5. Kretzschmar
6. Horn
7. Blume, Fleige
8. Stahr
9. Brümmer † (Amelung, Horn)
10. Wilke (Horn, Thiele-Bruhn, Welp)
11. Stahr

Numerous staff members and colleagues have contributed in many ways to the production of the 16th German edition; without their collaboration, the completion of the German textbook as a basis for the English translation in the present form would not have been possible. We would like to thank you all sincerely. In particular, we would like to mention Prof. Dr. J. Bachmann, Dr. R. Baritz, Dr. Iso Christl, Prof. Dr. W. Foissner, Prof. T. Friedel, Dr. T. Gaiser, Dr. J. Gauer, Dr. S. Haase, B. Heilbronner, Dr. A. Kölbl, Prof. Dr. B. Ludwig, Dr. M. von Lützow, Dr. S. Marhan, Dr. W. Markgraf, Dr. S. Peth, Dr. L. Philippot, Dr. C. Poll, Prof. Dr. L. Ruess, Dr. D. Stasch, Prof. Dr. R. Tippkötter, Dr. A. Voegelin, Dr. J. Wiederhold, and Dr. M. Zarei.

We thank the lector Dr. J. Lorenzen-Peth for didactical correction and critical review, and the publisher, particularly Dr. C. Iven, for his trustworthy and patient collaboration.

Not only are soil scientists interested in soils, but also farmers, foresters, gardeners, landscapers and landscape planners, ecologists, crop technicians, hydrologists, geographers, geologists, mineralogists, chemists, biologists, and archeologists. This is equally true for all those who deal with problems associated with nature conservation, environmental protection, and legislation, as well as with soil remediation in the political, administrative, standardization, and business sectors. In all of these sectors, Scheffer/Schachtschabel has become an indispensable source of information on soils. This is particularly true for students and for the next generation of scientists. May the new edition find like-minded readers and serve them as a useful companion. We also hope that the translation of the German version will spread the knowledge contained in Scheffer/Schachtschabel around the world, and contribute to a better and more comprehensive understanding of the processes taking place in soils as a vulnerable and especially nonrenewable resource.

The book cover shows a Podzol, an Albeluvisol/Retisol, and a Fluvic Gleysol.

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The authors

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